GroundSolve Ltd
Consulting Geotechnical Engineers

REMEDIATION STRATEGY FOR PHASE 1 DEVELOPMENT AREA- RUABON, WREXHAM

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Prepared for:

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GroundSolve Ltd

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This report has been prepared by GroundSolve Ltd with all reasonable care and diligence, within the best practice and guidance current at the time of issue within the proposed redline boundary and proposed Site end use as presented by the Client.

This report is confidential to the Client and GroundSolve Ltd accepts no responsibility whatsoever to third parties to whom this report is presented.

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1 INTRODUCTION

GroundSolve Ltd was commissioned by Pure-Homes to undertake a Remediation Strategy and Verification Plan for the Phase 1 development at Ruabon, North Wales (the "Site").

This report has been devised to generally comply with the relevant principles and requirements of a range of guidance including:

- Welsh Local Government Assoc- Development of Land Affected By Contamination Guide for Developers 2017
- Flintshire County Council, The Development of Land Affected by Contamination. Reports to support planning applications, Oct 2017
- Part IIA of the Environment Protection Act, 1990
- BS5930:2015: "Code of practice for site investigations"
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites - Code of Practice"
- The Building Regulations 2010. Part C (HM Government 2013)

1.1 Proposed Development

Current plans are for the construction of 132 No. residential properties, with associated roadways, hardstanding, soft landscaping and areas of public open space within the Phase 1 development area. The buildings are expected to be two-storey conventional brick and block construction. An extract from the proposed development plan is shown in Figure 1 below:

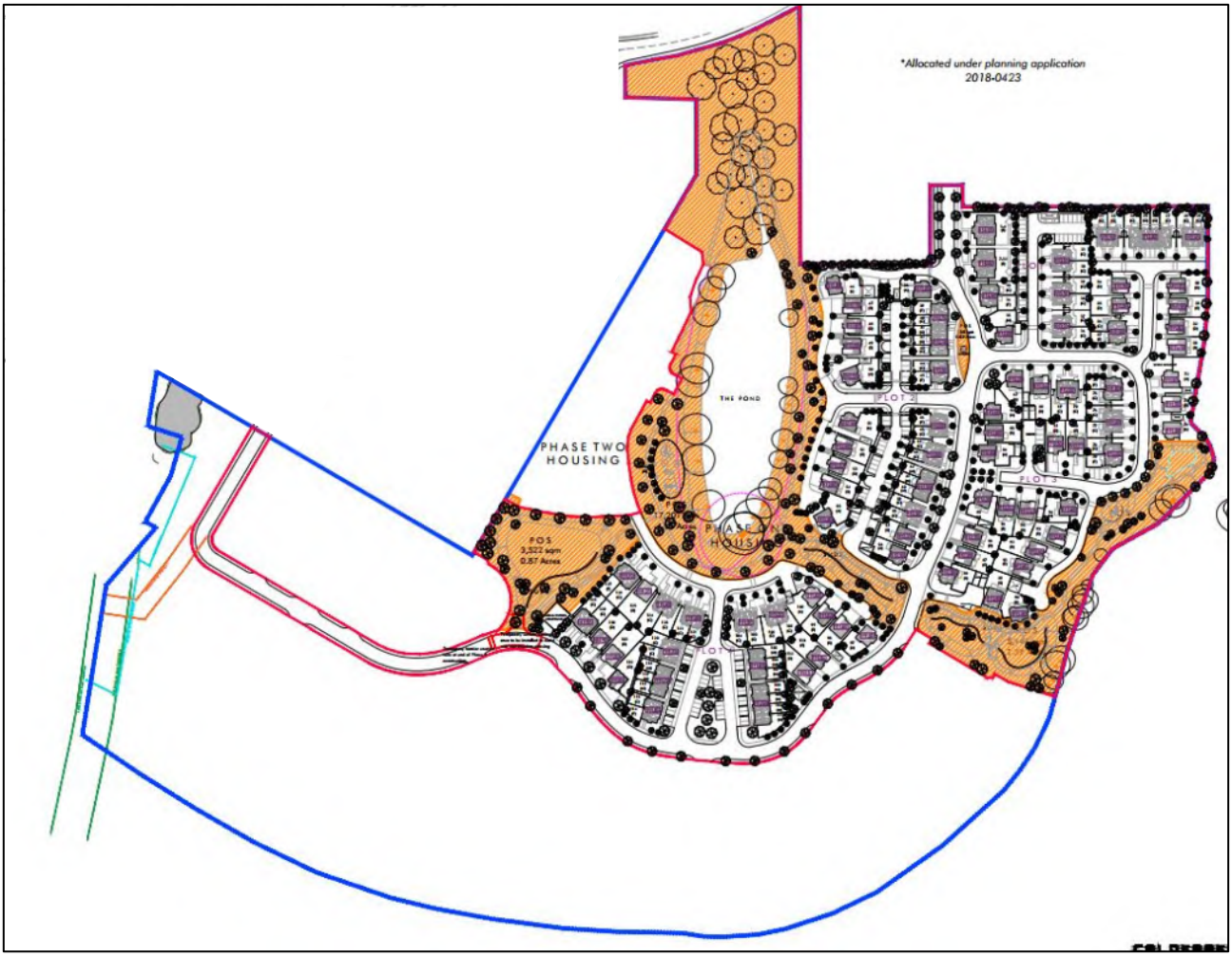


Figure 1-1 - Extract from proposed development plan

1.2 Objectives

The objective of this document is to present details of the remedial objectives which are based on the findings from previous investigations. This report presents how the remediation of the site will be undertaken and sets out how the works will be validated. In addition, this document explains how the works will be permitted under current regulatory regimes. The remediation will ensure that upon completion of the proposed development, the ground and conditions at the site can be shown to be appropriate for its intended use, and that it will not pose unacceptable risks to the identified receptors.

The findings and conclusions of the risk assessments have been set out and recommendations given for the proposed residential with homegrown produce end use.

This report provides a Remediation Strategy and Verification Plan in relation to the contaminant sources, together with further details of how the developer will deal with encountering unexpected contamination, should this occur.

This document is a working document and may need to be updated, in agreement with the relevant regulatory bodies, at any stage during development dependent on the conditions encountered. This version of this document is to be issued to regulators for approval (i.e., Wrexham County Borough Council).

1.3 Previous Investigations

GroundSolve have been provided previous third-party reports that pertain to the site. These are outlined below, and further discussed and summarised in Section 3 of this report:

- "Ruabon Park, Wrexham, Phase 1 Contamination Assessment Report" produced by MLM Environmental, dated 16th November 2015 (report ref: 773135-REP-ENV-001).
- "Ruabon Park, Wrexham, Phase 2 Preliminary Geoenvironmental Assessment Report" produced by MLM Environmental, dated 27th November 2015 (report ref: 773135-REP-ENV-002).
- "Plot 1, Plot 2, Plot 3 Ruabon Park, Wakin Way, Ruabon, LL14 6EP – Geotechnical and Ground Gas Investigation Report" produced by E Geo Solutions Ltd, dated May 2022 (report ref: E1450.GGI.R1)

1.4 Limitations

This report has been prepared for the sole use of Pure-Homes No other third party may rely upon or reproduce the contents of this report without the written approval of GroundSolve Ltd. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk.

2 SITE DETAILS AND DESCRIPTION

Table 2.1 Current Site Overview.

Site name	Ruabon, North Wales
Site address	The site is located off the A539, Ruabon, Wrexham, LL14 3EH
Site location and surrounding land uses	National Grid Reference: 329736, 343226  The site is currently occupied by agricultural fields with an existing pond in the centre
Approximate Site area	27.02ha (Phase 1 development and public open space areas only)
Site shape	The site is irregular in state
Surrounding land uses	The site is bordered to the east by James Caravan Park, to the west by Clwyd Caravan & Leisure, commercial developments and the A593 to the north and further agricultural fields to the south.
General topography and ground levels	The site is approx. 112m to 114m AOD.

3 PREVIOUS INVESTIGATIONS

The third-party reports provided to GroundSolve have been summarised in below. It is not the intention to reproduce these reports, but to highlight the most pertinent points.

It should be noted that the MLM Phase 1 and Phase 2 reports pertain to a slightly different site boundary, however it covers the full phase 1 development area under its new red line boundary. The E-Geo reports also have a slightly different boundary, only covering part of the full phase 1 development area.

Table 3.1 Summary MLM Environmental Phase 1 Report

Site History	Historical maps indicate the site has consisted of agricultural farmland, since the earliest editions. From 1900-1961, a football ground was present in the southwest corner of the site. A colliery was present directly to the west from 1873-1967 with the Groundsure report indicating that this may have extended onto the site. The colliery was decommissioned in the 1960s. Railway sidings are noted 25m to the northwest from 1873-1960, with the Groundsure report stating that these may have extended onto the site. A quarry was present 100m to the northwest from 1899-1961.
Environmental Setting	Published geology is of Glaciofluvial Deposits within the northeast of the site with Glacial Till overlying the remainder of the site. The bedrock on site is the Etruria Formation (mudstone) in the east and central sections of the site, with the Pennine Lower Coal Measures Formation, present on the western edge. The Glaciofluvial Deposits are classified as a Secondary (A) Aquifer, the Till as an Unproductive Aquifer, and both bedrock formations are classified as Secondary (A) Aquifers. The site is not within a groundwater Source Protection Zone. The nearest surface water feature is a large pond in the centre of the site. The site is indicated to be within an area where between 10% and 30% of properties are above the Radon Action Level.
Environmental Search Data	The following environmental search entries were identified that could potentially affect the site condition: • Discharge consent – Container site (226m west) • Wate Treatment Plants – Tyre recycling plant (173m west) • Current industrial sites – Clwyd Caravans & Leisure (94m west), Electricity substation (133m north), Hopper (153m south), Civic Amenity site (201m west) Electricity substation (234m west).
Potential Contamination Sources	The desk study and Site reconnaissance identified the following potential sources of contamination that could affect the site's condition: • Infilled former ponds on site. • Made Ground associated with the former sports ground and suspected road feature on site. • Agricultural use of the site. • Former marshland on site. • Infilled unspecified mine on site.

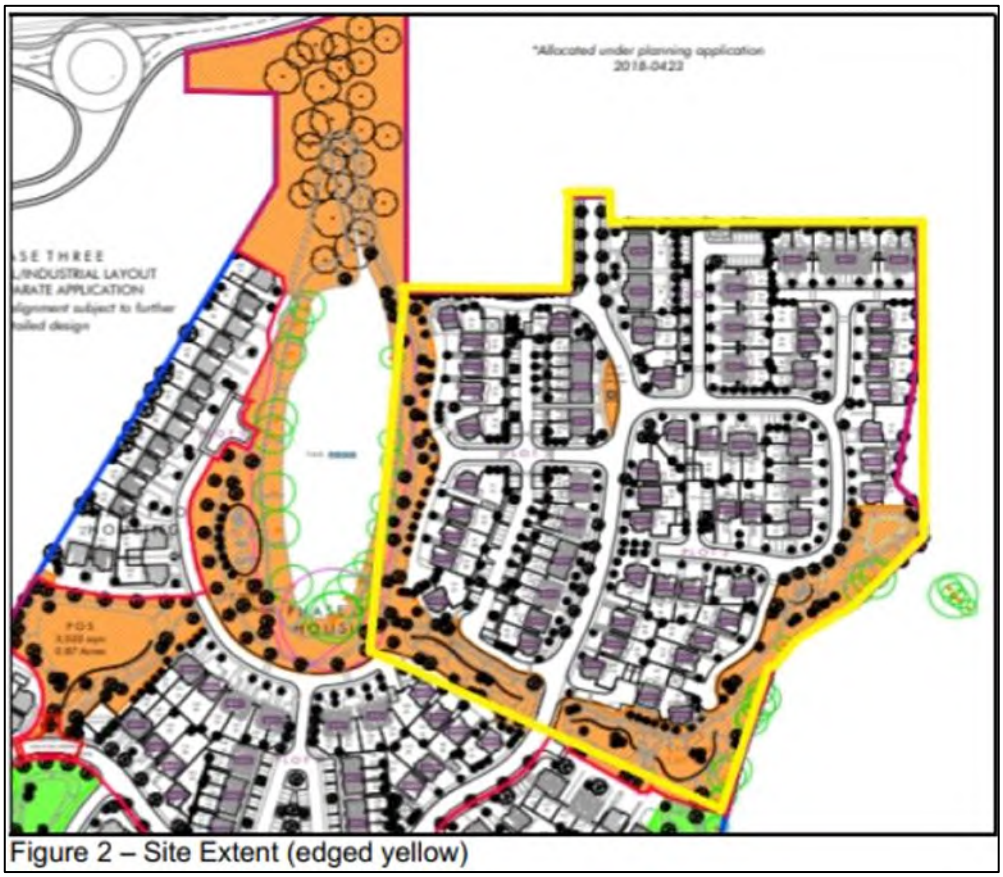
	• Historical colliery adjacent to the western boundary. • Historical tanks located 122m northwest. • Spoil heaps associated with the former colliery located 5m northwest. • Historical railway adjacent to the northwest and west,
Risk Raitngs	The site is low to high risk
Reccomendations	• Intrusive investigations to confirm desk study findings (to include soil and groundwater sampling and ground gas monitoring). • The Mineral and Waste Planning Officer at Wrexham County Council should be contacted to confirm that the site does not lie over a potentially workable coal deposit.

Table 3.2 Summary MLM Environmental Phase 2 Report

Ground Conditions Encountered	Topsoil from ground level to a maximum depth of 0.50m bgl. Made Ground proven to a depth of 1.10m bgl. Glacial Till to a proven depth of 4.50m bgl. Glaciofluvial Deposits proven to a maximum depth of 3.40m bgl. Etruria Formation proven to a depth of 5.00m bgl.
Ground Water	Groundwater was encountered at depths between 2.30m bgl to 4.50m bgl during the investigation works. During Monitoring post-fieldwork, groundwater depths ranged from 1.64m bgl to 3.40m bgl.
Existing Contructions	There is a possible section of partially constructed road within the north of the site although this was not noted during the site investigation works. Unless it is to be incorporated within the new development, any old construction encountered should be fully penetrated by all new foundations and broken well away from any new construction.
Excavations	Excavation to proposed founding depth should generally be readily achievable with standard excavation plant.
Foundations	The preliminary investigation indicates that the following options should be suitable, however this should be confirmed with further deeper investigations: • Strip/trench fill foundations at between 1.00m and 1.50m bgl. • Pad foundations between 1.00m and 1.50m bgl. • Net allowable bearing pressure – 100kN/m^2 on all soils. • Deepening of foundations/heave protection is likely to be required to allow for the effect of trees.
Ground Floors	Slab on ground or suspended/constructed on granular fill in clay areas due to the risk of swelling and shrinking.
Pavements	A design CBR of 2% should be assumed for the Made Ground materials and natural clay soils, a CBR value of 5% is considered appropriate for the sands and gravels. However, these CBR should be confirmed with in-situ testing.
Soakaways	Soakaway drainage may be suitable within the northeast of the site and within the sand and gravel materials, however testing would be needed to confirm this.
Buried Concrete	Design Sulphate Class DS-1 and ACEC Class AC-1

Soil Contaminaiton	Not present with regard to human health for the proposed mixed residential and commercial end use.
Gas/Vapour contamination	Slightly elevated levels of CO_2 were recorded and therefore the site is designated as CIRIA Characteristic Situation 2 / NHBC Amber 1
Remediation	Gas protection measures within new construction. Radon protection measures
Further Work	Tree survey required prior to site clearance. Further gas monitoring to better define the ground gas regime. Deeper intrusive investigation works

Table 3.3 Summary E Geo Geotechnical and Ground Gas Investigation Report

Site Location	The site is located off the A539 in Wrexham and comprises an extensive area of undeveloped grassed agricultural land. It is surrounded by agricultural land, plus a commercial development to the northwest and a small pond/lake to the east.  Figure 2 – Site Extent (edged yellow)
Scope of Work	E Geo's scope of work comprised: • 21. No shallow window boreholes to between 4.00m to 5.00m bgl. • Logging of ground conditions for geoenvironmental and geotechnical purposes. • Installation of 6 No. ground gas monitoring wells to 3.50m bgl.

	• Geotechnical and chemical soils testing. • Ground gas monitoring on 6 No. occasions over a 4-month period.
Ground Conditions	Topsoil was encountered from ground level to depths between 0.25m to 0.45m bgl. Superficial soils comprising gravelly silt or gravelly clay, sand a gravel and stiff clay was encountered across the site to the base of boreholes.
Sulphate and Concrete Class	Design Sulphate Class DS-1 and ACEC Class AC-1
Ground Gas Assessment	A peak carbon dioxide concentration of 2.3% v/v and a peak flow rate of <0.1l/hr were recorded giving a Gas Screening Value (GSV) of 0.0023l/hr. As no methane was detected above 1% v/v and no carbon dioxide was detected above 5% v/v the site has been classified as a Characteristic Situation 1
Radon	E-Geo obtained a site specific BGS Radon Report which details that the site is within an area where between 3% and 5% of the properties are above the Radon Action Level and therefore basic radon protection measures would be required.
Pavements	A design CBR of 2% should be assumed for the Made Ground materials and natural clay soils, a CBR value of 5% is considered appropriate for the sands and gravels. However, these CBR should be confirmed with in-situ testing.

4 REMEDIATION STRATEGY

4.1 Summary of Risk Assessments

Review of the CSM following the intrusive investigations, supplemental sampling and risk assessments identified Lead and Radon as the primary contaminants of concern to Human Health.

Samples were taken at varying depths within Made Ground, Topsoil and Till, to ensure that the shallow ground conditions are fully characterised where it is most likely to be encountered by the site end users, and that sample depths were to be representative of the anticipated cut and fill to create formation level at site.

The contamination at the site was assessed using the contaminant-pathway-receptor linkage approach. Following the site investigation, the plausible contaminant sources identified were updated and are detailed in **Table 4.1** below.

Table 4.1 Summary of Contaminant Linkages

Receptor Group	Pollution Source	
	Hotspots	Pervasive
Human Health	None	None
Controlled Waters	No unacceptable contamination.	
Water Supply Pipe Material Assessment	No special precautions required; use of PE pipe is deemed permissible.	
Human health / property (from ground gases)	The site is situated within an area where between 3% and 5% of the properties are above the Radon action Level and therefore basic radon protection measures will be required. The MLM Environmental report classified the site as a Characteristic Situation 2 due to elevated levels of carbon dioxide above 5% v/v for which ground gas protection measures are required, whereas the E-Geo report classified the site as a Characteristic Situation 1 for which no protection measures are required. Based on the conclusions of the E-Geo monitoring, Plots 1-3 within the Phase 1 development can be classified as CS1 for which no protection measures are required (not including Radon) however, further ground gas assessment is required in the plot 4 area of the phase 1 development.	

4.2 General Observations and Requirements

The risk assessments have concluded that remediation measures are required to address risks to human health only, resulting from hazardous ground gases

Dust

During the construction works there will be a risk from dust to onsite workers and people occupying adjacent properties. Appropriate risk assessments should be carried out by the contractor in accordance with the Control of Asbestos Regulations (2012) to allow appropriate controls for the mitigation of risk to health of construction workers to be put in place. This risk can be controlled to within acceptable limits by:

- Method statement for site activities including control of dust generation.
- Having adequate site hygiene facilities allowing staff to keep a good level of personal hygiene.
- All groundworkers should have been trained in asbestos awareness and should keep a look out for this being encountered during excavations.
- The method statement shall have a contingency plan which should be implemented if the presence of asbestos is suspected in groundworks; and
- Only permitting smoking or eating on site in appropriate pre-designated areas.

As a minimum it is anticipated the works will be undertaken in accordance with BRE best practise guidance and that the following measures will be introduced to assist with control of dust generation during the groundworks phase of the works:

- Access roads and any stockpiles created during groundworks should be regularly damped down with water.
- Vehicles used to transport materials/wastes and aggregates should be enclosed or tarpaulined.
- Vehicle movements and speed should be kept to a minimum within the site.
- Dust generating equipment (e.g. mobile crushing and screening equipment) should be located to minimise potential nuisance impacts to receptors as far as practicable.
- Minimising drop heights of all loading and unloading activities that involve the transfer of soils and demolition materials.

4.3 Unexpected Contamination

Whilst significant gross contamination is not anticipated, the proposed redevelopment could encounter previously unrecorded hotspots of contaminants. These will be assessed and mitigated in accordance with current good practice.

A ‘watching brief’ is to be maintained by the Principal Contractor during all earthworks at the site. This will enable any previously unidentified contamination on the site to be dealt with in an appropriate manner.

If unexpected contamination is encountered, then the procedures set out in **Appendix C** should be implemented.

4.4 Waste Characterisation and Classification

Excess soil will be sent to a suitable landfill site. A summary of current relatively complex guidance on categorising waste from earthworks is presented in **Appendix B**. A two-phase approach is required comprising comprises:

- Waste Characterisation; and,
- Waste Classification (Waste Acceptance Criteria).

Waste Characterisation

The results of the total concentrations form the chemical testing on soil samples have been assessed to determine whether or not they are hazardous in terms of waste classification. The results of this assessment indicate that some of the materials encountered during the investigation can be classified as non-hazardous.

Waste Classification

In order to determine whether soils can be sent to a licensed landfill for disposal further testing is required comprising landfill Waste Acceptance Criteria (WAC) analysis for both total concentrations for certain chemicals and for leachate analysis. No WAC testing was carried out as part of this investigation. WAC testing will have to be carried out to confirm the landfill waste classification and if any pre-treatment is required.

4.5 Gas Risk Assessment

Basic Radon protection is required for all the proposed developments.

The results from the previous E-Geo investigation has classified the site as a Characteristic Situation 1 based on the Gas Screening Value (GSV) alone, however, it is noted that the E-Geo monitoring wells do not cover the full phase 1 development area, and therefore further assessment is required.

It is recommended that the Phase 1 development is phased in regard to ground gas protection measures required. Based on the gas monitoring conducted by E-Geo, it is considered that Plots 1 -3 of the Phase 1 development will not require ground gas protection measures as monitoring demonstrated that these areas can be classified as CS1.

Plot 4, however, was not assessed as part of the E-Geo investigation. It is considered however, that CS1 classification can also be applied to Plot 4 based on the following:

- Review of historical mapping included within the Phase 1 MLM Environmental report has detailed that the plot 4 area has considered of agricultural land only since earliest mapping.

- The site superficial geology recorded on mapping, and confirmed within logs from the MLM Environmental Phase 2 investigation shows that the Plot 4 area comprises Till, predominantly recorded as firm to stiff clay.
- TOC concentrations within the Glacial Till have typically recorded <0.8%, therefore indicating no significant ground gas source.
- Bedrock beneath the Plot 4 area which will comprise housing, is the Etruria Formation with the higher gas risk Pennine Lower Coal Measures formation further west underneath the roadway area only of Phase 1.
- Any gas risk associated with Bedrock will be significantly mitigated by the low permeability, cohesive superficial Till deposits beneath the plot 4 area.
- Limited gas monitoring was undertaken by MLM Environmental, with 1 No. monitoring visit conducted. WS04 from their investigation is within thew Phase 1 Plot 4 area and was recorded to have a maximum carbon dioxide concentration of 2.7% v/v, maximum methane concentration of <0.1% v/v, lowest oxygen concentration of 16.9% v/v and a flow of 0.3l/hr. Based on this result, a GSV of 0.008l/hr was calculated, placing the site within a CS1 classification.

If unexpected ground conditions, such as deep organic rich Made Ground or evidence of visual and / or olfactory contamination is encountered within the Phase 1 Plot 4 area that would alter the CS1 classification, in the absence of further ground gas monitoring, The plot 4 area must be upgraded to a CS2 classification for which ground gas protection measures are required.

Details of ground gas protection measures required **if** the Plot 4 area has to be upgraded are provided below:

From BS8485:2015+A1:2019, Table 3, the new developments can be classified as Building Type A (private, residential) and from Table 4 of this standard, a score of 3.5 points of protection will be required for Characteristic situation 2 ground gas conditions. The standard does provide set requirements, but it provides a menu of different options which, in combination, can be used to provide an appropriate score as set out in Table 4 of this standard. It is understood that the proposed protection measures could include the following:

- Floor Slab:
    - Precast suspended segmental subfloor (i.e. beam and block) – Score 0 points.
    - Reinforced cast in situ suspended floor slab with minimal penetrations – Score 1.5 points.
- Passive subfloor dispersal layer:

- Good performance – Score 1.5 points.
- Media used to provide the dispersal layer is a no fines gravel layer.

- Gas resistant membrane – Score 2.0 points:
  - Visqueen Gas barrier – suitable for CO_2, CH_4 and Radon.
  - Verified in accordance with CIRIA C735.

The Principal Contractor must ensure that the gas membrane is suitable protected from follow on trades.

5 VERIFICATION PLAN

5.1 General

If plot 4 has to be upgraded to CS2 protection measures, an outline of verification requirements is provided below. It should be noted that this is only applicable if Plot 4 gets an upgraded ground gas classification. If it remains as currently classified (CS1), no protection measures are required, and therefore no verification will be needed. However, Radon protection measures are required site wide so verification by Building Control (e.g NHBC may be required in order to get the developments signed off from their perspective).

All stages of the remediation works should be verified independently by suitably qualified and experienced personnel. Verification reports should be prepared for the ground gas and radon protection measures to be implemented.

On completion a copy of the Verification Reports should be sent to the Local Authority Environmental Health Officer for their approval so that planning conditions can be discharged. A copy of the report should be sent to the NHBC, local authority building control officer or other similar authority for their approval. Where such organisations are involved in the development process, it is advised that approval be sought to any remediation works from these organisations prior to the commencement of development.

5.2 Ground Gas Verification

Verification is required in accordance with CIRIA C735. Verification is defined within CIRIA C735 as:

> *The process of demonstrating that risk has been reduced to meet the remediation criteria and objectives based on a quantitative assessment of remediation performance.*

Following the installation of each component that contributes to the gas protection score, verification is required, in accordance with BS8485 and CIRIA document C735 'good Practice on the Testing and Verification of Protection Systems for Buildings Against Hazardous Ground Gases (2014).

BS8485 states that "The installation and verification report should present an accurate description of the measures actually applies and present the evidence gathered to confirm that installed measures are suitable for purpose".

The risk-based approach identified within CIRIA C735 guides the verification plan to consider the following:

- Site specific gas regime.
- Number of plots.
- Complexity of the design and installation.
- Qualifications and experience of the workforce (Construction Skills level 2 NVQ Diploma).

The site is considered as the following:

- Classified as Characteristic Situation 2 in accordance with CIRIA C665 and Amber 1 in accordance with NHBC Guidance on Methane and Carbon Dioxide (2007).
- Proposed residential developments are small/medium – orange.
- The foundations and gas protection measures are relatively simple – green.
- Gas protection measures will be installed by a combination of general builders and/or a specialist contractor, which have extensive experience at installing gas protection systems.

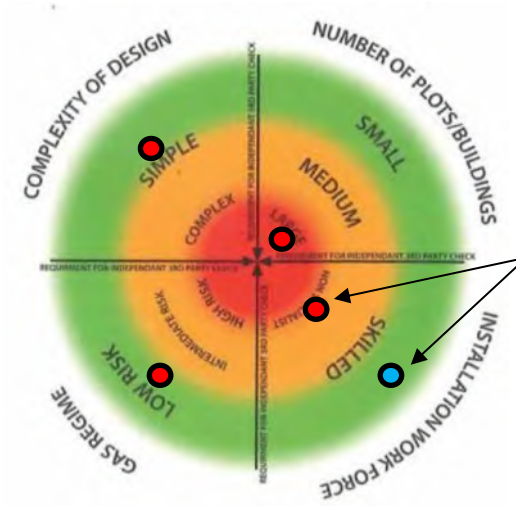


Figure 5.1 Analysis of the variables which have influenced the scope of verification plan for this site

The factors above shave shown a range of 'green' to 'red' as identified in Figure 3.1 of CIRIA C735. Therefore, the role of the independent verifier until a minimum acceptable standard has been achieved, whereby ensuring the membrane installation is suitably managed to achieve maximum confidence to the suitability of the installed materials.

Verification/validation of the gas membrane installation should confirm:

- Inspection of the products being used (membrane, tape, propriety top hats etc.) to ensure they are as specified.
- Laps are sufficient in length with edges, seams and service penetrations all sealed.
- The membrane spans across the cavity wall.
- The presence of a passive sub floor void.

Any defects identified in any of the points above will be recorded on the verification pro-forma with photographic evidence records, together with corrective actions and subsequent verification checks.

The visit details will be presented in a verification report including photographic evidence for the submission to the planning authority to complete the discharge of relative planning conditions.

The new development is situated within an area where between 3% and 5% of the properties are above the Radon Action Level and therefore the property will require basic radon protection measures.

The design of the proposed protection measures should be submitted to NHBC for confirmation of suitability ahead of installation and should be verified and signed off by an NHBC representative as sufficient post installation.

6 REGULATORY REQUIREMENTS

6.1 Remediation

Any proposals to remediate or develop the site should be agreed with the relevant authorities (e.g., local authority environmental health officer) to obtain Planning Permission prior to commencement of the works and should be agreed with the NHBC, or similar, or with the local authority building control officer prior to commencement of the works.

6.2 Health and Safety

The works should be undertaken in compliance with all relevant regulations, guidance and legislation. As outlined within the HSE publication "Successful Health and Safety Management – HSG65" this report should inform your development of safe systems of work and information as an input into the safety management system. The contents of this report may be used to supplement the contents of the Health and Safety File as required under the Construction Design and Management (CDM) Regulations 2015. All risk control measures should be in accordance with the guidelines laid down within the Management of Health and Safety at Work Regulations 1999.

In accordance with the Construction Design and Management (CDM) Regulations 2015, GroundSolve has acted in the role of Principal Contractor and as Principal Designer for the works as described in this report. With issue of this report, GroundSolve has discharged and completed all contractual and legal requirements for these positions, and we have no further involvement with the project. The Principal Contractor is responsible for obtaining any necessary approvals from regulatory bodies and third parties to fully implement the works.

7 REFERENCES

BRE BR211 (2015). Radon: Guidance on Protective Measures for New Dwellings. IHS BRE Press, Bracknell.

BRE SD1 (2005). Concrete in Aggressive Ground. Special Digest 1 (revised edition). IHS BRE Press, Bracknell.

BRE 414 (2001) Protective measures for housing on gas-contaminated land. BRE.

BS 10175:2011+A2:2017 Investigation of Potentially Contaminated Sites - Code of Practice. British Standards Institution, London.

BS5930:2015+A12020 Code of practice for ground investigations BSI

BS8485 2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases in new buildings. British Standards

BS8576-2013 Guidance on investigations for ground gas – permanent gases and volatile organic compounds (VOCs). BSI,

CIRIA Rep R 149 (1995a) Protecting Development from Methane. Report 149, CIRIA, London.

CIRIA Rep R 150 (1995b) Methane Investigation Strategies. Report 150, CIRIA, London.

CIRIA Rep R 132 (1996) A Guide for Safe Working on Contaminated Sites. Report 132, CIRIA, London.

CIRIA C552 (2001) Contaminated land risk assessment. A guide to good practice (report no. C552).

CIRIA C665 (2007) Assessing the risks posed by hazardous gases to buildings CIRIA, London

CIRIA C681 (2009) Unexploded ordnance (UXO) A guide for the construction industry (C681)

CIRIA C785 (2019) Unexploded ordnance (UXO) risk management guide for land-based projects (C785)

CIRIA C758D (2019) Abandoned mine workings manual (C758D)

Contaminated Land: Applications in Real Environments (CL:AIRE) (2011) Definition of Waste Code of Practice (version 2).

Department of Environment Food and Rural Affairs (DEFRA) (2012) Environmental Protection Act 1990:Part 2A Contaminated Land Statutory Guidance (report no. PB13735).

Environment Agency (2000) Technical Aspects of Site Investigation. Report P5-065/TR, Environment Agency, Bristol.

Environment Agency (2002) Guidance on Monitoring Landfill Leachate, Groundwater and Surface Water. Report LFTGN02, Environment Agency, Bristol.

Environment Agency (2007) Evaluation of Models for Predicting Plant Uptake of Chemicals from Soil. Report SC050021/SR, Environment Agency, Bristol.

Environment Agency (2015) Guidance on the Classification and Assessment of Waste Technical Guidance WM3 (1st edition).European Union (1998) Drinking Water Directive (Council Directive 98/83/EC).

Land Contamination Risk Management (LCRM) Environment Agency October 2020 https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm .

LQM/CIEH Ltd (2015) S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham.

SoBRA (2017) Development of Generic Assessment Criteria for Assessing Vapour Risks to Human Health from Volatile Contaminants in Groundwater – Version 1.0.

The Water Framework Directive, (Standards and Classification) Directions (England and Wales).

World Health Organisation (2017) Guidelines for Drinking Water Quality (4th edition).

Britain From Above -

http://www.warstateandsociety.com/Bombing-Britain

https://www.epa.gov/pfas/basic-information-pfas

UK Maps of Radon, http://www.ukradon.org/information/ukmaps

Health and Safety Executive (2015) Construction (Design and Management) Regulations.

Coal Authority Interactive Map Viewer, http://mapapps2.bgs.ac.uk/coalauthority/home.html

BGS Geology of Britain Viewer http://mapapps.bgs.ac.uk/geologyofbritain/home.html

8 DEFINITIONS

AOD	Above Ordnance Datum
bgl	Below ground level
BGS	British Geological Survey
BRE	Building Research Establishment
CBR	California Bearing Ratio (test)
COMAH	Control of Major Accident Hazards (regulations)
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EQS	Environmental Quality Standard
GAC	Generic Assessment Criterion
GQA	General Quality Assessment (Environment Agency)
GQRA	Generic Quantitative Risk Assessment
GSV	Gas Screening Value
HCV	Health Criteria Value
IPPC	Integrated Pollution Prevention and Control (regulations)
NGR	National Grid Reference
NIHHS	Notification of Installations Handling Hazardous Substances (regulations)
OS	Ordnance Survey
ppm	Parts per million
ppmv	Parts per million by volume
SAC	Special Area of Conservation
SPZ	Source Protection Zone
SSAC	Site-Specific Assessment Criterion
SSSI	Site of Special Scientific Interest

APPENDIX A - DRAWINGS

N



SITE LOCATION



NEAREST POSTCODE:LL14 6EP

SITE ENTRANCE WHAT3WORDS:
///AMBER.FOIL.MONTHS

Not to Scale

Site Location Plan – 3227-DR-001-V01	Drawn: ER	Checked: JT	Authorised: JT
	Date: JAN '25	Date: JAN '25	Date: JAN '25
Client: Pure Homes	**Project: Ruabon, North Wales**		

GroundSolve Ltd
Unit 1, 85 Station Road, Queensferry
Flintshire CH5 2TB

GroundSolve Ltd
Consulting Geotechnical Engineers

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NOTE: DO NOT SCALE FROM THIS DRAWING

REV.	DESCRIPTION	DATE	DRAWN
A	SCHEME DEVELOPMENT	17.09.20	AG
B	SCHEME DEVELOPMENT	18.09.20	AG
C	SCHEME DEVELOPMENT	02.09.20	AG
D	SCHEME DEVELOPMENT	15.08.20	AG
E	SCHEME DEVELOPMENT	04.08.20	AG
F	SCHEME DEVELOPMENT	08.06.20	AG
G	SCHEME DEVELOPMENT	08.06.20	AG
H	SCHEME DEVELOPMENT	18.05.20	AG
J	PLOT SIZE AMENDED	21.04.20	AG
K	PLOT SIZE AMENDED	31.03.20	AG
L	UPDATED LAYOUT	19.03.20	AG
M	PLOT BY UPDATE	21.01.21	AG

19126 - RUABON, WREXHAM - GROSS INTERNAL AREA SCHEDULE

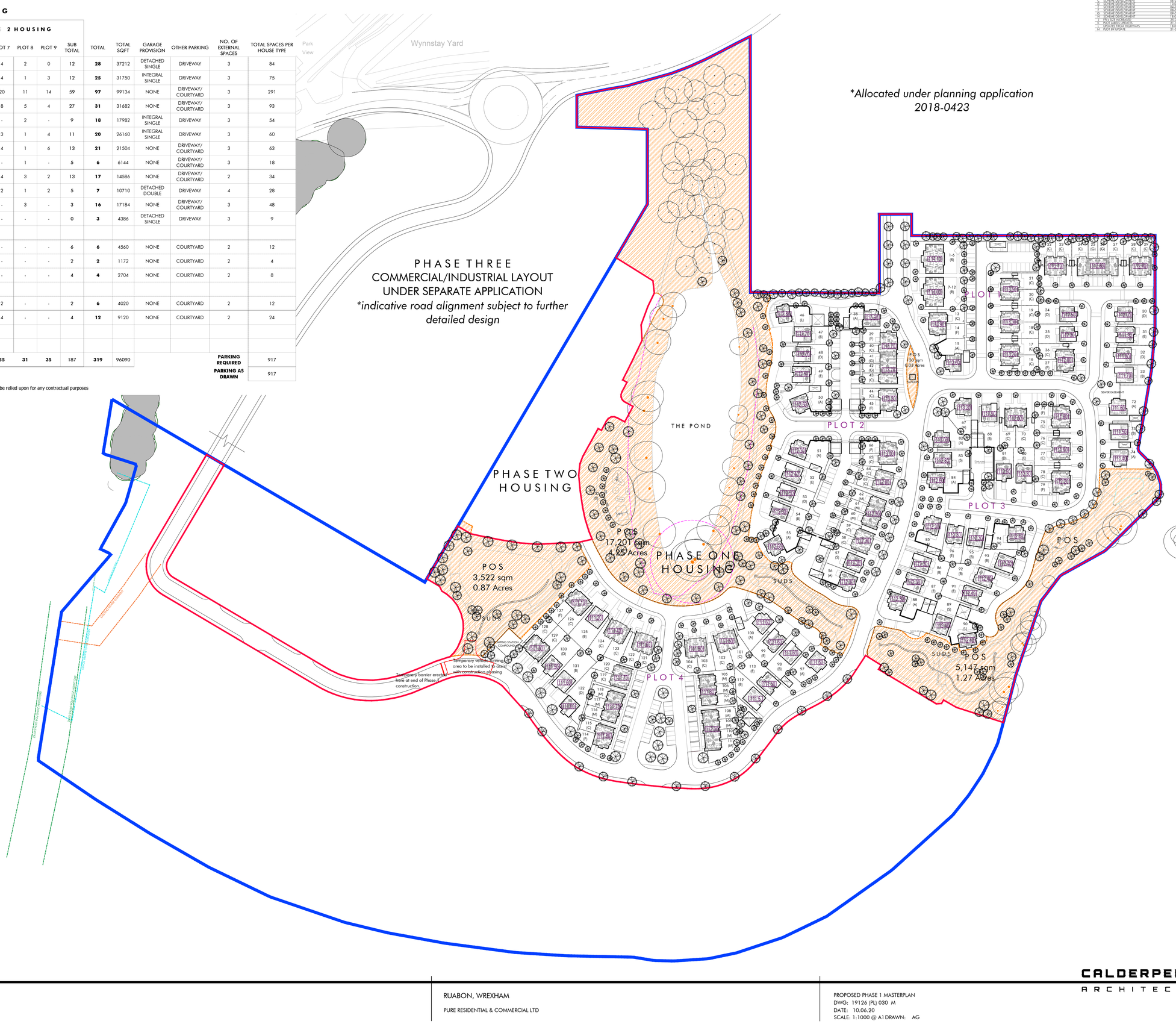
DATE: 09/06/2020 **Rev:** L

BASED ON DRAWING - 19126 (PL) 030 K

HOUSING

					PHASE 1 HOUSING					PHASE 2 HOUSING										
HOUSE TYPE	BED	TYPE	STOREY	SQFT	PLOT 1	PLOT 2	PLOT 3	PLOT 4	SUB TOTAL	PLOT 5	PLOT 6	PLOT 7	PLOT 8	PLOT 9	SUB TOTAL	TOTAL	TOTAL SQFT	GARAGE PROVISION	OTHER PARKING	NO. OF EXTERNAL SPACES	TOTAL SPACES PER HOUSE TYPE
A	4	DETACHED	2	1329	1	5	8	2	16	3	3	4	2	0	12	**28**	37212	DETACHED SINGLE	DRIVEWAY	3	84
B	4	DETACHED	2	1270	1	2	6	4	13	4	-	4	1	3	12	**25**	31750	INTEGRAL SINGLE	DRIVEWAY	3	75
C	3	SEMI DETACHED	2	1022	12	6	6	14	38	-	14	20	11	14	59	**97**	99134	NONE	DRIVEWAY/ COURTYARD	3	291
C	3	MEWS	2	1022	2	2	-	-	4	-	10	8	5	4	27	**31**	31682	NONE	DRIVEWAY/ COURTYARD	3	93
D	3	DETACHED	2	999	4	2	1	2	9	6	1	-	2	-	9	**18**	17982	INTEGRAL SINGLE	DRIVEWAY	3	54
E	4	DETACHED	2	1308	1	2	4	2	9	3	-	3	1	4	11	**20**	26160	INTEGRAL SINGLE	DRIVEWAY	3	60
F	3	SEMI DETACHED	2	1024	2	2	2	2	8	-	2	4	1	6	13	**21**	21504	NONE	DRIVEWAY/ COURTYARD	3	63
F	3	MEWS	2	1024	-	1	-	-	1	-	4	-	1	-	5	**6**	6144	NONE	DRIVEWAY/ COURTYARD	3	18
G	2	MEWS	2	858	2	2	-	-	4	-	4	4	3	2	13	**17**	14586	NONE	DRIVEWAY/ COURTYARD	2	34
L	5	DETACHED	2.5	1530	-	1	1	-	2	-	-	2	1	2	5	**7**	10710	DETACHED DOUBLE	DRIVEWAY	4	28
M	3	MEWS	2.5	1074	-	3	-	10	13	-	-	-	3	-	3	**16**	17184	NONE	DRIVEWAY/ COURTYARD	3	48
S	4	DETACHED	2	1462	-	1	2	-	3	-	-	-	-	-	0	**3**	4386	DETACHED SINGLE	DRIVEWAY	3	9
										-											
APT N	2	APARTMENTS	3	760	-	-	-	-	0	-	6	-	-	-	6	**6**	4560	NONE	COURTYARD	2	12
APT O	1	APARTMENTS	3	586	-	-	-	-	0	-	2	-	-	-	2	**2**	1172	NONE	COURTYARD	2	4
APT P	2	APARTMENTS	3	676	-	-	-	-	0	-	4	-	-	-	4	**4**	2704	NONE	COURTYARD	2	8
APT R1	2	APARTMENTS	3	670	4	-	-	-	4	-	-	2	-	-	2	**6**	4020	NONE	COURTYARD	2	12
APT R2	2	APARTMENTS	3	760	8	-	-	-	8	-	-	4	-	-	4	**12**	9120	NONE	COURTYARD	2	24
			TOTAL		**37**	**29**	**30**	**36**	132	**16**	**50**	**55**	**31**	**35**	187	**319**	96090			**PARKING REQUIRED**	917
																				PARKING AS DRAWN	917

please note that all areas are approximate and should not be relied upon for any contractual purposes



KEY

- Redline Boundary Phase 1 - 21.60 Acres
- Blueline Boundary (Phases 1 & 2)- 40.70 Acres
- 00 (-) Plot Number / House Type Reference
- 112.30 Proposed FFL's
- PLOT # Plot Number
- Phase 1 POS - total 26,000sqm / 6.42acres

CHESHIRE
Market Court
20-24 Church St
Altrincham
WA14 4DW
0161 929 7622

SURREY
100 High St
Esher
Surrey
KT10 9QJ
01372 203 335

SHEFFIELD
Electric Works
3 Concourse Way
Sheffield
S1 2BJ
0114 250 7983

LIVERPOOL
AvenueHQ
17 Mann Island
Liverpool
L3 1BP
0151 662 0122

MANCHESTER
All Work & Social
XYZ Building
2 Hardman Boulevard
M3 3AQ
0161 929 7622

RUABON, WREXHAM

PURE RESIDENTIAL & COMMERCIAL LTD

PROPOSED PHASE 1 MASTERPLAN
DWG: 19126 (PL) 030 M
DATE: 10.06.20
SCALE: 1:1000 @ A1 DRAWN: AG

CALDERPEEL ARCHITECTS

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REV. DESCRIPTION DATE DRAWN

19126 - RUABON, WREXHAM - GROSS INTERNAL AREA SCHEDULE

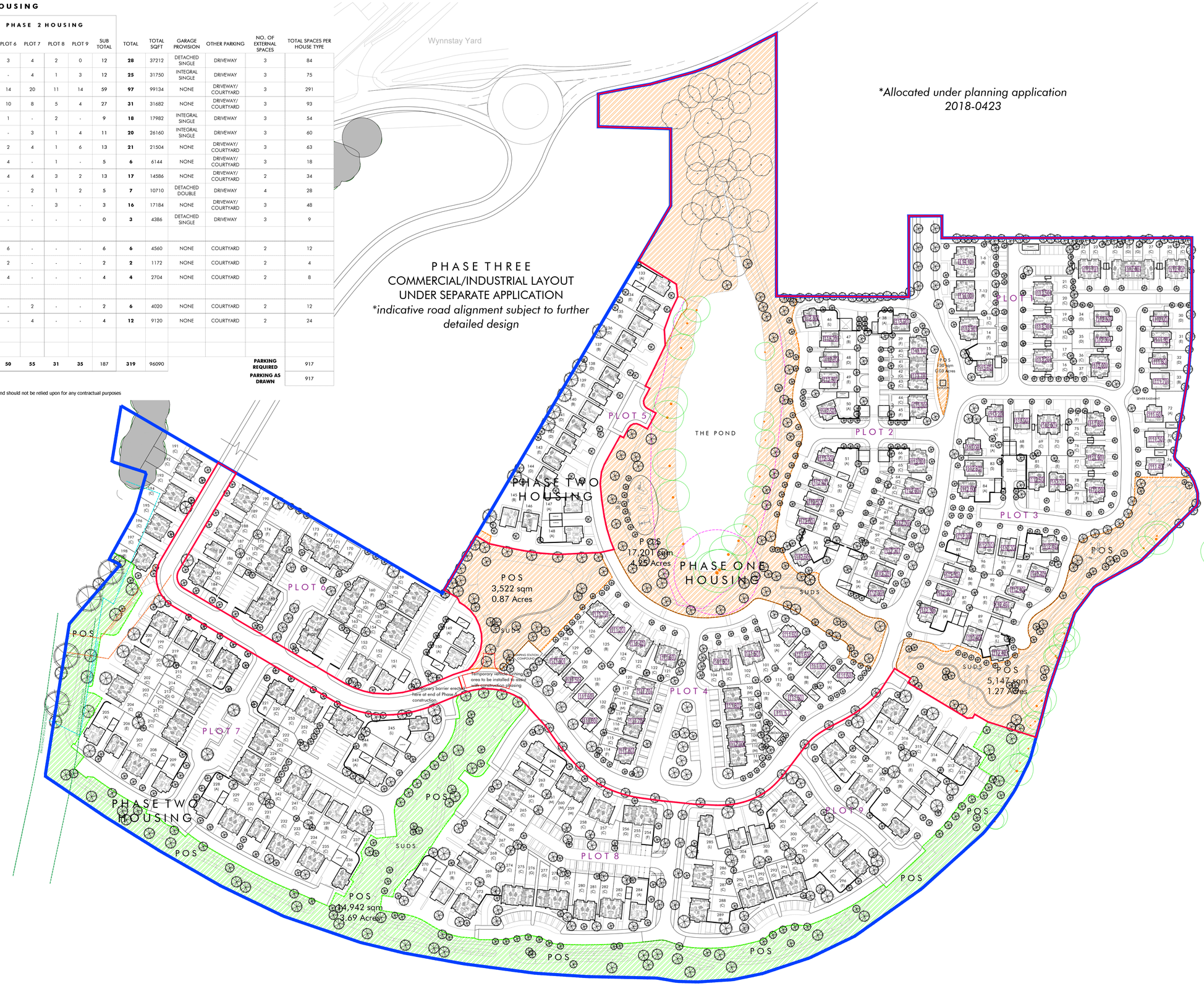
DATE: 09/06/2020 **Rev:** L

BASED ON DRAWING - 19126 (PL) 030 K

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- Phase 2 POS - total 14,942sqm / 3.69acres

CHESHIRE
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WA14 4DW
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SURREY
100 High St
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01372 203 335

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XYZ Building
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M3 3AQ
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RUABON, WREXHAM

PURE RESIDENTIAL & COMMERCIAL LTD

PROPOSED PHASE 1 & 2 MASTERPLAN
DWG: 19126 (PL) 031 S
DATE: 10.06.20
SCALE: 1:1000 @ A1 DRAWN: AG

CALDERPEEL ARCHITECTS

APPENDIX B - GUIDANCE FOR CLASSIFICATION OF SOIL FOR OFF SITE DISPOSAL AT A LANDFILL SITE

GroundSolve Ltd

Guidance for Classification of Soil for Off Site Disposal at a Landfill Site

Many site developments create a portion of excess soils and Made Ground which if not re-usable, are required to be disposed off-site at a suitably licensed landfill site. The regulations and associated guidance published by the Environment Agency is relatively complex and lengthy. This guidance provides a summary of the following documents which should be referred to when assessing soil (and common constituents found within Made Ground on remediation sites) for off-site disposal:

- Guidance for Waste destined for disposal in landfills: Interpretation of the Waste Acceptance Requirements of the Landfill (England and Wales) Regulations 2002 (as amended) (EA, 2004);
- Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance Procedures (EA, April 2005);
- WM3 - Hazardous Waste: Interpretation of the Definition and Classification of Hazardous Wastes (EA, May 2015);
- European Regulation No 1272/2008 on Classification, Labelling and Packaging of substances 2015 (CLP 2015);
- Guidance on Waste Destined for Disposal in Landfill (EA, June 2006);
- Treatment of Non-hazardous wastes for Landfill (EA, February 2007).

It is important to distinguish between the waste classification system and the designation of materials as "suitable for use" on site. A material may be retained on site for an appropriate end use if that end-use is clearly designated and that a site-specific risk assessment ensures that it does not pose a risk to human health or controlled waters. However, if this material is excavated and sent for disposal, the material is then subject to waste management regulations and the two systems cannot be directly correlated. It is therefore important to note that classifying a material as hazardous (should it be excavated and become a waste) does not necessarily indicate that it might not be suitable to be kept on site for re-use. Separate guidance in the form of a Code of Practice (CL:AIRE Version 2, 2011) has been developed jointly between the development industry and the Environment Agency to provide best practice when assessing whether materials are wastes or not, and for determining when waste can cease to be waste for a particular use.

In accordance with the current waste regulations (or Landfill Directive, as they are more commonly known), from 30th October 2007 all waste materials produced from construction sites have to be pre-treated prior to disposal. Pre-treatment includes waste minimisation, recovery (e.g., separation of demolition waste to be used as hardcore) and separation of materials into different waste categories (e.g., separate inert waste from hazardous waste etc). Mixing of different waste types shall be avoided and intentional mixing of inert materials with hazardous waste to 'dilute it' and hence change its waste classification, is illegal.

The current waste regulations (based on the EU landfill directive) introduced a two-tier classification system for waste materials, defining them as either being hazardous or non-hazardous. Landfills are licensed to take wastes based on a three-tier classification system with the non- hazardous waste divided into two sub-categories:

- Non-Hazardous - inert;
- Non-Hazardous - non-hazardous;
- Hazardous.

Waste materials are categorised with a six-figure numeric code in the European Waste Catalogue. Commonly found construction and demolition wastes including excavated soil from contaminated sites and Made Ground with their waste codes are summarised below (this is not a comprehensive list):

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
17 01 01 Concrete	Concrete, possibly with reinforcement (from Construction & Demolition)	✓		
17 01 02 Bricks		✓		
17 01 06* Mixtures of concrete, bricks, tiles & ceramics containing dangerous substances	These are not normally considered hazardous but if they are contaminated (e.g., by asbestos) then could be hazardous – see comment above			✓
17 01 07 Mixtures of concrete, bricks, tiles & ceramics other than those in 17 01 06	This is mixed inerts c.f. 17 09 04	✓		
17 05 03* soils and stones containing dangerous substances				✓
17 05 04 soils and stones other than those mentioned in 17 05 03	Soil and stones only (excluding top soil, peat, soil and stones from contaminated sites)	✓		
17 06 05* Construction materials containing asbestos	e.g., corrugated asbestos sheeting			✓
17 08 02 Gypsum-based construction materials other than those mentioned in 17 08 01	Plaster & plasterboard (although specific disposal requirements are required for high sulphate waste – see EA guidance 'Understanding the Landfill Directive' version 1.0 March 2010.		✓	
17 09 01* Construction & demolition wastes containing mercury				✓
17 09 02* Construction & demolition wastes containing PCBs	Waste with more than 50 mg/kg of PCB's are hazardous			✓

Waste Code	What is it?	Likely Waste Category–		
		Inert Waste	Non-Hazardous	Hazardous Waste
17 09 03* Other mixed construction & demolition wastes containing dangerous substances	Broad range of potentially (see notes below – if asterix the waste is hazardous) hazardous wastes			✓
17 09 04 Mixed construction & demolition wastes other than those mentioned in 17 09 01, 17 09 02 & 17 09 03	Mixed inerts with soil, tarmac, cables, vegetation, plaster, etc. (this waste can only be considered inert if it passes the waste acceptance criteria identified in the regulations).	✓	✓	

Note: all wastes with an asterix code are hazardous regardless of whether they are mirror or absolute entries in the EWC list the decision to with regard to composition must come before applying the code for mirror entries.

Some materials are classified as Inert Waste based in its origin (e.g., 17 01 01 Concrete, or glass) without any requirement for laboratory chemical analysis.

However, most soils will require laboratory testing to confirm whether they are classified as Hazardous Waste. The protocol for assessing these materials and the appropriate threshold values is complicated and are set out in the Environment Agency's "Technical Guidance *WM3* Hazardous Waste – Interpretation of the Definition and Classification of Hazardous Waste" (2015). If the test results for the waste indicates that it is not hazardous then further analysis of the waste is required to determine whether it is Inert Waste. If the waste does not meet the criteria for either Hazardous or Inert, then it is by default classified as Non-hazardous Waste.

As an alternative location to landfills for off-site disposal of inert and non-hazardous waste, there are a number of sites which have Waste Permit Exemptions that can accept certain categories of inert and non-hazardous wastes. Additionally, some quarries can accept certain types of wastes to be used for quarry restoration material. For both alternatives to disposal at landfill sites the material still requires chemical testing as these sites have site specific acceptance criteria for wastes. It should also be noted that these types of sites do not incur landfill tax which in the 2018/19 tax year is £2.80 for inactive waste (inert and some types of non-hazardous waste) and £88.95/Tonne for active waste (some types of non-hazardous waste and hazardous waste. Note that the Inland Revenue uses a different classification scheme for waste for tax purposes to the European Waste Classification scheme.

Waste Categorisation

The process of determining the category of wastes is a three-stage process:

- Stage 1 – is the waste either Hazardous or Inert by definition without the requirement for chemical analysis (if it is then Stages 2 and 3 are not required);
- Stage 2 - Waste characterisation;
- Stage 3 - WAC classification.

Waste characterisation determines if a waste is hazardous or not. Excavated soil is characterised using a system based on the contaminants present and their hazardous properties. The system uses total concentrations of the contaminants. Thresholds (as a percentage of the waste) have been set for the various hazardous properties.

Fourteen hazardous properties together with other scenarios where material could cause a hazard have been defined:

- Hazardous properties: explosive, oxidising, highly flammable/flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, toxic for reproduction, mutagenic and ecotoxic;
- Substances which can release toxic/very toxic gases in contact with water, acid or air;
- Substances which, after disposal, can yield another substance, e.g., a leachate, which possesses any of the above hazardous properties.

Some of the hazardous properties are sub-divided e.g., there are three categories of carcinogenic, mutagenic and toxic for reproduction substances. The hazardous properties were originally defined in the European Hazardous Waste Directive 91/689/EC. Should a waste contain a contaminant with one or more of the listed hazardous properties at a concentration equal to or above the threshold value for the particular property, then the waste is hazardous. The hazardous properties of a wide range of chemicals are sourced from CLP 2015.

There are many reasons why waste soil is classified as being hazardous, but the majority of reasons can be divided into the following four groups:

- Hydrocarbons – this is probably the most common reason for the hazardous classification of soils. For most soils hydrocarbon analysis will be required for both Polycyclic Aromatic Hydrocarbons (PAH) and speciated Petroleum Hydrocarbons (PHCs) but depending on the site's history other groups of organic contaminants may also be is included in any analysis suite for soil samples;
- Metals – Particularly sites from former metal processing or mining sites and also some types of ash have metal concentrations that are sufficiently high to characterise materials requiring disposal as hazardous waste.
- Asbestos;
- Anions – e.g., sulphate in plasterboard (there are special disposal requirements for high sulphate waste and specific WAC requirements); it is possible that sulphate salts of metals and semi-metals could make the waste hazardous – the sulphate concentration could possibly be significant under H12, H13 and H14.

The characterisation of wastes with significant metal concentrations involves some processing of the analysis data. The chemical analysis results for inorganic substances are generally reported as total concentrations e.g., total lead, total arsenic, total sulphate etc. However, CLP 2015 deals with the hazardous properties of actual compounds e.g., lead sulphate, arsenic pentoxide, nickel carbonate. Therefore, the total metal results have to be converted into assessed chemical analysis results for the compound most likely to be present in the soil samples. For example, if the sample contains high total lead concentrations and high sulphate concentrations, then the lead is likely to be present

in the soil as lead sulphate. The most likely compounds can often be determined from a desk study or previous site uses. If the site has been derelict for a number of years, consideration should be given as to whether water soluble compounds should or should not be chosen, as rainfall could have removed them from the soil (this does not apply if the soil has been taken from below under a concrete slab etc). Chemical knowledge and common sense needs to be used in choosing a suitable compound.

If no data is available, then a worst-case scenario has to be assumed and the most hazardous compound likely to be present has to be chosen. For example, metal chromates (lead chromate, nickel chromate) are often the most hazardous compounds formed by many metals, but if the chromium concentrations in the soil are low, chromates are unlikely to be present. It should also be noted that for many of the hazard categories, the cumulative hazard from different compounds is added (e.g., add the concentrations of the copper, lead and zinc compounds together to assess the Hazard Category H14 Ecotoxicity).

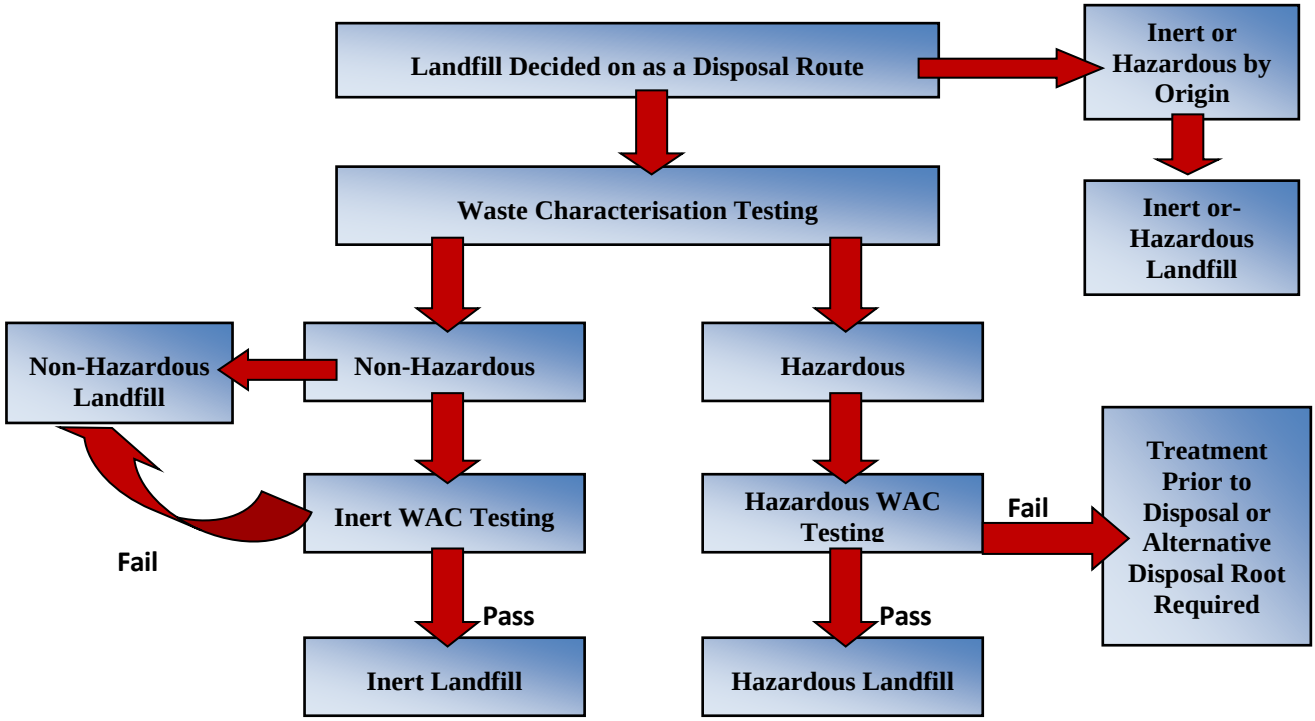
If the results of the above assessment determine that the waste is hazardous, it must then be analysed for the Waste Acceptance Criteria (WAC) analysis contained within appropriate Environmental Permitting Regulations (this comprises mainly leachate but also analysis for TOC and Loss on ignition). WAC limit values have been set for the listed determinands. If any of the determinands exceed their limit value, the waste must be pre-treated to reduce concentrations to below the limit values before the waste may be disposed of at a landfill site licensed to take hazardous waste.

For waste classified as not being hazardous, then there are two options available. Currently, waste correctly characterised as not being hazardous may be disposed of without WAC testing to a non-hazardous landfill. Alternatively, WAC testing for Inert Waste can be carried out (this is similar to the list for hazardous waste with the addition of PAH's, BTEX and Mineral Oil). If the results pass the Inert WAC criteria it can be disposed of at an Inert Waste Landfill. If any of the WAC test results exceed the Inert WAC criteria the waste has to be disposed at a non- hazardous landfill. There are WAC limits for non-hazardous waste set for pH and TOC. If these two criteria are not met then the waste must be pre-treated to so that it meets the criteria before it can be disposed.

If materials fail the WAC criteria it may be possible to pre-treat the waste on-site or be taken to a soil treatment centre for pre-treatment to reduce the soil's hazardous properties (e.g., by bioremediation of hydrocarbons).

It should be noted that in order to dispose of Hazardous Waste, the site must register as a producer of Hazardous Waste with the Environment Agency. When disposing of waste materials to landfill sites the appropriate Duty of Care Waste Transfer procedures must be followed.

Landfilled Waste Decision Tree



Landfill Tax

It should be noted that HM Revenue and Customs (HMRC) classify wastes for tax purposes using a different scheme to the threefold landfill EU Landfill Directive scheme (i.e., the hazardous, non-hazardous and inert). HMRC have a two-fold system for landfill tax. The Standard Landfill Tax is currently £88.95/T and applies to all wastes unless they qualify for the reduced rate of landfill tax of £2.80/T. The wastes that qualify for the reduced rate of Landfill Tax are set out in The Landfill Tax (Qualifying Material) Order 2011 with supplementary information on the interpretation of these regulations in HMRS "Notice LFT1 – A General Guide to Landfill Tax" (May 2012) and HMRC Briefing Notes 15/12 and 18/12.

APPENDIX C - UNFORESEEN GROUND CONTAMINATION

Unforeseen Ground Contamination

There is the potential for areas of previously unexpected contamination to be present, as is the case with any "brownfield" site. Any significant quantities of asbestos, significant ashy soils, unusual, brightly coloured or significantly oily or odorous material should be considered in this category. If unexpected contamination is found the following procedures should be adhered to:

1. All site works at the position of the suspected contamination will cease.
2. A suitably trained geo-environmental specialist should assess the visual and olfactory observations of the condition of the ground and the extent of contamination, and the Client and the Local Authority should be informed of the discovery. Should the contamination be likely to affect controlled waters the Environment Agency shall also be informed.
3. The suspected contaminated material will be investigated and tested appropriately in accordance with the assessed risks. The investigation works will be carried out in the presence of a suitably qualified geo-environmental engineer. The investigation works shall commence to recover samples for testing and, using visual and olfactory observations of the condition of the ground, delineate the area over which contaminated materials are present.
4. The unexpected, contaminated material will either be left in situ or be stockpiled whilst testing is carried out and suitable assessments completed to determine whether the material can be re-used on site or requires to be disposed as appropriate.
5. Where the material is left in situ awaiting results it will be reburied or covered with plastic sheeting.
6. Where the potentially contaminated material is to be temporarily stockpiled it will either be placed either on a prepared surface of clayey Alluvium, or on 2000-gauge Visqueen sheeting (or other impermeable surface) and covered to prevent dust and odour emissions.
7. Any areas where unexpected visual or olfactory ground contamination will be surveyed, a photographic record kept, and testing results incorporated into the Verification Report.
8. A photographic recorded will be made of relevant observations.
9. The testing suite will be determined by the independent geo-environmental specialist on the basis of visual and olfactory observations.
10. Test results will be compared against current assessment criteria suitable for the future use of the area of the site affected.
11. The results of the investigation and testing of any suspect unexpected contamination will be used to determine the relevant actions. After consultation with the Local Authority and if necessary the Environment Agency, materials should either be:

    - re-used in areas where test results indicate that it meets compliance targets so it can be reused without treatment; or
    - treatment of material on site to meet compliance targets so it can be reused; or

- removal from site to a treatment centre or to a suitably licensed landfill or permitted treatment facility.

12. Verification Report will be produced for the work.

Asbestos

Asbestos cement products and asbestos fibres have not been encountered in the soils at the site but based on the age of the Made Ground material containing asbestos could be expected to be encountered. If non-notifiable asbestos (e.g., chrysotile asbestos cement board) is encountered in excavations then it will be dealt with in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and the HSE's ACoP for asbestos (2013). Finding non-notifiable asbestos is a very common occurrence on brownfield sites and is a relatively low risk activity and can be dealt with as a matter of routine. Therefore, it is not proposed that the Council will be notified but an appropriate record will be kept of confirmatory testing and disposal. This will be included in remediation verification reports.

If suspect notifiable asbestos is encountered then the Council and the HSE will be notified. An appropriate action plan will be agreed with the Council and the HSE in accordance with CAR 2012. The action plan will include the preparation of the Risk Assessment and Plan of Work in accordance with CAR and other statutory requirements including:

- Site mobilisation;
- Excavation methodology;
- Handling, movement and storage on-site of excavation arisings;
- Any processing of excavation arisings containing ACMs;
- Movement and placement of arisings to final destination;
- Placing of cover system over soils with and ACMs remaining on-site;
- Off-site disposal of ACMs;
- Licences;
- PPE & RPE; and,
- Dust and fibre monitoring.

Potential mitigation measures that would be required include:

- Ensuring works are carried out by suitably trained and experienced personnel with working with asbestos;
- Site investigation and risk assessment;
- Removal or treatment of asbestos hotspots;
- Use of PPE and RPE by construction workers; and,

- Compliance monitoring.

Unexpected Tanks

No buried underground fuel storage tanks have been encountered during the site investigation works; however, there remains a low risk that tanks are present on-site. Should an underground tank be encountered, operations should cease in the area. Additionally, there may be pipework associated with these tanks which could have oily residues. The following procedures are to be adhered to if tanks and pipework are identified:

1. All site works at the position of the tanks/pipework should stop.
2. A description of the tank should be made by the geo-environmental engineer including; condition and surround, along with visual and olfactory observations should any contents in the tank be apparent. A photographic recorded will also be made of relevant observations.
3. The tank's position and depth should be determined and marked on a plan of the site.
4. The independent geo-environmental engineer will inform Client and the Local Authority.
5. During the presence of the independent geo-environmental engineer, investigation works should be undertaken to obtain samples of any liquid or sludge contents and to establish dimensions of the tank.
6. Testing will be determined on the basis of visual and olfactory observations by independent geo-environmental engineer.
7. Test results will be compared against current assessment criteria and proposals for disposal of any contents determined in agreement with the appropriate Regulatory Parties.
8. Emptying the tank and disposal of contents to a suitable licenced disposal facility.
9. Degassing and removal of the tank by a suitably qualified contractor will be required, and a Naked Flame Certificate should be provided.
10. Once the tank has been emptied in accordance with the above proposals, it is to be removed for disposal to a licensed waste management facility. Copies of the relevant waste consignment notes are to be kept and included in the Verification Report.
11. Excavation and remediation of any contaminated soils around the tank will be carried out.
12. Samples of the base and sides of the resultant hole will be sampled and supervised by the independent geo-environmental engineer to confirm whether risks to human health or controlled waters.

APPENDIX D – CURRENT GUIDANCE FOR GROUND GAS RISK ASSESSMENT

Current Guidance for Ground Gas Risk Assessment

Origin of Ground and Landfill Gases

When carrying out a ground gas risk assessment for permanent ground gases (e.g., methane and carbon dioxide), the origin or source of the gases is important as potential risks will vary depending on the source. This Appendix relates to the risk of the two main ground gases of concern: methane and carbon dioxide and does not apply to other ground gases (e.g., radon or vapours from hydrocarbon spills). Methane and carbon dioxide are major constituents of landfill gas but can also occur from a variety of anthropogenic and natural sources, as summarised in Table G1 below:

Table G1. Potential Sources of Ground Gases

Gas	Source	Comments
Landfill Gas	Anaerobic decomposition of degradable waste within landfill sites. Typically, 60% methane and 40% carbon dioxide during methanogenic phase.	Composition varies over time, particularly in early stages. Contains a range of minor constituents (particularly carbon monoxide and hydrogen sulphide).
Landfill Associated Gases	- Anaerobic degradation of leachate external to the site; - Degassing of dissolved gases in groundwater; - Evolution of gases following interaction between leachate and groundwater	Can result in secondary (external) production of methane or carbon dioxide.
Made Ground	Anaerobic degradation of organic components	Very variable depending on source
Sewer Gas, Cess Pits	Anaerobic degradation of organic components of sewage producing methane and carbon dioxide.	Often characterised by hydrogen sulphide odour.
Mains Gas	Leakage from underground pipework or storage tanks. Mainly methane but often contains higher alkanes.	An odouriser is added to permit detection of leaks. Typically, 90% CH_4, but 1 to 27% C_2-C_4 alkanes, May also contain other trace gases e.g., CO, helium and CO_2 (from degradation of CH_4 in the ground).
Other Anthropogenic Sources	- Degradation of leaked or spilled hydrocarbons or other industrial chemicals; - Anaerobic degradation of organic contaminants in groundwaters (e.g., silage liquor); - Reactions between monitoring well construction components and environment; - Burial grounds/cemeteries.	Hydrocarbon spillages often have an 'oily' odour. Fuel spillages common – Petrol or Diesel and can contain a wide range of VOC's. Can degrade to produce methane / carbon dioxide.
Alluvium / Marsh / Peat Gas	Anaerobic microbial degradation of organic material (usually waterlogged vegetation / peat). Often associated with the presence of alluvial deposits or dredgings.	
Geogenic Gas	Natural seepages of carbon dioxide and hydrocarbon gases derived from geologic sources such as coal seams and deep oil / gas source formations. Can be present in solution in groundwaters.	Methane most common but can contain carbon dioxide and higher alkanes.
Mine Gases	Various types. Most common is "fire damp" with high methane, produced by the desorption of gas trapped in coal. "Black damp" (Stythe gas) with high carbon dioxide and denser than air. "White damp" is high in carbon monoxide.	Methane most common. Can contain higher alkanes, carbon dioxide and carbon monoxide. Often low in oxygen.
Natural Shallow Ground Gas	Various types - high carbon dioxide formed by subsurface aerobic activity leading to depleted oxygen and elevated carbon dioxide; - chemical degradation of rocks (e.g., carbonates) producing carbon dioxide; - carbon dioxide production in root zone of soils by plants.	Gases can be emitted from ground under falling barometric pressure conditions.

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

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

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

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

Hazards Associated with Presence of Ground Gases

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

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

Parameters Influencing the Rate of Ground Gas Production

Figure G2 is taken from EA guidance document LFTGN 03 illustrates typical ground gas generation curves from biodegradable materials:

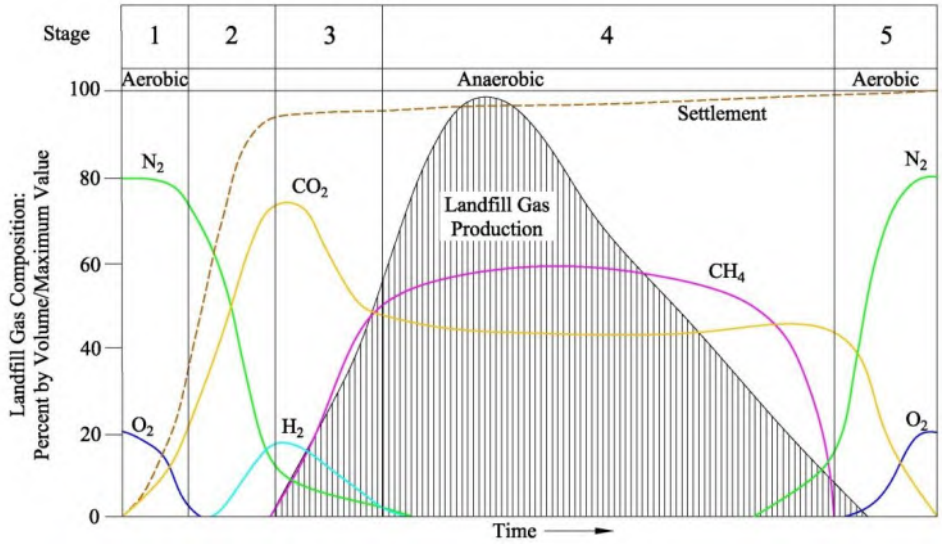


Figure G2. Idealised Representation of Landfill Gas Generation.

The production of methane and carbon dioxide at a landfill site may be expected to be considerable and ongoing. Concentrations of methane will eventually decrease, followed by concentrations of carbon dioxide, but the duration and rate of gas production can vary markedly between sites. Five distinct phases of gas production occur during the process which are, in order of event (as marked on Figure G2), as follows:

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

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

- High water content with adequate rainfall and water infiltration to provide moisture content between approximately 20 to 26%;

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

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

Factors Influencing the Migration and Behaviour of Ground Gases

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

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

Guidance Documents

Currently in the UK, there are no statutory threshold limits for hazardous gases in the ground as site specific variables mean that standard threshold values cannot be applied. The published guidance relating to development of sites where methane and carbon dioxide are present has been produced in response to building projects on or close to landfill sites, as both gases are principal constituents of landfill gas. Much of the historic guidance that has been produced on gas risk assessment focused on landfill sites and as a result there has previously been a lack of clarity when relating the process to gas conditions on non-landfill sites.

Statutory guidance regarding methane in the ground has previously taken a limiting concentration of 1.0 % by volume methane (equal to 20% of the lower explosive limit of methane in air) above which necessary actions will be appropriate. For carbon dioxide the limiting recommended trigger was 1.5 % by volume (the Long-Term Exposure Limit for carbon dioxide). Above these concentrations the Building Regulations Approved Document C (1992) stated that consideration should be given to whether actions may be appropriate, whilst more specific solutions would be likely to be necessary at concentrations greater than 5% by volume of carbon dioxide (Building Regulations Approved Document C, 1992). However, the latest fully revised version of Approved Document C (DoE, 2004) no longer endorses this approach and instead requires the use of a risk-based approach in interpreting the findings of a gas monitoring survey. Further, the latest EA documentation on landfill gas (LFTGN 03, 2004) continues to sanction the use of a risk-based approach through a structured approach to the assessment of ground gases and links with the risk assessment process outlined within CLR 11 for soil contaminants.

With the above in mind, recent guidance has been produced in 2006 and 2007 with the aim of providing up to date advice in relation to residential and commercial development. The guidance does not address issues associated with gas derived from landfills, for this refer to *"Guidance on the Management of Landfill Gas"* (Environment Agency 2004) for an overview.

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

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

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

  - **All development types except low rise housing with gardens and for Low Rise Buildings without a 150mm void** (Situation A) (Table 8.5 CIRIA C665)

  and;

  - **Low rise housing with gardens with a 150mm ventilated sub-floor void** (Situation B) (Table 8.7 CIRIA C665)
    (See below for further explanation of the methods of characterisation)

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

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

- **Wilson and Card (CIEH, expected 2011) *"Ground Gas Handbook for Designers and Regulators"***

  This document is expected to provide practical guidance on ground gas assessments and the design and evaluation of protection measures.

- **British Standard (BS 8485+A1, January 2019)** ***"Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings"***

  This document provides an overview of gas characterisation and assessment. The Standard is intended to be used by designers of gas protection measures and regulators involved in the assessment of design solutions. The Standard provides a framework in line with CLR11 allowing designers to judge the adequacy of ground gas and related site investigation data. The document provides an approach to determine appropriate ground gas parameters that can be used to identify a range of possible construction solutions mitigating against the presence of ground gas on a development site.

Each of these documents continues to highlight the importance of, and give further guidance towards, carrying out a tiered risk-based decision-making process in accord with government policy on dealing with contamination from historic or natural sources and highlight the importance of the Conceptual Model in site characterisation. These documents also stress the importance that the assessor should be confident that the ground gas monitoring results are representative of the likely worse case ground gas regime on a site and that the data collected from the site is sufficient. With this in mind, CIRIA C665 sets out ideal monitoring periods as below.

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

		Generation Potential of Source				
		Very Low	**Low**	**Moderate**	**High**	**Very High**
Sensitivity of Development	Low (Commercial)	4/1	6/2	6/3	12/6	12/12
	Moderate (Flats)	6/2	6/3	9/6	12/12	24/24
	High (Residential with Gardens)	6/3	9/6	12/6	24/12	24/24

Notes

1. First number is the number of readings and the second is the minimum period in months (e.g., 6/2 – six sets of readings over two months).

2. At least two sets of readings must be at low (preferably under 1,000 mb) and falling pressure.

3. High sensitivity end use on high or very high hazard site will not normally be acceptable unless the source is treated to reduce gassing potential.

Before the latest guidance, good practice for site characterisation had been based upon the method proposed by Wilson and Card (1999). CIRIA C665 (2007) effectively supersedes Wilson and Card (1999) and includes a modified version of the Wilson and Card method (Tables 8.5, 8.6 and Box 8.1). Gas concentrations and flow rates for either methane and/or carbon dioxide measured at a site to 'Characteristic Situations.' Appropriate protection measures are selected from Table 8.6 (if using modified Wilson & Card method) and from Box 8.4 from CIRIA C665 (if using the NHBC traffic lights method). Throughout the risk assessment process, strong regard must be given to the nature of the gassing source, the flow rates and the estimated surface emissions. Note that certain protection measures are stated in CIRIA Report 149 that are now considered wholly inappropriate to certain developments and consequently should not be used without modification. Throughout the process, it is important to remember that these tables are not

intended to be used as a definitive design tool and have been prepared to show the typical scope of measures for gas control.

Both the NHBC (2007) and CIRIA (2007) guidance documents and BS 8485+A1 (2019) propose that both ground gas concentrations and flow rates are used to calculate the limiting gas well gas volume flow rates for methane and carbon dioxide, based on the ground gas conditions monitored for during the worse-case temporal conditions. This limiting gas well volume flow rate is termed the Gas Screening Value (GSV, note that this was termed borehole gas volume flow), and is calculated as follows:

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

These GSVs are then compared to generic 'Traffic Lights' contained within the NHBC guidance, which present typical maximum gas concentrations and limiting GSV's, for 'Situation B Development' (Low rise housing with gardens).

Table 8.7 NHBC Traffic light system for 150 mm void

Traffic Light	Methane [1]		Carbon Dioxide [2]	
	Typical max concentration [3] (% by volume)	Gas Screening Value [2,4] (litres/hour)	Typical max concentration [3] (% by volume)	Gas Screening Value [2,4] (litres/hour)
Green	1	0.13	5	0.78
Amber 1	5	0.63	10	1.6
Amber 2	20	1.60	30	3.10
Red				

Notes:

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

Box 8.4 of CIRIA C665 Gas protection measures for low-rise housing development based upon allocated NHBC Traffic light (Boyle and Witherington, 2007)	
Traffic Light Classification	**Protection Measures Required**
Green	Negligible gas regime identified, and gas protection measures are not considered necessary.
Amber 1	Low to intermediate gas regime identified, which requires low-level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to limit the ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414. Ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours.
Amber 2	Intermediate to high gas regime identified, which requires high-level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to prevent the ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414. Membranes should always be fitted by a specialist Contractor. As with Amber 1, ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours. Certification that these passive protection measures have been installed correctly should be provided.
Red	High gas regime identified. It is considered that standard residential housing would not normally be acceptable without a further Gas Risk Assessment and/or possible remedial mitigation measures to reduce and/or remove the source of gas.

For a 'Situation A Development' (All development except low rise housing with gardens), the GSV value is used to derive the appropriate Characteristic Situation from Table 8.5 of CIRIA C665 (below):

Table 8.5 from CIRIA C665 Modified Wilson and Card Classification					
Characteristic Situation (CIRIA R149)	**Comparable Partners in Technology gas Regime (see Box 8.2)**	**Risk Classification**	**Gas Screening Value (CH_4 or CO_2) (l/hr)[1]**	**Additional Factors**	**Typical Source of Generation**
1	A	Very low risk	<0.07	Typically, methane ≤ 1% and/or carbon dioxide ≤ 5%. Otherwise consider increase to Situation 2	Natural soils with low organic content "Typical" made ground
2	B	Low risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to characteristic Situation 3	Natural soil, high peat/organic content. "Typical" made ground
3	C	Moderate risk	<3.5		Old landfill, inert waste, mine working flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protective measures.	Mine working susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70		Mine working unflooded inactive with shallow workings near surface
6	F	Very high risk	>70		Recent landfill site

It was intended in CIRIA C665 that the characteristic situation allocated to the development from the table above would then be used in Table 8.6 of CIRIA C665 in order to determine the level of gas protection the development requires. However, BS8485:2015 superseded this document and a different set of mitigation standards were put forward.

The recommended minimum gas protection score (points) be selected based on the building type (Table 3 which defines four building types) and the ground gas Characteristic Situation as detailed in Table 4 of BS8485:2015+A1:2019 (see below).

The first step in the decision-making process is to obtain the level of gas protection necessary in the range 0 to 7.5 from Table 4. Then a combination of structural barriers (Table 5) ventilation protection measures (Table 6) and/or gas resistant membranes (Table 8)should be chosen to meet that requirement. The level of gas protection necessary should take into account the characteristic gas situation and a number of other factors. The whole decision-making process should be made transparent, where all parties can see the approach being taken, can understand the various steps and decisions made and be confident that a risk-assessed solution has been designed and installed commensurate with the construction and site constraints.

Where the gas Characteristic Situation is 4 or more (and for NHBC Red situations according to CIRIA C665), the site requires a comprehensive risk assessment to confirm the scope of protection measures. These are higher risk sites and reliance on Table 4 alone is not sufficient.

BS8485:2015+A1:2019 Table 3 Building Types				
	Type A	**Type B**	**Type C**	**Type D**
Ownership	Private	Private or commercial/ public, possible multiple	Commercial / public	Commercial / industrial
Control (change of use, structural alterations, ventilation	None	Some but not all	Full	Full
Room sizes	Small	Small / medium	Small to large	Large industrial / retail park style

BS8485:2015+A1:2019 Table 4 Gas Protection Score by CS and Type of Building				
CS	Required Gas Protection			
	High risk	Medium risk	Low risk	
	Type A	Type B	Type C	Type D
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5 (A)	5.5(A)	4.5	3.5
5	(B)	6A)	5.5	4.5
6	(B)	(B)	(B)	6
a) Residential building should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g., high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g., in institutional and/or fully serviced contractual situations.				
b) The gas hazard is too high for this empirical method to be used to define the gas protection measures				
NOTE 3 The NHBC has published guidance for use on residential developments, which utilise an alternative classification ("traffic light") system. This guidance typically applies to Type A buildings utilising beam and block floor constructions with clear void ventilation. The design choice variables are limited to decisions relating to the membrane specification and verification recommendations (see Table 7). Designers utilising this system would therefore need to refer to NHBC to assess compliance for specific recommendations [see 8485:2015 for further on this note]				
NOTE4 The method of selecting the combination of these types of protection is given in section 7.2 of BS8485:2015. Once type of measures has been decided, the detailed design and specification of the measures should be undertaken (section 7.3)				

Section 7.2 defines the order of selecting protective measures. The first choice is provided by structural barriers as defined in Table 5.

BS8485+A1:2019 Table 5 Gas protection scores for structural barriers		
PROTECTION ELEMENT/SYSTEM	SCORE	COMMENTS
Floor and substructure design		
Floor slabs Block and beam floor slab	0	*General – score conditional that breaches of slab are sealed*
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5	
Cast in situ monolithic reinforced ground-bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations (with only nominal mesh reinforcement)	1 or 1.5	*To achieve 1.5, raft or suspended slab to be well reinforced to prevent cracking and minimal penetrations*
Basement floor and walls to BS 8102:2009, Grade 2 waterproofing – See notes in BS8485:2015+A1:2019	2	
Basement floor and walls to BS 8102:2009, Grade 3 waterproofing - See notes in BS8485:2015+A1:2019	2.5	*Conditional that waterproofing is not based on geosynthetic clay liner*

Ventilation methods are detailed in Table 6, and points can only be gained from using one of the five types:

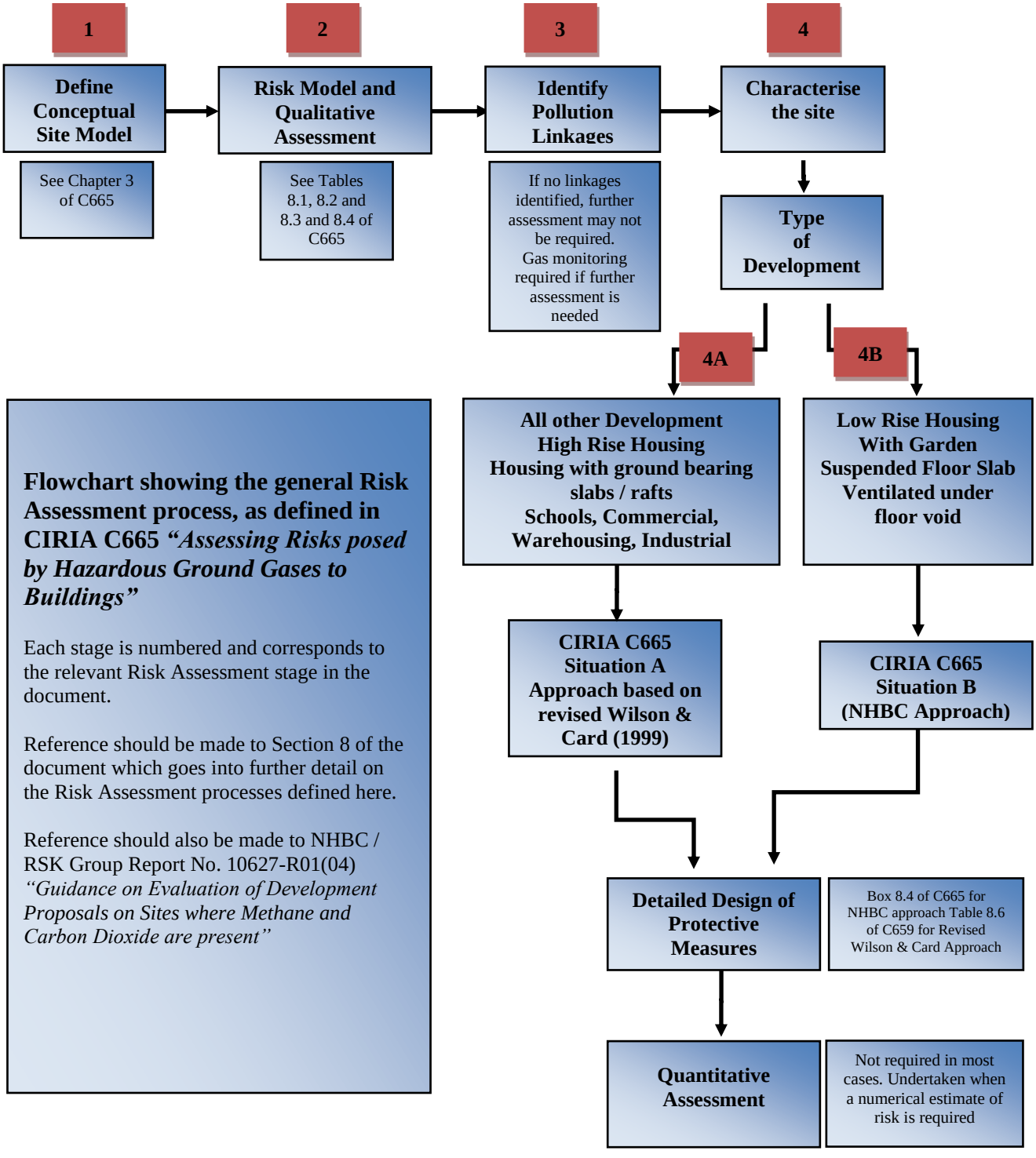
BS8485:2015+A1:2019 Table 6 Gas Protection Scores for Ventilation Protection Measures		
PROTECTION ELEMENT/SYSTEM	**SCORE**	**COMMENTS**
a) Pressure relief pathway (usually formed by low fines gravel or with a thin geocomposite blanket with strips terminating in a gravel trench external to the building	0.5	*Whenever possible, a pressure pathway relief pathway (as a minimum) should be installed in all gas protection measures systems.* *If a layer has a low permeability and/or is not terminating in a venting trench (or similar), then the score is zero.*
b) Passive sub floor dispersal layer Very good performance Good performance Media used to provide the dispersal layer are: • Clear void • Polystyrene void forming blanket • Geocomposite void former blanket • No-fines gravel layer with gas drains • No-fines gravel layer	 2.5 1.5	*Performance criteria shown in Fig B.6 and B.7 of BS 8484:2015.[See Annex B]*
c) Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers	1.5 to 2.5	*This system relies on continued serviceability of the pumps; therefore, alarm and response systems should be in place. [See Annex B].*
d) Active positive pressurisation by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket	1.5 to 2.5	*This system relies on continued operation of the pumps; therefore, alarm and response systems should be in place. [See Annex B].*
e) Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or under croft)	4	*Assumes car park is vented , designed to Building Regulations 2000, Approved Document F.*

Membrane methods are detailed in Table 7.

BS8485:2015+A1:2019 Table 7 Gas protection score for gas resistant membrane		
PROTECTION ELEMENT/SYSTEM	**SCORE**	**COMMENTS**
Gas resistant membrane meeting all of the following criteria: • Sufficiently impervious to gases with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method) • Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • Sufficiently strong to withstand in-service stresses (e.g., settlement if placed below a floor slab); • Sufficiently strong to withstand the installation process and following trades until covered (e.g., penetration from steel fibres in fibre reinforced concrete, dropping tools etc); and to withstand in-service stresses (e.g., settlement if placed below a floor slab) • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735	2	*The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation, and the integrity of joints.* *If a membrane is installed that does not meet the criteria, then the score is zero.*
See notes in BS8485:2015+A1:2019 regarding membrane requirements		

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

Following the choice of protection measures, detailed design should be entered into [Section 8 of BS 8485:2015+A1:2019].



Flowchart showing the general Risk Assessment process, as defined in CIRIA C665 *"Assessing Risks posed by Hazardous Ground Gases to Buildings"*

Each stage is numbered and corresponds to the relevant Risk Assessment stage in the document.

Reference should be made to Section 8 of the document which goes into further detail on the Risk Assessment processes defined here.

Reference should also be made to NHBC / RSK Group Report No. 10627-R01(04) *"Guidance on Evaluation of Development Proposals on Sites where Methane and Carbon Dioxide are present"*

APPENDIX E – PREVIOUS THIRD-PARTY REPORTS

PURE RESIDENTIAL AND COMMERCIAL LTD

PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP

GEOTECHNICAL AND GROUND GAS INVESTIGATION REPORT

REPORT No. E1450.GGC.R1

MAY 2022

Client :	**PURE RESIDENTIAL AND COMMERCIAL LTD**
Project Title :	**PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP**
Document Title:	**GEOTECHNICAL AND GROUND GAS INVESTIGATION REPORT**
Project No.	**E1450**
Report No.	**E1450.GGI.R1**
Date.	**MAY 2022**

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Distribution: **PURE RESIDENTIAL AND COMMERCIAL LTD**

Version: **Date:**	FINAL 02/05/22		
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Report Ref:	**E1450.GGI.R1**		
Signed:			

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1. INTRODUCTION.

1.1 Background and Terms of Reference

1.1.1 In December 2021 e-geo Solutions Ltd were commissioned by Pure Residential and Commercial Ltd to undertake a combined geotechnical and ground gas investigation at a proposed residential development site on land known as Plot 1, Plot 2, Plot 3 Ruabon Park off Watkin Way, Ruabon, Wrexham. The objective of the investigation was to determine the ground conditions at the site, the geotechnical properties of the ground strata, and to assess the site with respect to potential ground gas contamination.

1.1.2 This report presents the findings of intrusive investigations with in-situ geotechnical tests, the chemical analysis of soil samples and monitoring of ground gasses.

1.1.3 The site is presently greenfield agricultural land. It is proposed to redevelop the site with residential properties and the findings of the intrusive investigation have been assessed against this proposed end use.

1.1.4 The report has been prepared by e-geo Solutions Ltd for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. Any other party using this report for any purpose whatsoever do so at their own risk and any duty care to that party is specifically excluded.

1.1.5 The comments given, and opinions expressed, in this report are based on the information available at the time the report was compiled, however there may be additional information and data which becomes available at a later date which has an impact on the report content. Where data supplied by others has been used it has been assumed that the information is correct. No responsibility can be accepted by e-geo Solutions Ltd for inaccuracies within the data supplied by others.

1.1.6 The copyright of this report and its contents prepared by e-geo Solutions Ltd is solely owned by e-geo Solutions Ltd. Neither this report nor contents prepared by e-geo Solutions Ltd may be reproduced, published or adapted without the express written approval of e-geo Solutions Ltd.

1.2 Report Contents

1.2.1 The report includes sections on:-

- Present site description, profile and setting.
- The scope of the investigation, testing and analysis and its justification.
- The geological and hydro-geological conditions encountered in shallow boreholes
- The results of in-situ ground geotechnical strength tests and laboratory geotechnical tests
- Chemical analysis results
- The results of monitoring of selected boreholes for ground gasses.

2. SITE LOCATION, DESCRIPTION AND PROFILE.

2.1 Site Location

2.1.1 The residential development site known as Plot 1, Plot 2 and Plot 3 Ruabon Park is located 0.75km southwest of the centre of Ruabon near Wrexham and just west of the junction of the A539 and A483. The site location is shown on Figure 1 with the extent of Plot 1, Plot 2 and Plot 3 shown on Figure 2. The site area comprises a rectangular area of land which is currently agricultural land. The overall site area is centred at OS Grid Ref: SJ 29909 43303.

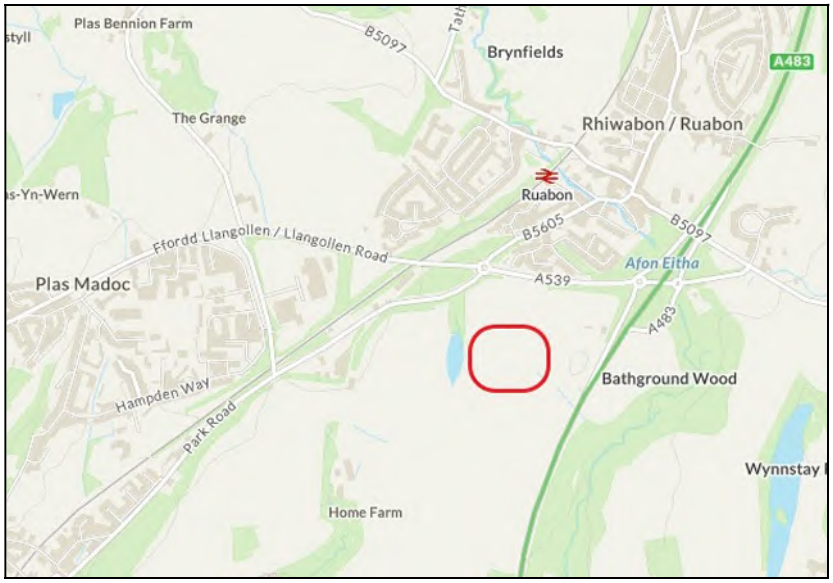


Figure 1 – Site Location

2.1.2 The extent of the site and the study area boundaries is shown on Figure 2.

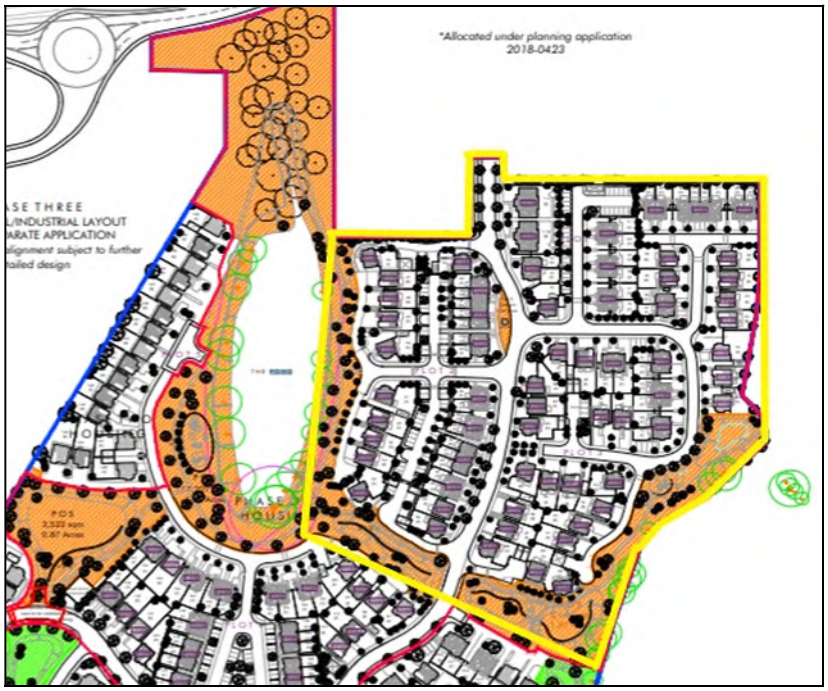


Figure 2 – Site Extent (edged yellow)

2.2 Site Description and Topography

2.2.1 The site area of Plot 1, Plot 2 and Plot 3 presently comprises an extensive area of undeveloped grassed agricultural land, surrounded by agricultural land on all sides and with a petrol station and Aldi store to the northwest and small lake to the west. The overall topography is gently undulating and slopes very gently overall from north to south and west to east, with a slightly raised area of ground in the centre of the site.

2.3 Site Profile

2.3.1 A desk-based Phase 1 contamination study of the site has been undertaken. Full details of the study are presented in a report titled : Ruabon Park, Wrexham, Phase 1 Contamination Assessment Report. Ref 773135-REP-ENV-00116th November 2015 by MLM Consulting Engineers.

3. GROUND INVESTIGATION WORKS.

3.1 Previous Investigations

3.1.1 A previous investigation of the ground at the site was undertaken in November 2015 by MLM Environmental Ltd. The findings are presented in a report titled: Ruabon Park, Wrexham, Preliminary Geoenvironmental Assessment Report. Ref 773135-REP-ENV-002 27th November 2015 by MLM Consulting Engineers.

3.2 Scope of Work – Exploratory Holes

3.2.1 A additional geotechnical and ground gas investigation was undertaken to provide further information on the ground conditions at the site and the soil gas regime. The works were carried out by e-geo Solutions Ltd with the field work element undertaken on 18th January 2022 and 22nd January 2022. The investigation was designed, supervised and administered by e-geo Solutions Ltd and undertaken in accordance with BS5930 (1999) – code of Practice for Site Investigations (Amendment 1).

3.2.2 The main scope of work involved:

- The construction of 21 Nr shallow boreholes to 4 to 5m with continuous core sampling and follow-on Dynamic Cone tests to determine ground SPT N values, density and strength and collect ground samples.
- The examination of ground strata by a geo-environmental engineer and the careful description of soil types. Detailed descriptions of the ground strata are presented on the borehole records in Appendix 1. The dynamic Cone Test report is presented in Appendix 2.
- The installation of ground gas monitoring standpipes in 6 Nr boreholes to 3.5m for ground gas monitoring.
- Collection of ground samples from near the ground surface for chemical analysis and for geotechnical laboratory testing.
- The monitoring of ground gasses on 6 occasions over a 4-month period. Gas monitoring results are presented in Appendix 4.

3.3 Scope of Work – Testing and Analysis

3.3.1 A total of 9 Nr. ground samples were collected from the shallow boreholes and submitted for chemical analysis – soluble sulphate at an accredited analytical laboratory. The analytical results are presented in Appendix 6.

3.3.2 A total of 11 samples were submitted for Atterberg limit test results to determine soil swelling and shrinkage potential. The results are presented in Appendix 3.

3.4 Borehole Locations

3.4.1 Window sampler borehole locations are indicated on Figure 4 below.

3.5 Gas Monitoring

3.5.1 Gas monitoring standpipes were installed in shallow boreholes WS2, WS6, WS11, WS15, WS18, WS21 to a depth of 3.0 to 4.0m and monitored on 6 occasions over a 4-month period. No monitoring of previously installed gas monitoring standpipes was undertaken as all had been completely destroyed.



Figure 4 – Borehole Locations (WS1 to WS21)

4. GROUND CONDITIONS AND GEOLOGY.

4.1 General

4.1.1 Details of the ground strata and depths are presented on the borehole records in Appendix 1. A summary of the findings is presented below.

4.2 Stratigraphy

4.2.1 The general strata and depths encountered during the investigation was:

Stratum	Description	Depth to base m range (average)
TOPSOIL	Dark brown gravelly sandy silty loamy TOPSOIL	0.25 to 0.45
Gravelly SILT or gravelly CLAY	Firm to stiff light brown to medium brown and orange brown very gravelly sandy SILT OR Firm to stiff light brown and orangish brown gravelly silty CLAY.	1.50 to 2.50
SAND and GRAVEL	Loose light to medium brown silty fine to coarse SAND and GRAVEL. OR Light greenish brown silty fine SAND with bands of sandy silt	2.50 to 3.00
Stiff CLAY	Stiff dark brown gravelly sandy silty CLAY with cobbles of sandstone	3.00+

4.3 Groundwater

4.3.1 Groundwater inflows were recorded in boreholes during construction. Details of the inflows are presented on the borehole records.

4.4 Contamination Observations

4.4.1 During the examination of the ground strata no obvious indications of contamination were noted.

4.5 Geotechnical Properties

4.5.1 The results of the Atterberg limit (plasticity) tests are presented in Appendix 3 and are summarised below.

WS No.	Depth	< 425um	PL%	LL%	PI%	Mod PI	Plasticity
WS1	1.50	68	Non plastic				
WS2	1.60	99	19	40	21	21	Intermediate
WS9	3.00	51	15	27	12	6.1	Low
WS11	2.00	67	13	26	13	8.7	Low
WS13	1.30	98	16	31	15	14.7	Low
WS13	1.70	70	Non plastic				
WS15	1.50	69	14	29	15	10.3	Low
WS17	1.20	54	15	24	9	4.8	Low
WS18	1.20	64	15	28	13	8.3	Low
WS20	1.50	63	13	23	10	6.3	Low
WS20	2.10	69	15	27	12	8.3	Low

4.5.2 Ground density and strength varied with depth across the investigation area with individual borehole records (Appendix 1) giving the geotechnical strength characteristics for separate locations.

4.6 Sulphates and Concrete Class

4.6.1 No elevated concentrations of soluble sulphate were detected in the samples analysed. The results indicate that ACEC Class AC1 and sulphate class DS-1 conditions prevail at the site, in accordance with BRE Special Digest 1 'Concrete in Aggressive Ground 2005'

5. GROUND GAS ASSESSMENT

5.1 Ground Gas Investigation Scope of Work

5.1.1 To supplement previous gas monitoring information the ground investigation included the completion of selected boreholes with gas monitoring installations and the monitoring of the installations on 6 occasions over a period of 4 months.

5.1.2 Gas monitoring standpipes were installed in the shallow boreholes to the following depths:

Borehole Number	Installation
WS2	1m plain 3m slotted to 4m
WS6	1m plain 3m slotted to 4m
WS11	0.5m plain 2.5m slotted to 3m
WS15	0.5m plain 2.5m slotted to 3m
WS18	0.5m plain 2.5m slotted to 3m
WS21	0.5m plain 2.5m slotted to 3m

5.1.3 Monitoring of the standpipes for methane (% volume), carbon dioxide (% volume), oxygen (% volume), and flow was undertaken on 01/02/22, 16/02/22, 04/03/22, 25/03/22, 19/04/22, and 12/05/22. Gas monitoring was undertaken with a GA5000 Serial number G507303. Gas monitoring results are presented in Appendix 4.

5.2 Ground Gas Monitoring Results Assessment

5.2.1 In the assessment of soil gasses reference has been made to the NHBC Guidance on Methane and Carbon Dioxide Report Edition No04 (March 2007), BS8485 and CIRIA Publication C659 Assessing Risks Posed by Hazardous Ground Gases To Buildings. The monitoring results have been compared to the standard trigger concentrations of 1% v/v for methane and 5.0% v/v for carbon dioxide.

5.2.2 No detectable concentrations of methane were recorded in boreholes WS2, WS6, WS11, WS15, WS18, WS21 by % volume or % lower explosive limit (LEL) on any of the 6 monitoring visits.

5.2.3 Very low concentrations of carbon dioxide, with slightly depleted oxygen concentrations were detected in all monitoring installations (WS2, WS6, WS11, WS15, WS18, WS21) on most occasions but concentrations were only in the range 0.4% to 2.2% (steady readings) with a maximum of 2.3% (peak reading) detected in WS18 on 04/03/22. All concentrations were consistent during the monitoring period and well below the 5.0% trigger concentration.

5.2.4 When the gas monitoring equipment (GA5000 Gas Analyser Serial Nr. G507303) potential margin of error is taken into consideration the potential maximum peak carbon dioxide concentration is still significantly less than 5.0%.

5.2.5 Gas flows in all monitoring installations were 0.1 l/hr or less.

5.2.6 With reference to the CIRIA and NHBC Guidance and the ‘Traffic Light’ system of ground gas risk assessment the results have been screened using the method for low rise housing developments. No methane was detected. For a maximum peak carbon dioxide concentration of 2.3% and a flow rate of 0.1l/hr the Gas Screening Value (GSV) is 0.0023l/hr. With a GSV of 0.0023 and maximum carbon dioxide concentration of 4.8% the site would be classified as ‘Characteristic Situation 1’.

5.3 Radon Report

5.3.1 A site specific radon report indicating the potential risk from radon gas is presented as Appendix 5. According to BGS Radon Report BGS_326495/34724 BASIC Radon protection measures are required for the site area.

Appendix 1 - Window Sampler Borehole Records

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS1**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown sandy silty loamy TOPSOIL		
0.20 - 0.50		SPT N=4				
0.50 - 0.80		SPT N=1	0.50	Soft dark brown to dark greyish brown clayey SILT with some organic matter as decayed roots		
0.80 - 1.10		SPT N=4				
1.10 - 1.40		SPT N=16	1.20	Firm dark greyish brown very gravelly clayey SILT. Gravel is subangular fine to coarse various lithologies		
1.40 - 1.70	D - 1.50	SPT N=12				
1.70 - 2.00		SPT N=22	1.80	Dense medium brown slightly silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular of various lithologies. Rare cobbloe		
2.00 - 2.30		SPT N=48				
2.30 - 2.60		SPT N=42		Water inflow at 2.20. Standing at 0.90		2.20 inflow
2.60 - 2.90		SPT N=44				
2.90 - 3.20		SPT N=26		Borehole collapse		
3.20 - 3.50		SPT N=16		Base of borehole at 3.00		
3.50 - 3.80		SPT N=14				
3.80 - 4.10		SPT N=17				
4.10 - 4.40		SPT N=19				
4.40 - 4.70		SPT N=21				
4.70 - 5.00		SPT N=24				
5.00 - 5.30		SPT N=30				
5.30 - 5.60		SPT N=29				
5.60 - 5.90		SPT N=23				
5.90 - 6.20		SPT N=28		Base of DCP at 7.10		
6.20 - 6.50		SPT N=26				

DCP with SPTs carried out to 7.10m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS1**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=26					
6.80 - 7.10		SPT N=24					
				Base of DCP at 7.10			

DCP with SPTs carried out to 7.10m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS2**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown sandy silty loamy TOPSOIL		Dry during boring
0.20 - 0.50		SPT N=4	0.30	Firm to stiff light brown to medium brown very gravelly sandy SILT. Gravel is subangular fine to coarse various lithologies		
0.50 - 0.80	Shear vane 62kN/m2	SPT N=6				
0.80 - 1.10		SPT N=5				
1.10 - 1.40	Shear vane 85kN/m2	SPT N=5	1.00	Stiff medium grey and medium brown silty CLAY		
1.40 - 1.70	D - 1.60	SPT N=6				
1.70 - 2.00		SPT N=9	1.80	Medium brown slightly gravelly fine to medium SAND		
2.00 - 2.30		SPT N=10	2.00	Stiff medium grey and medium brown silty CLAY		
2.30 - 2.60		SPT N=7				
2.60 - 2.90		SPT N=6				
2.90 - 3.20		SPT N=2				
3.20 - 3.50		SPT N=3				
3.50 - 3.80		SPT N=6				
3.80 - 4.10		SPT N=7				
4.10 - 4.40		SPT N=7		Base of borehole at 4.00		
4.40 - 4.70		SPT N=10				
4.70 - 5.00		SPT N=9				
5.00 - 5.30		SPT N=8				
5.30 - 5.60		SPT N=18				
5.60 - 5.90		SPT N=27		Base of DCP at 6.80		
5.90 - 6.20		SPT N=23				
6.20 - 6.50		SPT N=20				

DCP with SPTs carried out to 6.80m adjacent to window sample borehole. Gas monitoring pipe 1m plain 3m slotted to 4m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS2**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=21					
				Base of DCP at 6.80			

DCP with SPTs carried out to 6.80m adjacent to window sample borehole

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Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS3**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown sandy silty loamy TOPSOIL		Dry during boring
0.20 - 0.50		SPT N=4	0.35	Firm to stiff light brown to medium brown very gravelly sandy SILT. Gravel is subangular fine to coarse various lithologies		
0.50 - 0.80		SPT N=12	0.65	Firm light brown with some orange brown slightly gravelly sandy SILT		
0.80 - 1.10	Shear vane 50kN/m2	SPT N=11	0.85	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse various lithologies		
1.10 - 1.40	Shear vane 65kN/m2	SPT N=7				
1.40 - 1.70	D - 1.40	SPT N=9	1.50	Light greenish brown silty fine SAND with bands of sandy silt		
1.70 - 2.00		SPT N=7				
2.00 - 2.30		SPT N=8				
2.30 - 2.60		SPT N=7				
2.60 - 2.90		SPT N=7				
2.90 - 3.20		SPT N=5	2.90	Medium grey slightly gravelly medium SAND		
3.20 - 3.50		SPT N=6				
3.50 - 3.80		SPT N=4		Base of borehole at 3.50 Hole collapse		
3.80 - 4.10		SPT N=4				
4.10 - 4.40		SPT N=17				
4.40 - 4.70		SPT N=15				
4.70 - 5.00		SPT N=10				
5.00 - 5.30		SPT N=17				
5.30 - 5.60		SPT N=16				
5.60 - 5.90		SPT N=17				
5.90 - 6.20		SPT N=22				
6.20 - 6.50		SPT N=27		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

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Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS3**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=20					
6.80 - 7.10		SPT N=27					
7.10 - 7.40		SPT N=50+					
7.40 - 7.70		SPT N=36					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS4**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown sandy silty loamy TOPSOIL		Dry during boring	
0.20 - 0.50		SPT N=7	0.30	Firm to stiff light brown to medium brown very gravelly sandy SILT. Gravel is subangular fine to coarse various lithologies			
0.50 - 0.80		SPT N=10					
0.80 - 1.10		SPT N=11					
1.10 - 1.40		SPT N=6	1.10	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse various lithologies			
1.40 - 1.70		SPT N=12					
1.70 - 2.00		SPT N=10					
2.00 - 2.30		SPT N=15	2.00	Light greyish brown slightly gravelly silty fine SAND with bands of sandy silt			
2.30 - 2.60		SPT N=8					
2.60 - 2.90		SPT N=9					
2.90 - 3.20		SPT N=8	2.90	Medium greyish brown slightly gravelly silty medium SAND			
3.20 - 3.50		SPT N=8					
3.50 - 3.80		SPT N=9		Base of borehole at 3.50			
3.80 - 4.10		SPT N=10					
4.10 - 4.40		SPT N=10					
4.40 - 4.70		SPT N=9					
4.70 - 5.00		SPT N=20					
5.00 - 5.30		SPT N=30					
5.30 - 5.60		SPT N=40					
5.60 - 5.90		SPT N=22					
5.90 - 6.20		SPT N=24					
6.20 - 6.50		SPT N=28		Base of DCP at 8.00			

DCP with SPTs carried out to 8.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS4**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 17/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=32					
6.80 - 7.10		SPT N=27					
7.10 - 7.40		SPT N=28					
7.40 - 7.70		SPT N=29					
7.70 - 8.00		SPT N=32					
				Base of DCP at 8.00			

DCP with SPTs carried out to 8.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS5**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy silty TOPSOIL		Dry during boring
0.20 - 0.50		SPT N=10	0.35	Loose light to medium brown silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular predominantly sandstone		
0.50 - 0.80		SPT N=11				
0.80 - 1.10		SPT N=6				
1.10 - 1.40		SPT N=15	1.10	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone and quartz		
1.40 - 1.70	Shear vane 60kN/m2	SPT N=7				
1.70 - 2.00		SPT N=10				
2.00 - 2.30		SPT N=14	2.00	Light greyish brown slightly gravelly silty fine SAND with bands of sandy silt		
2.30 - 2.60		SPT N=8				
2.60 - 2.90		SPT N=6	2.50	Medium greyish brown slightly gravelly very silty medium SAND		
2.90 - 3.20		SPT N=7				
3.20 - 3.50		SPT N=14		Base of borehole at 3.00		
3.50 - 3.80		SPT N=21				
3.80 - 4.10		SPT N=20				
4.10 - 4.40		SPT N=18				
4.40 - 4.70		SPT N=20				
4.70 - 5.00		SPT N=20				
5.00 - 5.30		SPT N=25				
5.30 - 5.60		SPT N=20				
5.60 - 5.90		SPT N=18				
5.90 - 6.20		SPT N=23				
6.20 - 6.50		SPT N=22		Base of DCP at 6.80		

DCP with SPTs carried out to 6.80m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS5**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=19					
				Base of DCP at 6.80			

DCP with SPTs carried out to 6.80m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS6**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy silty TOPSOIL		Dry during boring
0.20 - 0.50		SPT N=12	0.30	Loose light to medium brown silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular predominantly sandstone		
0.50 - 0.80		SPT N=8				
0.80 - 1.10		SPT N=9				
1.10 - 1.40		SPT N=8	1.10	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone and quartz		
1.40 - 1.70		SPT N=9				
1.70 - 2.00		SPT N=8	1.80	Loose light to medium brown silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular predominantly sandstone		
2.00 - 2.30		SPT N=9				
2.30 - 2.60		SPT N=7	2.20	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone and quartz		
2.60 - 2.90		SPT N=7				
2.90 - 3.20		SPT N=5				
3.20 - 3.50		SPT N=16				
3.50 - 3.80		SPT N=25	3.60	Dense medium greenish brown slightly silty medium SAND		
3.80 - 4.10		SPT N=19				
4.10 - 4.40		SPT N=17		Base of borehole at 4.00		
4.40 - 4.70		SPT N=15				
4.70 - 5.00		SPT N=22				
5.00 - 5.30		SPT N=32				
5.30 - 5.60		SPT N=32				
5.60 - 5.90		SPT N=26				
5.90 - 6.20		SPT N=23				
6.20 - 6.50		SPT N=24		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole.Gas monitoring pipe 1m plain 3m slotted to 4m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS6**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=30					
6.80 - 7.10		SPT N=32					
7.10 - 7.40		SPT N=35					
7.40 - 7.70		SPT N=32					
				Base of DCP at 7.70			

DCP with SPTs carried out to 6.80m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS7**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy silty TOPSOIL		Dry during boring
0.20 - 0.50		SPT N=8	0.35	Loose light to medium brown silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular predominantly sandstone		
0.50 - 0.80		SPT N=8				
0.80 - 1.10		SPT N=18				
1.10 - 1.40		SPT N=10	1.20	Firm to stiff medium orangish brown gravelly silty CLAY. Gravel is subrounded fine to coarse sandstone and quartz		
1.40 - 1.70		SPT N=9				
1.70 - 2.00		SPT N=10	1.80	Loose light to medium brown silty fine to coarse SAND and GRAVEL. Gravel is subrounded to subangular predominantly sandstone		
2.00 - 2.30		SPT N=13				
2.30 - 2.60		SPT N=30				
2.60 - 2.90		SPT N=17				
2.90 - 3.20		SPT N=39	3.00	Base of borehole at 3.00		
3.20 - 3.50		SPT N=22				
3.50 - 3.80		SPT N=22				
3.80 - 4.10		SPT N=22				
4.10 - 4.40		SPT N=23				
4.40 - 4.70		SPT N=24				
4.70 - 5.00		SPT N=17				
5.00 - 5.30		SPT N=35				
5.30 - 5.60		SPT N=25				
5.60 - 5.90		SPT N=24				
5.90 - 6.20		SPT N=27				
6.20 - 6.50		SPT N=40		Base of DCP at 8.00		

DCP with SPTs carried out to 8.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS7**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=51					
6.80 - 7.10		SPT N=50+					
7.10 - 7.40		SPT N=50+					
7.40 - 7.70		SPT N=50+					
7.70 - 8.00		SPT N=50+					
				Base of DCP at 8.00			

DCP with SPTs carried out to 8.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS8**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy silty TOPSOIL		
0.20 - 0.50		SPT N=5				
			0.40	Firm medium grey and greyish brown slightly gravelly sandy SILT. Rare sandstone cobble		Water inflow 0.50mbgl
0.50 - 0.80		SPT N=5				
0.80 - 1.10		SPT N=4				
1.10 - 1.40		SPT N=8				
			1.20	Soft dark brown silty CLAY with bands of sandy silt (damp)		
1.40 - 1.70		SPT N=8				
1.70 - 2.00		SPT N=11				
			1.80	Stiff dark brown silty CLAY with bands of sandy silt (damp)		
2.00 - 2.30		SPT N=32				
2.30 - 2.60		SPT N=14				
2.60 - 2.90		SPT N=29				
			2.80	Dense medium brown medium SAND		
2.90 - 3.20		SPT N=26				
			3.00			
3.20 - 3.50		SPT N=29		Base of borehole at 3.00		
3.50 - 3.80		SPT N=30				
3.80 - 4.10		SPT N=50+				
4.10 - 4.40		SPT N=50+				
4.40 - 4.70		SPT N=39				
4.70 - 5.00		SPT N=49				
5.00 - 5.30		SPT N=37				
5.30 - 5.60		SPT N=23				
5.60 - 5.90		SPT N=19				
5.90 - 6.20		SPT N=26				
6.20 - 6.50		SPT N=22		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS8**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=18					
6.80 - 7.10		SPT N=20					
7.10 - 7.40		SPT N=29					
7.40 - 7.70		SPT N=37					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS9**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy TOPSOIL		
0.20 - 0.50		SPT N=5				
			0.40	Soft medium grey and greyish brown very gravelly sandy SILT. Gravel is subangualr fine to coarse sandstone and siltstone. Rare sandstone cobble.		
0.50 - 0.80		SPT N=5				
0.80 - 1.10		SPT N=4				
	D - 1.00					
1.10 - 1.40		SPT N=4				
1.40 - 1.70		SPT N=7				
			1.50	Loose medium grey slightly silty fine to coarse SAND and GRAVEL. Gravel is subrounded various lithologies		Inflow at 1.50mbgl
1.70 - 2.00		SPT N=6				
2.00 - 2.30		SPT N=15				
			2.20	Firm medium brown slightly gravelly sandy silty CLAY		
2.30 - 2.60		SPT N=13				
	D - 2.50					
2.60 - 2.90		SPT N=13				
2.90 - 3.20		SPT N=23				
			3.00	Base of borehole at 3.00		
3.20 - 3.50		SPT N=23				
3.50 - 3.80		SPT N=26				
3.80 - 4.10		SPT N=25				
4.10 - 4.40		SPT N=29				
4.40 - 4.70		SPT N=34				
4.70 - 5.00		SPT N=27				
5.00 - 5.30		SPT N=41				
5.30 - 5.60		SPT N=44				
5.60 - 5.90		SPT N=39				
5.90 - 6.20		SPT N=33				
6.20 - 6.50		SPT N=50+		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS9**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 21/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=50+					
6.80 - 7.10		SPT N=50+					
7.10 - 7.40		SPT N=50+					
7.40 - 7.70		SPT N=50+					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS10**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy TOPSOIL			
0.20 - 0.50		SPT N=6	0.30	Soft medium grey and greyish brown very gravelly sandy SILT. Gravel is subangular fine to coarse sandstone and siltstone. Rare sandstone cobble.			
0.50 - 0.80		SPT N=4					
0.80 - 1.10		SPT N=8					
1.10 - 1.40		SPT N=22					
1.40 - 1.70		SPT N=9					
1.70 - 2.00		SPT N=14	1.80	Loose medium grey slightly silty fine to coarse SAND and GRAVEL. Gravel is subrounded various lithologies			
2.00 - 2.30		SPT N=14					
2.30 - 2.60		SPT N=19					
2.60 - 2.90		SPT N=13		becoming very clayey from 2.70			
2.90 - 3.20		SPT N=14	3.00	Base of borehole at 3.00			
3.20 - 3.50		SPT N=19					
3.50 - 3.80		SPT N=23					
3.80 - 4.10		SPT N=36					
4.10 - 4.40		SPT N=28					
4.40 - 4.70		SPT N=26					
4.70 - 5.00		SPT N=50+					
5.00 - 5.30		SPT N=50+					
5.30 - 5.60		SPT N=49					
5.60 - 5.90		SPT N=50+					
5.90 - 6.20		SPT N=32					
6.20 - 6.50		SPT N=31		Base of DCP at 7.40			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS10**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=38					
6.80 - 7.10		SPT N=35					
7.10 - 7.40		SPT N=35					
				Base of DCP at 7.40			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS11**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly sandy TOPSOIL		
0.20 - 0.50		SPT N=4	0.32	Stiff light brown slightly gravelly sandy silty CLAY		
0.50 - 0.80		SPT N=4				
0.80 - 1.10		SPT N=4				
1.10 - 1.40		SPT N=6	1.20	Firm light brown to medium brown slightly gravelly sandy SILT with bands of silty fine sand		
1.40 - 1.70	D - 1.50	SPT N=9				
1.70 - 2.00		SPT N=6	1.80	Stiff dark brown gravelly sandy silty CLAY. Gravel is subangular fine to coarse various lithologies. Rare cobble		
2.00 - 2.30		SPT N=4				
2.30 - 2.60		SPT N=28				
2.60 - 2.90		SPT N=25				Inlow at 2.60mbgl
2.90 - 3.20		SPT N=33				
3.20 - 3.50		SPT N=21		Base of borehole at 3.00		
3.50 - 3.80		SPT N=20				
3.80 - 4.10		SPT N=32				
4.10 - 4.40		SPT N=39				
4.40 - 4.70		SPT N=33				
4.70 - 5.00		SPT N=46				
5.00 - 5.30		SPT N=50+				
5.30 - 5.60		SPT N=48				
5.60 - 5.90		SPT N=32				
5.90 - 6.20		SPT N=39		Base of DCP at 7.10		
6.20 - 6.50		SPT N=37				

DCP with SPTs carried out to 7.70m adjacent to window sample borehole.Gas monitoring pipe 0.5m plain 2.5m slotted to 3m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS11**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=27					
6.80 - 7.10		SPT N=47					
7.10 - 7.40		SPT N=50+					
7.40 - 7.70		SPT N=50+					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS12**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=3	0.30	Firm light brown slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=8					
0.80 - 1.10		SPT N=8					
1.10 - 1.40		SPT N=7					
1.40 - 1.70		SPT N=7					
1.70 - 2.00		SPT N=6					
2.00 - 2.30		SPT N=26	2.00	Stiff dark brown gravelly sandy silty CLAY. Gravel is subangular fine to coarse various lithologies. Rare cobble			
2.30 - 2.60		SPT N=26					
2.60 - 2.90		SPT N=16					
2.90 - 3.20		SPT N=28					
3.20 - 3.50		SPT N=32		Base of borehole at 3.00			
3.50 - 3.80		SPT N=32					
3.80 - 4.10		SPT N=23					
4.10 - 4.40		SPT N=29					
4.40 - 4.70		SPT N=39					
4.70 - 5.00		SPT N=28					
5.00 - 5.30		SPT N=28					
5.30 - 5.60		SPT N=39					
5.60 - 5.90		SPT N=26					
5.90 - 6.20		SPT N=31		Base of DCP at 7.40			
6.20 - 6.50		SPT N=36					

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS12**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=40					
6.80 - 7.10		SPT N=50					
7.10 - 7.40		SPT N=50+					
				Base of DCP at 7.40			

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS13**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL		
0.20 - 0.50		SPT N=6	0.22	Stiff light brown to light greenish grey brown slightly sandy silty CLAY. Rare cobble sandstone		
0.50 - 0.80		SPT N=5				
0.80 - 1.10		SPT N=4				
1.10 - 1.40		SPT N=3				Inflow at 1.20mbgl
1.40 - 1.70		SPT N=11	1.50	Medium brown fine to medium SAND		
1.70 - 2.00		SPT N=6				
2.00 - 2.30		SPT N=8	1.90 2.00	Greyish brown sandy SILT Loose medium brown slightly silty fine to medium SAND and GRAVEL. Gravel is subrounded various lithologies		
2.30 - 2.60		SPT N=5				
2.60 - 2.90		SPT N=6	2.50	Firm to stiff medium grey sandy clayey SILT		
2.90 - 3.20		SPT N=6				
3.20 - 3.50		SPT N=6		Base of borehole at 3.00		
3.50 - 3.80		SPT N=7				
3.80 - 4.10		SPT N=12				
4.10 - 4.40		SPT N=13				
4.40 - 4.70		SPT N=14				
4.70 - 5.00		SPT N=18				
5.00 - 5.30		SPT N=25				
5.30 - 5.60		SPT N=28				
5.60 - 5.90		SPT N=33				
5.90 - 6.20		SPT N=50+		Base of DCP at 7.40		
6.20 - 6.50		SPT N=50+				

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS13**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=50+					
6.80 - 7.10		SPT N=50					
7.10 - 7.40		SPT N=50+					
				Base of DCP at 7.40			

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS14**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL		
0.20 - 0.50		SPT N=6	0.20	Firm light brown to light greenish grey brown slightly sandy silty CLAY.		
0.50 - 0.80		SPT N=6				
0.80 - 1.10		SPT N=4				
1.10 - 1.40		SPT N=3		becoming more sandy from 1.10mbgl		
1.40 - 1.70		SPT N=4				
1.70 - 2.00		SPT N=7				Inflow at 1.50mbgl
2.00 - 2.30		SPT N=8	2.00	Loose medium brown slightly silty fine to medium SAND and GRAVEL. Gravel is subrounded various lithologies		
2.30 - 2.60		SPT N=8				
2.60 - 2.90		SPT N=14		becoming very silty from 2.70mbgl		
2.90 - 3.20		SPT N=6				
3.20 - 3.50		SPT N=9		Base of borehole at 3.00		
3.50 - 3.80		SPT N=7				
3.80 - 4.10		SPT N=9				
4.10 - 4.40		SPT N=11				
4.40 - 4.70		SPT N=14				
4.70 - 5.00		SPT N=17				
5.00 - 5.30		SPT N=21				
5.30 - 5.60		SPT N=38				
5.60 - 5.90		SPT N=27				
5.90 - 6.20		SPT N=34				
6.20 - 6.50		SPT N=39		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS14**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=31					
6.80 - 7.10		SPT N=38					
7.10 - 7.40		SPT N=39					
7.40 - 7.70		SPT N=46					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS15**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=5	0.30	Firm light brown light grey and some light orangish brown slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=5	0.60	Firm becoming firm to stiff medium brown to dark brown gravelly sandy silty CLAY. Gravel is subangular fine to coarse predominantly sandstone. Rare cobble			
0.80 - 1.10		SPT N=8					
1.10 - 1.40		SPT N=9					
1.40 - 1.70	D - 1.50	SPT N=10					
1.70 - 2.00		SPT N=10					
2.00 - 2.30		SPT N=21					
2.30 - 2.60		SPT N=17					
2.60 - 2.90		SPT N=13					
2.90 - 3.20		SPT N=16					
3.20 - 3.50		SPT N=50+		Base of borehole at 3.00			
3.50 - 3.80		SPT N=34					
3.80 - 4.10		SPT N=22					
4.10 - 4.40		SPT N=21					
4.40 - 4.70		SPT N=15					
4.70 - 5.00		SPT N=16					
5.00 - 5.30		SPT N=29					
5.30 - 5.60		SPT N=24					
5.60 - 5.90		SPT N=23					
5.90 - 6.20		SPT N=50+					
6.20 - 6.50		SPT N=31		Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole.Gas monitoring pipe 0.5m plain 2.5m slotted to 3m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS15**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=26					
6.80 - 7.10		SPT N=33					
7.10 - 7.40		SPT N=33					
7.40 - 7.70		SPT N=30					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS16**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 1
Dates : 26/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=4	0.30	Firm light brown light grey and some light orangish brown slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=3	0.60	Soft to firm becoming firm medium brown and dark brown gravelly sandy silty CLAY. Gravel is subangular fine to coarse predominantly sandstone. Rare cobble of sandstone			
0.80 - 1.10		SPT N=5					
1.10 - 1.40		SPT N=5					
1.40 - 1.70		SPT N=7					
1.70 - 2.00		SPT N=8					
2.00 - 2.30		SPT N=40		becoming very stiff			
2.30 - 2.60		SPT N=26					
2.60 - 2.90		SPT N=18					
2.90 - 3.20		SPT N=25					
3.20 - 3.50		SPT N=27		Base of borehole at 3.00			
3.50 - 3.80		SPT N=21					
3.80 - 4.10		SPT N=44					
4.10 - 4.40		SPT N=22					
4.40 - 4.70		SPT N=29					
4.70 - 5.00		SPT N=50+		Base of DCP at 5.00			

DCP with SPTs carried out to 5.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS17**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL		
0.20 - 0.50		SPT N=5	0.27			
0.50 - 0.80		SPT N=9		Firm light brown light orangish brown and light grey slightly garvelly sandy silty CLAY		
0.80 - 1.10		SPT N=10				
1.10 - 1.40		SPT N=16	1.20			
1.40 - 1.70	D - 1.20	SPT N=12		Stiff dark brown gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse various lithologies		Inflow at 1.50mbgl
1.70 - 2.00		SPT N=35				
2.00 - 2.30		SPT N=15				
2.30 - 2.60		SPT N=12				
2.60 - 2.90		SPT N=25				
2.90 - 3.20		SPT N=50+				
3.20 - 3.50		SPT N=41		Base of borehole at 3.00		
3.50 - 3.80		SPT N=19				
3.80 - 4.10		SPT N=36				
4.10 - 4.40		SPT N=32				
4.40 - 4.70		SPT N=31				
4.70 - 5.00		SPT N=50+				
5.00 - 5.30		SPT N=49				
5.30 - 5.60		SPT N=50				
5.60 - 5.90		SPT N=47				
5.90 - 6.20		SPT N=42				
6.20 - 6.50		SPT N=50		Base of DCP at 7.70		

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS17**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=50+					
6.80 - 7.10		SPT N=50+					
7.10 - 7.40		SPT N=50+					
				Base of DCP at 7.40			

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS18**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=13	0.30	Stiff light brown light orangish brown and light grey slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=14					
0.80 - 1.10		SPT N=40	0.80	Stiff dark brown gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse various lithologies			
1.10 - 1.40		SPT N=27					
1.40 - 1.70	D - 1.20	SPT N=15					
1.70 - 2.00		SPT N=24					
2.00 - 2.30		SPT N=42	1.80	Stiff medium grey very gravelly sandy silty CLAY. Gravel is subangualr fine to coarse various lithologies			
2.30 - 2.60		SPT N=27					
2.60 - 2.90		SPT N=37					
2.90 - 3.20		SPT N=24					
3.20 - 3.50		SPT N=36		Base of borehole at 3.00			
3.50 - 3.80		SPT N=50+					
3.80 - 4.10		SPT N=45					
4.10 - 4.40		SPT N=34					
4.40 - 4.70		SPT N=47					
4.70 - 5.00		SPT N=50+					
5.00 - 5.30		SPT N=50+					
5.30 - 5.60		SPT N=46					
5.60 - 5.90		SPT N=50+					
5.90 - 6.20		SPT N=50+					
6.20 - 6.50		SPT N=50+		Base of DCP at 7.70			

DCP with SPTs carried out to 7.40m adjacent to window sample borehole. Gas monitoring pipe 0.5m plain 2.5m slotted to 3m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS18**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=50+					
6.80 - 7.10		SPT N=50+					
7.10 - 7.40		SPT N=50+					
				Base of DCP at 7.40			

DCP with SPTs carried out to 7.40m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS19A**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 1
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=5	0.30	Stiff light brown light orangish brown and light grey slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=4					
0.80 - 1.10		SPT N=25					
1.10 - 1.40		SPT N=25	1.10	Stiff dark brown gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse various lithologies			
1.40 - 1.70		SPT N=25					
1.70 - 2.00		SPT N=23					
2.00 - 2.30		SPT N=19	2.00	Stiff medium grey very gravelly sandy silty CLAY. Gravel is subangualr fine to coarse various lithologies			
2.30 - 2.60		SPT N=25					
2.60 - 2.90		SPT N=25					
2.90 - 3.20		SPT N=29					
3.20 - 3.50		SPT N=29		Base of borehole at 3.00			
3.50 - 3.80		SPT N=30					
3.80 - 4.10		SPT N=18					
4.10 - 4.40		SPT N=21					
4.40 - 4.70		SPT N=29					
4.70 - 5.00		SPT N=50+		Base of DCP at 5.00			

DCP with SPTs carried out to 5.00m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS20**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL		
0.20 - 0.50		SPT N=4	0.30	Stiff light brown light orangish brown and light grey slightly gravelly sandy silty CLAY		
0.50 - 0.80		SPT N=3				
0.80 - 1.10		SPT N=5				
1.10 - 1.40		SPT N=7				Inflow at 1.00mbgl
1.40 - 1.70	D - 1.20 D - 1.50	SPT N=8				
1.70 - 2.00		SPT N=11	1.80	Stiff dark brown gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse various lithologies		
2.00 - 2.30	D - 2.10	SPT N=9				
2.30 - 2.60		SPT N=12				
2.60 - 2.90		SPT N=12				
2.90 - 3.20		SPT N=18				
3.20 - 3.50		SPT N=27		Base of borehole at 3.00		
3.50 - 3.80		SPT N=31				
3.80 - 4.10		SPT N=45				
4.10 - 4.40		SPT N=31				
4.40 - 4.70		SPT N=50+				
4.70 - 5.00		SPT N=50+				
5.00 - 5.30		SPT N=50+				
5.30 - 5.60		SPT N=49				
5.60 - 5.90		SPT N=50+				
5.90 - 6.20		SPT N=34				
6.20 - 6.50		SPT N=35		Base of DCP at 7.70		

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS20**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=35					
6.80 - 7.10		SPT N=40					
7.10 - 7.40		SPT N=31					
7.40 - 7.70		SPT N=34					
				Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS21**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 1 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
0.00 - 0.20		SPT N=0		Dark brown gravelly silty TOPSOIL			
0.20 - 0.50		SPT N=7					
			0.35	Stiff light brown light orangish brown and light grey slightly gravelly sandy silty CLAY			
0.50 - 0.80		SPT N=6					
0.80 - 1.10		SPT N=6					
1.10 - 1.40		SPT N=10					
1.40 - 1.70		SPT N=9					
1.70 - 2.00		SPT N=20					
2.00 - 2.30		SPT N=26					
			2.20	Stiff dark brown gravelly sandy silty CLAY. Gravel is angular to subrounded fine to coarse various lithologies			
2.30 - 2.60		SPT N=31					
2.60 - 2.90		SPT N=29					
2.90 - 3.20		SPT N=17					
				Base of borehole at 3.00			
3.20 - 3.50		SPT N=24					
3.50 - 3.80		SPT N=25					
3.80 - 4.10		SPT N=36					
4.10 - 4.40		SPT N=44					
4.40 - 4.70		SPT N=22					
4.70 - 5.00		SPT N=29					
5.00 - 5.30		SPT N=24					
5.30 - 5.60		SPT N=34					
5.60 - 5.90		SPT N=32					
5.90 - 6.20		SPT N=47					
6.20 - 6.50		SPT N=50+		Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole. Gas monitoring pipe 0.5m plain 2.5m slotted to 3m.

E-GEO SOLUTIONS LTD, GLASGOW HOUSE, HIGH STREET, ST. ASAPH, LL17 0RD
Tel: 01745 828494. Mob: 07899980958

WINDOW SAMPLE BOREHOLE RECORD

SITE: PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	BOREHOLE No:
PROJECT: E1450 PLOT1, PLOT2, PLOT3 RUABON PARK, WATKIN WAY, RUABON, LL14 6EP	**WS21**
CLIENT: PURE RESIDENTIAL AND COMMERCIAL LTD	Sheet 2 of 2
Dates : 27/01/2022	Project Ref: E1450
Elev (maOD) :	
Casing dia : 100mm	Logged By: HLJ
Engineer : e-geo Solutions Ltd	

Depth (m)	Sample/ Test	Field Record	Depth (m)	Strata Description	Casing Depth(m)	Water Depth(m)	
6.50 - 6.80		SPT N=50+					
6.80 - 7.10		SPT N=50+					
7.10 - 7.40		SPT N=50+					
7.40 - 7.70		SPT N=50+		Base of DCP at 7.70			

DCP with SPTs carried out to 7.70m adjacent to window sample borehole

Appendix 2 - Dynamic Probe Test Results Report

Dynamic Probe
Test Results

Ruabon Park, Ruabon

FACTUAL REPORT

Prepared for:

E-Geo Solutions,
Windsor House,
26 Mostyn Avenue,
Craig y Don,
Llandudno,
LL30 1YY

Report Reference: FTR 37877

Prepared by: Neil Aindow

ISSUE REF: 01

Issue Date: 11th February 2022

Celtest limited
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LL57 4LH
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FTR 37877

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1.0 Introduction

Following your instructions twenty-two (22) dynamic probe tests were carried out using a Dynamic Probe with Super Heavy hammer (DPSH-B) with 90° cone.

The test was carried out in with BS 1377: Part 9: clause 3.2 & BS EN ISO 22476-2 to determine the Dynamic Probe resistance of the underlying material.

It is assumed that the DPSH-B method has a direct correlation to the SPT.

NOTE: The SPT 'N' values should be used as guidelines only.

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited. These results relate only to the locations tested.

Site Address: Ruabon Park, Ruabon

Date of Test: 18th 21st 26th and 28th of January 2022

Weather Conditions: Dry

Tested By: Mr Daley Thomas and Mr Willis Bunting

This report was prepared by: _____

Mr. Neil Aindow

This report is issued on behalf of Celtest Limited by: _____

(✓) *Mr. Jason Chinery – Operations Manager*

Date of issue: 11th February 2022

FTR 37877

2.0 Location Plan

Not Provided

FTR 37877

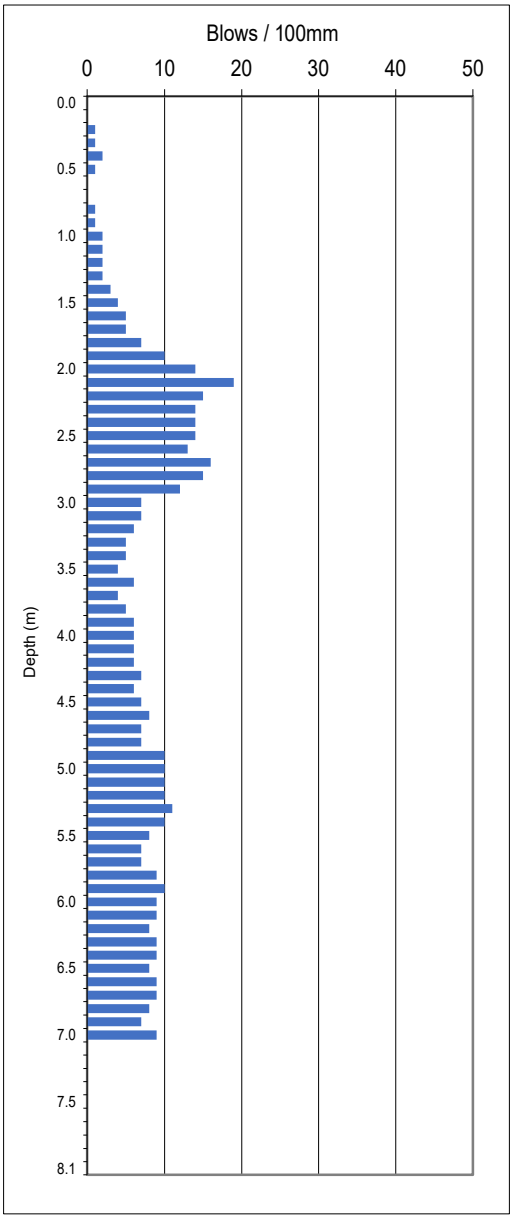
3.0 Test Results

3.1 – Test 1

LOCATION ON SITE : **Location 1**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	4.0
0.3	0.4	1	
0.4	0.5	2	
0.5	0.6	1	1.0
0.6	0.7	0	
0.7	0.8	0	
0.8	0.9	1	4.0
0.9	1.0	1	
1.0	1.1	2	
1.1	1.2	2	6.0
1.2	1.3	2	
1.3	1.4	2	
1.4	1.5	3	12.0
1.5	1.6	4	
1.6	1.7	5	
1.7	1.8	5	22.0
1.8	1.9	7	
1.9	2.0	10	
2.0	2.1	14	48.0
2.1	2.2	19	
2.2	2.3	15	
2.3	2.4	14	42.0
2.4	2.5	14	
2.5	2.6	14	
2.6	2.7	13	44.0
2.7	2.8	16	
2.8	2.9	15	
2.9	3.0	12	26.0
3.0	3.1	7	
3.1	3.2	7	
3.2	3.3	6	16.0
3.3	3.4	5	
3.4	3.5	5	
3.5	3.6	4	14.0
3.6	3.7	6	
3.7	3.8	4	
3.8	3.9	5	17.0
3.9	4.0	6	
4.0	4.1	6	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	6	19.0
4.2	4.3	6	
4.3	4.4	7	
4.4	4.5	6	21.0
4.5	4.6	7	
4.6	4.7	8	
4.7	4.8	7	24.0
4.8	4.9	7	
4.9	5.0	10	
5.0	5.1	10	30.0
5.1	5.2	10	
5.2	5.3	10	
5.3	5.4	11	29.0
5.4	5.5	10	
5.5	5.6	8	
5.6	5.7	7	23.0
5.7	5.8	7	
5.8	5.9	9	
5.9	6.0	10	28.0
6.0	6.1	9	
6.1	6.2	9	
6.2	6.3	8	26.0
6.3	6.4	9	
6.4	6.5	9	
6.5	6.6	8	26.0
6.6	6.7	9	
6.7	6.8	9	
6.8	6.9	8	24.0
6.9	7.0	7	
7.0	7.1	9	
7.1	7.2	END	0.0
7.2	7.3	0	
7.3	7.4	0	
7.4	7.5	0	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



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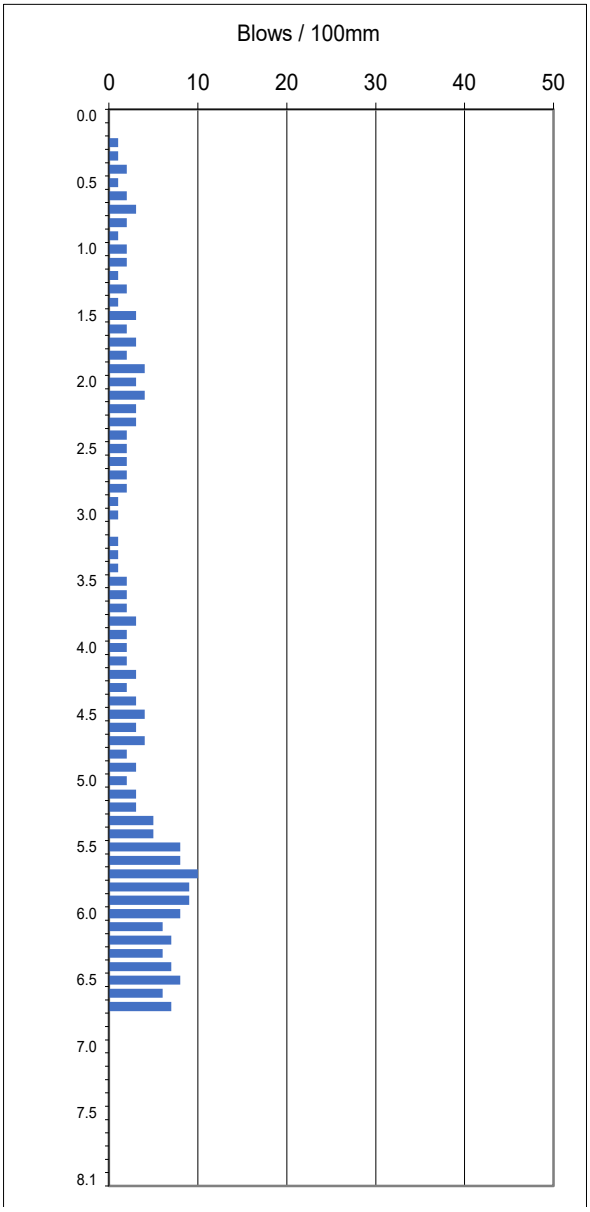
3.0 Test Results

3.1 – Test 2

LOCATION ON SITE : **Location 2**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	4.0
0.3	0.4	1	
0.4	0.5	2	
0.5	0.6	1	6.0
0.6	0.7	2	
0.7	0.8	3	
0.8	0.9	2	5.0
0.9	1.0	1	
1.0	1.1	2	
1.1	1.2	2	5.0
1.2	1.3	1	
1.3	1.4	2	
1.4	1.5	1	6.0
1.5	1.6	3	
1.6	1.7	2	
1.7	1.8	3	9.0
1.8	1.9	2	
1.9	2.0	4	
2.0	2.1	3	10.0
2.1	2.2	4	
2.2	2.3	3	
2.3	2.4	3	7.0
2.4	2.5	2	
2.5	2.6	2	
2.6	2.7	2	6.0
2.7	2.8	2	
2.8	2.9	2	
2.9	3.0	1	2.0
3.0	3.1	1	
3.1	3.2	0	
3.2	3.3	1	3.0
3.3	3.4	1	
3.4	3.5	1	
3.5	3.6	2	6.0
3.6	3.7	2	
3.7	3.8	2	
3.8	3.9	3	7.0
3.9	4.0	2	
4.0	4.1	2	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	2	7.0
4.2	4.3	3	
4.3	4.4	2	
4.4	4.5	3	10.0
4.5	4.6	4	
4.6	4.7	3	
4.7	4.8	4	9.0
4.8	4.9	2	
4.9	5.0	3	
5.0	5.1	2	8.0
5.1	5.2	3	
5.2	5.3	3	
5.3	5.4	5	18.0
5.4	5.5	5	
5.5	5.6	8	
5.6	5.7	8	27.0
5.7	5.8	10	
5.8	5.9	9	
5.9	6.0	9	23.0
6.0	6.1	8	
6.1	6.2	6	
6.2	6.3	7	20.0
6.3	6.4	6	
6.4	6.5	7	
6.5	6.6	8	21.0
6.6	6.7	6	
6.7	6.8	7	
6.8	6.9	END	0.0
6.9	7.0	0	
7.0	7.1	0	
7.1	7.2	0	0.0
7.2	7.3	0	
7.3	7.4	0	
7.4	7.5	0	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



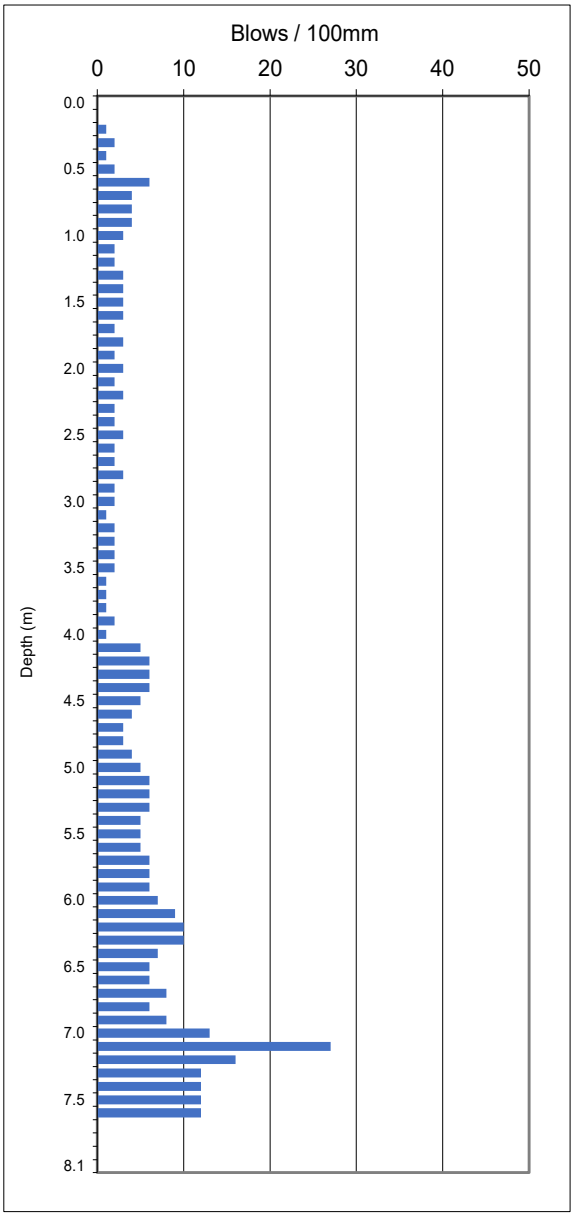
FTR 37877

3.0 Test Results

3.3 – Test 3

LOCATION ON SITE : **Location 3**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	4.0
0.3	0.4	2	
0.4	0.5	1	
0.5	0.6	2	12.0
0.6	0.7	6	
0.7	0.8	4	
0.8	0.9	4	11.0
0.9	1.0	4	
1.0	1.1	3	
1.1	1.2	2	7.0
1.2	1.3	2	
1.3	1.4	3	
1.4	1.5	3	9.0
1.5	1.6	3	
1.6	1.7	3	
1.7	1.8	2	7.0
1.8	1.9	3	
1.9	2.0	2	
2.0	2.1	3	8.0
2.1	2.2	2	
2.2	2.3	3	
2.3	2.4	2	7.0
2.4	2.5	2	
2.5	2.6	3	
2.6	2.7	2	7.0
2.7	2.8	2	
2.8	2.9	3	
2.9	3.0	2	5.0
3.0	3.1	2	
3.1	3.2	1	
3.2	3.3	2	6.0
3.3	3.4	2	
3.4	3.5	2	
3.5	3.6	2	4.0
3.6	3.7	1	
3.7	3.8	1	
3.8	3.9	1	4.0
3.9	4.0	2	
4.0	4.1	1	
4.1	4.2	5	17.0
4.2	4.3	6	
4.3	4.4	6	
4.4	4.5	6	15.0
4.5	4.6	5	
4.6	4.7	4	
4.7	4.8	3	10.0
4.8	4.9	3	
4.9	5.0	4	
5.0	5.1	5	17.0
5.1	5.2	6	
5.2	5.3	6	
5.3	5.4	6	16.0
5.4	5.5	5	
5.5	5.6	5	
5.6	5.7	5	17.0
5.7	5.8	6	
5.8	5.9	6	
5.9	6.0	6	22.0
6.0	6.1	7	
6.1	6.2	9	
6.2	6.3	10	27.0
6.3	6.4	10	
6.4	6.5	7	
6.5	6.6	6	20.0
6.6	6.7	6	
6.7	6.8	8	
6.8	6.9	6	27.0
6.9	7.0	8	
7.0	7.1	13	
7.1	7.2	27	55.0
7.2	7.3	16	
7.3	7.4	12	
7.4	7.5	12	36.0
7.5	7.6	12	
7.6	7.7	12	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



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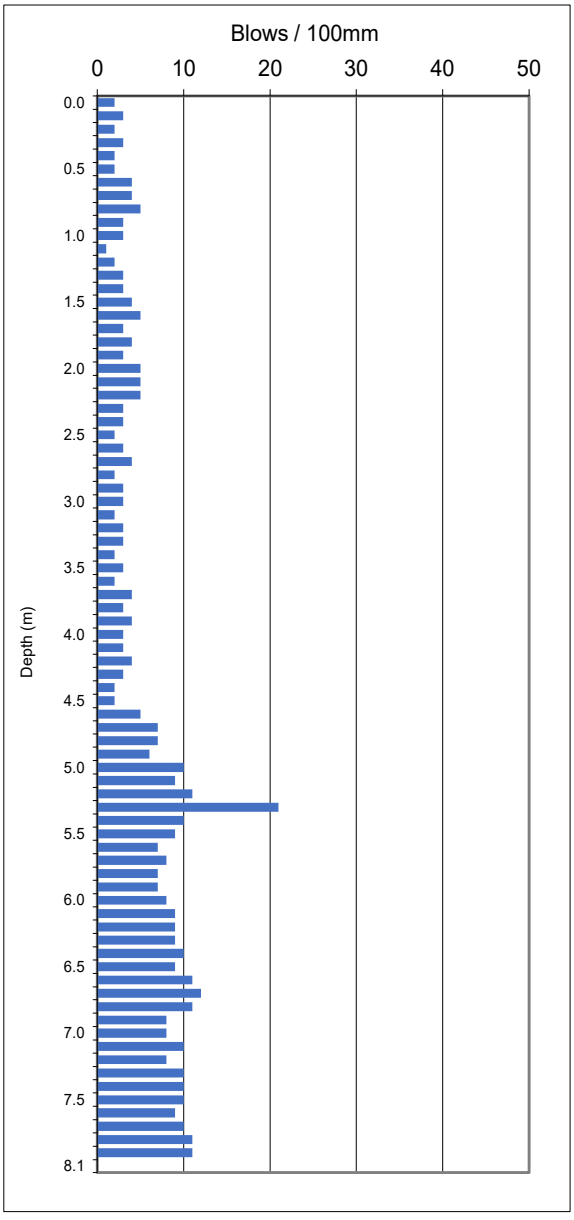
3.0 Test Results

3.4 – Test 4

LOCATION ON SITE : **Location 4**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	2	N/A
0.1	0.2	3	
0.2	0.3	2	7.0
0.3	0.4	3	
0.4	0.5	2	
0.5	0.6	2	10.0
0.6	0.7	4	
0.7	0.8	4	
0.8	0.9	5	11.0
0.9	1.0	3	
1.0	1.1	3	
1.1	1.2	1	6.0
1.2	1.3	2	
1.3	1.4	3	
1.4	1.5	3	12.0
1.5	1.6	4	
1.6	1.7	5	
1.7	1.8	3	10.0
1.8	1.9	4	
1.9	2.0	3	
2.0	2.1	5	15.0
2.1	2.2	5	
2.2	2.3	5	
2.3	2.4	3	8.0
2.4	2.5	3	
2.5	2.6	2	
2.6	2.7	3	9.0
2.7	2.8	4	
2.8	2.9	2	
2.9	3.0	3	8.0
3.0	3.1	3	
3.1	3.2	2	
3.2	3.3	3	8.0
3.3	3.4	3	
3.4	3.5	2	
3.5	3.6	3	9.0
3.6	3.7	2	
3.7	3.8	4	
3.8	3.9	3	10.0
3.9	4.0	4	
4.0	4.1	3	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	3	10.0
4.2	4.3	4	
4.3	4.4	3	
4.4	4.5	2	9.0
4.5	4.6	2	
4.6	4.7	5	
4.7	4.8	7	20.0
4.8	4.9	7	
4.9	5.0	6	
5.0	5.1	10	30.0
5.1	5.2	9	
5.2	5.3	11	
5.3	5.4	21	40.0
5.4	5.5	10	
5.5	5.6	9	
5.6	5.7	7	22.0
5.7	5.8	8	
5.8	5.9	7	
5.9	6.0	7	24.0
6.0	6.1	8	
6.1	6.2	9	
6.2	6.3	9	28.0
6.3	6.4	9	
6.4	6.5	10	
6.5	6.6	9	32.0
6.6	6.7	11	
6.7	6.8	12	
6.8	6.9	11	27.0
6.9	7.0	8	
7.0	7.1	8	
7.1	7.2	10	28.0
7.2	7.3	8	
7.3	7.4	10	
7.4	7.5	10	29.0
7.5	7.6	10	
7.6	7.7	9	
7.7	7.8	10	32.0
7.8	7.9	11	
7.9	8.0	11	
8.1	8.0	END	0.0



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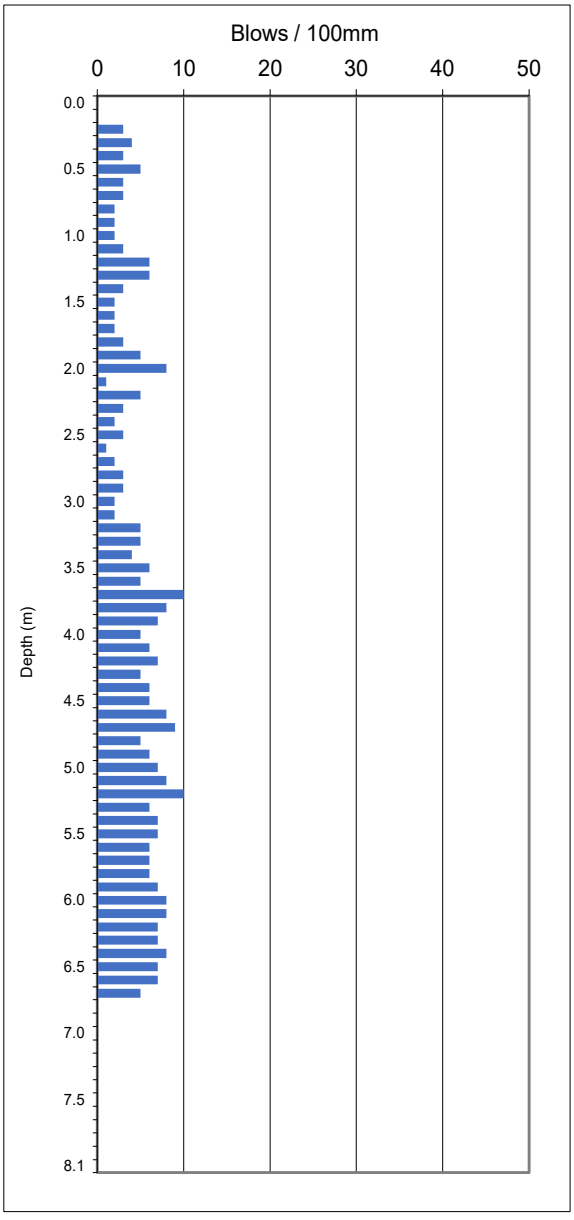
3.0 Test Results **Page 7**

3.5 – Test 5

LOCATION ON SITE : **Location 5**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	3	10.0
0.3	0.4	4	
0.4	0.5	3	
0.5	0.6	5	11.0
0.6	0.7	3	
0.7	0.8	3	
0.8	0.9	2	6.0
0.9	1.0	2	
1.0	1.1	2	
1.1	1.2	3	15.0
1.2	1.3	6	
1.3	1.4	6	
1.4	1.5	3	7.0
1.5	1.6	2	
1.6	1.7	2	
1.7	1.8	2	10.0
1.8	1.9	3	
1.9	2.0	5	
2.0	2.1	8	14.0
2.1	2.2	1	
2.2	2.3	5	
2.3	2.4	3	8.0
2.4	2.5	2	
2.5	2.6	3	
2.6	2.7	1	6.0
2.7	2.8	2	
2.8	2.9	3	
2.9	3.0	3	7.0
3.0	3.1	2	
3.1	3.2	2	
3.2	3.3	5	14.0
3.3	3.4	5	
3.4	3.5	4	
3.5	3.6	6	21.0
3.6	3.7	5	
3.7	3.8	10	
3.8	3.9	8	20.0
3.9	4.0	7	
4.0	4.1	5	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	6	18.0
4.2	4.3	7	
4.3	4.4	5	
4.4	4.5	6	20.0
4.5	4.6	6	
4.6	4.7	8	
4.7	4.8	9	20.0
4.8	4.9	5	
4.9	5.0	6	
5.0	5.1	7	25.0
5.1	5.2	8	
5.2	5.3	10	
5.3	5.4	6	20.0
5.4	5.5	7	
5.5	5.6	7	
5.6	5.7	6	18.0
5.7	5.8	6	
5.8	5.9	6	
5.9	6.0	7	23.0
6.0	6.1	8	
6.1	6.2	8	
6.2	6.3	7	22.0
6.3	6.4	7	
6.4	6.5	8	
6.5	6.6	7	19.0
6.6	6.7	7	
6.7	6.8	5	
6.8	6.9	END	0.0
6.9	7.0	0	
7.0	7.1	0	
7.1	7.2	0	0.0
7.2	7.3	0	
7.3	7.4	0	
7.4	7.5	0	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



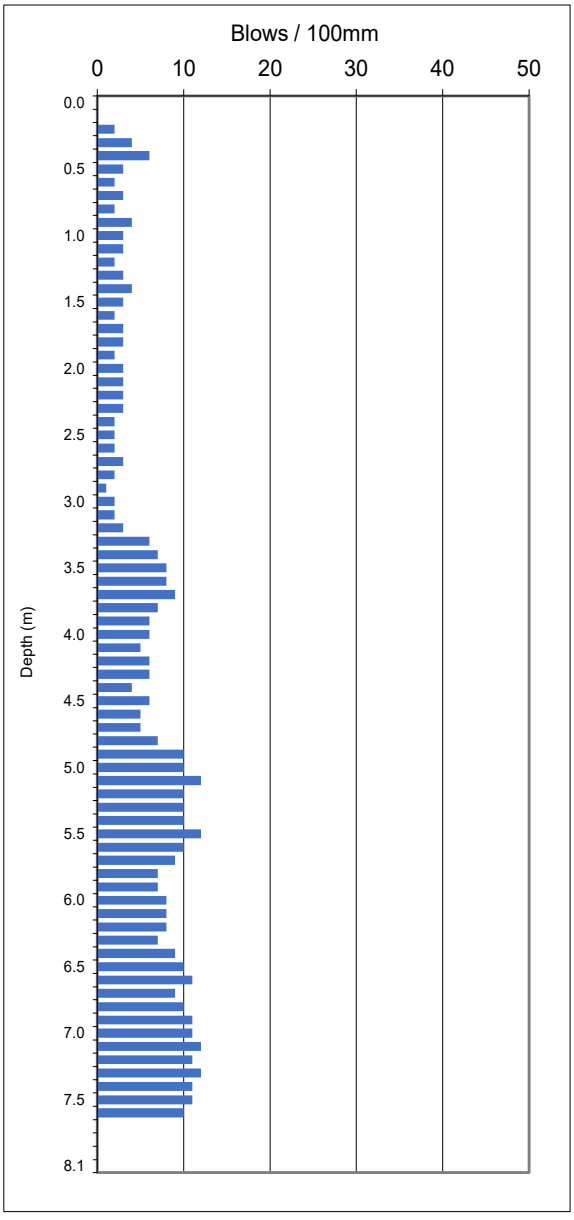
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3.6 – Test 6

LOCATION ON SITE : **Location 6**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	12.0
0.3	0.4	4	
0.4	0.5	6	
0.5	0.6	3	8.0
0.6	0.7	2	
0.7	0.8	3	
0.8	0.9	2	9.0
0.9	1.0	4	
1.0	1.1	3	
1.1	1.2	3	8.0
1.2	1.3	2	
1.3	1.4	3	
1.4	1.5	4	9.0
1.5	1.6	3	
1.6	1.7	2	
1.7	1.8	3	8.0
1.8	1.9	3	
1.9	2.0	2	
2.0	2.1	3	9.0
2.1	2.2	3	
2.2	2.3	3	
2.3	2.4	3	7.0
2.4	2.5	2	
2.5	2.6	2	
2.6	2.7	2	7.0
2.7	2.8	3	
2.8	2.9	2	
2.9	3.0	1	5.0
3.0	3.1	2	
3.1	3.2	2	
3.2	3.3	3	16.0
3.3	3.4	6	
3.4	3.5	7	
3.5	3.6	8	25.0
3.6	3.7	8	
3.7	3.8	9	
3.8	3.9	7	19.0
3.9	4.0	6	
4.0	4.1	6	
4.1	4.2	5	17.0
4.2	4.3	6	
4.3	4.4	6	
4.4	4.5	4	15.0
4.5	4.6	6	
4.6	4.7	5	
4.7	4.8	5	22.0
4.8	4.9	7	
4.9	5.0	10	
5.0	5.1	10	32.0
5.1	5.2	12	
5.2	5.3	10	
5.3	5.4	10	32.0
5.4	5.5	10	
5.5	5.6	12	
5.6	5.7	10	26.0
5.7	5.8	9	
5.8	5.9	7	
5.9	6.0	7	23.0
6.0	6.1	8	
6.1	6.2	8	
6.2	6.3	8	24.0
6.3	6.4	7	
6.4	6.5	9	
6.5	6.6	10	30.0
6.6	6.7	11	
6.7	6.8	9	
6.8	6.9	10	32.0
6.9	7.0	11	
7.0	7.1	11	
7.1	7.2	12	35.0
7.2	7.3	11	
7.3	7.4	12	
7.4	7.5	11	32.0
7.5	7.6	11	
7.6	7.7	10	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



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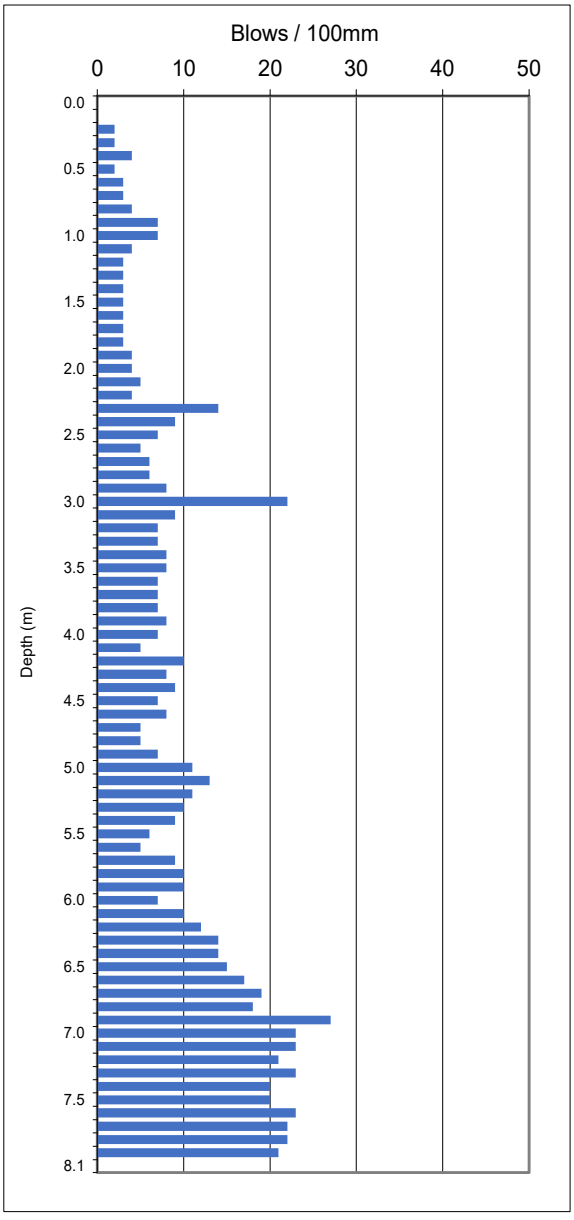
3.0 Test Results

3.7 – Test 7

LOCATION ON SITE : **Location 7**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	8.0
0.3	0.4	2	
0.4	0.5	4	
0.5	0.6	2	8.0
0.6	0.7	3	
0.7	0.8	3	
0.8	0.9	4	18.0
0.9	1.0	7	
1.0	1.1	7	
1.1	1.2	4	10.0
1.2	1.3	3	
1.3	1.4	3	
1.4	1.5	3	9.0
1.5	1.6	3	
1.6	1.7	3	
1.7	1.8	3	10.0
1.8	1.9	3	
1.9	2.0	4	
2.0	2.1	4	13.0
2.1	2.2	5	
2.2	2.3	4	
2.3	2.4	14	30.0
2.4	2.5	9	
2.5	2.6	7	
2.6	2.7	5	17.0
2.7	2.8	6	
2.8	2.9	6	
2.9	3.0	8	39.0
3.0	3.1	22	
3.1	3.2	9	
3.2	3.3	7	22.0
3.3	3.4	7	
3.4	3.5	8	
3.5	3.6	8	22.0
3.6	3.7	7	
3.7	3.8	7	
3.8	3.9	7	22.0
3.9	4.0	8	
4.0	4.1	7	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	5	23.0
4.2	4.3	10	
4.3	4.4	8	
4.4	4.5	9	24.0
4.5	4.6	7	
4.6	4.7	8	
4.7	4.8	5	17.0
4.8	4.9	5	
4.9	5.0	7	
5.0	5.1	11	35.0
5.1	5.2	13	
5.2	5.3	11	
5.3	5.4	10	25.0
5.4	5.5	9	
5.5	5.6	6	
5.6	5.7	5	24.0
5.7	5.8	9	
5.8	5.9	10	
5.9	6.0	10	27.0
6.0	6.1	7	
6.1	6.2	10	
6.2	6.3	12	40.0
6.3	6.4	14	
6.4	6.5	14	
6.5	6.6	15	51.0
6.6	6.7	17	
6.7	6.8	19	
6.8	6.9	18	68.0
6.9	7.0	27	
7.0	7.1	23	
7.1	7.2	23	67.0
7.2	7.3	21	
7.3	7.4	23	
7.4	7.5	20	63.0
7.5	7.6	20	
7.6	7.7	23	
7.7	7.8	22	65.0
7.8	7.9	22	
7.9	8.0	21	
8.1	8.0	END	0.0



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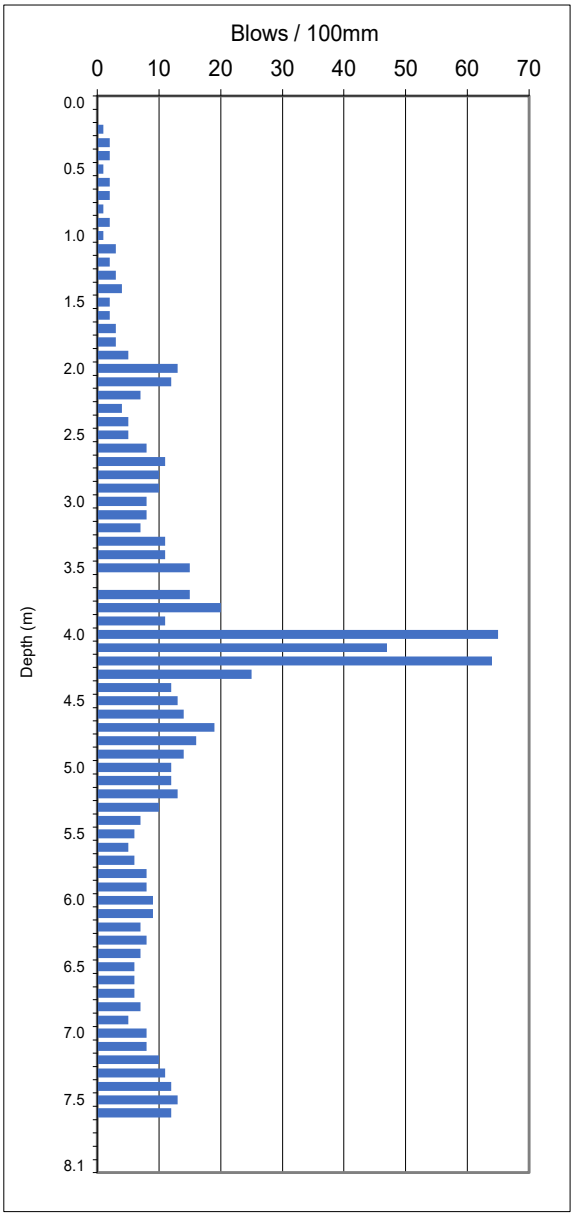
3.0 Test Results **Page 10**

3.8 – Test 8

LOCATION ON SITE : **Location 8**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	5.0
0.3	0.4	2	
0.4	0.5	2	
0.5	0.6	1	5.0
0.6	0.7	2	
0.7	0.8	2	
0.8	0.9	1	4.0
0.9	1.0	2	
1.0	1.1	1	
1.1	1.2	3	8.0
1.2	1.3	2	
1.3	1.4	3	
1.4	1.5	4	8.0
1.5	1.6	2	
1.6	1.7	2	
1.7	1.8	3	11.0
1.8	1.9	3	
1.9	2.0	5	
2.0	2.1	13	32.0
2.1	2.2	12	
2.2	2.3	7	
2.3	2.4	4	14.0
2.4	2.5	5	
2.5	2.6	5	
2.6	2.7	8	29.0
2.7	2.8	11	
2.8	2.9	10	
2.9	3.0	10	26.0
3.0	3.1	8	
3.1	3.2	8	
3.2	3.3	7	29.0
3.3	3.4	11	
3.4	3.5	11	
3.5	3.6	15	30.0
3.6	3.7	1`4	
3.7	3.8	15	
3.8	3.9	20	96.0
3.9	4.0	11	
4.0	4.1	65	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	47	136.0
4.2	4.3	64	
4.3	4.4	25	
4.4	4.5	12	39.0
4.5	4.6	13	
4.6	4.7	14	
4.7	4.8	19	49.0
4.8	4.9	16	
4.9	5.0	14	
5.0	5.1	12	37.0
5.1	5.2	12	
5.2	5.3	13	
5.3	5.4	10	23.0
5.4	5.5	7	
5.5	5.6	6	
5.6	5.7	5	19.0
5.7	5.8	6	
5.8	5.9	8	
5.9	6.0	8	26.0
6.0	6.1	9	
6.1	6.2	9	
6.2	6.3	7	22.0
6.3	6.4	8	
6.4	6.5	7	
6.5	6.6	6	18.0
6.6	6.7	6	
6.7	6.8	6	
6.8	6.9	7	20.0
6.9	7.0	5	
7.0	7.1	8	
7.1	7.2	8	29.0
7.2	7.3	10	
7.3	7.4	11	
7.4	7.5	12	37.0
7.5	7.6	13	
7.6	7.7	12	
7.7	7.8	End	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



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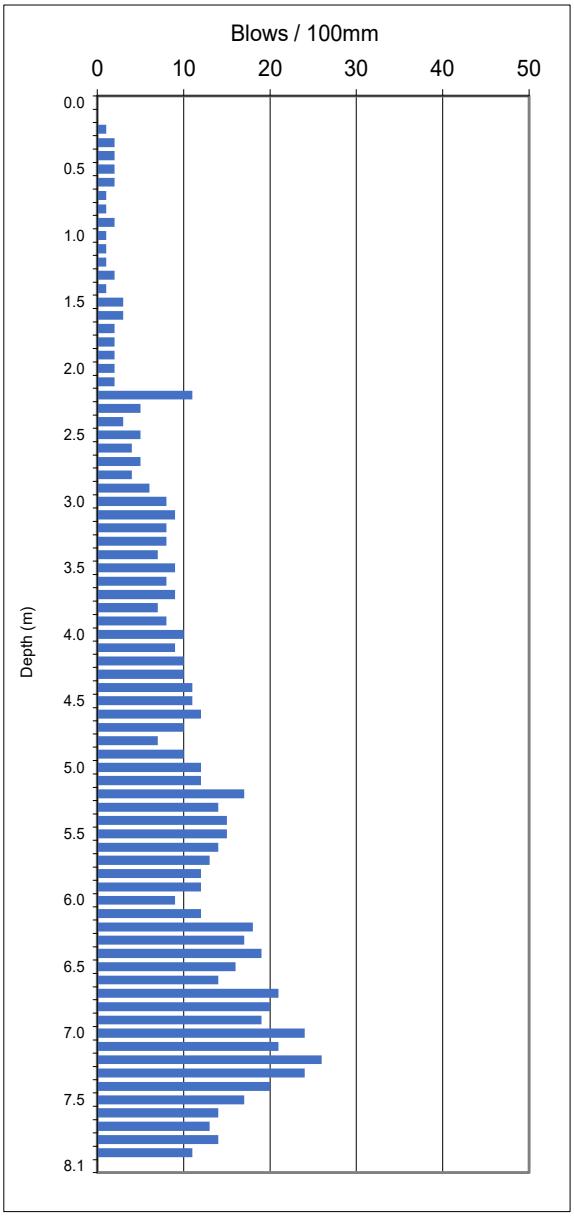
3.0 Test Results

3.9 – Test 9

LOCATION ON SITE : **Location 9**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	5.0
0.3	0.4	2	
0.4	0.5	2	
0.5	0.6	2	5.0
0.6	0.7	2	
0.7	0.8	1	
0.8	0.9	1	4.0
0.9	1.0	2	
1.0	1.1	1	
1.1	1.2	1	4.0
1.2	1.3	1	
1.3	1.4	2	
1.4	1.5	1	7.0
1.5	1.6	3	
1.6	1.7	3	
1.7	1.8	2	6.0
1.8	1.9	2	
1.9	2.0	2	
2.0	2.1	2	15.0
2.1	2.2	2	
2.2	2.3	11	
2.3	2.4	5	13.0
2.4	2.5	3	
2.5	2.6	5	
2.6	2.7	4	13.0
2.7	2.8	5	
2.8	2.9	4	
2.9	3.0	6	23.0
3.0	3.1	8	
3.1	3.2	9	
3.2	3.3	8	23.0
3.3	3.4	8	
3.4	3.5	7	
3.5	3.6	9	26.0
3.6	3.7	8	
3.7	3.8	9	
3.8	3.9	7	25.0
3.9	4.0	8	
4.0	4.1	10	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	9	29.0
4.2	4.3	10	
4.3	4.4	10	
4.4	4.5	11	34.0
4.5	4.6	11	
4.6	4.7	12	
4.7	4.8	10	27.0
4.8	4.9	7	
4.9	5.0	10	
5.0	5.1	12	41.0
5.1	5.2	12	
5.2	5.3	17	
5.3	5.4	14	44.0
5.4	5.5	15	
5.5	5.6	15	
5.6	5.7	14	39.0
5.7	5.8	13	
5.8	5.9	12	
5.9	6.0	12	33.0
6.0	6.1	9	
6.1	6.2	12	
6.2	6.3	18	54.0
6.3	6.4	17	
6.4	6.5	19	
6.5	6.6	16	51.0
6.6	6.7	14	
6.7	6.8	21	
6.8	6.9	20	63.0
6.9	7.0	19	
7.0	7.1	24	
7.1	7.2	21	71.0
7.2	7.3	26	
7.3	7.4	24	
7.4	7.5	20	51.0
7.5	7.6	17	
7.6	7.7	14	
7.7	7.8	13	38.0
7.8	7.9	14	
7.9	8.0	11	
8.1	8.0	END	0.0



FTR 37877

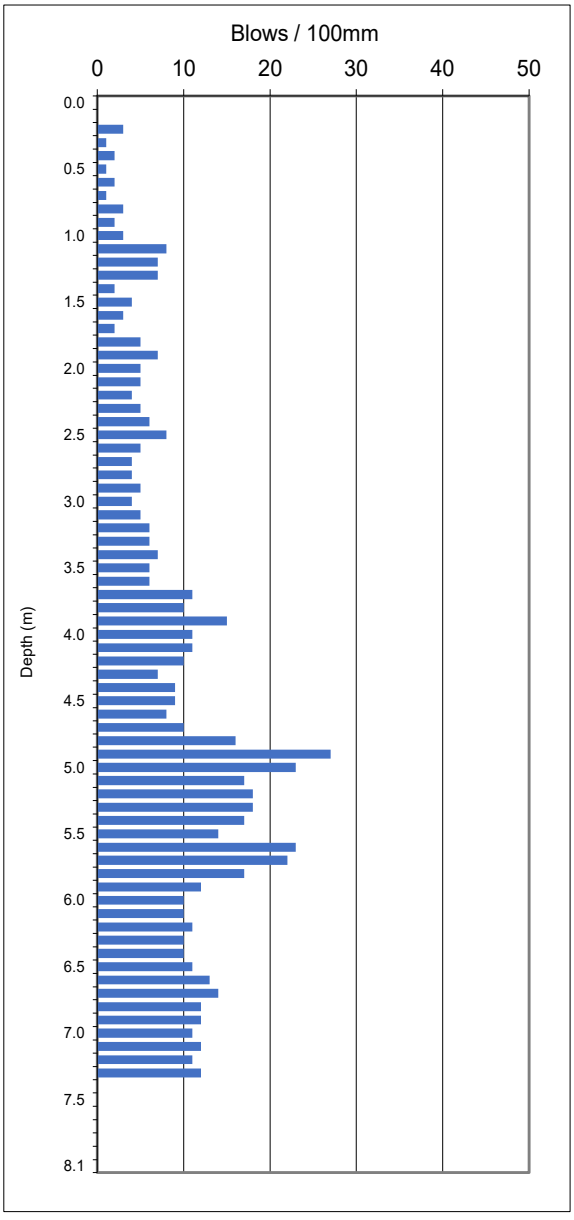
3.0 Test Results **Page 12**

3.10 – Test 10

LOCATION ON SITE : **Location 10**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	3	6.0
0.3	0.4	1	
0.4	0.5	2	
0.5	0.6	1	4.0
0.6	0.7	2	
0.7	0.8	1	
0.8	0.9	3	8.0
0.9	1.0	2	
1.0	1.1	3	
1.1	1.2	8	22.0
1.2	1.3	7	
1.3	1.4	7	
1.4	1.5	2	9.0
1.5	1.6	4	
1.6	1.7	3	
1.7	1.8	2	14.0
1.8	1.9	5	
1.9	2.0	7	
2.0	2.1	5	14.0
2.1	2.2	5	
2.2	2.3	4	
2.3	2.4	5	19.0
2.4	2.5	6	
2.5	2.6	8	
2.6	2.7	5	13.0
2.7	2.8	4	
2.8	2.9	4	
2.9	3.0	5	14.0
3.0	3.1	4	
3.1	3.2	5	
3.2	3.3	6	19.0
3.3	3.4	6	
3.4	3.5	7	
3.5	3.6	6	23.0
3.6	3.7	6	
3.7	3.8	11	
3.8	3.9	10	36.0
3.9	4.0	15	
4.0	4.1	11	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	11	28.0
4.2	4.3	10	
4.3	4.4	7	
4.4	4.5	9	26.0
4.5	4.6	9	
4.6	4.7	8	
4.7	4.8	10	53.0
4.8	4.9	16	
4.9	5.0	27	
5.0	5.1	23	58.0
5.1	5.2	17	
5.2	5.3	18	
5.3	5.4	18	49.0
5.4	5.5	17	
5.5	5.6	14	
5.6	5.7	23	62.0
5.7	5.8	22	
5.8	5.9	17	
5.9	6.0	12	32.0
6.0	6.1	10	
6.1	6.2	10	
6.2	6.3	11	31.0
6.3	6.4	10	
6.4	6.5	10	
6.5	6.6	11	38.0
6.6	6.7	13	
6.7	6.8	14	
6.8	6.9	12	35.0
6.9	7.0	12	
7.0	7.1	11	
7.1	7.2	12	35.0
7.2	7.3	11	
7.3	7.4	12	
7.4	7.5	END	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

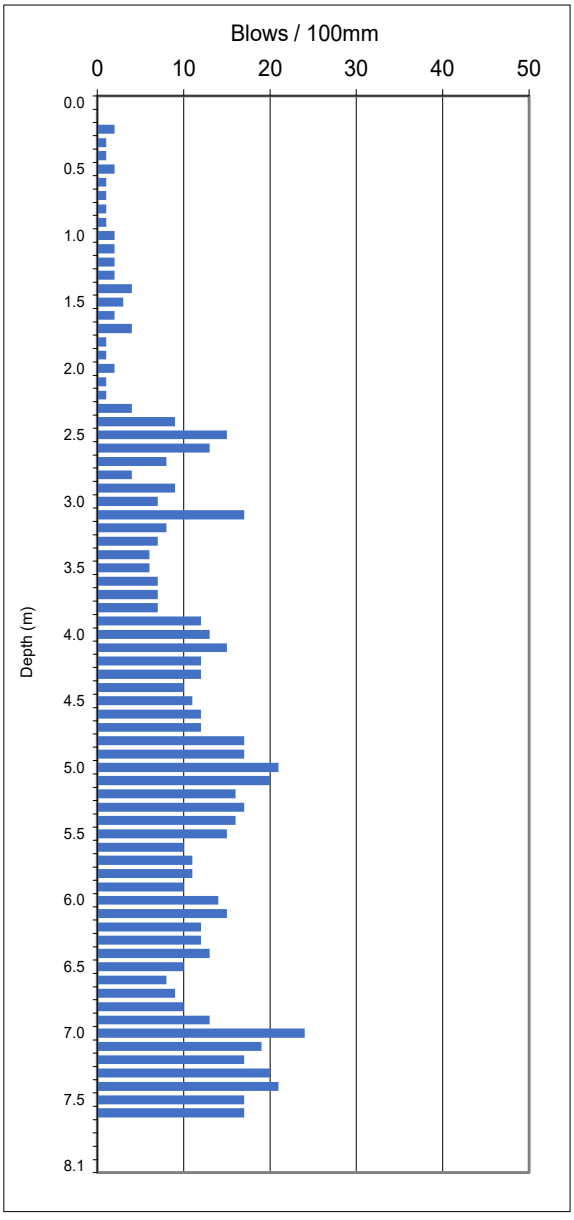
3.0 Test Results

3.11 – Test 11

LOCATION ON SITE : **Location 11**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	4.0
0.3	0.4	1	
0.4	0.5	1	
0.5	0.6	2	4.0
0.6	0.7	1	
0.7	0.8	1	
0.8	0.9	1	4.0
0.9	1.0	1	
1.0	1.1	2	
1.1	1.2	2	6.0
1.2	1.3	2	
1.3	1.4	2	
1.4	1.5	4	9.0
1.5	1.6	3	
1.6	1.7	2	
1.7	1.8	4	6.0
1.8	1.9	1	
1.9	2.0	1	
2.0	2.1	2	4.0
2.1	2.2	1	
2.2	2.3	1	
2.3	2.4	4	28.0
2.4	2.5	9	
2.5	2.6	15	
2.6	2.7	13	25.0
2.7	2.8	8	
2.8	2.9	4	
2.9	3.0	9	33.0
3.0	3.1	7	
3.1	3.2	17	
3.2	3.3	8	21.0
3.3	3.4	7	
3.4	3.5	6	
3.5	3.6	6	20.0
3.6	3.7	7	
3.7	3.8	7	
3.8	3.9	7	32.0
3.9	4.0	12	
4.0	4.1	13	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	15	39.0
4.2	4.3	12	
4.3	4.4	12	
4.4	4.5	10	33.0
4.5	4.6	11	
4.6	4.7	12	
4.7	4.8	12	46.0
4.8	4.9	17	
4.9	5.0	17	
5.0	5.1	21	57.0
5.1	5.2	20	
5.2	5.3	16	
5.3	5.4	17	48.0
5.4	5.5	16	
5.5	5.6	15	
5.6	5.7	10	32.0
5.7	5.8	11	
5.8	5.9	11	
5.9	6.0	10	39.0
6.0	6.1	14	
6.1	6.2	15	
6.2	6.3	12	37.0
6.3	6.4	12	
6.4	6.5	13	
6.5	6.6	10	27.0
6.6	6.7	8	
6.7	6.8	9	
6.8	6.9	10	47.0
6.9	7.0	13	
7.0	7.1	24	
7.1	7.2	19	56.0
7.2	7.3	17	
7.3	7.4	20	
7.4	7.5	21	55.0
7.5	7.6	17	
7.6	7.7	17	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

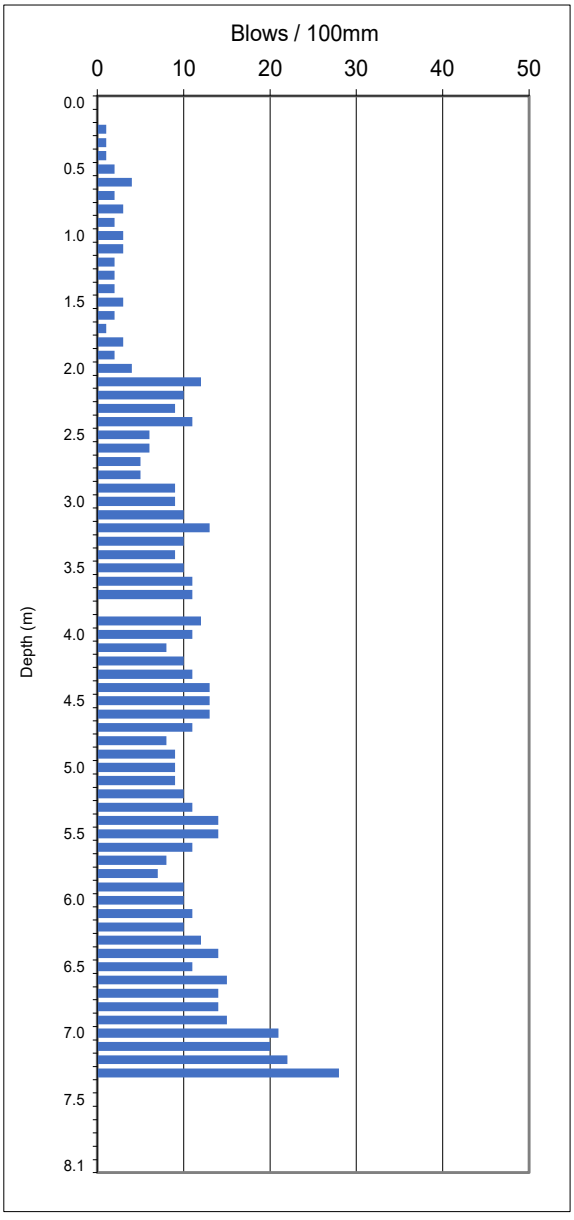
3.0 Test Results

3.12 – Test 12

LOCATION ON SITE : **Location 12**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	3.0
0.3	0.4	1	
0.4	0.5	1	
0.5	0.6	2	8.0
0.6	0.7	4	
0.7	0.8	2	
0.8	0.9	3	8.0
0.9	1.0	2	
1.0	1.1	3	
1.1	1.2	3	7.0
1.2	1.3	2	
1.3	1.4	2	
1.4	1.5	2	7.0
1.5	1.6	3	
1.6	1.7	2	
1.7	1.8	1	6.0
1.8	1.9	3	
1.9	2.0	2	
2.0	2.1	4	26.0
2.1	2.2	12	
2.2	2.3	10	
2.3	2.4	9	26.0
2.4	2.5	11	
2.5	2.6	6	
2.6	2.7	6	16.0
2.7	2.8	5	
2.8	2.9	5	
2.9	3.0	9	28.0
3.0	3.1	9	
3.1	3.2	10	
3.2	3.3	13	32.0
3.3	3.4	10	
3.4	3.5	9	
3.5	3.6	10	32.0
3.6	3.7	11	
3.7	3.8	11	
3.8	3.9	0	23.0
3.9	4.0	12	
4.0	4.1	11	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	8	29.0
4.2	4.3	10	
4.3	4.4	11	
4.4	4.5	13	39.0
4.5	4.6	13	
4.6	4.7	13	
4.7	4.8	11	28.0
4.8	4.9	8	
4.9	5.0	9	
5.0	5.1	9	28.0
5.1	5.2	9	
5.2	5.3	10	
5.3	5.4	11	39.0
5.4	5.5	14	
5.5	5.6	14	
5.6	5.7	11	26.0
5.7	5.8	8	
5.8	5.9	7	
5.9	6.0	10	31.0
6.0	6.1	10	
6.1	6.2	11	
6.2	6.3	10	36.0
6.3	6.4	12	
6.4	6.5	14	
6.5	6.6	11	40.0
6.6	6.7	15	
6.7	6.8	14	
6.8	6.9	14	50.0
6.9	7.0	15	
7.0	7.1	21	
7.1	7.2	20	70.0
7.2	7.3	22	
7.3	7.4	28	
7.4	7.5	END	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

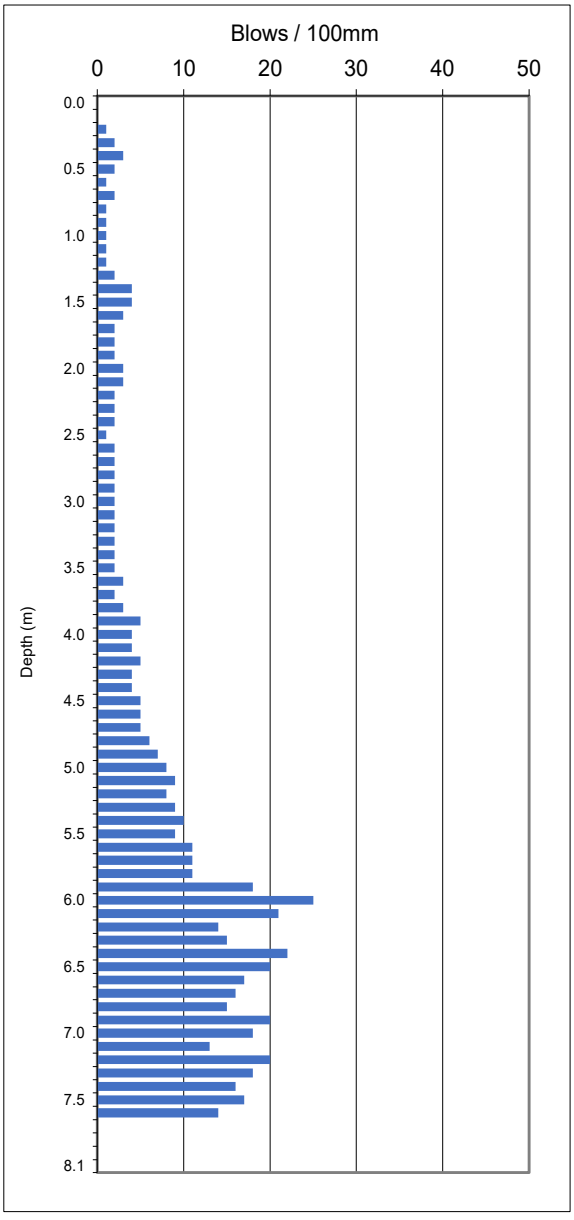
3.0 Test Results

3.13 – Test 13

LOCATION ON SITE : **Location 13**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	6.0
0.3	0.4	2	
0.4	0.5	3	
0.5	0.6	2	5.0
0.6	0.7	1	
0.7	0.8	2	
0.8	0.9	1	3.0
0.9	1.0	1	
1.0	1.1	1	
1.1	1.2	1	4.0
1.2	1.3	1	
1.3	1.4	2	
1.4	1.5	4	11.0
1.5	1.6	4	
1.6	1.7	3	
1.7	1.8	2	6.0
1.8	1.9	2	
1.9	2.0	2	
2.0	2.1	3	8.0
2.1	2.2	3	
2.2	2.3	2	
2.3	2.4	2	5.0
2.4	2.5	2	
2.5	2.6	1	
2.6	2.7	2	6.0
2.7	2.8	2	
2.8	2.9	2	
2.9	3.0	2	6.0
3.0	3.1	2	
3.1	3.2	2	
3.2	3.3	2	6.0
3.3	3.4	2	
3.4	3.5	2	
3.5	3.6	2	7.0
3.6	3.7	3	
3.7	3.8	2	
3.8	3.9	3	12.0
3.9	4.0	5	
4.0	4.1	4	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	4	13.0
4.2	4.3	5	
4.3	4.4	4	
4.4	4.5	4	14.0
4.5	4.6	5	
4.6	4.7	5	
4.7	4.8	5	18.0
4.8	4.9	6	
4.9	5.0	7	
5.0	5.1	8	25.0
5.1	5.2	9	
5.2	5.3	8	
5.3	5.4	9	28.0
5.4	5.5	10	
5.5	5.6	9	
5.6	5.7	11	33.0
5.7	5.8	11	
5.8	5.9	11	
5.9	6.0	18	64.0
6.0	6.1	25	
6.1	6.2	21	
6.2	6.3	14	51.0
6.3	6.4	15	
6.4	6.5	22	
6.5	6.6	20	53.0
6.6	6.7	17	
6.7	6.8	16	
6.8	6.9	15	53.0
6.9	7.0	20	
7.0	7.1	18	
7.1	7.2	13	51.0
7.2	7.3	20	
7.3	7.4	18	
7.4	7.5	16	47.0
7.5	7.6	17	
7.6	7.7	14	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

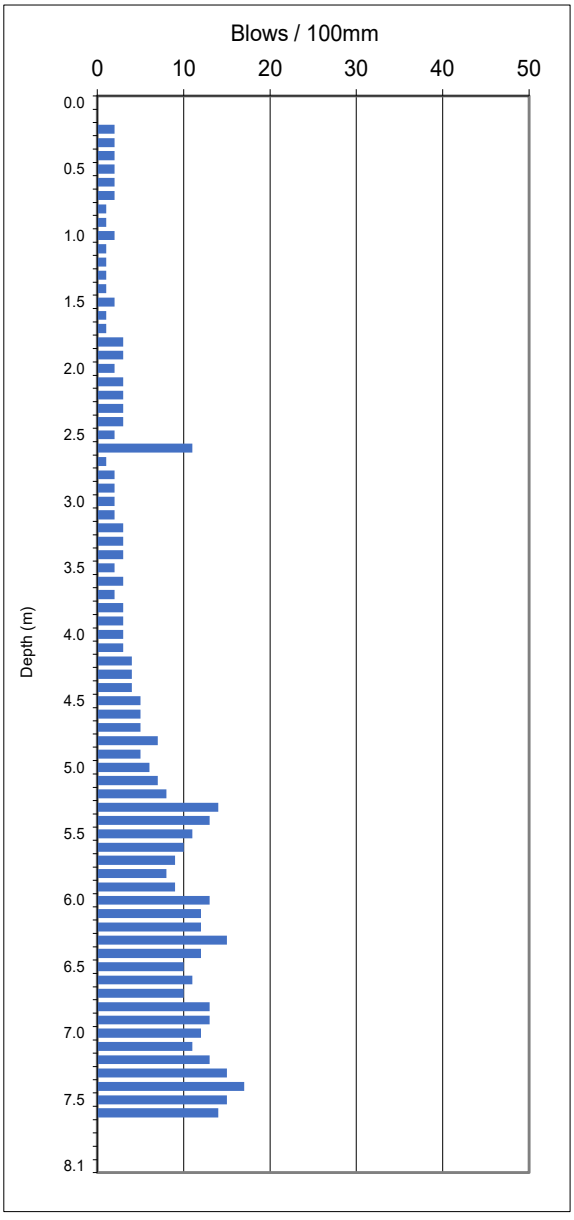
3.0 Test Results

3.14 – Test 14

LOCATION ON SITE : **Location 14**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	6.0
0.3	0.4	2	
0.4	0.5	2	
0.5	0.6	2	6.0
0.6	0.7	2	
0.7	0.8	2	
0.8	0.9	1	4.0
0.9	1.0	1	
1.0	1.1	2	
1.1	1.2	1	3.0
1.2	1.3	1	
1.3	1.4	1	
1.4	1.5	1	4.0
1.5	1.6	2	
1.6	1.7	1	
1.7	1.8	1	7.0
1.8	1.9	3	
1.9	2.0	3	
2.0	2.1	2	8.0
2.1	2.2	3	
2.2	2.3	3	
2.3	2.4	3	8.0
2.4	2.5	3	
2.5	2.6	2	
2.6	2.7	11	14.0
2.7	2.8	1	
2.8	2.9	2	
2.9	3.0	2	6.0
3.0	3.1	2	
3.1	3.2	2	
3.2	3.3	3	9.0
3.3	3.4	3	
3.4	3.5	3	
3.5	3.6	2	7.0
3.6	3.7	3	
3.7	3.8	2	
3.8	3.9	3	9.0
3.9	4.0	3	
4.0	4.1	3	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	3	11.0
4.2	4.3	4	
4.3	4.4	4	
4.4	4.5	4	14.0
4.5	4.6	5	
4.6	4.7	5	
4.7	4.8	5	17.0
4.8	4.9	7	
4.9	5.0	5	
5.0	5.1	6	21.0
5.1	5.2	7	
5.2	5.3	8	
5.3	5.4	14	38.0
5.4	5.5	13	
5.5	5.6	11	
5.6	5.7	10	27.0
5.7	5.8	9	
5.8	5.9	8	
5.9	6.0	9	34.0
6.0	6.1	13	
6.1	6.2	12	
6.2	6.3	12	39.0
6.3	6.4	15	
6.4	6.5	12	
6.5	6.6	10	31.0
6.6	6.7	11	
6.7	6.8	10	
6.8	6.9	13	38.0
6.9	7.0	13	
7.0	7.1	12	
7.1	7.2	11	39.0
7.2	7.3	13	
7.3	7.4	15	
7.4	7.5	17	46.0
7.5	7.6	15	
7.6	7.7	14	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

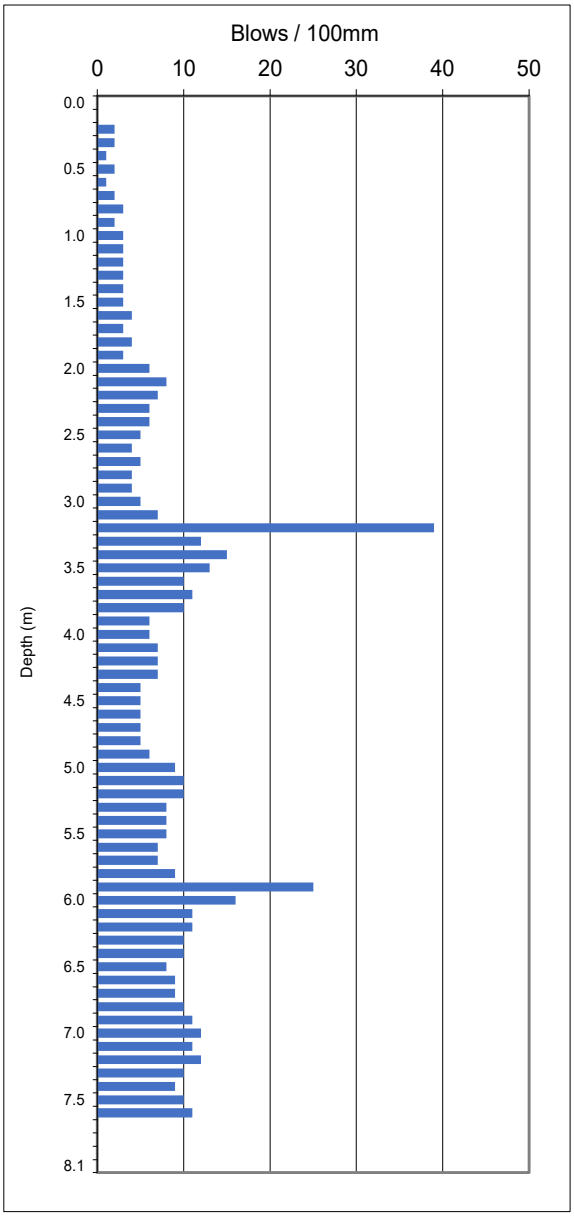
3.0 Test Results

3.15 – Test 15

LOCATION ON SITE : **Location 15**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	5.0
0.3	0.4	2	
0.4	0.5	1	
0.5	0.6	2	5.0
0.6	0.7	1	
0.7	0.8	2	
0.8	0.9	3	8.0
0.9	1.0	2	
1.0	1.1	3	
1.1	1.2	3	9.0
1.2	1.3	3	
1.3	1.4	3	
1.4	1.5	3	10.0
1.5	1.6	3	
1.6	1.7	4	
1.7	1.8	3	10.0
1.8	1.9	4	
1.9	2.0	3	
2.0	2.1	6	21.0
2.1	2.2	8	
2.2	2.3	7	
2.3	2.4	6	17.0
2.4	2.5	6	
2.5	2.6	5	
2.6	2.7	4	13.0
2.7	2.8	5	
2.8	2.9	4	
2.9	3.0	4	16.0
3.0	3.1	5	
3.1	3.2	7	
3.2	3.3	39	66.0
3.3	3.4	12	
3.4	3.5	15	
3.5	3.6	13	34.0
3.6	3.7	10	
3.7	3.8	11	
3.8	3.9	10	22.0
3.9	4.0	6	
4.0	4.1	6	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	7	21.0
4.2	4.3	7	
4.3	4.4	7	
4.4	4.5	5	15.0
4.5	4.6	5	
4.6	4.7	5	
4.7	4.8	5	16.0
4.8	4.9	5	
4.9	5.0	6	
5.0	5.1	9	29.0
5.1	5.2	10	
5.2	5.3	10	
5.3	5.4	8	24.0
5.4	5.5	8	
5.5	5.6	8	
5.6	5.7	7	23.0
5.7	5.8	7	
5.8	5.9	9	
5.9	6.0	25	52.0
6.0	6.1	16	
6.1	6.2	11	
6.2	6.3	11	31.0
6.3	6.4	10	
6.4	6.5	10	
6.5	6.6	8	26.0
6.6	6.7	9	
6.7	6.8	9	
6.8	6.9	10	33.0
6.9	7.0	11	
7.0	7.1	12	
7.1	7.2	11	33.0
7.2	7.3	12	
7.3	7.4	10	
7.4	7.5	9	30.0
7.5	7.6	10	
7.6	7.7	11	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

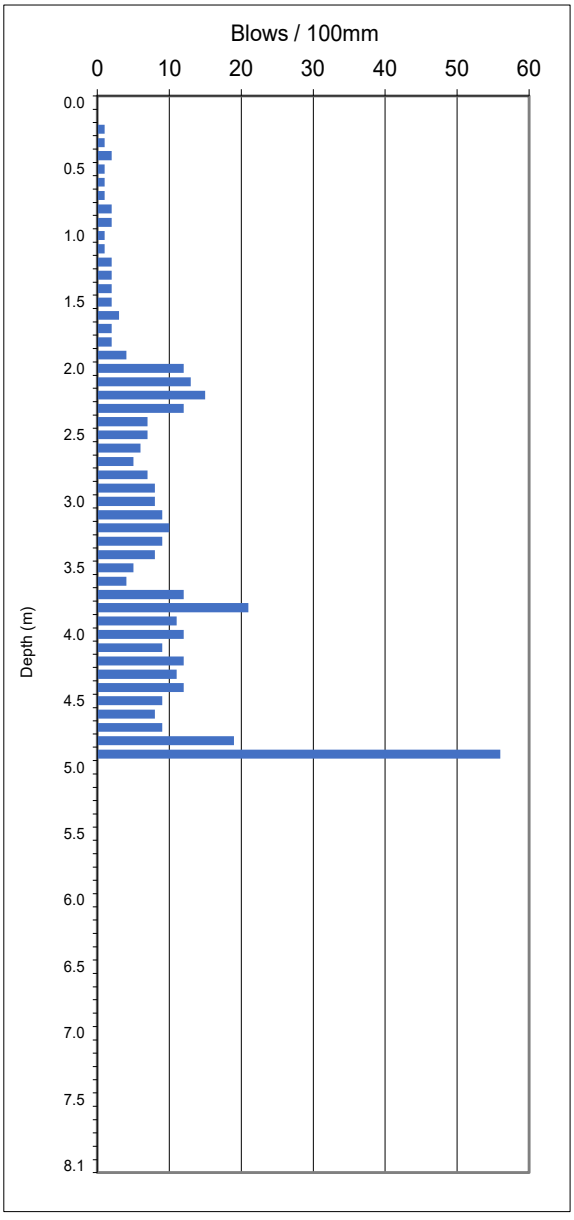
3.0 Test Results

3.16 – Test 16

LOCATION ON SITE : **Location 16**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	4.0
0.3	0.4	1	
0.4	0.5	2	
0.5	0.6	1	3.0
0.6	0.7	1	
0.7	0.8	1	
0.8	0.9	2	5.0
0.9	1.0	2	
1.0	1.1	1	
1.1	1.2	1	5.0
1.2	1.3	2	
1.3	1.4	2	
1.4	1.5	2	7.0
1.5	1.6	2	
1.6	1.7	3	
1.7	1.8	2	8.0
1.8	1.9	2	
1.9	2.0	4	
2.0	2.1	12	40.0
2.1	2.2	13	
2.2	2.3	15	
2.3	2.4	12	26.0
2.4	2.5	7	
2.5	2.6	7	
2.6	2.7	6	18.0
2.7	2.8	5	
2.8	2.9	7	
2.9	3.0	8	25.0
3.0	3.1	8	
3.1	3.2	9	
3.2	3.3	10	27.0
3.3	3.4	9	
3.4	3.5	8	
3.5	3.6	5	21.0
3.6	3.7	4	
3.7	3.8	12	
3.8	3.9	21	44.0
3.9	4.0	11	
4.0	4.1	12	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	9	32.0
4.2	4.3	12	
4.3	4.4	11	
4.4	4.5	12	29.0
4.5	4.6	9	
4.6	4.7	8	
4.7	4.8	9	84.0
4.8	4.9	19	
4.9	5.0	56	
5.0	5.1	END	0.0
5.1	5.2	0	
5.2	5.3	0	
5.3	5.4	0	0.0
5.4	5.5	0	
5.5	5.6	0	
5.6	5.7	0	0.0
5.7	5.8	0	
5.8	5.9	0	
5.9	6.0	0	0.0
6.0	6.1	0	
6.1	6.2	0	
6.2	6.3	0	0.0
6.3	6.4	0	
6.4	6.5	0	
6.5	6.6	0	0.0
6.6	6.7	0	
6.7	6.8	0	
6.8	6.9	0	0.0
6.9	7.0	0	
7.0	7.1	0	
7.1	7.2	0	0.0
7.2	7.3	0	
7.3	7.4	0	
7.4	7.5	0	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



FTR 37877

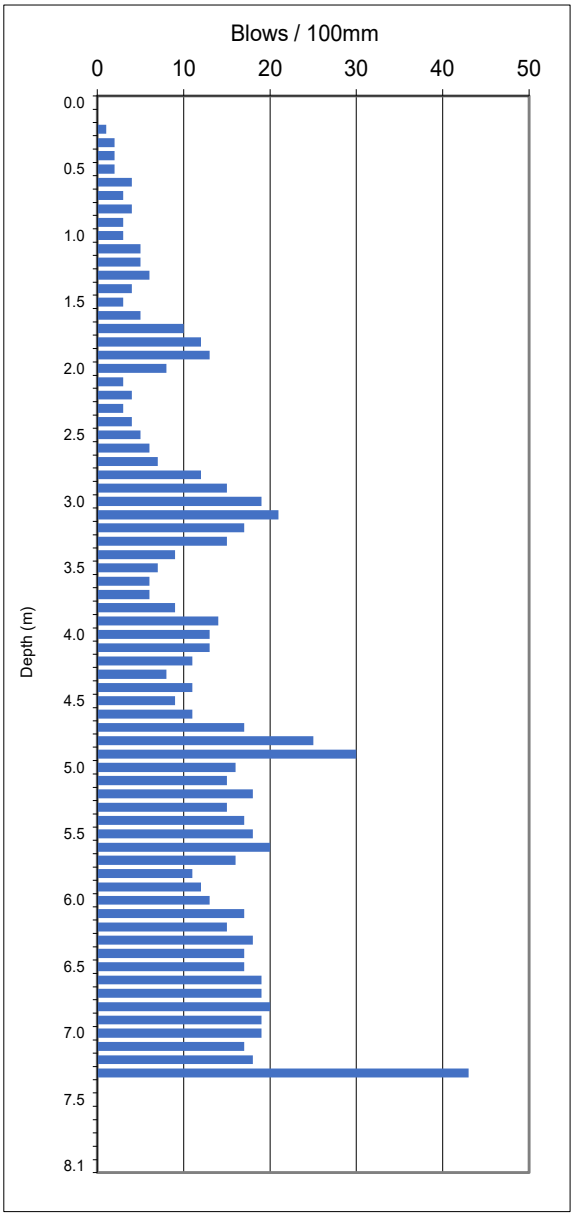
3.0 Test Results

3.17 – Test 17

LOCATION ON SITE : **Location 17**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	5.0
0.3	0.4	2	
0.4	0.5	2	
0.5	0.6	2	9.0
0.6	0.7	4	
0.7	0.8	3	
0.8	0.9	4	10.0
0.9	1.0	3	
1.0	1.1	3	
1.1	1.2	5	16.0
1.2	1.3	5	
1.3	1.4	6	
1.4	1.5	4	12.0
1.5	1.6	3	
1.6	1.7	5	
1.7	1.8	10	35.0
1.8	1.9	12	
1.9	2.0	13	
2.0	2.1	8	15.0
2.1	2.2	3	
2.2	2.3	4	
2.3	2.4	3	12.0
2.4	2.5	4	
2.5	2.6	5	
2.6	2.7	6	25.0
2.7	2.8	7	
2.8	2.9	12	
2.9	3.0	15	55.0
3.0	3.1	19	
3.1	3.2	21	
3.2	3.3	17	41.0
3.3	3.4	15	
3.4	3.5	9	
3.5	3.6	7	19.0
3.6	3.7	6	
3.7	3.8	6	
3.8	3.9	9	36.0
3.9	4.0	14	
4.0	4.1	13	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	13	32.0
4.2	4.3	11	
4.3	4.4	8	
4.4	4.5	11	31.0
4.5	4.6	9	
4.6	4.7	11	
4.7	4.8	17	72.0
4.8	4.9	25	
4.9	5.0	30	
5.0	5.1	16	49.0
5.1	5.2	15	
5.2	5.3	18	
5.3	5.4	15	50.0
5.4	5.5	17	
5.5	5.6	18	
5.6	5.7	20	47.0
5.7	5.8	16	
5.8	5.9	11	
5.9	6.0	12	42.0
6.0	6.1	13	
6.1	6.2	17	
6.2	6.3	15	50.0
6.3	6.4	18	
6.4	6.5	17	
6.5	6.6	17	55.0
6.6	6.7	19	
6.7	6.8	19	
6.8	6.9	20	58.0
6.9	7.0	19	
7.0	7.1	19	
7.1	7.2	17	78.0
7.2	7.3	18	
7.3	7.4	43	
7.4	7.5	END	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



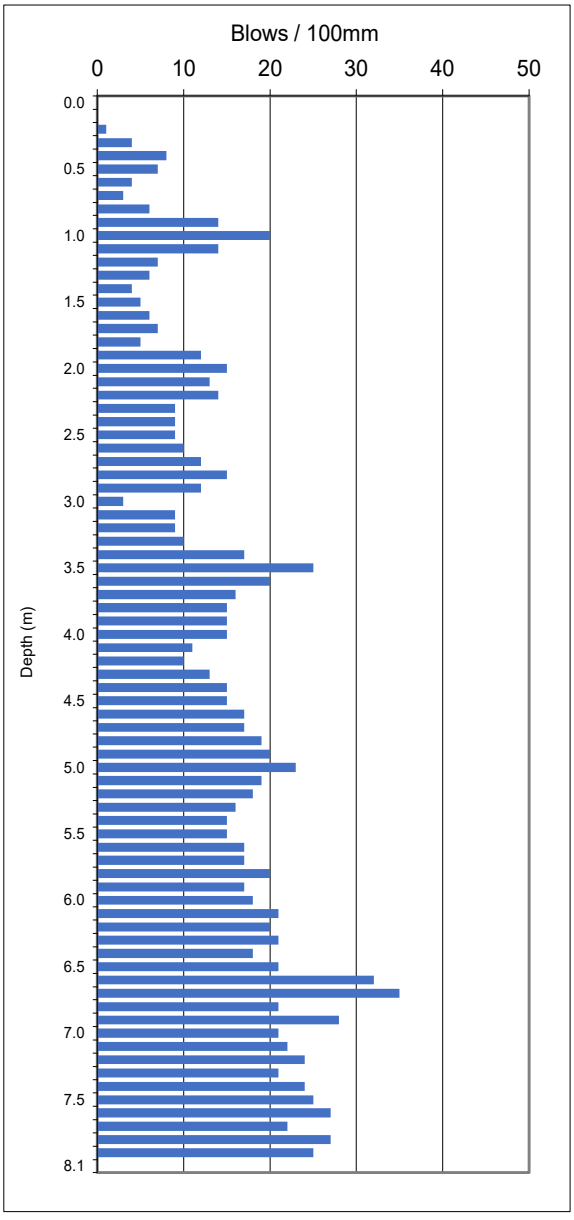
FTR 37877

3.0 Test Results

3.18 – Test 18

LOCATION ON SITE : **Location 18**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	13.0
0.3	0.4	4	
0.4	0.5	8	
0.5	0.6	7	14.0
0.6	0.7	4	
0.7	0.8	3	
0.8	0.9	6	40.0
0.9	1.0	14	
1.0	1.1	20	
1.1	1.2	14	27.0
1.2	1.3	7	
1.3	1.4	6	
1.4	1.5	4	15.0
1.5	1.6	5	
1.6	1.7	6	
1.7	1.8	7	24.0
1.8	1.9	5	
1.9	2.0	12	
2.0	2.1	15	42.0
2.1	2.2	13	
2.2	2.3	14	
2.3	2.4	9	27.0
2.4	2.5	9	
2.5	2.6	9	
2.6	2.7	10	37.0
2.7	2.8	12	
2.8	2.9	15	
2.9	3.0	12	24.0
3.0	3.1	3	
3.1	3.2	9	
3.2	3.3	9	36.0
3.3	3.4	10	
3.4	3.5	17	
3.5	3.6	25	61.0
3.6	3.7	20	
3.7	3.8	16	
3.8	3.9	15	45.0
3.9	4.0	15	
4.0	4.1	15	
4.1	4.2	11	34.0
4.2	4.3	10	
4.3	4.4	13	
4.4	4.5	15	47.0
4.5	4.6	15	
4.6	4.7	17	
4.7	4.8	17	56.0
4.8	4.9	19	
4.9	5.0	20	
5.0	5.1	23	60.0
5.1	5.2	19	
5.2	5.3	18	
5.3	5.4	16	46.0
5.4	5.5	15	
5.5	5.6	15	
5.6	5.7	17	54.0
5.7	5.8	17	
5.8	5.9	20	
5.9	6.0	17	56.0
6.0	6.1	18	
6.1	6.2	21	
6.2	6.3	20	59.0
6.3	6.4	21	
6.4	6.5	18	
6.5	6.6	21	88.0
6.6	6.7	32	
6.7	6.8	35	
6.8	6.9	21	70.0
6.9	7.0	28	
7.0	7.1	21	
7.1	7.2	22	67.0
7.2	7.3	24	
7.3	7.4	21	
7.4	7.5	24	76.0
7.5	7.6	25	
7.6	7.7	27	
7.7	7.8	22	74.0
7.8	7.9	27	
7.9	8.0	25	
8.1	8.0	END	0.0



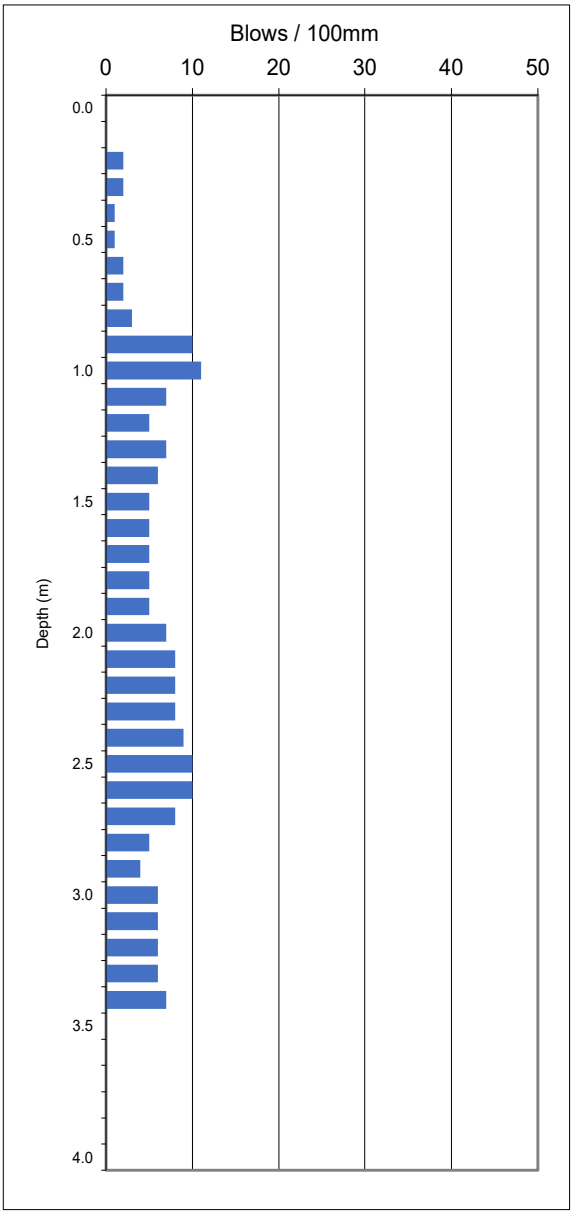
FTR 37877

3.0 Test Results

3.19 – Test 19

LOCATION ON SITE : **Location 19**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm Ø**	ROD TYPE/MASS : **8Kg/35mm Ø**
DAMPER USED : **NO**	CONE LEFT BEHIND : **NO**
HOLES BACKFILLED : **NO**	

Depth (m) From	Depth (m) To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	0.0
0.1	0.2	0	
0.2	0.3	2	5.0
0.3	0.4	2	
0.4	0.5	1	
0.5	0.6	1	5.0
0.6	0.7	2	
0.7	0.8	2	
0.8	0.9	3	24.0
0.9	1.0	10	
1.0	1.1	11	
1.1	1.2	7	19.0
1.2	1.3	5	
1.3	1.4	7	
1.4	1.5	6	16.0
1.5	1.6	5	
1.6	1.7	5	
1.7	1.8	5	15.0
1.8	1.9	5	
1.9	2.0	5	
2.0	2.1	7	23.0
2.1	2.2	8	
2.2	2.3	8	
2.3	2.4	8	27.0
2.4	2.5	9	
2.5	2.6	10	
2.6	2.7	10	23.0
2.7	2.8	8	
2.8	2.9	5	
2.9	3.0	4	16.0
3.0	3.1	6	
3.1	3.2	6	
3.2	3.3	6	
3.3	3.4	6	
3.4	3.5	7	
3.5	3.6	END	0.0
3.6	3.7		
3.7	3.8		
3.8	3.9		0.0
3.9	4.0		
4.0	4.1		



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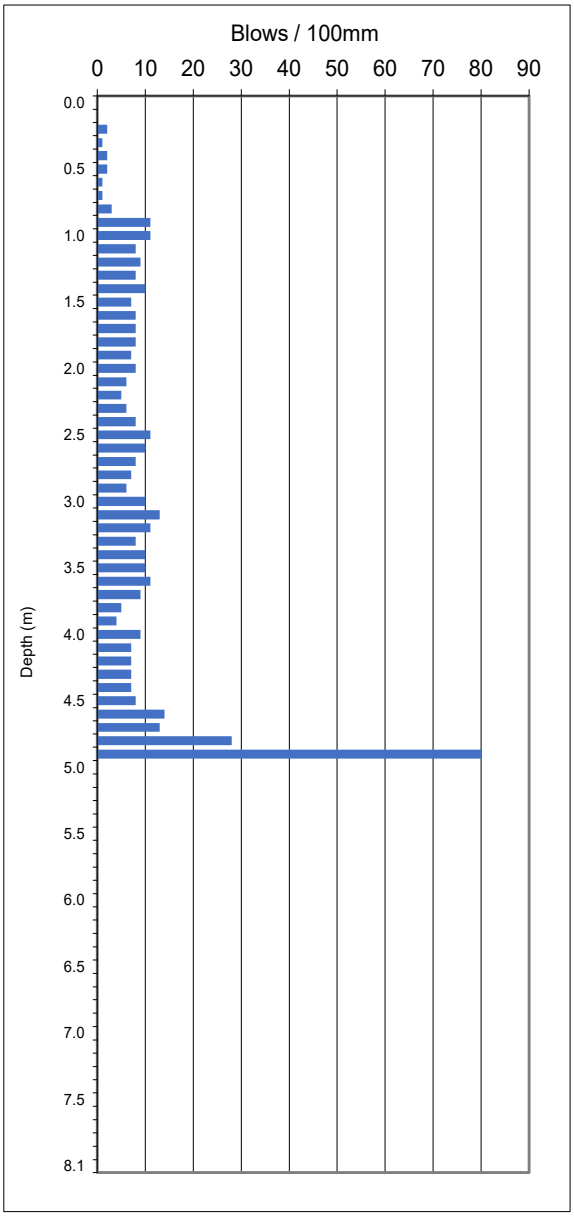
3.0 Test Results

3.20 – Test 20

LOCATION ON SITE : **Location 19A Moved 5 meters**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	5.0
0.3	0.4	1	
0.4	0.5	2	
0.5	0.6	2	4.0
0.6	0.7	1	
0.7	0.8	1	
0.8	0.9	3	25.0
0.9	1.0	11	
1.0	1.1	11	
1.1	1.2	8	25.0
1.2	1.3	9	
1.3	1.4	8	
1.4	1.5	10	25.0
1.5	1.6	7	
1.6	1.7	8	
1.7	1.8	8	23.0
1.8	1.9	8	
1.9	2.0	7	
2.0	2.1	8	19.0
2.1	2.2	6	
2.2	2.3	5	
2.3	2.4	6	25.0
2.4	2.5	8	
2.5	2.6	11	
2.6	2.7	10	25.0
2.7	2.8	8	
2.8	2.9	7	
2.9	3.0	6	29.0
3.0	3.1	10	
3.1	3.2	13	
3.2	3.3	11	29.0
3.3	3.4	8	
3.4	3.5	10	
3.5	3.6	10	30.0
3.6	3.7	11	
3.7	3.8	9	
3.8	3.9	5	18.0
3.9	4.0	4	
4.0	4.1	9	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	7	21.0
4.2	4.3	7	
4.3	4.4	7	
4.4	4.5	7	29.0
4.5	4.6	8	
4.6	4.7	14	
4.7	4.8	13	121.0
4.8	4.9	28	
4.9	5.0	80	
5.0	5.1	END	0.0
5.1	5.2	0	
5.2	5.3	0	
5.3	5.4	0	0.0
5.4	5.5	0	
5.5	5.6	0	
5.6	5.7	0	0.0
5.7	5.8	0	
5.8	5.9	0	
5.9	6.0	0	0.0
6.0	6.1	0	
6.1	6.2	0	
6.2	6.3	0	0.0
6.3	6.4	0	
6.4	6.5	0	
6.5	6.6	0	0.0
6.6	6.7	0	
6.7	6.8	0	
6.8	6.9	0	0.0
6.9	7.0	0	
7.0	7.1	0	
7.1	7.2	0	0.0
7.2	7.3	0	
7.3	7.4	0	
7.4	7.5	0	0.0
7.5	7.6	0	
7.6	7.7	0	
7.7	7.8	0	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



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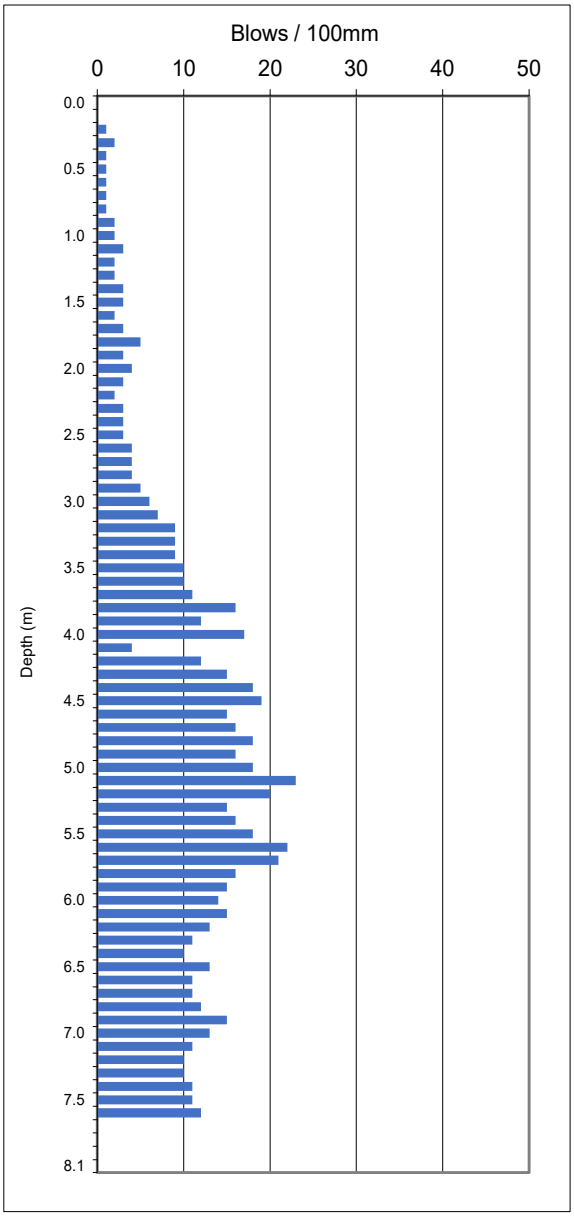
3.0 Test Results

3.21 – Test 21

LOCATION ON SITE : **Location 20**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	1	4.0
0.3	0.4	2	
0.4	0.5	1	
0.5	0.6	1	3.0
0.6	0.7	1	
0.7	0.8	1	
0.8	0.9	1	5.0
0.9	1.0	2	
1.0	1.1	2	
1.1	1.2	3	7.0
1.2	1.3	2	
1.3	1.4	2	
1.4	1.5	3	8.0
1.5	1.6	3	
1.6	1.7	2	
1.7	1.8	3	11.0
1.8	1.9	5	
1.9	2.0	3	
2.0	2.1	4	9.0
2.1	2.2	3	
2.2	2.3	2	
2.3	2.4	3	9.0
2.4	2.5	3	
2.5	2.6	3	
2.6	2.7	4	12.0
2.7	2.8	4	
2.8	2.9	4	
2.9	3.0	5	18.0
3.0	3.1	6	
3.1	3.2	7	
3.2	3.3	9	27.0
3.3	3.4	9	
3.4	3.5	9	
3.5	3.6	10	31.0
3.6	3.7	10	
3.7	3.8	11	
3.8	3.9	16	45.0
3.9	4.0	12	
4.0	4.1	17	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
4.1	4.2	4	31.0
4.2	4.3	12	
4.3	4.4	15	
4.4	4.5	18	52.0
4.5	4.6	19	
4.6	4.7	15	
4.7	4.8	16	50.0
4.8	4.9	18	
4.9	5.0	16	
5.0	5.1	18	61.0
5.1	5.2	23	
5.2	5.3	20	
5.3	5.4	15	49.0
5.4	5.5	16	
5.5	5.6	18	
5.6	5.7	22	59.0
5.7	5.8	21	
5.8	5.9	16	
5.9	6.0	15	44.0
6.0	6.1	14	
6.1	6.2	15	
6.2	6.3	13	34.0
6.3	6.4	11	
6.4	6.5	10	
6.5	6.6	13	35.0
6.6	6.7	11	
6.7	6.8	11	
6.8	6.9	12	40.0
6.9	7.0	15	
7.0	7.1	13	
7.1	7.2	11	31.0
7.2	7.3	10	
7.3	7.4	10	
7.4	7.5	11	34.0
7.5	7.6	11	
7.6	7.7	12	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



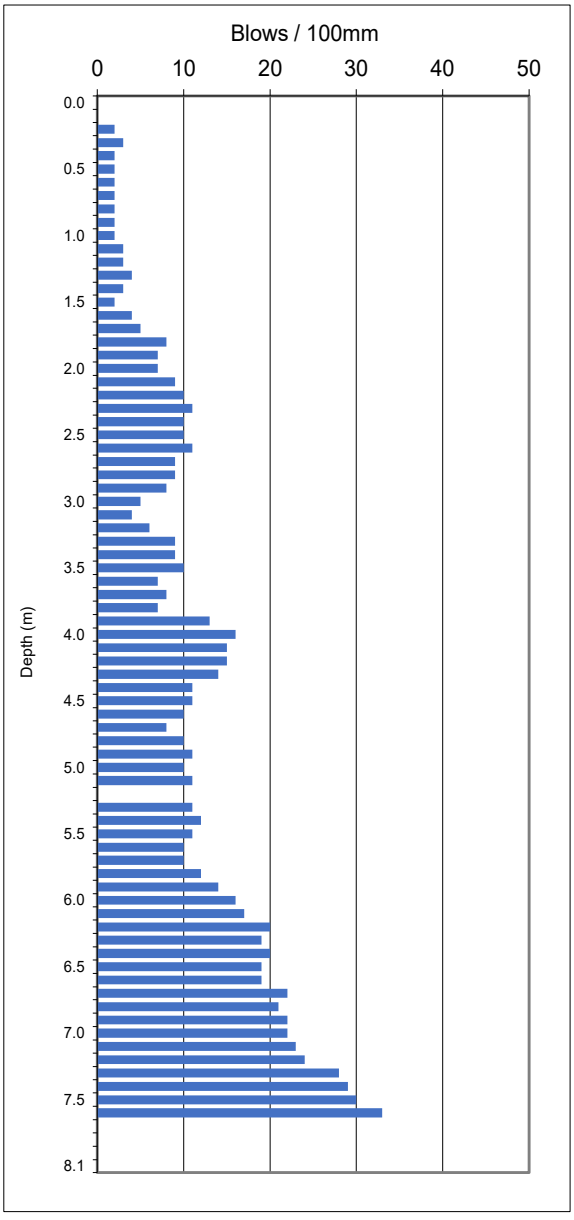
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3.0 Test Results

3.21 – Test 22

LOCATION ON SITE : **Location 21**	
HAMMER TYPE/MASS: **Super Heavy/63.5Kg**	STANDARD DROP: **760mm**
CONE TYPE/DIAMETER: **90°/50.5mm ∅**	ROD TYPE/MASS : **8Kg/35mm ∅**
DAMPER USED : **NO**	CONE LEFT BEHIND : **YES**
HOLES BACKFILLED : **NO**	

Depth (m) From	To	Blows/ 100mm	SPT 'N' Values
0.0	0.1	0	N/A
0.1	0.2	0	
0.2	0.3	2	7.0
0.3	0.4	3	
0.4	0.5	2	
0.5	0.6	2	6.0
0.6	0.7	2	
0.7	0.8	2	
0.8	0.9	2	6.0
0.9	1.0	2	
1.0	1.1	2	
1.1	1.2	3	10.0
1.2	1.3	3	
1.3	1.4	4	
1.4	1.5	3	9.0
1.5	1.6	2	
1.6	1.7	4	
1.7	1.8	5	20.0
1.8	1.9	8	
1.9	2.0	7	
2.0	2.1	7	26.0
2.1	2.2	9	
2.2	2.3	10	
2.3	2.4	11	31.0
2.4	2.5	10	
2.5	2.6	10	
2.6	2.7	11	29.0
2.7	2.8	9	
2.8	2.9	9	
2.9	3.0	8	17.0
3.0	3.1	5	
3.1	3.2	4	
3.2	3.3	6	24.0
3.3	3.4	9	
3.4	3.5	9	
3.5	3.6	10	25.0
3.6	3.7	7	
3.7	3.8	8	
3.8	3.9	7	36.0
3.9	4.0	13	
4.0	4.1	16	
4.1	4.2	15	44.0
4.2	4.3	15	
4.3	4.4	14	
4.4	4.5	11	32.0
4.5	4.6	11	
4.6	4.7	10	
4.7	4.8	8	29.0
4.8	4.9	10	
4.9	5.0	11	
5.0	5.1	10	21.0
5.1	5.2	11	
5.2	5.3	0	
5.3	5.4	11	34.0
5.4	5.5	12	
5.5	5.6	11	
5.6	5.7	10	32.0
5.7	5.8	10	
5.8	5.9	12	
5.9	6.0	14	47.0
6.0	6.1	16	
6.1	6.2	17	
6.2	6.3	20	59.0
6.3	6.4	19	
6.4	6.5	20	
6.5	6.6	19	60.0
6.6	6.7	19	
6.7	6.8	22	
6.8	6.9	21	65.0
6.9	7.0	22	
7.0	7.1	22	
7.1	7.2	23	75.0
7.2	7.3	24	
7.3	7.4	28	
7.4	7.5	29	92.0
7.5	7.6	30	
7.6	7.7	33	
7.7	7.8	END	0.0
7.8	7.9	0	
7.9	8.0	0	
8.1	8.0	0	0.0



END OF REPORT

Appendix 3 - Geotechnical Laboratory Test Results

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860919

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WSE1 at 1.5m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**23/02/2022**
Sampling Location:	**WSE1 at 1.3m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DB**
Soil Description:	**Brown gravelly silty clayey SAND**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**68**
Plastic Limit	**=**	**Non-plastic**
Liquid Limit	**=**	**N/A**
Plasticity Index	**=**	**N/A**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860920

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS2 at 1.6m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**23/02/2022**
Sampling Location:	**WS2 at 1.6m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Greyish brown slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**99**
Plastic Limit	**=**	**19**
Liquid Limit	**=**	**40**
Plasticity Index	**=**	**21**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860921

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS9 at 3.0m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**23/02/2022**
Sampling Location:	**WS9 at 3.0m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Brown gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**51**
Plastic Limit	**=**	**15**
Liquid Limit	**=**	**27**
Plasticity Index	**=**	**12**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860922

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS11 at 2.0m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**21/02/2022**
Sampling Location:	**WS11 at 2.0m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**67**
Plastic Limit	**=**	**13**
Liquid Limit	**=**	**26**
Plasticity Index	**=**	**13**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860923

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS13 at 1.3m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**21/02/2022**
Sampling Location:	**WS13 at 1.3m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Brown slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**98**
Plastic Limit	**=**	**16**
Liquid Limit	**=**	**31**
Plasticity Index	**=**	**15**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860924

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS13 at 1.7m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**21/02/2022**
Sampling Location:	**WS13 at 1.7m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DB**
Soil Description:	**Brown gravelly silty SAND**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**70**
Plastic Limit	**=**	**Non-plastic**
Liquid Limit	**=**	**N/A**
Plasticity Index	**=**	**N/A**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860925

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS15 at 1.5m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**22/02/2022**
Sampling Location:	**WS15 at 1.5m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DB**
Soil Description:	**Brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**69**
Plastic Limit	**=**	**14**
Liquid Limit	**=**	**29**
Plasticity Index	**=**	**15**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860926

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS17 at 1.2m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**22/02/2022**
Sampling Location:	**WS17 at 1.2m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Reddish brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**54**
Plastic Limit	**=**	**15**
Liquid Limit	**=**	**24**
Plasticity Index	**=**	**9**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860927

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS18 at 1.2m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**22/02/2022**
Sampling Location:	**WS18 at 1.2m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DJ**
Soil Description:	**Brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**64**
Plastic Limit	**=**	**15**
Liquid Limit	**=**	**28**
Plasticity Index	**=**	**13**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860928

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS20 at 1.5m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**23/02/2022**
Sampling Location:	**WS20 at 1.5m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DB**
Soil Description:	**Brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**63**
Plastic Limit	**=**	**13**
Liquid Limit	**=**	**23**
Plasticity Index	**=**	**10**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

E-geo Solutions Ltd.
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0RD

Date: 07 March 2022
Test Report Ref: TR 860929

Contract: Ruabon Park, Ruabon, Wrecsam

LABORATORY TEST REPORT

TEST REQUIREMENTS: Determination of liquid limit (80g/30° fall cone method: 4 point with increasing water content); Plastic limit and plasticity index in accordance with **BS EN ISO 17892-12: 2018 Clause 5.3, 5.5 and 6.5 respectively.**

SAMPLE DETAILS:

Certificate of sampling received:	**No**
Laboratory Ref. No:	**S100437**
Client Ref. :	**WS20 at 2.1m**
Date and Time of Sampling:	**26/01/2022**
Date of Receipt at Lab:	**28/01/2022**
Date of Start of Test:	**23/02/2022**
Sampling Location:	**WS20 at 2.1m**
Name of Source:	**Site won**
Method of Sampling:	**Disturbed Bulk Sample**
Sampled By:	**Client (Test results apply to sample as received)**
Tested By:	**DB**
Soil Description:	**Brown slightly gravelly slightly sandy silty CLAY**

RESULTS:

History of sample:	**:**	**After wet sieving**
% Materials passing 425µm	**=**	**69**
Plastic Limit	**=**	**15**
Liquid Limit	**=**	**27**
Plasticity Index	**=**	**12**

This test report shall not be reproduced, except in full, without the written approval of Celtest Company Limited.

These results relate only to the items tested.

Comments:
None

Report checked and approved by:

Euros Jones
Soils Team Manager

Appendix 4 - Gas Monitoring Results

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	01/02/2022					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
CO2 by VOL %	0.50%	0.40%	0.50%	0.90%	1.00%	0.50%
O2 by VOL %	19.60%	19.70%	19.20%	19.00%	19.10%	19.70%
BAL	91.90%	91.90%	91.90%	91.50%	91.40%	92.20%
LEL CH4	0%	0%	0%	0%	0%	0%
PEAK CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
PEAK CO2 by VOL %	0.50%	0.50%	0.50%	1.00%	1.00%	1.00%
MIN O2 by VOL %	19.60%	19.70%	19.20%	19.00%	19.10%	19.70%
BARO PRESSURE	0988mb	0988mb	0988mb	0988mb	0988mb	0988mb
FLOW l/hr	<0.0 1/hr	<0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	<0.0 1/hr

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	16/02/2022					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
CO2 by VOL %	0.90%	0.40%	1.50%	1.60%	1.40%	0.50%
O2 by VOL %	19.80%	19.60%	19.60%	19.50%	19.20%	19.80%
BAL	91.90%	91.90%	91.90%	91.50%	91.40%	92.20%
LEL CH4	0%	0%	0%	0%	0%	0%
PEAK CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
PEAK CO2 by VOL %	0.90%	0.90%	1.50%	1.70%	1.60%	1.60%
MIN O2 by VOL %	19.80%	19.60%	19.60%	19.50%	19.20%	19.80%
BARO PRESSURE	1003mb	1003mb	1003mb	1003mb	1003mb	1003mb
FLOW l/hr	<0.0 1/hr	<0.0 1/hr	<0.0 1/hr	0.0 1/hr	0.0 1/hr	<0.0 1/hr

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	04/03/2022					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
CO2 by VOL %	1.70%	0.60%	1.70%	1.60%	2.20%	0.50%
O2 by VOL %	19.40%	19.60%	19.60%	19.10%	19.30%	19.50%
BAL	88.80%	89.40%	87.00%	88.00%	88.10%	89.40%
LEL CH4	0%	0%	0%	0%	0%	0%
PEAK CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
PEAK CO2 by VOL %	1.80%	1.00%	1.80%	1.60%	2.30%	0.50%
MIN O2 by VOL %	19.40%	19.60%	19.60%	19.10%	19.30%	19.50%
BARO PRESSURE	1008mb	1008mb	1008mb	1008mb	1008mb	1008mb
FLOW l/hr	<0.0 1/hr	<0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	<0.0 1/hr

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	25/03/2022					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
CO2 by VOL %	1.80%	1.00%	0.80%	0.40%	2.20%	0.80%
O2 by VOL %	19.50%	19.40%	19.50%	19.30%	19.30%	19.60%
BAL	87.30%	89.20%	89.40%	89.50%	88.00%	89.10%
LEL CH4	0%	0%	0%	0%	0%	0%
PEAK CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
PEAK CO2 by VOL %	1.90%	1.10%	0.80%	0.40%	2.30%	0.90%
MIN O2 by VOL %	19.50%	19.40%	19.50%	19.30%	19.30%	19.60%
BARO PRESSURE	1020mb	1020mb	1020mb	1020mb	1020mb	1020mb
FLOW l/hr	<0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	<0.0 1/hr

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	19/04/2022					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
CO2 by VOL %	0.40%	1.60%	0.50%	1.90%	0.40%	1.90%
O2 by VOL %	19.60%	19.60%	19.40%	19.40%	19.50%	19.60%
BAL	92.30%	88.90%	92.30%	91.20%	92.20%	91.20%
LEL CH4	0%	0%	0%	0%	0%	0%
PEAK CH4 by VOL %	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%
PEAK CO2 by VOL %	0.50%	1.60%	0.50%	2.00%	0.50%	1.90%
MIN O2 by VOL %	19.60%	19.60%	19.40%	19.40%	19.50%	19.60%
BARO PRESSURE	1006mb	1006mb	1006mb	1006mb	1006mb	1006mb
FLOW l/hr	<0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	0.0 1/hr	<0.0 1/hr

PLOT1, PLOT2, PLOT3 RUABON PARK, RUABON
Ground Gas Monitoring

Monitoring Date	12/05/2018					
Borehole Nr	WS2	WS6	WS11	WS15	WS18	WS21
CH4 by VOL %	NA	<0.1%	NA	NA	NA	<0.1%
CO2 by VOL %	NA	0.90%	NA	NA	NA	0.40%
O2 by VOL %	NA	19.50%	NA	NA	NA	19.60%
BAL	NA	91.90%	NA	NA	NA	92.40%
LEL CH4		0%				0%
PEAK CH4 by VOL %	NA	<0.1%	NA	NA	NA	<0.1%
PEAK CO2 by VOL %	NA	1.00%	NA	NA	NA	1.00%
MIN O2 by VOL %	NA	19.50%	NA	NA	NA	19.60%
BARO PRESSURE	NA	1004mb	NA	NA	NA	1004mb
FLOW l/hr	NA	<0.0 1/hr	NA	NA	NA	<0.0 1/hr

CERTIFICATION OF CALIBRATION

Date Of Calibration: 03-Nov-2021

Certificate Number: G507303_2/29174

Issued by: QED Environmental Systems Ltd.

Customer: **Ashtead Technology Ltd**
Ashtead House Discovery Drive Arnhall Business Park
Westhill Aberdeenshire AB32 6FG UNITED KINGDOM

Description: Gas Analyser

Model: GA5000

Serial Number: G507303

UKAS Accredited results:

Results after adjustment :

Methane (CH_4)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.8	0.072
14.9	14.7	0.13
59.7	59.3	0.42

Carbon Dioxide (CO_2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
5.0	4.8	0.074
15.1	14.8	0.13
40.3	40.2	0.29

Oxygen (O_2)		
Certified Gas (%)	Instrument Reading (%)	Uncertainty (%)
21.2	21.3	0.25

The inwards assessment was carried out 21-Oct-2021.
The maximum adjustment is larger than the specification limit.
Inwards assessment data is available if requested.

All concentrations are molar.

CH_4, CO_2 readings recorded at : 32.3 °C ± 2.5 °C

O2 readings recorded at : 22.0 °C ± 2.5 °C

Barometric Pressure : 0993 mbar ± 4 mbar

Method of Test : The analyser is calibrated in a temperature controlled chamber using a series of reference gases, in compliance with procedure LP004.

Instrument has passed calibration as the measurement result is within the specification limit. The specification limit takes into account the measurement uncertainty.
The results relate only to the item calibrated

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www.qedenv.com +44 (0) 333 800 0088 sales@qedenv.co.uk

QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

CERTIFICATION OF CALIBRATION

Date Of Calibration: 03-Nov-2021

Certificate Number: G507303_2/29174

Issued by: QED Environmenta Systems Ltd.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Calibrations marked 'Non-UKAS Accredited results' on this certificate have been included for completeness.

Non-UKAS accredited results after adjustment:

Barometer (mbar)	
Reference	Instrument Reading
993	994

Additional Gas Cells		
Gas	Certified Gas (ppm)	Instrument Reading (ppm)
CO	509	511
H_2S	259	259

Internal Flow	
Applied (l/hr)	Instrument Reading (l/hr)
5.00	4.90
10.00	9.90

Date of Issue : 05-Nov-2021 Approved by Signatory Laura McBride

Laboratory Inspection

End of Certificate

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

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QED Environmental Systems Ltd. Cyan Park - Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

Registered in England and Wales 1898734

Appendix 5 - BGS Radon Report BGS_326495/34724

GeoReports

British Geological Survey

Gareth Huw Jones
E-Geo Solutions Ltd
Glasgow House
High Street
Llanelwy
LL17 0RD

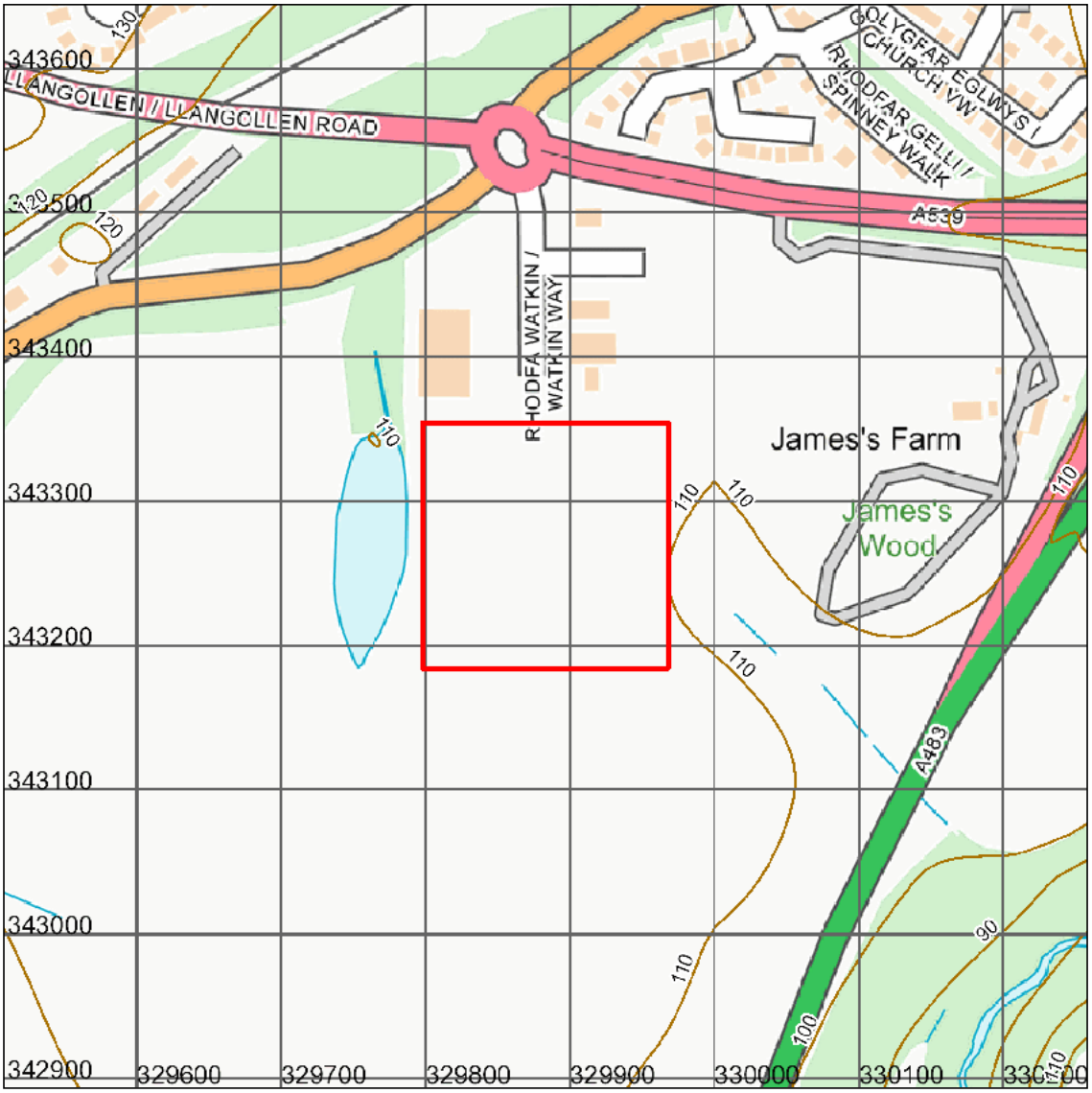
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: ***BGS_326495/34724***

Client reference:

Search location



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Search location indicated in red

This report describes a site located at National Grid Reference 329883, 343269. Note that for sites of irregular shape, this point may lie outside the site boundary. Where the client has submitted a site plan the assessment will be based on the area given.

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Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2015 edition), which also provides guidance on what to do if the* result *indicates that protective measures are required.*

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?

BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

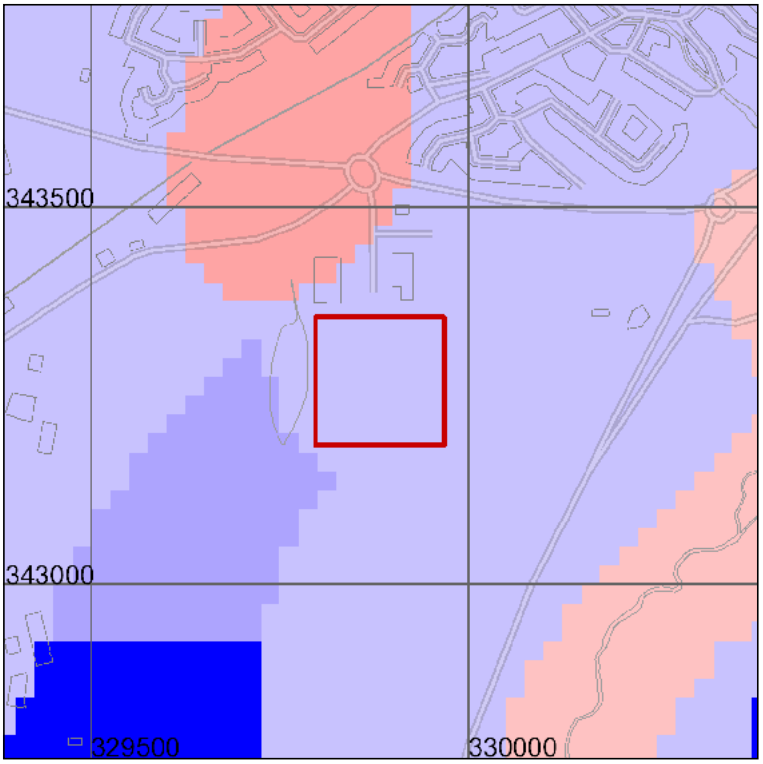
More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2015 Edition)*. Additional information and guidance is available from the Building Research Establishment website (http://www.bre.co.uk/radon/).

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

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Radon Affected Area



	% Homes estimated to be at or above the action level
	0-1%
	1-3%
	3-5%
	5-10%
	10-30%
	30-100%

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Scale: 1:10 000 (1cm = 100 m)
Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 3 TO 5% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a radon problem in the property; the only way to find out whether the radon level is above or below the Action Level is to carry out a radon measurement.

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The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level (200 Bq m^{-3}) should be remediated. Householders with levels between the Target Level (100 Bq m^{-3}) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

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What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.
Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m^{-3}). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293)**: Radon in the workplace.** BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.ukwebsite: www.brebookshop.com

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Contact Details

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Important notes about this Report

- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

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Ordnance Survey

Report issued by
BGS Enquiry Service

Appendix 6 - Chemical Analysis Results

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
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CH5 2UA

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F: +44 (0) 1244 833781
W: www.element.com

E-Geo Solutions
Glasgow House
High Street
St Asaph
Denbighshire
LL17 0UN

Attention :	Huw Littler-Jones
Date :	9th February, 2022
Your reference :	
Our reference :	Test Report 22/1472 Batch 1
Location :	Ruabon
Date samples received :	31st January, 2022
Status :	Final Report
Issue :	1

Nine samples were received for analysis on 31st January, 2022 of which nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Hayley Prowse
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 3rd Floor Davidson Building, 5 Southampton Street, London WC2E 7HA
Company Registration No: 11371415

Element Materials Technology

Client Name: E-Geo Solutions
Reference:
Location: Ruabon
Contact: Huw Littler-Jones
EMT Job No: 22/1472

Report : Solid

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

EMT Sample No.	1	2	3	4	5	6	7	8	9		LOD/LOR	Units	Method No.
Sample ID	WS3-1.50	WS9	WS11-1.5	WS13-1.4	WS15-1.5	WS17-1.2	WS18-1.2	WS20-1.50	WS20-2.1				
Depth	1.50	1.00	1.50	1.40	1.50	1.20	1.20	1.50	2.10				
COC No / misc													
Containers	J	J	J	J	J	J	J	J	J				
Sample Date	18/01/2022	21/01/2022	25/01/2022	25/01/2022	27/01/2022	27/01/2022	27/01/2022	27/01/2022	27/01/2022				
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	31/01/2022	31/01/2022	31/01/2022	31/01/2022	31/01/2022	31/01/2022	31/01/2022	31/01/2022	31/01/2022				
Sulphate as SO4 (2:1 Ext) #M	0.0053	0.0135	0.0034	0.0064	0.0087	0.0091	0.0099	0.0081	0.0680		<0.0015	g/l	TM38/PM20
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay			None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown	Medium Brown			None	PM13/PM0
Other Items	stones	stones, sand	stones	stones	stones	stones, vegetation	stones	stones	stones			None	PM13/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: E-Geo Solutions
Reference:
Location: Ruabon
Contact: Huw Littler-Jones

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 22/1472						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 22/1472

SOILS and ASH

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

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

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

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

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

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

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

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

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

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

WATERS

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

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

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

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

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 22/1472

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes

MLM

www.mlm.uk.com

MLM Environmental

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Main Fax: 01223 815630

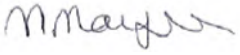
Carter Jonas

Ruabon Park, Wrexham

Phase 1 Contamination Assessment Report

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Executive Summary

Details	Summary of Main Text
Introduction	This report has been prepared on the instructions of Carter Jonas which proposes to market the site on behalf of their client for mixed industrial and residential purposes. It presents the results of a Phase 1 Contamination Assessment for the development.
Site Description	The 24.62 acre site consists of farmland.
Summary of Historical Mapping	Historical maps indicate the site has consisted of agricultural farmland, since the earliest editions. From 1900-1961 a football ground was present in the southwest corner of the site. A colliery was present directly to the west from 1873-1967 with the groundsure report indicating that this may have extended onto the site. The colliery was decommissioned in the 1960's. Railway sidings are noted 25m to the northwest from 1873-1960, with the groundsure report stating that these may have extended onto the site. A quarry was present 100m to the northwest from 1899-1961.
Environmental Setting	Published geology is of glaciofluvial deposits within the north east of the site with Glacial Till overlying the remainder of the site overlying the Etruria Formation (Mudstone) on the eastern and central sections of the site, Pennine Lower Coal Measures Formation on the western edge of the site. The glaciofluvial deposits are classified as a secondary (A) aquifer, the Till as unproductive strata, and the Etruria Formation and the Pennine Lower Coal Measures Formation as secondary (A) aquifers. The site is not within a groundwater source protection zone. The nearest surface water feature is a large pond in the centre of the site The site is bordered to the east by James Caravan Park with the A483 and fields beyond this, to the north by the A539 with residential properties beyond, to the west by Clwyd Caravan & Leisure with the B5605 beyond and to the south by farmland. The site is indicated to be within an area affected by radon as between 10 and 30% of properties are above the Action Level. Full radon protective measures are necessary.
Environmental Search Data	The following environmental search entries were identified that could potentially affect site condition: • Discharge consent – Container site (226m west) • Waste treatment plants – Tyre recycling plant (173m west) • Current industrial sites – Clwyd Caravans & Leisure Ltd (94m west), Electricity substation (133m north), Hopper (153m southwest), Civic Amenity site (201m west), Electricity substation (234m west).
Potential Contamination Sources	The desk study and site reconnaissance have identified the following potential sources of contamination that could affect site condition: • Infilled former ponds (on-site) • Made ground associated with former sports ground and suspected road feature(on-site) • Agricultural use of site associated with farming (on-site) • Former marshland (on-site) • Infilled unspecified mine (on-site) • Historical colliery (adjacent to western boundary) • Historical tanks (122m northwest) • Spoil heaps associated with former colliery (5m northwest) • Historical railway (adjacent to northwest and west)
Risk Ratings	Low to High
Recommendations	• Intrusive investigation to confirm desk study findings. To include: (i) sampling and testing of soils to determine contaminative nature of soils and groundwater, (ii) monitoring wells and an appropriate number of visits to establish the presence and levels of ground gas.

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	• The Mineral and Waste Planning Officer at Wrexham County Council should be contacted to confirm that the site does not lie over a potentially workable coal deposit.

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Desk Study General Notes

1 This report has been prepared by MLM Consulting Engineers Ltd (MLMCEL) and provides available factual data for the site at the time of the study and as obtained from the sources described in the text. The data is related to the site on the basis of the site location information provided by the Client.

2 It should be appreciated that the desk study information is not necessarily exhaustive and that further information relevant to the site and its proposed use may be available.

3 The accuracy of map extracts cannot be guaranteed and it should be recognised that different conditions on site may have existed between and subsequent to the various map editions.

4 Any borehole data from the British Geological Survey (BGS) sources is included on the following basis: 'The British Geological Survey accept no responsibility for omissions or misinterpretations of the data from their Data Bank as this may be old or obtained from non-BGS sources and may not represent current interpretation'.

5 Unless stated otherwise, the identification and assessment of potential of geotechnical issues is excluded from this report, although such assessments can be undertaken by MLMCEL on request.

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7 The content of websites visited during internet searches has not been validated and is accepted *de facto* and without prejudice. Anyone relying upon the information obtained from such sources does so at their own risk. Notwithstanding, MLMCEL takes all reasonable care in utilising information only from reputable and professional sources.

8 This report was prepared only for our Client and was not intended to be relied on by any other party. Third parties should not rely on the facts, matters or opinions set out in this report without the express written permission of MLMCEL.

9 The data contained within the Groundsure report is subject to the copyright and database rights ownership of the Groundsure Ltd.

10 Ordnance Survey mapping included within the Groundsure report is protected by Crown Copyright and must not be used for any purpose outside the context of this report.

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1 Introduction

1.1 General

This report has been prepared by MLM Consulting Engineers Limited (MLMCEL) on the instructions of Carter Jonas on behalf of their client, which is proposing to market the site for mixed use including residential and commercial development.

1.2 Terms of Reference

The terms of reference for the work were set out in the MLMCEL proposal 773135-FEE-ENV-001 dated 22 July 2015.

1.3 Scope of Work

This Phase 1 Contamination Assessment report presents the readily available information on and addresses the following:

- Current use and condition of the site based on a site walkover
- Previous uses of the site and surroundings based on available historical mapping and data
- Environmental setting in terms of geology, hydrogeology, hydrology and surrounding land use
- Environmental data searches
- Development of a preliminary conceptual site model and identification of potential risks to human health and environmental receptors
- Conclusions and recommendations

1.4 Technical Approach

The process of assessment adopted in this report generally follows the guidance provided in the following publications:

- Model Procedures for the Management of Land Contamination. Environment Agency Contaminated Land Report 11 (CLR11)
- GPLC1 – Guiding principles for land contamination. Environment Agency 2010
- National Planning Policy Framework (NPPF) (2012)
- NHBC Part 4 Foundations – Chapter 4.1 Land quality: Managing ground conditions

1.5 Proposed Development

It is understood that the proposed development will comprise the construction of 139,500 sq ft of office space, 50,000 sq ft of warehousing, 20,000 sq ft of retail, 30,000 sq ft of restaurant and/or hotel use, and 319 residential units. The existing pond in the centre of the site will remain.

An indicative site layout is shown on Bingham:Hall Associates drawing Combined Services Layout ref. 2978.100 rev P1 dated August 2015.

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2 The Site

2.1 Location

The site is located in Ruabon Park, Wrexham, LL14 3EH. The National Grid Reference for the site is 329736 343226.

A location plan of the site is presented as Figure 1.

2.2 Site Environmental Setting

2.2.1 Geology

Published geology is of Glacio-fluvial deposits in the north east of the site and Glacial Till deposits across the centre and south west. These superficial deposits generally overly a solid geology of the Etruria Formation (mudstone) which is recorded beneath the majority of the site with exception of the western extremity which is underlain by the Pennine Lower Coal Measures Formation.

The Groundsure Report (see section 3) indicates that the site is in an area affected by radon as between 10 and 30% of properties are above the Action Level. Full radon protective measures are likely to be necessary in new buildings.

The BGS borehole scan website indicates records of four boreholes having been drilled on site. One borehole encountered a strata sequence of topsoil (0.27m thick) and gravelly silty very sandy clay (4.35m thick).

2.2.2 Hydrogeology

The Environment Agency website provides the following hydrogeological information:

Table 2.1 Aquifer Properties

Aspect	Designation	Description
Groundwater Source Protection Zone	No SPZ	The site is not within a catchment area where groundwater is discharged to a source.
Superficial Aquifer Designation Glacio-fluvial deposits	Secondary Aquifer (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.
Superficial Aquifer Designation Till	Unproductive Strata	These are deposits with low permeability that have negligible significance for water supply or river base flow.
Bedrock Aquifer Designation Etruria Formation	Secondary Aquifer (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.
Bedrock Aquifer Designation Pennine Lower Coal Measures		

There is one historical groundwater abstraction within 2km for farming uses. It is located 1,992m to the northwest.

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There are no public water supply boreholes within 2km of the site.

2.2.3 Hydrology

The Groundsure report indicates that there are twelve significant surface water features within 250m of the site, including three that are on the site. The on site features include a small lake in the centre with a drain extending northwards, and ditches in the south and east.

The site is not shown to be in an area likely to be affected by sea or river flooding.

There are no abstractions from surface waters within 2km of the site.

2.2.4 Mining

A Coal Authority Mining Report has been obtained for the site and is summarised below. A full copy is attached as Appendix B.

The Coal Authority report states that the site is in the likely zone of influence from workings in nine seams of coal at 100 to 580m depth, and was last worked in 1927. The Coal Authority suggest that any ground movement associated with these coal workings should have ceased by now.

The report indicates that there are no known coal mine entries within, or within 20 metres of the boundary of the property. The Coal 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.

The report indicates that there is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

The report states that the property is not in an area for which the Coal Authority is determining whether to grant a license to remove coal using underground methods. However, reserves of coal exist in the local area which could be worked at some time in the future.

The report does not indicate that there are records of notice of the risk of the land being affected by subsidence having been given under section 46 of the Coal Mining Subsidence Act 1991.

Review of the geological information available from the BGS and the information given within the Coal Authority Mining Report indicates that although coal horizons may exist beneath the site, they are at a significant depth and it is considered unlikely that any instability associated with these coal horizons would impact upon the site.

2.2.4.1 Groundsure Report

The Groundsure report states that there is one record of a coal mining area within 1000m of the site boundary. This is on site and is indicated to be an unspecified disused mine.

The report also states that there are three non-coal mining areas within 1000m of the site. These are also all on site and are listed as a potential for occasional small scale mining of veins and rare minor bedded iron ore mining.

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2.2.5 Mineral Resource and Safeguarding

From reference to the British Geological Survey (BGS) Mineral Resources Map for North East Wales, the western edge of the site is situated within an area of Secondary Shallow Coal resource which is considered a mineral safeguarding area. From review of the Coal Authority interactive map this appears to relate to the presence of shallow surface coal resource which could potentially be worked.

There is no direct evidence at this stage to confirm if any workable coal is actually present, and the closure of the adjacent colliery indicates that productive coal resources within the area would have been exploited during the working life of the colliery. In MLM's view, to extract coal from below the site as a standalone operation would not be economically viable. In addition, to extract coal from below the site would impact on the adjacent road and rail line.

It is recommended that confirmation of the above is sought from the Mineral and Waste Planning Officer at Wrexham County Council.

2.3 Previous Reports

Report	Summary
Geotechnical Engineering Ltd (2003) Ruabon Business Park Ref. 14991	Geotechnical Engineering undertook an intrusive investigation to determine ground conditions across a site area which approximates to the eastern section of the current Ruabon Park Development site. The fieldwork was carried out on the 18-19 September 2003 and comprised the excavation of twenty two trial pits with soakaway testing in five of those trial pits. The trial pits ranged in depth from 1.70m-3.30m bgl. Ground conditions generally comprised silty sand, coarse gravel and sandy clay deposits although made ground was recorded in three of the trial pits, TP05, TP05a and TP14 in the east and west of the site to a depth of 1.0m. No laboratory testing or interpretation of the results of the investigation works was undertaken.

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3 Site Reconnaissance and Desk Study

3.1 General

A desk study has been carried out using information obtained from a Groundsure EnviroInsight report for the area commissioned by MLMCEL; through a review of published information, information obtained from regulatory bodies and online and from a site walkover. The full Groundsure report has been included as Appendix A.

3.2 Site Reconnaissance

3.2.1 Site Description and Use

The 24.6 hectare site is irregular in shape, generally flat lying and is currently used as farmland. Access is via the A539 along the northern boundary or from a small side road on the western boundary.

It predominantly consists of well-maintained, agricultural fields which are currently farmed. No hardstanding was present within the site boundary although compacted unmade tracks are present along the western edge.

A small elongated lake with an island is present in the centre of the site. A drain extends northwards from the lake. Ditches are present along the southern boundary and extend off site from the eastern boundary. Trees surround the pond and are also present along the western and northern boundaries. Shrubs and smaller trees are present along the southern boundary.

No evidence of trespassing or flytipping was noted on site. Overhead electricity power lines cross the site from the southwest to the northeast corner, with an offshoot to the northwest corner from the centre.

Aerial photos show an unidentified structure to the north of the pond. However, at the time of the investigation only a large mound of soil was present in this location. The previous by Geotechnical Engineering Ltd ref report indicates that a road had been planned to be built across the site in 2003, but was never completed. It is possible that this feature is related to initial ground works associated with the proposed road.

3.2.2 Surrounding Land Use

A caravan sales yard is adjacent to the western boundary of the site. The A539 and B5605 is present to the north with fields and housing beyond. Agricultural fields are present to the south and James' Caravan Park and the A483 is present to the eastern with fields beyond it.

3.3 Site History

Historical maps have been obtained as part of the Groundsure Report and these are presented in Appendix A.

The historical information of relevance from within 200m of the site is presented as follows:

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Table 3.1 Historical Map Summary

Map Date	On Site	Surrounding Area
1873 (1:10,560), 1873 (1:2,500)	Site is indicated to be farmland with a small lake in the centre. The western edge of the site is shown as dense vegetation and trees. A line of trees is shown running along the eastern boundary. A pond is indicated in the north west.	Shrewsbury and Chester railway line is present approximately 50m to the north and west. Wynnstay Colliery is located directly to the west of the site. Agricultural fields are present immediately adjacent to the northern, eastern and southern boundaries. James' Farm is located approximately 100m to the east. Home Farm and a pond are shown approximately 100m south of the site. Pond 150m south. Railway sidings are shown 25m to the north west associated with the Wynnstay Colliery. Ditch adjacent southeast boundary.
1899, 1900 (1:2,500) 1900 (1:10,560)	Pond in northeast has been infilled. Football ground in south west corner.	Spoil heaps associated with colliery 150m to north west with old quarry marked to the north of it. Smithy 100m north.
1910, 1914, 1938, 1949 (1:10,560), 1912 (1:2,500)	Tennis ground indicated adjacent to football ground in the south west. Marshland indicated to the west of the lake.	Spoil heaps have expanded and have infilled the old quarry. Gravel pit 100m east.
1960, 1968 (1:10,560), 1961, 1967 (1:2,500)	Football ground and tennis courts are no longer present. Pond in eastern corner.	Railway sidings are no longer present. Wynnstay Colliery is shown as disused 'Mine' and 'The Green' and many of the buildings have been removed. Smithy to the north is shown as cottages.
1971 (1:2,500), 1974 (1:10,000)	Drain along southwestern boundary.	Spoil heap appears to have been flattened out.
1978 (1:2,500), 1985 (1:10,000)	Pond in east is shown as marshland	No significant change from previous editions.
1989, 1990, 1991, 1992(1:2,500), 1994 (1:10,000), 1994, 1995 (1:2,500)	No significant change from previous editions.	A483 constructed 150m to the south east and east of the site. Caravan park present 100m to the east. A539 constructed directly to the north. Wynnstay Technology Park 150m and a Civic Amenity Centre to west.
2002, 2010, 2014 (1:10,000),	No significant change from previous editions.	Gravel pit to west has been infilled.

3.4 Environmental Data Searches

Environmental data has been obtained for the site from a Groundsure report and from data provided by the Environment Agency and local authority or their websites. Table 3.2 summarises this data as presented by Groundsure.

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Table 3.2 Environmental Data

Aspect	On Site	0 – 250m	Details of Relevance
Historical Industrial Sites			
Potentially Contaminative Uses Identified from 1:10,000 scale mapping	5	84	On site: Railway sidings (1873 and 1898). Unspecified disused mine (1960). Colliery (1873 and 1898).
Historical tank database	0	10	Unspecified tank 122m northwest (1899).
Historical energy features database	0	6	Electricity Substation 174m east (1992).
Potentially Infilled Land	12	63	On site: Unspecified disused mine (1960) Colliery (1873 and 1898) Pond or water body (1873 to 1994)
Environmental Permits, Incidents and Registers			
Records of Licensed Discharge Consents	0	1	Unspecified effluent 226m west (expired 1993)
National Incidents Recording System, List 2	1	4	On site: Atmospheric Pollutants (2006), Ammonia / Amine Odour Off site: Sewage Materials – 69m east (2012), 153m east (2013 Other pollutant - 112m southwest (2002) Blood and offal – 171m southwest (2001)
Landfill and Other Waste Sites			
Operational and Non-Operational Waste Treatment or Disposal Sites	0	4	173m west. Tyre recycling plant and unspecified.

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Industrial Land Use			
Current industrial sites	0	5	Vehicle hire 94m west Electricity substation 133m north Hoppers and silos 153m southwest Refuse disposal facilities 201m west Electricity substation 234m northwest
Ground Workings			
Historical surface ground working features from small scale mapping	8	46	Pond (1873-1949) Pond (1974-1985) Water body (1960) Colliery (1873)
Historical underground workings from small scale mapping	2	1	Unspecified disused mine (1960) Colliery (1873)
Current ground workings	0	2	Wynnstay Colliery 73m west (ceased) Wynnstay 175m northwest (ceased)
Mining, Extraction and Natural Cavities			
Historical Mining	2	1	Colliery (1873) Unspecified disused mine (1960)
Coal Mining	1	0	Potential for coal mining within the vicinity of the site
Non-Coal Mining	3	0	Identified potential for occasional minor vein mineral mining and/or rare and localised small scale iron ore mining

The Groundsure Report records that the historical colliery and features associated with the colliery including railway sidings and infilled land are within the site boundary. Review of the historical mapping indicates that these features are not within the boundary of the proposed development site but are recorded adjacent to this boundary. These features are therefore considered to be off site.

The records of non-coal mining indicate a possibility for occasional small scale vein mineral and/or iron ore workings within the site. There was no evidence during the site walkover or on historical mapping of vein mineral or iron ore mining within the site and the risk of vein or iron ore mining is considered to relate to the Pennine Coal Measures strata underlying the western edge of the site.

The records from the National Incidents Recording System indicate ammonia / amine odour on site in 2006 and a spillage of sewage within the caravan site 69m

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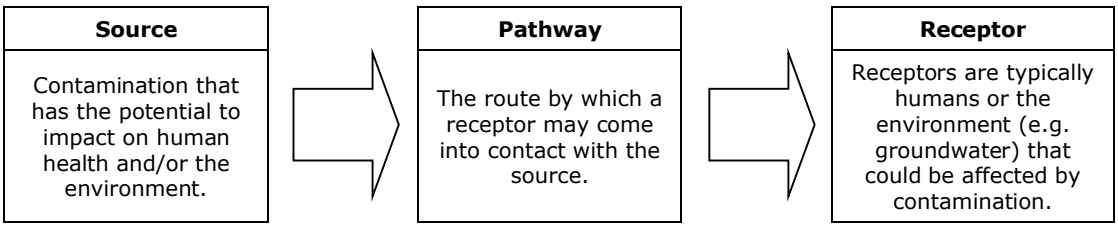
east of the site in 2012. Neither of these incidents are considered to have significantly impacted the site.

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4 Conceptual Site Model and Preliminary Assessment

4.1 General

The assessment of risk from contamination follows the source-pathway-receptor approach. Each of these elements is described as follows.



Without a source-pathway-receptor linkage in place, it is considered that there is no risk of harm.

If, however, there is a linkage between source and receptor then a risk-based assessment called a Qualitative Risk Assessment (QRA) is used to determine the significance or potential impact of the SPR-linkage.

The QRA process involves the identification of sources based on historical mapping, data searches and site walkover, together with identification of the exposure pathway and sensitive receptor. A Conceptual Site Model (CSM) is then developed and presented that shows the possible pollution linkages.

In terms of identifying *significant* pollution linkages (i.e. those that could require remediation), MLMCEL assigns a level of risk to each (ranging from Very High to Very Low). Where the level of risk is Moderate or greater, then the pollution linkage is considered to be 'significant' and further investigation would be required.

4.2 Review of Potential Sources of Contamination

Based on the information presented in the previous sections, potential sources of contamination that could impact on receptors have been identified and are summarized in tables 4.1 and 4.2 below.

Table 4.1 Potential Sources of Contamination – On Site

Source	Location On Site	Activity	Potential Contaminants
Infilled ponds	Northwest and west	Infilled land	Metals, TPH, PAH, ground gas.
Made ground	Southwest and north	Former sports ground and unidentified structure	Metals, TPH, PAH, ground gas, asbestos.
Agricultural use of the site	Entire site	Use of pesticides and fertilisers	Metals, pesticides.
Former marshland	Centre and west	Decomposition of organic matter in natural soils	Ground gas.
Infilled land	West	Infilled coal mining entry	Metals, TPH, PAH, ground gas, asbestos.

As discussed within Section 3.4, the former colliery and former railway sidings have been noted on the historical mapping to be adjacent to the site boundary to the

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west and are not considered to have been present within the boundary of the proposed development area.

Table 4.2 Potential Sources of Contamination – Off Site

Source	Location Off Site	Activity	Potential Contaminants
Former colliery site	Adjacent to west	Former colliery. Infilled land, possible tanks.	TPH, ground gas
Historical tanks	122NW	Industrial	TPH, hydrocarbons, organic vapour
Infilled land	5NW	Spoil heaps associated with the former colliery site.	Ground gas
Former railway	Adjacent to northwest and west	Leaks and spills of fuels	TPH

4.3 Review of Potential Exposure Pathways

Table 4.3 below presents a review of the identified potential pathways that could exist at the site, whether or not a source of contamination has been identified above.

Table 4.3 Potential Exposure Pathways and Receptors

Receptor	Pathway	Present	Notes
Human Health			
Future Site Users	Dermal contact, ingestion or inhalation of soil and soil dust	YES	Residential development including gardens is proposed.
	Migration in permeable strata and inhalation of gas and/or organic vapour	YES	New buildings are proposed. Shallow soils are mixed and considered permeable.
	Migration in permeable strata, accumulation and risk of explosion	YES	New buildings are proposed. Shallow soils are considered permeable.
Adjacent Site Users	Ingestion/inhalation of windblown dust	YES	Residential development is adjacent including a caravan park.
	Migration in groundwater and direct contact	NO	Off site residents are unlikely to come into contact with groundwater.
	Migration in groundwater and inhalation of organic vapour	YES	Organic contaminants in groundwater could migrate off site and release organic vapour
Construction Workers and Services Repair Staff	Dermal contact, ingestion or inhalation of soil and soil dust	YES	Site workers could be exposed to soil contamination during groundworks.
Development			

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Future Plant Life	Plant uptake in garden or landscape area	YES	Residential development including gardens is proposed.
Water Supply Pipes	Contact with contaminated material	YES	New services will be constructed below ground.
Environment			
Surface Water:	Surface runoff	YES	Site is generally level however there is a lake in the centre of the site which runoff could enter.
	Groundwater movement	YES	Groundwater may be in hydraulic connection with surface water via Glacio-fluvial Deposits.
Superficial aquifer (Glaciofluvial deposits)	Leaching from soil and vertical fluid movement	YES	Glacio-fluvial superficial aquifer is unconfined. Potential for leaching of contaminants into Glacio-fluvial soils.
Superficial aquifer (Glacial Till)	Leaching from soil and vertical fluid movement	NO	Superficial aquifer materials are unproductive strata
Bedrock aquifer (Etruria Formation and the Pennine Lower Coal Measures Formation)	Leaching from soil and vertical fluid movement	YES	Secondary (A) aquifer is unconfined beneath Glacio-fluvial deposits.

4.4 Potentially Complete SPR-Linkages

Based on the sources, pathways and receptors identified above, tables 4.4 and 4.5 below summarise all potentially complete pollutant linkages for the site and identifies the level of risk from each. Risk definitions are provided in Appendix C.

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Table 4.4 Potentially Complete SPR-Linkages (on site sources of contamination)

Source	Location	Contaminants	Pathway	Receptor	Probability	Consequence	Overall Risk	Justification and/or Mitigating Factors
Infilled Ponds	Northeast and east	Metals, TPH, PAH	Ingestion, dermal contact and fugitive inhalation	Site users	Likely	Medium	Moderate	Site users could be exposed to soil contamination within garden and soft landscaped areas.
				Construction and services repair workers	Likely	Medium	Moderate	Site workers could be exposed to soil contamination during groundworks.
				Adjacent site users	Low	Medium	Low	Residential development is adjacent. However the exposure period will be short term.
			Leaching (Glacial Till deposits)	Shallow groundwater	Unlikely	Medium	Low	Superficial Till is unproductive strata.
			Leaching (Glacio-fluvial deposits)	Shallow groundwater	Likely	Medium	Moderate	Superficial aquifer is Secondary 'A' aquifer and is unconfined.
			Leaching from soil and vertical fluid movement	Superficial aquifer groundwater (Glacial Till deposits)	Unlikely	Medium	Low	Superficial Till is unproductive strata.
			Leaching from soil and vertical fluid movement	Superficial aquifer groundwater (Glacio-fluvial deposits)	Likely	Medium	Moderate	Glaciofluvial soils are a Secondary 'A' aquifer and is unconfined.
			Leaching from soil and vertical fluid	Bedrock aquifer groundwater	Likely	Medium	Moderate	In part of the site, the Secondary (A) aquifer is overlain by

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			movement					permeable superficial strata.
			Surface runoff	Surface water	Low Likelihood	Medium	Low	Site is generally level however there is a lake in the centre of the site which surface runoff could impact.
		Metals	Plant uptake	Planting	Likely	Mild	Low	Residential development is proposed including garden areas
		TPH	Migration and contact	Water supply pipes	Likely	Medium	Moderate	New services will be constructed below ground.
		Organic contaminants	Migration in groundwater and inhalation of organic vapour	Adjacent site users	Likely	Medium	Moderate	Organic contaminants in groundwater could migrate off site and release organic vapour.
		Ground gas	Migration and inhalation	Site users	Likely	Medium	Moderate	New buildings are proposed. Possible accumulation of carbon dioxide within enclosed spaces could impact on proposed housing.
				Construction and services repair workers	Likely	Medium	Moderate	
			Migration and explosion	Site users	Likely	Severe	High	New buildings are proposed. Possible accumulation of methane within buildings.
Former sports ground – made ground materials	South west	Metals, TPH, PAH, asbestos	Ingestion, dermal contact and fugitive inhalation	Site users	Likely	Medium	Moderate	Site users could be exposed to soil contamination in gardens or soft landscape areas.

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Unidentified feature	North			Construction and services repair workers	Likely	Medium	Moderate	Site workers could be exposed to soil contamination during groundworks.
				Adjacent site users	Low	Medium	Low	Residential development is adjacent. However the exposure period will be short term.
			Shallow groundwater	Leaching (Glacial Till deposits)	Unlikely	Medium	Low	Superficial Till is unproductive strata.
			Leaching from soil and vertical fluid movement	Superficial aquifer groundwater (Glaciofluvial deposits)	Unlikely	Medium	Low	Glaciofluvial soils are unconfined.
			Leaching from soil and vertical fluid movement	Bedrock aquifer groundwater	Unlikely	Medium	Low	Secondary (A) aquifer is overlain by unproductive strata.
		Metals	Plant uptake	Planting	Likely	Mild	Low	Residential development is proposed including garden areas
		Hydrocarbons	Migration and contact	Water supply pipes	Likely	Medium	Moderate	New services will be constructed below ground.
		Ground gas	Migration and inhalation	Site users	Likely	Medium	Moderate	New buildings are proposed. Possible accumulation of carbon dioxide within enclosed spaces could impact on proposed housing.
				Construction and services repair workers	Likely	Medium	Moderate	
			Migration and	Site users	Likely	Severe	High	New buildings are

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			explosion					proposed. Possible accumulation of methane within buildings.
		Asbestos	Fibre inhalation	Site users	Likely	Severe	High	Site users could be exposed to soil contamination within gardens and soft landscaped areas.
				Construction and services repair workers	Low Likelihood	Severe	Moderate	Site workers could be exposed to soil contamination during groundworks.
				Adjacent site users	Low Likelihood	Severe	Moderate	Residential development is adjacent. Potential for dust generation during redevelopment of site, however exposure period will be short term.
Agricultural use of the site	Entire site	Pesticides	Ingestion, dermal contact and fugitive inhalation	Site users	Low Likelihood	Medium	Low	Site users could be exposed to soil contamination within gardens and soft landscaped areas. Pesticides would be at low levels within soils across fields.
				Construction and services repair workers	Low Likelihood	Medium	Low	Site workers could be exposed to soil contamination during groundworks. Pesticides would have been applied at low levels within soils across the fields and therefore significant

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								residual concentrations are not anticipated.
				Adjacent site users	Low Likelihood	Medium	Low	Residential development is adjacent. Pesticides would have been applied at low levels within soils across the fields and therefore significant residual concentrations are not anticipated.
			Shallow groundwater	Superficial aquifer (Glacial Till deposits)	Unlikely	Medium	Low	Superficial Till is unproductive strata. Pesticides would have been applied at low levels within soils across the fields and therefore significant residual concentrations are not anticipated.
			Leaching from soil and vertical fluid movement		Unlikely	Medium	Low	
			Shallow groundwater	Superficial Secondary 'A' Aquifer (Glacio-fluvial deposits)	Low Likelihood	Medium	Low	Superficial 'A' aquifer is unconfined. Pesticides would have been applied at low levels within soils across the fields and therefore significant residual concentrations are not anticipated.
			Leaching from soil and vertical fluid movement		Low Likelihood	Medium	Low	
			Leaching from soil and vertical fluid movement	Bedrock aquifer groundwater	Unlikely	Medium	Low	Secondary (A) aquifer is overlain by unproductive strata. Pesticides would have been applied at low

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								levels within soils across the fields and therefore significant residual concentrations are not anticipated.
			Surface runoff	Surface water	Low Likelihood	Medium	Low	Site is generally level however there is a lake in the centre of the site which runoff could enter. Pesticides would be at low levels within soils across fields.
			Plant uptake	Planting	Low Likelihood	Mild	Low	Residential development is proposed including garden areas. Pesticides would have been applied at low levels within soils across the fields and therefore significant residual concentrations are not anticipated.
Former marshland	Centre and west	Ground gas	Migration and inhalation	Site users	Likely	Medium	Moderate	New buildings are proposed. Possible accumulation of carbon dioxide within enclosed spaces.
				Construction and services repair workers	Likely	Medium	Moderate	
			Migration and explosion	Site users	Likely	Severe	High	New buildings are proposed. Possible accumulation of methane within buildings.

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Infilled land associated with historical mine entry	West	Metals, TPH, PAH, asbestos	Ingestion, dermal contact and fugitive inhalation	Site users	Likely	Medium	Moderate	Site users could be exposed to soil contamination during groundworks.
				Construction and services repair workers	Likely	Medium	Moderate	Site workers could be exposed to soil contamination during groundworks.
				Adjacent site users	Low	Medium	Low	Residential development is adjacent. However exposure period will be short term.
			Shallow groundwater	Superficial groundwater (Glacial Till deposits)	Unlikely	Medium	Low	Superficial materials is unproductive strata.
			Leaching from soil and vertical fluid movement		Unlikely	Medium	Low	
			Shallow groundwater	Superficial Secondary 'A' Aquifer (Glacio-fluvial deposits)	Low Likelihood	Medium	Low	Superficial glaciofluvial aquifer is unconfined.
			Leaching from soil and vertical fluid movement		Low Likelihood	Medium	Low	
			Bedrock aquifer groundwater	Leaching from soil and vertical fluid movement	Unlikely	Medium	Low	Secondary (A) aquifer is overlain by unproductive strata.
		Metals	Plant uptake	Planting	Likely	Mild	Low	Residential development is proposed including garden areas

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		Hydrocarbons	Migration and contact	Water supply pipes	Likely	Medium	Moderate	New services will be constructed below ground.
		Ground gas	Migration and inhalation	Site users	Likely	Medium	Moderate	New buildings are proposed. Possible accumulation of carbon dioxide within enclosed spaces could impact on proposed housing.
				Construction and services repair workers	Likely	Medium	Moderate	
			Migration and explosion	Site users	Likely	Severe	High	New buildings are proposed. Possible accumulation of methane within buildings.
		Organic contaminants	Migration in groundwater and inhalation of organic vapour	Adjacent site users	Low Likelihood	Medium	Low	Organic contaminants in groundwater could migrate off site and release organic vapour.
		Asbestos	Fibre inhalation	Site users	Likely	Severe	High	Site users could be exposed to soil contamination in gardens or landscaped areas.
				Construction and services repair workers	Likely	Severe	High	Site workers could be exposed to soil contamination during groundworks.
				Adjacent site users	Low Likelihood	Severe	Moderate	Residential development is adjacent. Potential for dust during redevelopment of site. However, the exposure period will be short term.

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Table 4.5 Potentially Complete SPR-Linkages (off site sources of mobile contamination)

Source	Location	Mobile Contaminants	Pathway	Receptor	Probability	Consequence	Overall Risk	Justification and/or Mitigating Factors
Former Colliery Site	Adjacent to west	TPH	Migration and contact	Site users	Unlikely	Moderate	Low	Low permeability superficial strata will restrict contaminant migration.
				Construction and services repair workers	Unlikely	Moderate	Low	
		Ground gas	Migration and inhalation	Construction workers	Unlikely	Moderate	Low	Low permeability superficial strata will restrict contaminant migration. Diffusion to atmosphere will be the preferential pathway.
			Migration and explosion	Site users	Unlikely	Severe	Low	
Historical tanks	122m NW	TPH	Migration and contact	Site users	Unlikely	Moderate	Low	Low permeability superficial strata will restrict contaminant migration.
			Migration and inhalation	Site users and construction workers				
Infilled land	5m NW	Ground gas	Migration and inhalation	Site users	Unlikely	Moderate	Low	Diffusion to atmosphere from spoil heaps will be the preferential pathway.
			Migration and explosion	Site users	Unlikely	Severe	Low	
Former railway	Adjacent to northwest and west	TPH	Migration and contact	Site users	Unlikely	Moderate	Low	Low permeability superficial strata will restrict contaminant migration.
				Construction and services repair workers	Unlikely	Moderate	Low	

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5 Summary and Recommendations

5.1 Summary

The 24.62 ha site consists of farmland with a lake in the centre, with an unidentified structure possibly relating to a partially constructed road to the north of the lake and other surface water features on site.

The review of the historical mapping indicates that the site has predominantly been used for farming. Ponds were indicated to have been present in the northeast and east of the site and are assumed to have been infilled in 1899 and 1978 respectively. Sports facilities including tennis courts and a football ground were recorded in the south west of the site between 1900 and 1967.

A historical colliery was present to the northwest of the site from 1873 to 1967. In 1967 it is shown as a disused mine and was redeveloped.

Published geology is of Glacio-fluvial deposits in the north east of the site and Glacial Till deposits across the centre and south west. These superficial deposits generally overly a solid geology of the Etruria Formation (mudstone) which is recorded beneath the majority of the site with exception of the western extremity which is underlain by the Pennine Lower Coal Measures Formation.

The glacio-fluvial deposits are classified by the EA as a secondary (A) aquifer, the Till as unproductive strata, and the Etruria Formation and the Pennine Lower Coal Measures Formation also as secondary (A) aquifers. The site is not indicated to be within a groundwater source protection zone.

The site is bordered to the east by James Caravan Park with the A483 and fields beyond this, to the north by the A539 with residential properties beyond, to the west by Clwyd Caravan & Leisure with the B5605 beyond and to the south by farmland.

The site is in an area affected by radon as between 10% and 30% of properties are above the Action Level. Full radon protective measures are indicated by the Groundsure report, to be necessary in new structures.

The desk study and site reconnaissance have identified potential sources of contamination as follows:

- Made ground associated with former sports facilities and use as farm land.
- Infilled land associated with adjacent historical colliery, mine and on-site former pond.
- Pesticides and fertilisers used on site
- Former marshland on site
- Historical colliery (adjacent to west)
- Historical tanks (122m northwest)
- Spoil heaps associated with former colliery (5m northwest)
- Historical railway (adjacent to northwest and west)

Qualitative risk assessment has identified potentially complete SPR-linkages as follows:

- Low risks to High

5.2 Recommendations

The moderate and high risks (above) warrant further investigation and a more

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detailed assessment to establish what, if any, remediation or mitigation is necessary for development.

MLMCEL has undertaken an intrusive investigation which will be reported under separate cover. The investigation included the following:

- Sampling of made ground materials to determine their nature and contaminative status.
- Monitoring wells and an appropriate number of visits to establish the presence and levels of ground gas

An invasive plant survey to establish presence or otherwise of controlled species is recommended.

Although recorded within the Groundsure Report as being on-site, the former colliery is shown within the historical mapping as being adjacent to the west of the site and is not considered to have impinged on the site area. There is therefore considered to be a low risk of ground instability associated with the former colliery site. The risk associated with contamination associated with the colliery including mine gas emissions has been considered within the conceptual site model and risk assessment within Section 4 of this report.

It is recommended that the Mineral and Waste Planning Officer at Flintshire County Council is contacted to confirm that the site does not lie over a potentially workable coal deposit.

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6 References

1 Environment Agency (2004) Model Procedures for the Management of Land Contamination Contaminated Land Report 11 (CLR11)

2 Environment Agency (2010) GPLC1 – Guiding Principles for Land Contamination

3 NHBC Standards (2011) Part 4 Foundations – Chapter 4.1 Land Quality: Managing Ground Conditions

4 National Planning Policy Framework (NPPF) (2012)

5 British Geological Survey (1993) Sheet 121 Wrexham 1:50,000 scale, Solid and Drift Edition

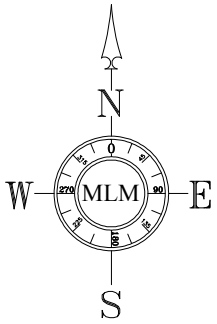
6 Groundsure EnviroInsight Report Ref: 773135 (20/08/2015)]

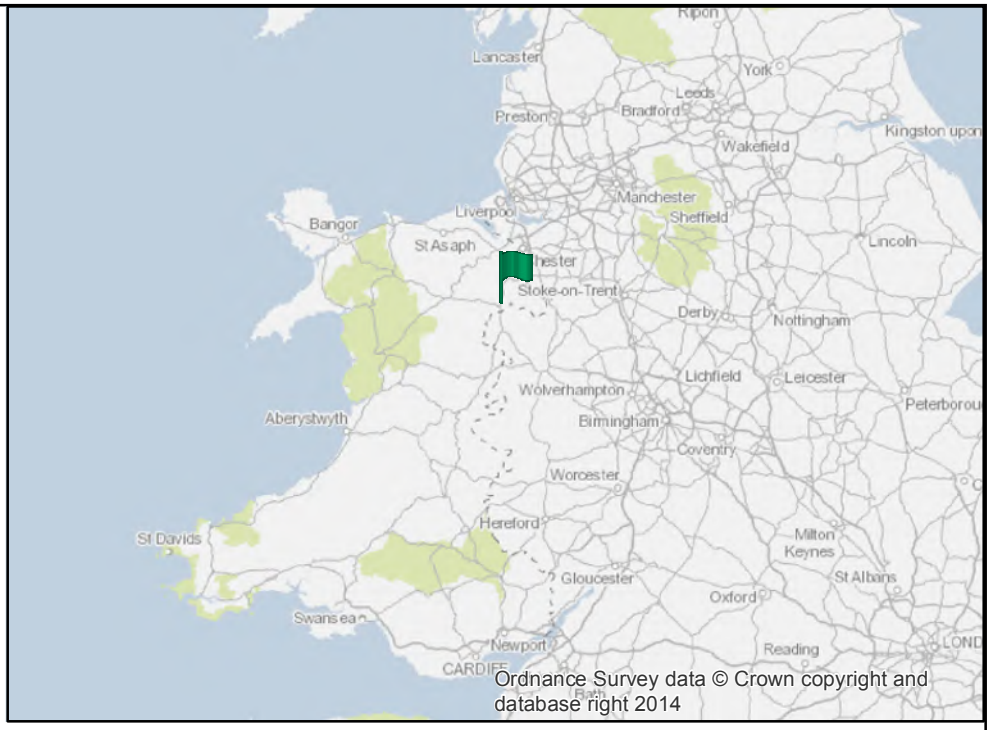
7 Coal Authority Report Ref: GS-2480871 (06/10/2015)

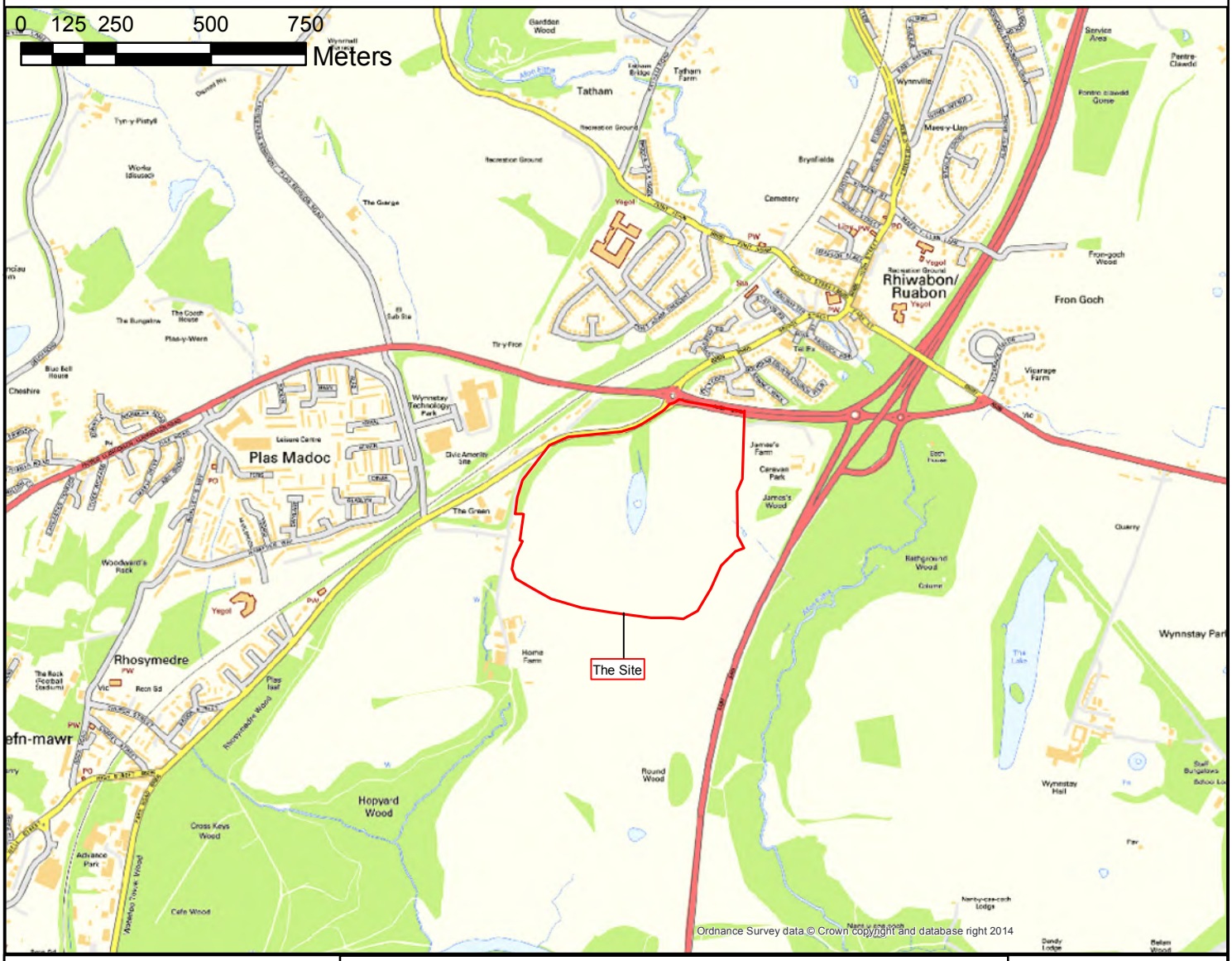
8 Geotechnical Engineering Ltd (2003) Ruabon Business Park Ref. 14991

Figures

Figure 1: Site Location Plan







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Project
Ruabon Park Wrexham

Site Location Plan

Job No.
773135

Figure No.
1

Appendices

Appendix A: Groundsure Report
Appendix B: Coal Authority Mining Report
Appendix C: Risk Definitions

Appendix A

Groundsure Report

MLM Consulting Engineers Limited

7200, BEACH DRIVE,
CAMBRIDGE, CB25 9TL

Groundsure Reference:	GS-2356366
Your Reference:	773135
Report Date	20 Aug 2015
Report Delivery Method:	Email - pdf

Groundsure Enviroinsight

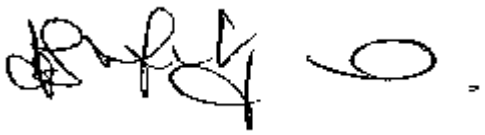
Address: Ruabon Park A483, WREXHAM, LL14 6DW

Dear Sir/ Madam,

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

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Groundsure Enviroinsight

Address:	**Ruabon Park A483, WREXHAM, LL14 6DW**
Date:	**20 Aug 2015**
Reference:	**GS-2356366**
Client:	**MLM Consulting Engineers Limited**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	27-Mar-2012
Grid Reference:	329736,343226
Site Size:	24.62ha

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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.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	5	18	66	69
1.2 Additional Information – Historical Tank Database	0	0	10	5
1.3 Additional Information – Historical Energy Features Database	0	0	6	31
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	0	3
1.6 Potentially Infilled Land	12	13	50	55

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	0	1
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	1	4
2.1.9 Records of Water Industry Referrals	0	0	0	1
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	1	0	4	2
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-5000
3.1 Landfill Sites						
3.1.1 Environment Agency Registered Landfill Sites	0	0	0	0	2	Not searched
3.1.2 Environment Agency Historic Landfill Sites	0	0	0	0	3	5
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	3	6
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	4	0	Not searched	Not searched
3.2.2 Environment Agency Licensed Waste Sites	0	0	0	8	0	14

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	5	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	0	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	No
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	1
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	4	2	3	1	Not searched	Not searched

	On-site	0-50m	51-250	251-500	501-1000	1000-1500

Section 6: Hydrogeology and Hydrology	0-500m					
6.9 Is there any Environment Agency information on river quality within 1500m of the study site?	No	No	No	Yes	No	Yes
6.10 Detailed River Network entries within 500m of the site	1	2	11	10	Not searched	Not searched
6.11 Surface water features within 250m of the study site	Yes	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding	
7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency Zone 3 floodplains within 250m of the study site	No
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Very Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	1	3
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	1	2
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	1	2	9	25	43	84
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	1	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	1

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	0	0	0	0	0	0
8.14 Records of Green Belt land	0	0	0	0	0	0

Section 9: Natural Hazards

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

Section 10: Mining

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

Using this report

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

1. Historical Industrial Sites

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

2. Environmental Permits, Incidents and Registers

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

3. Landfills and Other Waste Sites

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

4. Current Land Uses

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

5. Geology

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

6. Hydrogeology and Hydrology

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

7. Flooding

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

8. Designated Environmentally Sensitive Sites

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

9. Natural Hazards

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

10. Mining

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

11. Contacts

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

Note: Maps

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

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

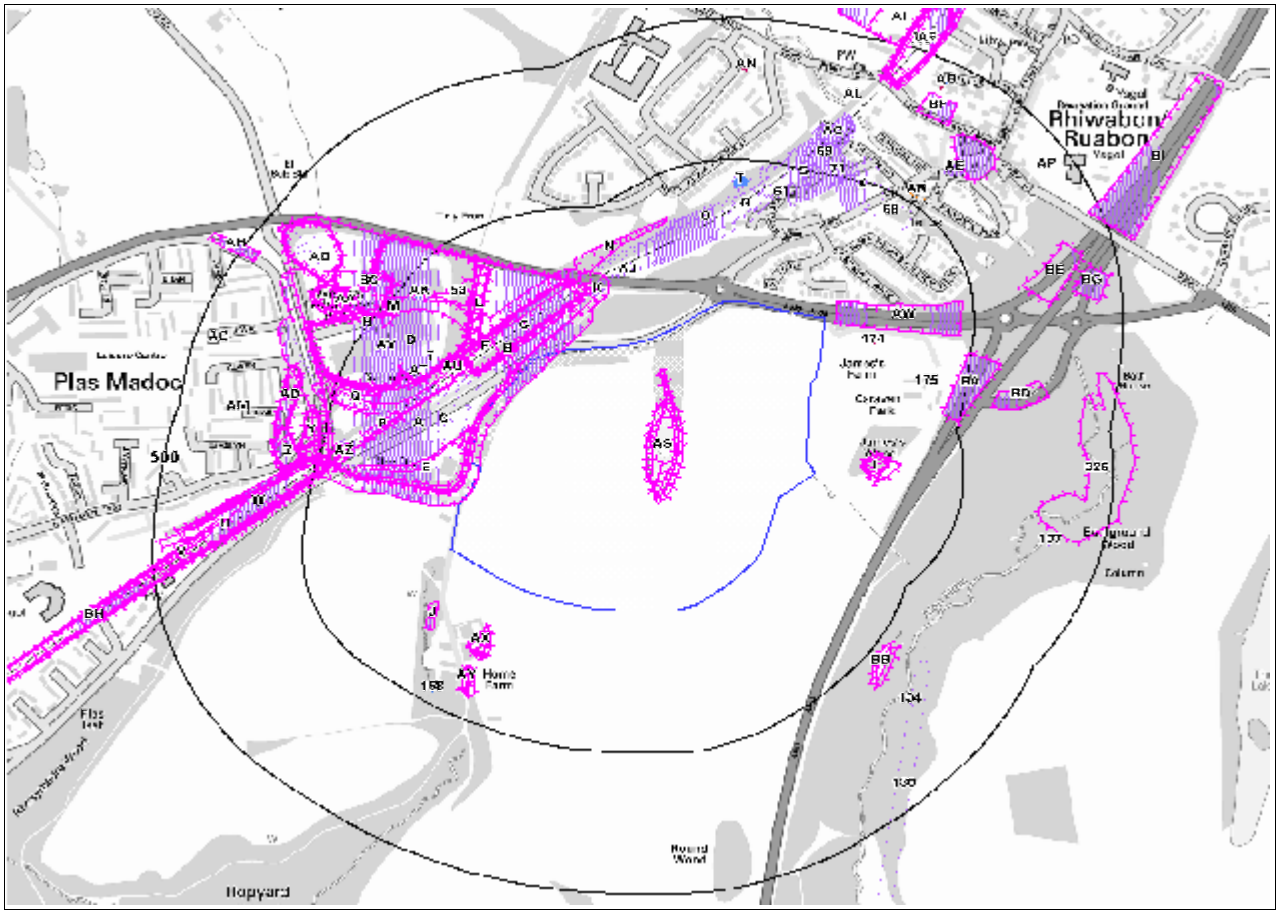
All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use

NW N NE

W E

SW S SE



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Site Outline

250
500
Search Buffers (m)

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

Industrial Land Use

Potentially Infilled Land

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

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

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

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

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 158

ID	Distance [m]	Direction	Use	Date
1F	0	On Site	Railway Sidings	1898
2C	0	On Site	Unspecified Disused Mine	1960
3A	0	On Site	Colliery	1873
4A	0	On Site	Railway Sidings	1873
5AT	0	On Site	Colliery	1898
6B	4	NW	Railway Sidings	1938
7	5	NW	Colliery	1949
8B	5	NW	Railway Sidings	1949
9	5	NW	Railway Sidings	1910
10C	5	NW	Colliery	1910
11D	6	NW	Colliery	1938
12D	6	NW	Colliery	1938
13E	8	W	Unspecified Ground Workings	1910
14E	10	W	Unspecified Heap	1960
15AW	18	E	Cuttings	1993
16G	31	NW	Cuttings	1873
17F	36	NW	Cuttings	1898
18G	37	NW	Cuttings	1949
19G	39	NW	Cuttings	1910
20G	39	NW	Cuttings	1938
21G	41	NW	Cuttings	1960
22AU	41	NW	Railway Sidings	1960
23H	44	W	Tramway Sidings	1938
24H	57	W	Tramway Sidings	1910
25I	82	E	Gravel Pit	1949
26I	83	E	Gravel Pit	1949
27I	83	E	Gravel Pit	1910
28I	86	E	Gravel Pit	1938
29I	86	E	Unspecified Pit	1968
30I	86	E	Unspecified Pit	1993
31J	88	SW	Unspecified Pit	1974
32J	88	SW	Unspecified Pit	1994
33J	88	SW	Unspecified Pit	1985
34M	90	NW	Unspecified Ground Workings	1910
35K	90	N	Smithy	1949

36K	90	N	Smithy	1898
37L	91	NW	Unspecified Heap	1949
38K	92	N	Smithy	1910
39K	93	N	Smithy	1938
40L	93	NW	Unspecified Heap	1960
41K	94	N	Smithy	1960
42M	101	NW	Unspecified Heap	1938
43M	101	NW	Unspecified Heap	1938
44M	101	NW	Unspecified Heap	1949
45M	104	NW	Refuse Heap	1960
46AV	106	NW	Unspecified Heap	1898
47R	111	NW	Railway Sidings	1910
48O	112	NW	Railway Sidings	1960
49P	128	W	Cuttings	1873
50N	132	N	Unspecified Ground Workings	1994
51N	132	N	Unspecified Ground Workings	1974
52N	132	N	Unspecified Ground Workings	1985
53	142	NW	Unspecified Old Quarry	1898
54O	144	NW	Railway Sidings	1910
55Q	173	W	Cuttings	1949
56P	175	W	Railway Building	1960
57Q	177	W	Cuttings	1974
58Q	177	W	Cuttings	1985
59S	178	N	Unspecified Commercial/Industrial	1898
60R	190	N	Railway Building	1960
61	191	N	Railway Building	1910
62X	191	N	Telephone Exchange	1938
63S	194	N	Railway Sidings	1873
64AZ	196	W	Cuttings	1873
65T	198	N	Unspecified Tank	1994
66T	198	N	Unspecified Tank	1974
67T	198	N	Unspecified Tank	1985
68	200	NE	Telephone Exchange	1993
69	212	N	Railway Sidings	1949
70AK	215	NW	Unspecified Tank	1994
71	220	N	Unspecified Depot	1993
72BA	220	E	Cuttings	1993
73U	226	W	Cuttings	1873
74W	230	W	Cuttings	1898
75V	233	W	Cuttings	1910
76U	233	W	Cuttings	1949
77V	233	W	Cuttings	1938
78W	234	W	Cuttings	1960
79S	238	N	Railway Building	1873
80S	239	N	Railway Building	1949

81X	240	NE	Telephone Exchange	1949
82W	242	W	Cuttings	1974
83W	242	W	Cuttings	1985
84W	242	W	Cuttings	1994
85S	243	N	Railway Building	1910
86S	244	N	Railway Building	1938
87S	245	N	Railway Building	1949
88S	245	N	Railway Building	1968
89S	248	N	Railway Building	1960
90Y	252	NW	Unspecified Heap	1938
91Y	252	NW	Unspecified Heap	1938
92Y	256	NW	Unspecified Heap	1910
93Y	257	NW	Unspecified Heap	1949
94Y	258	W	Unspecified Heap	1960
95AC	264	N	Railway Station	1910
96Z	269	W	Unspecified Old Quarry	1898
97Z	276	W	Unspecified Old Quarry	1938
98Z	277	W	Unspecified Old Quarry	1949
99Z	278	W	Unspecified Old Quarry	1910
100Z	279	W	Unspecified Old Quarry	1960
101AA	280	NW	Unspecified Heap	1873
102AA	287	NW	Unspecified Heap	1898
103AB	291	NW	Unspecified Heaps	1938
104AB	291	NW	Unspecified Heaps	1938
105BC	291	NW	Old Coal Shaft	1938
106AB	292	NW	Unspecified Heap	1949
107AC	292	N	Railway Station	1949
108AA	293	NW	Unspecified Heap	1960
109AA	294	NW	Old Coal Shaft	1938
110AC	295	N	Railway Station	1898
111AA	295	NW	Unspecified Old Shaft	1960
112BD	298	E	Cuttings	1993
113AC	298	N	Railway Station	1873
114AA	298	NW	Unspecified Shaft	1873
115AC	299	N	Railway Station	1949
116AC	301	N	Railway Station	1968
117AC	302	N	Railway Station	1938
118AD	305	W	Unspecified Heap	1938
119AD	305	W	Unspecified Heap	1938
120AD	305	W	Unspecified Heap	1910
121AD	305	W	Unspecified Heap	1949
122AC	306	N	Railway Station	1993
123AA	306	NW	Old Coal Shaft	1949
124AA	308	NW	Old Coal Shaft	1938
125AD	309	W	Unspecified Heap	1960
126AA	313	NW	Old Coal Shaft	1910
127AA	314	NW	Old Coal Shaft	1938
128AA	315	NW	Unspecified Old Shaft	1960

129AE	324	NE	Police Station	1873
130	325	SE	Rifle Range	1873
131BE	335	E	Cuttings	1993
132AB	345	NW	Unspecified Ground Workings	1960
133AE	345	NE	Grave Yard	1873
134	351	SE	Targets	1910
135AL	387	N	Gasometer	1873
136BF	397	NE	Grave Yard	1873
137	406	E	Water Wheel	1909
138BG	416	E	Cuttings	1993
139AF	422	N	Cuttings	1873
140	425	N	Railway Sidings	1949
141AG	425	N	Cuttings	1949
142AF	430	N	Cuttings	1949
143AG	430	N	Cuttings	1949
144AF	431	N	Cuttings	1910
145AF	432	N	Cuttings	1938
146AF	436	N	Cuttings	1993
147AF	436	N	Cuttings	1968
148AF	437	N	Railway Sidings	1910
149BH	448	W	Cuttings	1960
150AF	455	N	Cuttings	1898
151AH	471	NW	Railway Sidings	1898
152AH	471	NW	Cuttings	1873
153AH	471	NW	Railway Sidings	1949
154BI	479	NE	Cuttings	1993
155AH	484	NW	Railway Sidings	1910
156AI	498	N	Cemetery	1873
157AI	498	N	Cemetery	1898
158AI	499	N	Cemetery	1949

1.2 Additional Information – Historical Tank Database

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

Records of historical tanks within 500m of the search boundary: 15

ID	Distance (m)	Direction	Use	Date
159AJ	122	NW	Unspecified Tank	1899
160AJ	122	NW	Unspecified Tank	1912
161AJ	127	NW	Unspecified Tank	1961
162T	199	N	Unspecified Tank	1967
163T	199	N	Unspecified Tank	1971
164AK	215	NW	Unspecified Tank	1989

165AK	217	NW	Unspecified Tank	1994
166AK	218	NW	Unspecified Tank	1989
167AK	218	NW	Unspecified Tank	1991
168	223	SW	Unspecified Tank	1960
169AE	345	NE	Unspecified Tank	1960
170AE	345	NE	Unspecified Tank	1960
171AE	345	NE	Unspecified Tank	1960
172AL	389	N	Gasometer	1873
173AO	461	NE	Unspecified Tank	1912

1.3 Additional Information – Historical Energy Features Database

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

Records of historical energy features within 500m of the search boundary: 37

ID	Distance (m)	Direction	Use	Date
174	83	E	Electricity Substation	1992
175	177	E	Electricity Substation	1992
176AK	223	NW	Electricity Substation	1994
177AK	224	NW	Electricity Substation	1991
178AK	237	NW	Electricity Substation	1989
179AK	240	NW	Electricity Substation	1991
180AL	389	N	Gasometer	1873
181AM	400	W	Electricity Substation	1971
182AM	400	W	Electricity Substation	1991
183AM	400	W	Electricity Substation	1989
184AM	400	W	Electricity Substation	1989
185AM	400	W	Electricity Substation	1994
186AM	401	W	Electricity Substation	1989
187AN	408	N	Electricity Substation	1994
188AN	409	N	Electricity Substation	1989
189AN	409	N	Electricity Substation	1971
190AN	409	N	Electricity Substation	1991
191AN	409	N	Electricity Substation	1989
192AN	411	N	Electricity Substation	1967
193AO	448	NE	Electricity Substation	1992
194AO	448	NE	Electricity Substation	1992
195AO	448	NE	Electricity Substation	1989
196AO	448	NE	Electricity Substation	1995
197AO	448	NE	Electricity Substation	1995
198AO	449	NE	Electricity Substation	1960
199AO	449	NE	Electricity Substation	1960
200AP	453	NE	Electricity Substation	1992
201AP	453	NE	Electricity Substation	1992
202AP	453	NE	Electricity Substation	1989

203AP	456	NE	Electricity Substation	1960
204AP	456	NE	Electricity Substation	1960
205AQ	460	W	Electricity Substation	1991
206AQ	460	W	Electricity Substation	1989
207AQ	460	W	Electricity Substation	1989
208AQ	460	W	Electricity Substation	1989
209AQ	460	W	Electricity Substation	1994
210AQ	460	W	Electricity Substation	1971

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

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

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 3

ID	Distance (m)	Direction	Use	Date
211AR	261	NE	Garage	1960
212AR	261	NE	Garage	1960
213AR	261	NE	Garage	1960

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 130

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

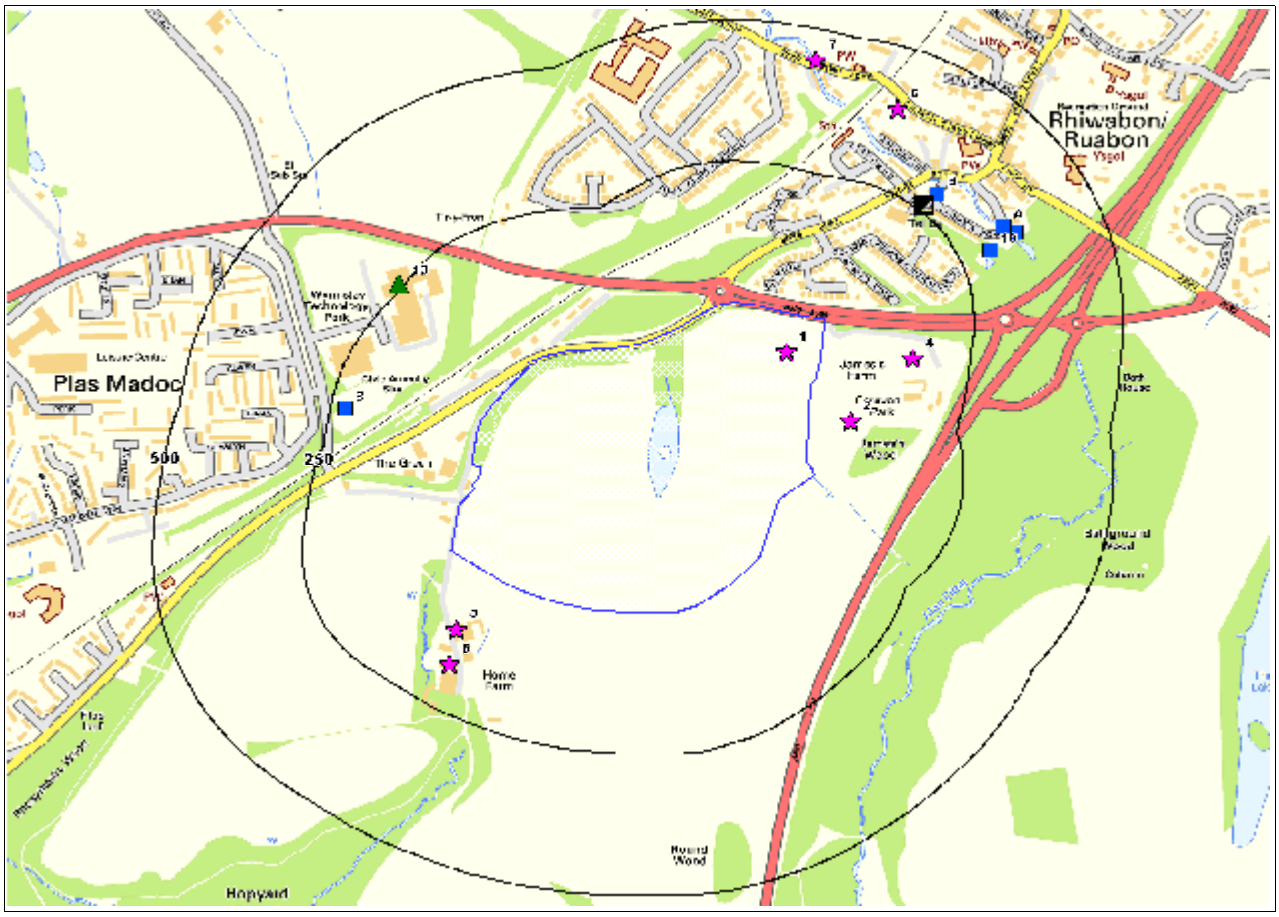
ID	Distance(m)	Direction	Use	Date
214C	0	On Site	Unspecified Disused Mine	1960
215AS	0	On Site	Pond	1938
216AS	0	On Site	Pond	1898
217AS	0	On Site	Pond	1873
218AS	0	On Site	Pond	1985
219AS	0	On Site	Pond	1994
220AS	0	On Site	Pond	1974
221A	0	On Site	Colliery	1873
222AS	0	On Site	Pond	1910

223AS	0	On Site	Water Body	1960
224AS	0	On Site	Pond	1949
225AT	0	On Site	Colliery	1898
226AU	5	NW	Colliery	1949
227C	5	NW	Colliery	1910
228AV	6	NW	Colliery	1938
229AV	6	NW	Colliery	1938
230E	8	W	Unspecified Ground Workings	1910
231E	10	W	Unspecified Heap	1960
232AW	18	E	Cuttings	1993
233G	31	NW	Cuttings	1873
234F	36	NW	Cuttings	1898
235G	37	NW	Cuttings	1949
236G	39	NW	Cuttings	1910
237G	39	NW	Cuttings	1938
238G	41	NW	Cuttings	1960
239AX	82	SW	Ponds	1960
240I	82	E	Gravel Pit	1949
241AX	83	SW	Ponds	1938
242I	83	E	Gravel Pit	1949
243I	83	E	Gravel Pit	1910
244AX	85	SW	Pond	1910
245I	86	E	Gravel Pit	1938
246I	86	E	Unspecified Pit	1993
247I	86	E	Unspecified Pit	1968
248J	88	SW	Unspecified Pit	1985
249J	88	SW	Unspecified Pit	1994
250J	88	SW	Unspecified Pit	1974
251M	90	NW	Unspecified Ground Workings	1910
252L	91	NW	Unspecified Heap	1949
253L	93	NW	Unspecified Heap	1960
254AX	97	SW	Pond	1873
255AX	97	SW	Pond	1898
256AX	100	SW	Pond	1949
257M	101	NW	Unspecified Heap	1938
258M	101	NW	Unspecified Heap	1938
259M	101	NW	Unspecified Heap	1949
260M	104	NW	Refuse Heap	1960
261AV	106	NW	Unspecified Heap	1898
262P	128	W	Cuttings	1873
263N	132	N	Unspecified Ground Workings	1985
264N	132	N	Unspecified Ground Workings	1994
265N	132	N	Unspecified Ground Workings	1974
266L	142	NW	Unspecified Old Quarry	1898
267AY	160	SW	Pond	1960

268AY	160	SW	Pond	1985
269AY	160	SW	Pond	1974
270AY	161	SW	Pond	1938
271AY	161	SW	Pond	1910
272AY	162	SW	Pond	1949
273AY	162	SW	Pond	1873
274AY	162	SW	Pond	1898
275Q	173	W	Cuttings	1949
276Q	177	W	Cuttings	1985
277Q	177	W	Cuttings	1974
278AZ	196	W	Cuttings	1873
279BA	220	E	Cuttings	1993
280U	226	W	Cuttings	1873
281W	230	W	Cuttings	1898
282V	233	W	Cuttings	1910
283U	233	W	Cuttings	1949
284V	233	W	Cuttings	1938
285W	234	W	Cuttings	1960
286W	242	W	Cuttings	1974
287W	242	W	Cuttings	1985
288W	242	W	Cuttings	1994
289Y	252	NW	Unspecified Heap	1938
290Y	252	NW	Unspecified Heap	1938
291Y	256	NW	Unspecified Heap	1910
292Y	257	NW	Unspecified Heap	1949
293Y	258	W	Unspecified Heap	1960
294BB	263	SE	Pond	1898
295Z	269	W	Unspecified Old Quarry	1898
296BB	273	SE	Pond	1873
297Z	276	W	Unspecified Old Quarry	1938
298Z	277	W	Unspecified Old Quarry	1949
299Z	278	W	Unspecified Old Quarry	1910
300Z	279	W	Unspecified Old Quarry	1960
301AA	280	NW	Unspecified Heap	1873
302BC	286	NW	Air Shaft	1898
303AA	287	NW	Unspecified Heap	1898
304AB	291	NW	Unspecified Heaps	1938
305AB	291	NW	Unspecified Heaps	1938
306BC	291	NW	Old Coal Shaft	1938
307AB	292	NW	Unspecified Heap	1949
308AA	293	NW	Unspecified Heap	1960
309BC	294	NW	Old Coal Shaft	1938
310BC	295	NW	Unspecified Old Shaft	1960
311BD	298	E	Cuttings	1993
312AA	298	NW	Unspecified Shaft	1873
313AD	305	W	Unspecified Heap	1938
314AD	305	W	Unspecified Heap	1938
315AD	305	W	Unspecified Heap	1910

316AD	305	W	Unspecified Heap	1949
317AA	306	NW	Old Coal Shaft	1949
318AA	308	NW	Old Coal Shaft	1938
319AD	309	W	Unspecified Heap	1960
320BC	313	NW	Old Coal Shaft	1910
321BC	314	NW	Old Coal Shaft	1938
322BC	315	NW	Unspecified Old Shaft	1960
323BE	335	E	Cuttings	1993
324AB	345	NW	Unspecified Ground Workings	1960
325AE	345	NE	Grave Yard	1873
326	380	E	Pond	1873
327BF	397	NE	Grave Yard	1873
328BG	416	E	Cuttings	1993
329AF	422	N	Cuttings	1873
330AG	425	N	Cuttings	1949
331AF	430	N	Cuttings	1949
332AF	430	N	Cuttings	1949
333AF	431	N	Cuttings	1910
334AF	432	N	Cuttings	1938
335AF	436	N	Cuttings	1993
336AF	436	N	Cuttings	1968
337BH	448	W	Cuttings	1960
338AF	455	N	Cuttings	1898
339AH	471	NW	Cuttings	1873
340BI	479	NE	Cuttings	1993
341AI	498	N	Cemetery	1898
342AI	498	N	Cemetery	1873
343AI	499	N	Cemetery	1949

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) 250 500
- Recorded Pollution Incicent
- Dangerous Substances (List 1)
- Dangerous Substances (List 2)
- Water Industry Referrals
- Licenced Discharge Consents
- Red List Discharge Consents
- RAS 3 & 4 Authorisations
- Part A(1) Authorised Processes and Historic IPC Authorisations
- Part A(2) and Part B Authorised Processes
- COMAH / NIHHS Sites
- Sites Determined as Contaminated Land
- Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

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

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

1

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

ID	Distance (m)	Direction	NGR	Details	
13	257	NW	329320 343558	Address: Rolinx Performance Coatings, Wynnstay Technology Park, Ruabon, Wrexham, LL14 6EN Process: Coating Process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcement Notified. Date of Enforcement: No Enforcement Notified. Comment: No Enforcement Notified.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

5

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

ID	Distance (m)	Direction	NGR	Details	
8	226	W	329230 343340	Address: RUABON MANNED CONTAINER SITE WYNNST, RUABON MANNED CONTAINER SITE WYN, MANNED CONTAINER SITE WYNNSTAY B, WYNNSTAY BANKS, UNKNOWN, UNKNOWN Effluent Type: UNSPECIFIED Permit Number: CM0151401 Permit Version: 1	Receiving Water: Status: CONSENT EXPIRED - TIME LIMIT Issue date: 06/04/1987 Effective Date: 06-Apr-1987 Revocation Date: 18/03/1993
9B	290	NE	330220 343720	Address: RUABON 5 DUKE STREET PRIVATE GARAGE, RUABON 5 DUKE STREET PRIVATE GAR, 5 DUKE STREET PRIVATE GARAGE, PRIVATE GARAGE, UNKNOWN, UNKNOWN Effluent Type: UNSPECIFIED Permit Number: CM0033401 Permit Version: 1	Receiving Water: Status: CONSENT EXPIRED - TIME LIMIT Issue date: 20/04/1966 Effective Date: 20-Apr-1966 Revocation Date: 05/04/1995
10	302	NE	330310 343620	Address: PADDOCK ROW RUABON ,, PADDOCK ROW RUABON ,, RUABON ,, RUABON ,, , Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: CG0358201 Permit Version: 1	Receiving Water: Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 21/07/1994 Effective Date: 21-Jul-1994 Revocation Date: -

ID	Distance (m)	Direction	NGR	Details	
11A	340	NE	330331 343663	Address: TAL Y LAN CSO, RUABON PS (SE OF BRIDGE STREET), (SE OF BRIDGE STREET) RUABON, RUABON, RUABON, RUABON Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: CM0008201 Permit Version: 1	Receiving Water: Status: NEW CONSENT, BY APPLICATION (WRA 91, SECTION 88) Issue date: 08/01/1960 Effective Date: 08-Jan-1960 Revocation Date: -
12A	354	NE	330353 343652	Address: RUABON PS, RUABON PS, UNKNOWN, UNKNOWN, UNKNOWN, LL14 1US Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: CM0190801 Permit Version: 3	Receiving Water: Status: VARIED UNDER EPR 2010 Issue date: 19/12/2011 Effective Date: 19-Dec-2011 Revocation Date: -

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

1

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

ID	Distance (m)	Direction	Address	Permission reference	Local Authority	First Date Received	Last Date Received	Status
15B	261	NE	SUPASTRIP LTD, PROVIDENCE CHAPEL, BRIDGE STREET, RUABON, RUABON, LL14 6DA	AU5688	WREXHAM COUNTY BOROUGH COUNCIL	01-Jun-2001	01-Apr-2015	RECEIVED

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

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

Database searched and no data found.

2.3 Environment Agency Recorded Pollution Incidents

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

7

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

ID	Distance (m)	Direction	NGR	Details	
1	0	On Site	329968 343441	Incident Date: 11-Sep-2006 Incident Identification: 434517 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Ammonia/Amine Odour	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 2 (Significant)
2	69	E	330076 343319	Incident Date: 15-Aug-2012 Incident Identification: 1026336 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 3 (Minor)
3	112	SW	329416 342950	Incident Date: 10-Oct-2002 Incident Identification: 113978 Pollutant: Other Pollutant Pollutant Description: Other	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
4	153	E	330180 343429	Incident Date: 11-May-2013 Incident Identification: 1111914 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 3 (Minor) Land Impact: Category 2 (Significant) Air Impact: Category 3 (Minor)
5	171	SW	329405 342888	Incident Date: 09-Sep-2001 Incident Identification: 29747 Pollutant: General Biodegradable Materials and Wastes Pollutant Description: Blood and Offal	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
6	392	N	330155 343871	Incident Date: 19-Aug-2003 Incident Identification: 183455 Pollutant: Inert Materials and Wastes Pollutant Description: Construction and Demolition Materials and Wastes	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
7	444	N	330017 343956	Incident Date: 05-Oct-2001 Incident Identification: 34948 Pollutant: Oils and Fuel Pollutant Description: Petrol	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

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

0

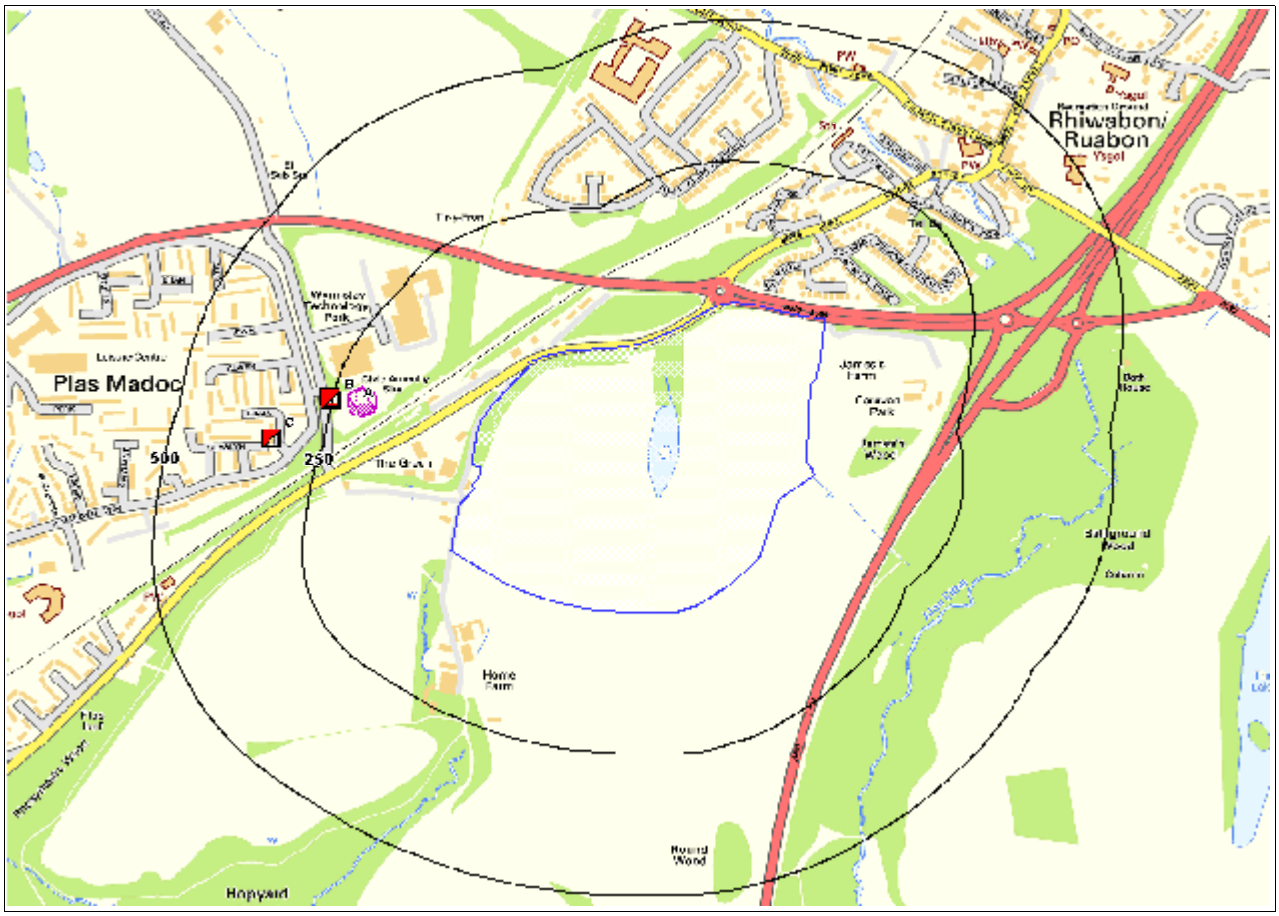
Database searched and no data found.

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

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

3. Landfill and Other Waste Sites Map



Mapping sourced from Ordnance Survey

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Site Outline
250
500
E.A. Active Landfill
E.A. Historic Landfill
BGS / DoE Survey Landfill
Historic and Planned Waste Sites
E.A. Licensed Waste Site
Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

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

2

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	681	N	330077 344722	Address: Tatham Road, Ruabon, Wrexham, Clwyd, LL14 6RF Landfill Reference: 37109.0 Environmental Permitting Regulations (Waste) Reference: SHA001 Landfill Type: A4 : Household, Commercial & Industrial Waste Landfill	Operator: Shanks Northern Ltd Status: Closure IPPC Reference: EPR Reference:
Not shown	764	N	330087 344716	Address: Gardden, Tatham Road, Ruabon, Wrexham, Clwyd, LL14 6RF Landfill Reference: 37014.0 Environmental Permitting Regulations (Waste) Reference: SHA005 Landfill Type: A4 : Household, Commercial & Industrial Waste Landfill	Operator: Shanks Midlands Ltd Status: Closure IPPC Reference: EPR Reference:

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

8

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	694	N	329800 344200	Site Address: Llys Offa, Tatham Road, Wrexham, Ruarbon Waste Licence: Yes Site Reference: WMBC L/29 Waste Type: Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 02-Jun-1983 Licence Surrendered: 02-Jun-1984 Licence Hold Address: - Operator: - First Recorded: 02-Jun-1983 Last Recorded: 02-Jun-1984

ID	Distance (m)	Direction	NGR	Details	
Not shown	743	N	330100 344500	Site Address: Gardden Clay Pit, Gardden Lodge, Tatham Road, Ruabon, Wrexham, Clywd Waste Licence: Yes Site Reference: WMBC L/23, WMBC L82 Waste Type: Industrial, Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 01-Apr-1977 Licence Surrendered: Licence Hold Address: A8 Edinburgh Road, Coatbridge, Lanarkshire Operator: - First Recorded: 31-Dec-1977 Last Recorded: 31-Aug-1984
Not shown	915	W	328400 343100	Site Address: Woodwards Rock, Plas Madoc Waste Licence: Yes Site Reference: - Waste Type: Inert, Industrial, Commercial, Household, Special, Liquid sludge, Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: - First Recorded: 01-Jan-1968 Last Recorded: 31-Dec-1978
Not shown	1284	W	327700 344000	Site Address: The Delph, Acrefair, Wrexham, Clwyd Waste Licence: Yes Site Reference: WMBC L/32 Waste Type: Inert, Industrial, Household, Special Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 05-Aug-1981 Licence Surrendered: 31-Dec-1986 Licence Hold Address: - Operator: - First Recorded: 30-Nov-1981 Last Recorded: 31-Dec-1986
Not shown	1333	W	328100 342500	Site Address: Rhosmedre Quarry, Rhosmedre Waste Licence: Yes Site Reference: L17 Waste Type: Industrial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 31-Dec-1977 Licence Surrendered: 30-Apr-1994 Licence Hold Address: - Operator: - First Recorded: - Last Recorded: -
Not shown	1348	W	327900 343200	Site Address: Air Products Social Club, Acrefair, Wrexham, Clwyd Waste Licence: - Site Reference: - Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: - First Recorded: 31-Dec-1950 Last Recorded: 31-Dec-1960
Not shown	1409	SW	328100 342200	Site Address: Druids United FC, Plas Kynaston Lane, Wrexham, Cefn Mawr Waste Licence: Yes Site Reference: WMBC L/42 Waste Type: Inert, Industrial, Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 28-Jul-1983 Licence Surrendered: 31-Oct-1983 Licence Hold Address: - Operator: - First Recorded: 01-Mar-1983 Last Recorded: 31-Oct-1983
Not shown	1460	W	327900 343000	Site Address: Air Products, Llangollen Road, Wrexham, Acrefair Waste Licence: Yes Site Reference: WMBC L/8, WMBC L/58 Waste Type: Inert, Industrial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 01-Sep-1977 Licence Surrendered: 30-Apr-1993 Licence Hold Address: - Operator: - First Recorded: 01-Sep-1977 Last Recorded: 31-Dec-1991

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

0

Database searched and no data found.

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

9

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

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
Not shown	914	W	328408 343092	Refuse Tip	1967 mapping	Polygon
Not shown	914	W	328436 343135	Refuse Tip	1961 mapping	Polygon
Not shown	914	W	328417 343136	Refuse Tip	1971 mapping	Polygon
Not shown	1363	SW	328143 342542	Refuse Tips	1960 mapping	Polygon
Not shown	1363	SW	328143 342542	Refuse Tips	1960 mapping	Polygon
Not shown	1396	SW	328125 342535	Refuse Tips	1960 mapping	Polygon
Not shown	1396	SW	328125 342535	Refuse Tips	1960 mapping	Polygon
Not shown	1411	W	328092 342547	Refuse Tips	1960 mapping	Polygon
Not shown	1411	W	328092 342547	Refuse Tips	1960 mapping	Polygon

3.2 Other Waste Sites

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

4

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

ID	Distance (m)	Direction	NGR	Details		
3A	173	W	329259 343351	Type of Site: Tyre Recycling Plant (Conversion) Site Address: 2 & 3, Wynnstay Technlogy Park, Ruabon, WREXHAM, Clwyd, LL14 6	Planning Application Reference: P/2008/0483 Date: -	Further Details: Scheme comprises change of use from industrial premises to used tyre recycling plant. An application (ref: P/2008/0483) for detailed planning permission was granted by Wrexham B.C. Planning decision obtained Data Source: Historic Planning Application Data Type: Point
4A	174	W	329258 343351	Type of Site: Amenity Site Site Address: N/A	Planning Application Reference: N/A Date: 1989	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

ID	Distance (m)	Direction	NGR	Details		
5A	174	W	329258 343351	Type of Site: Amenity Site Site Address: N/A	Planning Application Reference: N/A Date: 1989	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
6A	174	W	329258 343351	Type of Site: Amenity Site Site Address: N/A	Planning Application Reference: N/A Date: 1991	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

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

22

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

ID	Distance (m)	Direction	NGR	Details	
15B	252	W	329206 343357	Site Address: Off Plas Bennion Road, Wynnstay Bank Ruabon, Wrexham, Clwyd, LL14 1TP Type: Household, Commercial & Industrial Waste T Stn Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 3CW010 EPR reference: - Operator: 3 C Waste Ltd Waste Management licence No: 37039 Annual Tonnage: 0.0	Issue Date: 01/10/1993 Effective Date: 13/11/2001 Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Transferred Site Name: Wynnstay Banks Civic Amenity Site Correspondence Address: -, Barton House, Darland Lane, Lavister, Wrexham, LL12 0EL
16B	252	W	329206 343357	Site Address: Off Plas Bennion Road, Wynnstay Bank Ruabon, Wrexham, Clwyd, LL14 1TP Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 3CW010 EPR reference: - Operator: 3 C Waste Ltd Waste Management licence No: 37039 Annual Tonnage: 0.0	Issue Date: 01/10/1993 Effective Date: 13/11/2001 Modified: 10/12/2003 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Wynnstay Banks Civic Amenity Site Correspondence Address: Chris Giffiths, Barton House, Darland Lane, Lavister, Wrexham, LL12 0EL
17B	252	W	329206 343357	Site Address: Off Plas Bennion Road, Wynnstay Bank Ruabon, Wrexham, Clwyd, LL14 3ES Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: 3CW010 EPR reference: EA/EPR/MP3394FY/V004 Operator: 3 C Waste Ltd Waste Management licence No: 37039 Annual Tonnage: 0.0	Issue Date: 01/10/1993 Effective Date: 13/11/2001 Modified: 28/02/2007 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Wynnstay Banks Civic Amenity Site Correspondence Address: -, -

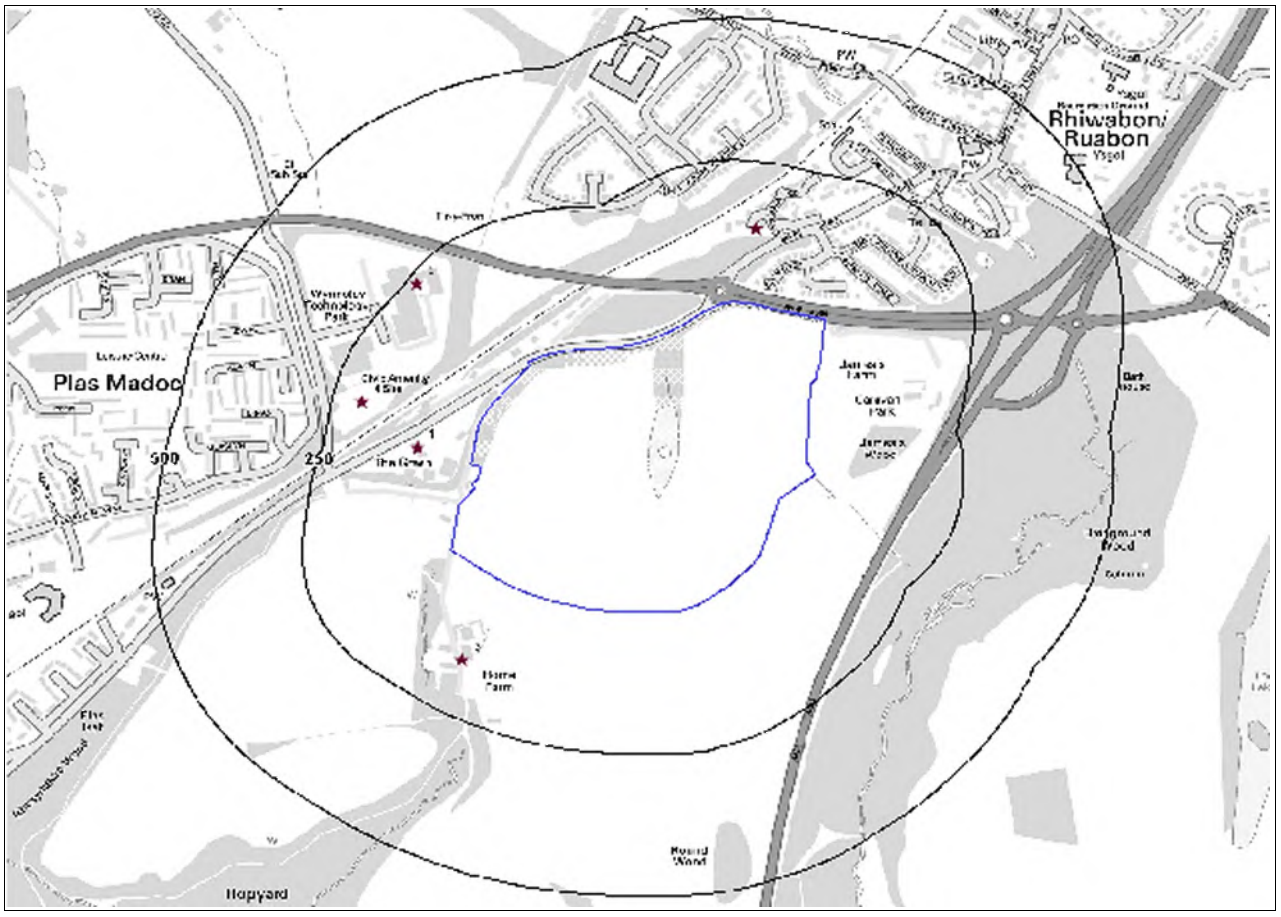
ID	Distance (m)	Direction	NGR	Details	
18B	252	W	329206 343357	Site Address: Off Plas Bennion Road, Wynnstay Bank Ruabon, Wrexham, Clwyd, LL14 3ES Type: Household Waste Amenity Site Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: 3CW010 EPR reference: MP3394FY/V004 Operator: 3 C Waste Ltd Waste Management licence No: 37039 Annual Tonnage: 0.0	Issue Date: 01/10/1993 Effective Date: 13/11/2001 Modified: 28/02/2007 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Revoked Site Name: Wynnstay Banks Civic Amenity Site Correspondence Address: -, -
19B	254	W	329205 343361	Site Address: Plas Madoc H W R C, Wynnstay Industrial Estate, Acrefair, Wrexham, Clwyd, LL14 1TP Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAS025 EPR reference: EA/EPR/NP3095EW/V002 Operator: F C C Recycling (U K) Limited Waste Management licence No: 100081 Annual Tonnage: 24999.0	Issue Date: 23/10/2007 Effective Date: - Modified: 22/11/2012 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Plas Madoc Household Waste Recycling Centre Correspondence Address: -, -
20B	254	W	329205 343361	Site Address: Plas Madoc H W R C, Wynnstay Industrial Estate, Acrefair, Wrexham, Clwyd, LL14 1TP Type: Household Waste Amenity Site Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: WAS025 EPR reference: NP3095EW/V002 Operator: F C C Recycling (U K) Limited Waste Management licence No: 100081 Annual Tonnage: 0.0	Issue Date: 23/10/2007 Effective Date: - Modified: 22/11/2012 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Plas Madoc Household Waste Recycling Centre Correspondence Address: -, -
21C	336	W	329107 343288	Site Address: Land/ Premises At, Acrefair, Plas Madoc, Wrexham, Clwyd, LL14 3ES Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAS025 EPR reference: EA/EPR/NP3095EW/A001 Operator: Waste Recycling Ltd Waste Management licence No: 100081 Annual Tonnage: 24999.0	Issue Date: 23/10/2007 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Plas Madoc Household Waste Recycling Centre Correspondence Address: -, -
22C	336	W	329107 343288	Site Address: Acrefair, Plas Madoc, Wrexham, Clwyd, LL14 3ES Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: WAS025 EPR reference: - Operator: Waste Recycling Limited Waste Management licence No: 100081 Annual Tonnage: 0.0	Issue Date: 23/10/2007 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Plas Madoc Household Waste Recycling Centre Correspondence Address: -, Bold Business Centre, Bold Lane, Sutton, St Helens, Merseyside, WA9 4TX
Not shown	1204	N	330083 344716	Site Address: Tatham Road, Ruabon, Wrexham, LL14 6DR Type: Household, Commercial & Industrial Waste Landfill Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA001 EPR reference: - Operator: Shanks Northern Ltd Waste Management licence No: 37109 Annual Tonnage: 0.0	Issue Date: 06/07/1994 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Gardden Claypit 2 Northern Correspondence Address: -, Unit 9, Abbey Lane Industrial Estate, Burscough, Ormskirk, Merseyside, L40 7SR

ID	Distance (m)	Direction	NGR	Details	
Not shown	1204	N	330087 344716	Site Address: Gardden, Tatham Road, Ruabon, Wrexham, Clwyd, LL14 6RF Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA005 EPR reference: BP3494FC/A001 Operator: Shanks Midlands Ltd Waste Management licence No: 37014 Annual Tonnage: 400.0	Issue Date: 02/05/1989 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Gardden Claypit 1 Midlands Correspondence Address: -, -
Not shown	1209	N	330077 344722	Site Address: Tatham Road, Ruabon, Wrexham, Clwyd, LL14 6RF Type: Household, Commercial & Industrial Waste Landfill Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA001 EPR reference: EA/EPR/HP3694FJ/A001 Operator: Shanks Northern Ltd Waste Management licence No: 37109 Annual Tonnage: 51712.0	Issue Date: 06/07/1994 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Gardden Claypit 2 Northern Correspondence Address: -, -
Not shown	1209	N	330077 344722	Site Address: Tatham Road, Ruabon, Wrexham, Clwyd, LL14 6RF Type: Household, Commercial & Industrial Waste Landfill Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA001 EPR reference: HP3694FJ/A001 Operator: Shanks Northern Ltd Waste Management licence No: 37109 Annual Tonnage: 51712.0	Issue Date: 06/07/1994 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Gardden Claypit 2 Northern Correspondence Address: -, -
Not shown	1209	N	330087 344721	Site Address: Tatham Road, Ruabon, Wrexham, LL14 6DR Type: Household, Commercial & Industrial Waste Landfill Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA005 EPR reference: - Operator: Shanks Midlands Ltd Waste Management licence No: 37014 Annual Tonnage: 0.0	Issue Date: 02/05/1989 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Closure Site Name: Gardden Claypit 1 Midlands Correspondence Address: -, Woodside House, Church Road, Woburn Sands, Milton Keynes, MK17 8TA
Not shown	1428	N	330083 344942	Site Address: Land / Premises At, Gardden Ind Est, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BEN001 EPR reference: EA/EPR/VP3394FX/A001 Operator: Bennett D Waste Management licence No: 37163 Annual Tonnage: 30000.0	Issue Date: 31/03/1999 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Clwyd Car Breakers Correspondence Address: -, -
Not shown	1428	N	330083 344942	Site Address: Land / Premises At, Gardden Ind Est, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: >= 25000 tonnes < 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: BEN001 EPR reference: VP3394FX/A001 Operator: Bennett D Waste Management licence No: 37163 Annual Tonnage: 30000.0	Issue Date: 31/03/1999 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Expired Site Name: Clwyd Car Breakers Correspondence Address: -, -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1439	N	330053 344957	Site Address: Gardden Industrial Estate, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Vehicle depollution facility Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: CLW002 EPR reference: EA/EPR/NP3290VM/A001 Operator: Clwyd Breakers Ltd Waste Management licence No: 102006 Annual Tonnage: 74999.0	Issue Date: 07/10/2010 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Clwyd Breakers Ltd Correspondence Address: -, -
Not shown	1439	N	330053 344957	Site Address: Gardden Industrial Estate, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Vehicle depollution facility Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: CLW002 EPR reference: NP3290VM/A001 Operator: Clwyd Breakers Ltd Waste Management licence No: 102006 Annual Tonnage: 0.0	Issue Date: 07/10/2010 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: Clwyd Breakers Ltd Correspondence Address: -, -
Not shown	1475	N	330082 344990	Site Address: I Hayward Ltd, Gardden Ind Est, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HAY001 EPR reference: EA/EPR/EP3794FY/V003 Operator: I Hayward Limited Waste Management licence No: 37162 Annual Tonnage: 24999.0	Issue Date: 31/03/1999 Effective Date: - Modified: 31/01/2013 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: I Hayward Ltd Correspondence Address: -, -
Not shown	1475	N	330082 344990	Site Address: Gardden Ind Est, Ruabon, Wrexham, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: HAY001 EPR reference: - Operator: Haywards I Waste Management licence No: 37162 Annual Tonnage: 0.0	Issue Date: 31/03/1999 Effective Date: - Modified: - Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Issued Site Name: I Haywards Ltd Correspondence Address: -, Gardden Ind Est, Ruabon, Wrexham, LL14 6RG
Not shown	1475	N	330082 344990	Site Address: I Hayward Ltd, Gardden Ind Est, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: Unknown Environmental Permitting Regulations (Waste) Licence Number: HAY001 EPR reference: EP3794FY/V003 Operator: I Hayward Limited Waste Management licence No: 37162 Annual Tonnage: 0.0	Issue Date: 31/03/1999 Effective Date: - Modified: 31/01/2013 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: I Hayward Ltd Correspondence Address: -, -
Not shown	1483	S	329188 341568	Site Address: Pen-y-bont Landfill, Newbridge Road, Chirk, Wrexham, LL14 3JE Type: Household, Commercial & Industrial Waste Landfill Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA004 EPR reference: EA/EPR/CP3094FU/V002 Operator: Shanks Midlands Ltd Waste Management licence No: 37123 Annual Tonnage: 214490.0	Issue Date: 23/12/1994 Effective Date: - Modified: 26/03/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: To PPC Site Name: Pen-y-bont Landfill Correspondence Address: -, -

ID	Distance (m)	Direction	NGR	Details	
Not shown	1483	S	329188 341568	Site Address: Pen-y-bont Landfill, Newbridge Road, Chirk, Wrexham, LL14 3JE Type: Household, Commercial & Industrial Waste Landfill Size: >= 75000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA004 EPR reference: CP3094FU/V002 Operator: Shanks Midlands Ltd Waste Management licence No: 37123 Annual Tonnage: 214490.0	Issue Date: 23/12/1994 Effective Date: - Modified: 26/03/2002 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: To PPC Site Name: Pen-y-bont Landfill Correspondence Address: -, -

4. Current Land Use Map



Mapping sourced from Ordnance Survey®

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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 5

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	94	W	Clwyd Caravans & Leisure Ltd	329352 343272	The Green, Wynnstay Yard, Ruabon, Wrexham, LL14 6DP	Vehicle Hire and Rental	Hire Services
2	133	N	Electricity Sub Station	329918 343658	LL14	Electrical Features	Infrastructure and Facilities
3	153	SW	Hopper	329426 342897	LL14	Hoppers and Silos	Farming
4	201	W	Civic Amenity Site	329258 343353	LL14	Refuse Disposal Facilities	Infrastructure and Facilities
5	234	NW	Electricity Sub Station	329350 343561	LL14	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 0

Database searched and no data found.

4.3 National Grid High Voltage Underground Electricity Transmission Cables

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

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

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

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

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

5.2 Superficial Ground and Drift Geology

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

Lex Code	Description	Rock Type
TILLD	TILL, DEVENSIAN	DIAMICTON
GFDUD	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]

5.3 Bedrock and Solid Geology

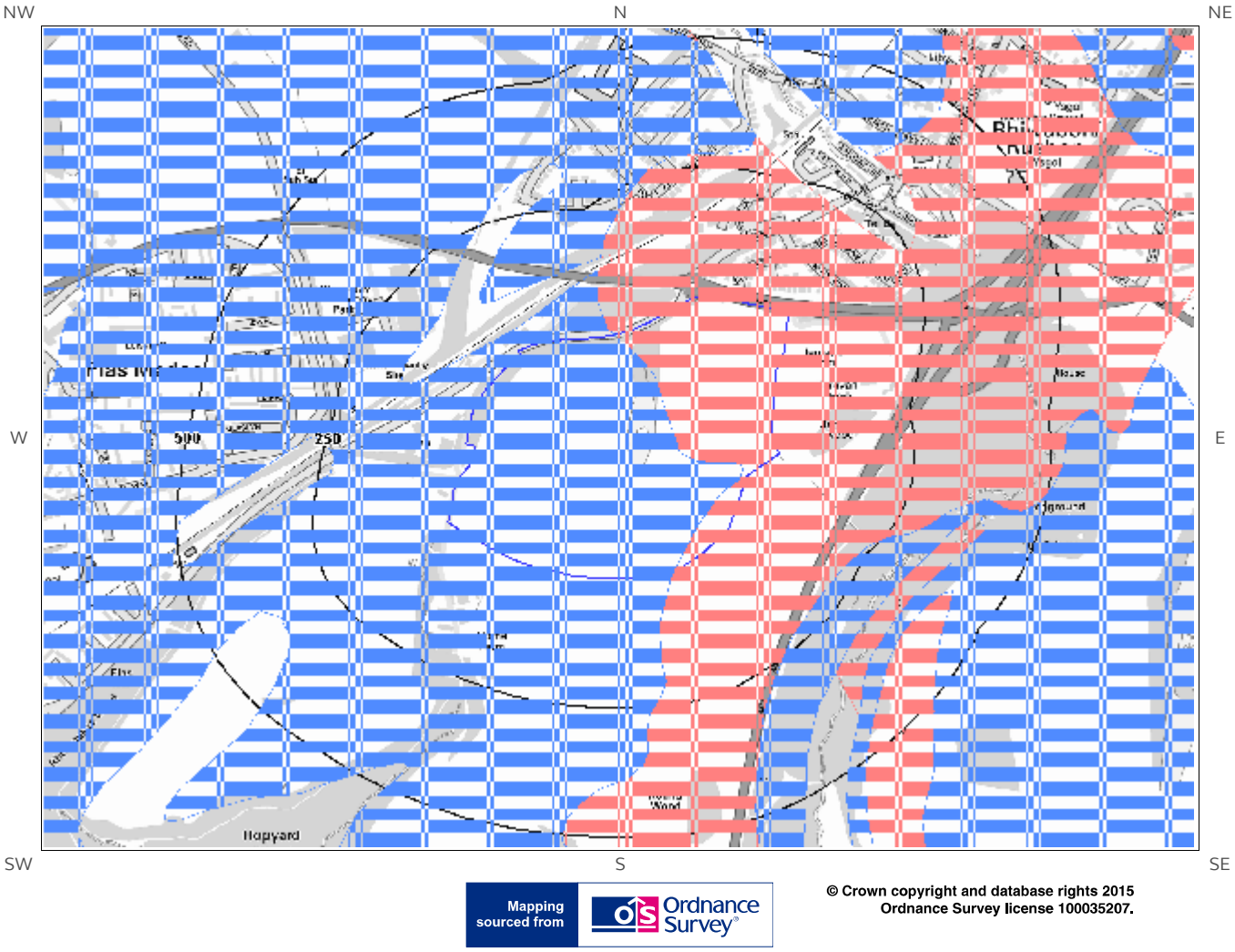
The database has been searched on site, including a 50m buffer.

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

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

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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Site Outline

250
500

Principal Aquifer

Secondary (A) Aquifer Permeable Layers

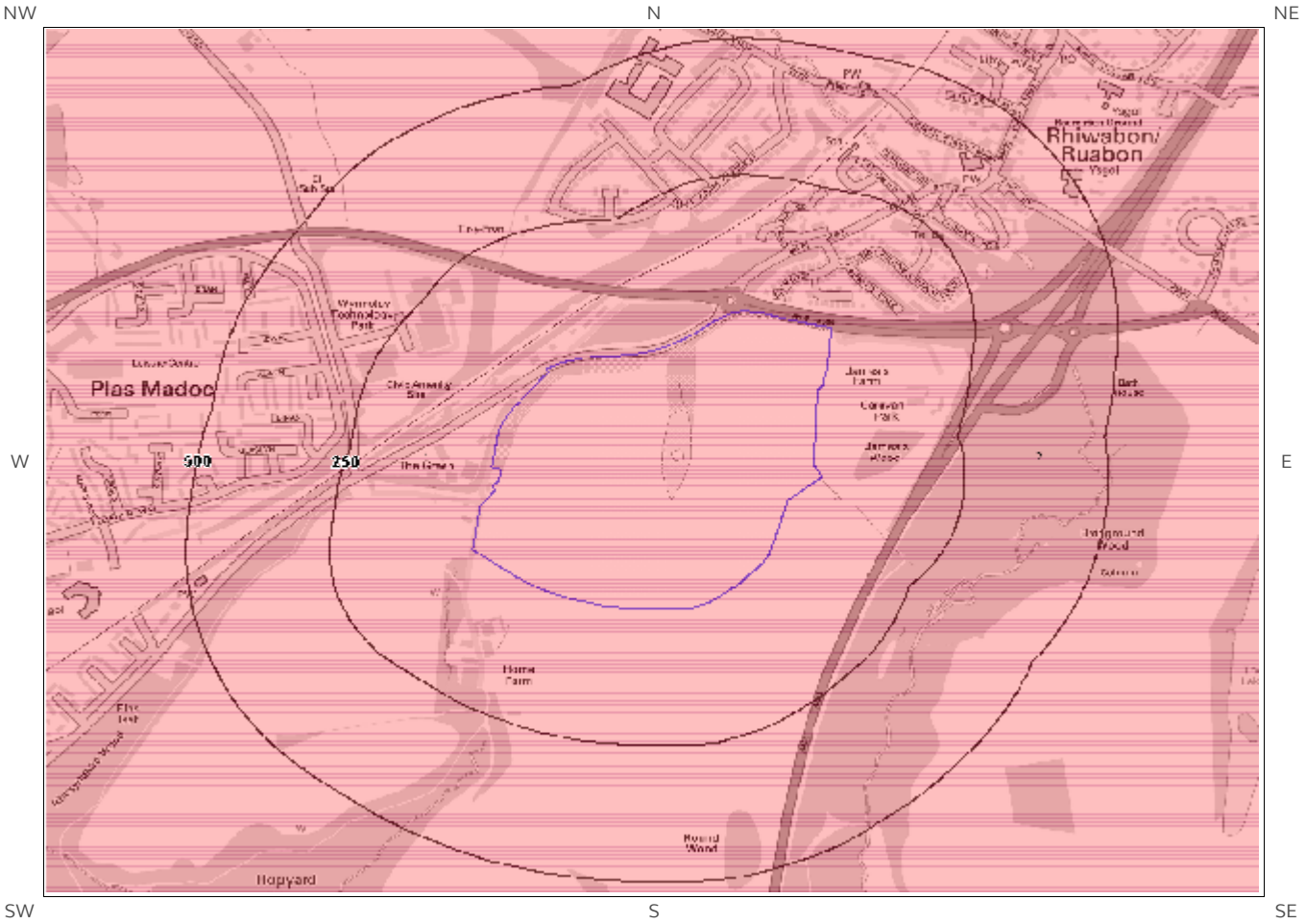
Secondary (B) Aquifer Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

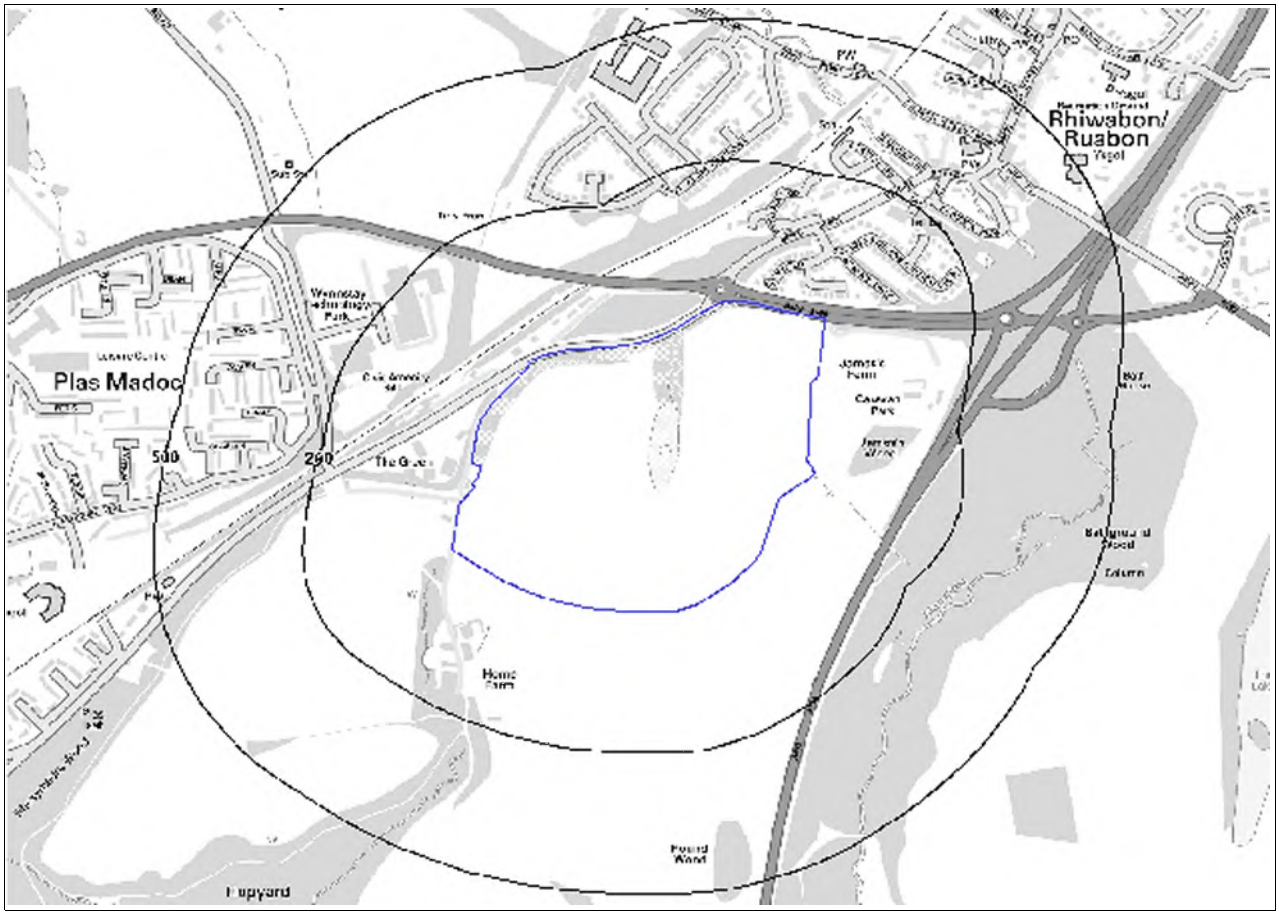
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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Site Outline
250
500
Search Buffers (m)
Principal Aquifer
Secondary (A) Aquifer - Permeable Layers
Secondary (B) Aquifer - Lower Permeability Layers
Groundwater Abstraction Licence
Secondary Aquifer - Undifferentiated Layers
Unproductive
Unknown (lakes and landslip)
Surface Water Abstraction Licence

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



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Site Outline

250

500

Source Protection Zone 1 - Inner Catchment

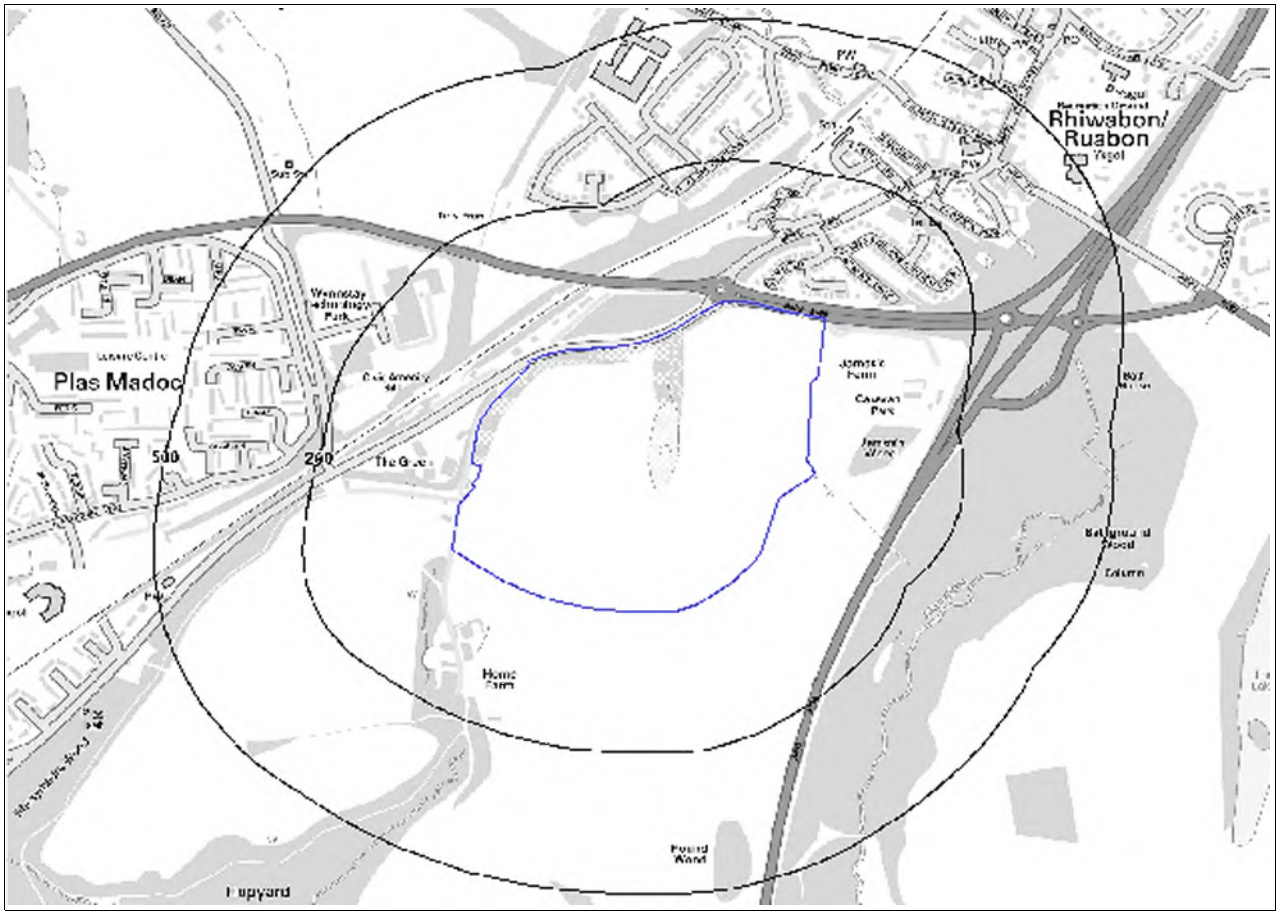
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

Potable Water Abstraction Licence

6d. Hydrogeology – Source Protection Zones within confined aquifer



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Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

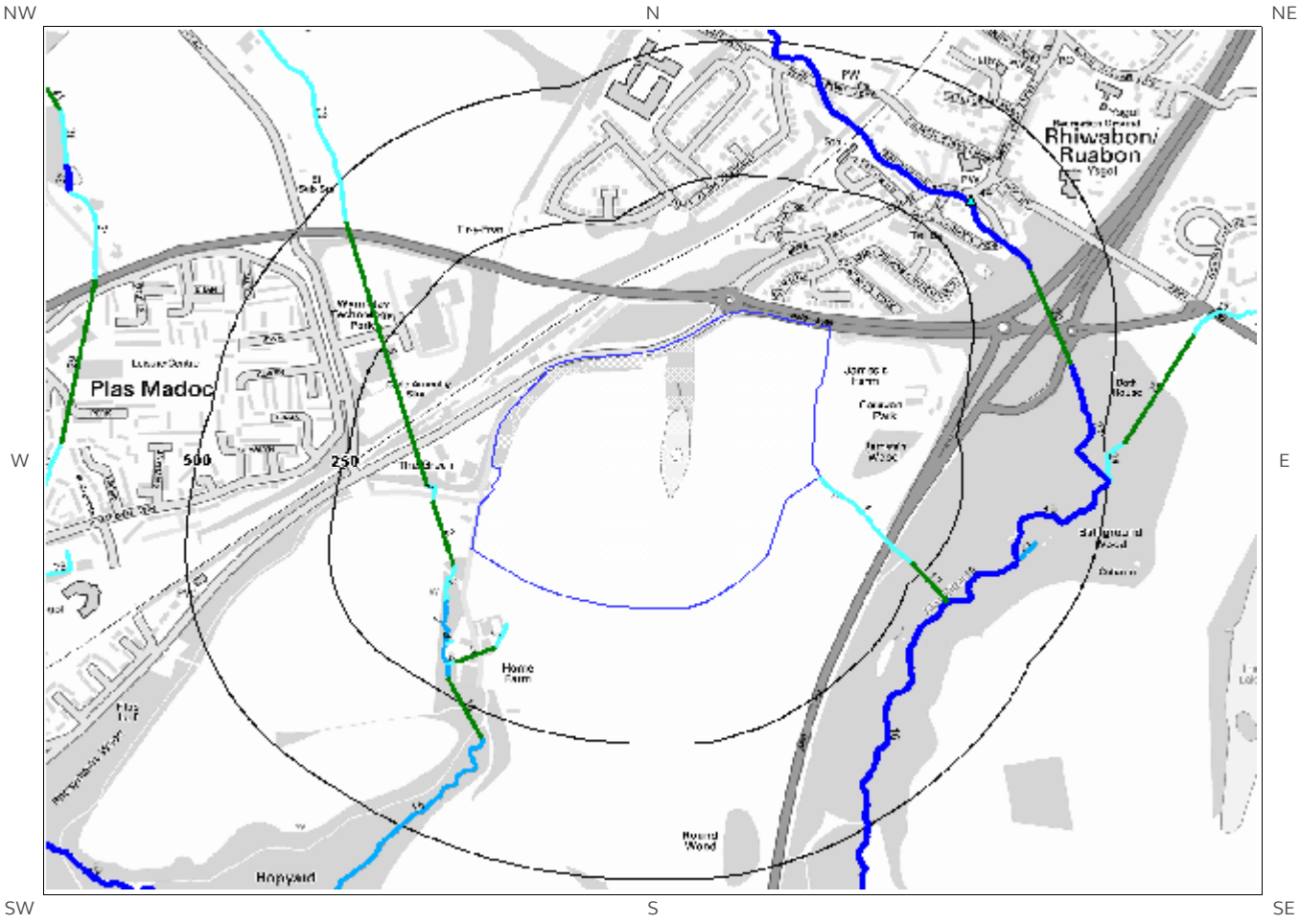
Site Outline

250

500

Search Buffers (m)

6e. Hydrology – Detailed River Network and River Quality



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Site Outline

250
500
Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (Inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Public Sewer)
Underground River (Local Knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

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

From 1 April 2010, the Environment Agency'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 (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
9	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
10	213	SE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
11	292	SE	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
3	310	SE	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
4	377	SE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
12	473	N	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
5	491	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

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

From 1 April 2010, the Environment Agency'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 (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	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

6.3 Groundwater Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1992	NW	328100 344800	Status: Historical Licence No: 24/67/5/0046 Details: General Farming & Domestic Direct Source: Eaw Groundwater Point: 35 Ft Deep, 8ft Dia. Well Data Type: Point Name: Lloyd	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: N124 Original Start Date: 12/10/1973 Expiry Date: - Issue No: 100 Version Start Date: 12/10/1973 Version End Date:

6.4 Surface Water Abstraction Licences

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

Database searched and no data found.

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
0	On Site	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
19	N	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
43	NW	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
59	NW	Minor Aquifer/Intermediate Leaching Potential	I1	Soils which can possibly transmit a wide range of pollutants.
151	W	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
250	N	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
313	SE	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

6.9 River Quality

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

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

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

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

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
44	338	NE	330280 343730	River Name: Eitha Reach: Conf.r.dee W.park - Conf.trib.nr.penycae End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1451	SW	328730 341800	River Name: Dee Reach: Conf.bradley Bk.-conf.trefynant Bk. End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1451	SW	328730 341800	River Name: Dee Reach: Conf.cyflymen Bk.- Conf.eglwyseg End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1451	SW	328730 341800	River Name: Dee Reach: Conf.trefynant Bk.- Conf. Cyflymen Bk. End/Start of Stretch: Sample Point NGR	A	A	A	A	-
Not shown	1451	SW	328730 341800	River Name: Dee Reach: Conf.eglwyseg - Conf. Afon Morwynion End/Start of Stretch: Sample Point NGR	A	A	A	A	-

6.10 Detailed River Network

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

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

ID	Distance (m)	Direction	Details	
1	0	On Site	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	40	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
3	45	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	82	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	84	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	100	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
7	103	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
8	132	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
9A	160	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
10A	170	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
11B	191	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
12B	201	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
13	222	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
14	222	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
15	295	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
16	299	SE	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
17	304	NE	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
18	321	SE	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
19	359	E	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
20	365	E	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
21	377	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined

ID	Distance (m)	Direction	Details	
22	425	E	River Name: Afon Eitha Welsh River Name: - Alternative Name: -	River Type: Primary River Main River Status: Currently Undefined
23	443	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
24	500	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

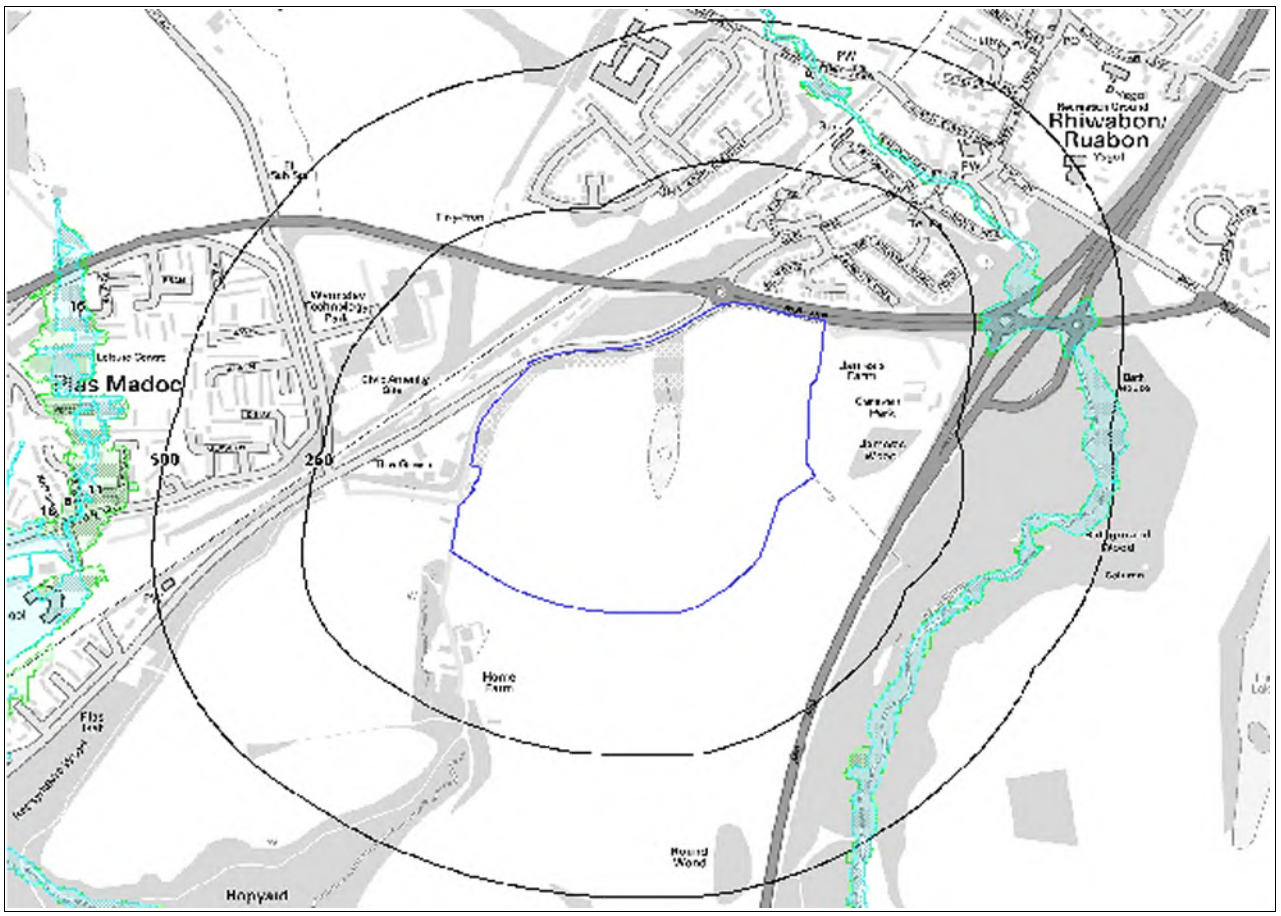
6.11 Surface Water Features

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

The following surface water records are not represented on mapping:

Distance (m)	Direction
0	On Site
0	On Site
0	On Site
45	SW
63	SW
76	SE
83	NW
84	SW
130	SE
160	SW
180	SE
191	SW

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



Mapping sourced from Ordnance Survey

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Site Outline

Search Buffers (m)

Zone 2 Floodplain

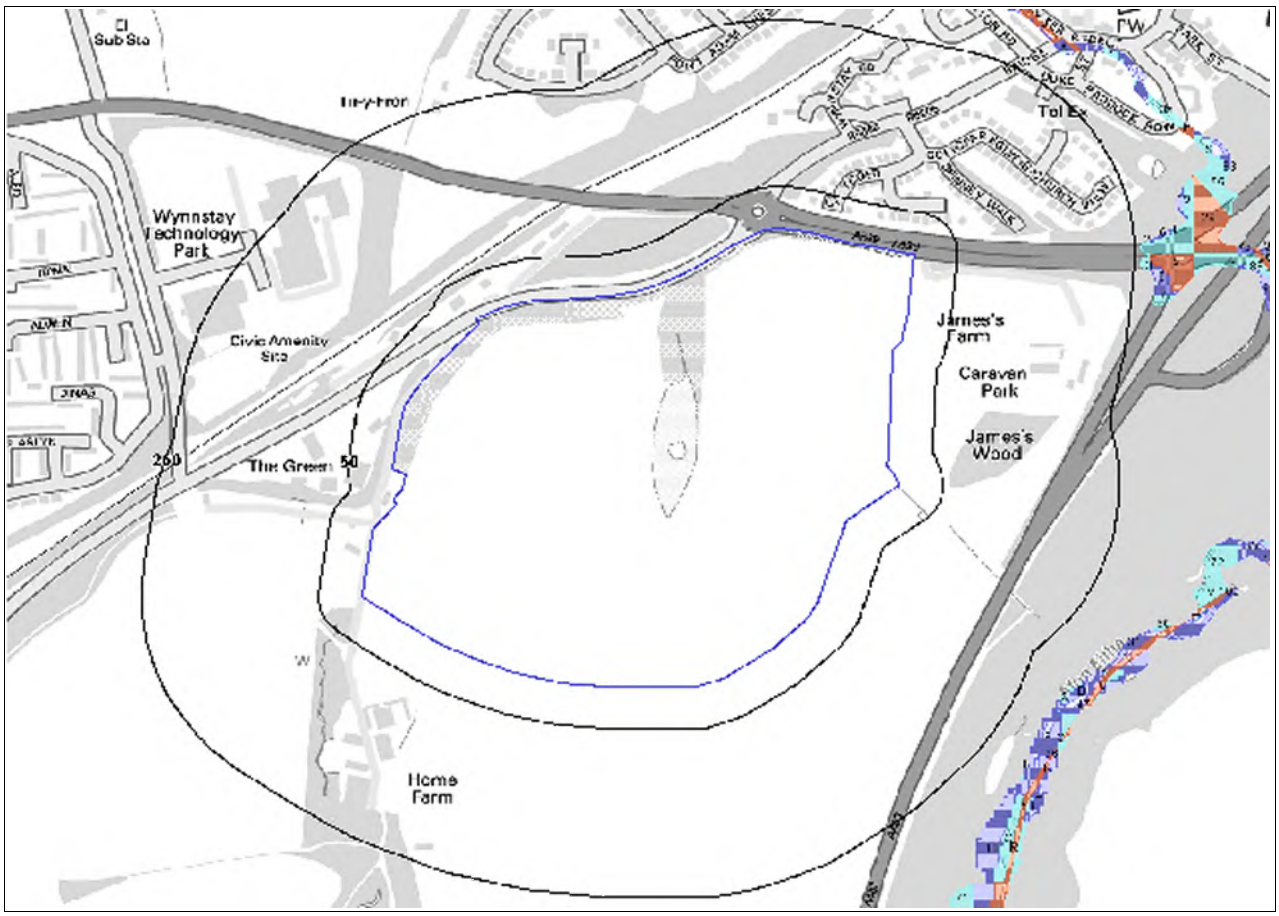
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



Mapping sourced from Ordnance Survey

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Site Outline

100 250 Search Buffers (m)

RoFRaS Rating

- Very Low
- Low
- Medium
- High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency Zone 3 floodplain? No

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

Database searched and no data found.

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

What is the highest risk of flooding onsite? Very Low

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

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

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

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

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

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

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

Potential at Surface

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

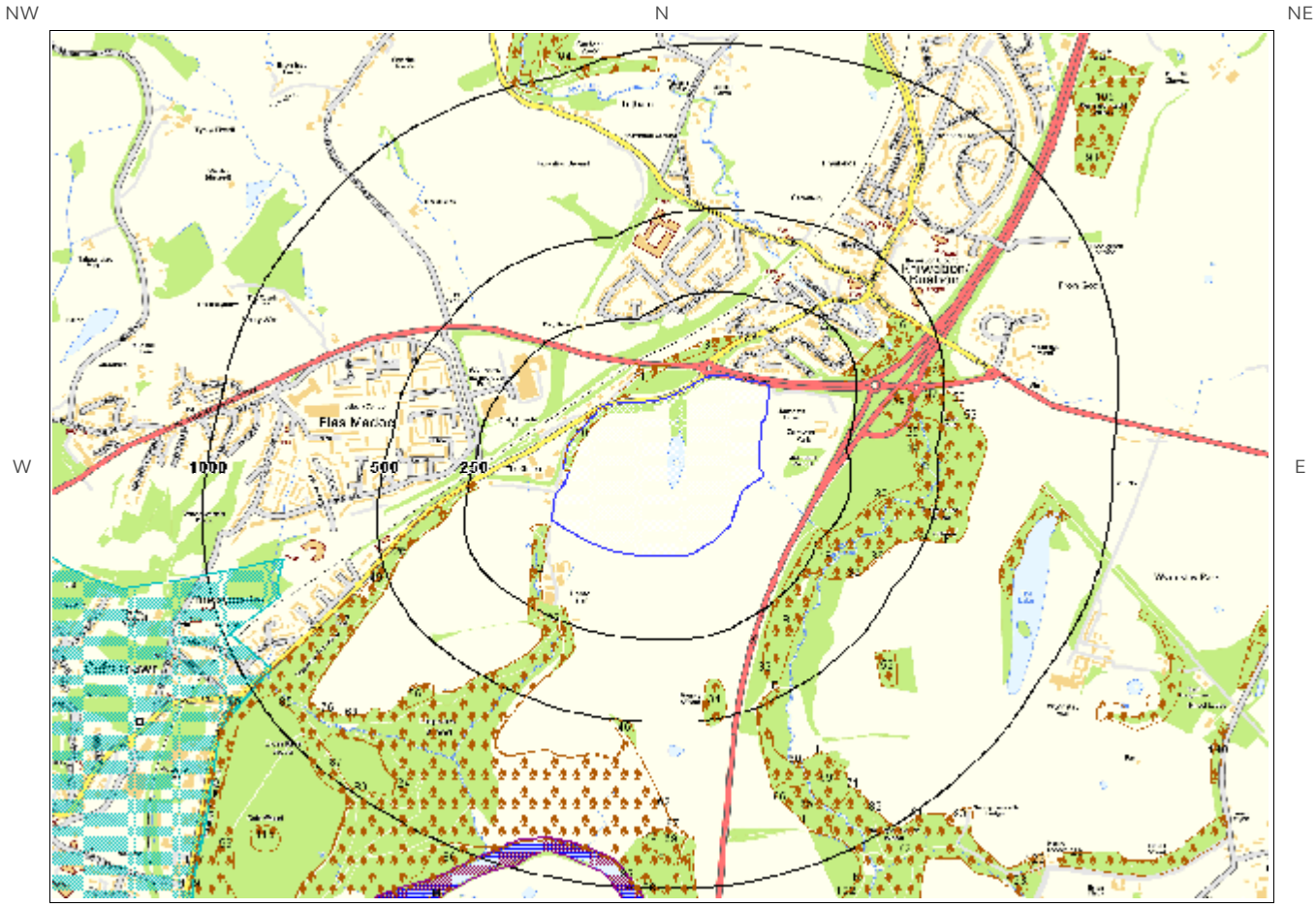
7.8 Groundwater Flooding Confidence Areas

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

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

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

8. Designated Environmentally Sensitive Sites Map



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AONB
National Park
SSSI
Special Protection Areas
Nitrate Vulnerable Zones
Green Belt
Environmentally Sensitive Areas
Special Areas of Conservation
World Heritage Sites
Nitrate Sensitive Areas
Ancient Woodland
National Nature Reserve
Local Nature Reserves
Ramsar Sites

8. Designated Environmentally Sensitive Sites

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

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

4

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
4	885	S	AFON DYFRDWY (RIVER DEE)	Natural Resources Wales
Not shown	1650	N	STRYT LAS A'R HAFOD	Natural Resources Wales
Not shown	1681	S	NANT-Y-BELAN AND PRYNELA WOODS	Natural Resources Wales
Not shown	1901	N	STRYT LAS A'R HAFOD	Natural Resources Wales

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

0

Database searched and no data found.

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

3

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

ID	Distance (m)	Direction	SAC Name	Data Source
1	885	S	River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (Wales)	Natural Resources Wales
Not shown	1650	N	Johnstown Newt Sites	Natural Resources Wales
Not shown	1901	N	Johnstown Newt Sites	Natural Resources Wales

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

164

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

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
10	0	On Site	Unknown	Ancient and Semi-Natural Woodland
11	12	N	Unknown	Ancient and Semi-Natural Woodland
12	17	SW	Unknown	Ancient and Semi-Natural Woodland
13	70	N	Unknown	Ancient and Semi-Natural Woodland
14	205	SW	Unknown	Restored Ancient Woodland Site
15	212	E	Unknown	Restored Ancient Woodland Site
16	213	E	Unknown	Ancient Replanted Woodland
17A	215	E	Unknown	Restored Ancient Woodland Site
18	220	SE	Unknown	Restored Ancient Woodland Site
19	223	W	Unknown	Ancient and Semi-Natural Woodland
20	224	SE	Unknown	Ancient Replanted Woodland
21B	225	SE	Unknown	Other Ancient Woodland
22	252	SE	Unknown	Ancient Replanted Woodland
23	260	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
24	260	SW	Unknown	Restored Ancient Woodland Site
25	298	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
26	302	W	Unknown	Ancient and Semi-Natural Woodland
27A	305	E	Unknown	Ancient Replanted Woodland
28	324	E	Unknown	Restored Ancient Woodland Site
29C	329	E	Unknown	Ancient Replanted Woodland
30	334	E	Unknown	Ancient Replanted Woodland
31B	350	SE	Unknown	Ancient and Semi-Natural Woodland
32	364	SE	Unknown	Ancient Replanted Woodland
33	372	SE	Unknown	Ancient and Semi-Natural Woodland
34	377	S	Unknown	Ancient and Semi-Natural Woodland
35	386	E	Unknown	Restored Ancient Woodland Site
36	399	SE	Unknown	Ancient Replanted Woodland
37	407	E	Unknown	Ancient Replanted Woodland
38C	420	E	Unknown	Ancient Replanted Woodland
39	421	E	Unknown	Ancient Replanted Woodland
40	449	E	Unknown	Restored Ancient Woodland Site
41G	469	SE	Unknown	Ancient Replanted Woodland

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
42	470	SE	Unknown	Ancient Replanted Woodland
43D	471	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
44E	476	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
45D	477	SE	Unknown	Restored Ancient Woodland Site
46	495	S	HOPYARD WOOD	Ancient and Semi-Natural Woodland
47	504	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
48E	516	SE	Unknown	Restored Ancient Woodland Site
49	524	W	Unknown	Ancient Replanted Woodland
50	532	E	Unknown	Ancient Replanted Woodland
51F	538	E	Unknown	Ancient Replanted Woodland
52	563	SE	Unknown	Ancient and Semi-Natural Woodland
53	578	E	Unknown	Ancient Replanted Woodland
54F	589	E	Unknown	Ancient Replanted Woodland
55	598	W	Unknown	Restored Ancient Woodland Site
56	618	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
57G	631	S	Unknown	Restored Ancient Woodland Site
58	680	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
59	691	SE	Unknown	Ancient Replanted Woodland
60	694	SE	Unknown	Ancient and Semi-Natural Woodland
61H	699	SE	Unknown	Ancient and Semi-Natural Woodland
62	700	S	HOPYARD WOOD	Ancient and Semi-Natural Woodland
63H	701	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
64	729	E	Unknown	Ancient and Semi-Natural Woodland
65	740	S	Unknown	Restored Ancient Woodland Site
66	781	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
67	786	S	Unknown	Restored Ancient Woodland Site
68	790	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
69	815	S	Unknown	Ancient Replanted Woodland
70	822	S	Unknown	Ancient Replanted Woodland
71	828	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
72	838	SE	Unknown	Ancient and Semi-Natural Woodland
73	841	S	Unknown	Restored Ancient Woodland Site
74	846	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
75I	850	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
76	853	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
77J	887	S	Unknown	Restored Ancient Woodland Site
78	888	S	HOPYARD WOOD	Ancient and Semi-Natural Woodland
79I	903	S	Unknown	Ancient Replanted Woodland
80	904	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
81J	910	S	Unknown	Ancient Replanted Woodland
82	916	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
83	919	S	Unknown	Ancient and Semi-Natural Woodland
84	926	N	Unknown	Ancient and Semi-Natural Woodland
85	930	SW	Unknown	Restored Ancient Woodland Site
86	943	S	HOPYARD WOOD	Ancient and Semi-Natural Woodland
87	964	SW	Unknown	Ancient Replanted Woodland
88	966	S	Unknown	Ancient Replanted Woodland
89	974	SW	Unknown	Ancient Replanted Woodland
90	1011	SW	Unknown	Ancient Replanted Woodland
91	1012	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
92	1025	SE	Unknown	Ancient Replanted Woodland
93	1028	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1039	S	Unknown	Ancient Replanted Woodland
95	1042	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1058	S	Unknown	Restored Ancient Woodland Site
97K	1082	SE	Unknown	Ancient Replanted Woodland
98	1082	NE	Unknown	Restored Ancient Woodland Site
99	1088	SW	Unknown	Ancient and Semi-Natural Woodland
Not shown	1088	S	Unknown	Ancient Replanted Woodland
101K	1092	SE	Unknown	Ancient Replanted Woodland
102	1103	SE	Unknown	Ancient Replanted Woodland

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
103M	1115	S	Unknown	Ancient and Semi-Natural Woodland
Not shown	1120	S	Unknown	Restored Ancient Woodland Site
105	1137	NE	Unknown	Ancient and Semi-Natural Woodland
106L	1137	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
107L	1139	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
108	1149	E	Unknown	Restored Ancient Woodland Site
Not shown	1162	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1164	S	Unknown	Ancient Replanted Woodland
111L	1165	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
112N	1180	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1201	S	Unknown	Other Ancient Woodland
Not shown	1203	S	Unknown	Restored Ancient Woodland Site
115	1221	SW	Unknown	Ancient Replanted Woodland
116M	1233	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1247	S	Unknown	Ancient Replanted Woodland
Not shown	1247	SW	Unknown	Restored Ancient Woodland Site
119N	1263	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1287	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1291	S	Unknown	Ancient and Semi-Natural Woodland
122	1302	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
123	1313	SE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1351	SE	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
125	1371	SE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1383	S	Unknown	Ancient Replanted Woodland
127	1428	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1430	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1430	SW	Unknown	Restored Ancient Woodland Site

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1438	S	Unknown	Ancient Replanted Woodland
Not shown	1441	SW	Unknown	Restored Ancient Woodland Site
Not shown	1450	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1452	N	Unknown	Restored Ancient Woodland Site
Not shown	1464	S	Unknown	Ancient Replanted Woodland
Not shown	1468	SW	Unknown	Ancient Replanted Woodland
136	1478	E	Unknown	Ancient and Semi-Natural Woodland
Not shown	1492	SE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1506	S	Unknown	Ancient Replanted Woodland
139	1509	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
140	1509	SE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1512	S	Unknown	Ancient Replanted Woodland
Not shown	1542	E	Unknown	Restored Ancient Woodland Site
Not shown	1545	N	Unknown	Ancient and Semi-Natural Woodland
Not shown	1560	S	Unknown	Ancient Replanted Woodland
Not shown	1577	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1587	SW	Unknown	Restored Ancient Woodland Site
Not shown	1588	SW	HOPYARD WOOD	Ancient and Semi-Natural Woodland
Not shown	1601	S	Unknown	Ancient and Semi-Natural Woodland
Not shown	1614	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1629	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1644	SW	Unknown	Restored Ancient Woodland Site
Not shown	1660	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1674	SE	Unknown	Ancient and Semi-Natural Woodland
Not shown	1676	NE	Unknown	Restored Ancient Woodland Site
Not shown	1729	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1795	S	Unknown	Ancient Replanted Woodland

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1799	S	Unknown	Ancient Replanted Woodland
Not shown	1800	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1814	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1816	S	Unknown	Ancient and Semi-Natural Woodland
Not shown	1821	E	Unknown	Ancient Replanted Woodland
Not shown	1834	E	Unknown	Restored Ancient Woodland Site
Not shown	1866	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1900	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1901	S	Unknown	Restored Ancient Woodland Site
Not shown	1908	S	Unknown	Ancient Replanted Woodland
Not shown	1922	S	Unknown	Ancient Replanted Woodland
Not shown	1940	S	Unknown	Ancient Replanted Woodland
Not shown	1947	S	Unknown	Ancient Replanted Woodland
Not shown	1968	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1991	S	NANT-Y-CAE-COCH WOOD/BATHGROUND/+	Ancient and Semi-Natural Woodland
Not shown	1994	S	Unknown	Restored Ancient Woodland Site
Not shown	1997	S	Unknown	Restored Ancient Woodland Site

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

0

Database searched and no data found.

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

1

The following World Heritage Site records provided by English Heritage and Cadw are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	World Heritage Site Name	Data Source
8	775	W	Pontcysyllte Aqueduct and Canal Buffer Zone	English Heritage

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

0

Database searched and no data found.

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

1

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

ID	Distance (m)	Direction	AONB/NSA Name	Data Source
Not shown	1438	SW	Clwyidan Range	Natural Resources Wales

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

What is the maximum Running Sand*[*] hazard rating identified on the study site? Very Low

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

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

9.2 Radon

9.2.1 Radon Affected Areas

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

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

9.2.2 Radon Protection

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

10. Mining

10.1 Coal Mining

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

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

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

10.2 Non-Coal Mining

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

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

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.
0.0	On Site	Not available	Iron Ore (Bedded)	Rare and localised small scale mining may have occurred.
0.0	On Site	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.

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

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

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**

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

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

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Wrecsam - Wrexham County Borough Council
Phone: 01978 292 000
Web: http://www.wrexham.gov.uk/
Address: The Guildhall, Wrexham, Wrexham, LL11 1AY

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

Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.
PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].
This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

1 Definitions

I**n these terms and conditions unless the context otherwise requires:**

"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.

"Client" means the party or parties entering into a Contract with Groundsure.

"Commercial" means any building or property which is not Residential.

"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.

"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.

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

"Data Reports" means reports comprising factual data with no accompanying interpretation.

"Fees" has the meaning set out in clause 5.1.

"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.

"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.

"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.

"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.

"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.

"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.

"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.

"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.

"Residential" means any building or property used as or intended to be used as a single dwelling.

"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.

"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.

"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.

"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.

"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.

2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.

2.3 Subject to clause 7.3 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 writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.

2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.

2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.

2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.

3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.

3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.

3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.

3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.

4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

(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, and

(v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.

4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and

frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. 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 (together "Fees").

5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.

5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to

(i) full payment of all relevant Fees and

(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.

6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.

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

6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, 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 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;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.

6.6 The Client shall procure that any person 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.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.

7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.

7.4 Groundsure shall not be liable for

(i) loss of profits;

(ii) loss of business;

(iii) depletion of goodwill and/or similar losses;

(iv) loss of anticipated savings;

(v) loss of goods;

(vi) loss of contract;

(vii) loss of use;

(viii) loss or corruption of data or information;

(ix) business interruption;

(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;

(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;

(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;

(xiii) loss or damage to a computer, software, modem, telephone or other property; and

(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.

7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.

8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 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 term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.

9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event

(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) 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 and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) 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 or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.

12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.

12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.

12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.

12.5 Save as expressly provided in this Contract, 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.

12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.

12.7 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 Third Party Data Providers;

(viii) changes in law; or

(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 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.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 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.

12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent required by law. **© Groundsure Limited June 2013**

MLM Consulting Engineers Limited

7200, BEACH DRIVE,
CAMBRIDGE, CB25 9TL

Groundsure Reference:	GS-2356367
Your Reference:	773135
Report Date	20 Aug 2015
Report Delivery Method:	Email - pdf

Groundsure Geoinsight

Address: Ruabon Park A483, WREXHAM, LL14 6DW

Dear Sir/ Madam,

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

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geoinsight

Groundsure Geoinsight

Address:	**Ruabon Park A483, WREXHAM, LL14 6DW**
Date:	**20 Aug 2015**
Reference:	**GS-2356367**
Client:	**MLM Consulting Engineers Limited**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	27-Mar-2012
Grid Reference:	329736,343226
Site Size:	24.62ha

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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.

Section 1: Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	No
1.2 Superficial Geology and 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
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 10 and 30% of properties are above the Action Level
	1.4.2 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

Section 2: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	8	7	39	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	2	1	0	5	11
2.3 Current Ground Workings	0	0	2	2	6

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	2	1	0	5	11
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	3	0	0	0	0
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

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Very Low
4.2 Landslides	Very Low
4.3 Ground Dissolution of Soluble Rocks	Negligible
4.4 Compressible Deposits	Negligible
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Very Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	4	3	31

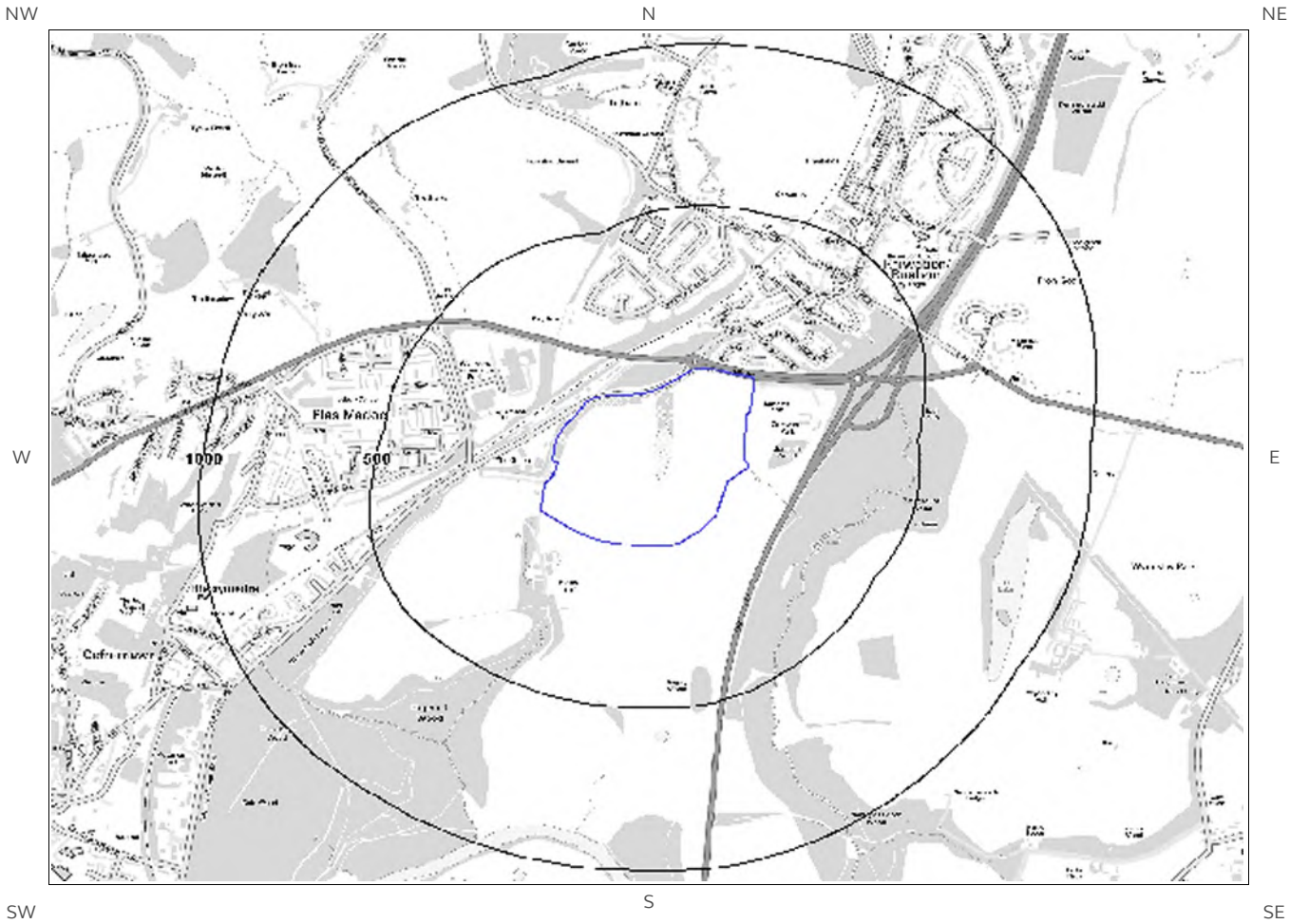
Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	11	4	23

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	2	9	14	Not Searched
7.3 Historical Railways	0	0	1	Not Searched
7.4 Active Railways	0	0	4	Not Searched

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

1 Geology

1.1 Artificial Ground Map



Artificial Ground Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Disturbed Ground (undivided)

Worked Ground (undivided)

Landscaped Ground (undivided)

Infilled Ground

Reclaimed Ground

1 Geology

1.1 Artificial Ground

1.1.1Artificial/ Made Ground

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

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

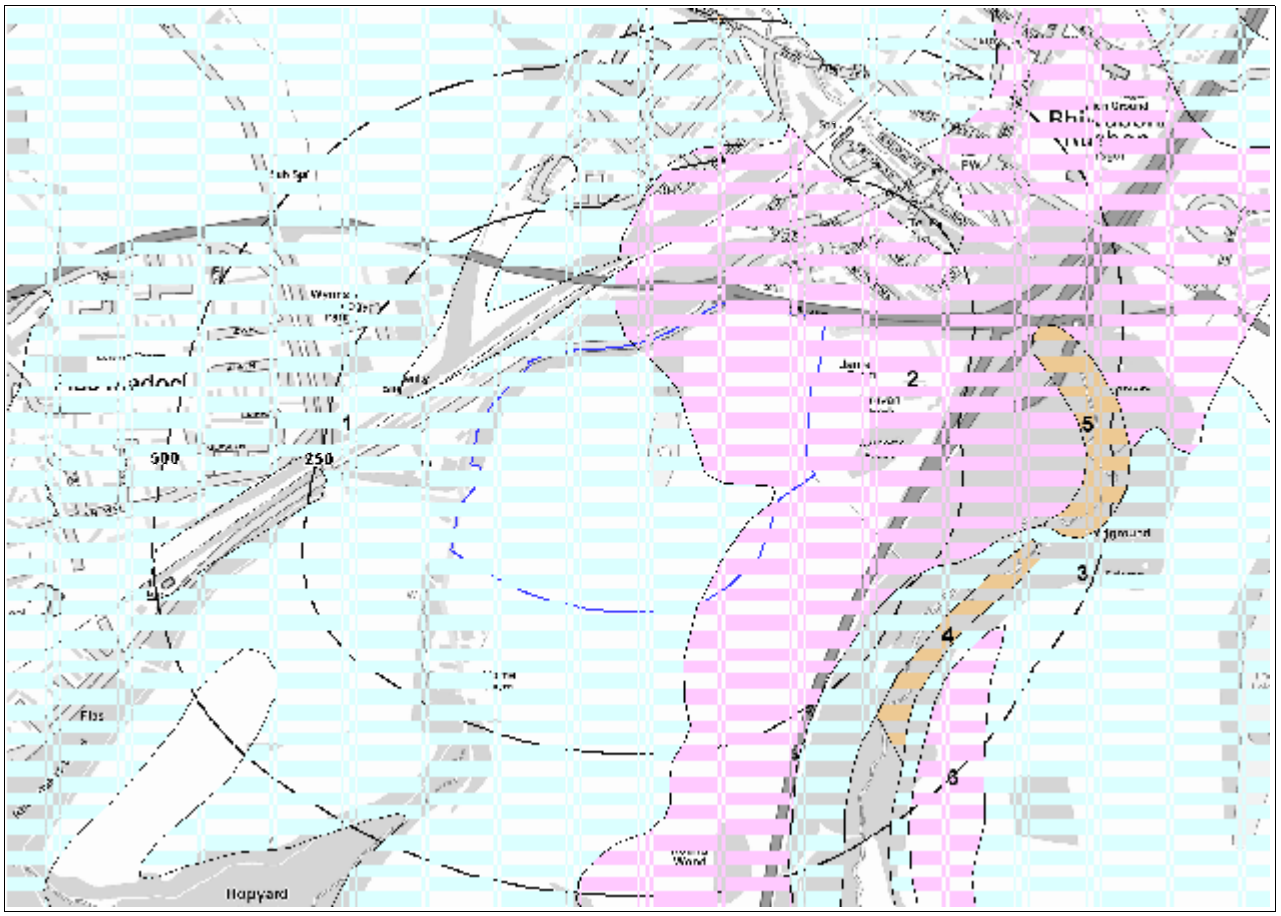
Database searched and no data found.

1.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

1.2 Superficial Deposits and Landslips Map



Superficial Deposits and Landslips Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000
Search Buffers (m)

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	TILLD	TILL, DEVENSIAN	DIAMICTON
2	0.0	On Site	GFDUD	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
3	213.0	SE	TILLD	TILL, DEVENSIAN	DIAMICTON
4	310.0	SE	ALV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
5	349.0	E	ALV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
6	377.0	SE	GFDUD	GLACIOFLUVIAL DEPOSITS, DEVENSIAN	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
7	491.0	N	RTDU	RIVER TERRACE DEPOSITS (UNDIFFERENTIATED)	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]

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	Mixed	High	Low
0.0	On Site	Intergranular	Very High	High
0.0	On Site	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.

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

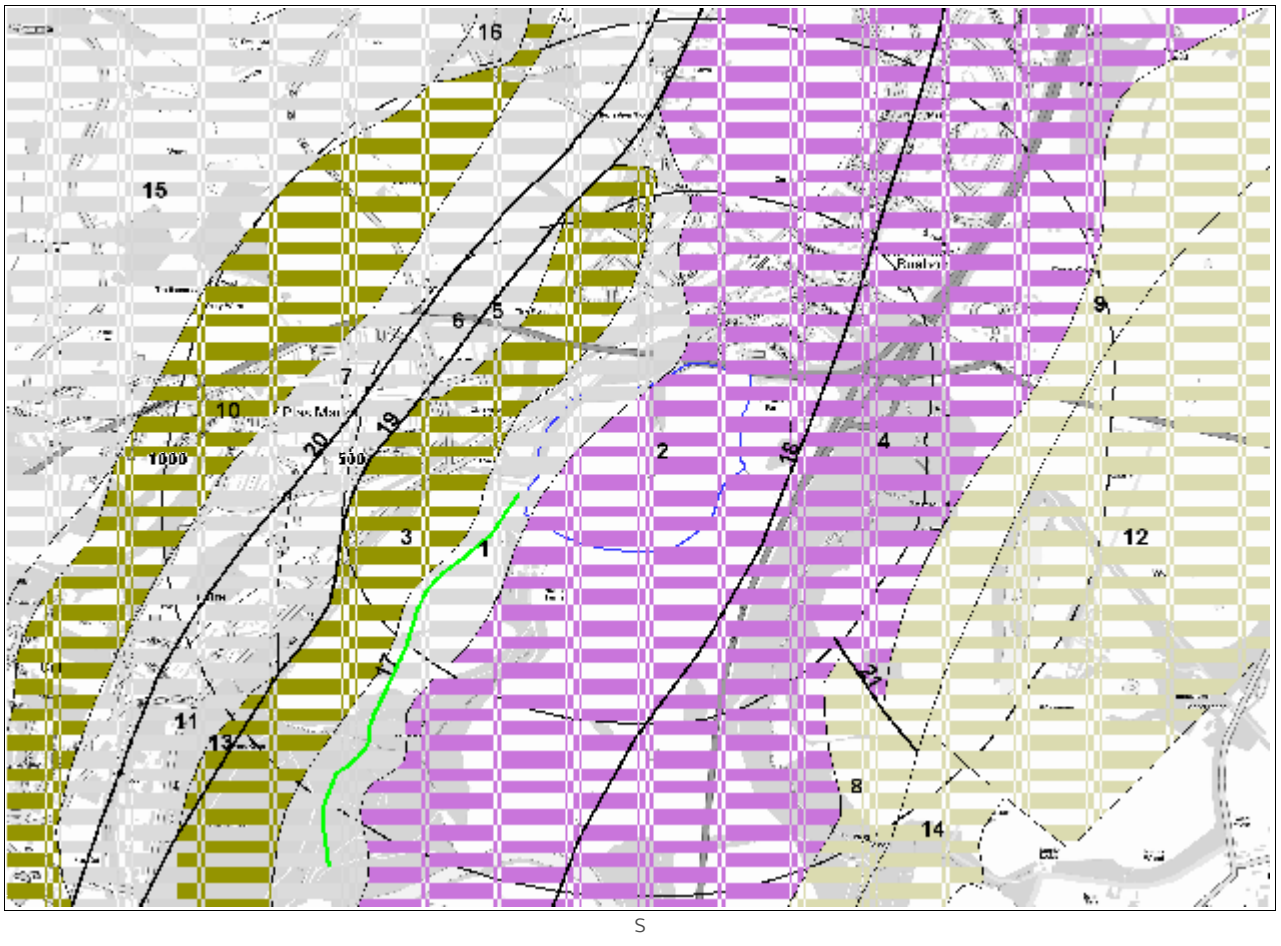
Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

---

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

1.3 Bedrock and Faults Map



Bedrock and Faults Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000
Search Buffers (m)

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	Description	Rock Age
1	0.0	On Site	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian / Langsettian
2	0.0	On Site	ETM-MDST	Etruria Formation - Mudstone	No Details
3	63.0	NW	CF-SDST	Cefn Rock - Sandstone	Bolsovian
4	119.0	E	ETM-MDST	Etruria Formation - Mudstone	No Details
5	251.0	NW	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian / Langsettian
6	334.0	NW	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian / Langsettian
7	471.0	NW	PLMC-MDSS	Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation (undifferentiated) - Mudstone, Siltston	Bolsovian / Langsettian

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	Low	Low
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Moderate	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
17	23.0	W	ROCK	Coal seam, inferred
18	119.0	E	FAULT	Fault, inferred, displacement unknown

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

ID	Distance (m)	Direction	Category Description	Feature Description
19	334.0	NW	FAULT	Fault, inferred, displacement unknown
20	471.0	NW	FAULT	Fault, inferred, displacement unknown
21	475.0	SE	FAULT	Fault, inferred, displacement unknown

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

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

1.4 Radon Data

1.4.1 Radon Affected Areas

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

---

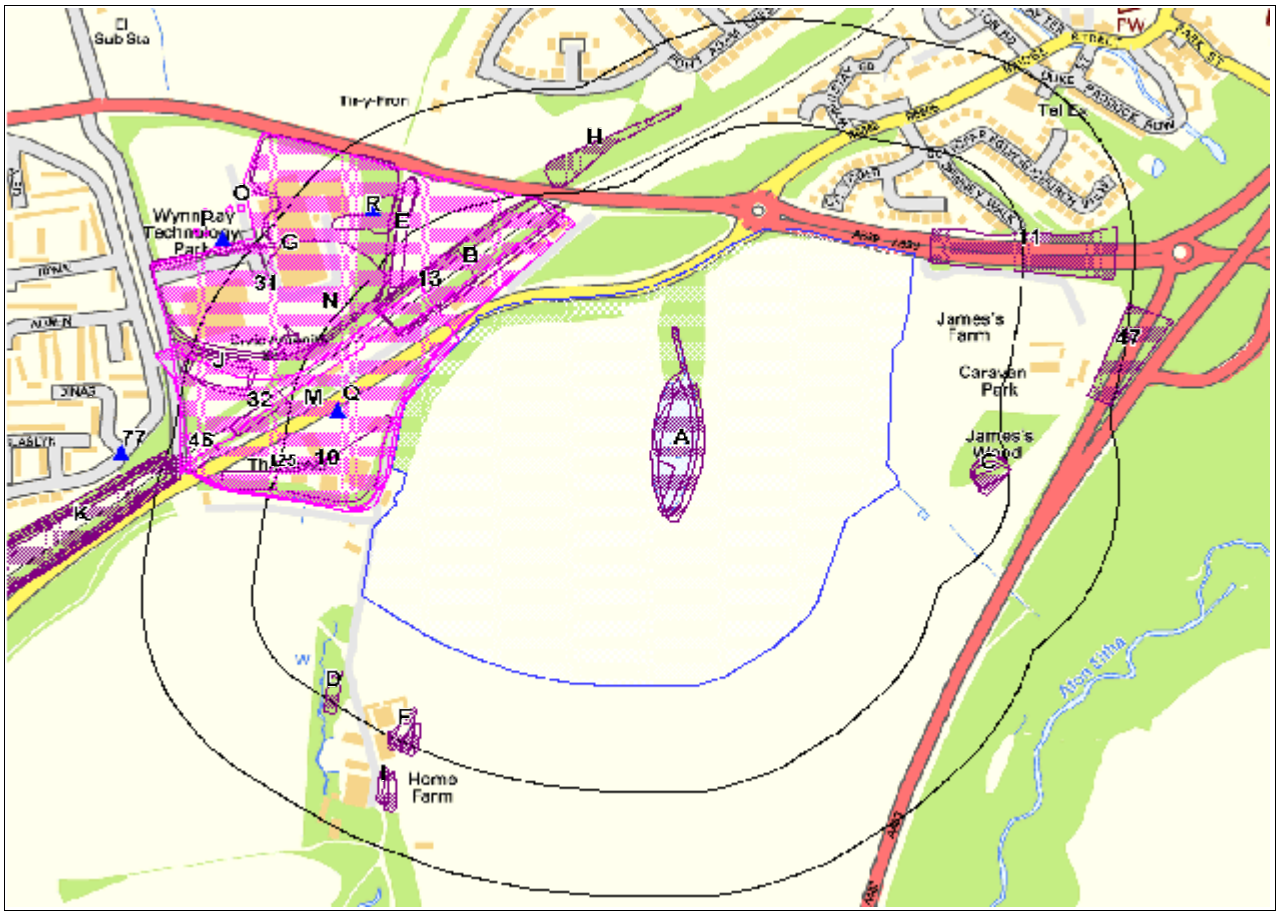
1.4.2 Radon Protection

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

---

2 Ground Workings Map

NW N NE



W E

SW S SE

Ground Workings Legend

Mapping sourced from Ordnance Survey

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Site Outline

125
250
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
1A	0.0	On Site	329771 343259	Pond	1949
2A	0.0	On Site	329771 343259	Pond	1898
3M	0.0	On Site	329346 343325	Colliery	1873
4A	0.0	On Site	329771 343259	Pond	1873
5A	0.0	On Site	329761 343266	Pond	1994
6A	0.0	On Site	329761 343266	Pond	1974
7A	0.0	On Site	329761 343266	Pond	1985
8A	0.0	On Site	329763 343296	Water Body	1960
9N	5.0	NW	329411 343417	Colliery	1949
10	10.0	W	329402 343253	Unspecified Heap	1960
11	18.0	E	330161 343500	Cuttings	1993
12B	31.0	NW	329530 343479	Cuttings	1873
13	36.0	NW	329484 343450	Cuttings	1898
14B	37.0	NW	329521 343483	Cuttings	1949
15B	41.0	NW	329530 343485	Cuttings	1960
16F	82.0	SW	329453 342930	Ponds	1960
17C	82.0	E	330120 343229	Gravel Pit	1949
18C	83.0	E	330120 343236	Gravel Pit	1949
19C	86.0	E	330123 343246	Unspecified Pit	1993
20C	86.0	E	330123 343246	Unspecified Pit	1968

ID	Distance (m)	Direction	NGR	Use	Date
21D	88.0	SW	329376 342972	Unspecified Pit	1985
22D	88.0	SW	329376 342972	Unspecified Pit	1994
23D	88.0	SW	329376 342972	Unspecified Pit	1974
24E	91.0	NW	329456 343520	Unspecified Heap	1949
25E	93.0	NW	329455 343523	Unspecified Heap	1960
26F	97.0	SW	329463 342917	Pond	1898
27F	97.0	SW	329463 342917	Pond	1873
28F	100.0	SW	329453 342919	Pond	1949
29G	101.0	NW	329310 343505	Unspecified Heap	1949
30G	104.0	NW	329310 343505	Refuse Heap	1960
31	106.0	NW	329304 343442	Unspecified Heap	1898
32	128.0	W	329292 343306	Cuttings	1873
33H	132.0	N	329674 343625	Unspecified Ground Workings	1985
34H	132.0	N	329674 343625	Unspecified Ground Workings	1994
35H	132.0	N	329674 343625	Unspecified Ground Workings	1974
36R	142.0	NW	329433 343544	Unspecified Old Quarry	1898
37I	160.0	SW	329432 342862	Pond	1974
38I	160.0	SW	329432 342862	Pond	1985
39I	160.0	SW	329432 342862	Pond	1960
40I	162.0	SW	329440 342854	Pond	1949
41I	162.0	SW	329440 342854	Pond	1898
42I	162.0	SW	329440 342854	Pond	1873
43J	173.0	W	329247 343354	Cuttings	1949
44J	177.0	W	329247 343357	Cuttings	1985
45J	177.0	W	329247 343357	Cuttings	1974
46	196.0	W	329229 343256	Cuttings	1873
47	220.0	E	330279 343376	Cuttings	1993
48K	226.0	W	329013 343113	Cuttings	1873

ID	Distance (m)	Direction	NGR	Use	Date
49L	230.0	W	329086 343169	Cuttings	1898
50K	233.0	W	329005 343110	Cuttings	1949
51L	234.0	W	329078 343165	Cuttings	1960
52L	242.0	W	328971 343093	Cuttings	1994
53L	242.0	W	328971 343093	Cuttings	1985
54L	242.0	W	328971 343093	Cuttings	1974

2.2 Historical Underground Working Features derived from Historical Mapping

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

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

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
55Q	0.0	On Site	329413 343360	Unspecified Disused Mine	1960
56M	0.0	On Site	329346 343325	Colliery	1873
57N	5.0	NW	329411 343417	Colliery	1949
58O	286.0	NW	329272 343552	Air Shaft	1898
59O	295.0	NW	329259 343550	Unspecified Old Shaft	1960
60P	298.0	NW	329232 343522	Unspecified Shaft	1873
61P	306.0	NW	329221 343523	Old Coal Shaft	1949
62P	315.0	NW	329230 343548	Unspecified Old Shaft	1960
Not shown	814.0	NW	328734 343701	Unspecified Disused Shaft	1974
Not shown	814.0	NW	328734 343701	Unspecified Disused Shaft	1994
Not shown	814.0	NW	328734 343701	Unspecified Disused Shaft	1985
Not shown	879.0	NW	328951 344080	Unspecified Old Shaft	1898
Not shown	880.0	NW	328953 344085	Unspecified Old Shaft	1960

ID	Distance (m)	Direction	NGR	Use	Date
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1994
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1985
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1974
Not shown	934.0	N	330314 344393	Unspecified Old Shaft	1949
Not shown	937.0	N	330316 344395	Unspecified Old Shaft	1898
Not shown	937.0	N	330316 344395	Unspecified Old Shaft	1949

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.

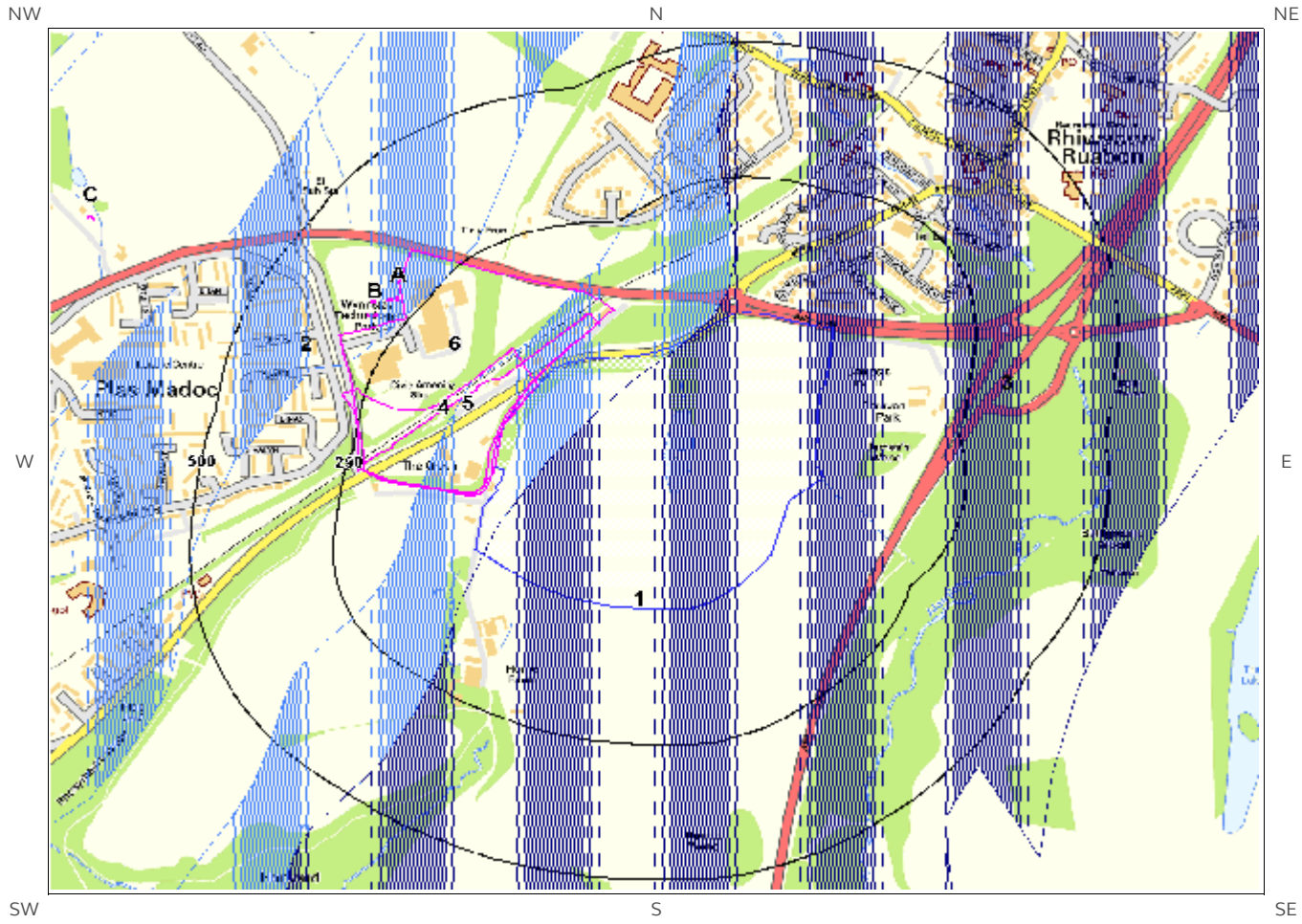
Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

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

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
74Q	73.0	W	329380 343310	Coal, Deep	Wynnstay Colliery, Nos 1 & 2 Shafts	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
75R	175.0	NW	329420 343550	Sandstone	Wynnstay	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
76P	283.0	NW	329250 343515	Coal, Deep	Wynnstay Colliery, No 3 Shaft	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
77	300.0	W	329135 343260	Sandstone	Plas Madoc Lodge	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	775.0	NW	328760 343655	Coal, Deep	Plas-yn-Wern Shaft	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	883.0	NW	328950 344080	Coal, Deep	Plas Madoc Colliery	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	927.0	N	330091 344434	Clay & Shale	Tatham Brick & Tile Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	930.0	W	328490 343230	Sandstone	Acrefair Quarries	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	936.0	N	330312 344392	Vein Minerals	New Hall	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
Not shown	999.0	W	328410 343115	Sandstone	Acrefair	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

3 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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Site Outline

250
500
Search Buffers (m)

Historical Mining

Non-Coal Mining Cavities

Natural Cavities

Non-Coal Mining

Highly likely

L kely

Unlikely

Highly unlikely

Rare

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? Yes

The following Historical Mining information is provided by Groundsure:

ID	Distance (m)	Direction	NGR	Details	Date
4	0.0	On Site	329346 343325	Colliery	1873
5	0.0	On Site	329413 343360	Unspecified Disused Mine	1960
6	5.0	NW	329411 343417	Colliery	1949
7A	286.0	NW	329272 343552	Air Shaft	1898
8A	295.0	NW	329259 343550	Unspecified Old Shaft	1960
9B	298.0	NW	329232 343522	Unspecified Shaft	1873
10B	306.0	NW	329221 343523	Old Coal Shaft	1949
11B	315.0	NW	329230 343548	Unspecified Old Shaft	1960
12C	814.0	NW	328734 343701	Unspecified Disused Shaft	1985
13C	814.0	NW	328734 343701	Unspecified Disused Shaft	1994
14C	814.0	NW	328734 343701	Unspecified Disused Shaft	1974
Not shown	879.0	NW	328951 344080	Unspecified Old Shaft	1898
Not shown	880.0	NW	328953 344085	Unspecified Old Shaft	1960
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1985
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1994
Not shown	888.0	NW	328951 344094	Unspecified Disused Shaft	1974
Not shown	934.0	N	330314 344393	Unspecified Old Shaft	1949
Not shown	937.0	N	330316 344395	Unspecified Old Shaft	1898
Not shown	937.0	N	330316 344395	Unspecified Old Shaft	1949

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 and no data 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	Vein Mineral	Occasional minor mining may have occurred but of restricted extent.
2	0.0	On Site	Not available	Iron Ore (Bedded)	Rare and localised small scale mining may have occurred.
3	0.0	On Site	Not available	Vein Mineral	Occasional minor mining may have occurred but of restricted 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 data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

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

Database searched and no data found.

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.

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

Database searched and no data found.

3.10 Clay Mining

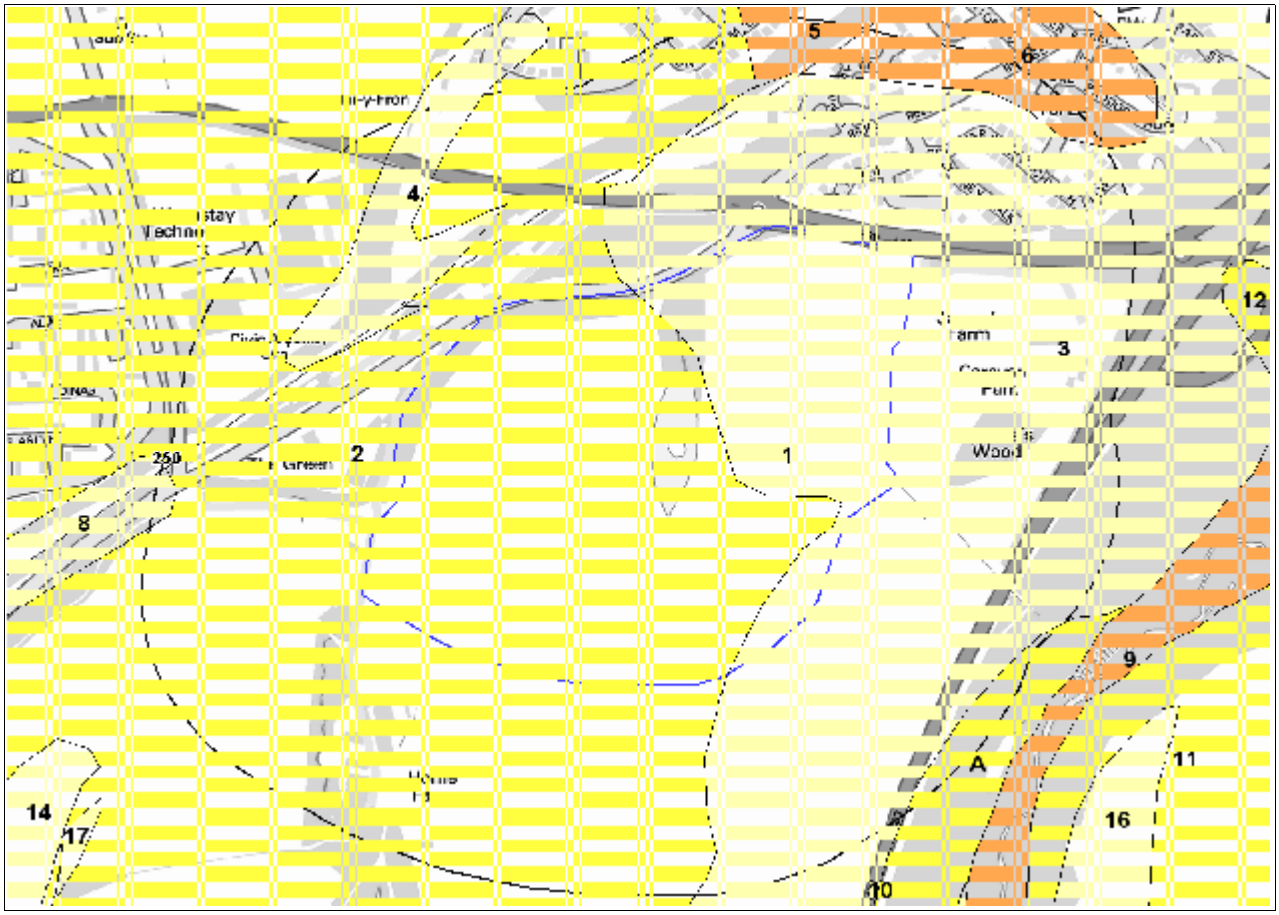
This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

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

Mapping sourced from Ordnance Survey®

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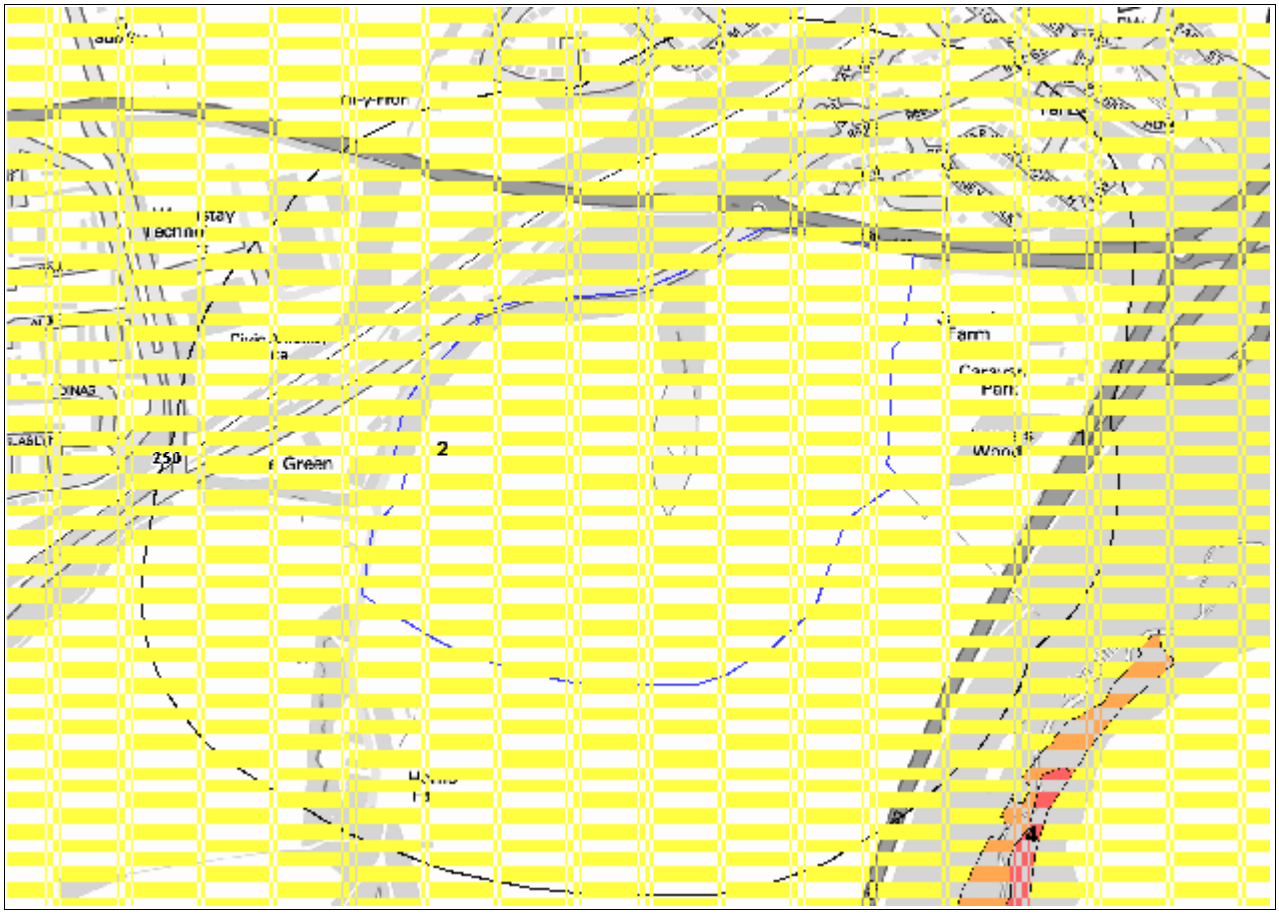
Site Outline

Search Buffers (m)
125
250

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.2 Landslides Map



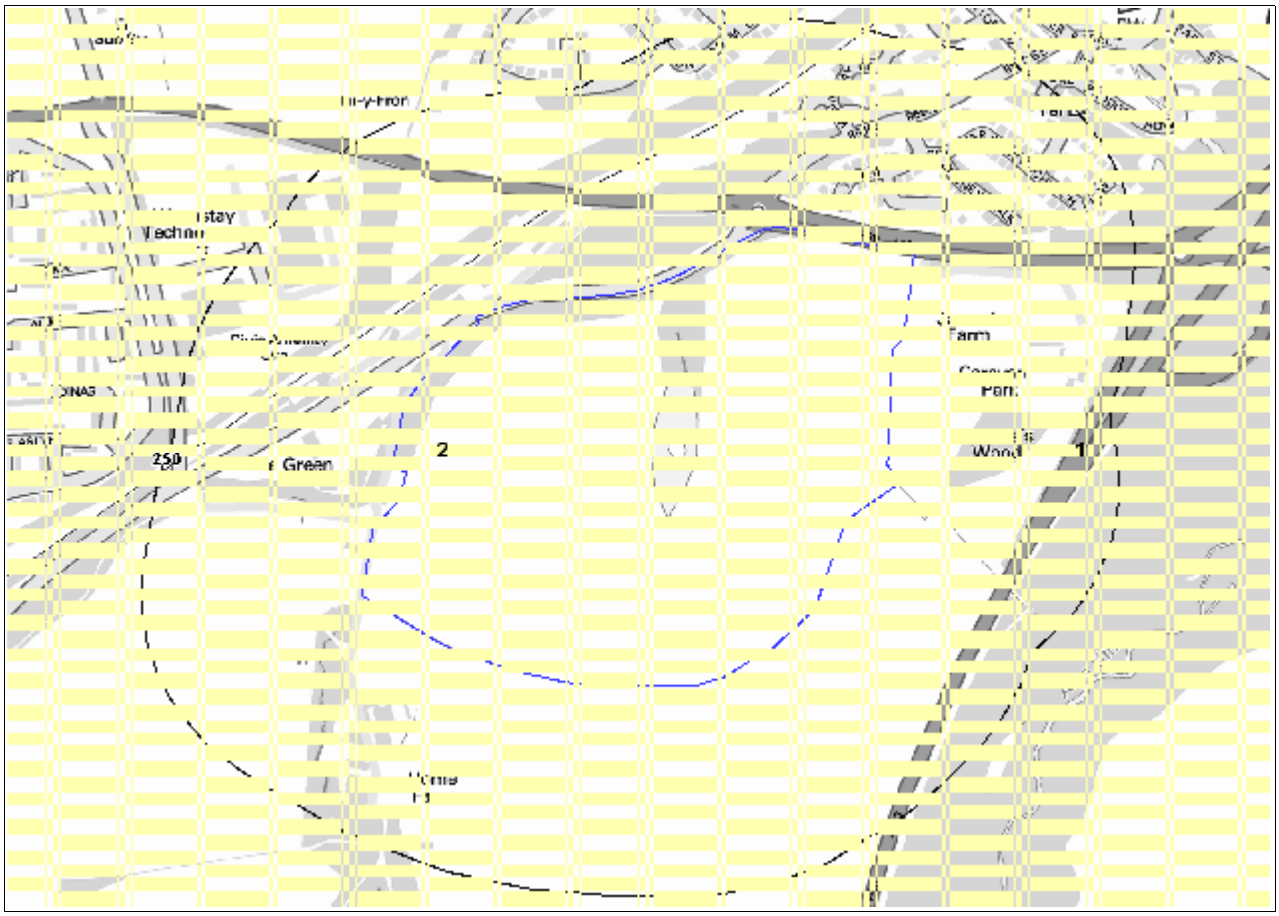
Landslides Legend

Mapping sourced from Ordnance Survey

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4.3 Ground Dissolution Soluble Rocks Map



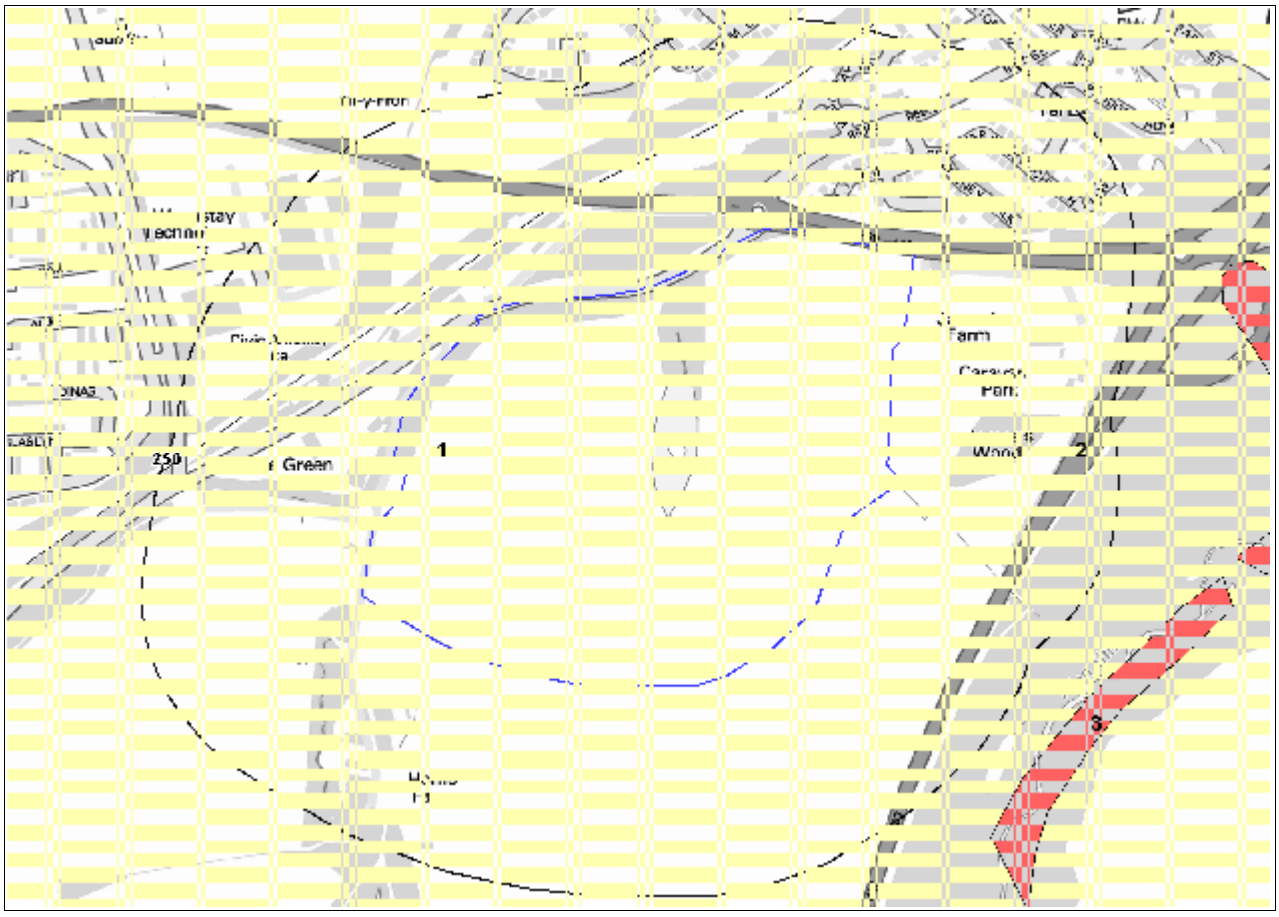
Ground Dissolution Soluble Rocks Legend

Mapping sourced from Ordnance Survey

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4.4 Compressible Deposits Map



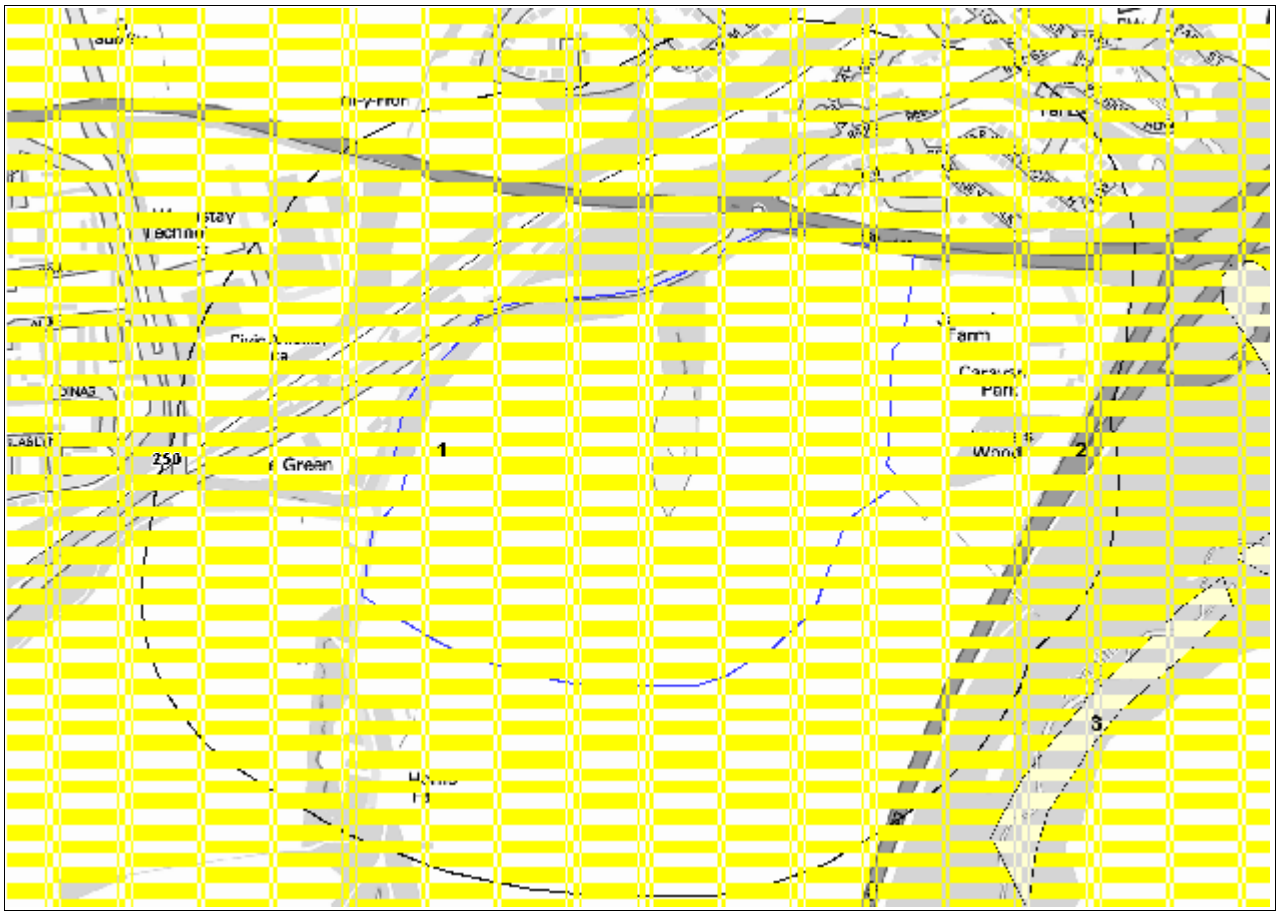
Compressible Deposits Legend

Mapping sourced from Ordnance Survey

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4.5 Collapsible Deposits Map



Collapsible Deposits Legend

Mapping sourced from Ordnance Survey

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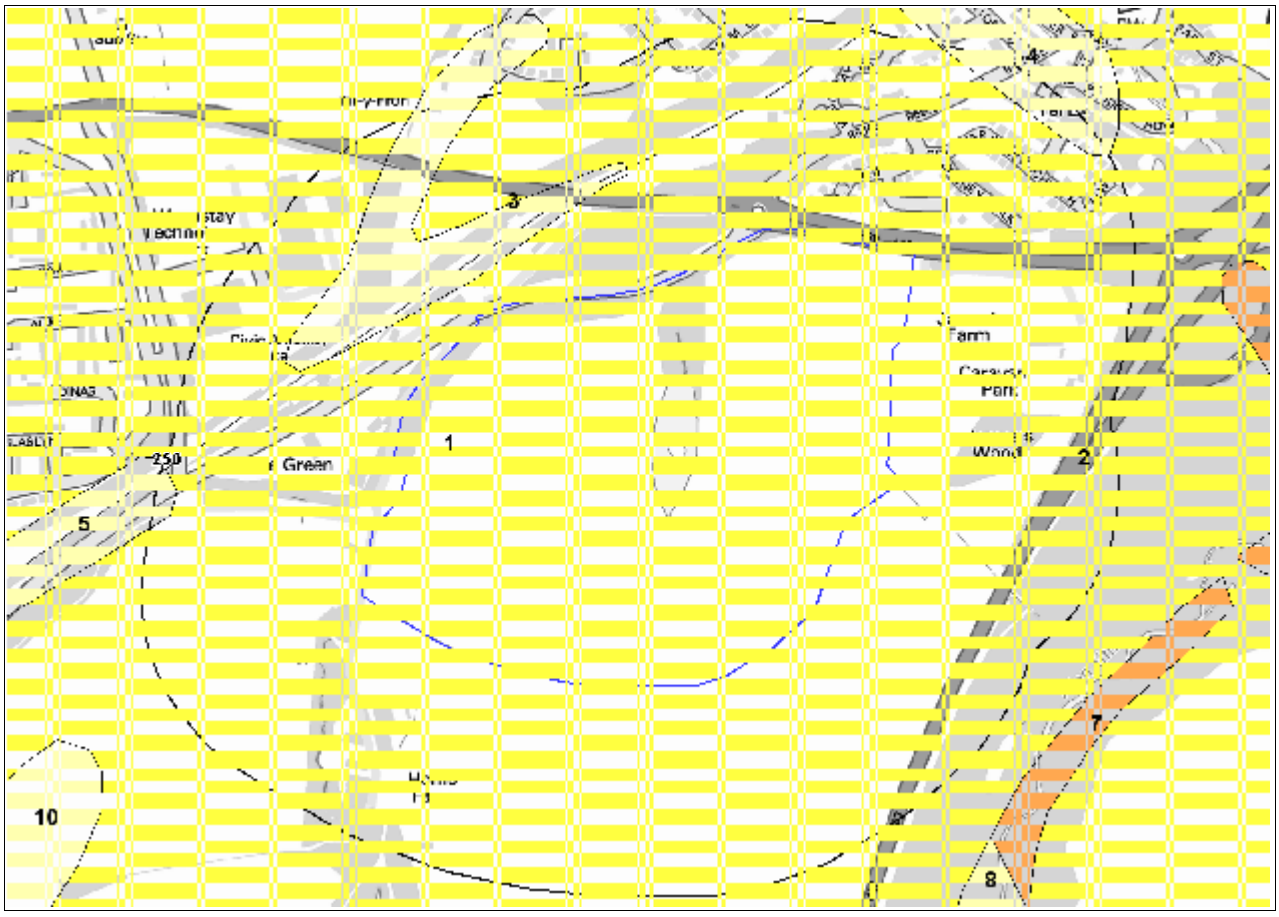
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

4.6 Running Sand Map



Running Sand Legend

Mapping sourced from Ordnance Survey

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Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

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? Very Low

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	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 due to potential problems with shrink-swell clays.
2	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.
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 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.
2	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

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

4.3 Ground Dissolution of Soluble Rocks

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
2	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

4.4 Compressible Deposits

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.
2	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.

4.5 Collapsible Deposits

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

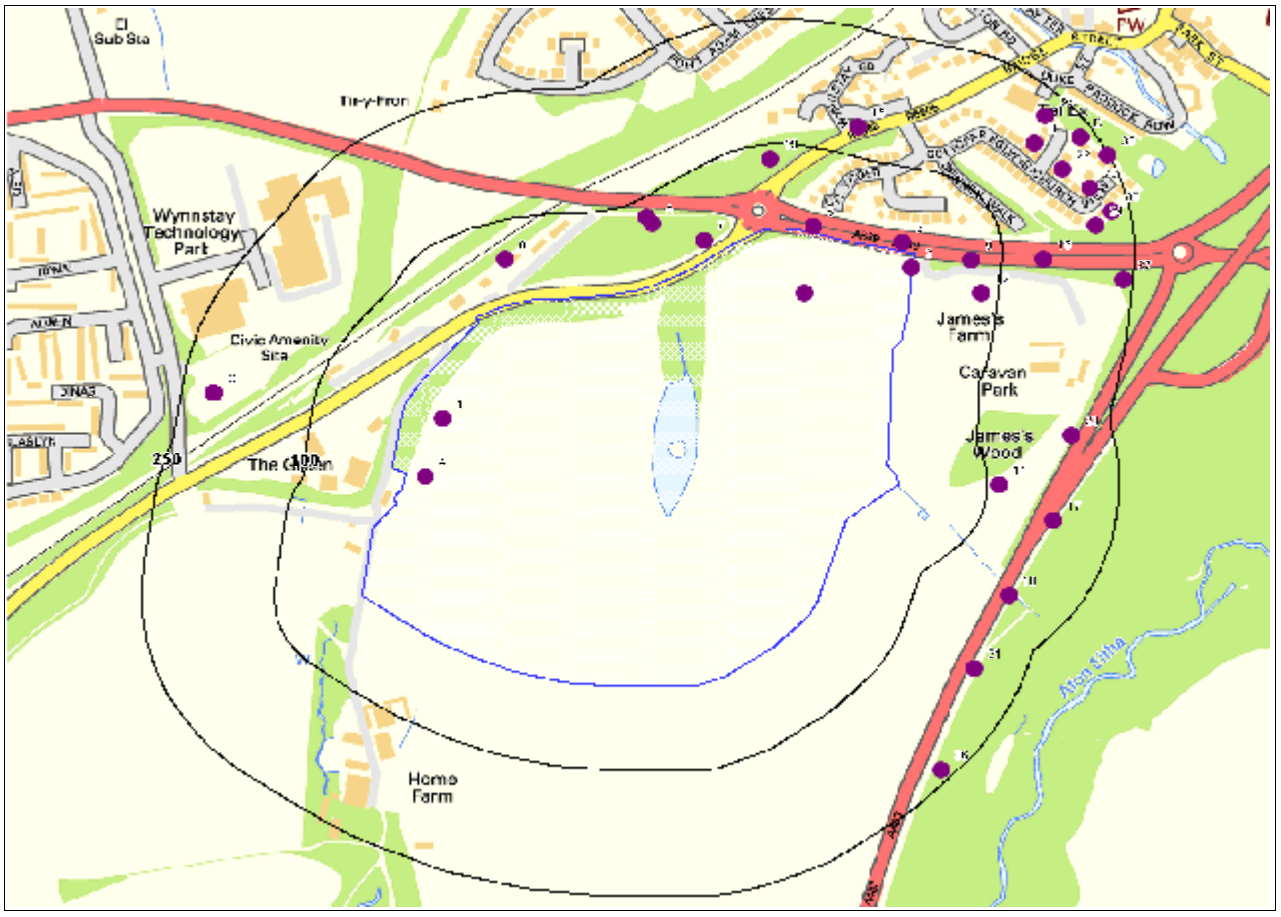
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

4.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	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.
3	41.0	NW	Negligible	No indicators for running sand identified. 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.

5 Borehole Records Map



Borehole Records Legend

Mapping sourced from Ordnance Survey

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Site Outline

Borehole Locations

125
250
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: 38

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	329500 343300	SJ24SE364	-1.0	WYNNSTAY COLLIERY
2	0.0	On Site	330030 343480	SJ34SW46	5.0	RUABON BY-PASS. 239
3	0.0	On Site	329910 343450	SJ24SE675	4.57	WREXHAM SEWERAGE 9
4	0.0	On Site	329480 343230	SJ24SE674	4.88	WREXHAM SEWERAGE 8
5	6.0	N	329920 343529	SJ24SE451	5.0	RUABON BYPASS 309
6	9.0	N	330020 343510	SJ34SW80	-1.0	RUABON NEWBRIDGE CHIRK BYPASSES TP 554
7	22.0	NW	329795 343513	SJ24SE431	11.0	RUABON BYPASS 17
8	54.0	N	329570 343490	SJ24SE420	4.0	RUABON BY-PASS. 237
9	66.0	E	330099 343489	SJ34SW66	7.0	RUABON BYPASS 308
10A	68.0	NW	329737 343533	SJ24SE453	6.0	RUABON BYPASS 311
11A	78.0	NW	329730 343540	SJ24SE421	8.0	RUABON BY-PASS. 238
12	81.0	E	330110 343450	SJ34SW114	6.4	WREXHAM SEWERAGE 10
13	82.0	N	329870 343610	SJ24SE419	6.0	RUABON BY-PASS. 236
14	113.0	E	330130 343220	SJ34SW14	10.6	JAMES'S FARM
15	134.0	N	329970 343648	SJ24SE452	4.0	RUABON BYPASS 310
16	146.0	E	330180 343490	SJ34SW42	20.0	RUABON BY-PASS. 18
17	179.0	E	330191 343178	SJ34SW69	4.0	RUABON BYPASS 314
18	183.0	SE	330141 343088	SJ34SW51	4.5	RUABON BYPASS 21
19B	189.0	NE	330170 343629	SJ34SW96	-1.0	PARKLANDS RUABON 1A
20B	189.0	NE	330170 343629	SJ34SW95	-1.0	PARKLANDS RUABON 1
21	194.0	SE	330102 343001	SJ34SW70	3.0	RUABON BYPASS 315
22	196.0	NE	330202 343598	SJ34SW98	-1.0	PARKLANDS RUABON 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
23	203.0	E	330212 343280	SJ34SW68	5.0	RUABON BYPASS 313
24	208.0	E	330240 343530	SJ34SW76	-1.0	RUABON NEWBRIDGE CHIRK BYPASSES 506
25	213.0	E	330233 343575	SJ34SW101	-1.0	PARKLANDS RUABON 5
26C	214.0	W	329240 343330	SJ24SE382	5.5	WYNNNSTAY BANKS DEPOT. 1
27C	214.0	W	329240 343330	SJ24SE383	5.0	WYNNNSTAY BANKS DEPOT. 2
28C	214.0	W	329240 343330	SJ24SE387	5.0	WYNNNSTAY BANKS DEPOT. 6
29C	214.0	W	329240 343330	SJ24SE386	5.0	WYNNNSTAY BANKS DEPOT. 5
30C	214.0	W	329240 343330	SJ24SE385	5.0	WYNNNSTAY BANKS DEPOT. 4
31C	214.0	W	329240 343330	SJ24SE384	5.0	WYNNNSTAY BANKS DEPOT. 3
32	221.0	NE	330183 343661	SJ34SW97	-1.0	PARKLANDS RUABON 2
33	228.0	E	330257 343547	SJ34SW103	-1.0	PARKLANDS RUABON 7
34D	233.0	NE	330222 343636	SJ34SW100	-1.0	PARKLANDS RUABON 4A
35D	233.0	NE	330222 343636	SJ34SW99	-1.0	PARKLANDS RUABON 4
36	237.0	SE	330064 342880	SJ34SW71	3.0	RUABON BYPASS 316
37	239.0	E	330271 343466	SJ34SW65	12.0	RUABON BYPASS 307
38	248.0	NE	330253 343614	SJ34SW102	-1.0	PARKLANDS RUABON 6

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

#1: scans.bgs.ac.uk/sobi_scans/boreholes/144048
#2: scans.bgs.ac.uk/sobi_scans/boreholes/153981
#3: scans.bgs.ac.uk/sobi_scans/boreholes/17087484
#4: scans.bgs.ac.uk/sobi_scans/boreholes/17087483
#5: scans.bgs.ac.uk/sobi_scans/boreholes/144135
#7: scans.bgs.ac.uk/sobi_scans/boreholes/144115
#8: scans.bgs.ac.uk/sobi_scans/boreholes/144104
#9: scans.bgs.ac.uk/sobi_scans/boreholes/154001
#10A: scans.bgs.ac.uk/sobi_scans/boreholes/144137
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#16: scans.bgs.ac.uk/sobi_scans/boreholes/153977
#17: scans.bgs.ac.uk/sobi_scans/boreholes/154004
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#23: scans.bgs.ac.uk/sobi_scans/boreholes/154003
#26C: scans.bgs.ac.uk/sobi_scans/boreholes/144066
#27C: scans.bgs.ac.uk/sobi_scans/boreholes/144067
#28C: scans.bgs.ac.uk/sobi_scans/boreholes/144071
#29C: scans.bgs.ac.uk/sobi_scans/boreholes/144070
#30C: scans.bgs.ac.uk/sobi_scans/boreholes/144069
#31C: scans.bgs.ac.uk/sobi_scans/boreholes/144068
#36: scans.bgs.ac.uk/sobi_scans/boreholes/154006
#37: scans.bgs.ac.uk/sobi_scans/boreholes/154000

6 Estimated Background Soil Chemistry

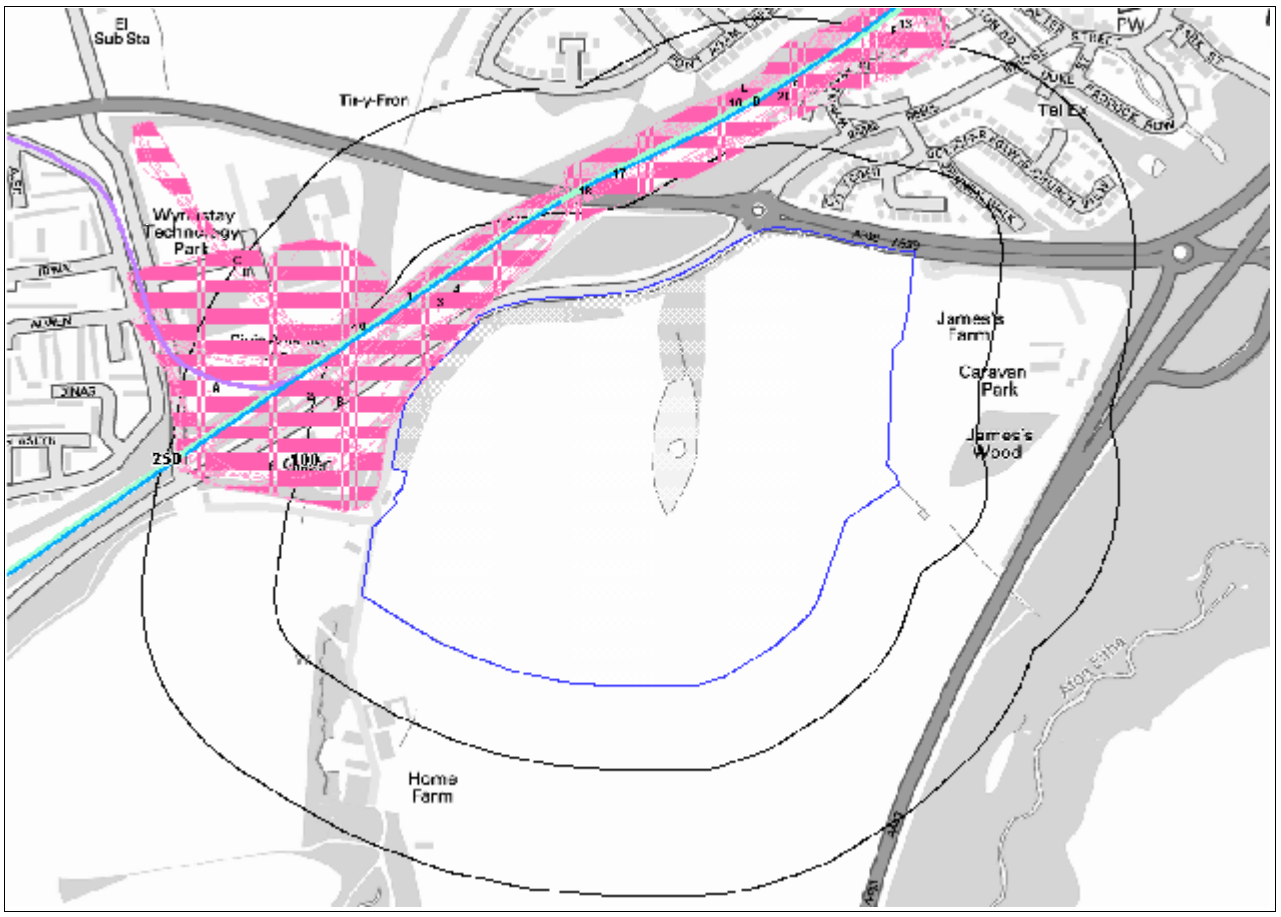
Records of background estimated soil chemistry within 250m of the study site boundary: 38

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

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	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
6.0	NW	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
28.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
41.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
46.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
52.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
62.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
63.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
63.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
77.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
87.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
88.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
89.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
107.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
108.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
108.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
117.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
119.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
159.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
162.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
190.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
191.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
205.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 mg/kg
212.0	NE	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	15 - 30 mg/kg	<100 mg/kg
213.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
215.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
225.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
227.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	100 - 200 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 Railways and Tunnels Map



Railways and Tunnels Legend

Mapping sourced from Ordnance Survey

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- Underground or Partially Underground Railway / Subway System
- Railway Track (OpenStreetMap)
- Site Outline
- Railway Tunnel (OS Mapping)
- High Speed 2
- 250 / 500 Search Buffers (m)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Crossrail 1
- Railway Track (OS Mapping)
- Railway and/or Tunnel Feature from Historical Mapping

7 Railways and Tunnels

7.1 Tunnels

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

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

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

Database searched and no data found.

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

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

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

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

Database searched and no data found.

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

7.2 Historical Railway and Tunnel Features

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

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

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

ID	Distance (m)	Direction	NGR	Details	Date
1	0	On Site	329683 343585	Railway Sidings	1898
2	0	On Site	329346 343325	Railway Sidings	1873
14A	3	NW	329276 343363	Railway Sidings	1899
3	4	NW	329598 343509	Railway Sidings	1938
4	5	NW	329399 343387	Railway Sidings	1949
5A	5	NW	329209 343363	Railway Sidings	1910

ID	Distance (m)	Direction	NGR	Details	Date
15B	7	NW	329410 343364	Railway Sidings	1912
16B	9	NW	329181 343392	Railway Sidings	1873
6	41	NW	329425 343402	Railway Sidings	1960
7C	44	W	329267 343480	Tramway Sidings	1938
17	50	NW	329597 343532	Railway Sidings	1961
18	53	NW	329287 343318	Railway Sidings	1967
8	57	W	329269 343480	Tramway Sidings	1910
19C	59	W	329268 343481	Tramway Sidings	1912
20	89	N	n/a	Railway	1873
21D	109	NW	329845 343679	Railway Sidings	1899
9	111	NW	329907 343696	Railway Sidings	1910
10	112	NW	329822 343688	Railway Sidings	1960
22D	112	NW	329889 343695	Railway Sidings	1912
23E	114	N	329882 343692	Railway Sidings	1873
11E	144	NW	329887 343710	Railway Sidings	1910
24	171	W	329189 343398	Railway Sidings	1912
12F	194	N	330006 343771	Railway Sidings	1873
13	212	N	330042 343784	Railway Sidings	1949
25F	243	N	330020 343769	Railway Sidings	1960

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

7.3 Historical Railways

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

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

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

Distance (m)	Direction	Status
123	W	Abandoned

Note: multiple sections of the same track may be listed in the detail above

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

7.4 Active Railways

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

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

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

Distance (m)	Direction	Name	Type
59	NW	Not given	Multi Track
61	NW	Shrewsbury to Chester Line	Rail
127	N	Not given	Multi Track
242	W	Not given	Multi Track

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

7.5 Railway Projects

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

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

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

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

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

Contact Details

Groundsure Helpline

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info@groundsure.com

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Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

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Leicestershire
LE12 6HX

The Coal Authority

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

Public Health England

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

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Website:**http://www.peterbrett.com/home**

Contact Details

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Standard Terms and Conditions

1 Definitions

In these terms and conditions unless the context otherwise requires:
"Beneficiary" means the person or entity for whose benefit the Client has obtained the Services.
"Client" means the party or parties entering into a Contract with Groundsure.
"Commercial" means any building or property which is not Residential.
"Confidential Information" means the contents of this Contract and all information received from the Client as a result of, or in connection with, this Contract other than

(i) information which the Client can prove was rightfully in its possession prior to disclosure by Groundsure and

(ii) any information which is in the public domain (other than by virtue of a breach of this Contract).

"Support Services" means Support Services provided by Groundsure including, without limitation, interpreting third party and in-house environmental data, providing environmental support advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.
"Contract" means the contract between Groundsure and the Client for the provision of the Services, and which shall incorporate these terms and conditions, the Order, and the relevant User Guide.
"Third Party Data Provider" means any third party providing Third Party Content to Groundsure.
"Data Reports" means reports comprising factual data with no accompanying interpretation.
"Fees" has the meaning set out in clause 5.1.
"Groundsure" means Groundsure Limited, a company registered in England and Wales under number 03421028.
"Groundsure Materials" means all materials prepared by Groundsure and provided as part of the Services, including but not limited to Third Party Content, Data Reports, Mapping, and Risk Screening Reports.
"Intellectual Property" means any patent, copyright, design rights, trade or service mark, moral rights, data protection rights, know-how or trade mark in each case whether registered or not and including applications for the same or any other rights of a similar nature anywhere in the world.
"Mapping" means a map, map data or a combination of historical maps of various ages, time periods and scales.
"Order" means an electronic, written or other order form submitted by the Client requesting Services from Groundsure in respect of a specified Site.
"Ordnance Survey" means the Secretary of State for Business, Innovation and Skills, acting through Ordnance Survey, Adanac Drive, Southampton, SO16 0AS, UK.
"Order Website" means the online platform through which Orders may be placed by the Client and accepted by Groundsure.
"Report" means a Risk Screening Report or Data Report for Commercial or Residential property.
"Residential" means any building or property used as or intended to be used as a single dwelling.
"Risk Screening Report" means a risk screening report comprising factual data with an accompanying interpretation by Groundsure.
"Services" means any Report, Mapping and/or Support Services which Groundsure has agreed to provide by accepting an Order pursuant to clause 2.6.
"Site" means the area of land in respect of which the Client has requested Groundsure to provide the Services.
"Third Party Content" means data, database information or other information which is provided to Groundsure by a Third Party Data Provider.
"User Guide" means the user guide, as amended from time to time, available upon request from Groundsure and on the website (www.Groundsure.com) and forming part of this Contract.

2 Scope of Services, terms and conditions, requests for insurance and quotations

2.1 Groundsure agrees to provide the Services in accordance with the Contract.
2.2 Groundsure shall exercise reasonable skill and care in the provision of the Services.
2.3 Subject to clause 7.3 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 writing in the Contract and all such statements and representations are hereby excluded to the fullest extent permitted by law.
2.4 The Client acknowledges that terms and conditions appearing on a Client's order form, printed stationery or other communication, or any terms or conditions implied by custom, practice or course of dealing shall be of no effect, and that this Contract shall prevail over all others in relation to the Order.
2.5 If the Client or Beneficiary requests insurance in conjunction with or as a result of the Services, Groundsure shall use reasonable endeavours to recommend such insurance, but makes no warranty that such insurance shall be available from insurers or that it will be offered on reasonable terms. Any insurance purchased by the Client or Beneficiary shall be subject solely to the terms of the policy issued by insurers and Groundsure will have no liability therefor. In addition you acknowledge and agree that Groundsure does not act as an agent or broker for any insurance providers. The Client should take (and ensure that the Beneficiary takes) independent advice to ensure that the insurance policy requested or offered is suitable for its requirements.
2.6 Groundsure's quotations or proposals are valid for a period of 30 days only unless an alternative period of time is explicitly stipulated by Groundsure. Groundsure reserves the right to withdraw any quotation or proposal at any time before an Order is accepted by Groundsure. Groundsure's acceptance of an Order shall be binding only when made in writing and signed by Groundsure's authorised representative or when accepted through the Order Website.

3 The Client's obligations

3.1The Client shall comply with the terms of this Contract and

(i) procure that the Beneficiary or any third party relying on the Services complies with and acts as if it is bound by the Contract and

(ii) be liable to Groundsure for the acts and omissions of the Beneficiary or any third party relying on the Services as if such acts and omissions were those of the Client.

3.2 The Client shall be solely responsible for ensuring that the Services are appropriate and suitable for its and/or the Beneficiary's needs.
3.3 The Client shall supply to Groundsure as soon as practicable and without charge all requisite information (and the Client warrants that such information is accurate, complete and appropriate), including without limitation any environmental information relating to the Site and shall give such assistance as Groundsure shall reasonably require in the provision of the Services including, without limitation, access to the Site, facilities and equipment.
3.4 Where the Client's approval or decision is required to enable Groundsure to carry out work in order to provide the Services, such approval or decision shall be given or procured in reasonable time and so as not to delay or disrupt the performance of the Services.
3.5 Save as expressly permitted by this Contract the Client shall not, and shall procure that the Beneficiary shall not, re-sell, alter, add to, or amend the Groundsure Materials, or use the Groundsure Materials in a manner for which they were not intended. The Client may make the Groundsure Materials available to a third party who is considering acquiring some or all of, or providing funding in relation to, the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.
3.6 The Client is responsible for maintaining the confidentiality of its user name and password if using the Order Website and the Client acknowledges that Groundsure accepts no liability of any kind for any loss or damage suffered by the Client as a consequence of using the Order Website.

4 Reliance

4.1The Client acknowledges that the Services provided by Groundsure consist of the presentation and analysis of Third Party Content and other content and that information obtained from a Third Party Data Provider cannot be guaranteed or warranted by Groundsure to be reliable.
4.2 In respect of Data Reports, Mapping and Risk Screening Reports, the following classes of person and no other are entitled to rely on their contents;

(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, and

(v) the professional advisers and lenders of the first purchaser or tenant of the Site.

4.3 In respect of Support Services, only the Client, Beneficiary and parties expressly named in a Report and no other parties are entitled to rely on its contents.
4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise expressly agreed in writing, no other person or entity of any kind is entitled to rely on any Services or Report issued or provided by Groundsure. Any party considering such Reports and Services does so at their own risk.

5 Fees and Disbursements

5.1Groundsure shall charge and the Client shall pay fees at the rate and frequency specified in the written proposal, Order Website or Order acknowledgement form, plus (in the case of Support Services) all proper disbursements incurred by Groundsure. 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 (together "Fees").
5.2 The Client shall pay all outstanding Fees to Groundsure in full without deduction, counterclaim or set off within 30 days of the date of Groundsure's invoice or such other period as may be agreed in writing between Groundsure and the Client ("Payment Date"). Interest on late payments will accrue on a daily basis from the Payment Date until the date of payment (whether before or after judgment) at the rate of 8% per annum.
5.3 The Client shall be deemed to have agreed the amount of any invoice unless an objection is made in writing within 28 days of the date of the invoice. As soon as reasonably practicable after being notified of an objection, without prejudice to clause 5.2 a member of Groundsure's management team will contact the Client and the parties shall then use all reasonable endeavours to resolve the dispute within 15 days.

6 Intellectual Property and Confidentiality

6.1 Subject to

(i) full payment of all relevant Fees and

(ii) compliance with this Contract, the Client is granted (and is permitted to sub-licence to the Beneficiary) a royalty-free, worldwide, non-assignable and (save to the extent set out in this Contract) non-transferable licence to make use of the Groundsure Materials.

6.2 All Intellectual Property in the Groundsure Materials are and shall remain owned by Groundsure or Groundsure's licensors (including without limitation the Third Party Data Providers) the Client acknowledges, and shall procure

acknowledgement by the Beneficiary of, such ownership. Nothing in this Contract purports to transfer or assign any rights to the Client or the Beneficiary in respect of such Intellectual Property.
6.3 Third Party Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.
6.4 The Client shall, and shall procure that any recipients of the Groundsure Materials shall:

(i) not remove, suppress or modify any trade mark, 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 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;

(v) not reformat or otherwise change (whether by modification, addition or enhancement), the Services (save that those acting for the Beneficiary in a professional capacity shall not be in breach of this clause 6.4(v) where such reformatting is in the normal course of providing advice based upon the Services);

(vi) where a Report and/or Mapping contains material belonging to Ordnance Survey, acknowledge and agree that such content is protected by Crown Copyright and shall not use such content for any purpose outside of receiving the Services; and

(vii) not copy in whole or in part by any means any map prints or run-on copies containing content belonging to Ordnance Survey (other than that contained within Ordnance Survey's OS Street Map) without first being in possession of a valid Paper Map Copying Licence from Ordnance Survey,

6.5 Notwithstanding clause 6.4, the Client may make reasonable use of the Groundsure Materials in order to advise the Beneficiary in a professional capacity. However, Groundsure shall have no liability in respect of any advice, opinion or report given or provided to Beneficiaries by the Client.
6.6 The Client shall procure that any person 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.

7.Liability: Particular Attention Should Be Paid To This Clause

7.1 This Clause 7 sets out the entire liability of Groundsure, including any liability for the acts or omissions of its employees, agents, consultants, subcontractors and Third Party Content, in respect of:

(i) any breach of contract, including any deliberate breach of the Contract by Groundsure or its employees, agents or subcontractors;

(ii) any use made of the Reports, Services, Materials or any part of them; and

(iii) any representation, statement or tortious act or omission (including negligence) arising under or in connection with the Contract.

7.2 All warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
7.3 Nothing in the Contract limits or excludes the liability of the Supplier for death or personal injury resulting from negligence, or for any damage or liability incurred by the Client or Beneficiary as a result of fraud or fraudulent misrepresentation.
7.4 Groundsure shall not be liable for

(i) loss of profits;
(ii) loss of business;
(iii) depletion of goodwill and/or similar losses;
(iv) loss of anticipated savings;
(v) loss of goods;
(vi) loss of contract;
(vii) loss of use;
(viii) loss or corruption of data or information;
(ix) business interruption;
(x) any kind of special, indirect, consequential or pure economic loss, costs, damages, charges or expenses;
(xi) loss or damage that arise as a result of the use of all or part of the Groundsure Materials in breach of the Contract;
(xii) loss or damage arising as a result of any error, omission or inaccuracy in any part of the Groundsure Materials where such error, omission or inaccuracy is caused by any Third Party Content or any reasonable interpretation of Third Party Content;
(xiii) loss or damage to a computer, software, modem, telephone or other property; and
(xiv) loss or damage caused by a delay or loss of use of Groundsure's internet ordering service.

7.5 Groundsure's total liability in relation to or under the Contract shall be limited to £10 million for any claim or claims.
7.6 Groundsure shall procure that the Beneficiary shall be bound by limitations and exclusions of liability in favour of Groundsure which accord with those detailed in clauses 7.4 and 7.5 (subject to clause 7.3) in respect of all claims which the Beneficiary may bring against Groundsure in relation to the Services or other matters arising pursuant to the Contract.

8 Groundsure's right to suspend or terminate

8.1 If Groundsure reasonably believes that the Client or Beneficiary has not provided the information or assistance required to enable the proper provision of the Services, Groundsure shall be entitled to suspend all further performance of the Services until such time as any such deficiency has been made good.
8.2 Groundsure shall be entitled to terminate the Contract immediately on written notice in the event that:

(i) the Client fails to pay any sum due to Groundsure within 30 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 term of the Contract (including, but not limited to, the obligations in clause 4) which is incapable of remedy or if remediable, is not remedied within five days of notice of the breach.

9. Client's Right to Terminate and Suspend

9.1 Subject to clause 10.1, the Client may at any time upon written notice terminate or suspend the provision of all or any of the Services.
9.2 In any event, where the Client is a consumer (and not a business) he/she hereby expressly acknowledges and agrees that:

(i) the supply of Services under this Contract (and therefore the performance of this Contract) commences immediately upon Groundsure's acceptance of the Order; and

(ii) the Reports and/or Mapping provided under this Contract are

(a) supplied to the Client's specification(s) and in any event
(b) by their nature cannot be returned.

10 Consequences of Withdrawal, Termination or Suspension

10.1 Upon termination of the Contract:

(i) 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 and/or Beneficiary any property of the Client and/or Beneficiary in Groundsure's possession or control; and

(ii) 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 or suspension. In respect of any Support Services provided, the Client shall also pay Groundsure any additional costs incurred in relation to the termination or suspension of the Contract.

11 Anti-Bribery

11.1 The Client warrants that it shall:

(i) comply with all applicable laws, statutes and regulations relating to anti-bribery and anti-corruption including but not limited to the Bribery Act 2010;

(ii) comply with such of Groundsure's anti-bribery and anti-corruption policies as are notified to the Client from time to time; and

(iii) promptly report to Groundsure any request or demand for any undue financial or other advantage of any kind received by or on behalf of the Client in connection with the performance of this Contract.

11.2 Breach of this Clause 11 shall be deemed a material breach of this Contract.

12 General

12.1 The Mapping contained in the Services is protected by Crown copyright and must not be used for any purpose other than as part of the Services or as specifically provided in the Contract.
12.2 The Client shall be permitted to make one copy only of each Report or Mapping Order. Thereafter the Client shall be entitled to make unlimited copies of the Report or Mapping Order only in accordance with an Ordnance Survey paper map copy license available through Groundsure.
12.3 Groundsure reserves the right to amend or vary this Contract. No amendment or variation to this Contract shall be valid unless signed by an authorised representative of Groundsure.
12.4 No failure on the part of Groundsure to exercise, and no delay in exercising, any right, power or provision under this Contract shall operate as a waiver thereof.
12.5 Save as expressly provided in this Contract, 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.
12.6 The Secretary of State for Business, Innovation and Skills ("BIS") or BIS' successor body, as the case may be, acting through Ordnance Survey may enforce a breach of clause 6.4(vi) and clause 6.4(vii) of these terms and conditions against the Client in accordance with the provisions of the Contracts (Rights of Third Parties) Act 1999.
12.7 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 Third Party Data Providers;
(viii) changes in law; or
(ix) any other reason beyond Groundsure's reasonable control.

In the event that Groundsure is prevented from performing the Services (or any part thereof) in accordance with this clause 12.6 for a period of not less than 30 days then Groundsure shall be entitled to terminate this Contract immediately on written notice to the Client.

12.8 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.

12.9 Such notice shall be deemed to have been received on the day of delivery if delivered by hand, facsimile or email (save to the extent such day is not a working day where it shall be deemed to have been delivered on the next working day) and on the second working day after the day of posting if sent by first class post.

12.10 The Contract constitutes the entire agreement between the parties and shall supersede all previous arrangements between the parties relating to the subject matter hereof.

12.11 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.

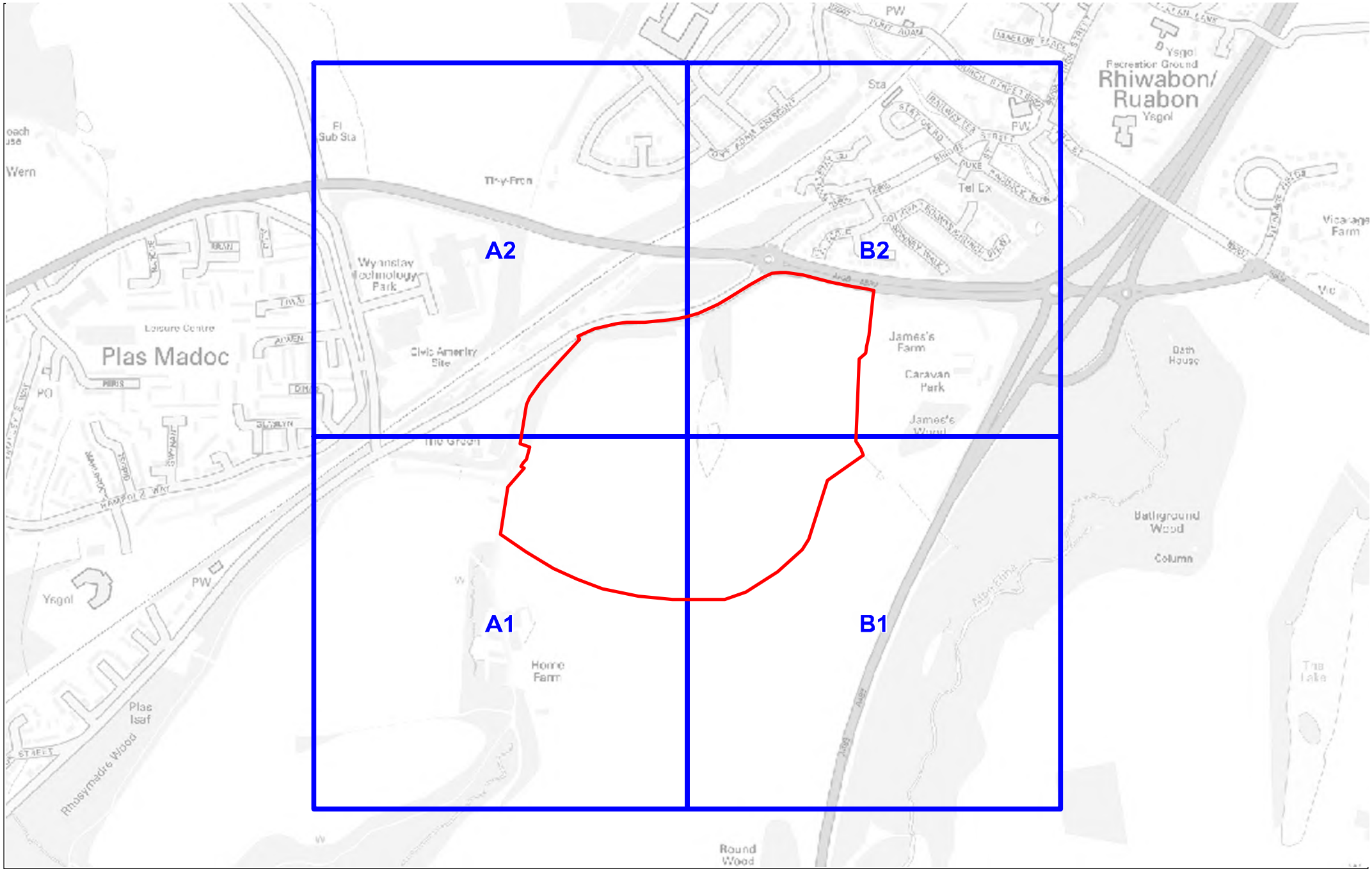
12.12 This Contract shall be governed by and construed in accordance with English law and any proceedings arising out of or connected with this Contract shall be subject to the exclusive jurisdiction of the English courts.

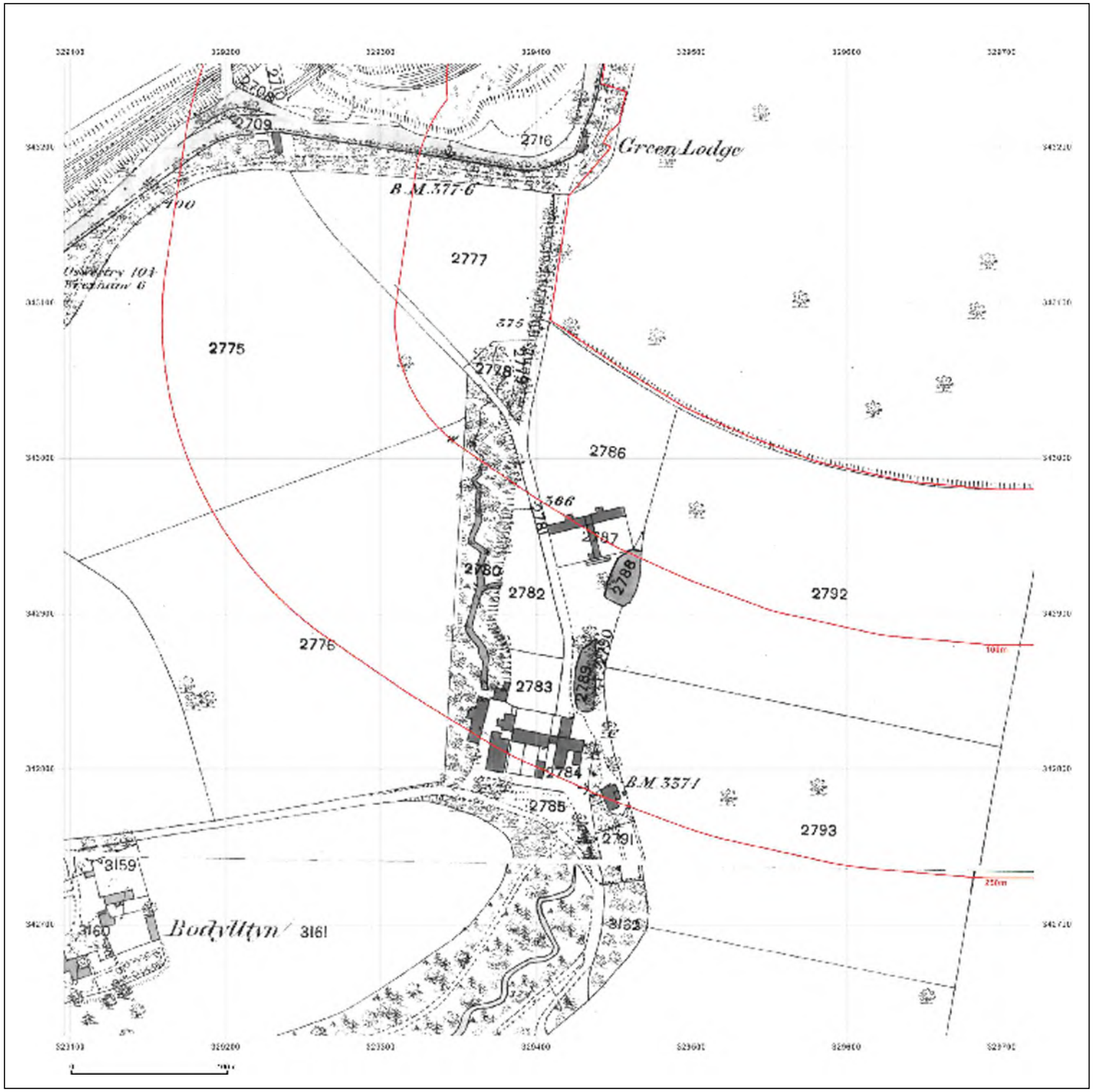
12.13 Groundsure is an executive member of the Council of Property Search Organisation (CoPSO) and has signed up to the Search Code administered by the Property Codes Compliance Board (PCCB). All Risk Screening Reports shall be supplied in accordance with the provisions of the Search Code.

12.14 If the Client or Beneficiary has a complaint about the Services, written notice should be given to the Compliance Officer at Groundsure who will respond in a timely manner.

12.15 The Client agrees that it shall, and shall procure that each Beneficiary shall, treat in confidence all Confidential Information and shall not, and shall procure that each Beneficiary shall not (i) disclose any Confidential Information to any third party other than in accordance with the terms of this Contract; and (ii) use Confidential Information for a purpose other than the exercise of its rights and obligations under this Contract. Subject to clause 6.6, nothing shall prevent the Client or any Beneficiary from disclosing Confidential Information to the extent
required by law

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A2
B2
A1
B1
Plas Madoc
Leisure Centre
Wyn Valley Technology Park
Civic Amenity Site
James's Farm
Caravan Park
Rhiwabon/ Ruabon
Recreation Ground
Ysgol
Horne Farm
Round Wood
Battleground Wood
Column
Bath House
Vicarage Farm
Plas Isaf
Rhosymadoc Wood
Tel Ex
Sta
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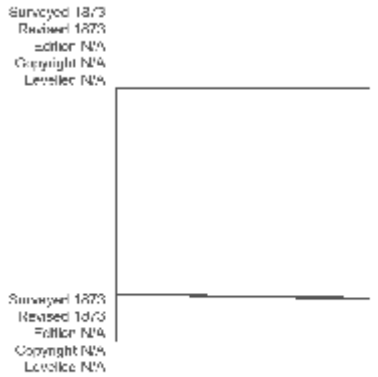
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Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A1
Grid Ref: 329408, 342941

Map Name: County Series
Map date: 1873
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Printed at: 1:2,500

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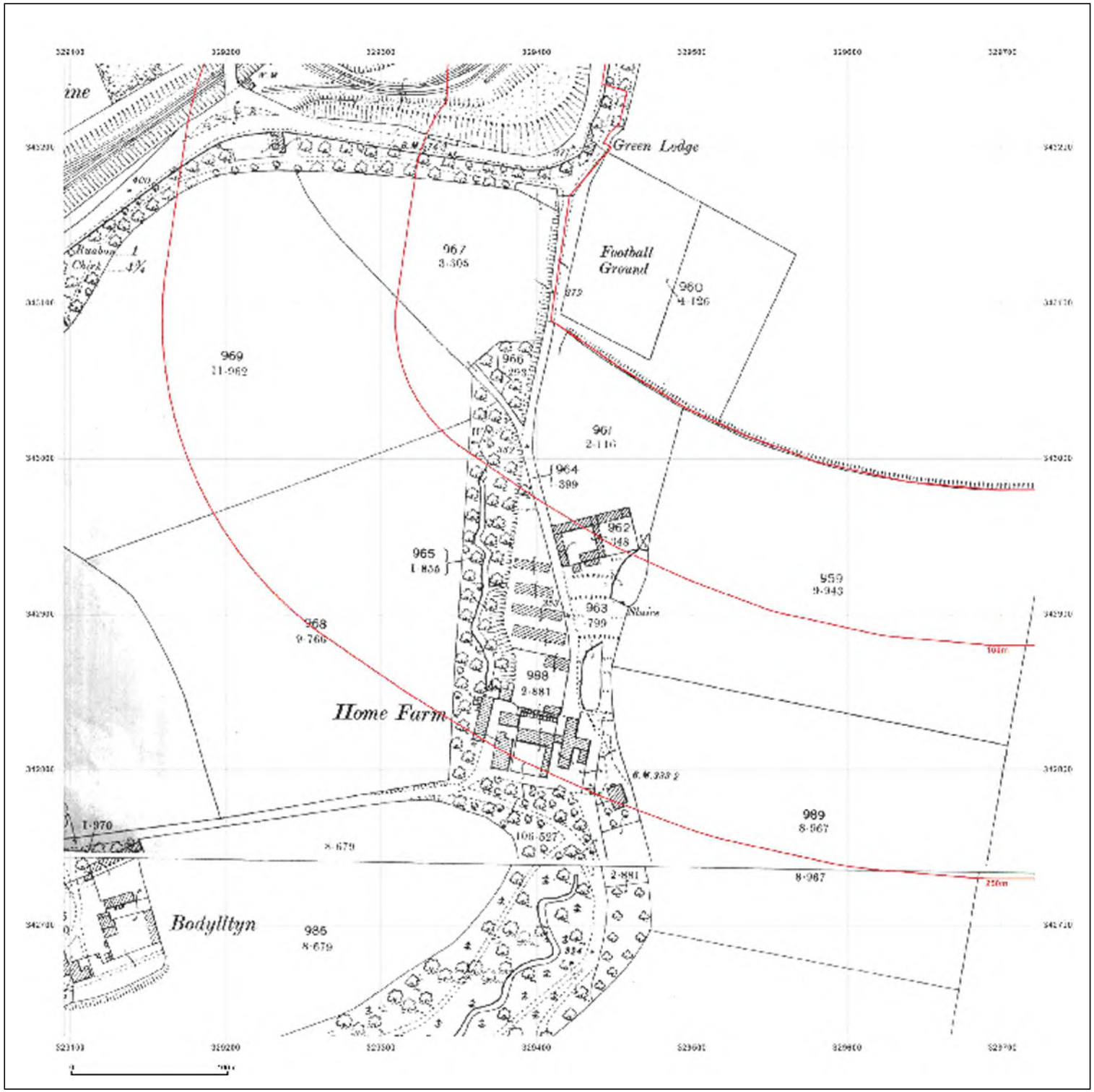
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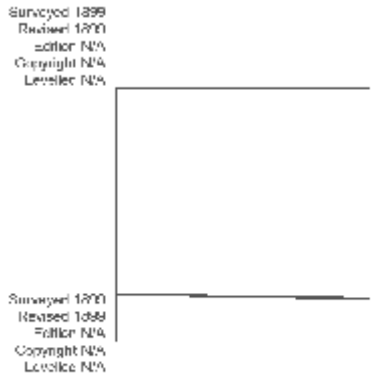
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Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A1
Grid Ref: 329408, 342941

Map Name: County Series
Map date: 1899
Scale: 1:2,500
Printed at: 1:2,500

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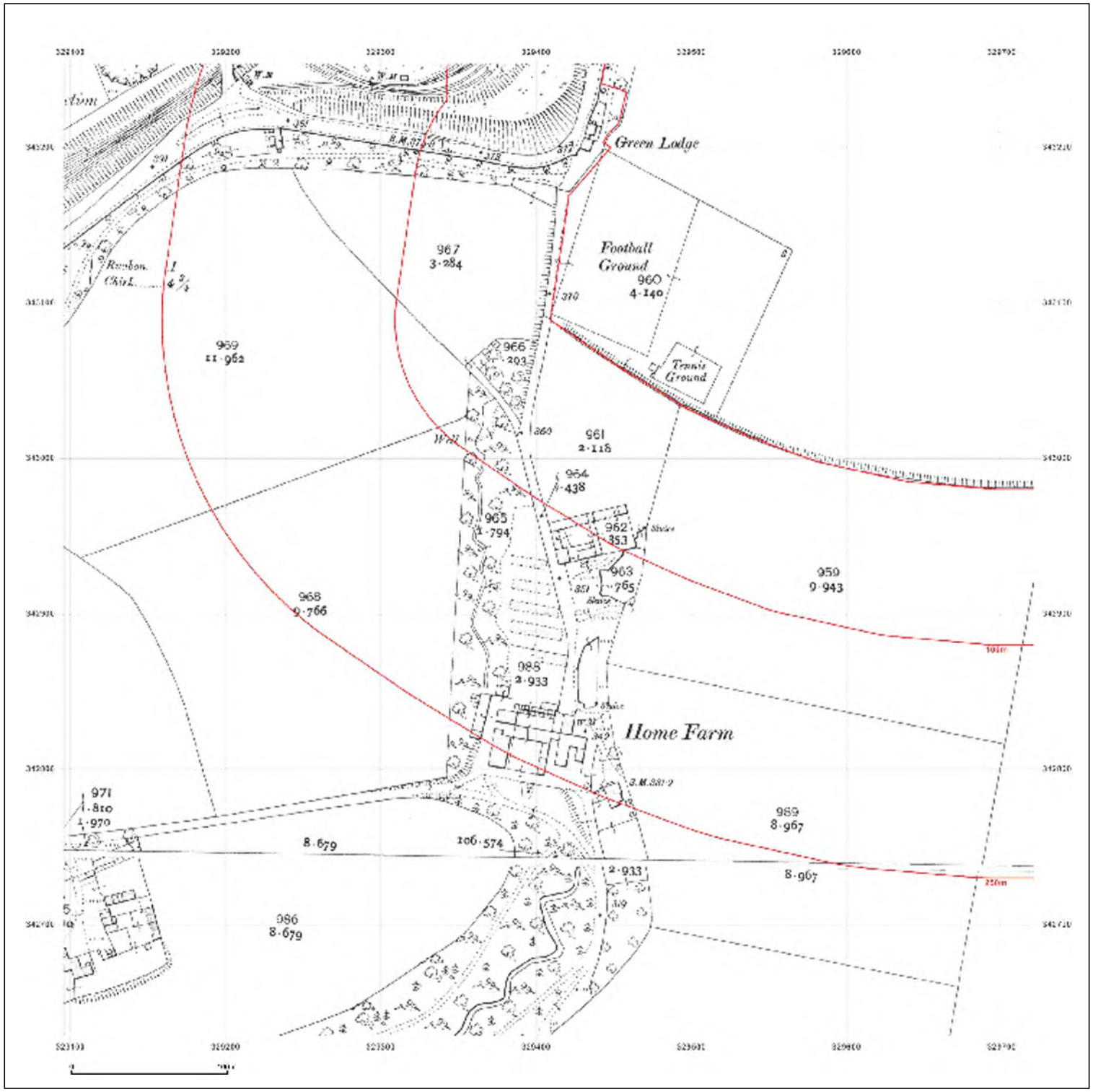
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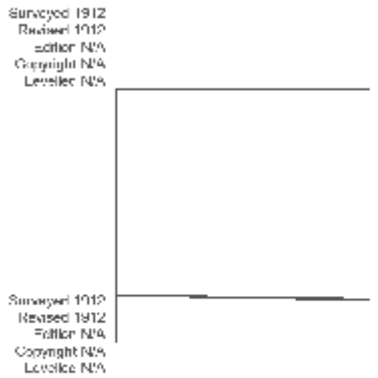
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LL14 6DW

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Map Name: County Series
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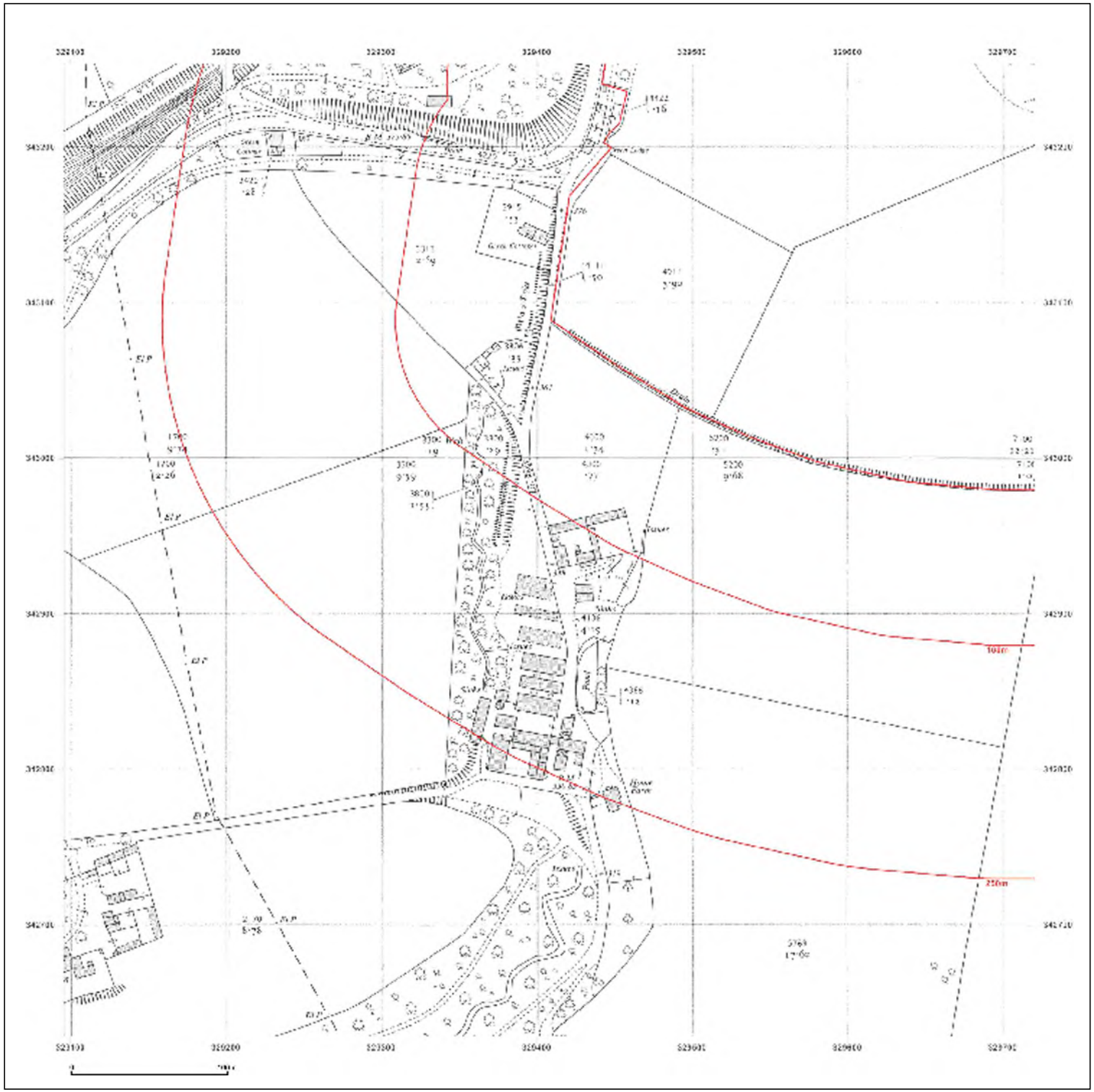
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Client Ref: 773135
Report Ref: GS-2356368_LS_A1
Grid Ref: 329408, 342941

Map Name: National Grid
Map date: **1960-1961**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1961
Revised 1961
Edition N/A
Copyright 1962
Levelled 1958

Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
Levelled 1958

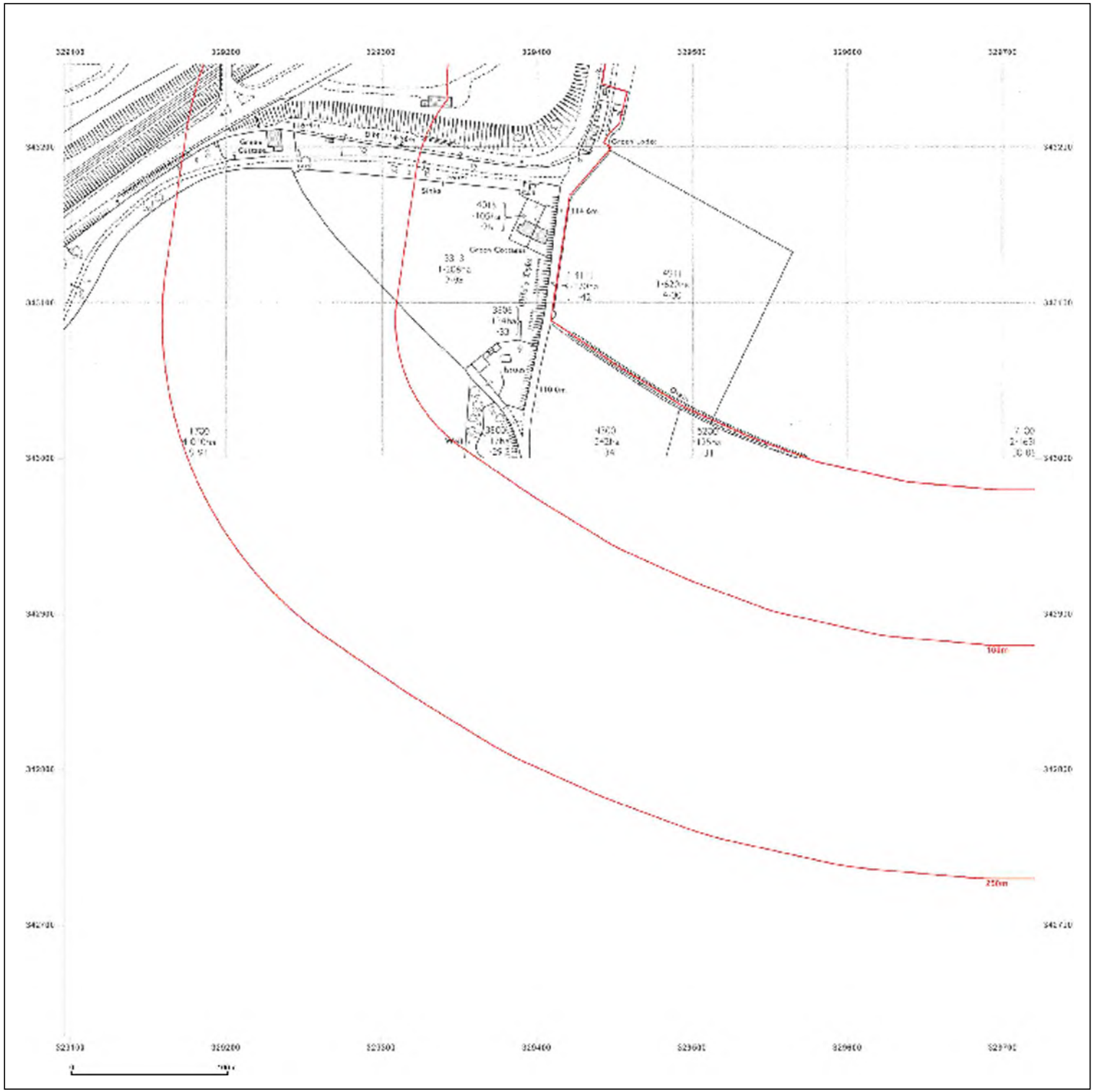
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A1
Grid Ref: 329408, 342941

Map Name: National Grid
Map date: **1971**
Scale: 1:2,500
Printed at: 1:2,500

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Revised 1971
Edition N/A
Copyright 1972
Levelled 1958

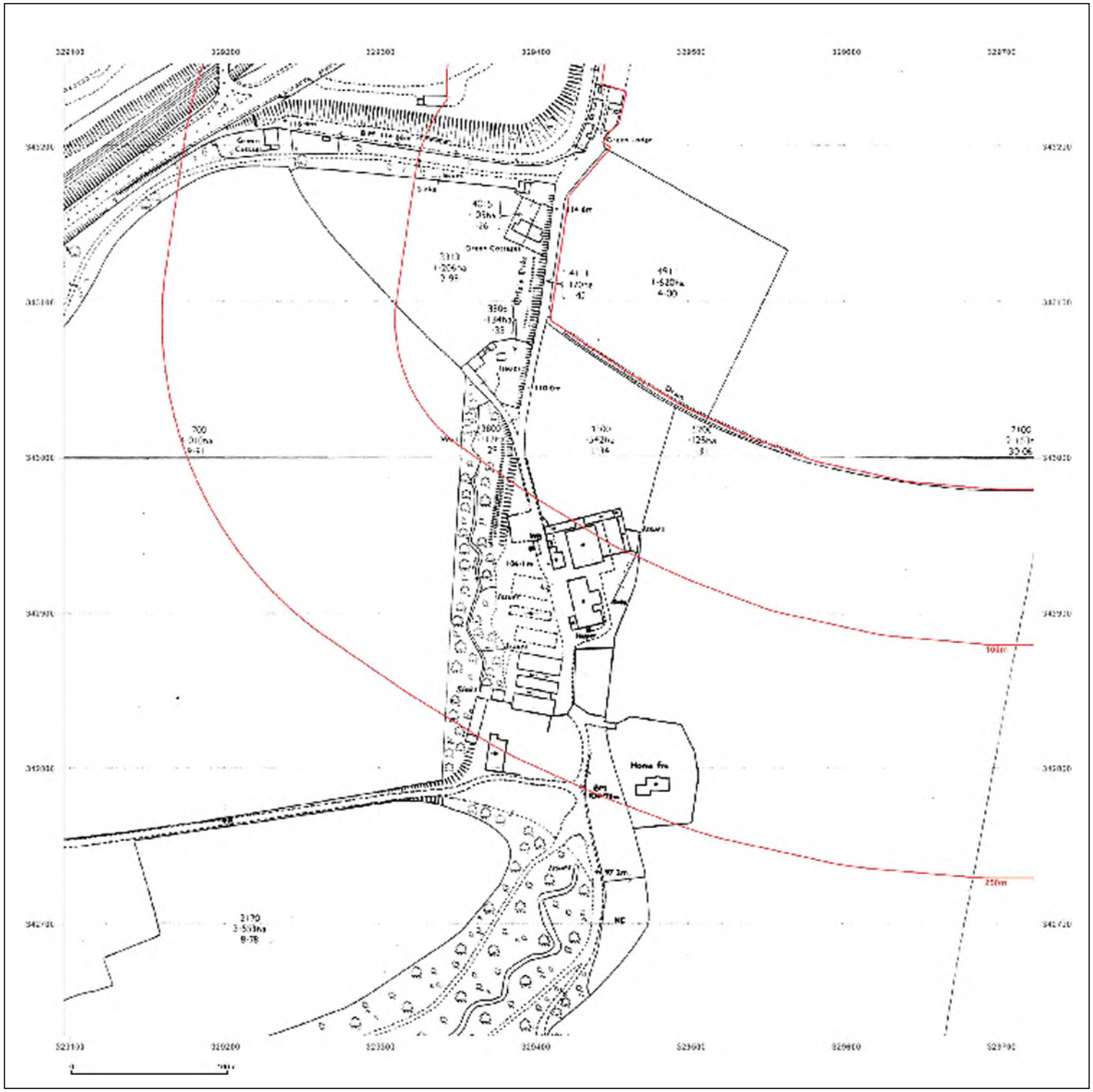
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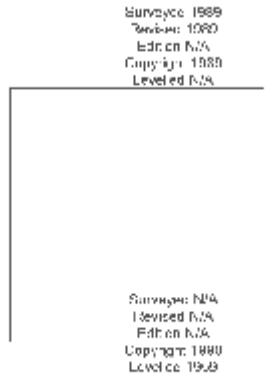
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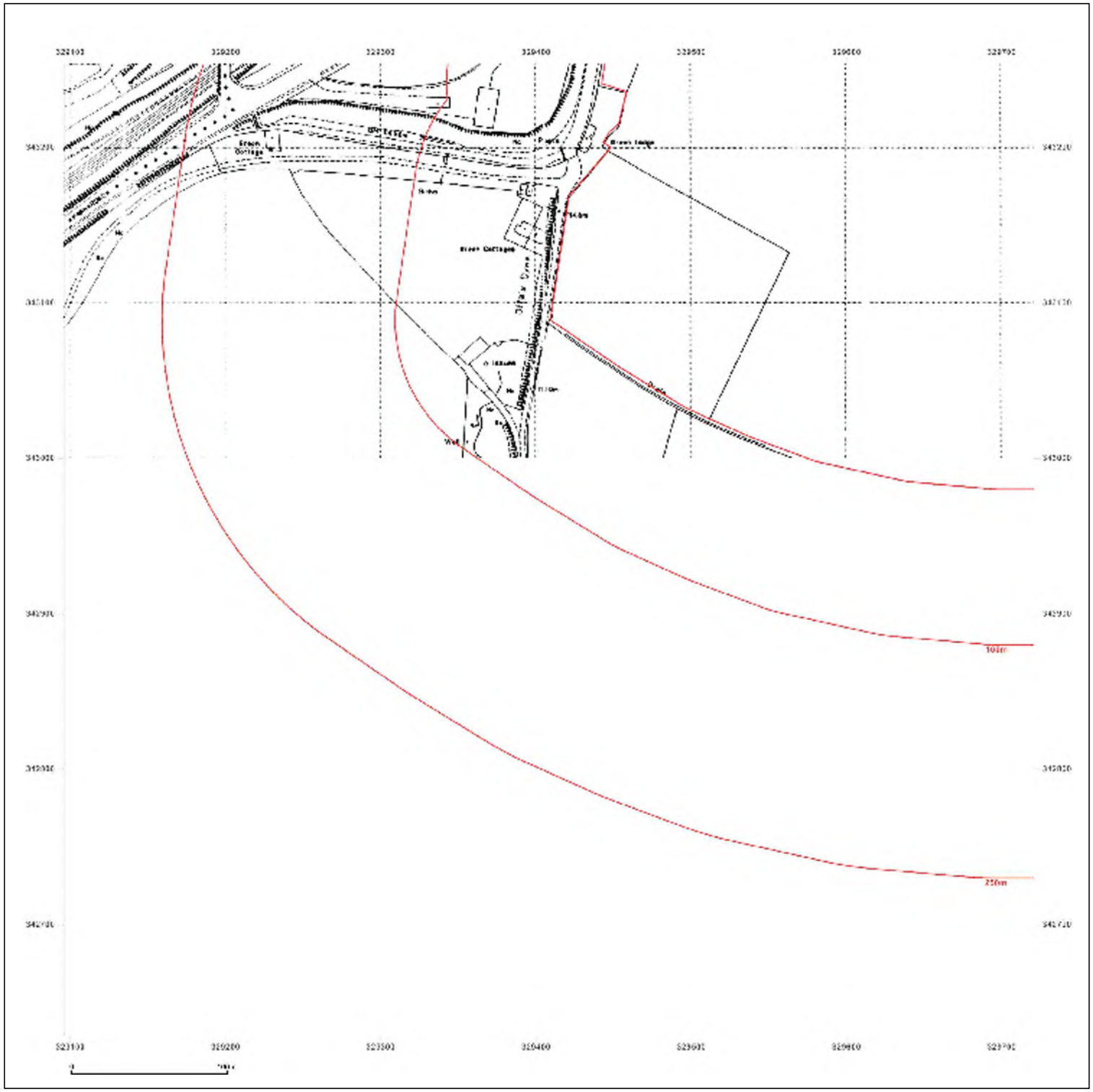
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Client Ref: 773135
Report Ref: GS-2356368_LS_A1
Grid Ref: 329408, 342941

Map Name: National Grid
Map date: **1994**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1994
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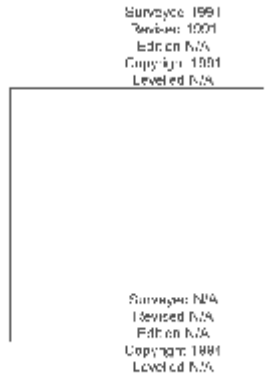
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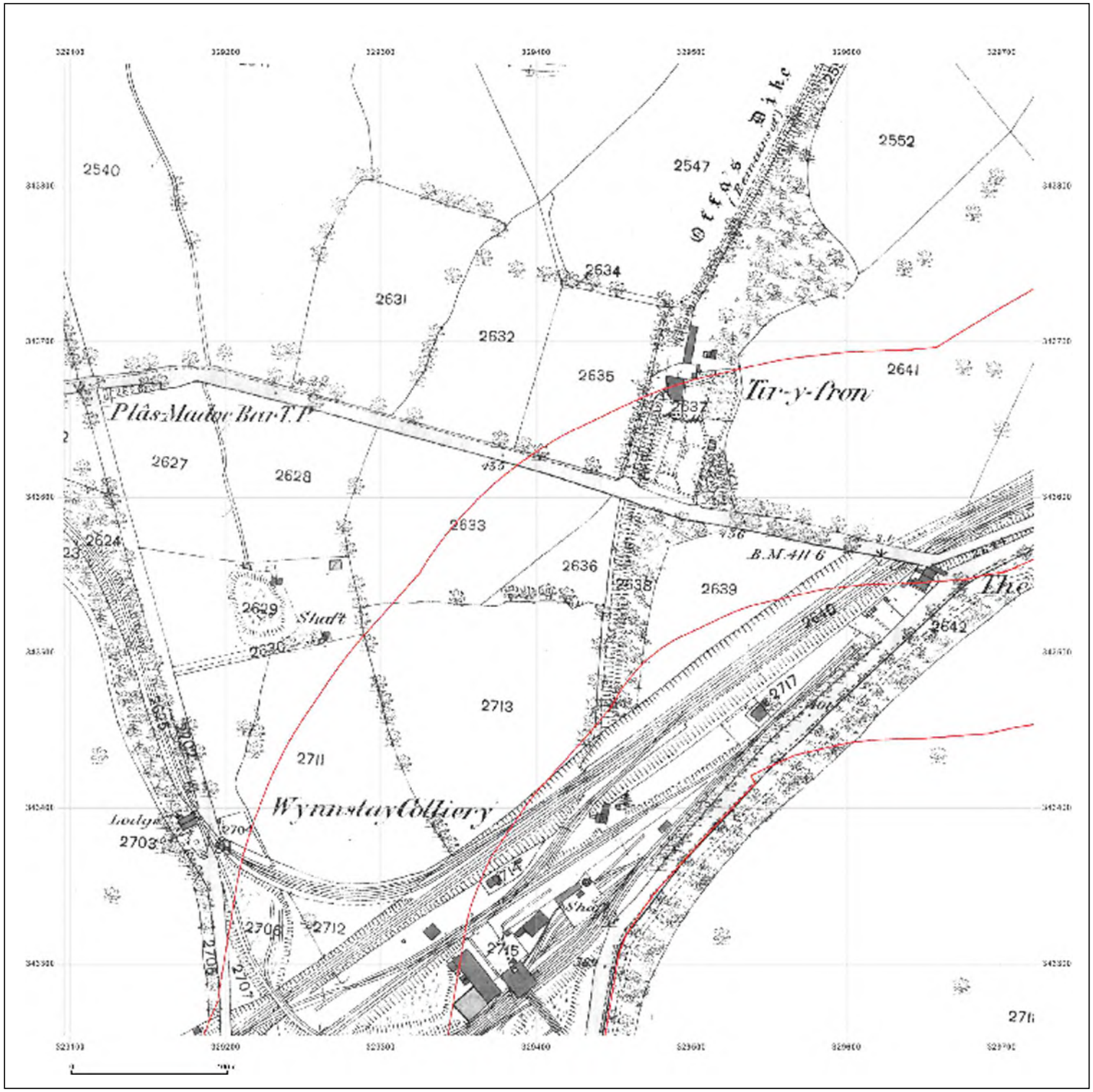
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Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: County Series
Map date: 1873
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1873
Revised 1873
Publish N/A
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Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: County Series
Map date: 1899
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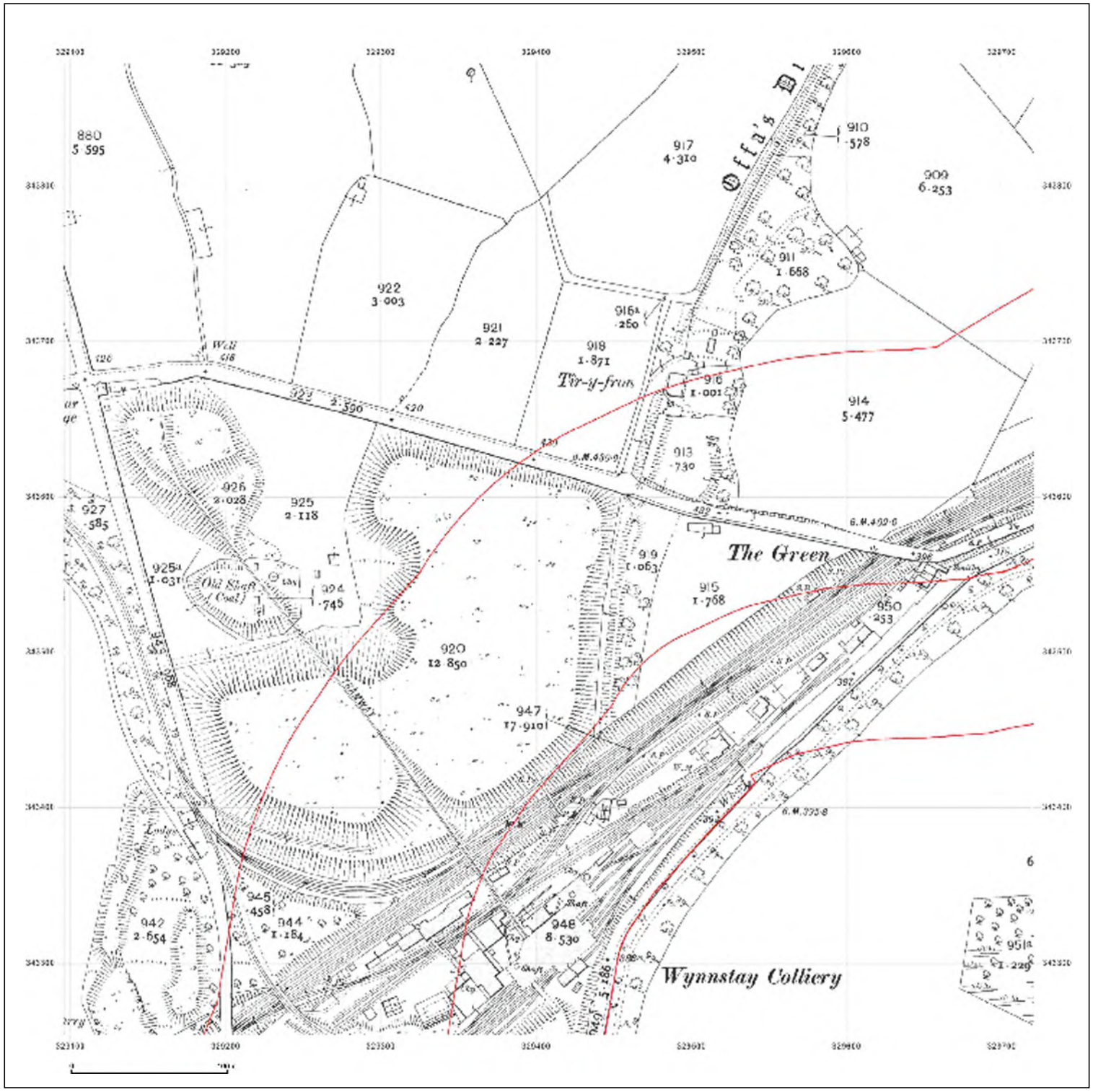
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Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: County Series
Map date: 1912
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1912
Revised 1917
Publ... No.
Copyright No.
Levelled: No.

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Site Details:

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Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: National Grid
Map date: **1961**
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Printed at: 1:2,500

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Surveyed 1961
Revised 1961
Edition N/A
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Reprinted 1969

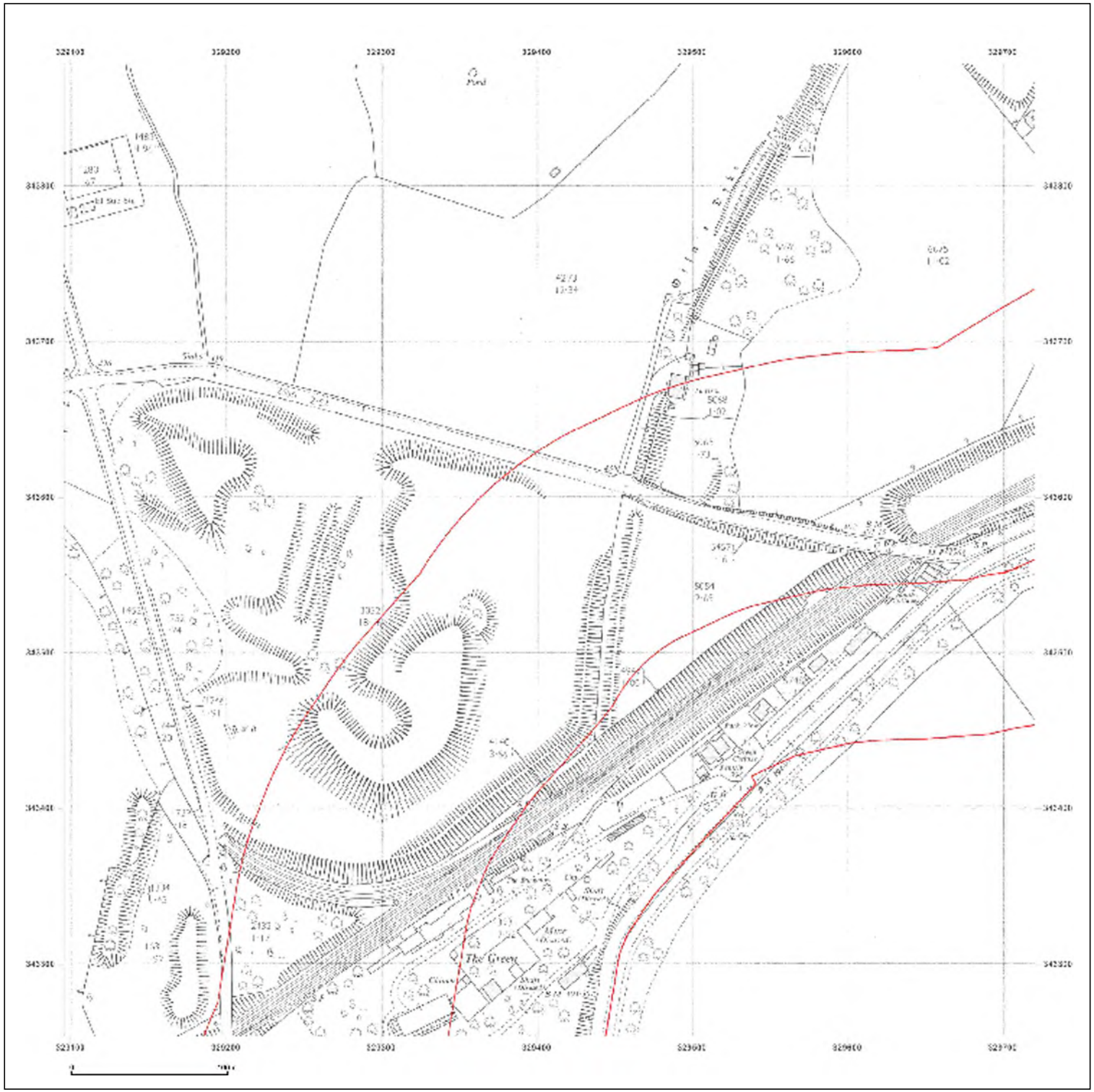
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Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

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Surveyed 1967
Revised 1937
Edition N/A
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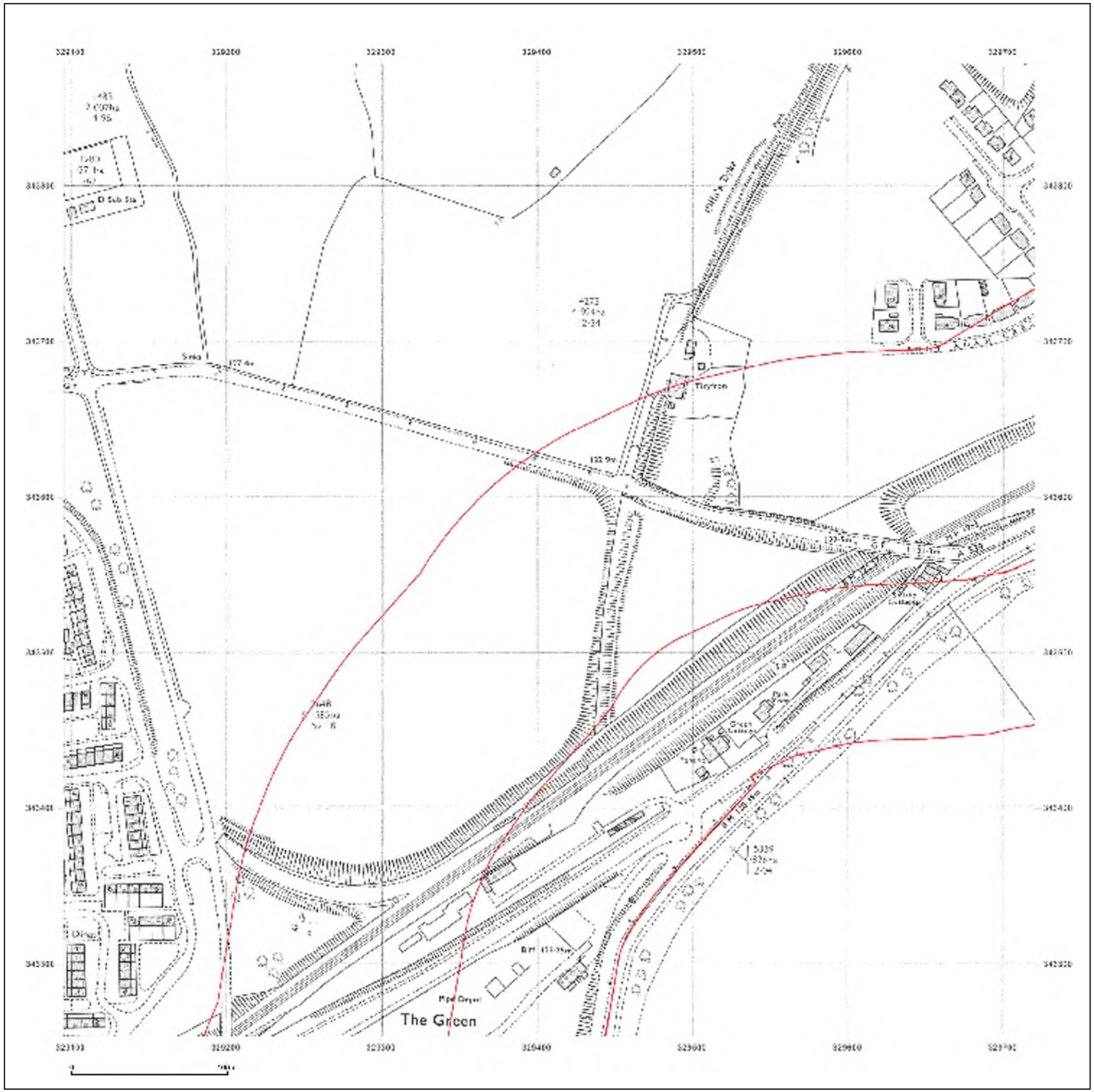
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Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: National Grid
Map date: **1971**
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Printed at: 1:2,500

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Surveyed 1971
Revised 1971
Edition N/A
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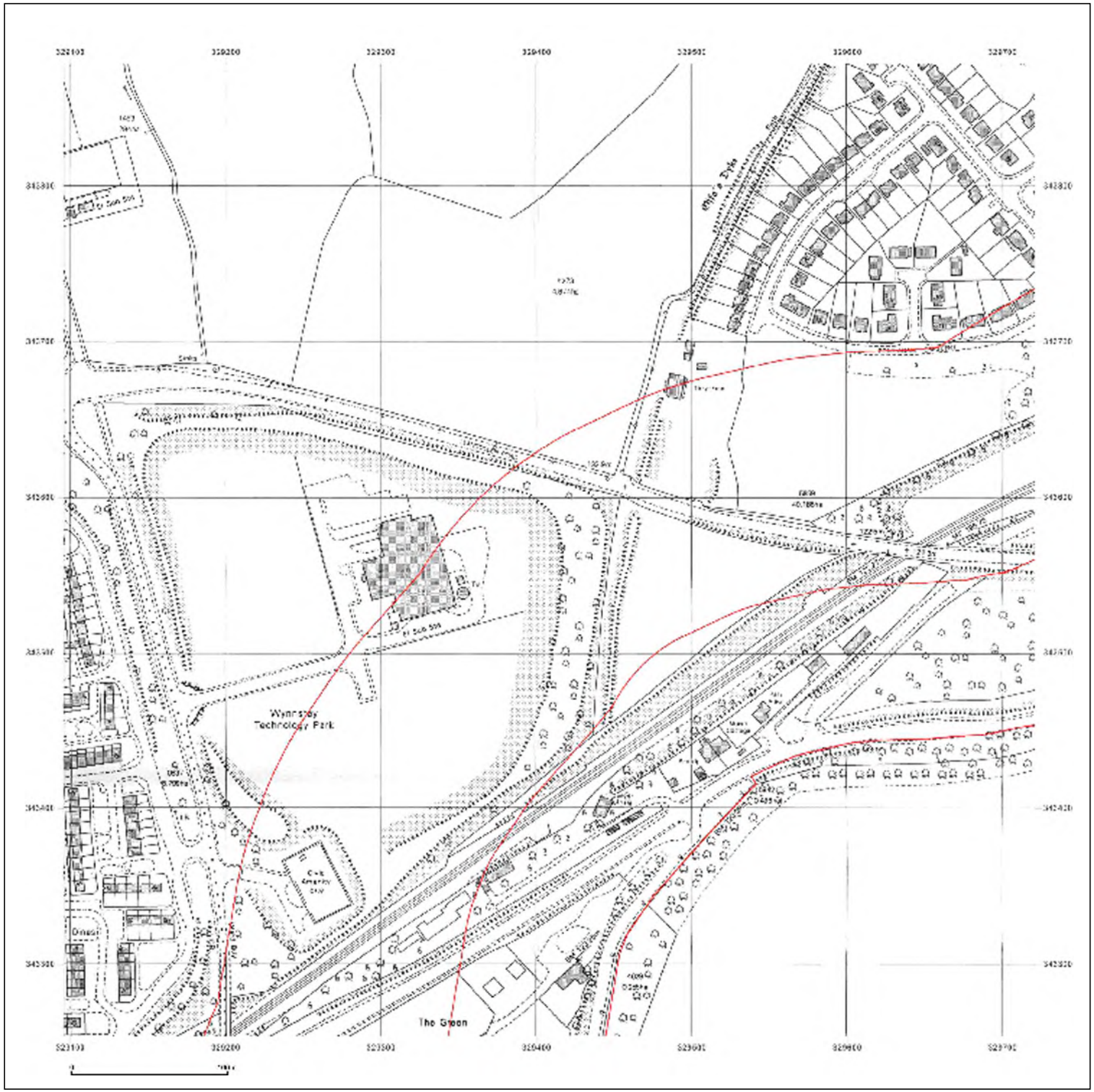
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Grid Ref: 329408, 343566

Map Name: National Grid
Map date: 1989
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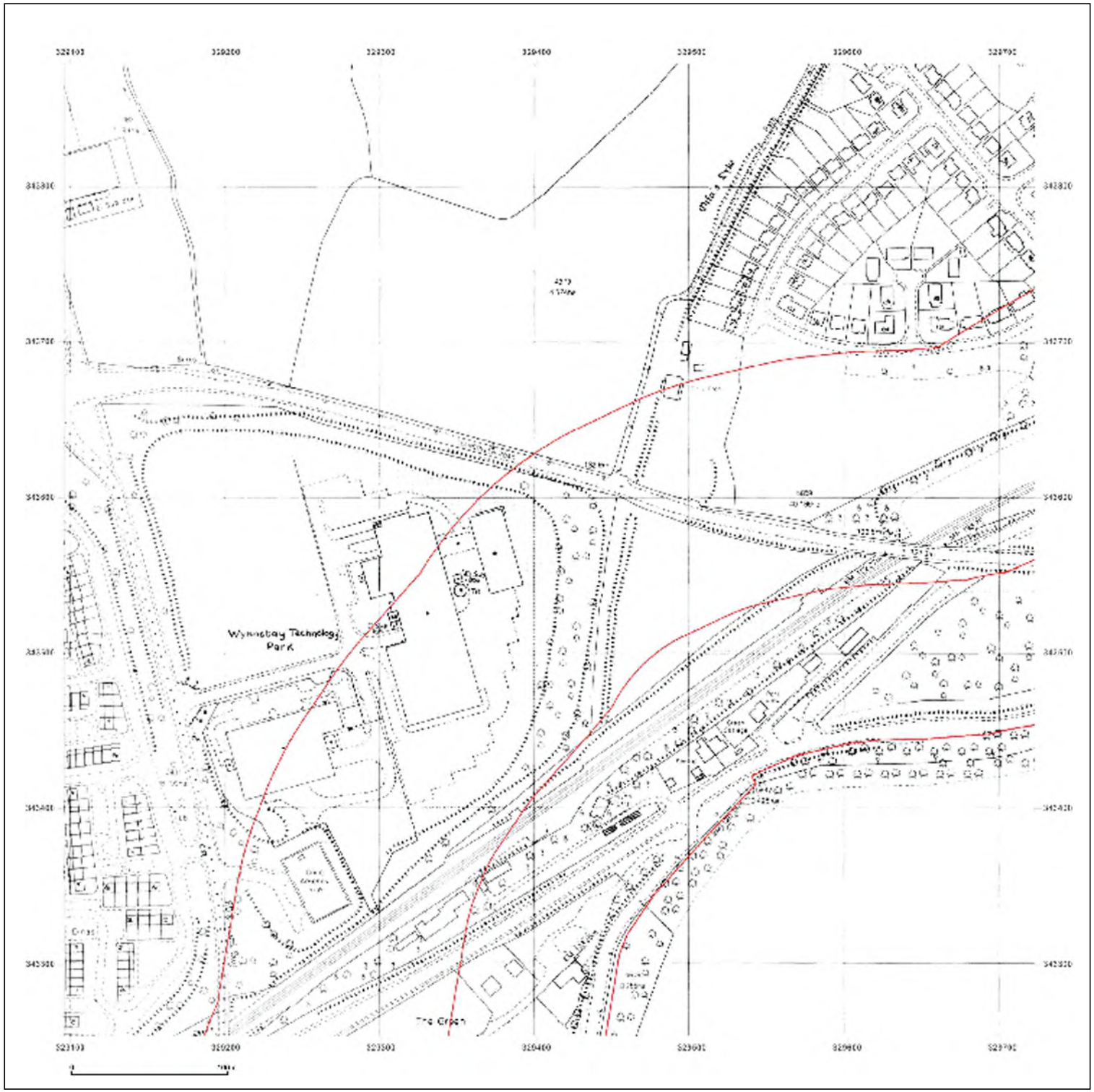
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Grid Ref: 329408, 343566

Map Name: National Grid
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Printed at: 1:2,500

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Surveyed 1991
Revised 1991
Edited N/A
Copyright 1991
Levelled N/A

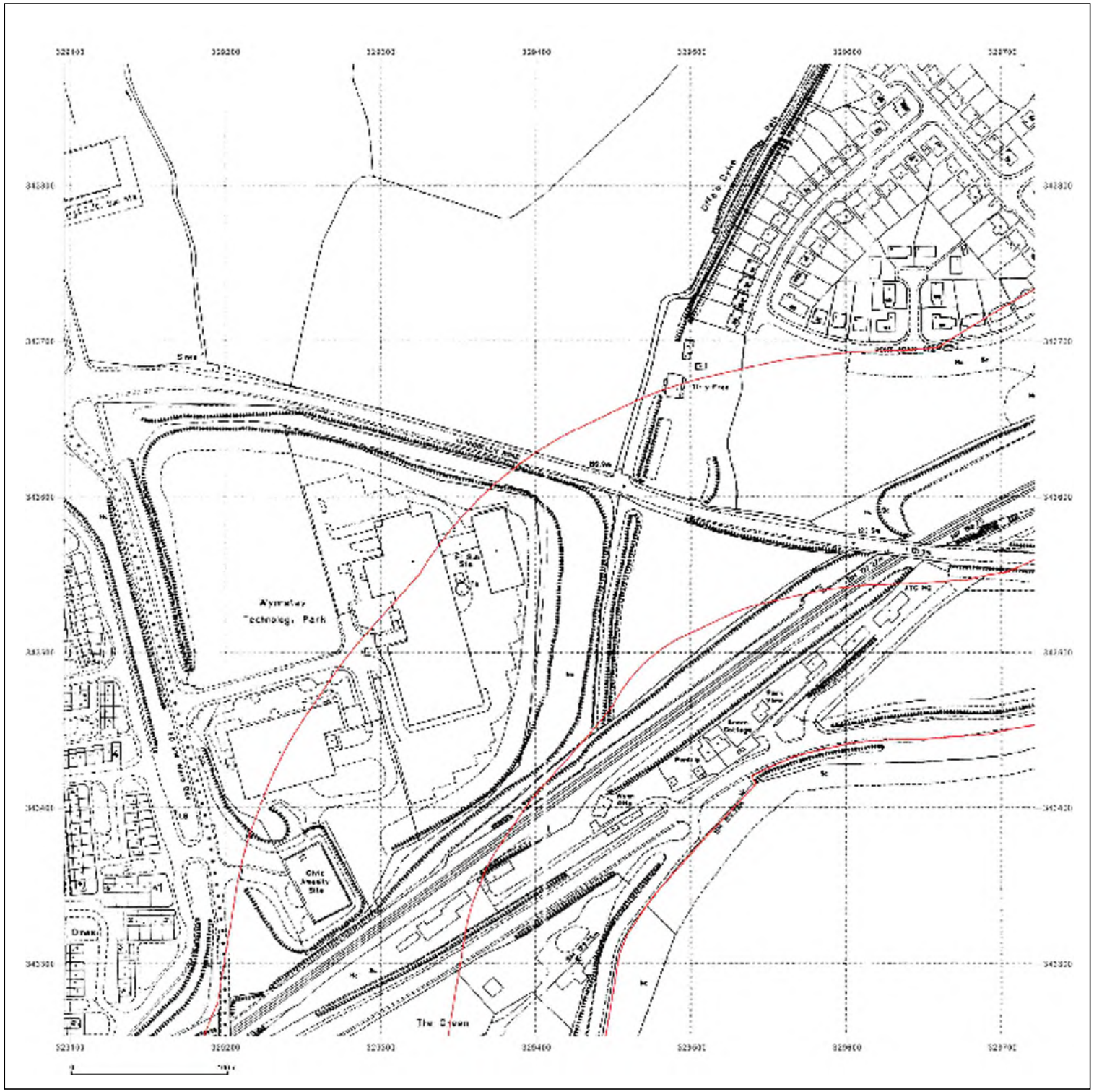
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_A2
Grid Ref: 329408, 343566

Map Name: National Grid
Map date: 1994
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edited N/A
Copyright 1994
Levelled N/A

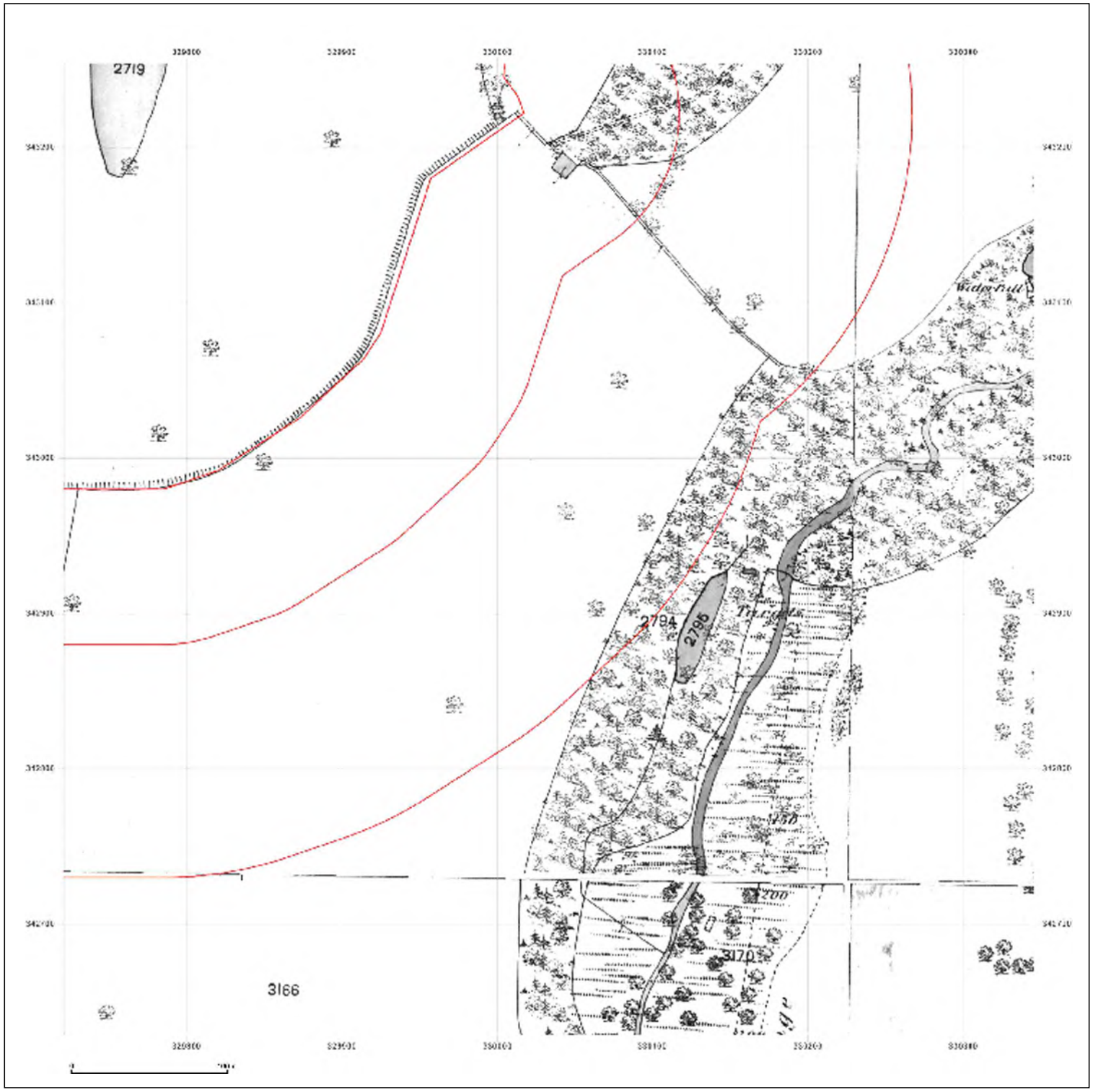
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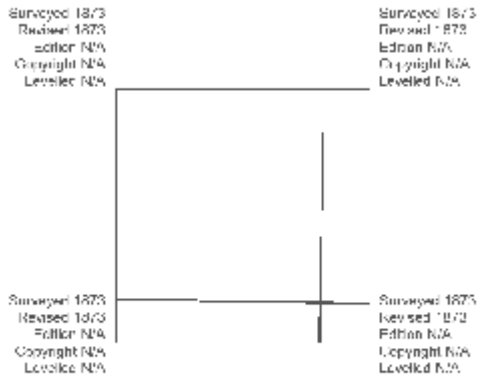
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: County Series
Map date: 1873
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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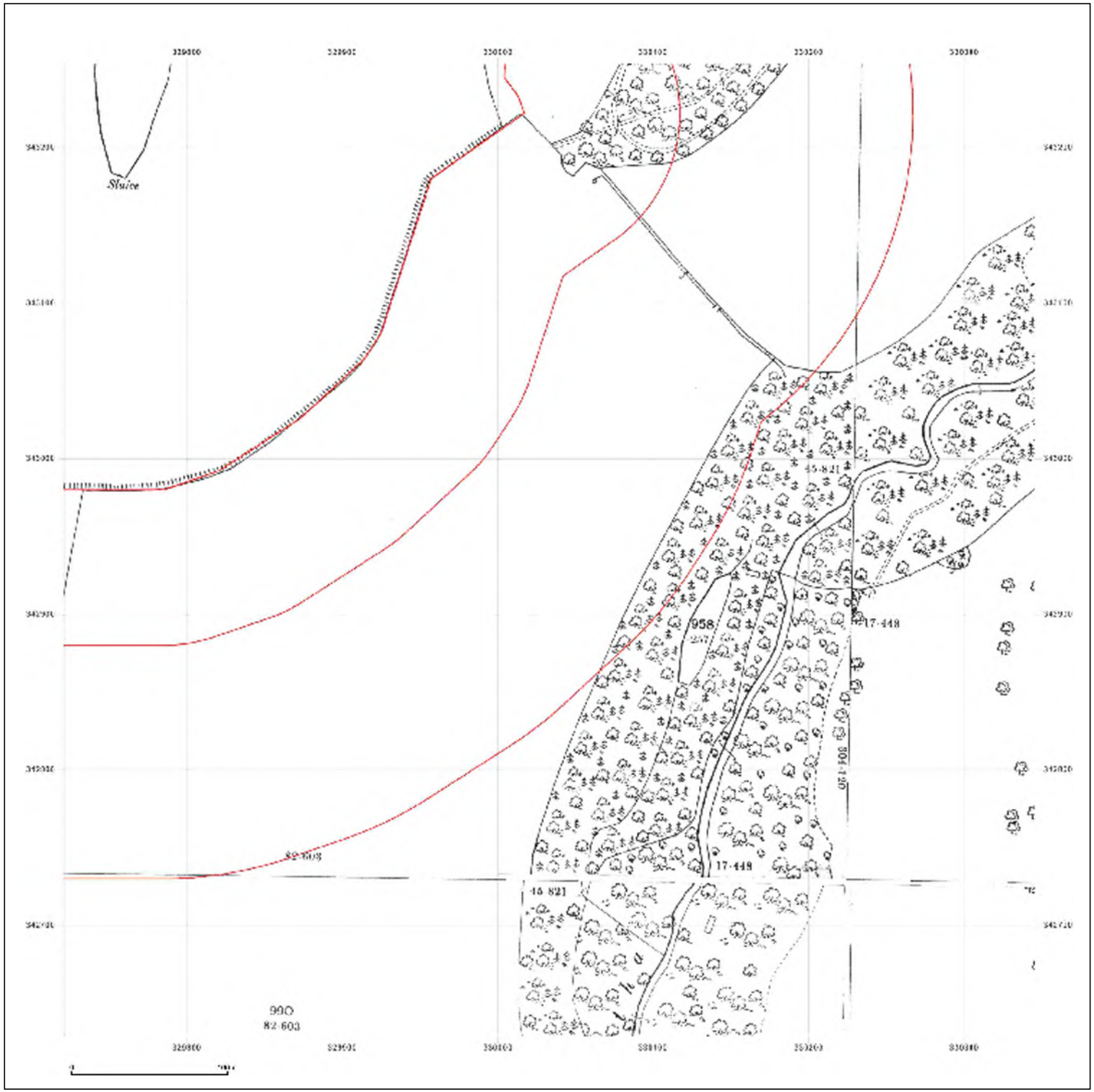
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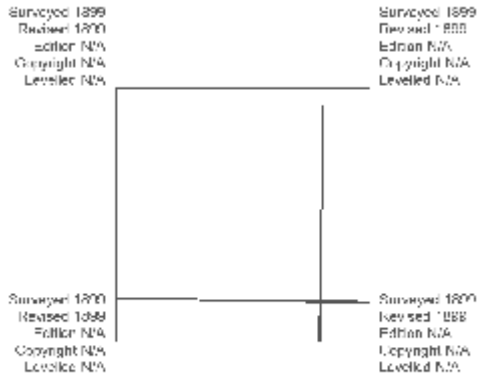
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: County Series
Map date: 1899
Scale: 1:2,500
Printed at: 1:2,500

N
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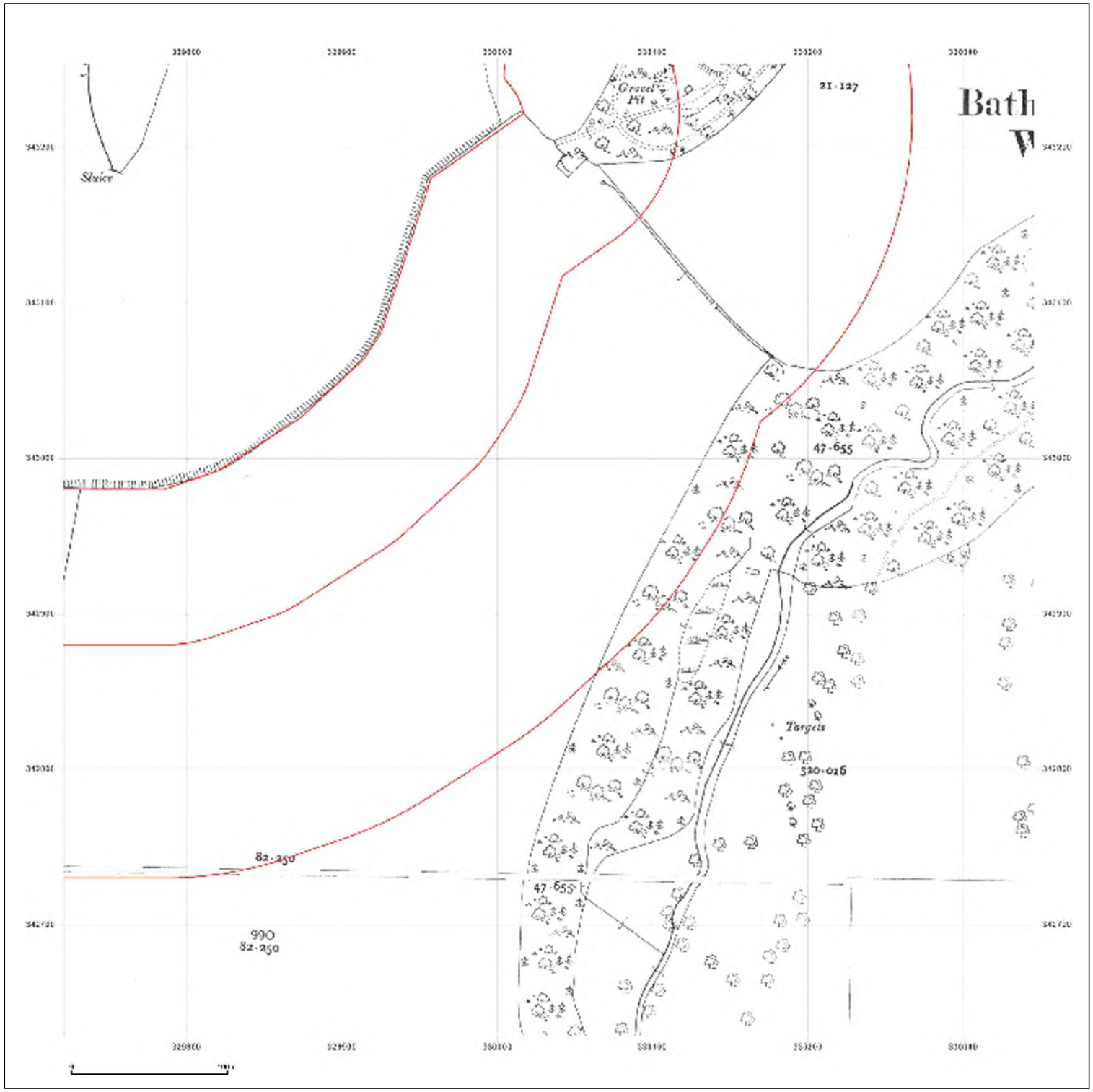
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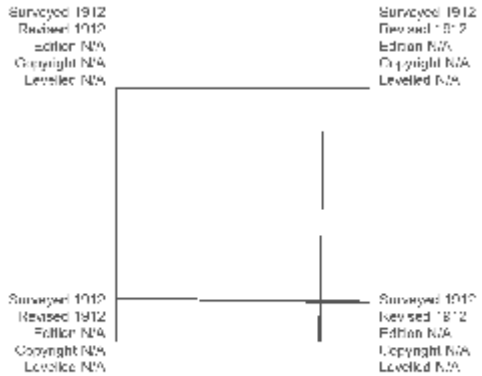
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: County Series
Map date: **1912**
Scale: 1:2,500
Printed at: 1:2,500

N
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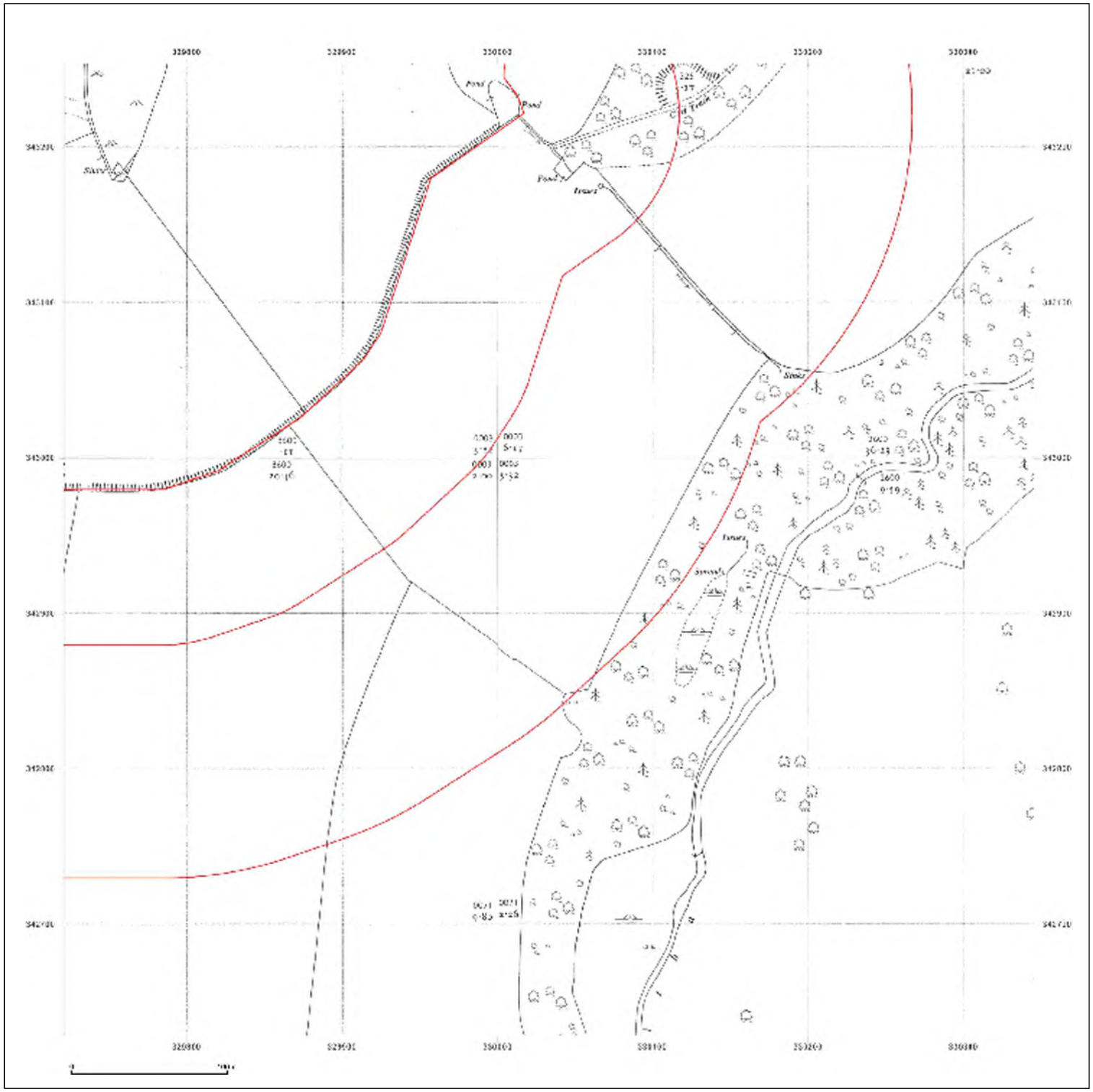
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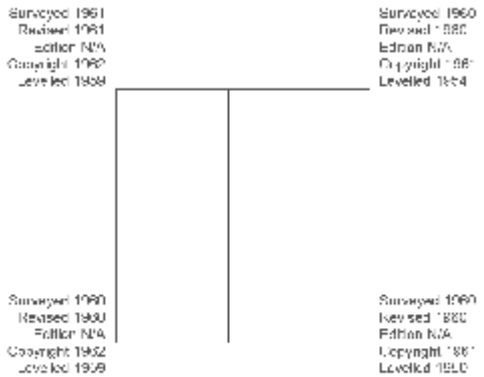
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1960-1961**
Scale: 1:2,500
Printed at: 1:2,500

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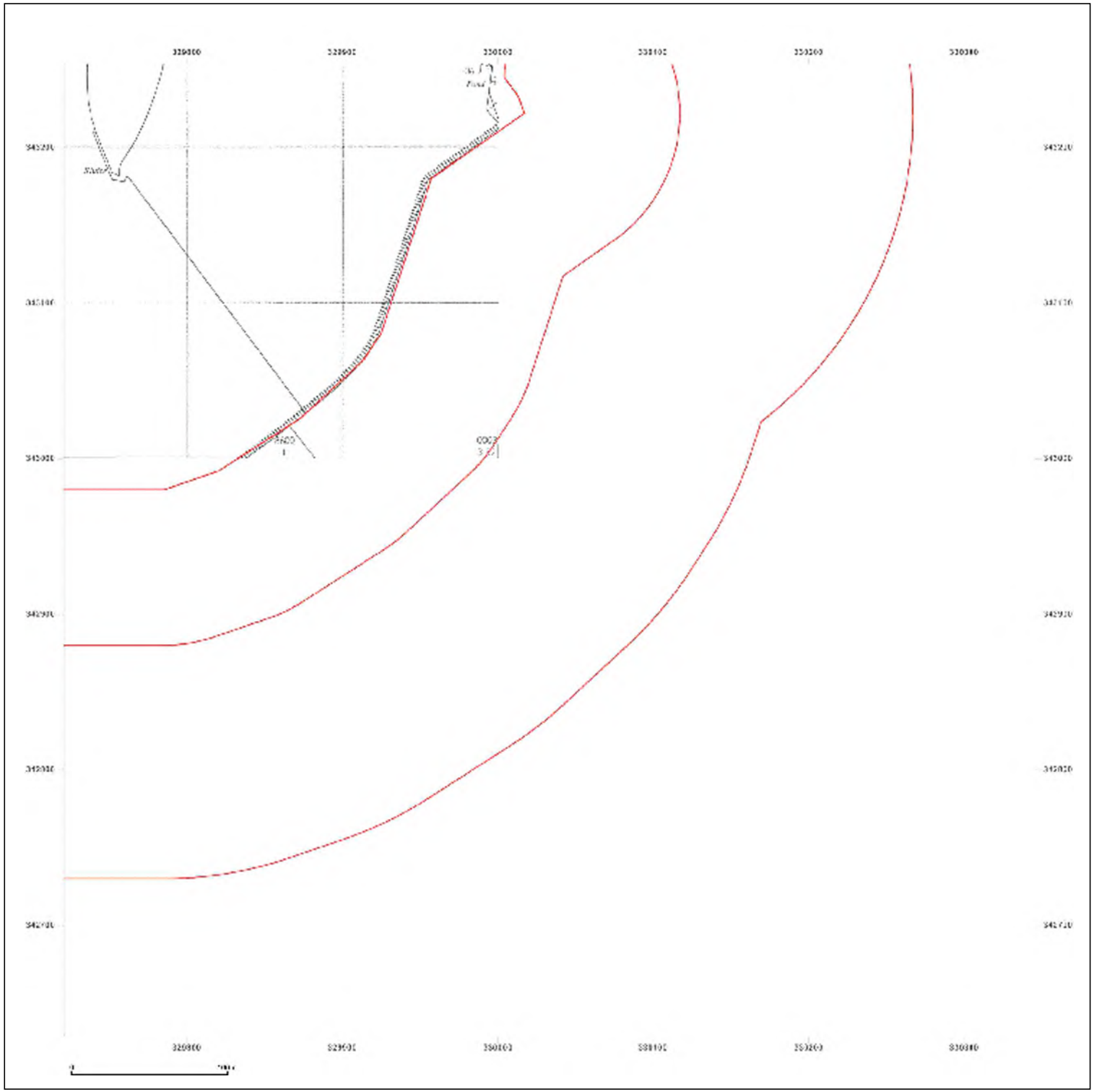
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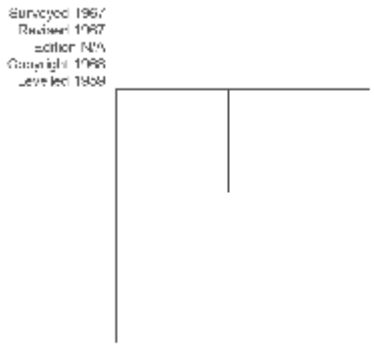
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1967**
Scale: 1:2,500
Printed at: 1:2,500

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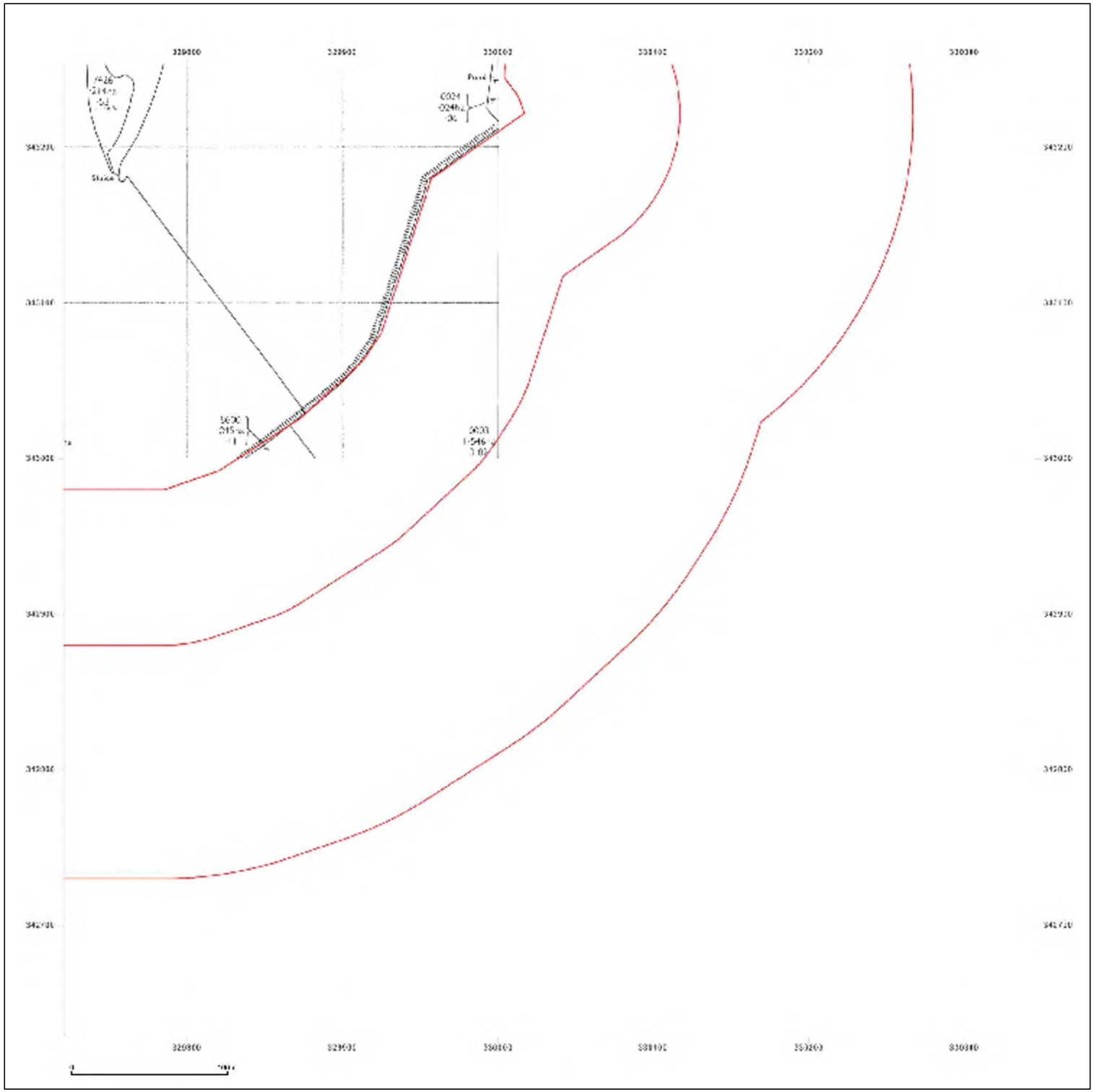
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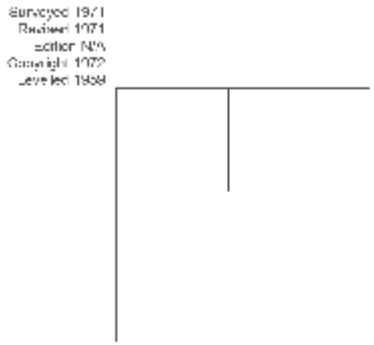
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1971**
Scale: 1:2,500
Printed at: 1:2,500

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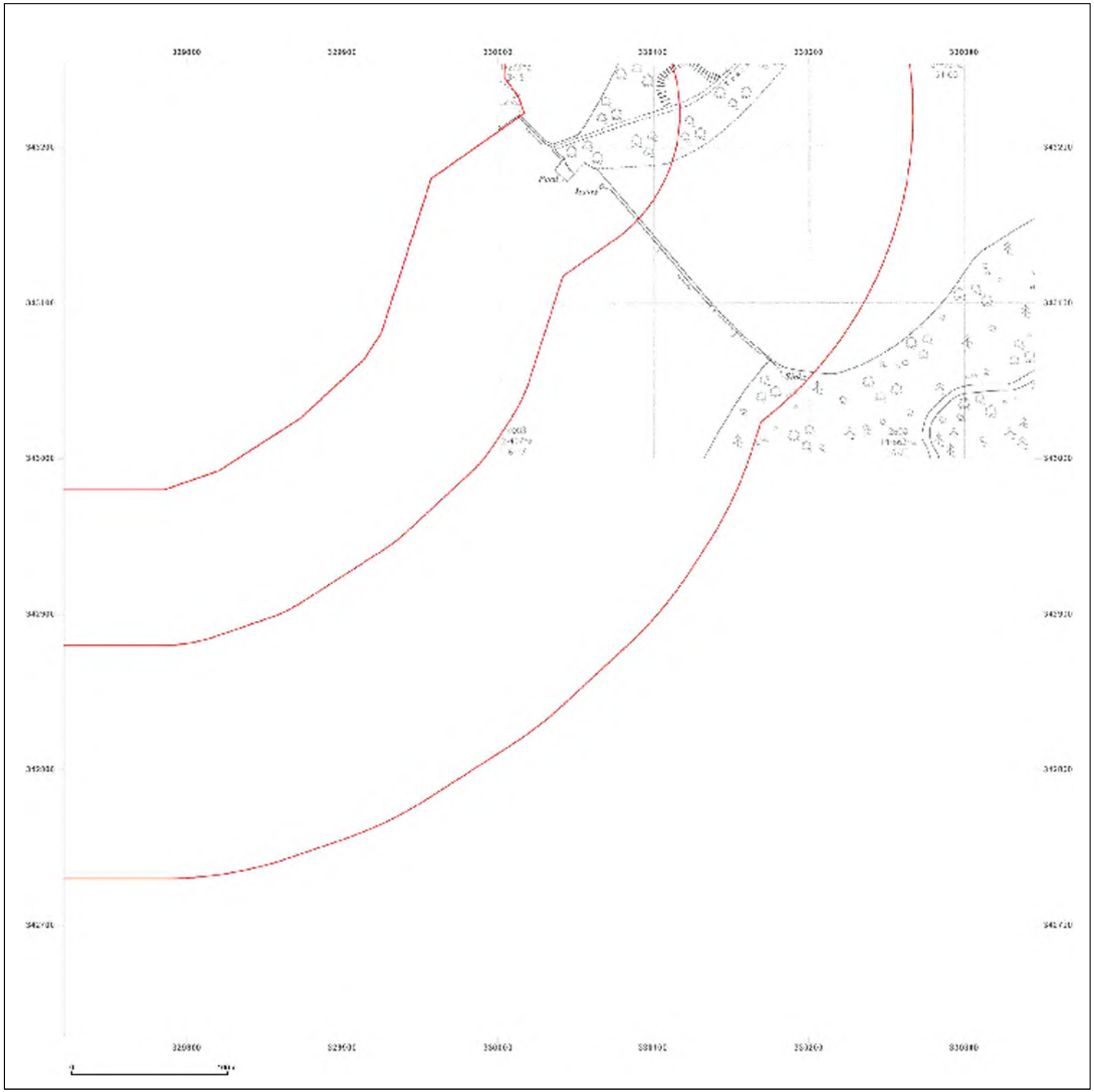
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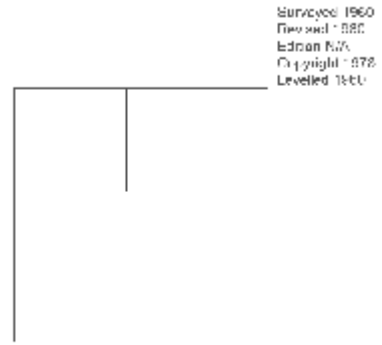
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1978**
Scale: 1:2,500
Printed at: 1:2,500

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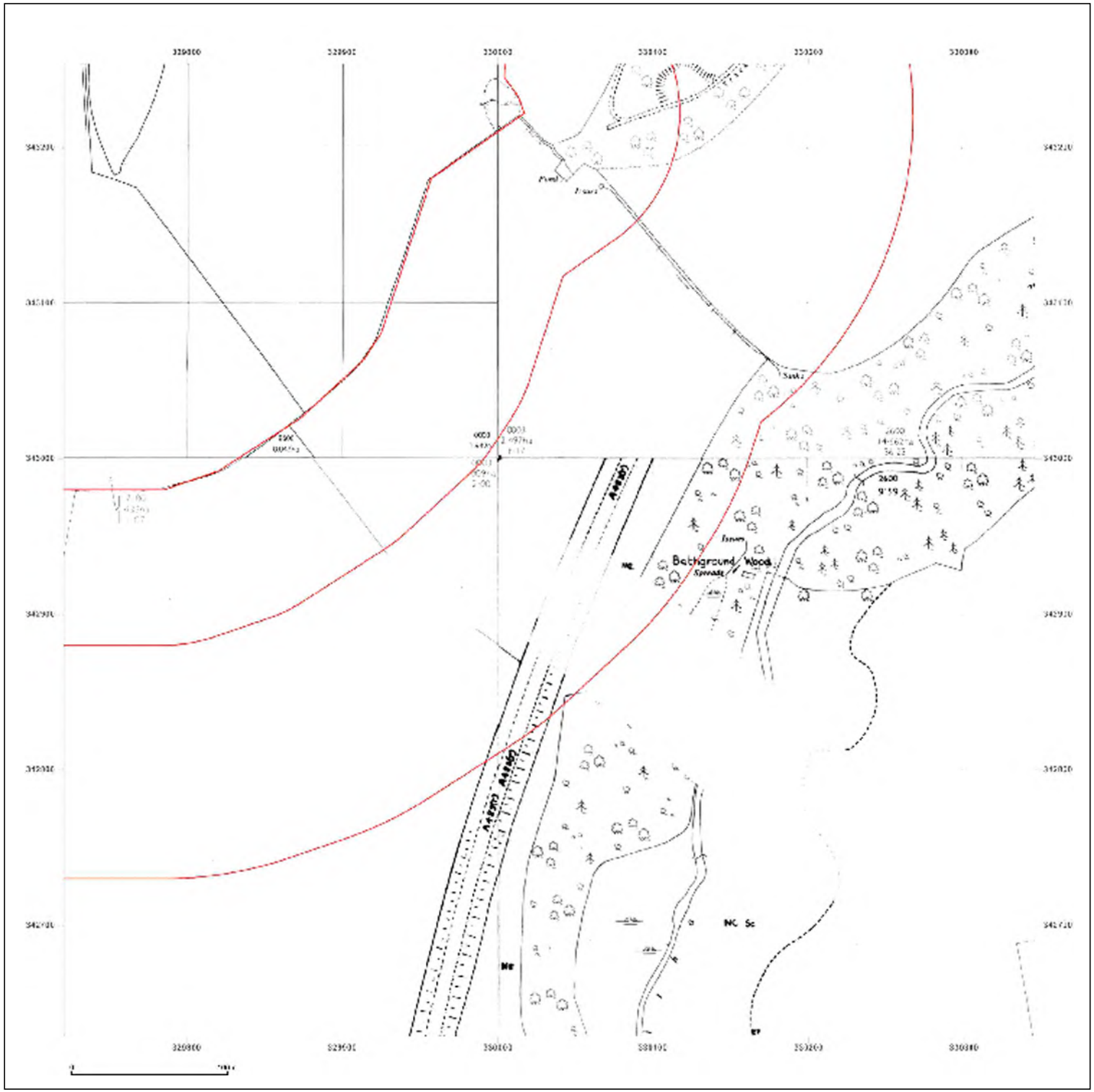
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: 1989-1990
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1989
Revised 1990
Edition N/A
Copyright 1991
Levelled N/A

Surveyed 1989
Revised 1990
Edition N/A
Copyright 1990
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1990
Levelled 1989

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

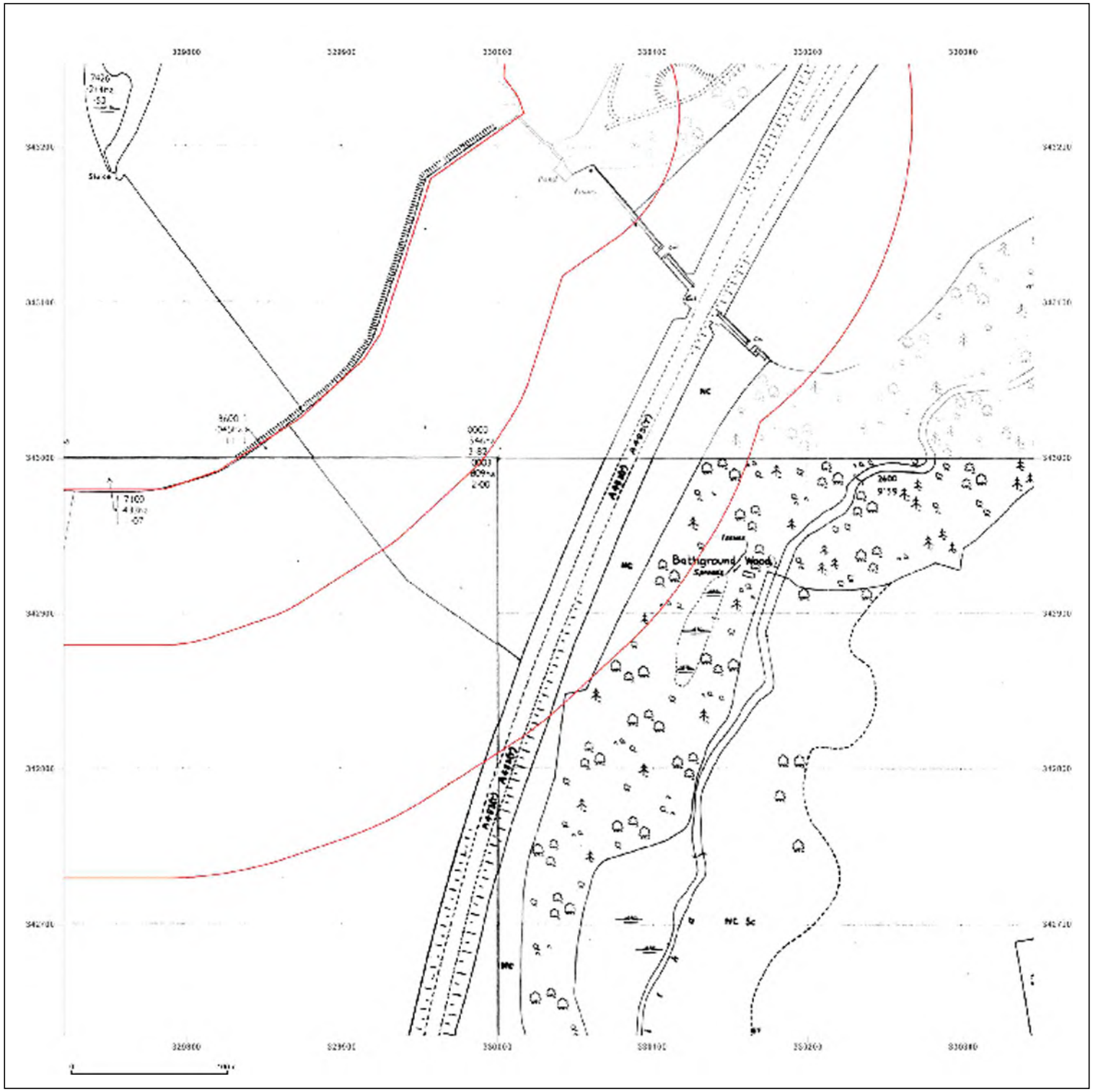
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Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

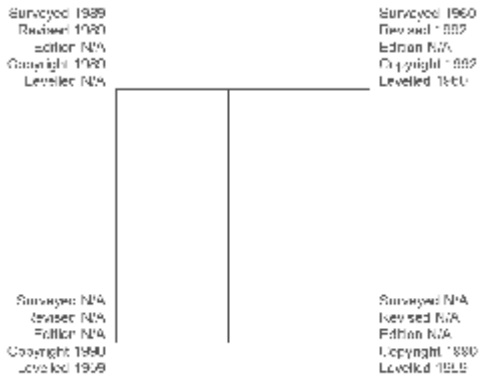
Map Name: National Grid

Map date: 1989-1992

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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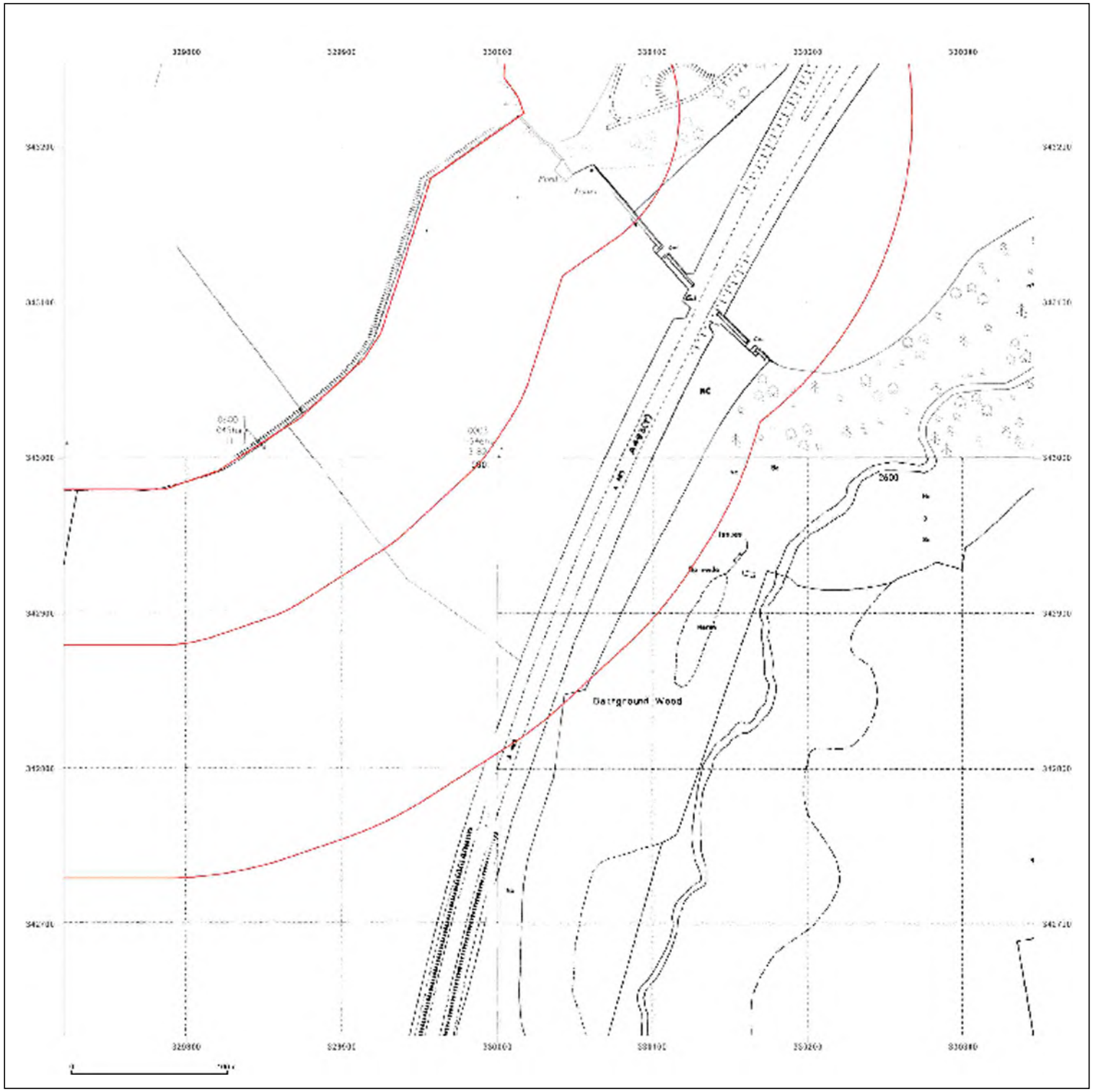
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

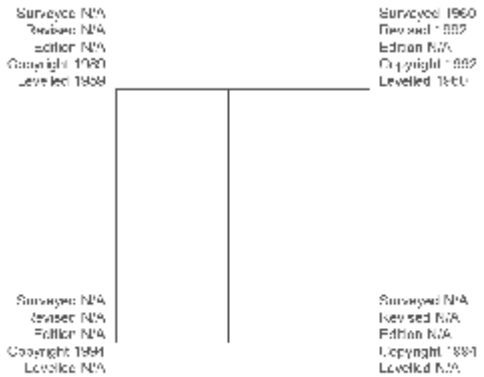
Map Name: National Grid

Map date: **1989-1994**

Scale: 1:2,500

Printed at: 1:2,500

N
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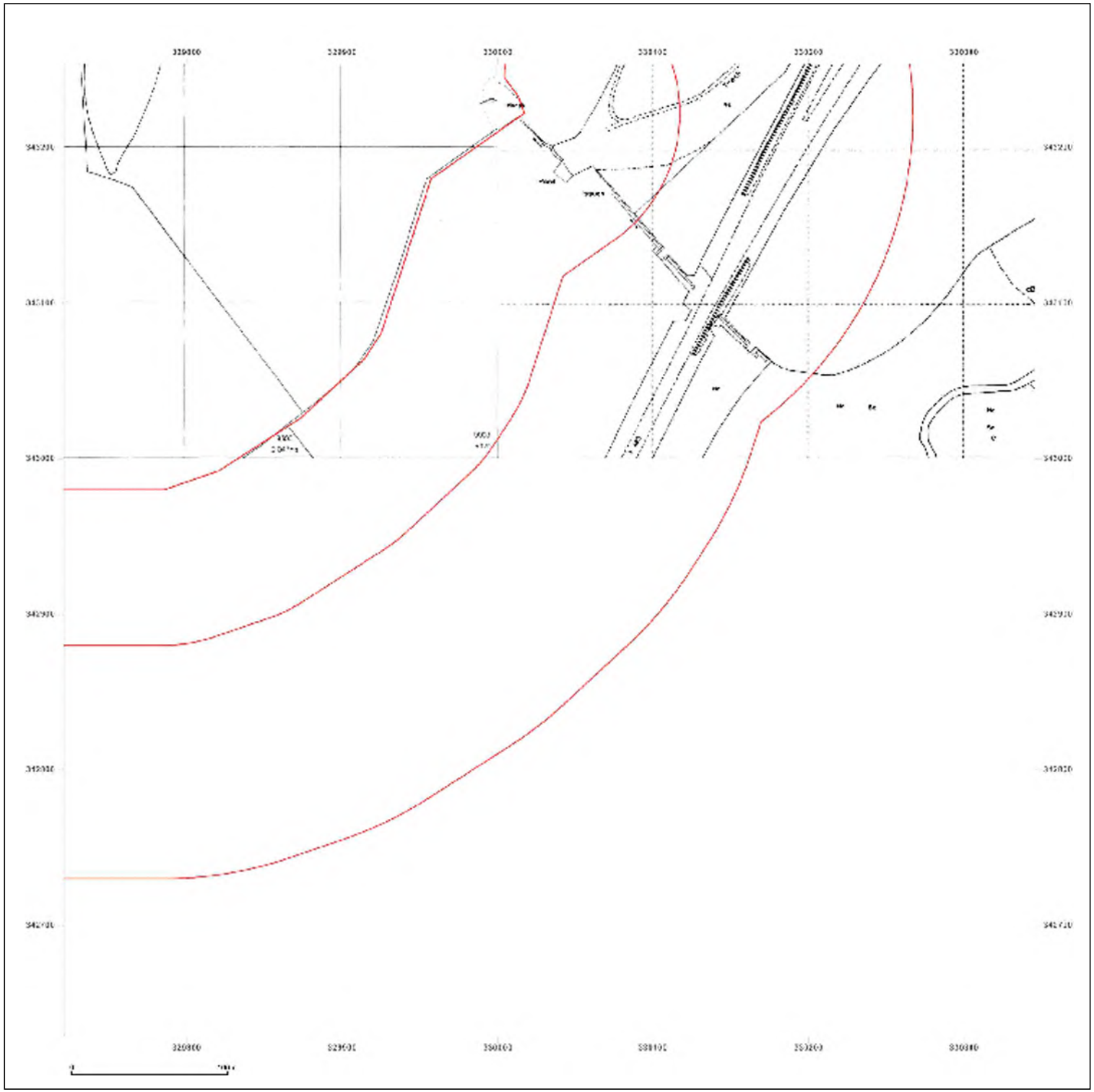
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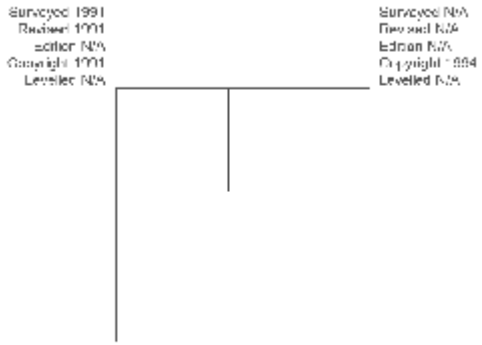
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Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1991-1994**
Scale: 1:2,500
Printed at: 1:2,500

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W E
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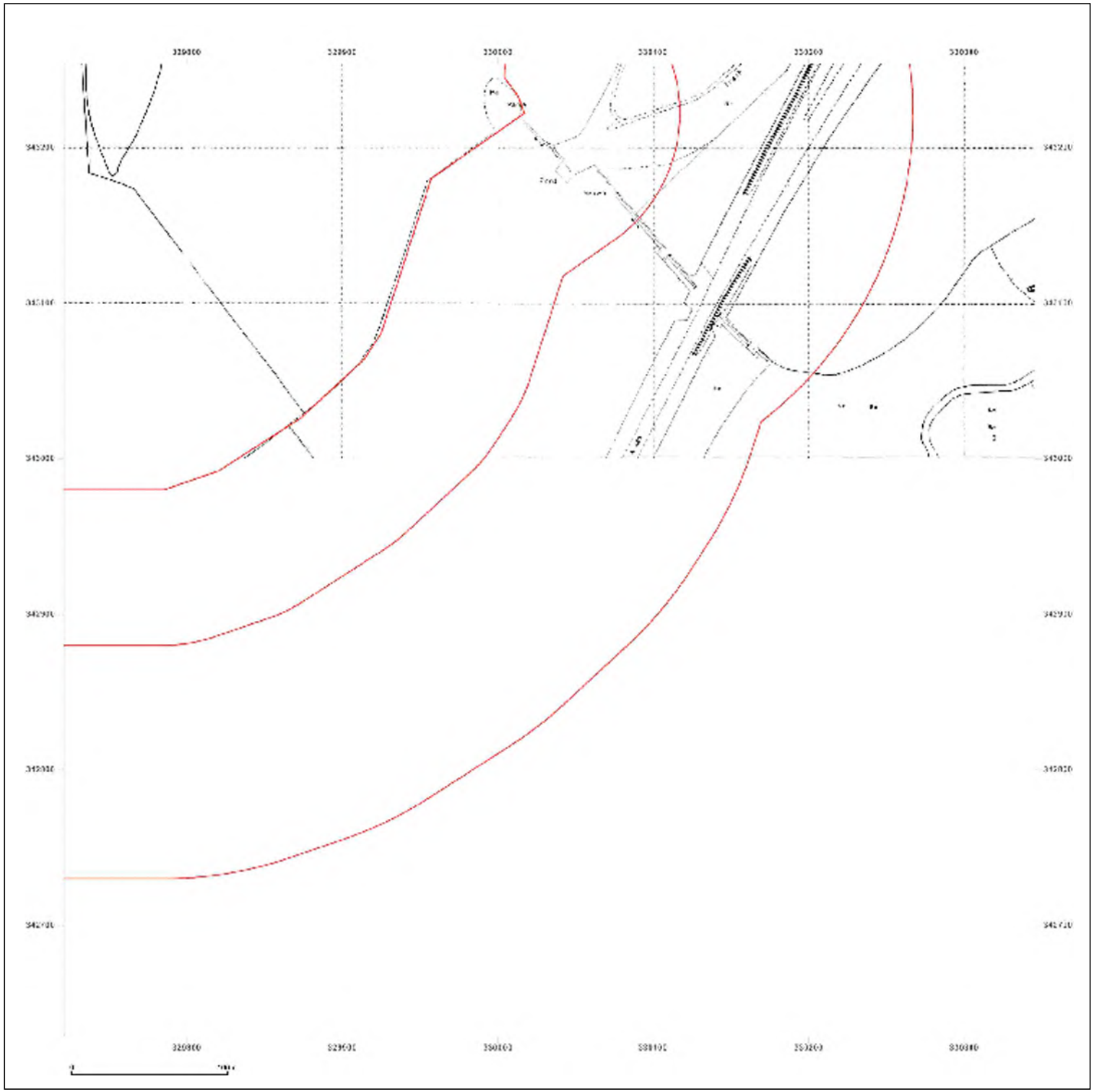
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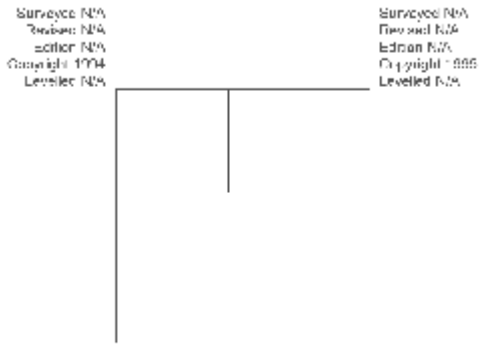
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B1
Grid Ref: 330033, 342941

Map Name: National Grid
Map date: **1994-1995**
Scale: 1:2,500
Printed at: 1:2,500

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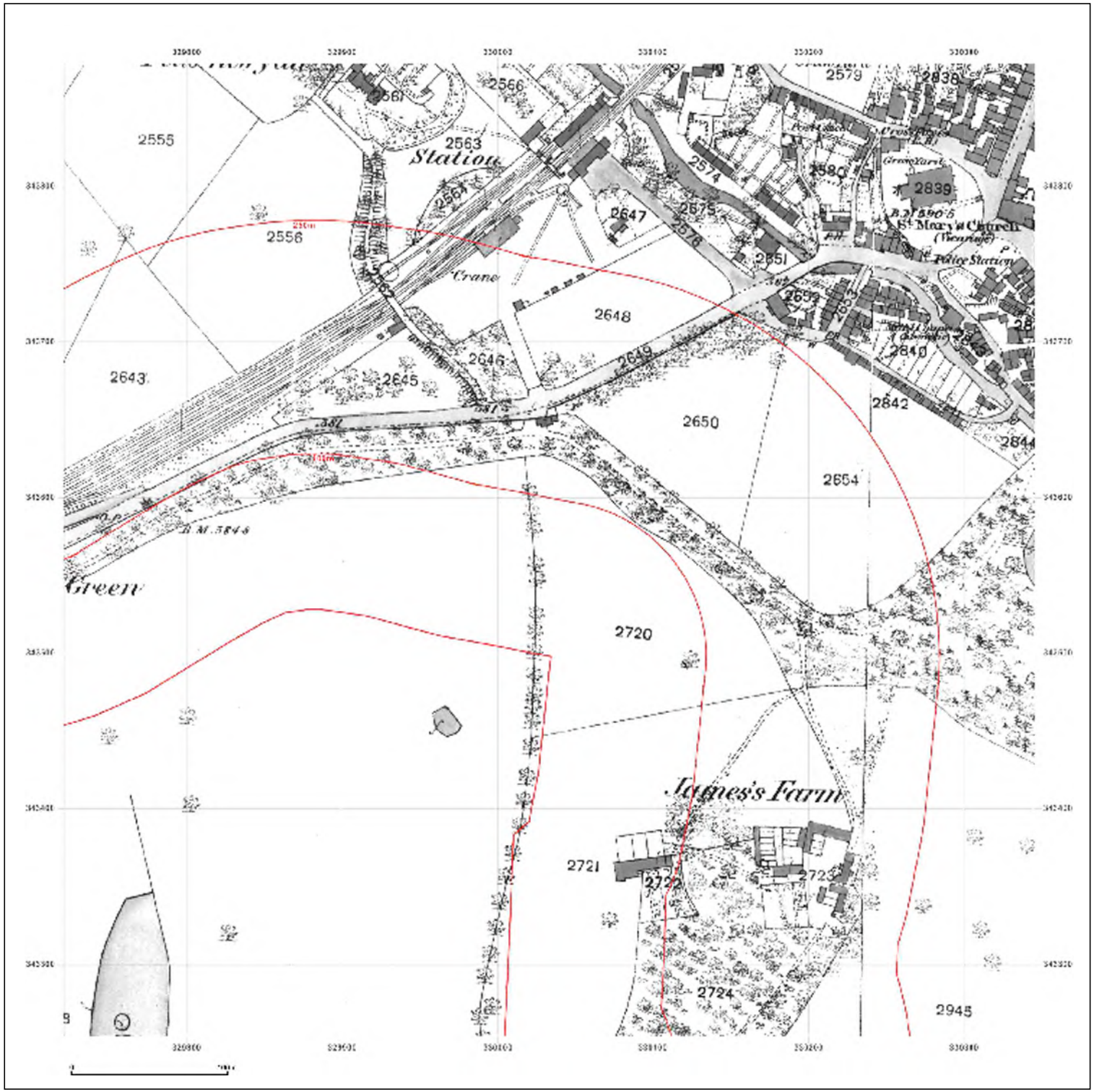
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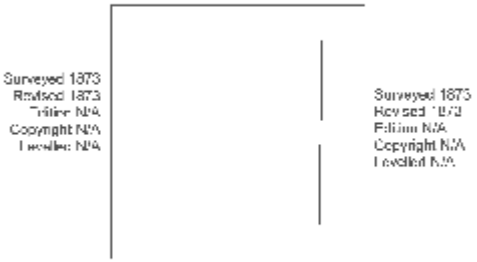
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: County Series
Map date: 1873
Scale: 1:2,500
Printed at: 1:2,500

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W E
S



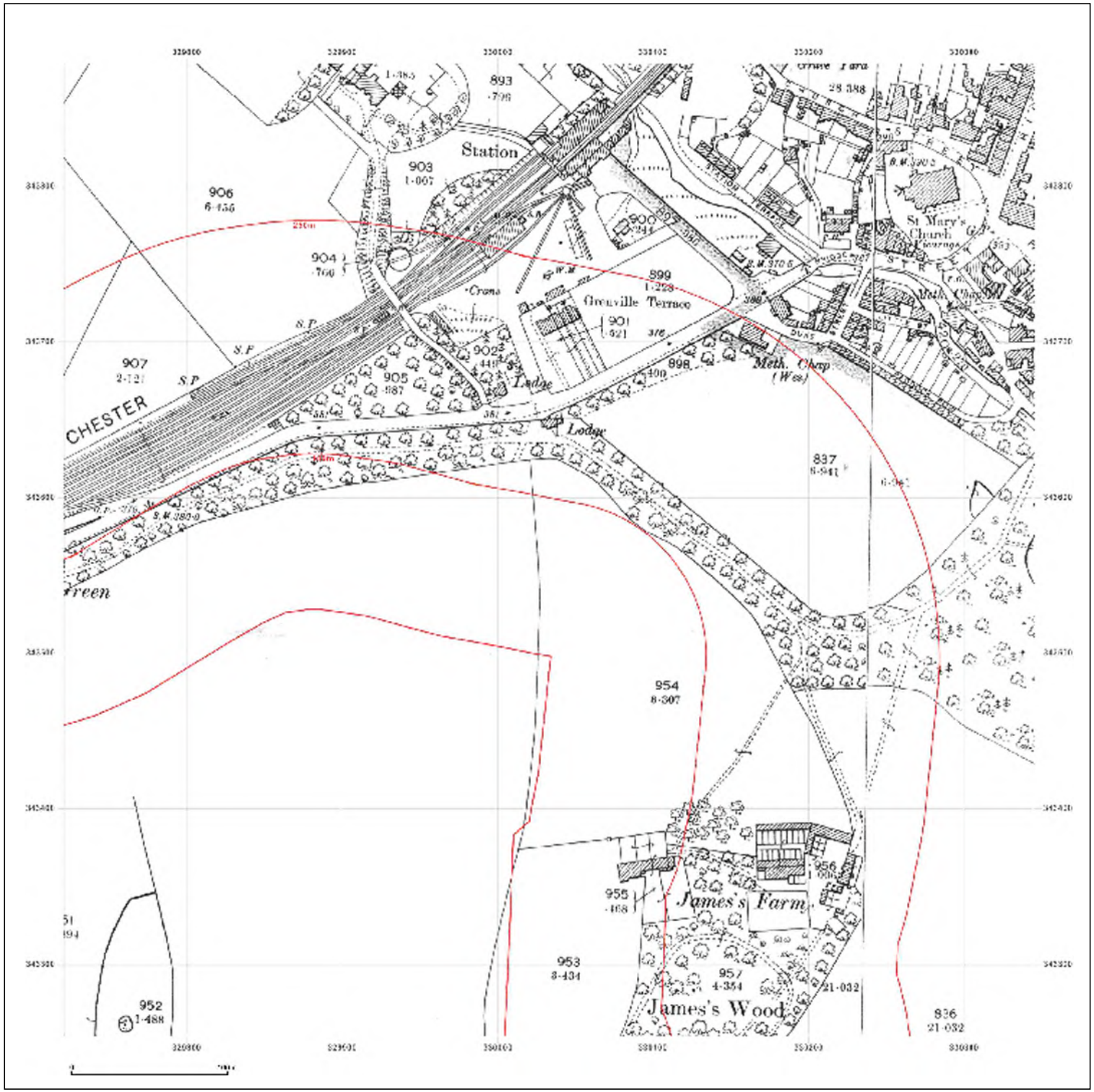
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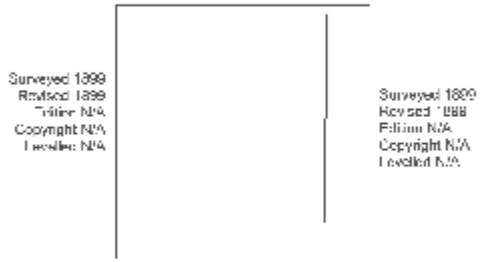
Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: County Series
Map date: 1899
Scale: 1:2,500
Printed at: 1:2,500

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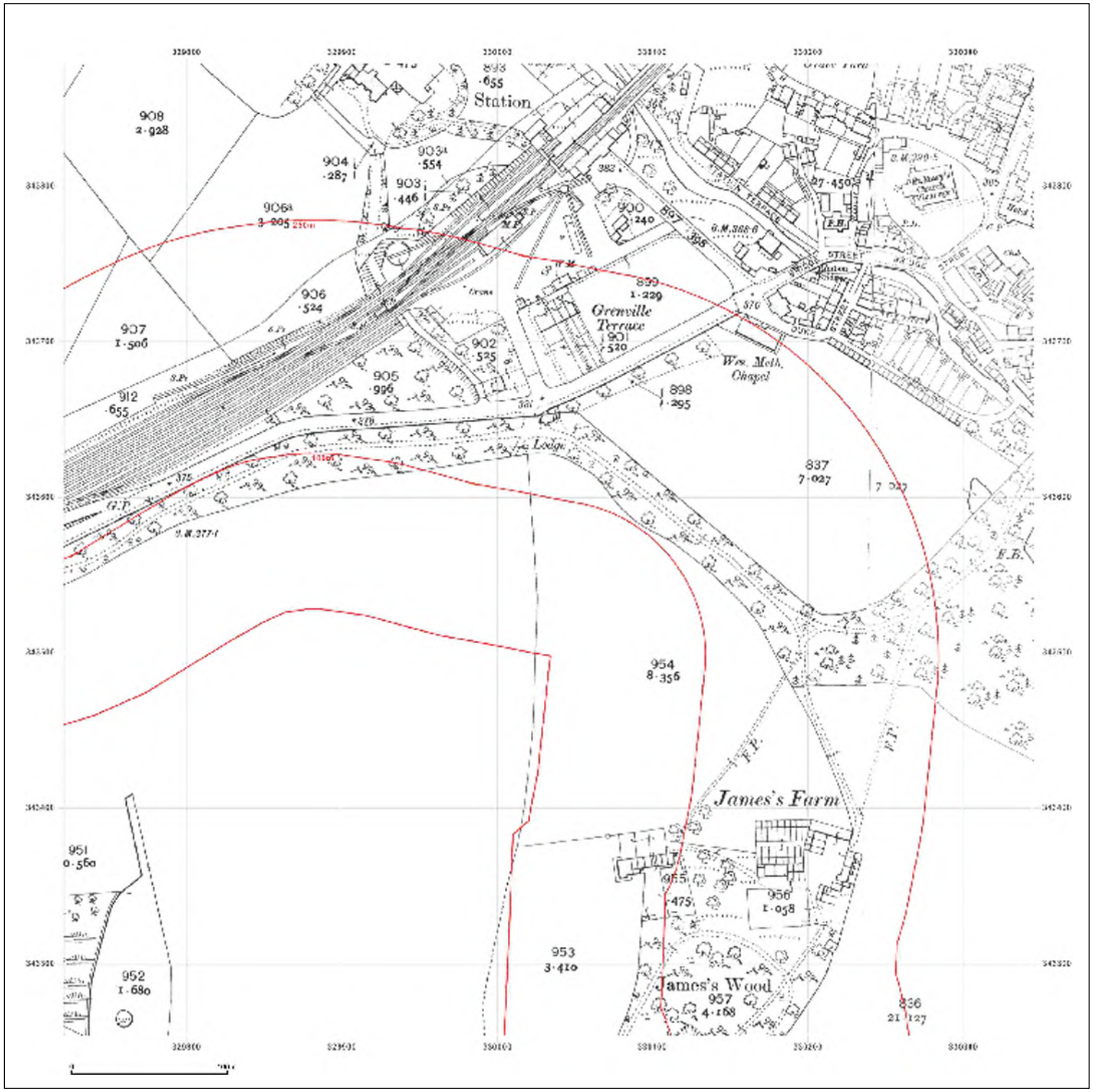
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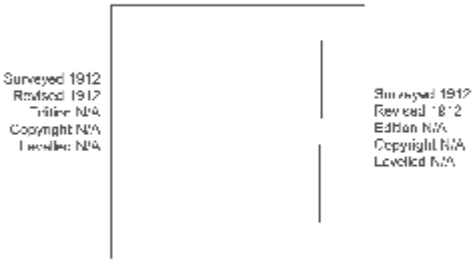
Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: County Series
Map date: **1912**
Scale: 1:2,500
Printed at: 1:2,500

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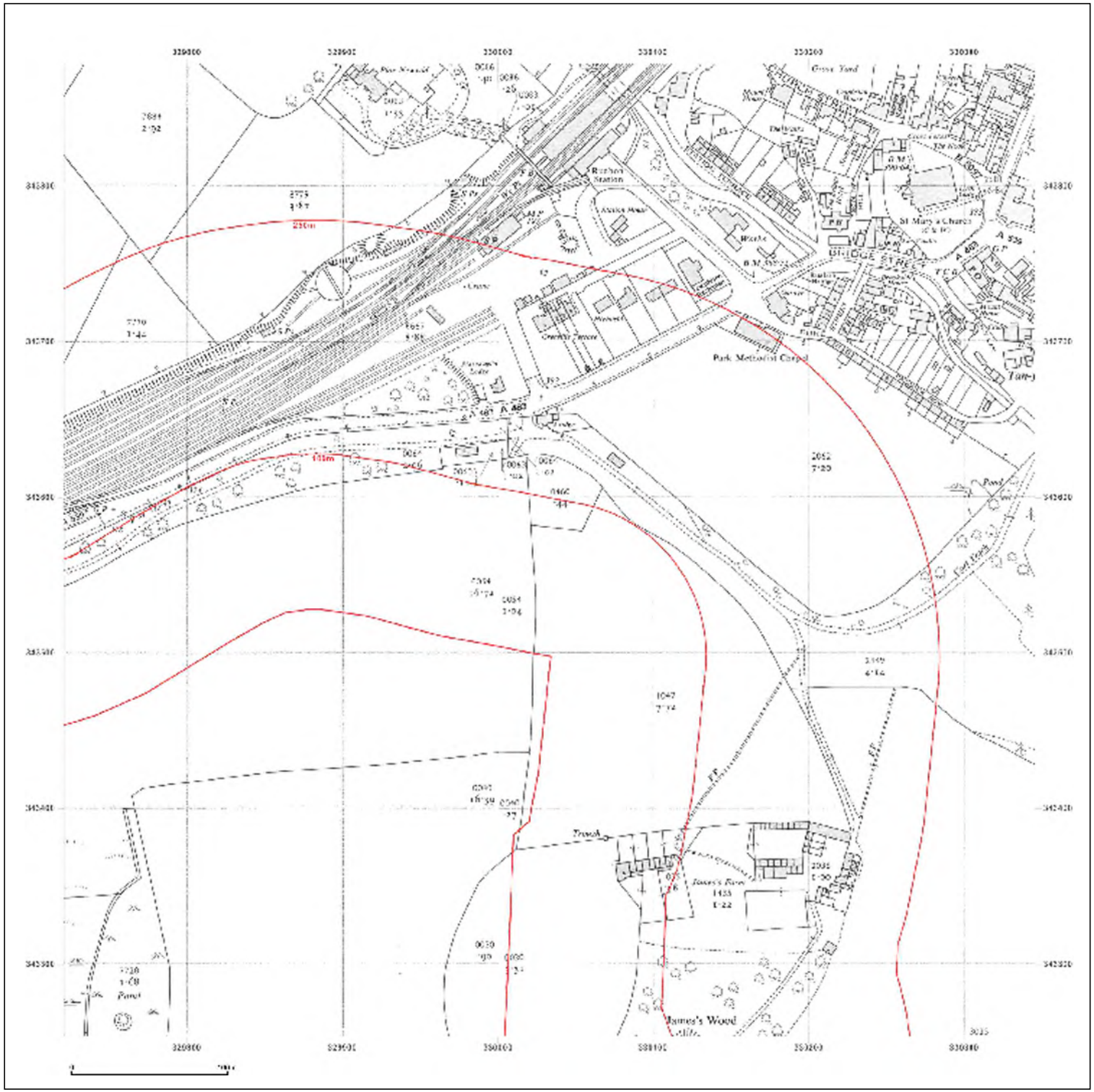
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: **1960-1961**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1961
Revised 1931
Edition N/A
Copyright 1962
Levelled 1959

Surveyed 1960
Revised 1880
Edition N/A
Copyright 1881
Levelled 1954

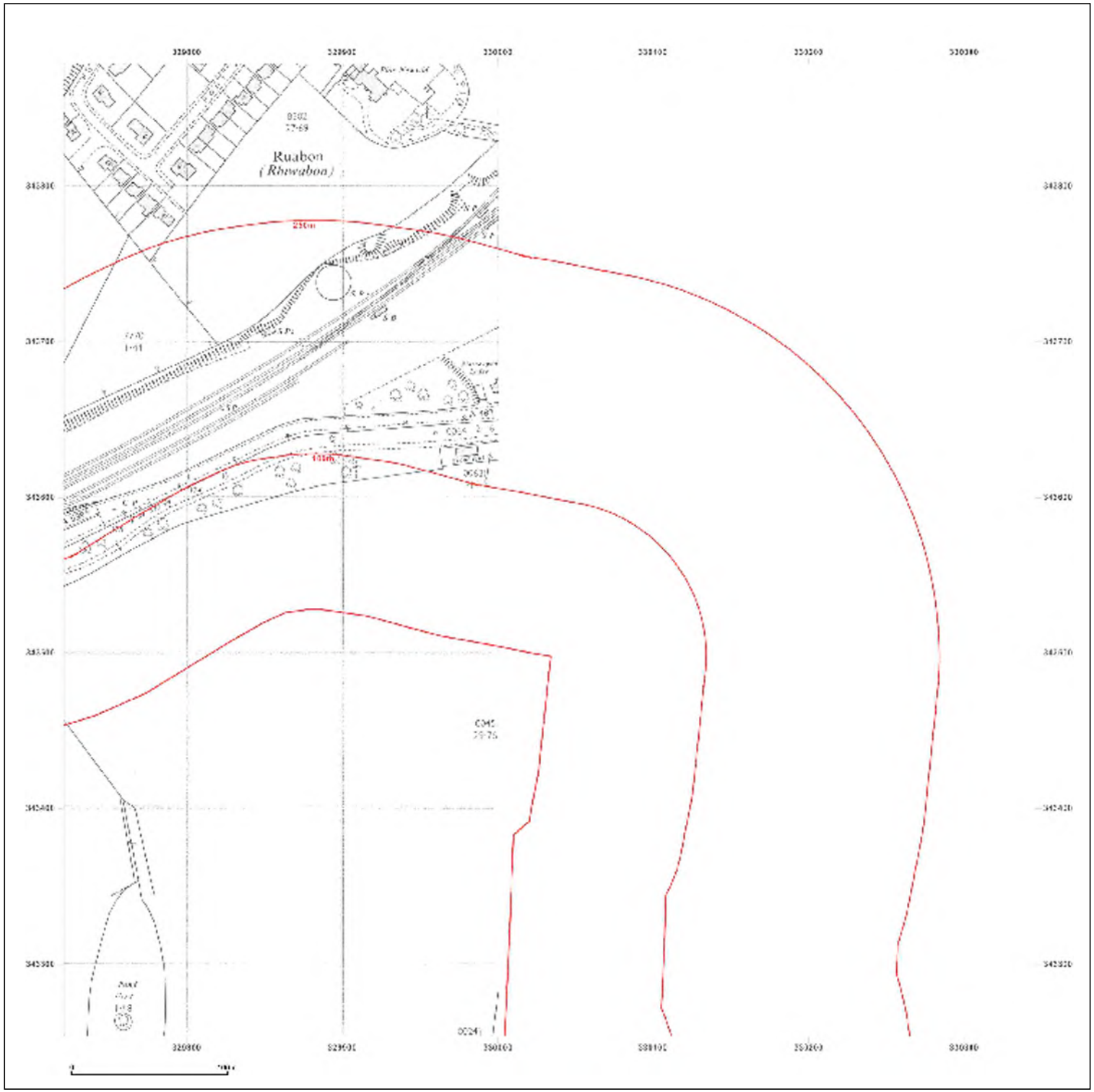
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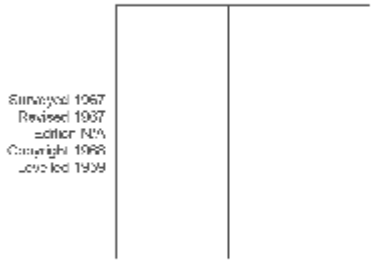
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: **1967**
Scale: 1:2,500
Printed at: 1:2,500

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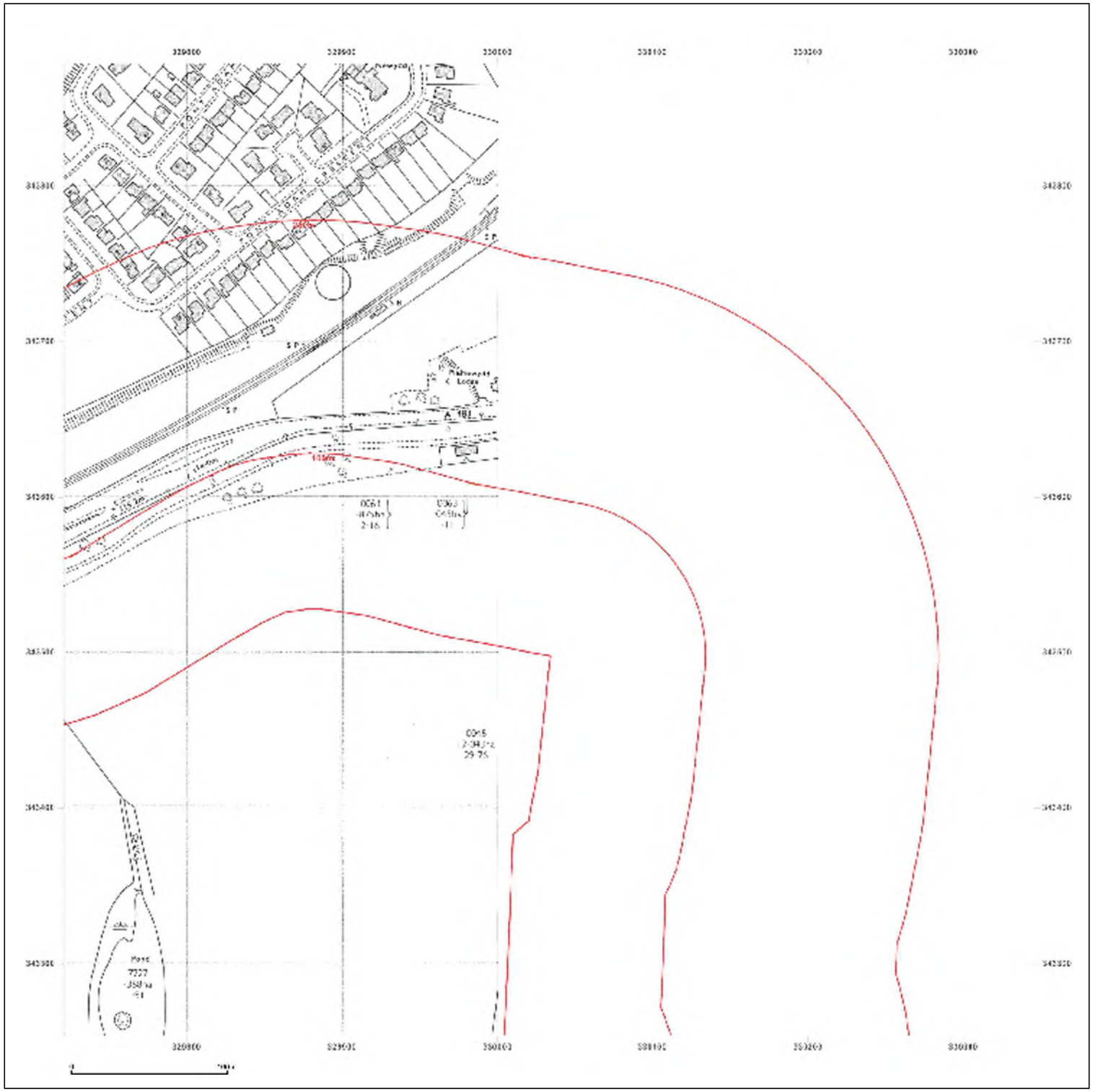
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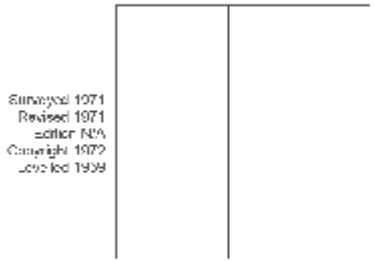
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: **1971**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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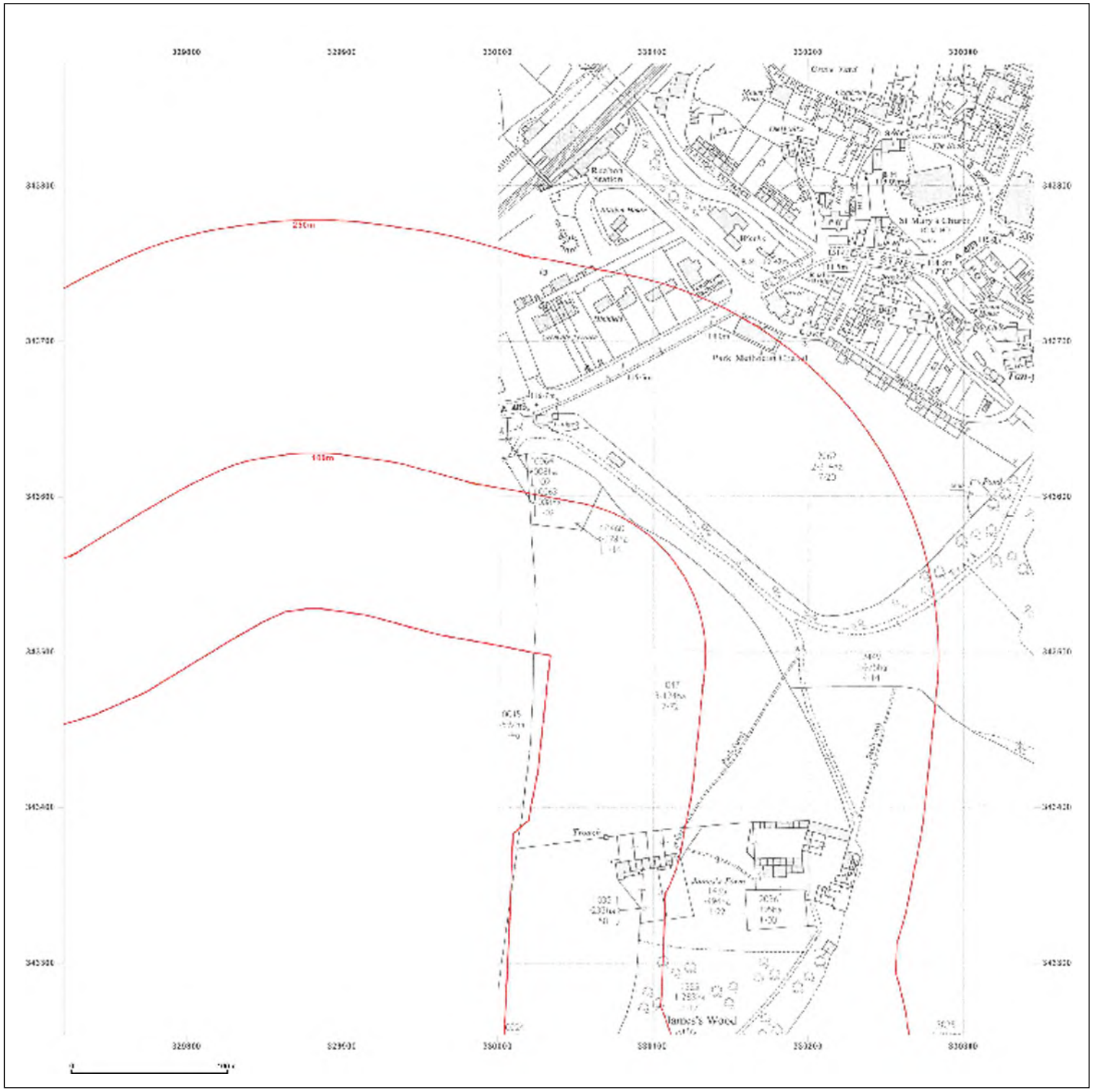
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: **1978**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1960
Revised 1960
Edition N/A
Copyright 1978
Levelled 1960

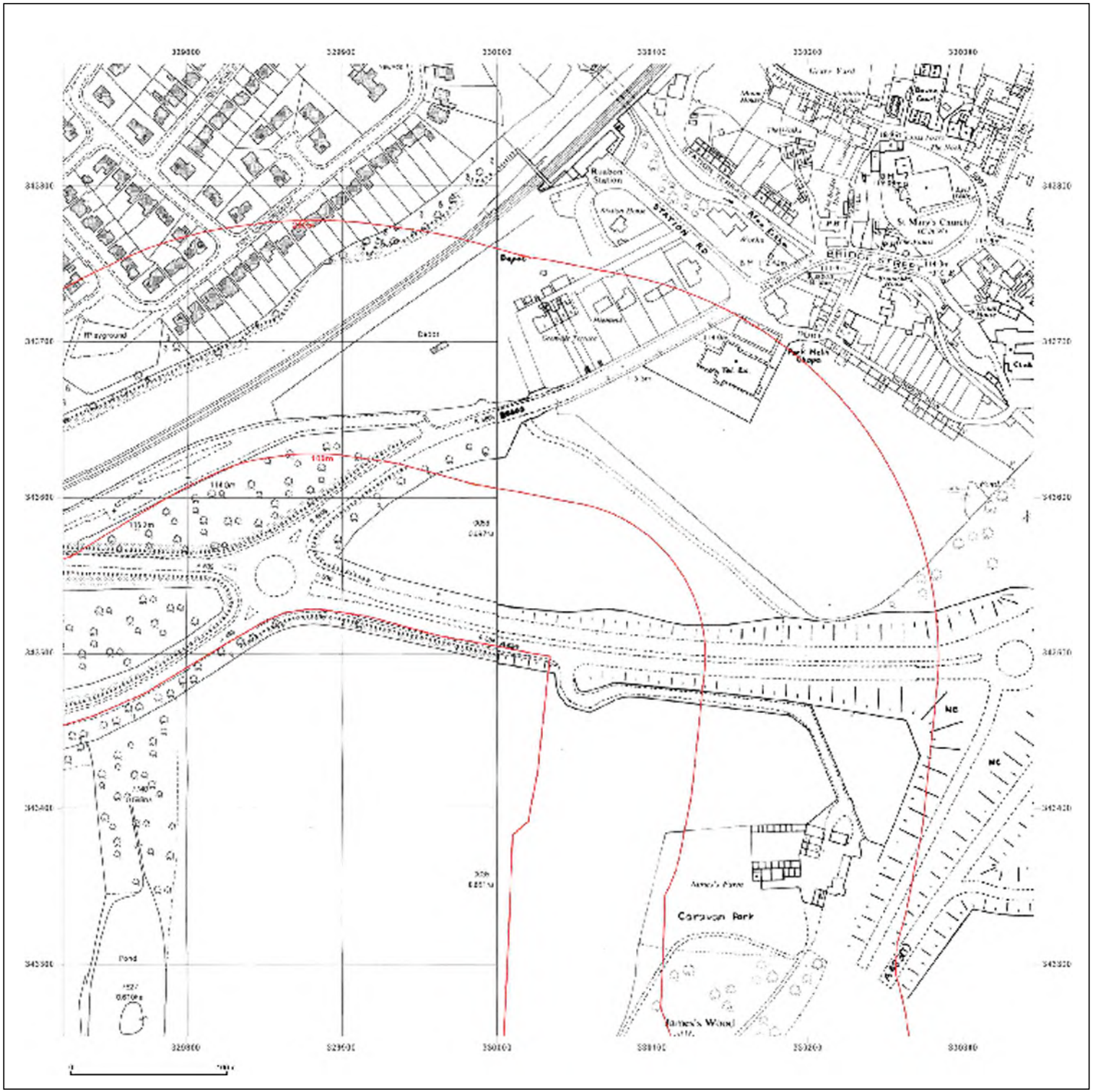
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Site Details:

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Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: 1989
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1989
Revised 1989
Edition N/A
Copyright 1991
Levelled N/A

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

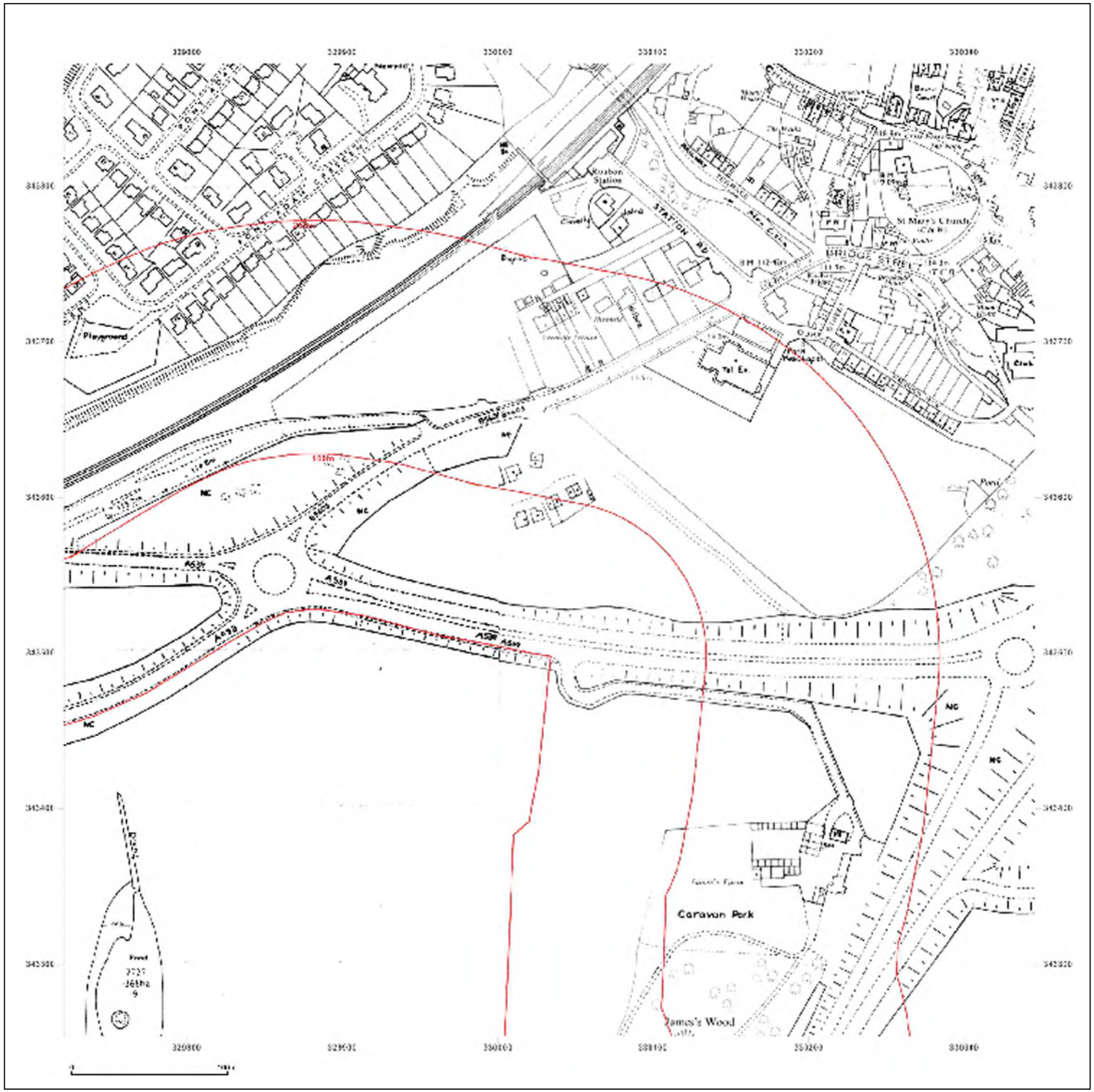
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: 1989-1992
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1989
Revised 1989
Edition N/A
Copyright 1989
Levelled N/A

Surveyed 1992
Revised 1992
Edition N/A
Copyright 1992
Levelled 1990

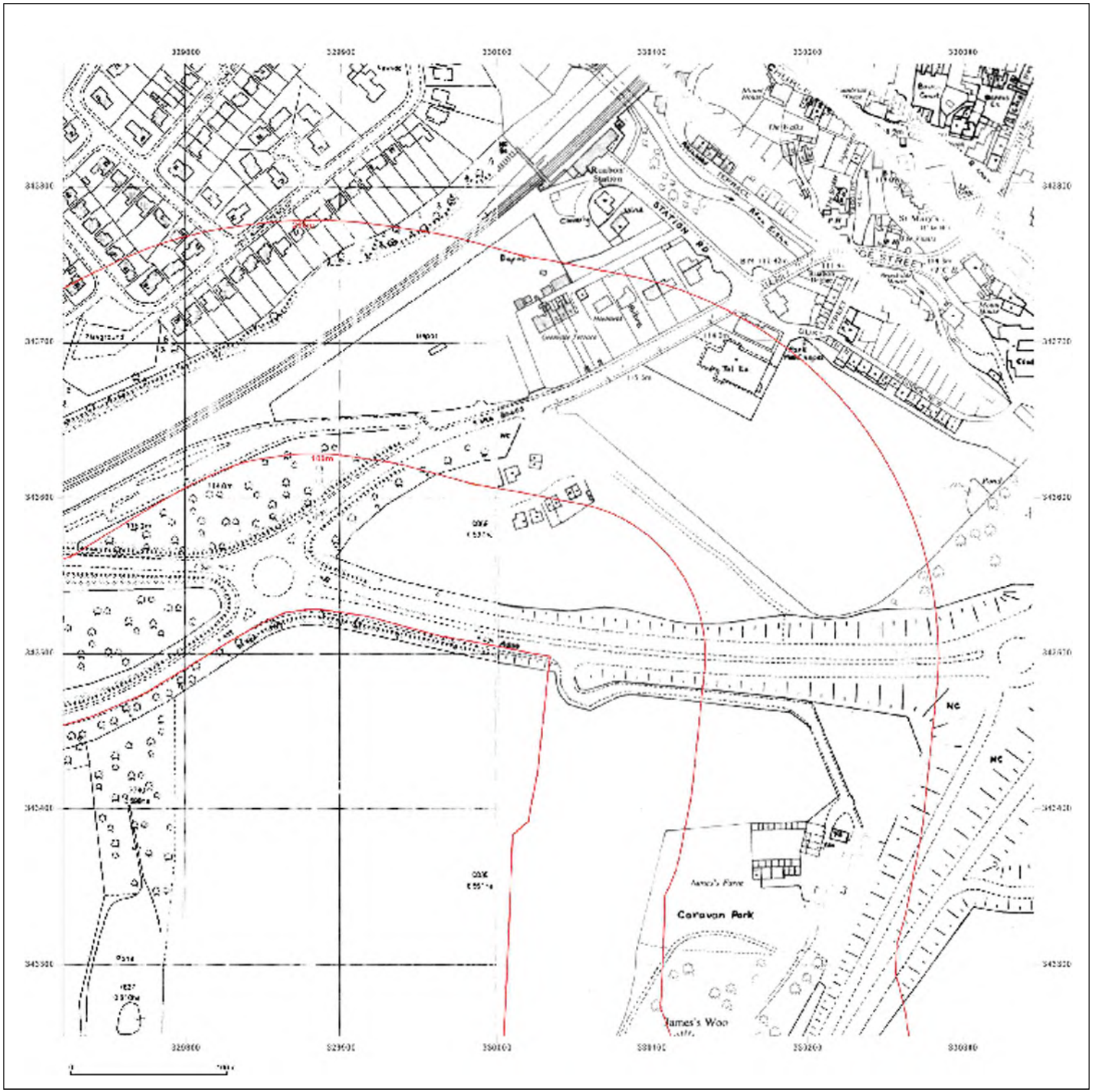
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Site Details:

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Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: 1991-1992
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

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

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Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: **1991-1994**
Scale: 1:2,500
Printed at: 1:2,500

N
W E
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Surveyed 1991
Revised 1991
Edition N/A
Copyright 1991
Levelled N/A

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

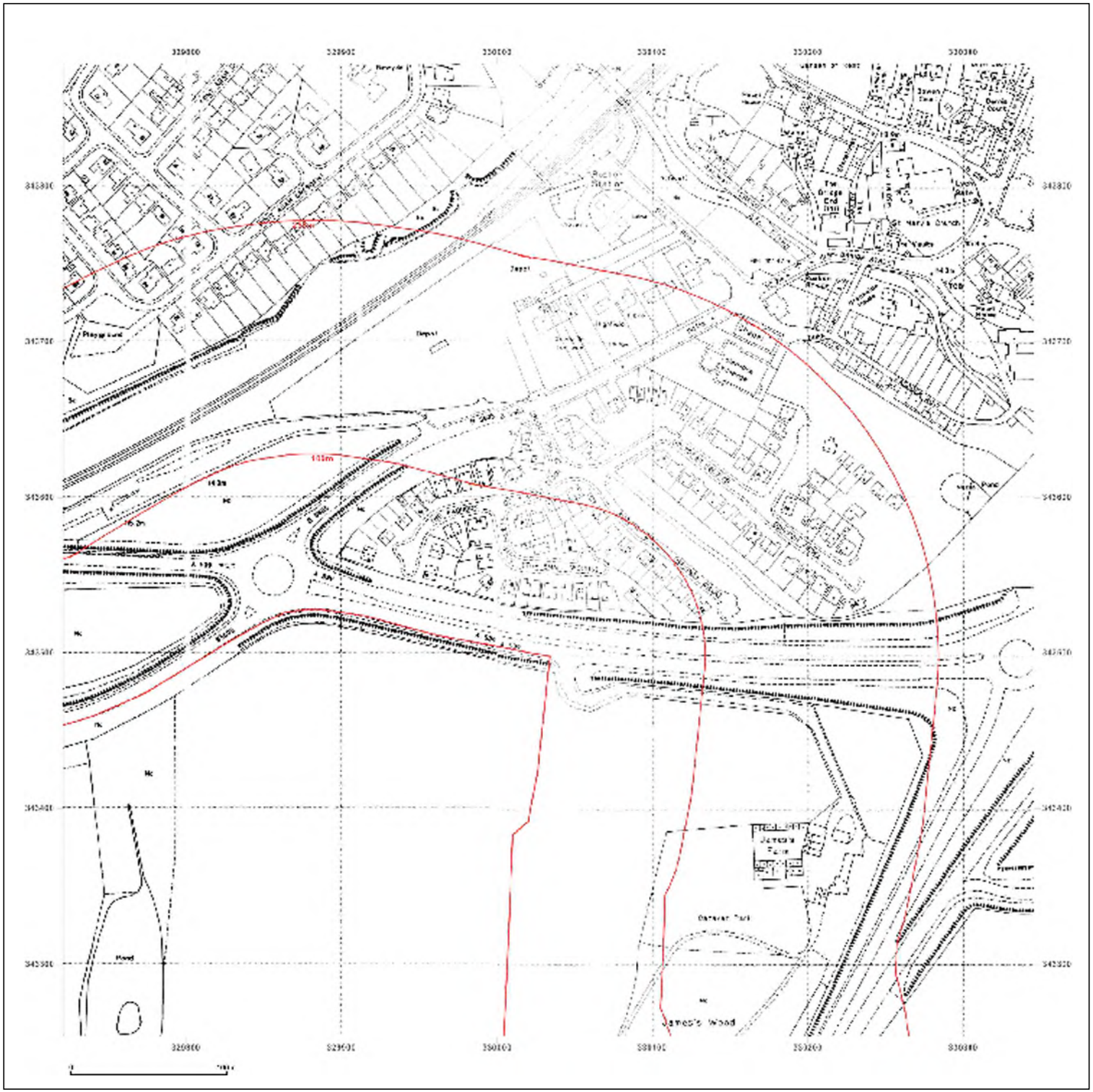
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: 1994-1995
Scale: 1:2,500
Printed at: 1:2,500

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

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A

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Site Details:

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Client Ref: 773135
Report Ref: GS-2356368_LS_B2
Grid Ref: 330033, 343566

Map Name: National Grid
Map date: 1995
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1995
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

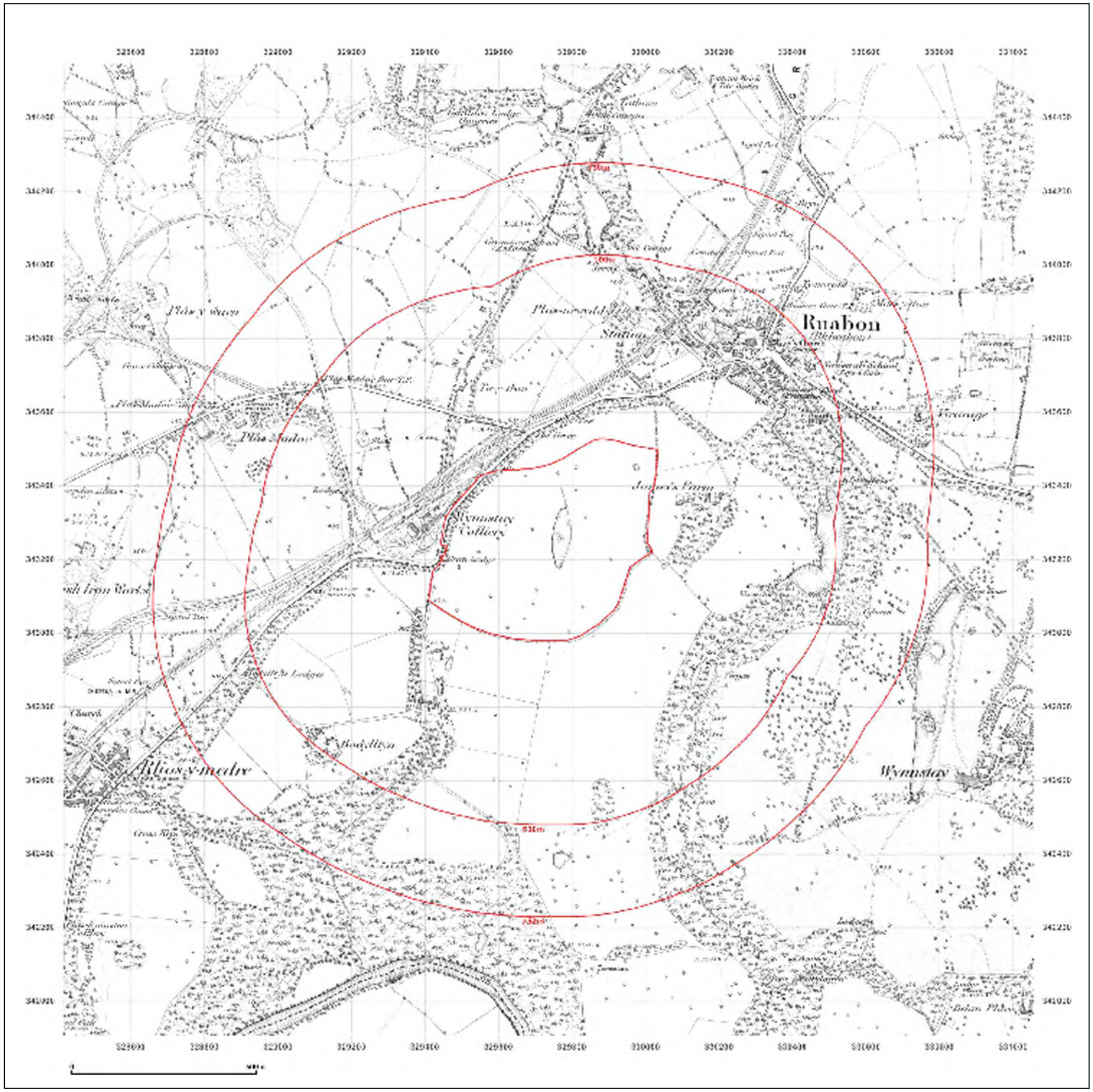
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Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: County Series
Map date: 1873
Scale: 1:10,560
Printed at: 1:10,560

N
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Surveyed 1873
Revised 1873
Edition N/A
Copyright N/A
Reprinted N/A

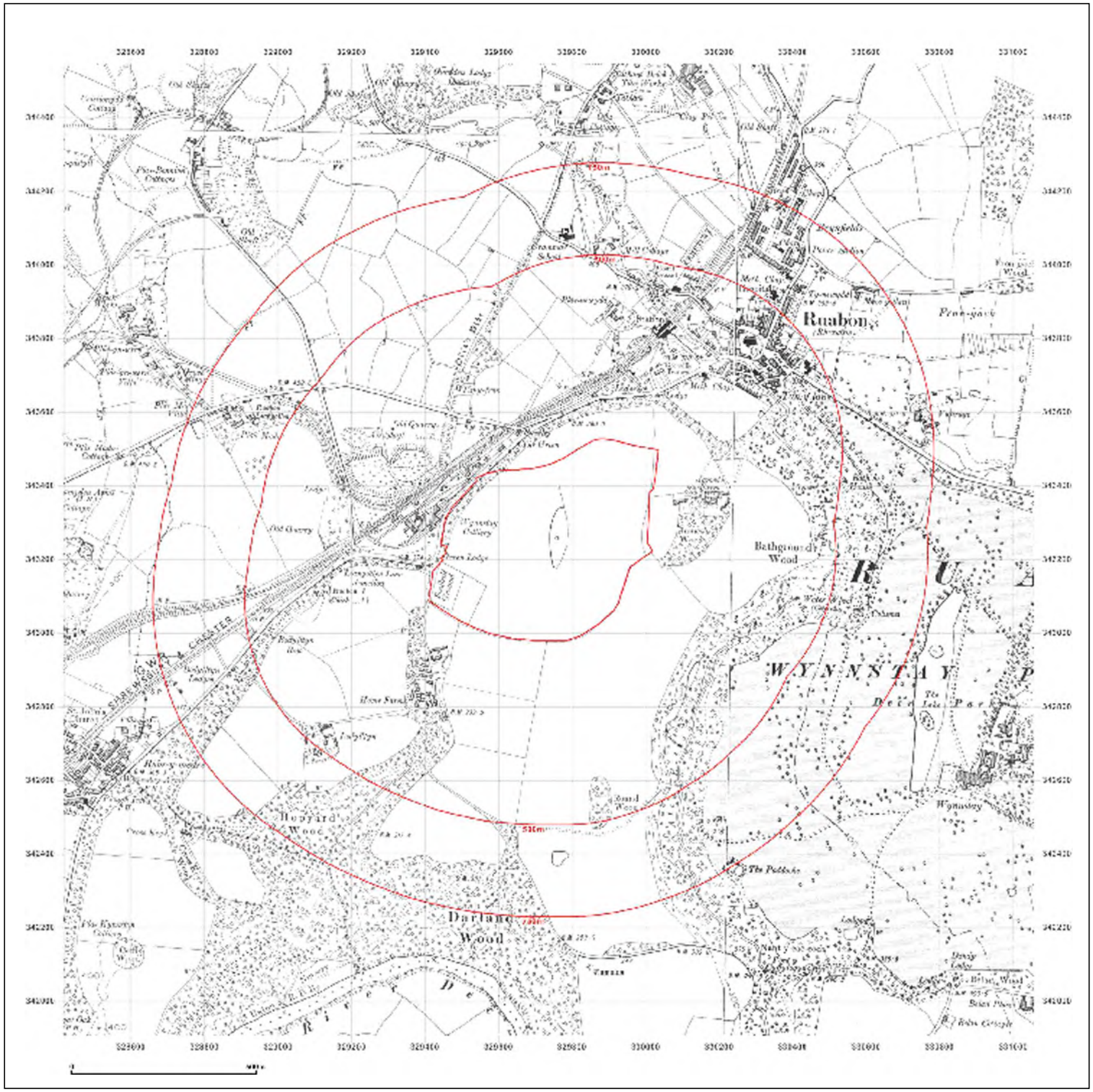
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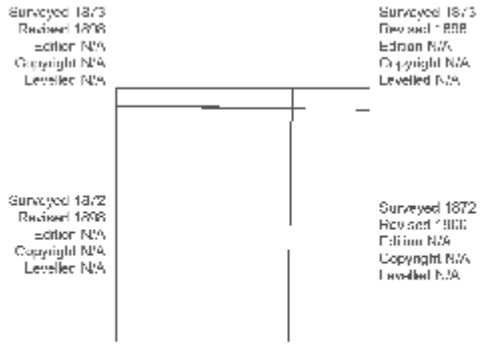
Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: County Series
Map date: **1898-1900**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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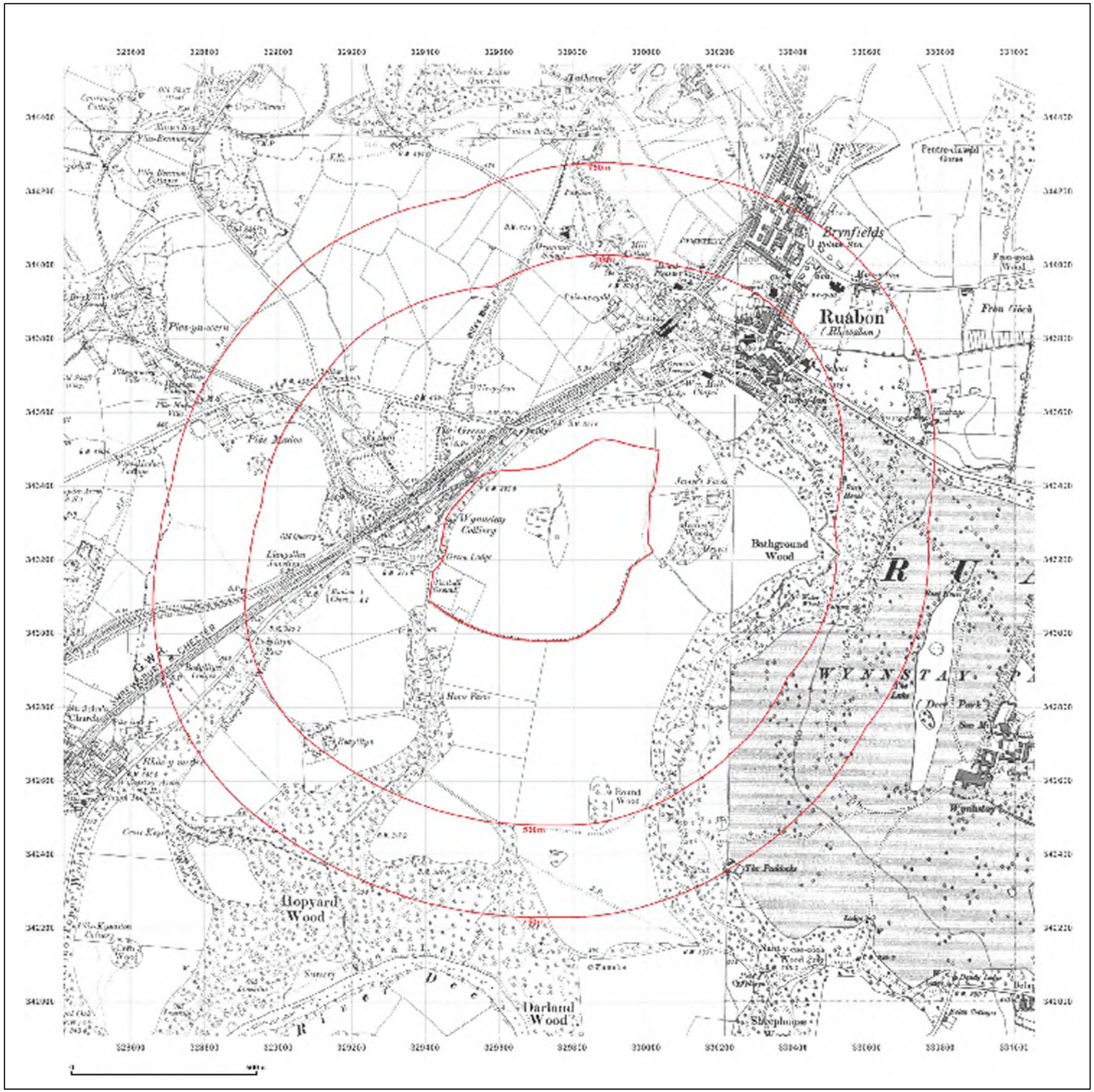
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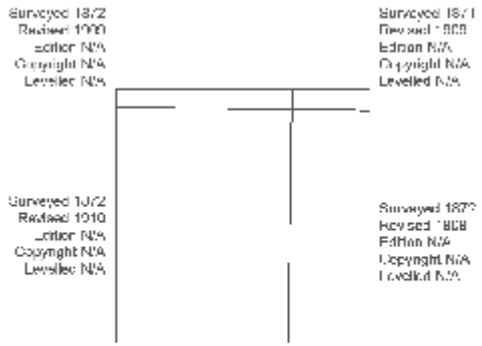
Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: County Series
Map date: 1909-1910
Scale: 1:10,560
Printed at: 1:10,560

N
W E
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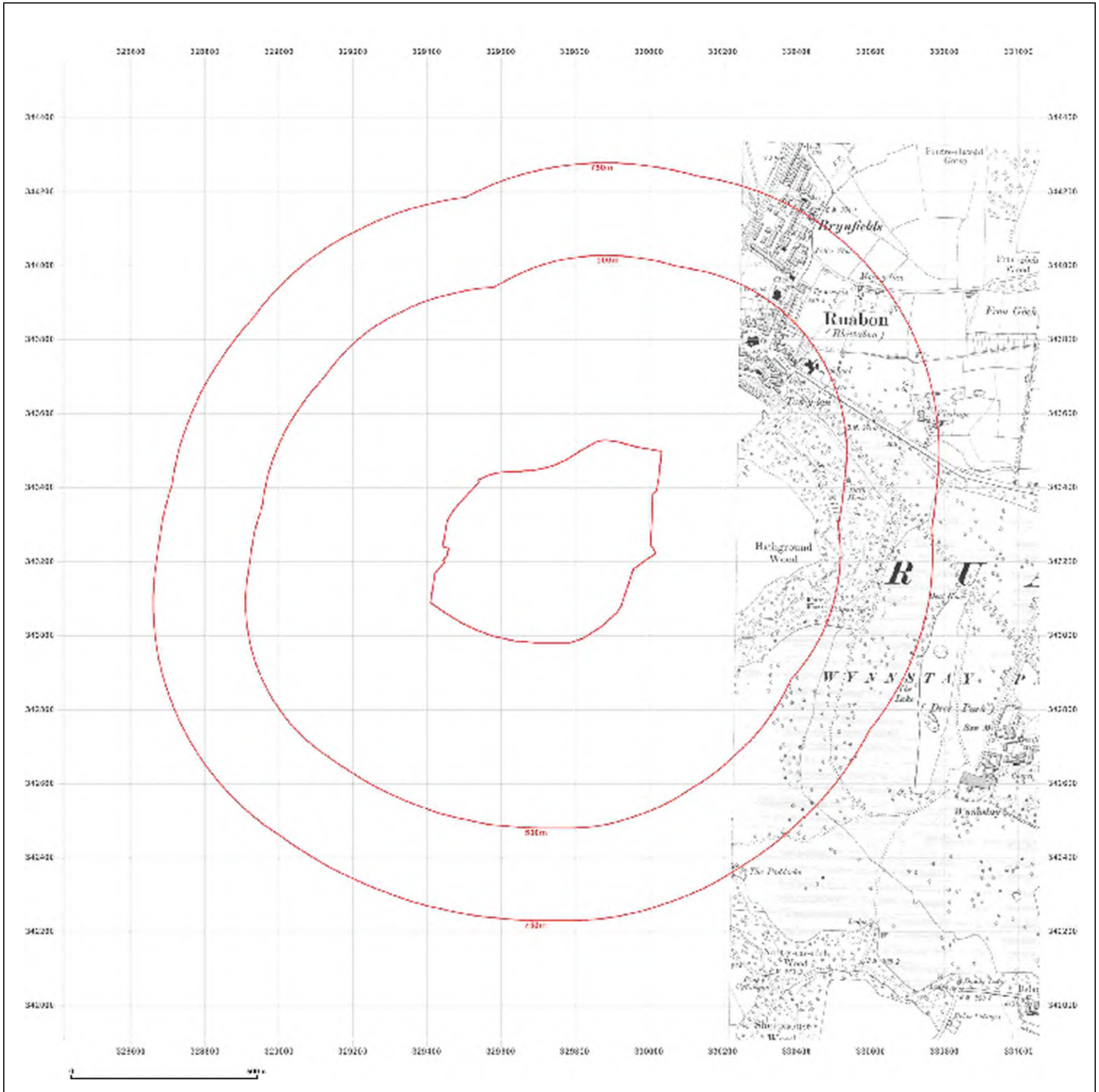
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: County Series

Map date: **1914**

Scale: 1:10,560

Printed at: 1:10,560

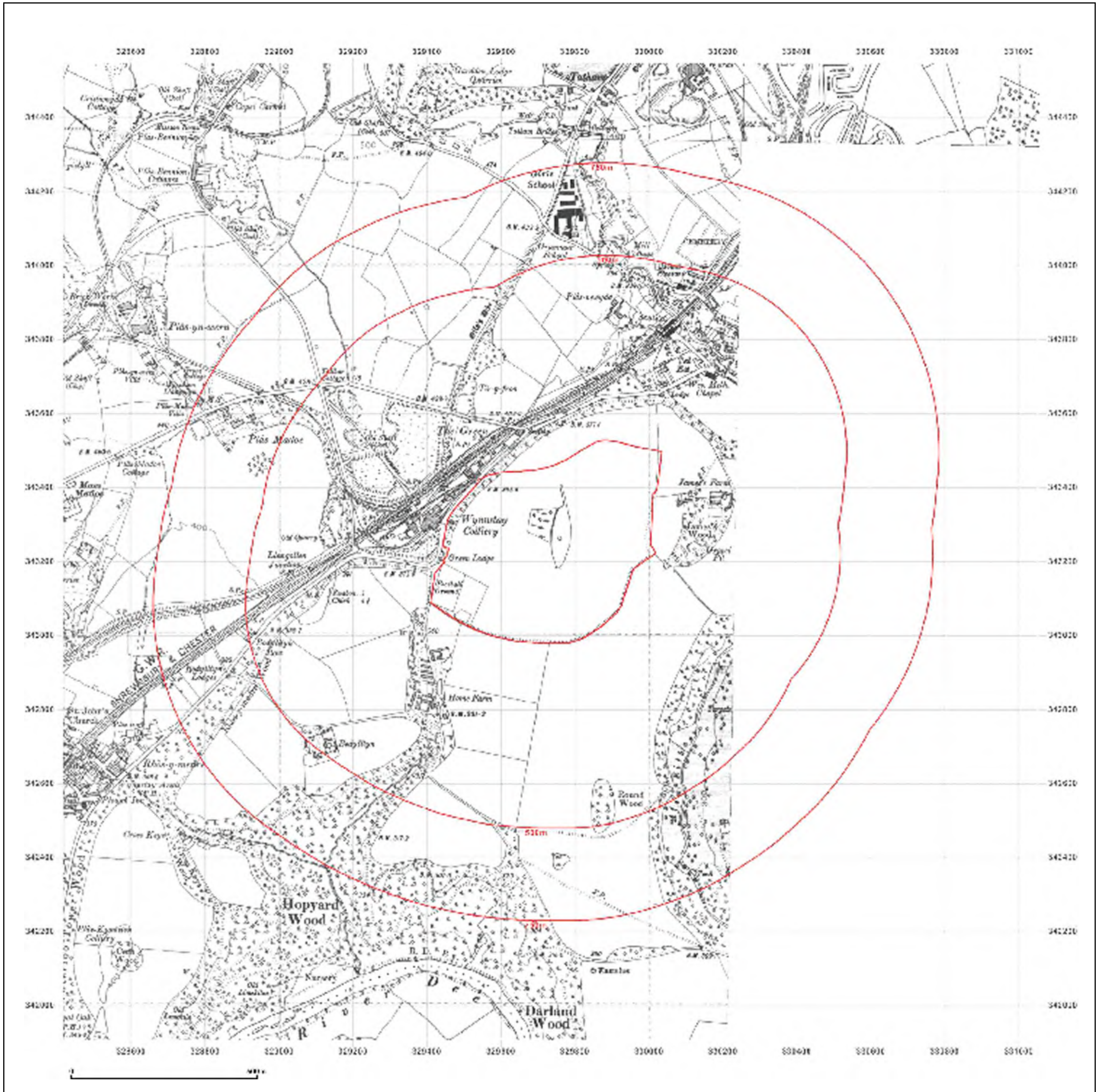
Surveyed 1872
Revised 1914
Edition N/A
Copyright N/A
Levelled N/A

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LL14 6DW

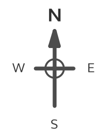
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Report Ref: GS-2356368
Grid Ref: 329736, 343226

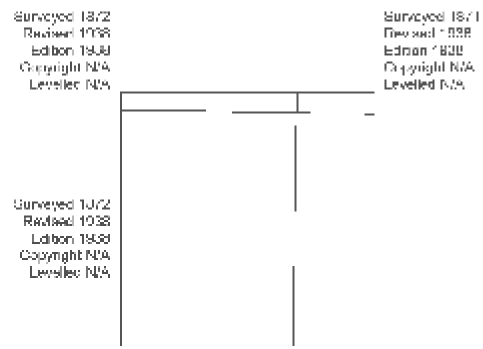
Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560



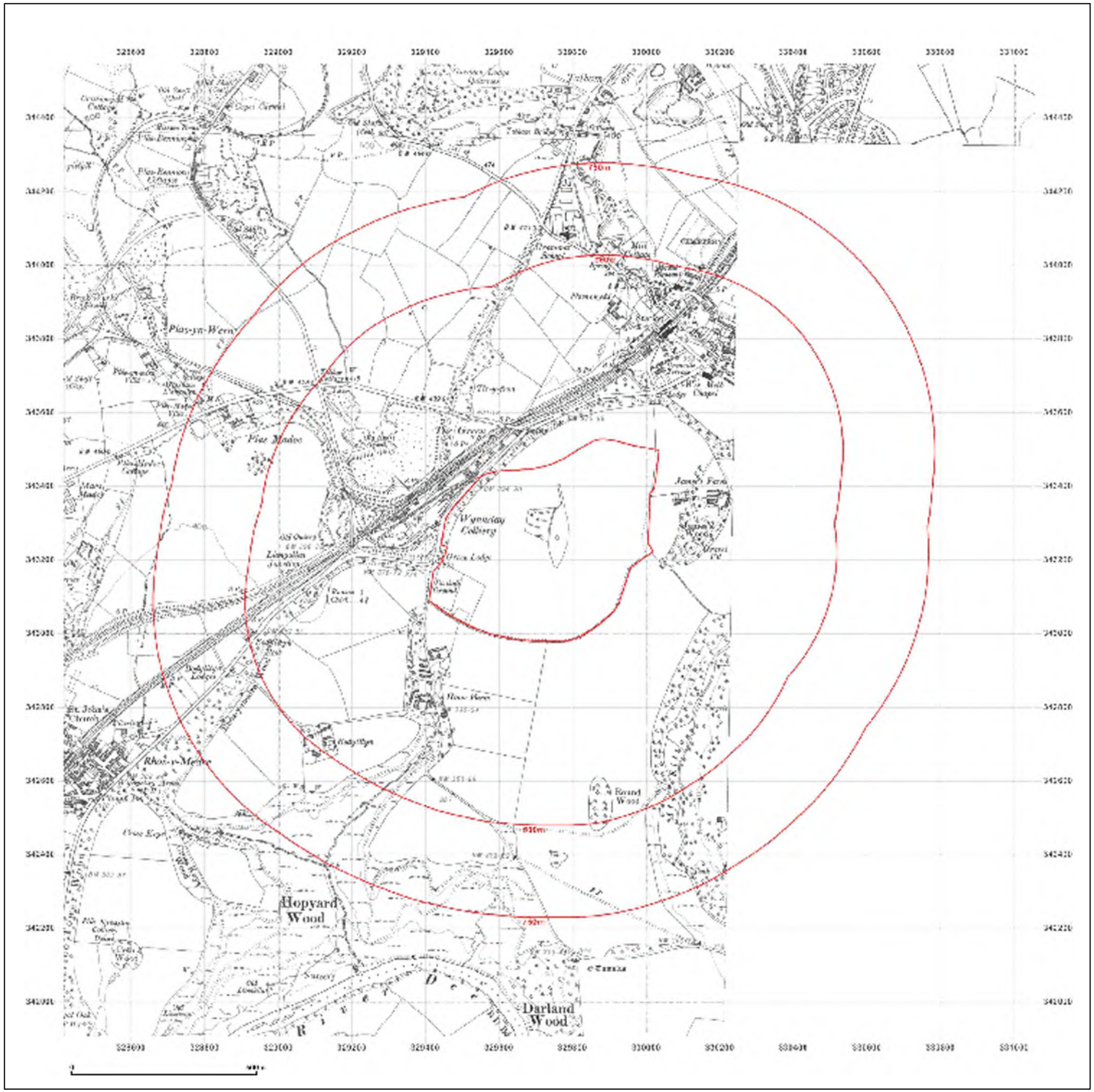


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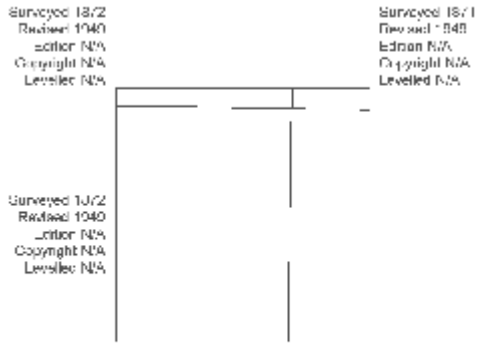
Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: County Series
Map date: **1949**
Scale: 1:10,560
Printed at: 1:10,560

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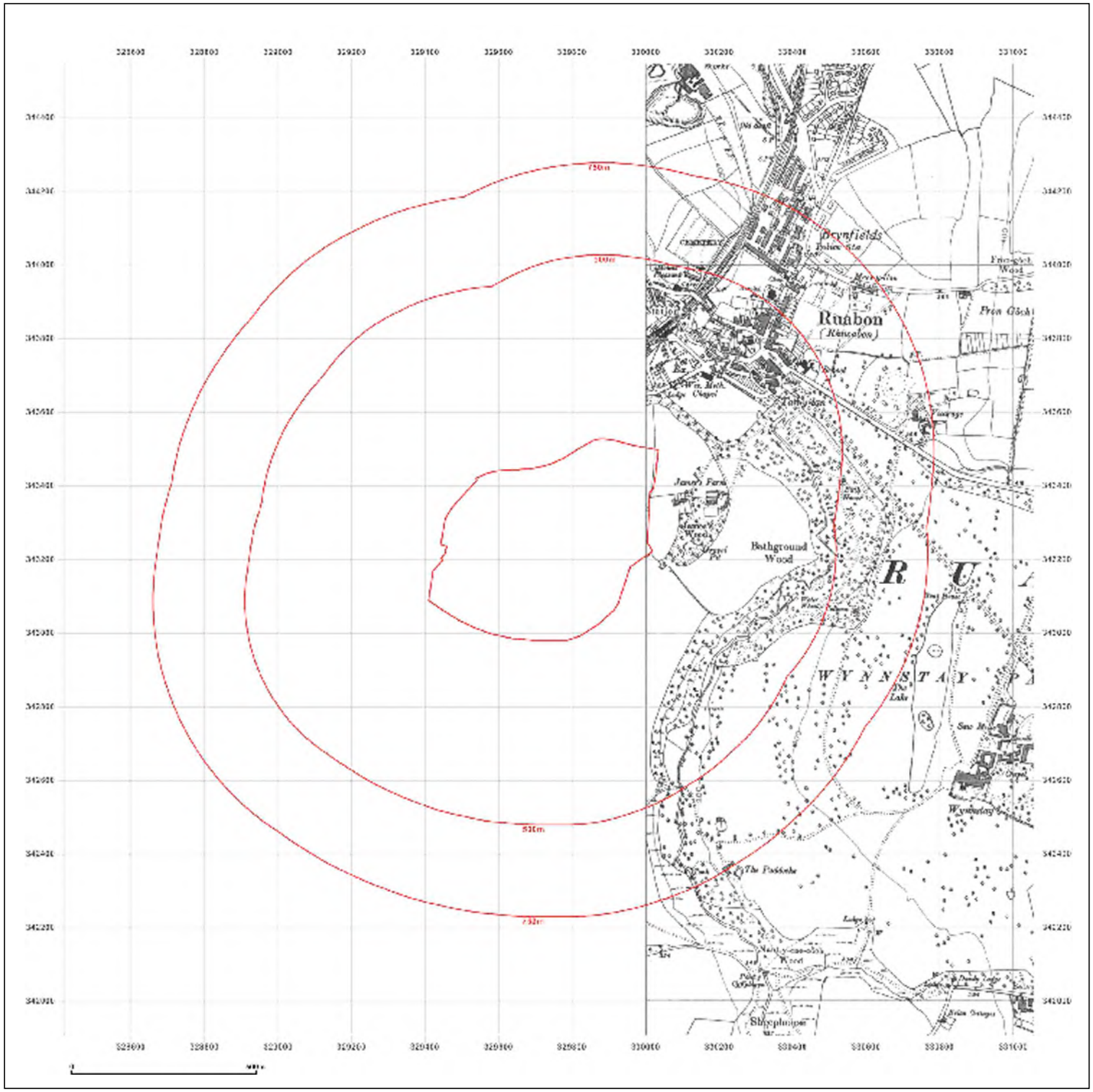
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: Provisional
Map date: **1949**
Scale: 1:10,560
Printed at: 1:10,560

N
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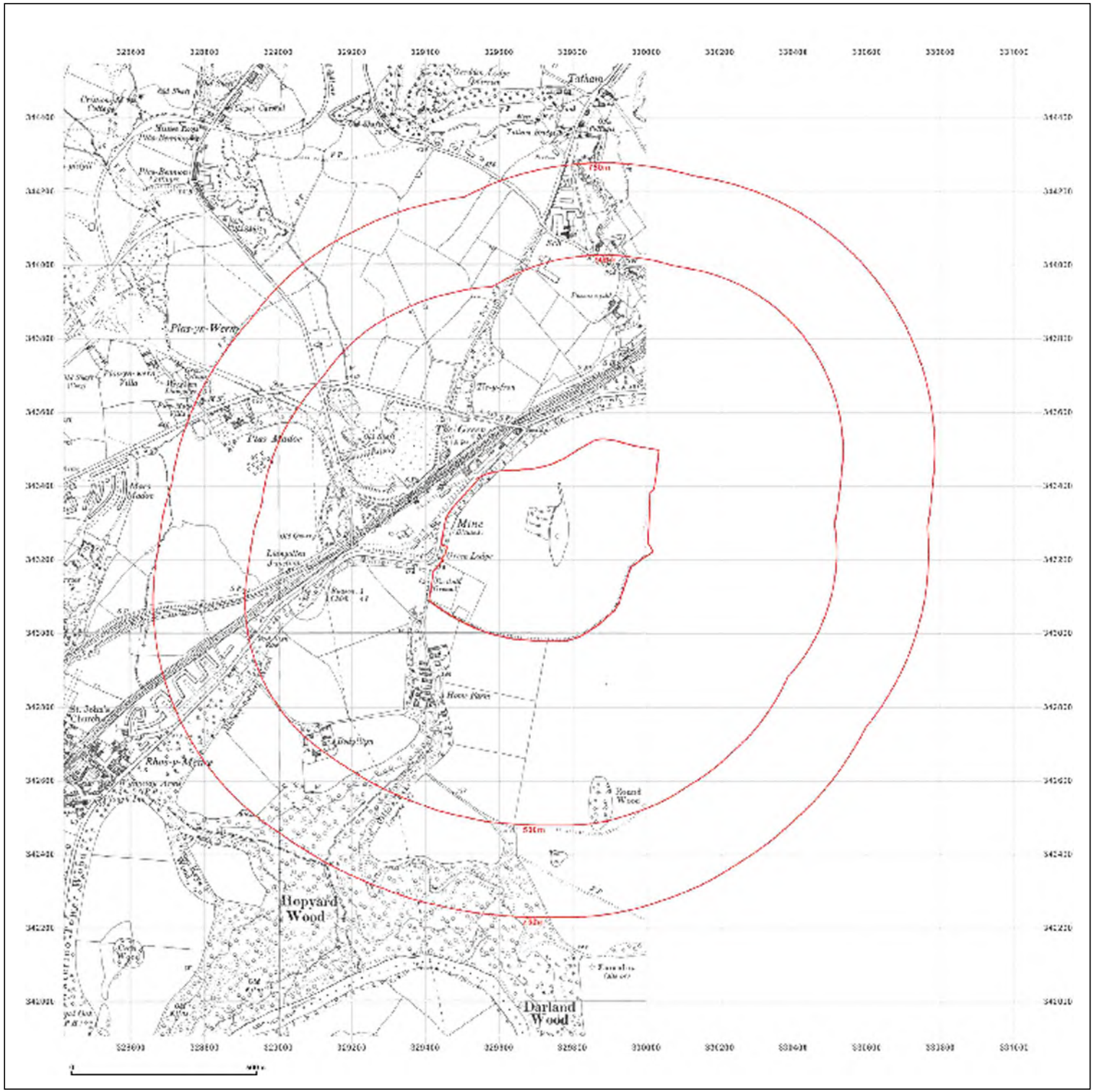
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Groundsure INSIGHTS

Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: Provisional
Map date: **1960**
Scale: 1:10,560
Printed at: 1:10,560

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

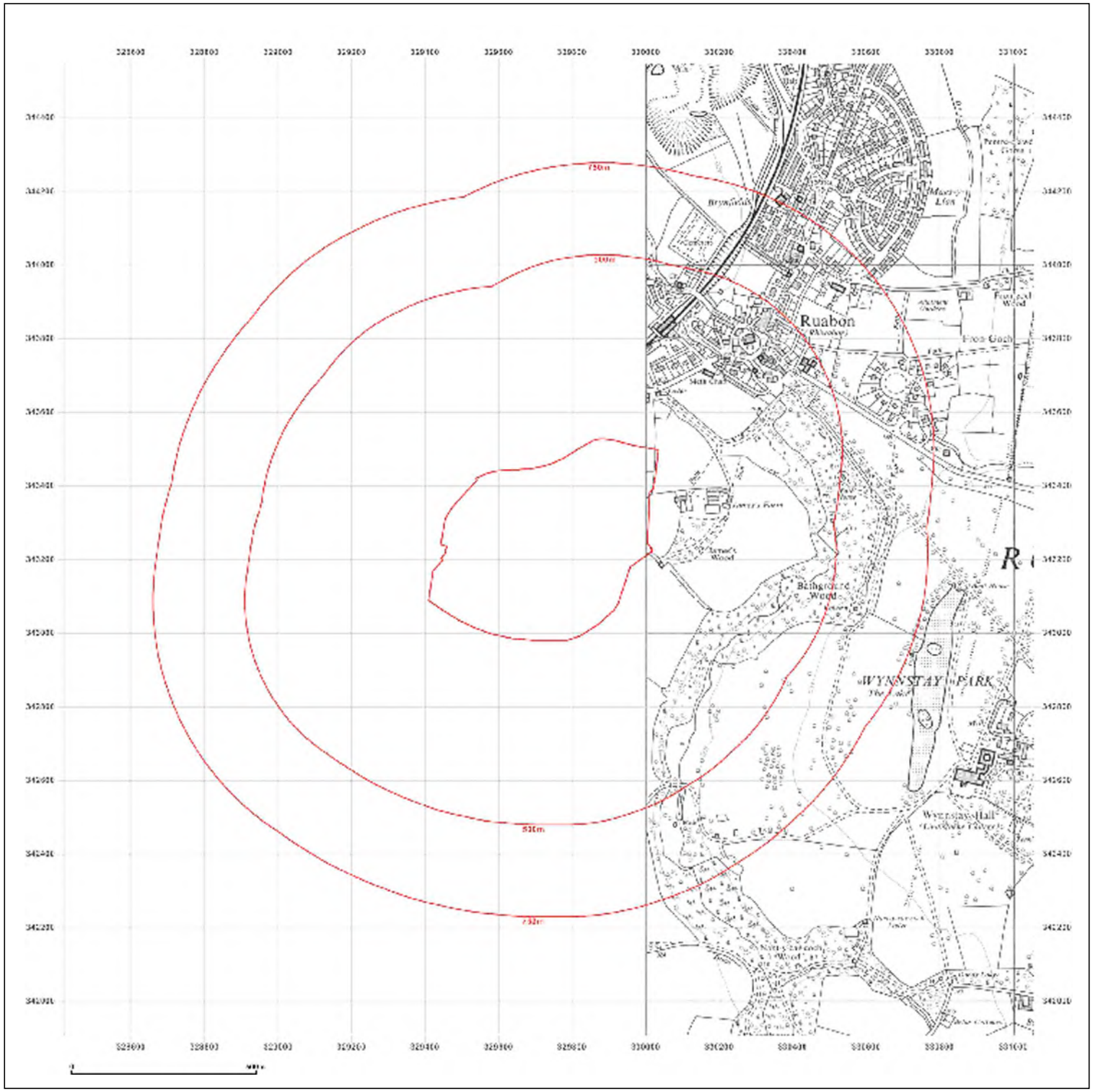
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Groundsure INSIGHTS

Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: Provisional
Map date: **1968**
Scale: 1:10,560
Printed at: 1:10,560

N
W E
S

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

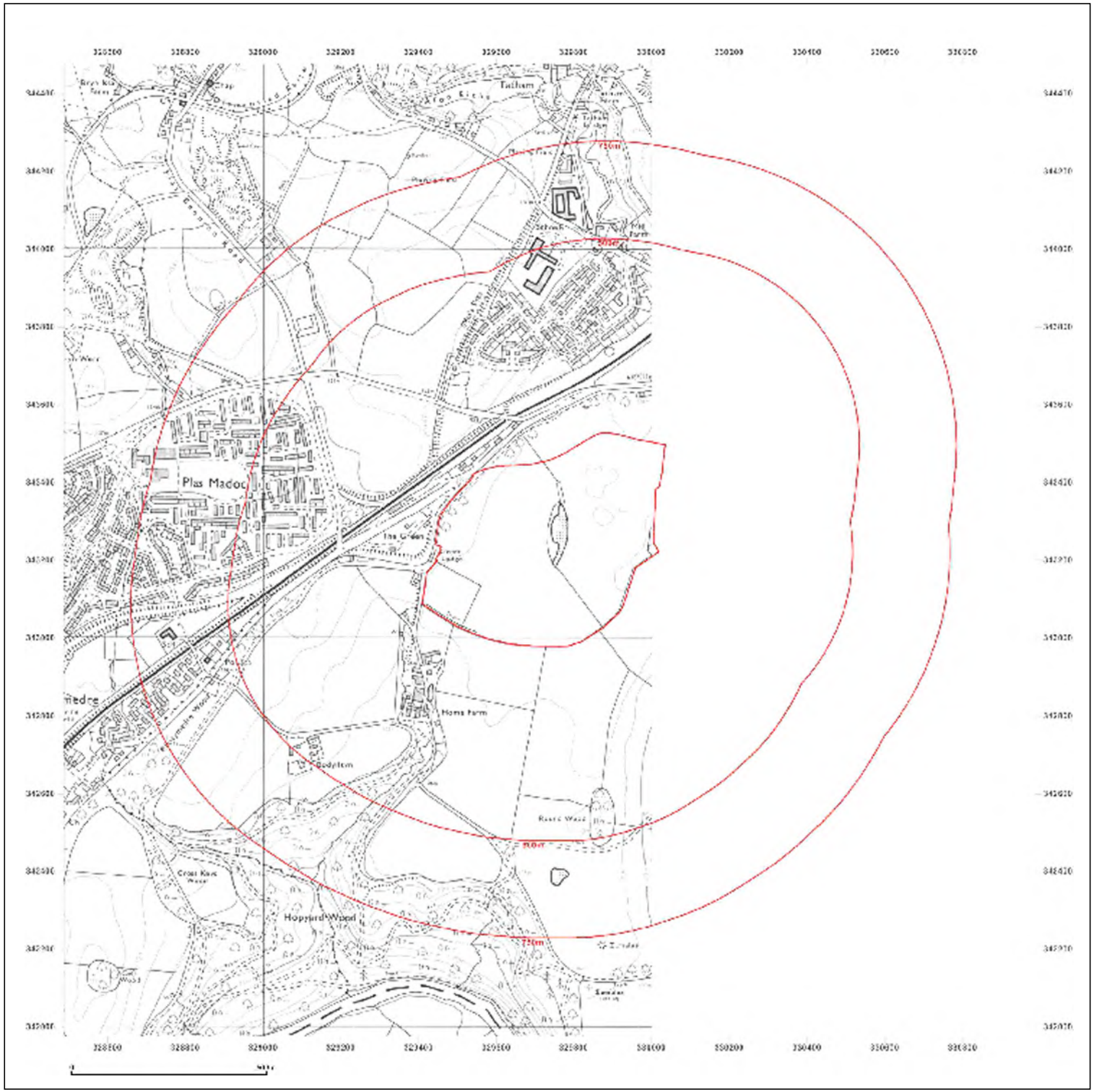
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Groundsure INSIGHTS

Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: National Grid
Map date: **1974**
Scale: 1:10,000
Printed at: 1:10,000

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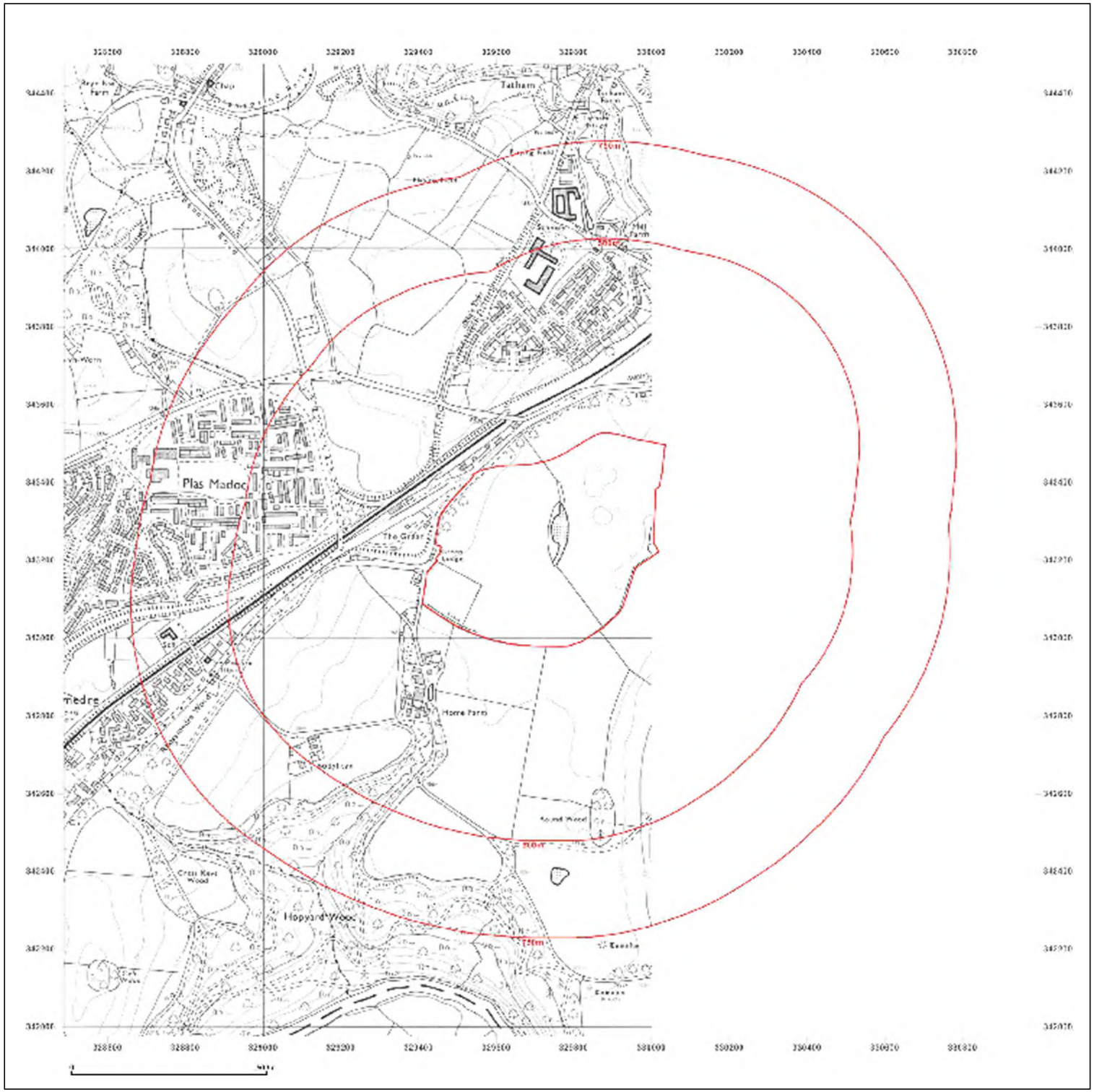
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: National Grid
Map date: **1985**
Scale: 1:10,000
Printed at: 1:10,000

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W E
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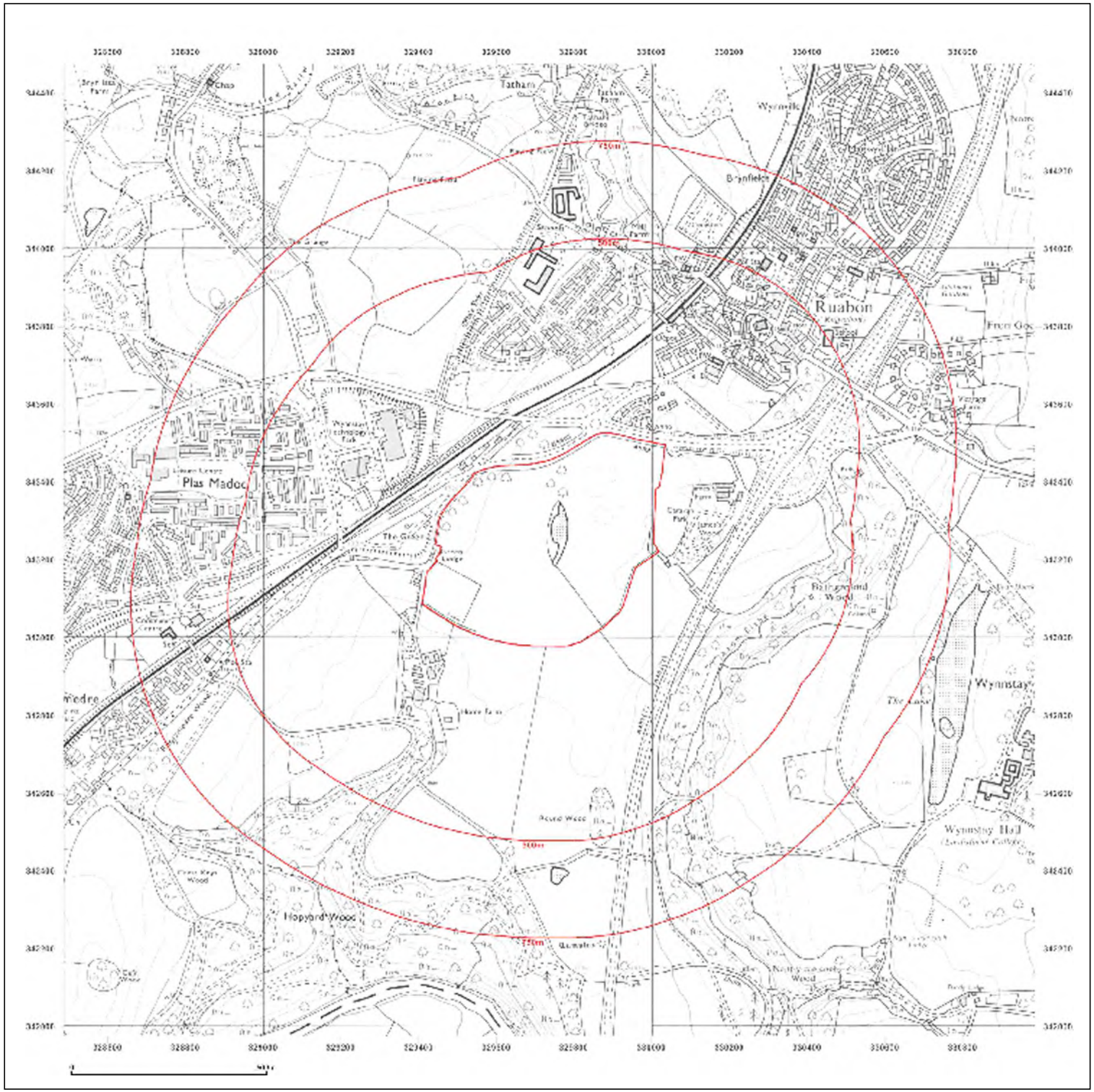
Surveyed 1971
Revised 1985
Copyright N/A

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Groundsure INSIGHTS

Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: National Grid
Map date: **1993-1994**
Scale: 1:10,000
Printed at: 1:10,000

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Surveyed 1971
Revised 1994
Publication N/A
Copyright N/A
Unedited N/A

Surveyed 1991
Revised 1992
Publication N/A
Copyright N/A
Unedited N/A

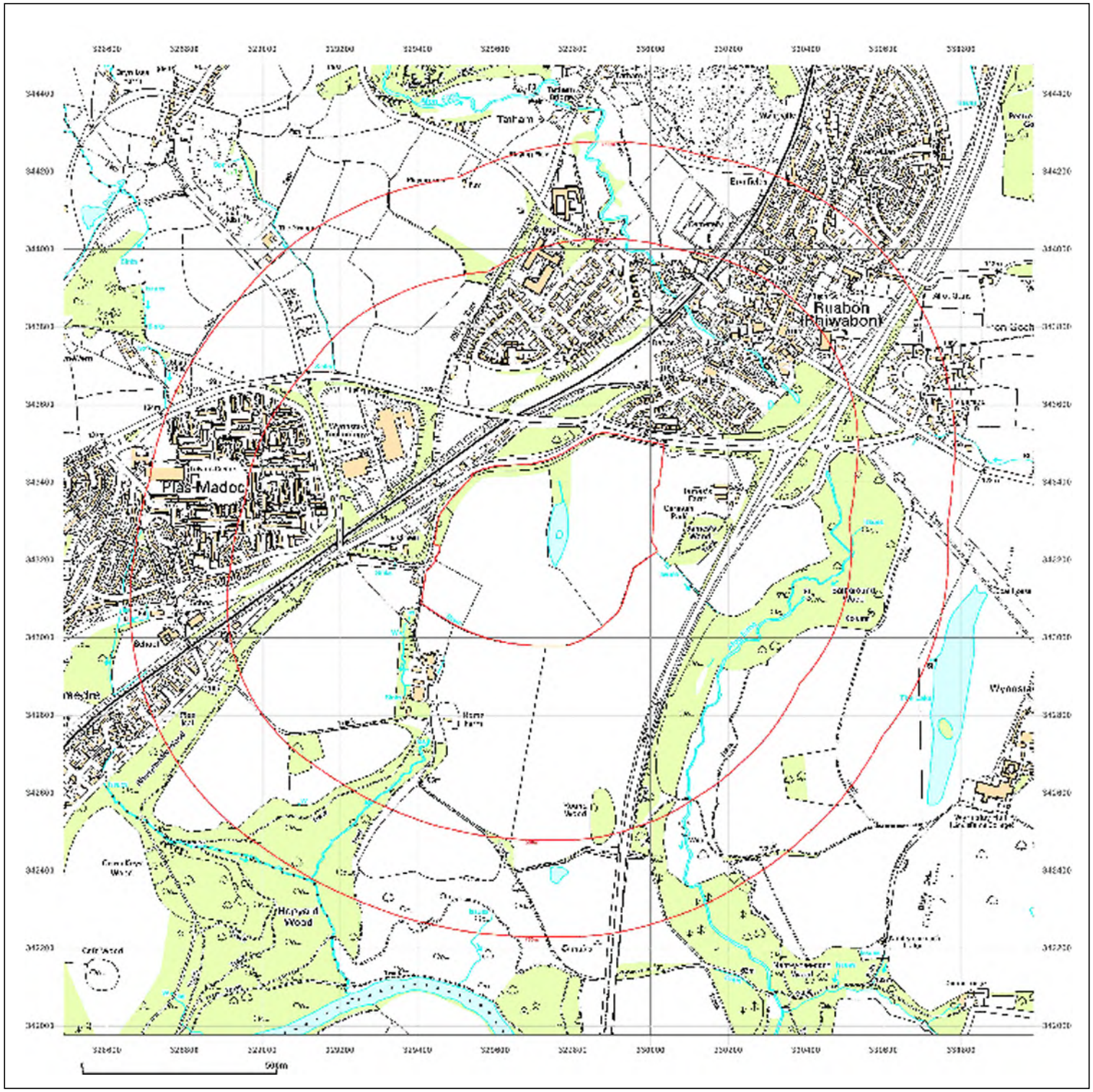
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Groundsure INSIGHTS

Site Details:

Ruabon Park A483, WREXHAM, LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: 1:10,000 Raster
Map date: 2002
Scale: 1:10,000
Printed at: 1:10,000

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2002

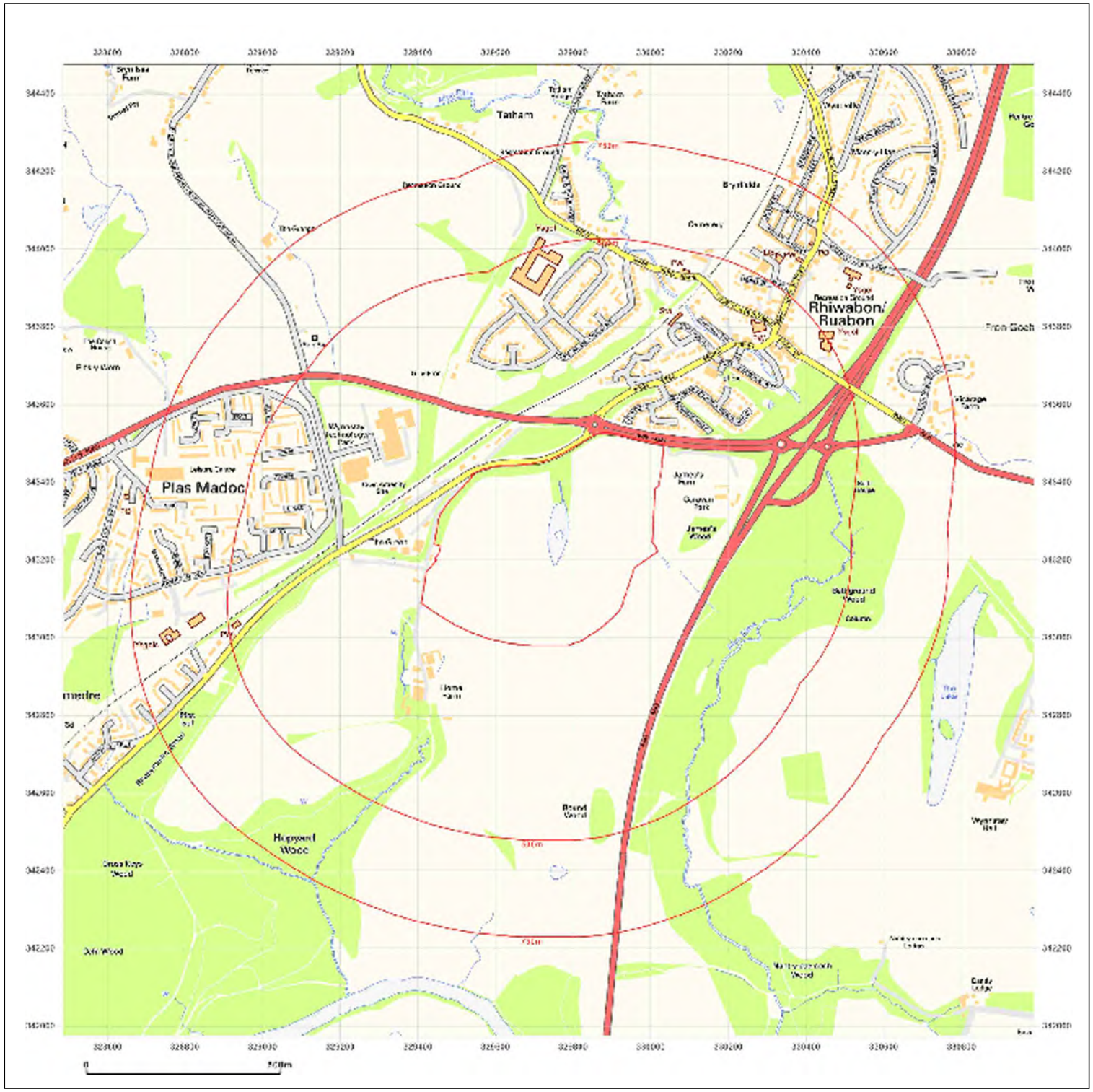
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Groundsure INSIGHTS

Site Details:

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LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: National Grid
Map date: 2010
Scale: 1:10,000
Printed at: 1:10,000

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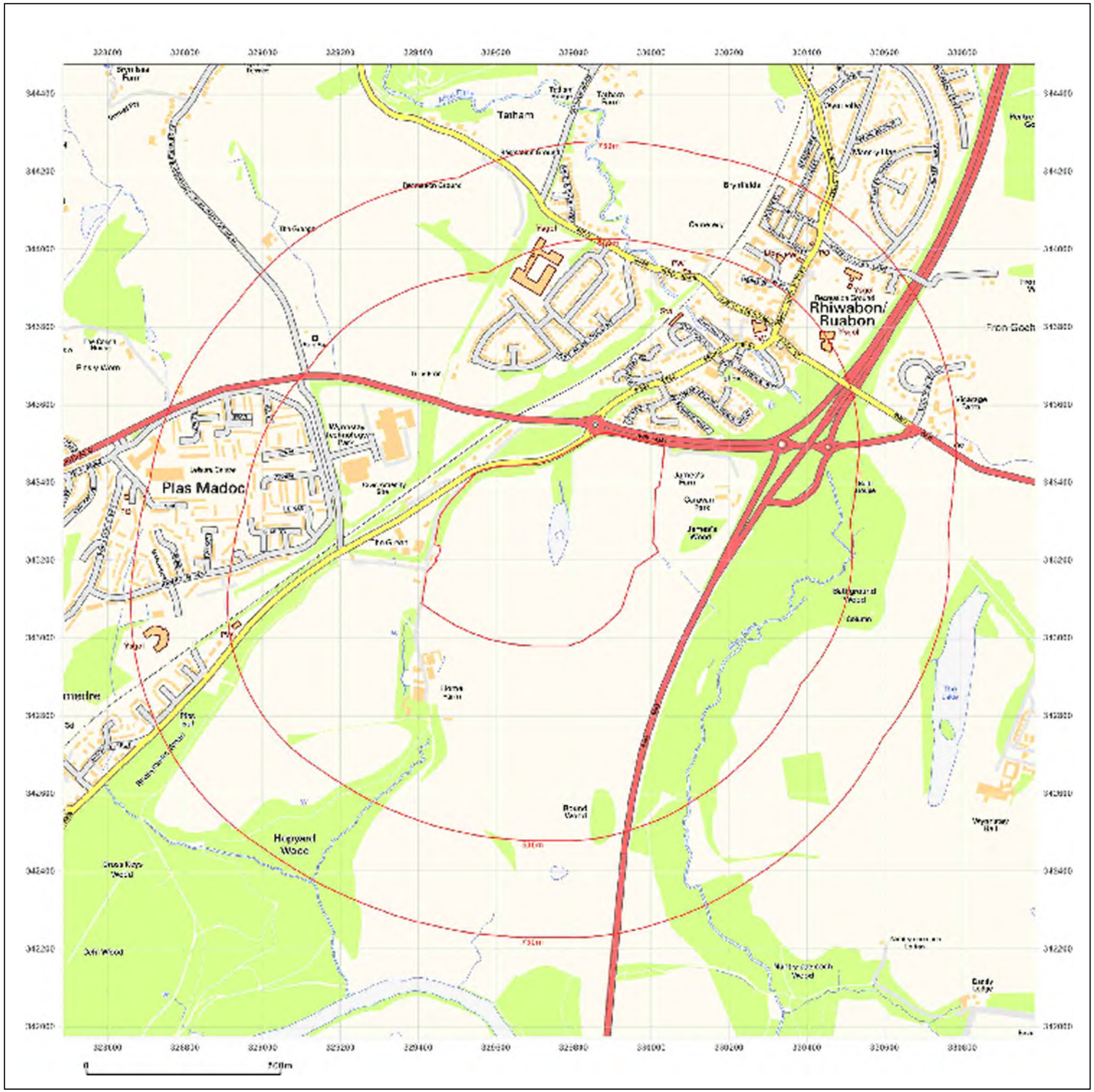
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Site Details:

Ruabon Park A483, WREXHAM,
LL14 6DW

Client Ref: 773135
Report Ref: GS-2356368
Grid Ref: 329736, 343226

Map Name: National Grid
Map date: 2014
Scale: 1:10,000
Printed at: 1:10,000

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Appendix B

Coal Authority Mining Report

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848 DX 716176 MANSFIELD 5

GROUNDSURE LTD
SOVEREIGN HOUSE
CHURCH STREET
BRIGHTON
BN1 1UJ

Our reference:	**51001011099001**
Your reference:	**GS-2480871**
Date of your enquiry:	**06 October 2015**
Date we received your enquiry:	**06 October 2015**
Date of issue:	**06 October 2015**

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

Non-Residential Coal Authority Mining Report

RUABON PARK A483, WREXHAM, WREXHAM, LL14 6D

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 9 seams of coal at 100m to 580m depth, and last worked in 1927.

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.

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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.

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Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

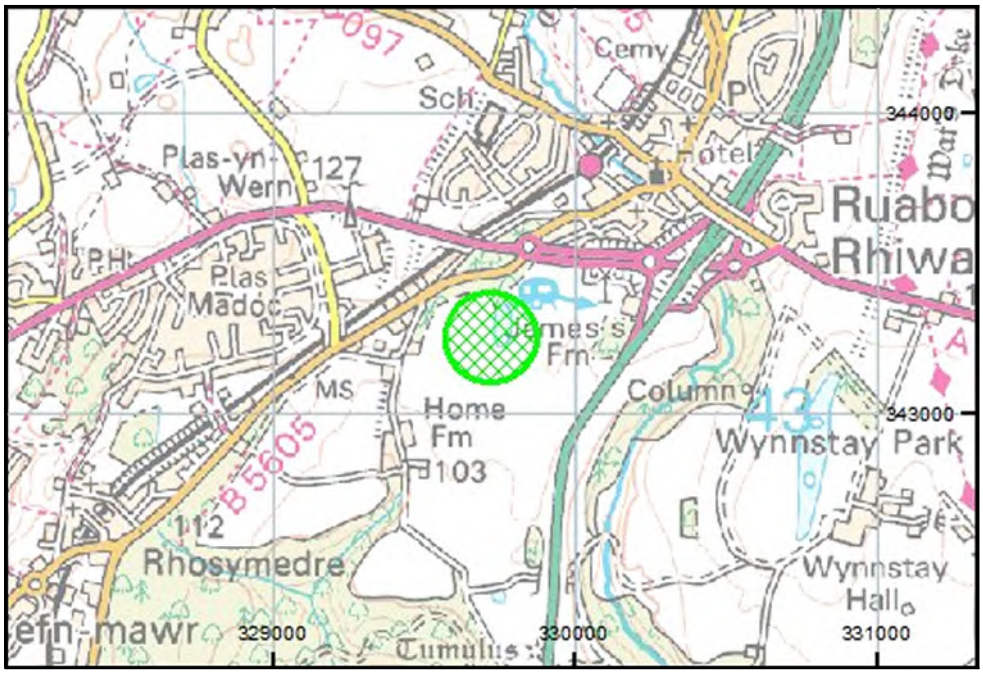
Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Tax Point Date:	06 October 2015
Issued to:	GROUNDSURE LTD SOVEREIGN HOUSE CHURCH STREET BRIGHTON BN1 1UJ
Property Search for:	RUABON PARK A483, WREXHAM, WREXHAM, LL14 6D
Reference Number:	51001011099001
Date of Issue:	06 October 2015
Cost:	£59.00
VAT @ 20%:	£11.80
Total Received:	£70.80
VAT Registration	598 5850 68

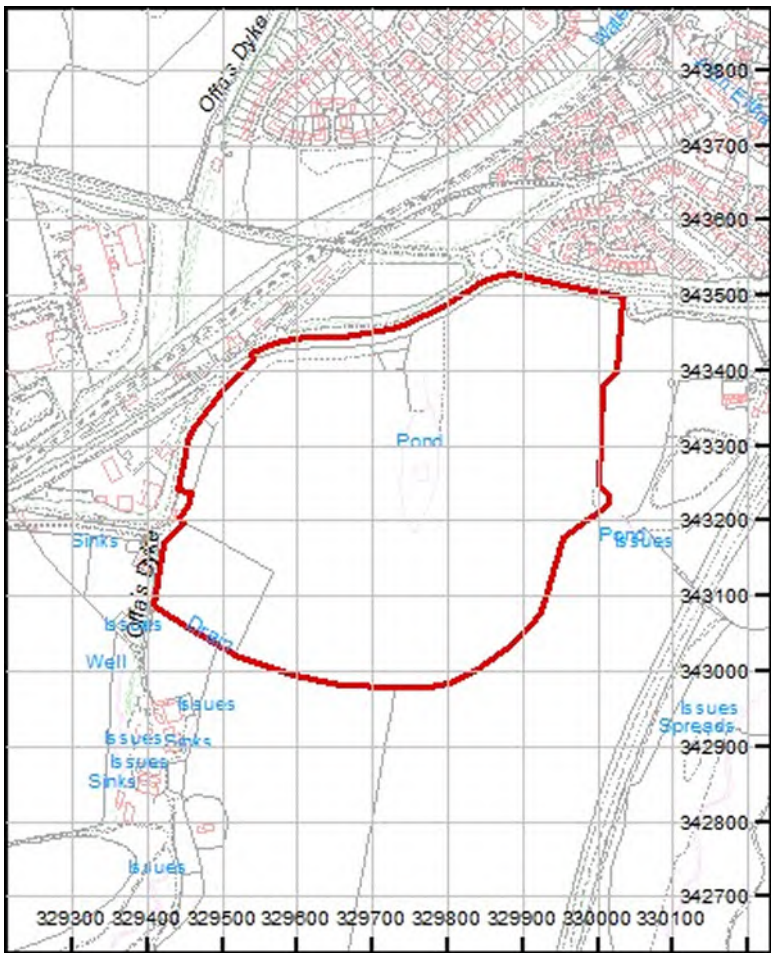
Location map

Approximate position of property



Enquiry boundary

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Key

Approximate position of enquiry boundary shown

Appendix C:

Risk Definitions

Identification of Unacceptable Risk

The method for risk evaluation is qualitative and is developed from the model provided in CIRIA C552 *Contaminated Land Risk Assessment – a guide to good practice* (DETR 2001). It involves classifying risk in terms of (a) magnitude of the potential consequence (severity) of occurrence and (b) the probability (likelihood) of occurrence. The risk rating derived is used to determine what action, if any, is needed to further investigate that risk and/or remediate to reduce risk to an acceptable level.

Task 1: Classification of Consequence

Classification	Definition	Examples
Severe	• Short-term (acute) risk to human health likely to result in "significant harm" (as defined in EPA90 Part 2a). • Short-term (acute) risk of pollution of sensitive water resource. • Short-term (acute) risk to an ecosystem, or organism forming part of an ecosystem.	Unusually high concentration of toxic substance on the surface of a garden or recreation area. Major spillage of contamination from the site into controlled waters. EA Category 1 pollution incident. Closure of an abstraction point. Explosion, causing building collapse (and death if occupied).
Medium	• Chronic damage to human health likely to result in "significant harm". • Pollution of sensitive water resource. • Significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentration of contaminant from site exceeds generic or site-specific assessment criteria for human health or water supply pipes. Presence of asbestos. Leaching of contaminants from a site to a principal or secondary (A) aquifer. Concentration exceeds DWS or EQS in Inner Source Protection Zone (SPZ1). EA Category 2 pollution incident. Death of a species or loss of habitat within an area of national importance.
Mild	• Exposure is unlikely to result in "significant harm" to human health. • Pollution of non-sensitive water resource. • Damage to sensitive buildings, structures and services or the environment.	Concentration of contaminant from site below generic or site-specific assessment criteria. Pollution of secondary (B or undifferentiated) aquifer. EA Category 3 pollution incident. Damage to a building rendering it unsafe to occupy. Death of a species or loss of habitat within an area of local importance. Loss of plants in garden or landscape areas (BS3882 limits exceeded).
Minor	• Harm (but not significant harm) resulting in a financial loss or expenditure to resolve. • Non-permanent human health effects. • Easily repairable damage to buildings, structures and services.	Pollution of unproductive strata.

Task 2: Classification of Probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term or there is actual evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur in the very long term.

Task 3: Risk Estimation

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Low risk	Very low risk	Very low risk
	No linkage	No risk			

Task 4: Description of the Estimated Risks and Likely Action Required

Risk	Action
Very high risk	There is a high probability that severe harm could arise or there is evidence that severe harm is currently happening. This risk, if realised, is likely to result in substantial liability. Urgent investigation and remediation are required for the site in its existing state and for development.
High risk	Harm is likely to arise. Realisation of the risk is likely to present a significant liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term. Remediation will be required for development.
Moderate risk	A potential linkage is identifiable. However, it is either relatively unlikely that harm would be severe or, if any harm were to occur, it is more likely that the harm would be relatively mild. Investigation is required to quantify the risk and determine potential liability. Remediation will be required for development.
Low risk	It is possible that harm could arise but it is likely that this harm, if realised, would at worst normally be mild. Investigation is not normally required but could be useful to confirm a preliminary assessment. Remedial works are unlikely to be required or will be limited.
Very low risk	There is a low possibility that harm could arise. In the event of such harm being realised it is not likely to be severe. Site is not capable of being determined under Part 2a. No further action recommended.

MLM Environmental

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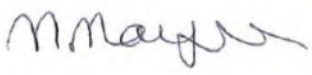
Carter Jonas

Ruabon Park, Wrexham

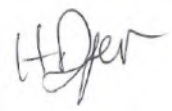
Phase 2 Preliminary Geoenvironmental Assessment Report

Document Ref:	773135-REP-ENV-002
Revision:	0
Date:	27 November 2015

Prepared: Michael Maynard
Geoenvironmental Engineer



Checked: Hugh Dyer
Senior Geoenvironmental Engineer



Approved: Jason Monk
Technical Director



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V7

Document Control Sheet

Revision No	Date	Status	Changes	Author	Approved
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773135-DWG-ENV-001 Exploratory hole location plan

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Executive Summary

Details	Summary of Main Text
Introduction	This report has been prepared on the instructions of Carter Jonas which proposes to market the site on behalf of their client, for mixed industrial and residential purposes It presents the results of a preliminary ground investigation and geoenvironmental assessment.
Site description	The 24.62 acre site consists of farmland.
Environmental Setting	The site is underlain by Glaciofluvial Sand and Gravel within the north east section of the site and Glacial Till beneath the remaining areas of the site. The majority of the site is underlain by strata of the Etruria Formation with a small section along the western edge of the site underlain by Pennine Coal Measures strata. The site is not within a groundwater source protection zone. A large pond is located in the centre of the site. The site is bordered to the east by James Caravan Park with the A483 and fields beyond this, to the North by the A539 with residential properties beyond, to the West by Clwyd Caravan & Leisure with the B5605 beyond and to the South by farmland.
Ground Investigation	
Ground Conditions Encountered	Topsoil (maximum proven depth 0.50m bgl) Made Ground (maximum proven depth 1.10m bgl) Glacial Till (maximum proven depth 4.50m bgl) Glaciofluvial Deposits (maximum proven depth 3.40m bgl) Etruria Formation (maximum proven depth 5.00m bgl)
Groundwater	Encountered at between 2.30m and 4.50m bgl during the investigation. Recorded post-fieldwork at depths ranging from 1.64m to 3.40m bgl.
Geotechnical Assessment	
Existing Construction	There is a possible section of partially constructed road within the north of the site although this was not noted during the site investigation works. Unless it is to be incorporated within the new development, any old construction encountered should be fully penetrated by all new foundations and broken well away from any new construction.
Excavations	Excavation to proposed founding depth generally should be readily achievable with standard excavation plant.
Foundations	The preliminary investigation indicates that the following foundation options would be suitable for the site, however these would need to be confirmed following further deeper investigations; Strip/trench fill foundations at between 1.0m bgl and 1.5m bgl. Pad foundations at between 1.0m bgl and 1.5m bgl. Net allowable bearing pressure – 100kN/m^2 (all soils). Deepening of foundations/heave protection is likely to be required to allow for the effects of trees.
Ground Floors	Slab-on-ground or suspended/constructed on granular fill in clay areas due to risk of swelling and shrinkage
Pavements	CBR values should be confirmed by in-situ testing, however a design CBR value of 2% may be assumed within the made ground materials and natural clay soils. A CBR value of 5% is considered appropriate for the sands and gravels.
Soakaways	Soakaway drainage may be suitable within the north east of the site within the sand and gravel materials, however this would need to be confirmed.
Buried Concrete	Design Sulphate Class – DS - 1 and ACEC Class – AC – 1.

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Details	Summary of Main Text
Contamination	
Soil Contamination	Soil contamination was not present with respect to human health for the proposed mixed residential and commercial development.
Gas/Vapour Contamination	Slightly elevated levels of carbon dioxide were noted. Based on these isolated elevated levels the site is designated CIRIA Characteristic 2/NHBC Amber 1
Remediation	Possible incorporation of gas protective measures within new construction at the site. Incorporation of radon protective measures within new construction at the site.
Further Work	
	A tree survey is required prior to site clearance, to determine the potential influence of trees on and adjacent to the site. Further gas and groundwater monitoring to better define and delineate the ground gas regime. Further deeper boreholes across the site area to confirm the findings of the site investigation and to determine the characteristics of the deeper ground conditions and to confirm the foundation design for the development.

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Limitations and Exceptions

1 This report and its findings should be considered in relation to the terms and conditions proposed and scope of works agreed between MLM Consulting Engineers Ltd (MLMCEL) and the client.

2 The Executive Summary, Conclusions and Recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon until considered in the context of the whole report and the development, if any, proposed.

3 The assessment and interpretation of contamination and associated risks are based on the scope of work agreed with the client and the report may not be sufficient to fully address contaminations or to allow detailed remediation design to proceed without further investigation and analysis.

4 Any assessments made in this report are based on the ground conditions as revealed by the exploratory holes and pits, together with the results of any field or laboratory testing undertaken and, where appropriate, other relevant data which may have been obtained for the sites including previous site investigation reports. There may be special conditions appertaining to the site, however, which have not been revealed by the investigation and which have not, therefore, been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available.

5 Interpretations and recommendations contained in the report represent our professional opinions, which were arrived at in accordance with currently accepted industry practices at the time of reporting and based on current legislation in force at that time.

6 Where the data available from previous site investigation reports, supplied by the Client, have been used, it has been assumed that the information is correct. No responsibility can be accepted by MLMCEL for inaccuracies within the data supplied.

7 Whilst the report may express an opinion of possible configuration of strata between or beyond exploratory hole or pit locations, or on the possible presence of features based on visual, verbal or published evidence, this is for guidance only and no liability can be accepted for the accuracy.

8 Comments on groundwater conditions are based on observations made at the time of the investigation unless otherwise stated. It should be noted that groundwater levels can vary due to seasonal or other effects.

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10 This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to us for re-assessment and, if necessary, re-appraisal.

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1 Introduction

1.1 General

This report has been prepared by MLM Consulting Engineers Limited (MLMCEL) on the instructions of Carter Jonas (Client), which is proposing to market the site on behalf of their client, for mixed use including residential and commercial development.

The objective of this report is to provide an initial assessment of ground conditions with respect to design of foundations, slabs and infrastructure and gives general recommendations for appropriate solutions. It also includes a preliminary generic quantitative risk assessment (GQRA) of contamination risks to human health and the environment and provides, where necessary, a summary of recommended mitigation or remediation measures.

This report has been prepared to provide details for marketing of the site and to outline potential constraints to development at the site which may require further investigation and assessment prior to development.

1.2 Terms of Reference

The terms of reference for the work were set out in the MLMCEL proposal 773135-FEE-ENV-001 dated 22 July 2015.

1.3 Technical Approach

The work undertaken by MLMCEL follows the Association of Geotechnical and Geoenvironmental Specialists (AGS) *Good Practice Guidelines for Site Investigations.*

The process of contamination assessment adopted in this report generally follows the model procedures for the management of contaminated land described in the Environment Agency Contaminated Land Report 11. It also takes into account the guidance issued in the National Planning Policy Framework (NPPF) and NHBC Standards Chapter 4.1 *Land quality: Managing ground conditions*.

The format of the report is in general accordance with the reporting requirements of BS5930:2015.

1.4 Proposed Development

It is understood that the proposed development will comprise 139,500 sq ft of office space, 50,000 sq ft of warehouse, 20,000 sq ft of retail, 30,000 sq ft of leisure and/or hotel use, and 319 residential units.

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2 The Site

2.1 Location and Description

The site is located in Ruabon Park, Wrexham, LL14 3EH. The National Grid Reference for the site is 329736 343226.

It is irregular in shape and covers an area of 24.62 hectares. The site currently consists of farmland. No hardstanding was noted across the fields at the time of the ground investigation works. A large lake is located within the centre of the site with a small brook feeding the lake from the north. Ditches are present along the southern boundary of the site.

Aerial photography indicates a small section of possible road construction within the north of the site, however this was not noted during the walk over survey or site investigation works.

The site is bordered to the East by James Caravan Park with the A483 and fields beyond this, to the North by the A539 with residential properties beyond, to the west by Clwyd Caravan & Leisure with the B5605 beyond and to the south by farmland.

A location plan of the site is presented as Figure 1.

2.2 Geology

Published geology is of Glacio-fluvial deposits within the north east of the site and Glacial Till deposits across the central and south west section of the site overlying the Etruria Formation (mudstone) recorded below the majority of the site, with the Pennine Lower Coal Measures Formation recorded beneath the western edge of the site.

The site is in a known mining area, with one historical mine indicated on site in the Groundsure Report. However, no evidence of mine workings or made ground associated with mine workings were encountered during the site investigation.

The site is in an area affected by radon as between 10% and 30% of properties are above the Action Level. Full radon protective measures are necessary.

The site is shown to lie in an area unaffected by historical landslips.

2.3 Hydrogeology

The Environment Agency website provides the following hydrogeological information:

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Table 2.1 Aquifer Properties

Aspect	Designation	Description
Groundwater Source Protection Zone	No SPZ	The site is not within a catchment area where groundwater is discharged to a source.
Superficial Aquifer Designation Glacio-fluvial deposits	Secondary Aquifer (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.
Superficial Aquifer Designation Till	Unproductive Strata	These are deposits with low permeability that have negligible significance for water supply or river base flow.
Bedrock Aquifer Designation Etruria Formation	Secondary Aquifer (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.
Bedrock Aquifer Designation Pennine Lower Coal Measures		

2.4 Hydrology

A large pond is located in the centre of the site. There are no other significant surface water features within the vicinity of the site.

There are no abstractions from surface waters within 500m of the site.

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3 Ground Investigation

3.1 Site Work

Site work was carried out between the 21 September and 28 September 2015and included the following.

Table 3.1 Summary of Exploratory Holes

Type	Ref.	Depth Range (m bgl)
Windowless sampler boreholes	WS01 – WS15	2.00 - 5.00
Trial pits	TP01 – TP50	1.90 – 4.50
Soakaway pits	TP12, TP21, TP32, TP33	1.90 – 2.20

The exploratory holes were set out by an MLMCEL engineer based on the findings of the desk study in locations to maximise the available data, whilst operating within the constraints of the site.

All exploratory holes were logged by a Geoenvironmental engineer in general accordance with BS5930: 2015.

The exploratory hole logs are presented in Appendix A.

3.2 Investigation Rationale

The rationale for the investigation is presented in Tables 3.2 and 3.3 below.

Table 3.2 Rationale for Contamination Sampling and Testing

Target/Area	Potential Contamination	Exploratory Hole(s)
Made ground/Entire site	Ground gas, metals, TPH, PAH, sulphate, pH	All

Table 3.3 Rationale for Geotechnical Sampling and Testing

Target/Area	Potential Geotechnical Feature	Exploratory Hole(s)
Made ground/Entire site	Strength	All
Natural ground/Entire site	Strength	All

The locations of all the exploratory holes are presented on Drawing 773135-DWG-ENV-001.

3.3 Installations

Combined gas and groundwater monitoring standpipes were installed in WS01 to WS04, WS07, WS09, WS11 and WS13 toWS15.

Details of the installations are provided on the relevant borehole logs.

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3.4 In Situ Testing

Standard penetration tests (SPTs) were undertaken at regular intervals in the windowless sampler boreholes.

Hand shear vane tests were undertaken at shallow depth (<1.2m) in the trial pits and on samples recovered from depth in trial pits and the windowless sampler boreholes.

In situ test types and depths are recorded on the relevant exploratory hole records.

3.5 Sampling

Continuous soil cores were recovered from the windowless sampler boreholes in clear PVC liners to prevent cross contamination and aid sample recovery.

Disturbed samples were recovered from all exploratory holes: in bulk bags and/or tubs depending on the soil types and proposed laboratory testing.

Contamination samples were recovered in plastic tubs and glass jars, appropriate for the laboratory analysis undertaken.

Sample types and depths are recorded on the relevant exploratory hole records.

3.6 Post-Fieldwork Monitoring

Post-fieldwork monitoring of ground gas/organic vapour concentrations and groundwater levels has been undertaken on one occasion on 7 October 2015. The results are presented in Appendix B.

3.7 Laboratory Analysis

3.7.1 Geotechnical Testing

The following laboratory tests were scheduled on soil samples recovered from the exploratory holes.

Table 3.4 Summary of Geotechnical Testing

Test	No.
Natural moisture content	19
Atterberg limits	7
Particle Size Distribution	3
Sedimentation	1
pH and soluble	5

Geotechnical testing was undertaken by a UKAS-accredited laboratory to BS1377 and the results are presented in Appendix C.

3.7.2 Contamination Analysis

Based on the results of the Phase 1 Contamination Assessment, the following laboratory analysis was scheduled on soil samples recovered from the exploratory holes:

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Table 3.5 Summary of Contamination Analysis - Soil

Test	No.
MLM soils suite : Metals (As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, Se), speciated Polycyclic Aromatic Hydrocarbons (PAH USEPA16), Total Petroleum Hydrocarbons (TPH CWG AA-splits), total cyanide, total phenols, sulphur, water soluble sulphate and pH	12
Metals (As, Cd, Cr (total), Cr(vi), Cu, HG, Ni, Pb, Se, Zn)	48
Total sulphate, water soluble sulphate	47
pH	47
Soil Organic Matter	15
Asbestos	7

Table 3.7 Summary of Contamination Analysis – Groundwater

Test	No.
Metals (As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, Se)	10
PAH (speciated USEPA 16)	10
Petroleum hydrocarbons (speciated TPHCWG)	10
Sulphate	10
Hardness	10

Contamination analysis was undertaken by a UKAS-accredited laboratory and the results are presented in Appendix D.

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4 Ground and Groundwater Conditions

4.1 General

The following general strata sequence was encountered across the site. Interpolation between exploratory hole positions has been undertaken based on visual observations and laboratory testing.

Table 4.1 Generalised Strata Sequence

Stratum	Depth range (m bgl)		Proven Thickness range (m)
	Top	Base	
Topsoil	GL	0.20 – 0.50	0.20 – 0.50
Made ground	0.30 – 0.50	0.70 – 1.10	0.40 - 0.80
Glacial Till*	0.20 – 1.10	2.00 - 4.50*	0.40 – 3.80*
Glacio-fluvial Deposits*	0.30 – 0.60	1.90 – 3.40*	1.60 - 3.10*
Etruria Formation*	1.80 – 3.40	2.60 – 5.00*	0.10 – 1.70*

* Base of stratum not proven in all holes

Features, structures or certain ground conditions may be present between exploratory hole locations, which are different to those encountered during the investigation but which may impact upon construction.

The findings of the site investigations generally match the published geology for the area.

4.2 Topsoil

For the purposes of this report topsoil is defined as a near surface soil which appears from visual inspection alone to be capable of supporting plant growth. The description of topsoil within this report does not imply compliance with BS3882.

Topsoil was encountered in all the boreholes and trial pits on site. This is considered to represent the ploughed horizon across the agricultural fields and had at the time of the investigation work been harvested.

4.3 Made Ground

Underlying the topsoil, made ground was present in trial pits TP02-TP07, TP10-TP11 and TP45 in the northwest and centre of the site and comprised reworked Glacial Till deposits with occasional fragments of brick and concrete.

4.4 Glacial Till

Underlying the topsoil/made ground in trial pits TP01-TP31, TP38-TP50 and boreholes WS01-WS10 and WS12-15, a mixture of sandy gravelly clays and sand and gravels were encountered with lenses of stiff brown grey clay. These are considered to be Glacial Till deposits. These deposits contained abundant cobbles and large boulders of sandstone and quartzite, which is consistent with their environment. Boreholes WS01-WS10 and trial pits TP01-TP17, TP19-TP21, TP24, TP26-TP28, TP31, TP38, TP41, TP43 and TP49 were terminated within these soils.

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4.5 Glacio-fluvial deposits

Underlying the topsoil in TP32-TP37 and WS11 in the northeast of the site sand and gravels were encountered. These are considered to be Glacio-fluvial Deposits. These deposits contained abundant cobbles and large boulders of sandstone and quartzite, which is consistent with their environment. These exploratory holes were terminated within these soils.

4.6 Etruria Formation

Underlying the glacial till in boreholes WS12-WS15 and trial pits TP18, TP22-TP23, TP25, TP29-TP30, TP39-TP40, TP42-TP48 and TP50 in the south and east of the site, stiff to hard slightly sandy gravelly silty clay was encountered. These deposits are considered to be part of the Etruria Formation. Boreholes WS12-WS15 and trial pits TP18, TP22-TP23, TP25, TP29-TP30, TP39-TP40, TP42-TP48 and TP50 were terminated within these soils.

4.7 Groundwater Conditions

Groundwater seepages were encountered during the fieldwork in boreholes WS01-WS02, WS06-WS07, WS09-WS12 and trial pits TP02, TP04, TP10, TP13-TP15, TP17, TP19-TP20, TP24, TP26, TP30, TP34, TP37-TP41, TP43 and TP48-TP50 across the site, at depths ranging from 2.30m bgl to 4.50m bgl.

During post-fieldwork monitoring water levels were recorded at depths ranging from 1.64m bgl to 3.40m bgl.

The groundwater is from the base of the glacial till/glacio-fluvial deposits and is considered to be representative of the groundwater table in the area which is confirmed by the large pond in the centre of the site.

4.8 Contamination Observations

Made ground was present, including fragments of brick, within trial pits TP02-TP07, TP10-TP11 and TP45 in the northwest and centre of the site with concrete and wood (potentially treated) present in trial pits TP02 and TP03 in the northwest of the site.

No other visual or olfactory evidence of contamination was noted at the site.

4.9 Ground Gas and Vapour Conditions

The presence of made ground in the centre and northwest of the site indicates the potential for ground gases to be present. There was no visual or olfactory evidence of hydrocarbon contamination in soil or groundwater to indicate the potential presence of organic vapour.

A summary of the range of readings is presented in table 4.3 below.

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Table 4.3 Summary of Gas Monitoring

Date	Methane (%)	Carbon Dioxide (%)	Flow Rate (l/hr)	Barometric Pressure (mb)
07/05/15	<0.10 – 0.50	1.40 – 6.50	<0.10 – 0.50	991 - 995

4.10 Underground Obstructions

It is understood a football ground and tennis courts was located within the southwest corner of the site. Whilst there is a potential for buried construction (e.g. foundations and/or services) in these areas, the risk is considered low given the ongoing farming activities currently being undertaken within this area.

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5 Material Properties

5.1 General

The following presents a summary of the properties of the soils encountered, based on field observations, in situ field testing and laboratory test results.

For the purposes of property designation, soils are divided into fine soils (clays and silts) and coarse soils (sands and gravels).

Soil plasticity class for fine soils is based on the classification system of BS5930, adopting modified plasticity index values (based on percentage passing 425µm sieve).

Volume change potential of fine soils on change of moisture content has been assessed using guidance provided in NHBC Standards/BRE Digest 240 - Part 1.

Equivalent approximate undrained shear strengths (c_u) and equivalent approximate coefficients of volume compressibility (m_v) have been calculated from recorded SPT N values, adopting f_1 and f_2 values respectively (based on CIRIA 143) appropriate to the recorded plasticity.

The angle of shearing resistance (φ) of the coarse soils has been derived from the uncorrected standard penetration resistance N using the relationship published by Hatanaka and Uchida (1996).

5.2 Made Ground

The made ground is inherently variable and as such representative values of geotechnical properties are impracticable to determine. On this basis, no laboratory geotechnical testing has been undertaken on it.

5.3 Glacial Till

Natural moisture contents in the fine fraction of these materials range from 9% to 20% and modified plasticity indices range from 10% to 13%. On this basis these soils are classified as of low plasticity (CL soils) and of low swelling/shrinkage potential on change of moisture content.

In situ SPT N values within the fine fraction of these materials range from 1 to 36, but are generally within the range 9 to 15. Approximate undrained shear strengths based on these results range from 62kN/m^2 to 103kN/m^2, adopting an f_1 value of 6.9 (based on an 'average' plasticity of 12%).

5.4 Glacio-fluvial Deposits

In situ SPT N values within the coarse fraction of these materials range from 2 to 39 but are generally within the range 8 to 20, showing them to be of low to medium relative density. Angles of shearing resistance based on these results range from 30° to 34°.

5.5 Etruria Formation

Natural moisture contents in the fine fraction of these materials range from 10% to 30% and modified plasticity indices are between 8% and21%. On this basis these soils are classified as of low to intermediate plasticity (CL/CI soils) and of low to medium swelling/shrinkage potential on change of moisture content.

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In situ SPT N values within the fine fraction of these materials range from 32 to 48. Approximate undrained shear strengths based on these results range from 205kN/m^2 to 307kN/m^2, adopting an f_1 value of 6.4 (based on an 'average' plasticity of 15%).

5.6 Summary

In summary the following geotechnical parameters have been recorded and/or calculated:

Table 5.1 Geotechnical Parameters

Stratum	Moisture Content (%)	Plasticity Index* (%)	SPT N Values	Calculated Shear Strength (kN/m^3)
Made Ground	4.9 to 5.1	N/A	N/A	N/A
Glacial Till	9.1 to 20	9.7 to 13	1 to 36	62 to 103
Glacio-fluvial Deposits	9.1 to 14	N/A	2 to 39	N/A
Etruria Formation	10 to 30	7.8 to 21	32 to 48	205 to 307

* Modified

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6 Geotechnical Assessment

6.1 General

This geotechnical assessment is based on the parameters determined from the field work and laboratory analysis as described in Section 5. It presents a geotechnical assessment of possible foundation solutions and infrastructure design; it does not constitute a detailed design report for the proposed development.

The merits of the available options discussed should be reviewed by the foundation/structural engineers.

It is understood that the proposed development will comprise 139,500 sq ft of office space, 50,000 sq ft of warehouse, 20,000 sq ft of retail, 30,000 sq ft of leisure and/or hotel use, and 319 residential units.

It is anticipated that finished ground levels will be at, or close to, existing ground levels. Should this not be the case then this assessment may need to be reviewed.

6.2 Existing Buried Construction

There is a former development to the southwest corner of the site and it is possible that existing buried construction including foundations and services will be encountered below the site.

Unless it is to be incorporated within the new development, any old construction encountered should be fully penetrated by all new foundations and broken well away from any new construction.

Any soil disturbed by excavation of foundations and services should also be fully penetrated by new foundations.

6.3 Excavations

Excavation to anticipated founding depths should be readily achievable using standard excavation plant.

Instability of excavation faces was noted during excavation of the trial pits. This is prevalent in the natural coarse soils.

Random and sudden falls should be expected from the faces of near vertically sided excavations put down at the site. This situation is likely to be prevalent in the natural coarse soils and is likely to be exacerbated by water inflows.

Temporary trench support, or battering of excavation sides, is likely to be required for all excavations that are to be left open for any length of time, and will definitely be required where man entry is required.

Particular attention should be paid to excavation at, or close to, site boundaries where collapse of excavation faces could have a disproportionate effect.

A risk assessment of the stability of any open excavation should be undertaken by a competent person and appropriate measures adopted to ensure safe working practise in and around open excavations. Further guidance on responsibilities and requirements for working near, and in, excavations can be obtained from the Construction Design and Management Regulations (2015).

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Based on site observations, it is considered that sump pumping is likely to be sufficient to deal with anticipated flows. However, it should be recognised that groundwater levels will fluctuate seasonally and the timing of construction may dictate the extent of groundwater control required.

Any water pumped from excavations is likely to need to be passed via settlement tanks before being discharged to the sewer; discharge consents will also be required.

6.4 Foundations

This foundation assessment is based on the information available and is for the purposes of initial site appraisal. The investigation works examined the shallow soils to depths of up to circa 5.0m below ground level across the area of the site. Further investigation works to prove the deeper soil conditions and to determine the nature of the underlying solid strata, together with more detailed laboratory analysis and geotechnical assessment would be required to better quantify the foundation depths and allowable bearing pressures appropriate for the proposed development.

The appropriate foundation solution adopted for the site will depend not only on ground conditions, but also on structural loading, load distribution and the limiting criteria for movement or settlement of the buildings, which may have high specification finishes and unevenly distributed loadings so that settlement, and particularly differential settlement, will need to be maintained within tight tolerances.

The superficial Glacial Till soils are of low swelling/shrinkage potential on change of moisture content.

Trees are noted in the central parts of the site close to the lake and along the southern, western and northern boundaries although they are of unknown size, species or maturity. Plots constructed within influencing distance of these trees (whether on or off site and whether to remain or be removed), should be constructed in accordance with NHBC Standards for residential housing or the recommendations of BRE Digest 240 for commercial and retail buildings.

On the basis of the above, minimum founding depths are likely to be around 1.0m within the firm to stiff clay or medium dense sand and gravel soils. A number of isolated areas of soft / loose ground were identified within particular investigation positions where foundations would need to be deepened to penetrate the low strength soils.

Foundations that are carried deep due to tree influence may be stepped up, in accordance with a suitable specification, such as BS8004:2015, as long as a suitable founding stratum is present at shallower depth.

If trees are to be removed, the roots should be grubbed out and foundations extended to below the zone of disturbance created by this activity.

6.4.1 Strip/Trench Fill Foundations

Traditional strip/trench fill foundations are considered suitable for the proposed residential development and based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing capacity of 100kN/m^2 should be available for a 600mm wide strip/trench fill foundation bearing on the natural superficial clay and sand and gravel soils.

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Excavation of trench fill foundations to depths in excess of 2.5m bgl is unlikely to be economical and may be impracticable to undertake. Care should be taken to ensure the verticality of deep, narrow foundations to prevent eccentric loading.

6.4.2 Pad Foundations

Pad foundations are considered an appropriate solution for the proposed commercial / retail development and based on the design soil parameters provided in earlier sections of this report, as a guide, an allowable net bearing pressure of 100kN/m^2 should be available for a pad 1.5m square bearing on the natural superficial clay and sand and gravel soils.

Should enlarging the pads be considered (for example because loads are such that the quoted bearing pressure is inadequate based on the size of foundation identified) this will probably lead to increased settlements and the above recommendations should be reviewed.

6.4.3 Heave Protection

A number of plots across the site are to be constructed within the influencing distance of trees and heave protection will be required on the inside faces of the ground beams.

Consideration should be given to the possible effect of direct root action on foundations or services, and to the continued stability of existing trees, where buildings are constructed very close to existing trees that are to remain.

6.5 Ground Floor Slabs

Ground conditions at the site are such that ground bearing slabs should be acceptable for the residential and commercial/retail development at the site. However, consideration should be given to the swelling and shrinkage potential of the near surface soils, with reference to NHBC and/or BRE Digest 412, which may require ground floor slabs to be suspended over a void or constructed over a layer of granular fill of a thickness based on the anticipated degree of swelling/shrinkage.

6.6 Pavement Construction

Following site preparation/regrading the sub-grade will comprise mainly natural superficial clay, and sand and gravel materials. Made ground materials were noted within the north west of the site and comprise generally re-worked natural material with inclusions of brick and broken concrete.

For the natural clay soils a design CBR value of 2% should be adopted, and for the sands and gravels, a design CBR of 5% is considered appropriate.

The made ground is mixed and variable and it is recommended that, where encountered at formation level, these deposits be excavated to a depth of 0.5m below formation level (or to suitable natural soils, whichever is reached first) and the sub-formation rolled. The excavated material should be sorted to remove any oversize or otherwise unsuitable materials, prior to recompacting the suitable materials in thin layers compatible with the compaction plant employed. Any deficit in material should be made up in suitable imported material suitably compacted as above. Following this treatment an overall design CBR of 2% should be available.

It is recommended that the above design CBR values be confirmed by in situ testing.

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6.7 Below Ground Concrete Design

Based on the results of the pH and water soluble sulphate determinations on soil and groundwater samples and in accordance with the categorisation system of BRE Special Digest 1, the soils below the site fall within the classes presented in Table 6.2 below.

Table 6.2 Summary of Concrete Design Class

Soil Type	Design Sulphate Class (DS)	Aggressive Chemical Environment for Concrete (ACEC)
Topsoil	DS – 1	AC – 1[d]
Made ground	DS – 1	AC – 1[d]
Till/Glaciofluvial	DS - 1	AC – 1[d]

6.8 Soakaway Potential

Soakaway testing was undertaken as part of the investigation within TP12, TP21, TP32 and TP33. The results of these tests are presented in Appendix E. Three of the four soakaway tests undertaken (TP12, TP21 and TP32) were not completed in the time allowed due to the slow infiltration rate of the water. Approximated infiltration rates for these three soakaway tests gained by extrapolating the results of the information indicate infiltration rates in the order of 5×10^{-6}m/sec. The soakaway test undertaken within TP33, recorded an infiltration rate of 2.96×10^{-4}m/sec within the glacio-fluvial sand and gravel materials in the north east of the site.

Given the variability of the soils across the site, further testing should be considered once the location of any proposed soakaway drainage scheme is known.

6.9 Reuse of Materials

The made ground below the site should be suitable for re-use as fill at the site below areas of hard-standing or buildings following sorting to remove any deleterious oversize or otherwise unsuitable materials.

Excavated natural fine soils are considered suitable for re-use as fill at the site, in landscaped areas and gardens, but as they will be liable to long term consolidation settlement their use should be limited to areas where long-term settlements would not be an issue. Excavated natural coarse soils are considered suitable for re-use as fill at the site below areas of hard-standing or buildings or in landscaped areas and gardens, following sorting to remove any deleterious, oversize or otherwise unsuitable materials.

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7 Assessment of Soil Chemical Data

7.1 Guidelines

This section presents a generic quantitative risk assessment (GQRA) to identify potential sources of contamination for further evaluation in the Contaminated Land Risk Assessment section of the report. GQRA involves a comparison of chemical laboratory test results to soil screening levels that are considered to be appropriate to the context of the intended site use.

Soil screening values used in this human health risk assessment have been drawn from the following publications:

- Suitable for Use Levels (S4ULs) were published in 2015 by Land Quality Management Ltd (LQM) and the Chartered Institute of Environmental Health (CIEH). S4ULs are based on the principles of 'minimal' or 'tolerable' risk and are therefore sufficiently conservative for GQRAs under the planning regime, which need only demonstrate that new development is 'safe' and 'suitable for use'. By reproducing these S4ULs, MLMCEL acknowledges "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3184. All rights reserved".
- Category 4 Screening Levels (C4SLs) were published in 2014 by Defra and have been used for lead, which has no S4UL.
- There is no S4UL for cyanide and, in the absence of UK guidance, a Dutch Intervention Value (DIV) of 50mg/kg has been used.
- Generic Assessment Criteria (GAC) were published jointly in 2009 by the Environmental Industries Commission, Association of Geotechnical and Geoenvironmental Specialists and Contaminated Land: Applications in Real Environments (EIC/AGS/CL:AIRE) for a range of organic and inorganic contaminants not covered by S4ULs.

Risks to water supply pipes have been assessed using guidance published by the United Kingdom Water Industry Research Ltd (UKWIR). The guidance provides threshold concentrations above which organic compounds can permeate water supply pipes, impact on their construction and cause a water quality issue for consumers. For the purposes of this assessment it is assumed that polyethylene water supply pipework will be adopted.

Potential risks to plant life, such as for proposed landscaping, are assessed through BS3882:2007. This standard sets out the threshold values in soil above which phytotoxic effects can occur from the metals copper, nickel and zinc.

A full list of screening levels used in the assessment is included in Appendix F.

Appropriately sensitive testing methods have been adopted throughout and on this basis, where contaminants are recorded at less than detection limits, they are considered to be 'not present'.

7.2 Risks to Human Health

The development proposals are for mixed residential and commercial and for the purpose of this human health risk assessment the intended land use scenario is considered to be residential with homegrown produce (RWHP)

Soil organic matter tests in samples of soil gave values of between 0.62% and 7.6% with a mean of 1.76%, therefore a generic SOM of 2% has been used for selecting appropriate screening levels.

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None of the measured contaminant concentrations are above screening levels and therefore further assessment of these contaminants in relation to risks to human health is not considered to be necessary.

Asbestos fibres were not identified in any of the seven soil samples tested.

7.3 Risks to Water Supply

None of the measured concentrations are above UKWIR threshold levels and therefore further assessment of these contaminants in relation to risks to new water supplies is not considered to be necessary.

7.4 Risks to Plant Life

Recorded concentrations of copper, nickel and zinc are below BS3882:2007 threshold values.

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8 Assessment of Soil Leachate and Groundwater Chemical Data

This section presents a GQRA to identify potential sources of soil leachate and groundwater contamination that could impact on controlled waters.

8.1 Guidelines

The site is underlain by a Secondary 'A' Aquifer and therefore the results of the analyses have been compared to the UK Drinking Water Standards (DWS).

The site is close to a surface water body and therefore the results of the analyses have been compared to Environmental Quality Standards (EQS). Where there are no EQS for a contaminants of concern reference will be made to appropriate alternatives.

EQS for some metals are banded according to water hardness. Water hardness values ranging from 320 to 670 $CaCO_3$/l have been recorded and for the purposes of this assessment the EQS values for the >250 mg $CaCO_3$/l range have been adopted.

8.2 Groundwater

None of the contaminant concentrations are recorded above DWS and/or EQS and therefore further assessment of these contaminants in relation to groundwater risks is not considered to be necessary.

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9 Assessment of Ground Gas and Organic Vapour Data

This section presents a GQRA to identify potential sources of gas and organic vapour in the ground that could impact on human health.

9.1 Guidelines

The proposed development is mixed low-rise residential and commercial and the potential impact of ground gas on development is assessed through the British Standard BS8485:2007 and the Traffic Light designations published by the National House Building Council and the Characteristic Situations published by CIRIA.

A generic quantitative risk assessment for organic vapour (v-GQRA) has been undertaken in accordance with the CIRIA VOC Handbook C682 to assess the potential impact on human health from the indoor inhalation of vapour generated by organic compounds in soil. For TPH, the LQM S4ULs are considered to be protective of human health from the indoor inhalation of hydrocarbon vapour.

9.2 Screening Assessment – Ground Gas

One visit to site has been made following site work. A summary of site maximum monitoring results are presented in Table 9.1 below from which Gas Screening Values (GSVs) have been calculated.

Table 9.1 Site Maximum Gas Concentrations and Flow Rate

Parameter	Site Maximum	GSV
Methane	0.50%	0.0025 l/hr
Carbon dioxide	6.50%	0.035 l/hr
Flow rate	0.50l/hr	

The screening assessment places the site in a CIRIA Characteristic Situation 2 / NHBC Traffic Light Amber 1 for carbon dioxide.

9.3 Screening Assessment – Organic Vapour

Based on soil test results, S4ULs for TPH compounds in soil are not exceeded, which indicates that there is no potential risk to human health for the inhalation of vapour generated by organic compounds in soil.

9.4 Nature and Distribution of Ground Gas and Organic Vapour Contamination

The assessment of the gas regime at the site is based on the results of one monitoring round and will need to be updated following further monitoring undertaken. The monitoring indicates generally low levels of carbon dioxide across the majority of the site with methane generally below the detection limit of the gas monitoring equipment. An isolated elevated level of 6.5% carbon dioxide and 0.5% methane was noted within WS02 to the west of the existing lake.

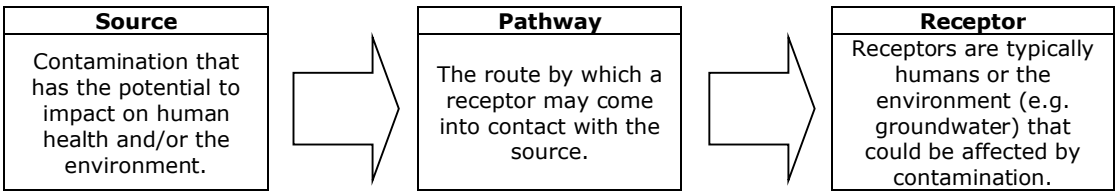
The Phase 1 Contamination Assessment report concluded that the site is within an area where full radon protective measures are likely to be necessary within new buildings.

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10 Contaminated Land Risk Assessment and Conceptual Site Model

10.1 General Approach

The assessment of risk from contamination follows the source-pathway-receptor (SPR) approach. Each of these elements is described as follows.



Without a source-pathway-receptor linkage in place, it is considered that there is no risk of harm and remediation is unlikely to be required. If, however, there is a linkage between source and receptor then a risk-based approach is used to assess the significance or potential impact of the SPR-linkage to determine if remediation is required.

Such an assessment involves Quantitative Risk Assessment (QRA). The QRA process involves the identification of sources based on site investigation findings (eg compound concentration exceeding S4UL) together with identification of the exposure pathway and sensitive receptor. A Conceptual Site Model (CSM) is then developed and presented that shows the possible pollution linkages.

In terms of identifying *significant* pollution linkages (i.e. those that require remediation), a level of risk (ranging from Very Low to Very High) is assigned to each. Where the level of risk is 'Moderate' or greater, then the pollution linkage is considered to be 'significant' and remediation is required. Risk definitions are provided in Appendix G.

10.2 Identified Contamination Sources

Based on the GQRA presented in the previous sections, sources of contamination that could impact on receptors have been identified and are summarised in Table 11.1 below.

Table 10.1 Identified Sources of Contamination

Receptor type	Source
Human health	Carbon dioxide in superficial soils
Human Health	Radon contamination from underlying geology.

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10.3 Potential Exposure Pathways

Table 10.2 below presents a review of potential pathways and receptors for the site.

Table 10.2 Potential Exposure Pathways and Receptors

Receptor	Pathway	Notes	SPR Link
Human Health			
Future site users	Dermal contact, ingestion or inhalation of soil and soil dust	No soil contamination identified above screening levels.	✘
	Migration in permeable strata and inhalation of gas/organic vapour	Ground gas including radon could enter new buildings and accumulate. Gas monitoring has recorded elevated concentrations of carbon dioxide albeit with low flow.	✓
	Migration in permeable strata, accumulation and risk of explosion	Gas monitoring has not recorded elevated concentrations of methane.	✘
Adjacent site users	Ingestion/inhalation of windblown dust	No soil contamination identified above screening levels.	✘
	Migration in groundwater and direct contact	Off site residents are unlikely to come into contact with groundwater.	✘
	Migration in groundwater and inhalation of organic vapour	However no soil contamination above screening levels was identified.	✘
Construction workers and services maintenance staff	Dermal contact, ingestion or inhalation of soil and soil dust	No soil contamination identified above screening levels.	✘
Development			
Future plant life	Plant uptake in garden or landscape area	No soil contamination identified above screening levels.	✘
Water supply pipes	Contact with contaminated material	No soil contamination identified above screening levels.	✘
Environment			
Surface water: Lake within centre of site	Surface runoff	No soil contamination identified above screening levels.	✘
	Groundwater movement	No soil contamination identified above screening levels.	✘
Groundwater: Superficial Secondary 'A' aquifer (Glaciofluvial deposits)	Leaching from soil and vertical fluid movement	No soil or groundwater contamination identified above screening levels.	✘
Groundwater Superficial aquifer (Glacial Till)	Leaching from soil and vertical fluid movement	Superficial aquifer materials are unproductive strata. No soil or groundwater contamination identified above screening levels.	✘
Groundwater: Bedrock Secondary 'A' aquifer	Leaching from soil and vertical fluid movement	No soil or groundwater contamination identified above screening levels.	✘

Potentially complete SPR linkages are carried forward for further assessment in Table 10.3.

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10.4 Phase 2 Updated Conceptual Model

Based on the sources, pathways and receptors identified above, Table 10.3 below summarises all complete pollutant linkages for the site and identifies the level of risk from each.

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Table 10.3 Phase 2 Updated Conceptual Site Model

Source	Area Affected	Contaminants	Pathway	Receptor	Likelihood	Potential Magnitude	Overall Risk	Notes
Superficial Materials / Made Ground	North west area of site	Ground gas (carbon dioxide)	Inhalation	Site users	Likely	Severe	High	The site is designated NHBC traffic light Amber 1 for carbon dioxide. Low flow measured during monitoring.
				Site construction/ maintenance workers	Low Likelihood	Severe	Moderate	Carbon dioxide was present in excess of 5% and could accumulate in deep excavations and services voids.

11 Remediation and Risk Management

11.1 General

This assessment has identified potential hazards at the site with possible SPR-linkages, which could represent potentially unacceptable risks to identified receptors.

Mitigation of the SPR-linkages summarised in Table 10.3 is recommended to reduce the impact of contamination on site occupants.

The following is for guidance only and does not represent final design of a remediation scheme. Remediation schemes can require the submission of a remediation strategy and verification plan to the Local Authority and/or Environment Agency.

11.2 Soil Remediation

Based on the GQRA and CSM, soil remediation is not considered to be required.

11.3 Groundwater Remediation

DWS and EQS are not exceeded and remediation for the protection of groundwater is not considered to be necessary.

11.4 Gas and Organic Vapour Protection

Further monitoring of ground gas levels will be required across the site to better determine the ground gas regime at the site. The further monitoring would also look to delineate the area of elevated carbon dioxide within the north west of the site area around WS02.

Hydrocarbon vapour protection is not considered to be required for new buildings.

11.5 Off Site Disposal

All waste soils which are to be removed from site (e.g. foundation arisings) need to be classified in terms of waste disposal prior to export.

The waste classification and ability to accept the waste soils can be confirmed by the proposed receiving landfill site, who should be provided with a copy of the laboratory test results in Appendix D.

Some additional testing may be necessary for the receiving landfill site to confirm its ability to accept the waste.

Natural soils form an uncontaminated site (excluding peat and topsoil) would normally be classified as Inert for off-site disposal without the need for further testing.

Non-hazardous soils require pre-treatment prior to disposal. Effective pre-treatment, involving separation, sorting and screening can offer cost reductions. Costs for disposal of non-hazardous and hazardous soils are significant compared to disposal of inert material.

11.6 Remediation Documentation

Based on the findings of this report, remediation for soils and groundwater contamination is not considered to be required and under the conditions of planning, a remediation strategy document will not need to be submitted to the planning authority.

11.7 Construction Health and Safety

It is recommended that construction workers at the site adopt appropriate personal hygiene precautions at the site and use personal protective equipment as required, particularly provision of washing facilities, wearing of gloves and avoidance of hand to mouth contact (e.g. eating or smoking), especially when dealing with made ground.

Handling of soil and water should be minimised and dust suppression measures should be implemented, particularly during any excavation through the made ground. Soils should be dampened during excavation and handling to limit dust, and lorries suitably sheeted. Surface run-off from vehicle washing, dust suppression or storms, during construction, should be controlled to prevent entry into watercourses and off-site drainage systems.

Gas and vapour monitoring should be carried out before entry into deep excavations or confined spaces.

These precautions are considered to be industry standard when developing sites of this nature, and reference can be made to the HSE document HSG66 *Protection of workers and the general public during development of contaminated land* for further information.

11.8 Land Remediation Relief

At the time of writing, Land Remediation Relief (LRR) is a 150% credit on corporation tax claimable by certain corporate bodies against qualifying expenditure when undertaking investigation and remediation of potentially contaminated or derelict sites.

12 Summary and Recommendations

Published geology is Glacio-fluvial deposits within the north east of the site and Glacial Till deposits across the central and south west section of the site overlying the Etruria Formation mudstone recorded below the majority of the site, with the Pennine Lower Coal Measures Formation recorded beneath the western edge of the site.

Existing construction including foundations and services, may possibly be present as a result of the previous development of the site.

12.1 Geotechnical

Strip and or trench fill foundations are considered appropriate for the residential development across the site. It is considered that where the commercial and retail units are constructed as concrete or steel frame units, pad foundations would be considered suitable.

The infiltration capacity for soakaway drainage is variable across the site with adequate capacity more likely within the north east of the site. The local conditions should be confirmed once the drainage strategy for the site has been confirmed.

Excavated natural soils should be suitable for re-use at the site.

The natural superficial clay and sand and gravel should be suitable as a founding stratum and an allowable net bearing capacity of 100kN/m^2 should be available for a strip/trench fill foundation 600mm wide or a 1.5m square pad foundation. These values should result in settlements of not more than 20mm and 25mm respectively, keeping differential settlements within acceptable limits.

Heave protection is likely to be required where foundations are within the influencing distance of trees.

Ground floors may be constructed as ground bearing slabs. Buried construction should be broken away from the slab to avoid interaction. Heave protection, such as suspended over void, or constructed on a granular fill maybe required locally due to swelling and shrinkage of clay soils.

The soils at the site fall within Design Sulphate Class DS-1 with a corresponding ACEC Class of AC-1^d.

12.2 Contamination

Soil contamination above human health screening levels is absent.

Soil contamination above BS3882:2007 threshold levels is absent.

Soil contamination above UKWIR threshold levels is absent.

Ground gas monitoring identified an isolated elevated level of carbon dioxide above the generic assessment level. The site is therefore classified as Amber 1 in accordance with the NHBC and CIRIA Characteristic Situation 2.

Groundwater contamination above DWS and EQS is absent.

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Levels of carbon dioxide noted within one location at the site exceeded the guidance value classifying the site as Amber 1 / Characteristic Situation 2. In addition, the BGS records the site to be within an area where full radon protective measures would be required within new buildings across the site.

12.3 Further Work

A current tree survey is required to determine the potential influence of trees on and adjacent to the site, to the proposed foundation solution.

Further monitoring and assessment would be required to determine whether gas protection measures would be required to be incorporated into the design of structures at the site.

Further investigation of the deeper ground conditions should be undertaken to confirm the foundation depths and bearing capacities across the site area.

13 References

1. Association of Geotechnical and Geoenvironmental Specialists (2004) A clients guide to site investigations.

2. Association of Geotechnical and Geoenvironmental Specialists (2006) AGS guidelines for good practise in site investigations.

3. Association of Geotechnical and Geoenvironmental Specialists (1999) Code of conduct for site investigations.

4. Association of Geotechnical and Geoenvironmental Specialists (2005) Management of risk associated with the preparation of ground reports.

5. Association of Geotechnical and Geoenvironmental Specialists (2005) Guidelines for the preparation of the ground report.

6. Association of Geotechnical and Geoenvironmental Specialists (2000) Guidelines for combined geoenvironmental and geotechnical investigations.

7. British Standards Institution (2011) Investigation of potentially contaminated sites - code of practice. BS10175:2011.

8. British Standards Institution (2015) Code of practice for site investigation. BS5930:2015.

9. British Standards Institution (1990) Methods of test for civil engineering purposes. BS1377:1990.

10. British Standards Institution (2015) Specification for topsoil. BS3882:2015.

11. British Standards Institution (1986) Code of practice for foundations. BS8004:2015.

12. British Standards Institution (2007) Code of practice for the characterization and remediation from ground gas in affected developments. BS8485:2007.

13. British Geological Survey (1993) Sheet 121 Wrexham 1:50,000 scale Geology Map, Solid and Drift Edition.

14. Building Research Establishment (1993) Building on shrinkable clay. BRE Digest 240 - Part 1.

15. Building Research Establishment (1993) Low rise buildings: the influence of trees in clay soils. BRE Digest 298.

16. Building Research Establishment (1996) Desiccation in clay soils. BRE Digest 412.

17. Building Research Establishment (2005) Concrete in aggressive ground. BRE Special Digest 1.

18. Building Research Establishment (2003) Soakaway Design. BRE Digest 365.

19. CIRIA (1995) The standard penetration test (SPT). Methods and use. CIRIA Report C143.

20. CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings. CIRIA Report C665.

21. CIRIA (2009) The VOCs Handbook: Investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination. CIRIA Report C682.

22. DEFRA & Environment Agency (2004) Model procedures for the management of contaminated land. Contaminated Land Report 11.

23. Dutch Reference Framework (2001) Circular on target values and intervention values for soil remediation.

24. Environment Industries Commission, Association of Geotechnical and Geoenvironmental Specialists and Contaminated Land: Applications in Real Environments (2009) The soil generic assessment criteria for human health risk assessment.

25. European Community (1976) Environmental quality standards for List 1 and List 2 dangerous substances (EC Directive 76/464/EEC).

26. Hatanaka M and Uchida A (1996) Empirical correlation between penetration resistance and effective friction of sandy soil. Soils and Foundations, Vol 36 (4), 1-9.

27. Hansen J and Brinch A (1961) General formula for bearing capacity. Danish Geotechnical Institute Bulletin No. 11.

28. Hansen J and Brinch A (1968) A revised extended formula for bearing capacity. Danish Geotechnical Institute Bulletin No. 28.

29. Hansen J and Brinch A (1978) A code of practise for foundation engineering. Danish Geotechnical Institute Bulletin No. 32.

30. Health and Safety Executive (1991) Protection of workers and the general public during the development of contaminated land.

31. Highways Agency (2009) Interim Advice Note 73/06 - Revision 1 - Design guidance for road pavement foundations.

32. Land Quality Management Ltd (2015) The LQM/CIEH S4ULs for human health risk assessment.

33. National House Building Council (2007) Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present.

34. National House Building Council (2011) NHBC Standards - Chapter 4.1 Land quality: Managing ground conditions.

35. National House Building Council (2011) NHBC Standards - Chapter 4.2. Building near trees.

36. Department for Communities and Local Government (2012) National Planning Policy Framework.

37. Peck RB, Hanson WE and Thornburn TH (1967) Foundation engineering 2nd Edition. John Wiley, New York.

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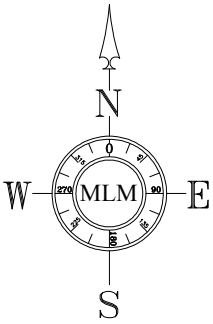
38. Skempton AW (1951) The bearing capacity of clays. Building Research Congress, Div. I, 180.

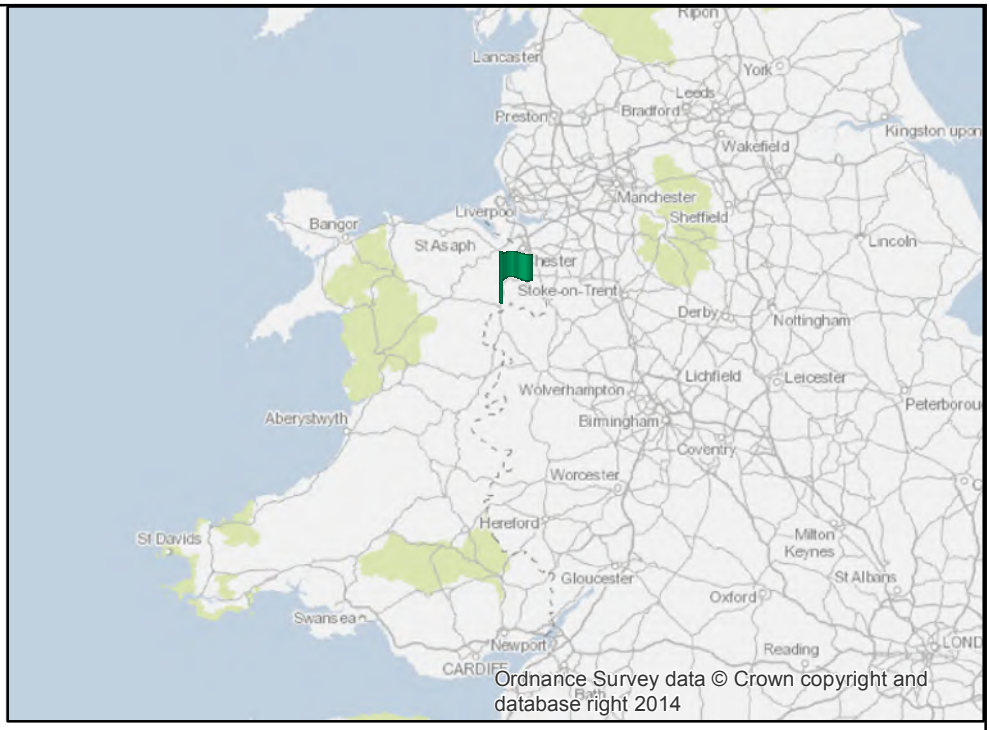
39. UK Water Industry Research (UKWIR) (2011) Guidance for the selection of water supply pipes to be used in brownfield sites.

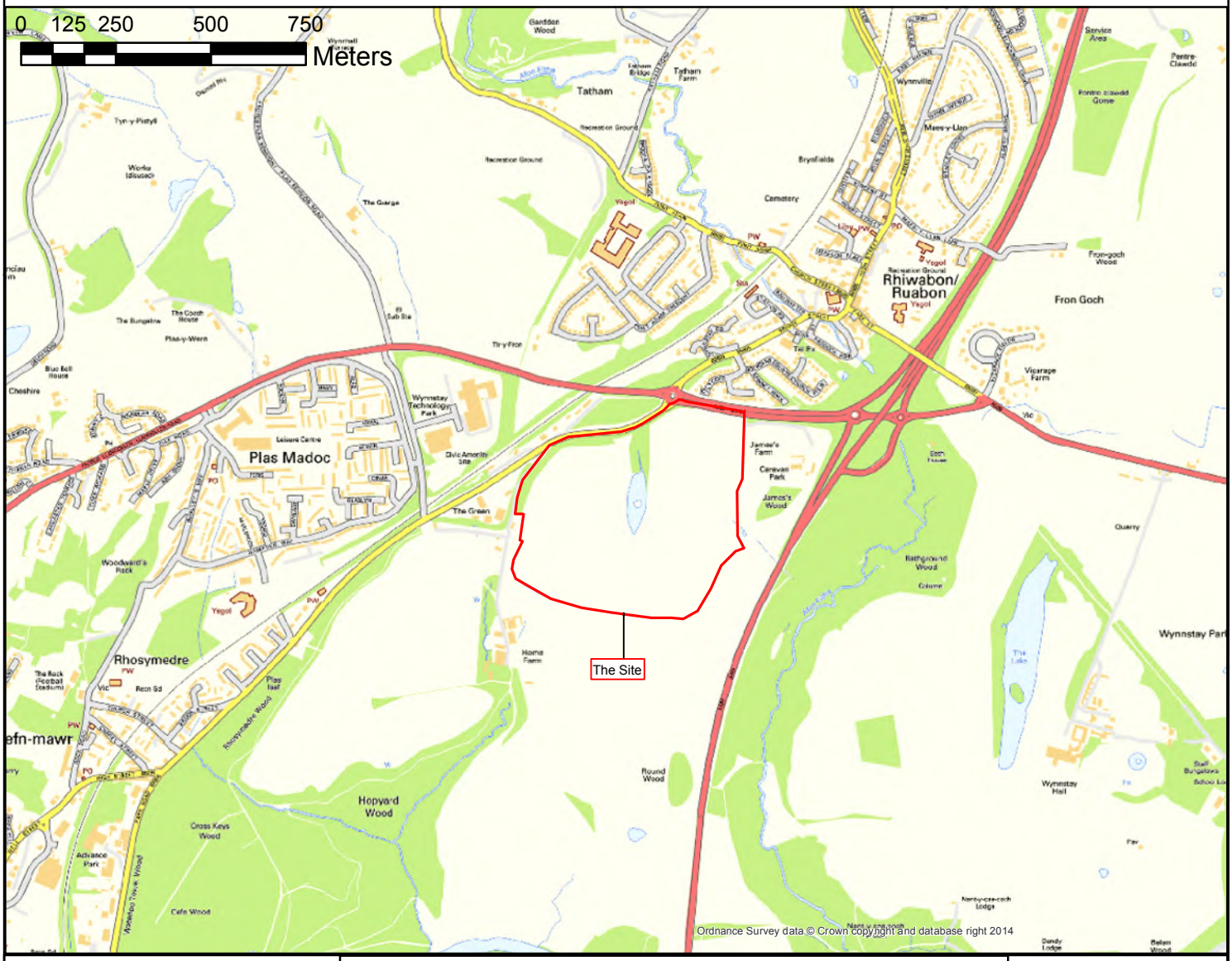
40. Water Supply (Water Quality) Regulations (2000)

Figures

Figure 1: Site Location Plan







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Project
Ruabon Park Wrexham

Site Location Plan

Job No.
773135

Figure No.
1

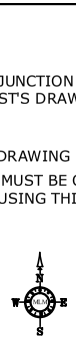
Drawings

773135-DWG-ENV-001 Exploratory Hole Location Plan

NOTES

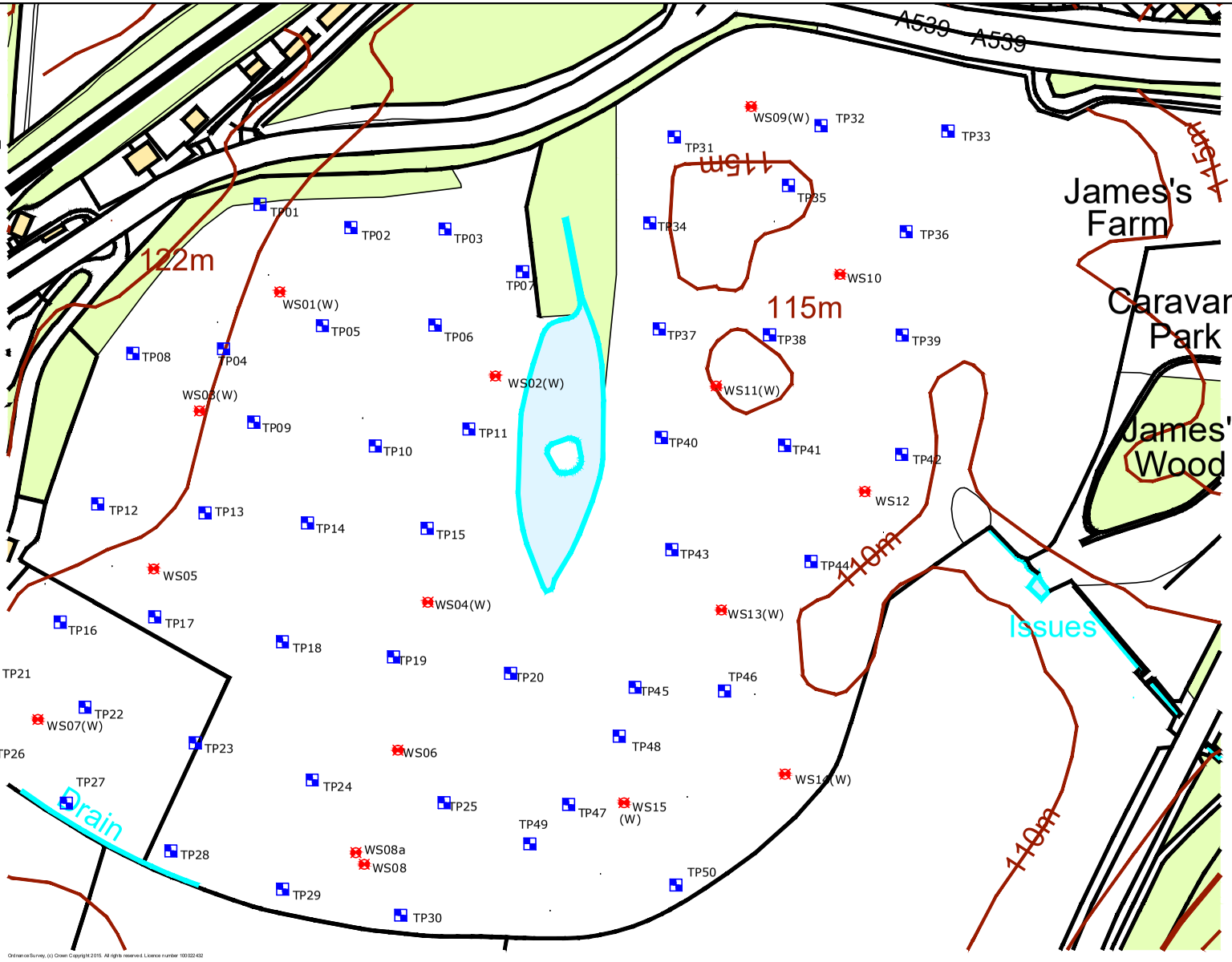
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2. DO NOT SCALE FROM THIS DRAWING MANUALLY OR ELECTRONICALLY. WRITTEN PERMISSION MUST BE OBTAINED FROM MLM PRIOR TO SCALING ELECTRONICALLY OR USING THIS ELECTRONIC FILE.



LEGEND

TP1	TRIAL PIT LOCATION
WS1	WINDOWLESS SAMPLER BOREHOLE LOCATION
(W)	MONITORING WELL LOCATION



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Rev	Date	Description	Made	Ckd
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Website: www.mlm.uk.com

Drawing Status: FINAL ISSUE

Client: CARTER JONAS

Project: RUABON PARK, WREXHAM

Drawing Title: EXPLORATORY HOLE LOCATION PLAN

Drawn/Design	ER	Date	OCT 2015	Scales	NTS @ A1
Checked	HD	Approved	DG		1:2500 @ A3

Drawing No.: 773135-DWG-ENV-001

Rev: .

Appendices

Appendix A: Exploratory Hole Logs
Appendix B: Gas and Groundwater Monitoring Results
Appendix C: Geotechnical Test Results
Appendix D: Results of Chemical Analysis
Appendix E: Soakaway Test Results
Appendix F: Generic Assessment Criteria
Appendix G: Defining Risk

Appendix A

Exploratory Hole Logs

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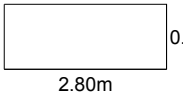
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Project Engineer:	Hugh Dyer	Co-ordinates: 329592.14E - 343398.13N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
1.00	B1			1		Orange brown slightly clayey SAND and GRAVEL, becoming less clayey with depth. Gravel of fine to coarse angular to sub-rounded quartzite, sandstone and quartz. Cobbles of sandstone and quartzite.	1.50	
1.00	D2							
				2.00		Firm grey to brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and quartz.	1.00	
				3.00		Stiff grey to brown sandy CLAY.	1.00	
3.50		120						
4.00		125		4.00		End of trial pit at 4.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m

Dimensions:



Stability: Stable

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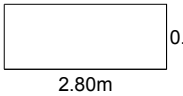
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Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded, sandstone, concrete, quartzite, quartz, wood and brick.	0.40	
0.80	D1					Firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.20	D2			2.10		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				3.00		Firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
4.00		70		3.50		Firm to stiff grey to brown silty CLAY.	1.00	
4.50		105		4.50		End of trial pit at 4.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 4.50m

Dimensions:



Stability: Stable

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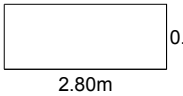
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded, sandstone, quartzite, quartz, concrete and brick. Cobbles of sandstone, quartzite and brick.	0.80	
1.20	D2			1.10		Firm brown to dark brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded quartzite and sandstone. Cobbles and boulders of sandstone and quartzite.	2.30	
3.50		70		3.40		Firm grey to brown silty CLAY. Decayed roots.	0.10	
3.50	D3			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	21/09/2015
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TP04

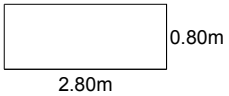
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Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		MADE GROUND: Light brown to brown silty sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and brick, Cobbles of sandstone and quartzite.	0.70	
1.00	D1			1.10		Soft grey gravelly very sandy CLAY. Gravel of fine to coarse sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.00	D2			2.50		Grey gravelly SAND. Gravel of fine to medium sub-angular to rounded sandstone and quartzite.	2.00	
4.50	D3			4.50		End of trial pit at 4.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 4.50m. Slow GW seepage at 3.00m

Dimensions:



Stability: Unstable

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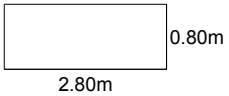
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0.30	D1			0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
				0.90		MADE GROUND: Brown sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite, quartz and rare brick. Cobbles and boulders of sandstone and quartzite.	0.40	
				1.90		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	1.00	
2.00		95				Very stiff grey to brown silty CLAY.	1.10	
3.00		140		3.00		End of trial pit at 3.00 m		
3.00	D2							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Concrete pipe at 1.20m

Dimensions:



Stability: Stable

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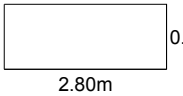
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
0.50	D1					MADE GROUND: Light brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and brick. Cobbles and boulders of sandstone and quartzite.	0.70	
				1.10		Firm grey sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.60	
1.50	D2							
				2.70		Stiff grey to brown sandy CLAY.	0.30	
3.00		82		3.00		End of trial pit at 3.00 m		
3.00	D3							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

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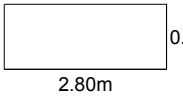
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INSITU TEST/SAMPLING			STRATA					
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				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						MADE GROUND: Dark brown to brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and brick. Cobbles and boulders of sandstone.	0.50	
0.80	D1			0.80		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	0.60	
				1.40		Grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	1.80	
2.00	D2							
2.00	B1							
				3.20		Stiff grey to brown sandy CLAY.	0.50	
3.50		140						
3.70	D3			3.70		End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m

Dimensions:



Stability: Stable

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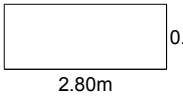
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329519.94E - 343289.23N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	B1					Brown to light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.00	D1			1.10		Grey to brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
				2.80		Grey gravelly very sandy clay. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone.	0.70	
3.50	D2			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM

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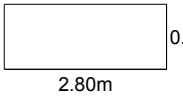
Project:	Ruabon Park, Wrexham	Method: TP	TP09
Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329581.11E - 343284.02N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.60		Red brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.20	
				1		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.50	D2			1.40		Firm brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
				2 2.00		Firm grey to dark grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.50	
				3				
3.50	D3			3.50		End of trial pit at 3.50 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM
www.mlm.uk.com

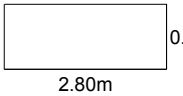
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329645.26E - 343286.68N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		MADE GROUND: Brown to grey sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite, quartz and brick. Cobbles and boulders of sandstone and quartzite.	0.60	
1.00	D1			1.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	0.70	
				1.70		Stiff grey to brown sandy CLAY.	1.40	
2.50	B1							
3.00		82						
3.10	D2			3.10		End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Slow GW seepage at 3.10m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

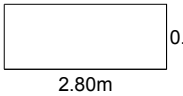
Project:	Ruabon Park, Wrexham	Method: TP	TP11
Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329707.85E - 343280.01N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1			0.70		MADE GROUND: Brown sand and gravel. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick. Cobbles of sandstone and quartzite.	0.40	
				1.60		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
2.00	D2	65		2.00		Firm grey to brown silty CLAY.	0.40	
2.00						End of trial pit at 2.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m

Dimensions:



Stability: Stable

MLM

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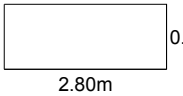
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Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329488.90E - 343235.78N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.30		Brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
1.00	D1			1				
				1.20		Brown clayey gravelly SAND. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				2 2.00		End of trial pit at 2.00 m		
				3				
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

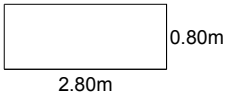
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329552.22E - 343230.54N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
1.00	D1			1.10		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.50	D2					Soft to firm grey to dark grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.70	
3.50	D3			3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.80m. Slow GW seepage at 3.80m

Dimensions:



Stability: Unstable

MLM

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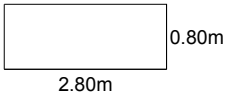
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Project ID:	773135	Start: 21/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329612.66E - 343224.63N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.30	D1			0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
						Firm brown to grey silty CLAY. Root traces throughout.	0.70	
1.50	B1			1.10		Stiff grey to brown silty CLAY. Root traces throughout	1.30	
2.00		85						
2.00	D2			2.40		End of trial pit at 2.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Slow GW seepage at 2.40m

Dimensions:



Stability: Stable

MLM
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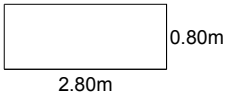
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Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329683.22E - 343221.44N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
0.50	D1			0.40		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00		62		0.80		Firm to stiff brown to grey silty CLAY.	1.20	
1.50		78						
				2.00		Brown silty fine to coarse SAND.	0.30	
				2.30		Firm grey to brown sandy silty CLAY.	0.40	
				2.70		Stiff to very stiff fissile grey silty CLAY.	1.40	
3.00		90						
3.50		98						
4.00		92						
4.10	D2			4.10		End of trial pit at 4.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Slow GW seepage at 4.10m

Dimensions:



Stability: Stable

MLM

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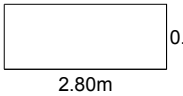
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Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329457.95E - 343188.80N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
0.50	D1					Brown to light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.05	
				1.40		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.		
2.00	B1						1.20	
				2.60		Firm to stiff grey gravelly sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
							1.30	
3.90	D2			3.90		End of trial pit at 3.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

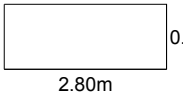
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Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329522.51E - 343169.17N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.90		Brown to light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
1.50	D2			1.60		Brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite	0.70	
				2.60		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.00	
				3.30		Brown to grey clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
3.50	D3			3.50		Brown to grey gravelly very sandy CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.20	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.50m

Dimensions:



Stability: Stable

MLM

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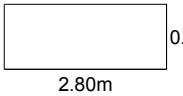
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Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329597.94E - 343154.41N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1			0.60		Light brown to brown slightly sandy gravelly silty CLAY. Gravel of fine to coarse sandstone and quartzite. Cobbles of sandstone.	0.30	
						Soft to firm brown to grey gravelly very sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	2.10	
				2.70		Stiff to hard dark grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.10	
3.00		140						
3.50		140						
3.80	D2			3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

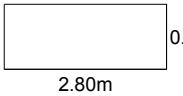
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Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329663.37E - 343145.55N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1			0.60		Firm light brown to brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30	
1.20	D2			1.50		Firm brown to grey slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90	
2.00		83		2.70		Stiff grey to brown silty CLAY. Root traces throughout.	1.20	
2.50		86						
2.70	B1					Stiff fissile grey silty CLAY. Root traces throughout.	0.50	
3.00		98						
3.20	D3			3.20		End of trial pit at 3.20 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.20m

Dimensions:



Stability: Stable

MLM
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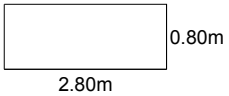
Project:	Ruabon Park, Wrexham	Method: TP	TP20
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329732.49E - 343135.82N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.10	D1			0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20	
				0.50		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
0.60		85				Stiff to very stiff grey to brown silty CLAY.	0.70	
1.00	D2			1.20				
1.10		140				Stiff to very stiff grey silty CLAY.	0.60	
1.50		140		1.80				
						Firm brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
				2.20		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone.	0.70	
2.50	D3			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.20m. Partial pit collapse at 2.90m. Fast GW seepage at 2.70m

Dimensions:



Stability: Unstable

MLM
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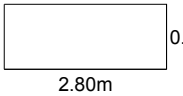
Project:	Ruabon Park, Wrexham	Method: TP	TP21
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329425.52E - 343138.97N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1					TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.35		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.65	
				1.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20	
2.00	D2							
				2.20		End of trial pit at 2.20 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM
www.mlm.uk.com

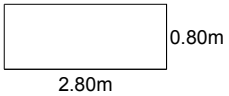
Project:	Ruabon Park, Wrexham	Method: TP	TP22
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329481.38E - 343115.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.40	
				1.10		Firm light brown to grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
2.00	D2			2.80		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.70	
3.00		85		4.10		Stiff to hard dark grey to purplish grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.30	
4.00		140						
4.00	D3					End of trial pit at 4.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 4.10m

Dimensions:



Stability: Unstable

MLM
www.mlm.uk.com

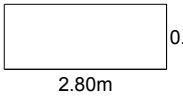
Project:	Ruabon Park, Wrexham	Method: TP	TP23
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329546.63E - 343094.79N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.20		Light brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.85	
2.80	D2			3.00		Soft to firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.80	
3.50		140		3.50		Stiff to hard dark grey to purplish grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.50m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

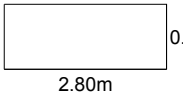
Project:	Ruabon Park, Wrexham	Method: TP	TP24
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329615.48E - 343072.94N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
1.00	D2			1.10		Firm brown to grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.80	
1.20	B1			1.60		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.50	
				3.50		Soft to firm grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.90	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

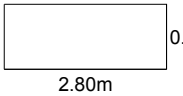
Project:	Ruabon Park, Wrexham	Method: TP	TP25
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329693.19E - 343059.49N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00	D1			1		Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.90	
1.50	B1			2				
				2.60		Firm to stiff grey to dark grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.20	
3.00		80		3				
3.50		94						
3.80	D2			3.80		End of trial pit at 3.80 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

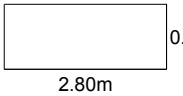
Project:	Ruabon Park, Wrexham	Method: TP	TP26
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329422.42E - 343093.29N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.40	
1.00	D1			1.50		Light brown to grey sandy very gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
3.70	D2			3.70		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	2.20	
						End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.70m. Slow GW seepage at 3.70m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	22/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329470.46E - 343059.25N

TP27

1:25

Sheet 1 of 1

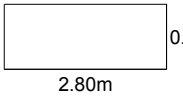
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INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						Light brown firm gravelly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				1.20		Soft red brown to brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and quartz. Cobbles and boulders of sandstone and quartzite.	1.20	
1.50	D1							
				2.40		Soft to firm grey sandy gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.40	
3.00	D2							
				3.80		End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

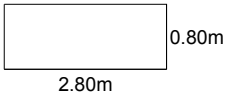
Project:	Ruabon Park, Wrexham	Method: TP	TP28
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329532.01E - 343031.04N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20	
0.50 0.50	D1 B1			1.10		Firm brown slightly sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
				2.80		Soft to firm brown to grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.70	
3.70	D2			3.80		Firm to stiff grey slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00	
						End of trial pit at 3.80 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

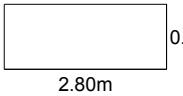
Project:	Ruabon Park, Wrexham	Method: TP	TP29
Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329597.97E - 343008.51N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Stiff light brown to grey slightly gravelly slightly sandy silty clay. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.50	D1			1		Firm brown to grey sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	2.00	
2.00	B1			2				
				2.70		Stiff to hard grey to dark grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and claystone.	1.00	
3.00		87		3				
3.50		140						
3.50	D2			3.70		End of trial pit at 3.70 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM
www.mlm.uk.com

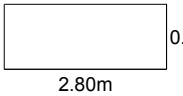
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Project ID:	773135	Start: 22/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329667.63E - 342993.11N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.00	D1			1		Firm brown sandy gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
2.00		79		1.80		Stiff to hard dark grey to purplish grey slightly gravelly slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
2.00	D2			2				
3.00		140		3				
3.50		140		3.50		End of trial pit at 3.50 m		
3.50	D3			4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM
www.mlm.uk.com

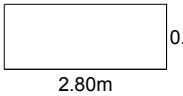
Project:	Ruabon Park, Wrexham	Method: TP	TP31
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329844.97E - 343462.98N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
0.30	D1			0.35		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.05	
1.00	D2			1.40		Firm red brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
				1.70		Brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.70	
3.40	D3			3.40		End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Partial pit collapse at 3.40m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

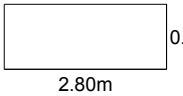
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Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329915.52E - 343459.08N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.50	D1					Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				1.10		Brown clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
1.90	D2			1.90		End of trial pit at 1.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

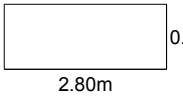
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Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329990.39E - 343455.83N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.45	
0.50	D1			0.45		Light brown to grey silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.45	
				0.90		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
1.90	D2			1.90		End of trial pit at 1.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.45m

Dimensions:



Stability: Stable

MLM
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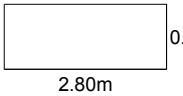
Project:	Ruabon Park, Wrexham	Method: TP	TP34
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329814.54E - 343401.62N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
0.60	D1			0.90		Dark brown to brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
2.20	B1			2.20		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.30	
				2.40		Brown to green brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.20	
3.40	D2			3.40		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
						End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

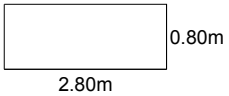
Project:	Ruabon Park, Wrexham	Method: TP	TP35
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329888.04E - 343402.70N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.70		Brown to light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
1.20	D1					Light brown to orange brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	2.20	
2.90	D2			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 2.90m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

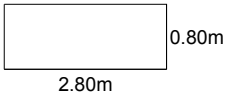
Project:	Ruabon Park, Wrexham	Method: TP	TP36
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329965.76E - 343396.54N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
				0.50		Brown to orange brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
0.70	D1							
0.80	B1			0.90		Brown to orange brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
				1.50		Brown to orange brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
2.00	D2							
2.90	D3			2.90		End of trial pit at 2.90 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.50m. Partial pit collapse at 2.90m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

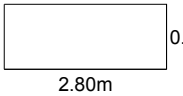
Project:	Ruabon Park, Wrexham	Method: TP	TP37
Project ID:	773135	Start: 24/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329820.11E - 343339.01N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.60	
				0.60		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.20	
1.00	D1			1				
				1.80		Brown to red brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
2.00	B1			2				
				2.60		Brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	▼
3.00	D2			3	3.00	End of trial pit at 3.00 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.00m. Slow GW seepage at 2.75m

Dimensions:



Stability: Unstable

MLM
www.mlm.uk.com

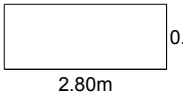
Project:	Ruabon Park, Wrexham	Method: TP	TP38
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329885.17E - 343335.64N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
1.00	D1			1.10		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
2.00	D2			2.30		Firm brown to grey gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.20	
3.70	D3			3.70		Brown silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.40	
						End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.70m. Slow GW seepage at 3.70m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

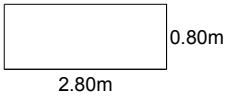
Project:	Ruabon Park, Wrexham	Method: TP	TP39
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329963.43E - 343335.49N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.10		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.75	
1.50		93				Stiff to very stiff grey silty CLAY. Becoming sandy with depth.		
1.50	B1						1.30	
2.00		140		2.40		Brown to grey gravelly SAND. Gravel of fine to medium sub-rounded to rounded sandstone and quartzite.	0.90	
				3.30		Stiff red brown to purplish brown gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
3.50		86						
3.60	D2			3.60		End of trial pit at 3.60 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35. Slow GW seepage at 3.30m

Dimensions:



Stability: Stable

MLM

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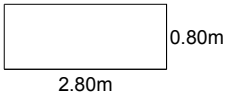
Project:	Ruabon Park, Wrexham	Method: TP	TP40
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329821.34E - 343275.03N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
						Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
				1.10		Firm grey to dark grey gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
				1.60		Grey to purple grey slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.70	
2.00	D2							
2.30	B1			2.30		Firm to stiff purple grey to grey slightly gravelly sandy CLAY. Gravel of fine to coarse sub-rounded to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
2.50		80						
2.60	D3			2.60		End of trial pit at 2.60 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 2.80m. Slow GW seepage at 2.30m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

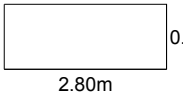
Project:	Ruabon Park, Wrexham	Method: TP	TP41
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329894.03E - 343270.38N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
				0.40		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.40	
1.00	D1			0.80		Firm mottled brown grey to orange brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
				1.80		Grey slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded. Cobbles of sandstone and quartzite.	1.20	
3.00	D2			3.00		End of trial pit at 3.00 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m. Partial pit collapse at 3.00m. Slow GW seepage at 3.00m

Dimensions:



Stability: Unstable

MLM

www.mlm.uk.com

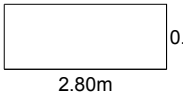
Project:	Ruabon Park, Wrexham	Method: TP	TP42
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329963.12E - 343265.06N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.30		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
				1.00		Brown to orange brown very clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
1.50	D1							
				1.70		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
2.00	D2							
				2.50		Stiff to hard grey to purplish grey gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.60	
3.00		140						
3.10	D3			3.10		End of trial pit at 3.10 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM
www.mlm.uk.com

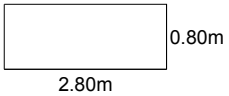
Project:	Ruabon Park, Wrexham	Method: TP	TP43
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329827.57E - 343208.82N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
1.00	D1			1.20		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.85	
1.50		140		2.10		Very stiff dark grey to purple grey silty CLAY. Root traces throughout.	0.90	
2.00		140		2.70		Very stiff dark grey to purple grey slightly sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.60	
2.50		140		3.20		Dark grey to purple grey clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.50	
3.00		140				End of trial pit at 3.20 m		
3.20	D2							

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Slow GW seepage at 3.10m

Dimensions:



Stability: Stable

MLM

www.mlm.uk.com

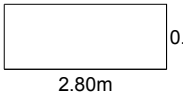
Project:	Ruabon Park, Wrexham	Method: TP	TP44
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329909.61E - 343201.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA					
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40	
1.00	D1			1.40		Firm light brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	1.00	
2.00	D2			2.40		Firm brown gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
2.50		140				Very stiff to hard grey to purple grey silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
3.00		140						
3.50	D3			3.50		End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.40m

Dimensions:



Stability: Stable

MLM

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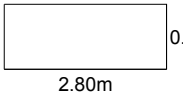
Project:	Ruabon Park, Wrexham	Method: TP	TP45
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329805.86E - 343127.56N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
0.50	D1			0.80		MADE GROUND: Light brown to brown silty sand and gravel. Gravel of fine to coarse sub-angular to rounded sandstone, quartzite and brick, Cobbles and boulders of sandstone and quartzite.	0.45	
2.00	D2			2.40		Firm to stiff brown sandy gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.60	
2.50		140				Very stiff to hard grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.80	
3.00		140						
3.20	D3			3.20		End of trial pit at 3.20 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	23/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329876.41E - 343123.66N

TP46

1:25

Sheet 1 of 1

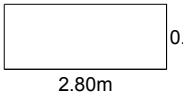
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INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.35		Light brown to brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.25	
				0.60		Brown to red brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.		
1.00	D1			1			0.80	
				1.40		Firm to very stiff brown to red brown slightly sandy very gravelly CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
1.50	B1						0.80	
				2				
				2.20		Very stiff to hard grey to purple grey gravelly silty CLAY. Gravel of fine to coarse sub-rounded to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.		
2.50		140					1.00	
3.00		140		3				
3.20	D2			3.20		End of trial pit at 3.20 m		
				4				

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m

Dimensions:



Stability: Stable

MLM
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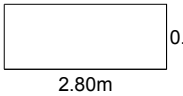
Project:	Ruabon Park, Wrexham	Method: TP	TP47
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329766.66E - 343058.42N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.50		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.50	
				0.80		Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.30	
1.40	D1			1.50		Brown to red brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.70	
2.20	D2			2.40		Brown to dark brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.90	
3.00		82				Firm to stiff dark grey to purplish grey sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.30	
3.50		89						
3.70	D3			3.70		End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m

Dimensions:



Stability: Stable

MLM

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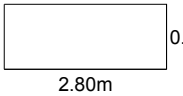
Project:	Ruabon Park, Wrexham	Method: TP	TP48
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329836.62E - 343063.15N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.35		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.35	
				0.90		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.55	
1.50	D1			2.00		Stiff brown to red brown slightly sandy very gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.10	
2.20	B1			3.20		Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20	
3.50	D2	140		3.50		Very stiff to hard grey to purplish grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.30	
						End of trial pit at 3.50 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.35m. Partial pit collapse at 3.50m. Slow GW seepage at 3.10m

Dimensions:



Stability: Unstable

MLM

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Project:	Ruabon Park, Wrexham	Method:	TP
Project ID:	773135	Start:	23/09/2015
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	
Project Engineer:	Hugh Dyer	Co-ordinates:	329755.66E - 342996.05N

TP49

1:25

Sheet 1 of 1

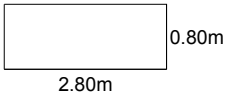
Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.60		Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.30	
				1.30		Brown clayey SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.70	
1.50	D1			2.40		Firm brown to red brown sandy gravelly CLAY. Gravel of fine to coarse angular to rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	1.10	
						Brown slightly clayey SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.00	
3.40	D2			3.40		End of trial pit at 3.40 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Partial pit collapse at 3.40m. Fast GW seepage at 3.30m

Dimensions:



Stability: Unstable

MLM
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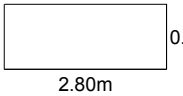
Project:	Ruabon Park, Wrexham	Method: TP	TP50
Project ID:	773135	Start: 23/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:25
Project Engineer:	Hugh Dyer	Co-ordinates: 329830.00E - 343010.87N	Sheet 1 of 1
			Logged by: MM

INSITU TEST/SAMPLING			STRATA						
Depth (m)	Sample Ref.	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Water (m)
0.20	D1			0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30	
				0.80		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite. Boulders of sandstone.	0.50	
1.50	D2			2.40		Firm to stiff red brown to red slightly sandy very gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.60	
2.80	B1			3.30		Firm brown gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles and boulders of sandstone and quartzite.	0.90	
3.50		140				Stiff to hard grey to purplish grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	0.40	
3.70	D3			3.70		End of trial pit at 3.70 m		

Notes:
Shear strengths recorded using Pilicon Hand Shear Vane

Remarks
Live roots to 0.30m. Slow GW seepage at 3.70m

Dimensions:



Stability: Stable

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS01
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329589.59E - 343371.22N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
				0.60		Grey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30		
D1 : 0.90m						Orange brown to brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.40		
1.00	N=16 (13,10/6,4,3,3) ()			1.00		Firm brown gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D2 : 1.50m									
2.00	N=12 (4,2/3,3,3,3) ()								
3.00	N=13 (2,2/3,3,4,3) ()						4.00		
4.00	N=36 (3,4/6,6,11,13) ()								
D3 : 4.90m									
5.00	50 (24 for 105mm/50 for 225mm) ()			5.00		End of borehole at 5.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 5.00m. GW at 3.00m. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS02
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329697.58E - 343317.18N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D1 : 0.70m									
1.00	N=37 (10,8/10,8,10,9) ()			1			1.10		
				1.50		Firm to stiff brown gravelly sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.			
D2 : 1.80m									
2.00	N=17 (6,4/4,5,4,4) ()			2			1.20		
				2.70		Firm to stiff brown to grey silty CLAY. Occasionally sandy.			
3.00 3.00	N=24 (5,5/5,6,6,7) ()	57		3					
4.00 4.00	N=20 (6,4/4,5,5,6) ()	78		4			2.30		
D3 : 4.90m									
5.00 5.00	N=26 (6,6/6,7,6,7) ()	83		5					
				5.00		End of borehole at 5.00 m			
				6					
				7					
				8					
				9					

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 4.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	4.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS03
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329549.94E - 343289.78N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.90m 1.00	N=9 (4,2/2,2,2,3) ()			1.20		Brown to light brown slightly clayey silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90		
D2 : 1.50m						Firm brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
2.00	N=9 (1,2/1,2,3,3) ()			2.00		Soft to firm dark brown slightly gravelly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.85		
3.00	N=29 (11,8/6,8,7,8) ()			2.85		Dark brown to grey gravelly silty SAND. Becoming gravelly very clayey sand. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.45		
4.00 D3 : 4.00m	50 (8,6/50 for 135mm) ()			4.30		End of borehole at 4.30 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.30m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS04
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329683.75E - 343177.86N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.20		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.20		
				0.50		Stiff orange brown to light brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.30		
D1 : 0.90m 1.00	N=14 (3,3/3,4,3,4) ()			1		Firm to stiff brown to orange brown slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.20		
				1.70		Firm to stiff brown to orange brown sandy very silty CLAY.	0.30		
D2 : 1.90m 2.00	N=11 (3,2/2,3,3,3) ()			2					
2.50		80		2.00		Firm to stiff grey silty CLAY.	1.00		
3.00	N=20 (3,3/3,4,6,7) ()			3					
				3.00		Brown slightly gravelly silty SAND. Gravel of fine to medium angular to sub-rounded sandstone and quartzite.	1.00		
D3 : 3.90m 4.00	N=50 (25 for 110mm/50 for 260mm) ()			4					
				4.00		End of borehole at 4.00 m			
				5					
				6					
				7					
				8					
				9					

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. Live roots to 0.20m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS05
Project ID:	773135	Start: 25/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329497.46E - 343199.27N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.50m						Brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
1.00 D2 : 1.20m	N=17 (7,4/4,4,4,5) ()			1.00		Firm brown to dark brown sandy gravelly CLAY. Gravel of fine to coarse angular to sub-rounded quartzite and sandstone. Cobbles of sandstone and quartzite.	1.35		
2.00 D3 : 2.00m	50 (5,4/50 for 75mm) ()			2.35		End of borehole at 2.35 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.35m due to boulder, Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS06
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329665.90E - 343090.44N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
D1 : 0.90m 1.00	N=13 (3,3/3,4,3,3) ()					Stiff brown grey to orange brown silty CLAY.	1.20		
D2 : 1.90m 2.00	N=31 (3,7/6,9,6,10) ()			1.50		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.50		
3.00	N=24 (4,3/4,6,6,8) ()								
D3 : 3.70m									
4.00	N=50 (10,11/50 for 285mm) ()			4.00		End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. GW at 3.00m. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS07
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329453.63E - 343108.64N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
						Firm to stiff brown to light brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.60		
D1 : 0.90m 1.00	N=20 (3,4/7,5,4,4) ()			1.00		Firm brown to light brown slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.80m 2.00	N=21 (5,5/5,5,4,7) ()			2.00		Firm to light brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.50		
3.00	N=34 (4,5/9,9,9,7) ()			3.50		Stiff grey slightly gravelly sandy CLAY. Gravel of fine to medium angular to sub-rounded sandstone and quartzite.	0.50		
D3 : 3.90m 4.00 4.00	50 (25 for 135mm/50 for 170mm) ()	90		4.00		End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.00m. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS08
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329646.18E - 343023.17N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
1.00	N=15 (2,3/4,4,3,3,4) ()					Firm brown to grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.70		
2.00	N=50 (10,13/50 for 230mm) ()			2.00		End of borehole at 2.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.00m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS08a
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: E - N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
						Firm to stiff brown to light brown slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
D1 : 0.90m 1.00	N=12 (2,3/3,3,3,3) ()			1.00		Firm brown slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.90m 2.00	N=50 (5,9/50 for 235mm) ()			2.00		End of borehole at 2.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 2.00m due to boulder. Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS09
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329879.18E - 343486.92N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
D1 : 0.90m 1.00	N=9 (3,2/3,2,2,2) ()					Brown to light brown slightly clayey gravelly SAND. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.60		
D2 : 1.90m 2.00	N=7 (2,1/2,2,1,2) ()								
3.00	N=1 (1,0/0,0,0,1) ()			3.00		Firm brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
4.00	N=2 (1,0/0,1,0,1) ()			4.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	1.00		
D3 : 4.90m 5.00	N=8 (2,3/2,2,2,2) ()			5.00		End of borehole at 5.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS10
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329926.75E - 343371.24N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
D1 : 0.90m 1.00	N=14 (4,4/4,3,3,4) ()			1.20		Light brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
				1.90		Firm to stiff brown slightly gravelly slightly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.70		
D2 : 1.90m 2.00 2.00	N=13 (1,2/1,2,4,6) ()	92		2.30		Stiff grey silty CLAY. Root traces throughout.	0.40		
				2.60		Firm brown very sandy CLAY.	0.30		
D3 : 2.90m 3.00	0 (25 for 5mm/0 for 0mm) ()			3.00		Brown SAND and GRAVEL. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.40		▼
						End of borehole at 3.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 3.00m due to boulder. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS11
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329853.75E - 343305.46N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Orange brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.20		
D1 : 0.90m 1.00	N=7 (2,2/2,1,2,2) ()			1					
				1.60		Brown very clayey GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.80		
D2 : 1.90m 2.00	N=9 (3,3/3,2,2,2) ()			2					
				2.40		Orange brown SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	2.60		
3.00	N=9 (2,2/3,2,2,2) ()			3					
4.00	N=8 (1,1/2,2,2,2) ()			4					
D3 : 4.90m 5.00	N=18 (3,5/5,4,4,5) ()			5					
				5.00		End of borehole at 5.00 m			
				6					
				7					
				8					
				9					

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
GW at 3.50m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.50			

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS12
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329952.37E - 343219.22N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
D1 : 0.20m				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
1.00	N=13 (3,4/2,4,3,4) ()			1.40		Light brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	1.00		
D2 : 1.90m 2.00	N=22 (3,3/3,4,7,8) ()			2.60		Firm brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite. Cobbles of sandstone and quartzite.	1.20		
3.00	N=39 (5,6/8,10,10,11) ()			3.20		Brown to light brown very clayey SAND.	0.60		▼
3.50		140		4.00		Very stiff to hard brown to purplish brown slightly gravelly very sandy CLAY. Gravel of fine to coarse sub-angular to rounded sandstone and quartzite.	0.80		
D3 : 3.90m 4.00	N=48 (11,12/11,11,12 ,14) ()					End of borehole at 4.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Collapse at 4.00m. GW at 3.00m. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)
	3.00			

MLM
www.mlm.uk.com

Project:	Ruabon Park, Wrexham	Method: WS	WS13
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329856.86E - 343173.18N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.30		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.30		
						Light brown to brown silty SAND and GRAVEL. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.60		
D1 : 0.80m				0.90					
1.00	N=33 (5,8/9,9,8,7) ()					Stiff brown slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.90		
D2 : 1.90m				1.80					
2.00	N=23 (7,11/7,6,5,5) ()	89				Stiff brown to purplish brown slightly gravelly slightly sandy silty CLAY.	0.70		
2.00				2.50					
D3 : 2.90m						Stiff grey slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub rounded sandstone and quartzite.	1.50		
3.00	N=24 (3,7/5,4,6,9) ()	92							
3.00									
4.00	N=22 (7,7/4,6,5,7) ()			4.00		Stiff grey to brown very sandy CLAY.	0.50		
4.50		140		4.50		Very stiff red to reddish brown slightly gravelly silty CLAY.	0.50		
5.00	N=37 (8,9/10,9,8,10) ()	140		5.00		End of borehole at 5.00 m			
5.00									

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Live roots to 0.30m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS14
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329894.36E - 343076.41N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
				0.40		TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
						Firm light brown to brown slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.50		
D1 : 0.90m 1.00	N=18 (2,4/4,4,5,5) ()			0.90		Stiff red brown to brown slightly sandy slightly gravelly silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
1.50		95							
D2 : 1.90m 2.00	N=35 (3,4/5,7,9,14) ()						2.10		
2.50		103							
D3 : 2.90m 3.00	0 (75 for 80mm/0 for 0mm) ()			3.00		End of borehole at 3.00 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 3.00m due to boulder. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

MLM
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Project:	Ruabon Park, Wrexham	Method: WS	WS15
Project ID:	773135	Start: 28/09/2015	
Location:	Wrexham	Finish:	
Client:	Carter Jonas	Level (mOD):	1:50
Project Engineer:	Hugh Dyer	Co-ordinates: 329785.43E - 343017.63N	Sheet 1 of 1
			Logged by: MM

Depth (m)	SPT Results (Type)	Strength Shear (kPa)	Level (mAOD)	Depth (m)	Legend	Description of Strata	Thickness (m)	Inst'/ Backfill	Water (m)
						TOPSOIL: Firm dark brown to black slightly sandy slightly gravelly silty clay. Gravel of fine to coarse angular to sub-rounded sandstone, quartzite and rare brick.	0.40		
				0.40		Firm to stiff light brown to grey slightly gravelly sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.	0.55		
D1 : 0.90m 1.00	N=20 (3,6/5,5,4,6) ()			0.95 1.00		Red to red brown slightly clayey SAND.	0.05		
						Firm to stiff brown to dark brown slightly gravelly very sandy CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
D2 : 1.90m 2.00	N=25 (3,4/4,7,7,7) ()						2.00		
3.00	N=32 (9,8/8,7,8,9) ()			3.00		Very stiff to hard grey to purplish grey slightly gravelly slightly sandy silty CLAY. Gravel of fine to coarse angular to sub-rounded sandstone and quartzite.			
3.50		140							
4.00	N=40 (5,7/7,10,11,12) ()						1.70		
4.50		140							
4.70 D3 : 4.70m	50 (25 for 115mm/50 for 145mm) ()			4.70		End of borehole at 4.70 m			

General Notes
1. Shear Strengths determined by hand shear vane.
2. See key sheet for explanation of symbols

Remarks
Refusal at 4.70m due to boulder. Live roots to 0.40m

Water Strike Details. Recorded in metres below ground level (m bgl)

Date	Depth Encountered	Casing Depth	Inflow Remarks	Depth to water after 20 mins (m)

KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA


MADE GROUND / FILL


TOPSOIL


COBBLES AND BOULDERS


GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details

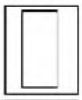

CONCRETE


BENTONITE


FILTER/GRAVEL


ARISINGS BACKFILL

Pipe Details


PLAIN PIPE


SLOTTED PIPE


PIEZOMETER TIP

SAMPLES

U100	OPEN DRIVE TUBE SAMPLE (100 mm NOMINAL DIAMETER)
UT100	OPEN DRIVE THIN WALL TUBE SAMPLE (100 mm NOMINAL DIAMETER)
U38	OPEN DRIVE TUBE SAMPLE (38 mm NOMINAL DIAMETER)
P	PISTON SAMPLE (100 mm NOMINAL DIAMETER UNLESS NOTED OTHERWISE)
D	SMALL DISTURBED SAMPLE
B	BULK DISTURBED SAMPLE
BLK	BLOCK SAMPLE
C	ROTARY CORE SAMPLE
G	GAS SAMPLE
U	UNDISTURBED SAMPLE
JT	TUBE SAMPLE
ES	ENVIRONMENTAL SAMPLE
W	WATER SAMPLE
SPTLS	STANDARD PENETRATION TEST LINER SAMPLE

IN SITU TESTING

S STANDARD PENETRATION TEST USING THE SPLIT SPOON SAMPLER

C STANDARD PENETRATION TEST USING A SOLID CONE

WHERE A TEST HAS BEEN COMPLETED THE TYPE OF TEST AND THE N-VALUE WILL BE REPORTED.

WHERE THE FULL 300 mm PENETRATION OF THE MAIN DRIVE HAS NOT BEEN COMPLETED, THE NUMBER OF BLOWS (NOT AN N-VALUE) WILL BE REPORTED.

THE FIELD RECORDS COLUMN ON THE LOG WILL SHOW EACH SET OF BLOW COUNTS PER 75 mm OF PENETRATION INCLUDING SEATING BLOWS AND WILL ALSO INDICATE THE PARTIAL PENETRATION ACHIEVED (mm) FOR INCOMPLETE TESTS.

MLM

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KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA


MADE GROUND / FILL


TOPSOIL


COBBLES AND BOULDERS


GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details

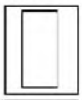

CONCRETE


BENTONITE


FILTER/GRAVEL


ARISINGS BACKFILL

Pipe Details


PLAIN PIPE


SLOTTED PIPE


PIEZOMETER TIP

SAMPLES

U100	OPEN DRIVE TUBE SAMPLE (100 mm NOMINAL DIAMETER)
UT100	OPEN DRIVE THIN WALL TUBE SAMPLE (100 mm NOMINAL DIAMETER)
U38	OPEN DRIVE TUBE SAMPLE (38 mm NOMINAL DIAMETER)
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D	SMALL DISTURBED SAMPLE
B	BULK DISTURBED SAMPLE
BLK	BLOCK SAMPLE
C	ROTARY CORE SAMPLE
G	GAS SAMPLE
U	UNDISTURBED SAMPLE
JT	TUBE SAMPLE
ES	ENVIRONMENTAL SAMPLE
W	WATER SAMPLE
SPTLS	STANDARD PENETRATION TEST LINER SAMPLE

IN SITU TESTING

S STANDARD PENETRATION TEST USING THE SPLIT SPOON SAMPLER

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THE FIELD RECORDS COLUMN ON THE LOG WILL SHOW EACH SET OF BLOW COUNTS PER 75 mm OF PENETRATION INCLUDING SEATING BLOWS AND WILL ALSO INDICATE THE PARTIAL PENETRATION ACHIEVED (mm) FOR INCOMPLETE TESTS.

MLM

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KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

STRATA


MADE GROUND / FILL


TOPSOIL


COBBLES AND BOULDERS


GRAVEL


SAND


SILT


CLAY


PEAT

WATER


WATER STRIKE


WATER STANDING

BACKFILL / INSTALLATIONS

Backfill Details

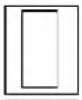

CONCRETE


BENTONITE


FILTER/GRAVEL


ARISINGS BACKFILL

Pipe Details


PLAIN PIPE


SLOTTED PIPE


PIEZOMETER TIP

SAMPLES

U100	OPEN DRIVE TUBE SAMPLE (100 mm NOMINAL DIAMETER)
UT100	OPEN DRIVE THIN WALL TUBE SAMPLE (100 mm NOMINAL DIAMETER)
U38	OPEN DRIVE TUBE SAMPLE (38 mm NOMINAL DIAMETER)
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D	SMALL DISTURBED SAMPLE
b	BULK DISTURBED SAMPLE
BLK	BLOCK SAMPLE
C	ROTARY CORE SAMPLE
G	GAS SAMPLE
U	UNDISTURBED SAMPLE
JT	TUBE SAMPLE
ES	ENVIRONMENTAL SAMPLE
W	WATER SAMPLE
SPTLS	STANDARD PENETRATION TEST LINER SAMPLE

IN SITU TESTING

S STANDARD PENETRATION TEST USING THE SPLIT SPOON SAMPLER

C STANDARD PENETRATION TEST USING A SOLID CONE

WHERE A TEST HAS BEEN COMPLETED THE TYPE OF TEST AND THE N-VALUE WILL BE REPORTED.

WHERE THE FULL 300 mm PENETRATION OF THE MAIN DRIVE HAS NOT BEEN COMPLETED, THE NUMBER OF BLOWS (NOT AN N-VALUE) WILL BE REPORTED.

THE FIELD RECORDS COLUMN ON THE LOG WILL SHOW EACH SET OF BLOW COUNTS PER 75 mm OF PENETRATION INCLUDING SEATING BLOWS AND WILL ALSO INDICATE THE PARTIAL PENETRATION ACHIEVED (mm) FOR INCOMPLETE TESTS.

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Appendix B

Gas and Groundwater Monitoring Results

MLM

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Soil-Gas & Groundwater Monitoring / Sampling Site Data

Project	Ruabon Park, Wrexham			**Project Number**	773135
Date of Monitoring	05/1015	**Time**		**Equipment Used**	
Technician	MM	**Weather**	Overcast	GA5000, Dip Meter	

Notes:

Well No. / Location	Methane (%)	Carbon Dioxide (%)	Oxygen (%)	Pressure (mbar)	Flow (l/hr)	VOC (ppm)	Height of Casing (m)	Depth to Water (mb casing)	Depth to Water (mbgl)	Depth to Base (mbgl)	Sample Collected (Y/N)	Comments and Visual/Olfactory Description of Sample Collected
WS01	<0.1	1.4	19.6	992	<0.1	N/A	0.4	3.3	2.9	4.10	Y	
WS02	0.5	6.5	14.3	993	0.1	N/A	0.4	2.8	2.4	4.60	Y	
WS03	<0.1	3.5	16.7	991	0.2	N/A	0.4	2.7	2.3	3.60	Y	
WS04	<0.1	2.7	16.9	993	0.3	N/A	0.4	2.2	1.8	3.45	Y	
WS07	<0.1	2.4	19.4	993	0.5	N/A	0.4	3.0	2.6	3.67	Y	
WS09	<0.1	2.0	15.1	994	0.1	N/A	0.4	3.4	3.0	4.35	Y	
WS11	<0.1	2.3	19.9	994	0.2	N/A	0.4	3.8	3.4	3.9	Y	
WS13	<0.1	1.9	19.1	994	0.4	N/A	0.4	2.1	1.7	5.1	Y	
WS14	<0.1	2.4	18.7	995	0.3	N/A	0.4	2.0	1.6	2.9	Y	
WS15	<0.1	1.9	19.7	995	0.5	N/A	0.4	2.2	1.8	4.8	Y	

Appendix C

Geotechnical Test Results

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL15/4944

Client's Reference: 773135 Report Date: 19 October 2015

Client Name: MLM
Building 7200
Cambridge Research Park
Cambridge
CB25 9TL

For the attention of: Hugh Dyer

Contract Title: Ruabon Park, Wrexham, Wales

Date Received: 8/10/2015
Date Commenced: 8/10/2015
Date Completed: 19/10/2015

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

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

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	M Beastall (Laboratory Manager)
D Lambe (Senior Technician)	S Royle (Senior Technician)	

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fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP01	1	B	1.00	Brown gravelly sandy CLAY.
TP07	1	B	2.00	Brown very gravelly very sandy CLAY.
TP08	1	B	0.50	Brown very gravelly very sandy CLAY.
TP10	1	B	2.50	Brown very sandy CLAY.
TP14	1	B	1.50	Brown slightly gravelly sandy CLAY.
TP16	1	B	2.00	Brown gravelly very sandy CLAY.
TP19	1	B	2.70	Grey very silty CLAY.
TP24	1	B	1.20	Brown very sandy very clayey GRAVEL.
TP25	1	B	1.50	Brown slightly gravelly very sandy CLAY.
TP28	1	B	0.50	Brown very gravelly very sandy CLAY.
TP29	1	B	2.00	Brown gravelly sandy CLAY.
TP34	1	B	2.20	Brown gravelly slightly clayey SAND.
TP36	1	B	0.80	Brown slightly gravelly very silty SAND
TP37	1	B	2.00	Brown very gravelly very clayey SAND.
TP39	1	B	1.50	Grey very sandy CLAY.
TP40	1	B	2.30	Brown very gravelly very sandy CLAY.
TP46	1	B	1.50	Brown very sandy CLAY.
TP48	1	B	2.20	Brown slightly gravelly slightly clayey SAND.
TP50	1	B	2.80	Brown gravelly very sandy CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	19/10/15		19/10/15		19/10/15

RUABON PARK, WREXHAM, WALES

Contract No: PSL15/4944

Client Ref: 773135

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
TP01	1	B	1.00	14								
TP07	1	B	2.00	9.2								
TP08	1	B	0.50	9.1								
TP10	1	B	2.50	23				38	19	19	100	Intermediate plasticity CI.
TP14	1	B	1.50	30				40	20	20	95	Low plasticity CL.
TP16	1	B	2.00	11								
TP19	1	B	2.70	24				43	22	21	100	Intermediate plasticity CI.
TP24	1	B	1.20	11								
TP25	1	B	1.50	12				29	17	12	81	Low plasticity CL.
TP28	1	B	0.50	11								
TP29	1	B	2.00	17								
TP34	1	B	2.20	10								
TP36	1	B	0.80	9.1								
TP37	1	B	2.00	14								
TP39	1	B	1.50	20				30	17	13	100	Low plasticity CL.
TP40	1	B	2.30	10				26	14	12	65	Low plasticity CL.
TP46	1	B	1.50	10								
TP48	1	B	2.20	10								
TP50	1	B	2.80	12				32	16	16	80	Low plasticity CL.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	19/10/15		19/10/15		19/10/15

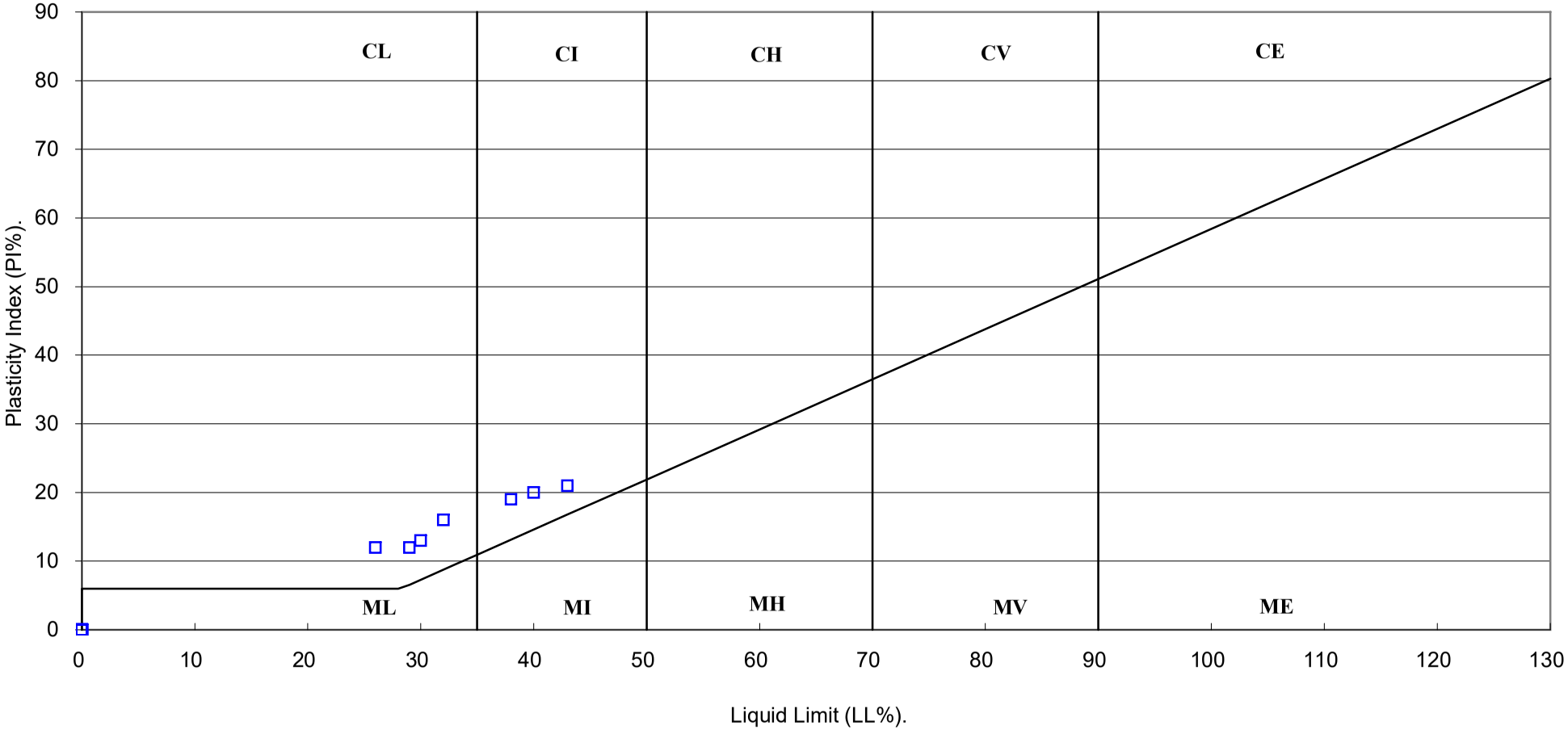
RUABON PARK, WREXHAM, WALES

Contract No: **PSL15/4944**

Client Ref: **773135**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		19/10/15		19/10/15		19/10/15
	RUABON PARK, WREXHAM, WALES				Contract No:	PSL15/4944
					Client Ref:	773135

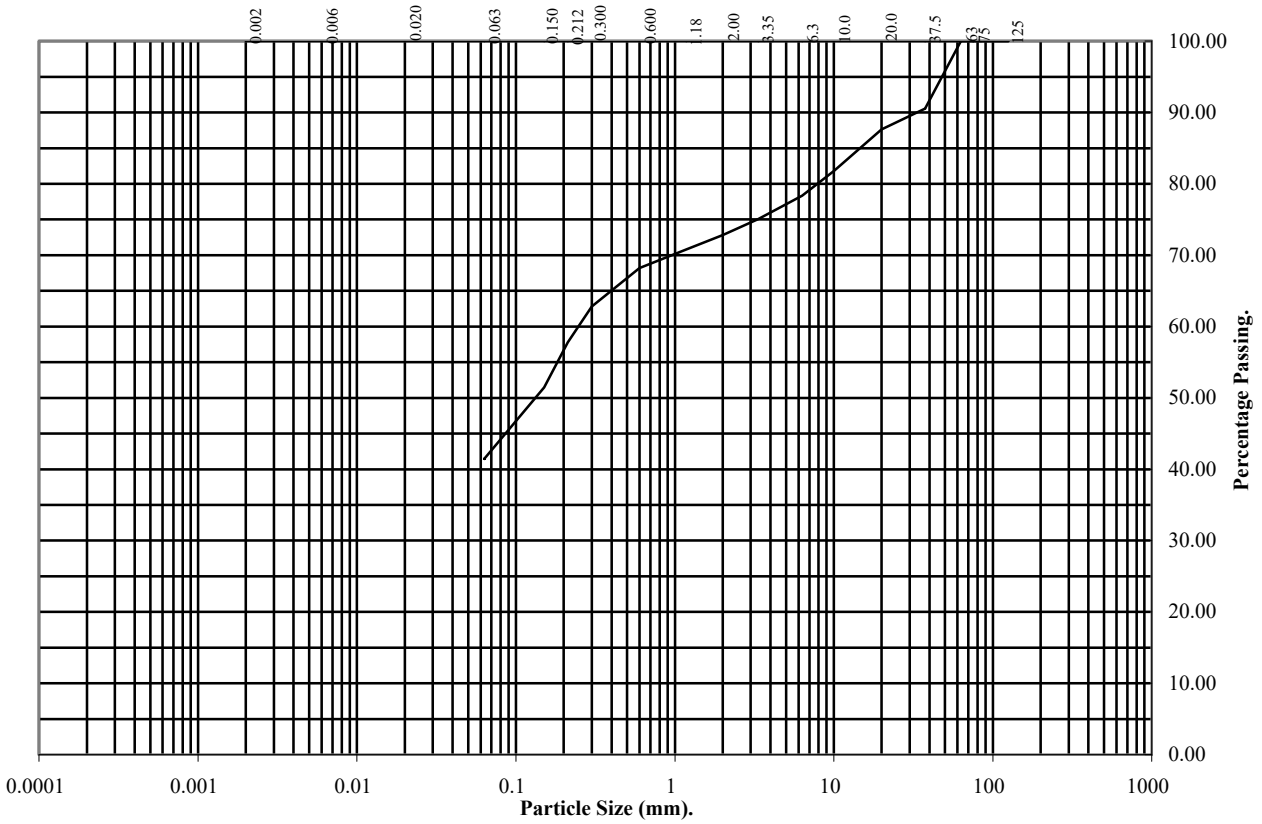
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP08** **Depth (m):** **0.50**

Sample Number: **1** **Sample Type:** **B**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	88
10	82
6.3	78
3.35	75
2	73
1.18	71
0.6	68
0.3	63
0.212	58
0.15	51
0.063	41

Soil Fraction	Total Percentage
Cobbles	0
Gravel	27
Sand	32
Silt / Clay	41

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/10/15		19/10/15

PSL Professional Soils Laboratory	**RUABON PARK, WREXHAM, WALES.**	**Contract No.: PSL15/4944**

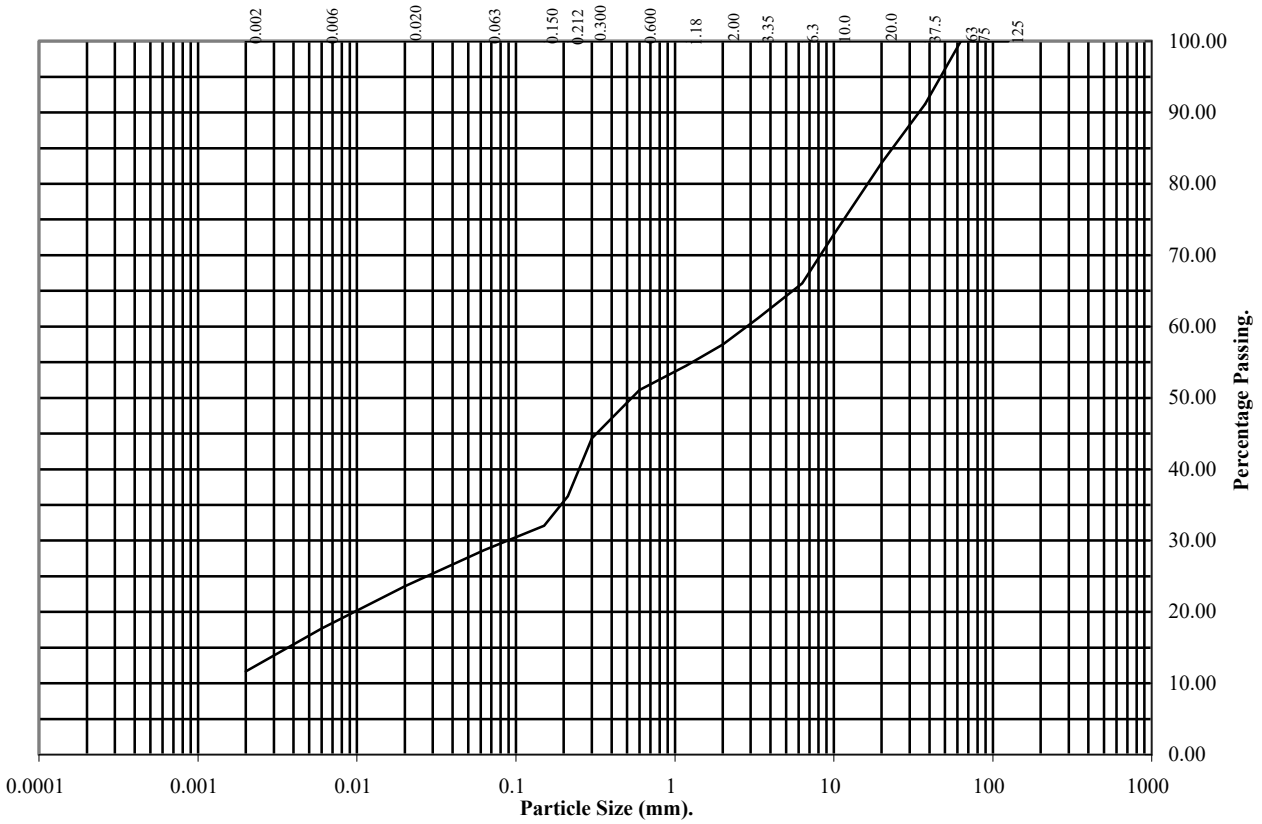
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: TP24 **Depth (m):** 1.20

Sample Number: 1 **Sample Type:** B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	91
20	83
10	73
6.3	66
3.35	61
2	57
1.18	55
0.6	51
0.3	44
0.212	36
0.15	32
0.063	29

Particle Diameter	Percentage Passing
0.02	24
0.006	18
0.002	12

Soil Fraction	Total Percentage
Cobbles	0
Gravel	43
Sand	28
Silt	17
Clay	12

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/10/15		19/10/15

PSL Professional Soils Laboratory	**RUABON PARK, WREXHAM, WALES.**	**Contract No.: PSL15/4944**

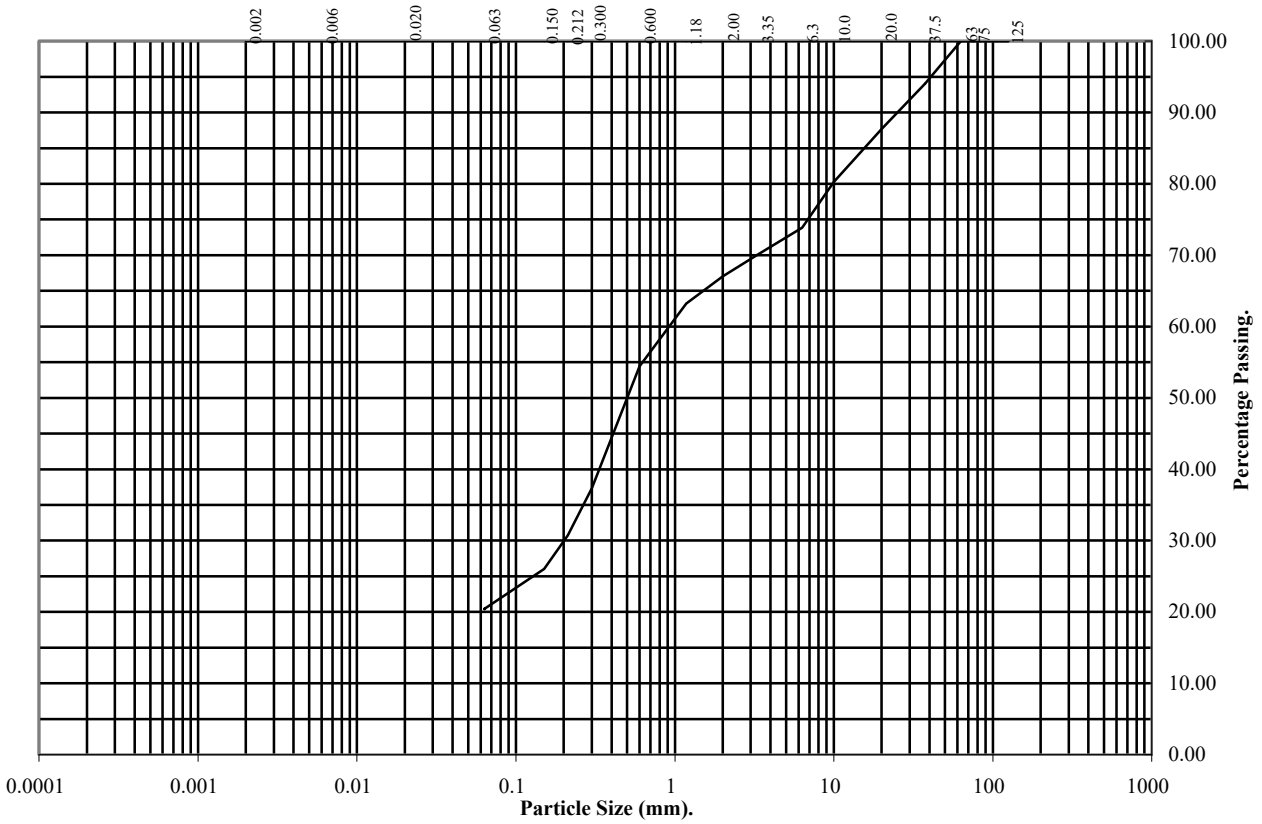
Particle Size Distribution Test

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP37 **Depth (m):** 2.00

Sample Number: 1 **Sample Type:** B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	94
20	88
10	80
6.3	74
3.35	70
2	67
1.18	63
0.6	54
0.3	37
0.212	31
0.15	26
0.063	20

Soil Fraction	Total Percentage
Cobbles	0
Gravel	33
Sand	47
Silt / Clay	20

Remarks:
See summary of soil descriptions.

Checked By	Date	Approved By	Date
	19/10/15		19/10/15

PSL Professional Soils Laboratory	**RUABON PARK, WREXHAM, WALES.**	**Contract No.: PSL15/4944**

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

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Final Report

Report No.:	15-23878-1
Initial Date of Issue:	16-Oct-2015
Client	Professional Soils Laboratory
Client Address:	5/7 Hexthorpe Road Doncaster South Yorkshire DN4 0AR
Contact(s):	Anthony Watkins Mark Beastall Russell Gunson Sean Royle
Project	PSL15/4944 - Ruabon Park, Wrexham, Wales

Quotation No.:		**Date Received:**	13-Oct-2015
Order No.:		**Date Instructed:**	12-Oct-2015
No. of Samples:	5	**Target Date:**	16-Oct-2015
Turnaround (Wkdays):	5	**Results Due:**	16-Oct-2015
Date Approved:	16-Oct-2015		

Approved By:



Details: Keith Jones, Technical Manager

Chemtest
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Results - Soil

Project: PSL15/4944 - Ruabon Park, Wrexham, Wales

Client: Professional Soils Laboratory		Chemtest Job No.:			15-23878	15-23878	15-23878	15-23878	15-23878
Quotation No.:		Chemtest Sample ID.:			204195	204196	204197	204198	204199
Order No.:		Client Sample Ref.:			TP08	TP25	TP50	TP39	TP37
		Client Sample ID.:			B1(x3)	B1(x3)	B1(x3)	B1(x3)	B1(x3)
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.5	1.5	2.8	1.5	2.0
		Bottom Depth (m):							
		Date Sampled:							
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Moisture	N	2030	%	0.020	10	10	9.4	16	13
pH	U	2010		N/A	7.8	8.7	8.6	8.6	8.6
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	0.042	< 0.010
Sulphate (Total)	U	2430	%	0.010	0.017	0.017	0.044	0.18	0.023

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Appendix D

Results of Chemical Analysis

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

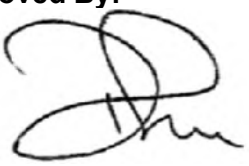
2183

Final Report

Report No.:	15-22938-1
Initial Date of Issue:	09-Oct-2015
Client	MLM
Client Address:	55 Charlotte Street Birmingham B3 1PX
Contact(s):	Hugh Dyer
Project	773135 - Ruabon Park, Wrexham

Quotation No.:		**Date Received:**	01-Oct-2015
Order No.:		**Date Instructed:**	05-Oct-2015
No. of Samples:	164	**Target Date:**	09-Oct-2015
Turnaround (Wkdays):	5	**Results Due:**	09-Oct-2015
Date Approved:	09-Oct-2015		

Approved By:



Details: Darrell Hall, Laboratory Director

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200052	200053	200055	200058	200061	200065	200066	200068
Order No.:					Client Sample Ref.:	TP1	TP1	TP2	TP3	TP4	TP6	TP6	TP7
					Client Sample ID.:	D1	D2	D1	D2	D2	D1	D2	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	1.0	0.8	1.2	2.0	0.5	1.5	0.8
					Bottom Depth (m):								
					Date Sampled:	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A		-	-						
Asbestos Identification	U	2192		N/A		No Asbestos Detected	No Asbestos Detected						
Moisture	N	2030	%	0.020	12			10	9.5	5.1	8.0	5.5	
Chromatogram (AA Split)	N			N/A	See Attached					See Attached			
pH	U	2010		N/A	7.1			8.0	8.0	8.6	8.5	8.2	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.012			0.025	< 0.010	0.13	0.023	0.024	
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50					< 0.50			
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	4.7					3.1			
Sulphate (Total)	U	2430	%	0.010				0.094	0.011		0.088	0.045	
Arsenic	U	2450	mg/kg	1.0	13			8.3	9.2	11	10	10	
Boron	N	2450	mg/kg	0.40	6.2					3.6			
Cadmium	U	2450	mg/kg	0.10	0.81			0.26	0.25	0.82	0.29	0.28	
Chromium	U	2450	mg/kg	1.0	31			16	15	18	21	23	
Copper	U	2450	mg/kg	0.50	32			15	21	21	20	19	
Mercury	U	2450	mg/kg	0.10	0.20			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	
Nickel	U	2450	mg/kg	0.50	20			16	26	23	25	24	
Lead	U	2450	mg/kg	0.50	120			72	55	72	51	62	
Selenium	U	2450	mg/kg	0.20	< 0.20			< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.50	130			64	46	110	72	73	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Organic Matter	U	2625	%	0.40	7.6					1.5			
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0					< 1.0			
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0	< 5.0					< 5.0			
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0					< 1.0			
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0					< 1.0			

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200052	200053	200055	200058	200061	200065	200066	200068
Order No.:					Client Sample Ref.:	TP1	TP1	TP2	TP3	TP4	TP6	TP6	TP7
					Client Sample ID.:	D1	D2	D1	D2	D2	D1	D2	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	1.0	0.8	1.2	2.0	0.5	1.5	0.8
					Bottom Depth (m):								
					Date Sampled:	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0					< 1.0		
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0		< 5.0					< 5.0		
Total Petroleum Hydrocarbons	U	2680	mg/kg	10		< 10					< 10		
Naphthalene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Acenaphthene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Fluorene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Phenanthrene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Anthracene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Fluoranthene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Pyrene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Benzo[a]anthracene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Chrysene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Benzo[a]pyrene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		< 0.10					< 0.10		
Total Of 16 PAH's	U	2700	mg/kg	2.0		< 2.0					< 2.0		
Total Phenols	U	2920	mg/kg	0.30		< 0.30					< 0.30		

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200071	200073	200074	200076	200078	200080	200081	200085	200088
Order No.:				Client Sample Ref.:	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14	TP16
				Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1	D2	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	0.2	1.5	1.0	0.5	1.0	1.0	2.0	0.5
				Bottom Depth (m):									
				Date Sampled:	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	24-Sep-2015	21-Sep-2015	21-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A									
Asbestos Identification	U	2192		N/A									
Moisture	N	2030	%	0.020	6.6	8.1	7.3	6.2	4.9	7.9	7.1	9.7	7.7
Chromatogram (AA Split)	N			N/A	See Attached								
pH	U	2010		N/A	7.5		8.6	8.3	8.7	7.6	7.3	8.2	7.4
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010		0.013	0.25	0.069	< 0.010	< 0.010	0.011	< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50								
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	1.3								
Sulphate (Total)	U	2430	%	0.010			0.013	0.18	0.064	0.032	0.027	< 0.010	0.040
Arsenic	U	2450	mg/kg	1.0	8.9		8.4	9.8	10	6.3	7.8	11	6.7
Boron	N	2450	mg/kg	0.40	2.3								
Cadmium	U	2450	mg/kg	0.10	0.20		0.18	0.53	0.39	0.13	0.19	0.21	0.20
Chromium	U	2450	mg/kg	1.0	17		16	16	14	16	25	33	19
Copper	U	2450	mg/kg	0.50	21		19	20	18	11	12	28	15
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	24		26	19	19	12	26	41	19
Lead	U	2450	mg/kg	0.50	58		90	47	75	56	34	37	70
Selenium	U	2450	mg/kg	0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	48		47	83	70	43	47	71	51
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	1.7	6.9							
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0								
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0								
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0	< 5.0								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0								
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	< 1.0								

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200071	200073	200074	200076	200078	200080	200081	200085	200088
Order No.:					Client Sample Ref.:	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14	TP16
					Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1	D2	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.0	0.2	1.5	1.0	0.5	1.0	1.0	2.0	0.5
					Bottom Depth (m):									
					Date Sampled:	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	21-Sep-2015	24-Sep-2015	21-Sep-2015	21-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0									
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0	< 5.0									
Total Petroleum Hydrocarbons	U	2680	mg/kg	10	< 10									
Naphthalene	U	2700	mg/kg	0.10	< 0.10									
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10									
Acenaphthene	U	2700	mg/kg	0.10	< 0.10									
Fluorene	U	2700	mg/kg	0.10	< 0.10									
Phenanthrene	U	2700	mg/kg	0.10	< 0.10									
Anthracene	U	2700	mg/kg	0.10	< 0.10									
Fluoranthene	U	2700	mg/kg	0.10	< 0.10									
Pyrene	U	2700	mg/kg	0.10	< 0.10									
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10									
Chrysene	U	2700	mg/kg	0.10	< 0.10									
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10									
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10									
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10									
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10									
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10									
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10									
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0									
Total Phenols	U	2920	mg/kg	0.30	< 0.30									

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200091	200093	200094	200095	200099	200104	200106	200109	200110
Order No.:				Client Sample Ref.:	TP17	TP18	TP19	TP19	TP20	TP22	TP23	TP24	TP25
				Client Sample ID.:	D2	D1	D1	D2	D2	D2	D1	D2	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.5	0.5	0.5	1.2	1.0	2.0	1.0	1.0	1.0
				Bottom Depth (m):									
				Date Sampled:	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A						-			
Asbestos Identification	U	2192		N/A						No Asbestos Detected			
Moisture	N	2030	%	0.020	6.6	8.0	9.0	9.2	9.7		6.7	8.2	7.5
Chromatogram (AA Split)	N			N/A				See Attached				See Attached	
pH	U	2010		N/A	8.2	7.5	7.4	8.7	7.9		7.8	8.7	8.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	0.013
Cyanide (Total)	U	2300	mg/kg	0.50				< 0.50				< 0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50				1.7				1.3	
Sulphate (Total)	U	2430	%	0.010	< 0.010	0.037	0.037		0.012		< 0.010		0.032
Arsenic	U	2450	mg/kg	1.0	10	9.3	7.9	10	9.7		7.0	8.5	11
Boron	N	2450	mg/kg	0.40				2.6				11	
Cadmium	U	2450	mg/kg	0.10	0.37	0.28	0.33	0.18	0.27		0.11	0.15	0.24
Chromium	U	2450	mg/kg	1.0	21	31	32	18	31		13	28	27
Copper	U	2450	mg/kg	0.50	28	19	17	19	23		18	22	19
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.13		< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	33	31	33	26	38		21	33	31
Lead	U	2450	mg/kg	0.50	78	36	54	56	64		49	44	36
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	61	55	71	54	66		35	60	55
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40				0.95				0.62	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0				< 1.0	
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0				< 5.0				< 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				< 1.0				< 1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0				< 1.0				< 1.0	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200091	200093	200094	200095	200099	200104	200106	200109	200110
Order No.:					Client Sample Ref.:	TP17	TP18	TP19	TP19	TP20	TP22	TP23	TP24	TP25
					Client Sample ID.:	D2	D1	D1	D2	D2	D2	D1	D2	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.5	0.5	0.5	1.2	1.0	2.0	1.0	1.0	1.0
					Bottom Depth (m):									
					Date Sampled:	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0				< 1.0		
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0				< 5.0				< 5.0		
Total Petroleum Hydrocarbons	U	2680	mg/kg	10				< 10				< 10		
Naphthalene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Acenaphthylene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Acenaphthene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Fluorene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Phenanthrene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Anthracene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Fluoranthene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Pyrene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Benzo[a]anthracene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Chrysene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Benzo[b]fluoranthene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Benzo[k]fluoranthene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Benzo[a]pyrene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10				< 0.10				< 0.10		
Total Of 16 PAH's	U	2700	mg/kg	2.0				< 2.0				< 2.0		
Total Phenols	U	2920	mg/kg	0.30				< 0.30				< 0.30		

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200112	200114	200116	200118	200120	200124	200126	200128	200130
Order No.:				Client Sample Ref.:	TP26	TP27	TP28	TP29	TP30	TP31	TP32	TP33	TP34
				Client Sample ID.:	D1	D1	D1	D1	D1	D2	D1	D1	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	1.5	0.5	1.5	1.0	1.0	0.5	0.5	0.6
				Bottom Depth (m):									
				Date Sampled:	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	24-Sep-2015	24-Sep-2015	24-Sep-2015	24-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-								
Asbestos Identification	U	2192		N/A	No Asbestos Detected								
Moisture	N	2030	%	0.020	7.0	7.9	9.7	7.3	7.5	5.4	5.4	4.9	7.1
Chromatogram (AA Split)	N			N/A			See Attached						
pH	U	2010		N/A	8.1	8.7	7.7	8.7	7.6	7.8	8.1	7.8	7.9
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Cyanide (Total)	U	2300	mg/kg	0.50			< 0.50						
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50			1.4						
Sulphate (Total)	U	2430	%	0.010	0.011	< 0.010		0.018	0.011	< 0.010	0.011	< 0.010	0.028
Arsenic	U	2450	mg/kg	1.0	9.5	10	7.3	13	6.6	10	10	1.3	5.9
Boron	N	2450	mg/kg	0.40			6.5						
Cadmium	U	2450	mg/kg	0.10	0.15	0.17	0.19	0.20	0.13	0.13	0.36	< 0.10	0.28
Chromium	U	2450	mg/kg	1.0	25	13	24	19	18	25	26	18	14
Copper	U	2450	mg/kg	0.50	23	19	14	22	15	21	21	4.4	15
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	31	20	25	28	16	26	35	19	14
Lead	U	2450	mg/kg	0.50	66	49	41	67	41	45	63	30	64
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	54	43	50	47	31	61	59	40	67
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40			1.0						
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0			< 1.0						
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0			< 5.0						
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0			< 1.0						

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM													
			Chemtest Job No.:		15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:			Chemtest Sample ID.:		200112	200114	200116	200118	200120	200124	200126	200128	200130
Order No.:			Client Sample Ref.:		TP26	TP27	TP28	TP29	TP30	TP31	TP32	TP33	TP34
			Client Sample ID.:		D1	D1	D1	D1	D1	D2	D1	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.0	1.5	0.5	1.5	1.0	1.0	0.5	0.5	0.6
			Bottom Depth (m):										
			Date Sampled:		22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	22-Sep-2015	24-Sep-2015	24-Sep-2015	24-Sep-2015	24-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0			< 1.0						
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0			< 5.0						
Total Petroleum Hydrocarbons	U	2680	mg/kg	10			< 10						
Naphthalene	U	2700	mg/kg	0.10			< 0.10						
Acenaphthylene	U	2700	mg/kg	0.10			< 0.10						
Acenaphthene	U	2700	mg/kg	0.10			< 0.10						
Fluorene	U	2700	mg/kg	0.10			< 0.10						
Phenanthrene	U	2700	mg/kg	0.10			< 0.10						
Anthracene	U	2700	mg/kg	0.10			< 0.10						
Fluoranthene	U	2700	mg/kg	0.10			< 0.10						
Pyrene	U	2700	mg/kg	0.10			< 0.10						
Benzo[a]anthracene	U	2700	mg/kg	0.10			< 0.10						
Chrysene	U	2700	mg/kg	0.10			< 0.10						
Benzo[b]fluoranthene	U	2700	mg/kg	0.10			< 0.10						
Benzo[k]fluoranthene	U	2700	mg/kg	0.10			< 0.10						
Benzo[a]pyrene	U	2700	mg/kg	0.10			< 0.10						
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10			< 0.10						
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10			< 0.10						
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10			< 0.10						
Total Of 16 PAH's	U	2700	mg/kg	2.0			< 2.0						
Total Phenols	U	2920	mg/kg	0.30			< 0.30						

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200132	200134	200137	200139	200142	200145	200147	200149
Order No.:					Client Sample Ref.:	TP35	TP36	TP37	TP38	TP39	TP40	TP41	TP42
					Client Sample ID.:	D1	D1	D1	D1	D1	D2	D1	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.2	0.7	1.0	1.0	1.0	2.0	1.0	1.5
					Bottom Depth (m):								
					Date Sampled:	24-Sep-2015	24-Sep-2015	24-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A		-							
Asbestos Identification	U	2192		N/A		No Asbestos Detected							
Moisture	N	2030	%	0.020	3.9	3.0	7.1	5.1	5.5	11	9.1	7.5	
Chromatogram (AA Split)	N			N/A		See Attached	See Attached	See Attached					
pH	U	2010		N/A	7.9	7.9	8.0	7.7	7.8	8.5	8.6	8.1	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	0.037	< 0.010	< 0.010	0.18	< 0.010	< 0.010	
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50					
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50		0.87	0.87	0.80					
Sulphate (Total)	U	2430	%	0.010	0.016				0.039	0.64	0.019	< 0.010	
Arsenic	U	2450	mg/kg	1.0	8.3	6.6	7.1	6.8	5.2	13	7.0	14	
Boron	N	2450	mg/kg	0.40		2.1	2.2	2.8					
Cadmium	U	2450	mg/kg	0.10	0.19	0.28	0.33	< 0.10	0.18	0.23	0.13	0.31	
Chromium	U	2450	mg/kg	1.0	15	23	16	24	20	18	14	19	
Copper	U	2450	mg/kg	0.50	15	11	12	13	8.8	15	16	18	
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14	
Nickel	U	2450	mg/kg	0.50	15	26	14	22	15	22	22	27	
Lead	U	2450	mg/kg	0.50	56	60	47	24	35	61	51	47	
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.50	50	66	75	61	60	45	38	51	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Organic Matter	U	2625	%	0.40		0.79	1.5	0.76					
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0		< 5.0	< 5.0	< 5.0					
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200132	200134	200137	200139	200142	200145	200147	200149
Order No.:					Client Sample Ref.:	TP35	TP36	TP37	TP38	TP39	TP40	TP41	TP42
					Client Sample ID.:	D1	D1	D1	D1	D1	D2	D1	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.2	0.7	1.0	1.0	1.0	2.0	1.0	1.5
					Bottom Depth (m):								
					Date Sampled:	24-Sep-2015	24-Sep-2015	24-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0					
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0		< 5.0	< 5.0	< 5.0					
Total Petroleum Hydrocarbons	U	2680	mg/kg	10		< 10	< 10	< 10					
Naphthalene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Acenaphthylene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Acenaphthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Fluorene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Phenanthrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Benzo[a]anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Chrysene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Benzo[a]pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10					
Total Of 16 PAH's	U	2700	mg/kg	2.0		< 2.0	< 2.0	< 2.0					
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30					

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200152	200154	200157	200158	200160	200162	200163	200165
Order No.:				Client Sample Ref.:	TP43	TP44	TP45	TP45	TP46	TP47	TP47	TP48
				Client Sample ID.:	D1	D1	D1	D2	D1	D1	D2	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	1.0	0.5	2.0	1.0	1.4	2.2	1.5
				Bottom Depth (m):								
				Date Sampled:	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A								
Asbestos Identification	U	2192		N/A								
Moisture	N	2030	%	0.020	4.2	7.8	5.6	7.0	6.9	5.8	7.4	8.1
Chromatogram (AA Split)	N			N/A				See Attached	See Attached		See Attached	
pH	U	2010		N/A	8.8	8.4	8.8	8.6	8.6	8.8	8.6	8.4
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010	< 0.010	0.010	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50				< 0.50	< 0.50		< 0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50				0.97	1.2		1.1	
Sulphate (Total)	U	2430	%	0.010	< 0.010	0.016	0.016			< 0.010		< 0.010
Arsenic	U	2450	mg/kg	1.0	11	5.8	9.8	10	9.7	10	12	8.6
Boron	N	2450	mg/kg	0.40				3.5	2.9		3.6	
Cadmium	U	2450	mg/kg	0.10	0.17	0.13	0.14	0.14	0.17	0.24	0.12	0.17
Chromium	U	2450	mg/kg	1.0	20	20	23	21	21	16	16	20
Copper	U	2450	mg/kg	0.50	18	9.0	18	21	19	18	16	21
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	25	17	30	27	25	23	21	27
Lead	U	2450	mg/kg	0.50	37	41	26	41	58	49	44	51
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	47	37	47	49	38	44	41	44
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40				0.78	0.76		0.95	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0				< 5.0	< 5.0		< 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	

Chemtest
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Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM												
			Chemtest Job No.:		15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:			Chemtest Sample ID.:		200152	200154	200157	200158	200160	200162	200163	200165
Order No.:			Client Sample Ref.:		TP43	TP44	TP45	TP45	TP46	TP47	TP47	TP48
			Client Sample ID.:		D1	D1	D1	D2	D1	D1	D2	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.0	1.0	0.5	2.0	1.0	1.4	2.2	1.5
			Bottom Depth (m):									
			Date Sampled:		23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015	23-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0	< 1.0		< 1.0	
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0				< 5.0	< 5.0		< 5.0	
Total Petroleum Hydrocarbons	U	2680	mg/kg	10				< 10	< 10		< 10	
Naphthalene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Acenaphthylene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Acenaphthene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Fluorene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Phenanthrene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Anthracene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Fluoranthene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Pyrene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Benzo[a]anthracene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Chrysene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Benzo[a]pyrene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10				< 0.10	< 0.10		< 0.10	
Total Of 16 PAH's	U	2700	mg/kg	2.0				< 2.0	< 2.0		< 2.0	
Total Phenols	U	2920	mg/kg	0.30				< 0.30	< 0.30		< 0.30	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM					Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:					Chemtest Sample ID.:	200167	200170	200172	200173	200175	200178	200181	200185	200187
Order No.:					Client Sample Ref.:	TP49	TP50	WS01	WS01	WS02	WS03	WS04	WS05	WS06
					Client Sample ID.:	D1	D2	D1	D2	D1	D1	D1	D2	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.5	1.5	0.9	1.5	0.7	0.9	0.9	1.2	0.9
					Bottom Depth (m):									
					Date Sampled:	23-Sep-2015	23-Sep-2015	25-Sep-2015	25-Sep-2015	25-Sep-2015	25-Sep-2015	24-Sep-2015	25-Sep-2015	28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
ACM Type	U	2192		N/A		-		-						
Asbestos Identification	U	2192		N/A		No Asbestos Detected		No Asbestos Detected						
Moisture	N	2030	%	0.020	6.8		5.4		5.7	6.0	11	5.7	9.7	
Chromatogram (AA Split)	N			N/A										
pH	U	2010		N/A	8.7		8.9			8.2	8.6	8.3	8.6	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010		0.035			< 0.010	< 0.010	< 0.010	< 0.010	
Cyanide (Total)	U	2300	mg/kg	0.50										
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50										
Sulphate (Total)	U	2430	%	0.010	0.026		0.033			< 0.010	< 0.010	< 0.010	< 0.010	
Arsenic	U	2450	mg/kg	1.0	12		8.7			6.5	11	9.5	9.3	
Boron	N	2450	mg/kg	0.40										
Cadmium	U	2450	mg/kg	0.10	0.26		0.24			0.19	0.23	0.21	0.18	
Chromium	U	2450	mg/kg	1.0	16		14			14	28	18	29	
Copper	U	2450	mg/kg	0.50	19		13			16	24	24	27	
Mercury	U	2450	mg/kg	0.10	< 0.10		< 0.10			< 0.10	< 0.10	< 0.10	< 0.10	
Nickel	U	2450	mg/kg	0.50	23		17			22	38	29	38	
Lead	U	2450	mg/kg	0.50	60		76			50	45	78	56	
Selenium	U	2450	mg/kg	0.20	< 0.20		< 0.20			< 0.20	< 0.20	< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.50	44		40			31	63	50	67	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50			< 0.50	< 0.50	< 0.50	< 0.50	
Organic Matter	U	2625	%	0.40					1.5					
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0										
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0										
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0										
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0										
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0										
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0										
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0										
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0										
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0										
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0										
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0										
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0										
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0										
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0										
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0										
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0										

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM													
				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200167	200170	200172	200173	200175	200178	200181	200185	200187
Order No.:				Client Sample Ref.:	TP49	TP50	WS01	WS01	WS02	WS03	WS04	WS05	WS06
				Client Sample ID.:	D1	D2	D1	D2	D1	D1	D1	D2	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.5	1.5	0.9	1.5	0.7	0.9	0.9	1.2	0.9
				Bottom Depth (m):									
				Date Sampled:	23-Sep-2015	23-Sep-2015	25-Sep-2015	25-Sep-2015	25-Sep-2015	25-Sep-2015	24-Sep-2015	25-Sep-2015	28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0									
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0									
Total Petroleum Hydrocarbons	U	2680	mg/kg	10									
Naphthalene	U	2700	mg/kg	0.10									
Acenaphthylene	U	2700	mg/kg	0.10									
Acenaphthene	U	2700	mg/kg	0.10									
Fluorene	U	2700	mg/kg	0.10									
Phenanthrene	U	2700	mg/kg	0.10									
Anthracene	U	2700	mg/kg	0.10									
Fluoranthene	U	2700	mg/kg	0.10									
Pyrene	U	2700	mg/kg	0.10									
Benzo[a]anthracene	U	2700	mg/kg	0.10									
Chrysene	U	2700	mg/kg	0.10									
Benzo[b]fluoranthene	U	2700	mg/kg	0.10									
Benzo[k]fluoranthene	U	2700	mg/kg	0.10									
Benzo[a]pyrene	U	2700	mg/kg	0.10									
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10									
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10									
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10									
Total Of 16 PAH's	U	2700	mg/kg	2.0									
Total Phenols	U	2920	mg/kg	0.30									

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200190	200195	200196	200198	200201	200204	200207	200210	200211
Order No.:				Client Sample Ref.:	WS07	WS09	WS09	WS10	WS11	WS12	WS13	WS14	WS14
				Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1	D1	D2
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.9	0.9	1.9	0.9	0.9	0.2	0.9	0.9	1.9
				Bottom Depth (m):									
				Date Sampled:	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A									
Asbestos Identification	U	2192		N/A									
Moisture	N	2030	%	0.020	8.0	6.6	6.4	4.3	3.4	9.5	4.9	8.0	9.9
Chromatogram (AA Split)	N			N/A									
pH	U	2010		N/A	7.4	8.4		8.0	8.2		8.7		8.5
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	< 0.010	< 0.010		< 0.010	< 0.010		< 0.010		< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50									
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50									
Sulphate (Total)	U	2430	%	0.010	< 0.010	0.019		< 0.010	< 0.010		0.017		0.022
Arsenic	U	2450	mg/kg	1.0	9.5	7.5		9.0	10	9.1		8.4	
Boron	N	2450	mg/kg	0.40									
Cadmium	U	2450	mg/kg	0.10	0.28	0.17		0.12	0.38	0.92		0.20	
Chromium	U	2450	mg/kg	1.0	18	13		20	19	25		17	
Copper	U	2450	mg/kg	0.50	35	15		16	17	22		20	
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	0.16		0.13	
Nickel	U	2450	mg/kg	0.50	36	17		30	26	14		22	
Lead	U	2450	mg/kg	0.50	75	40		87	93	110		53	
Selenium	U	2450	mg/kg	0.20	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20		< 0.20	
Zinc	U	2450	mg/kg	0.50	57	42		62	52	140		39	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50		< 0.50	
Organic Matter	U	2625	%	0.40			0.71						
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0									
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0									
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0									
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0									
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0									
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0									
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0									
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0									
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0									
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0									
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0									
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0									
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0									
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0									
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0									
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0									

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

Client: MLM				Chemtest Job No.:	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938	15-22938
Quotation No.:				Chemtest Sample ID.:	200190	200195	200196	200198	200201	200204	200207	200210	200211
Order No.:				Client Sample Ref.:	WS07	WS09	WS09	WS10	WS11	WS12	WS13	WS14	WS14
				Client Sample ID.:	D1	D1	D2	D1	D1	D1	D1	D1	D2
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.9	0.9	1.9	0.9	0.9	0.2	0.9	0.9	1.9
				Bottom Depth (m):									
				Date Sampled:	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015	28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0									
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0									
Total Petroleum Hydrocarbons	U	2680	mg/kg	10									
Naphthalene	U	2700	mg/kg	0.10									
Acenaphthylene	U	2700	mg/kg	0.10									
Acenaphthene	U	2700	mg/kg	0.10									
Fluorene	U	2700	mg/kg	0.10									
Phenanthrene	U	2700	mg/kg	0.10									
Anthracene	U	2700	mg/kg	0.10									
Fluoranthene	U	2700	mg/kg	0.10									
Pyrene	U	2700	mg/kg	0.10									
Benzo[a]anthracene	U	2700	mg/kg	0.10									
Chrysene	U	2700	mg/kg	0.10									
Benzo[b]fluoranthene	U	2700	mg/kg	0.10									
Benzo[k]fluoranthene	U	2700	mg/kg	0.10									
Benzo[a]pyrene	U	2700	mg/kg	0.10									
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10									
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10									
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10									
Total Of 16 PAH's	U	2700	mg/kg	2.0									
Total Phenols	U	2920	mg/kg	0.30									

Results - Soil

Project: 773135 - Ruabon Park, Wrexham

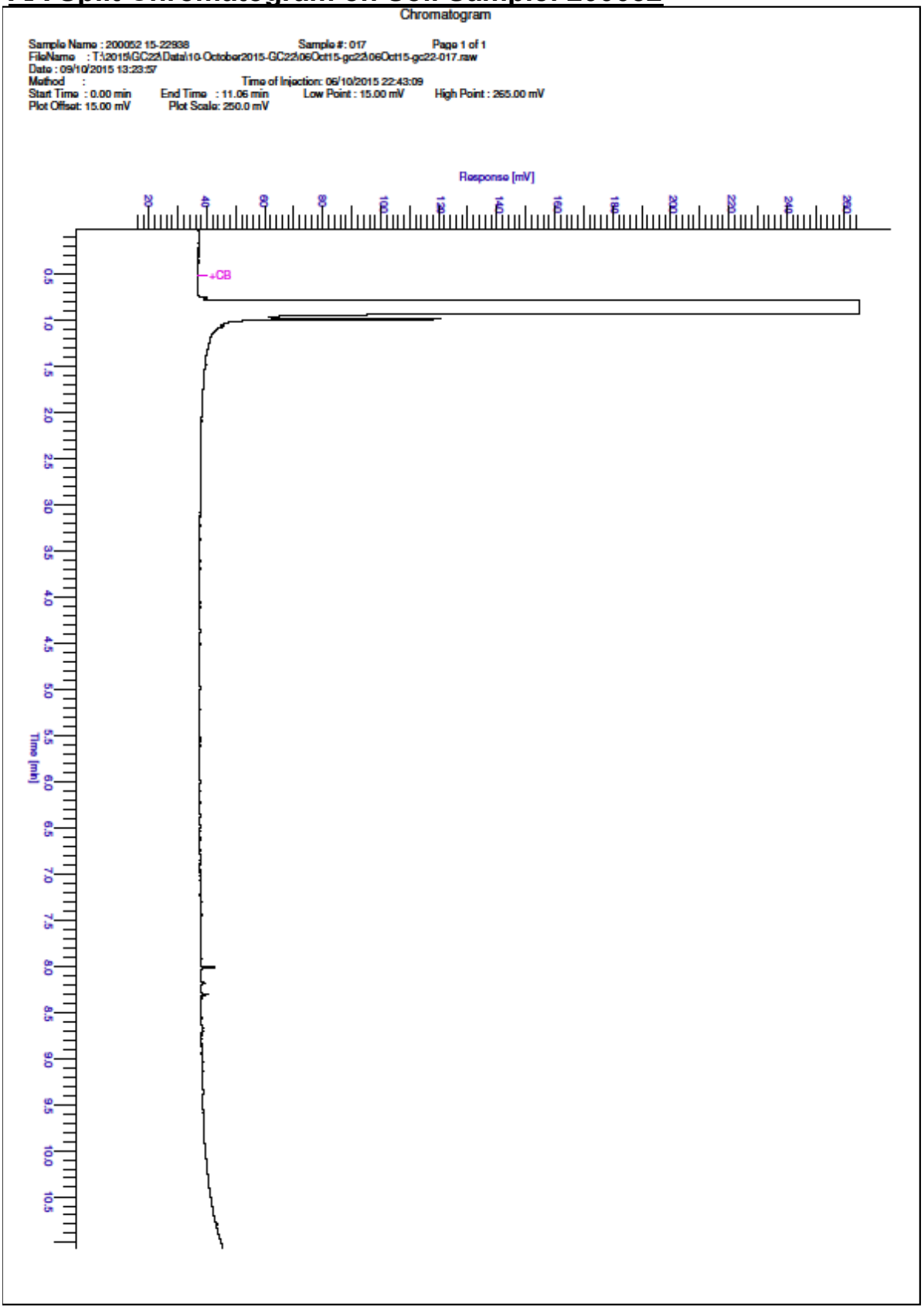
Client: MLM			Chemtest Job No.:		15-22938
Quotation No.:			Chemtest Sample ID.:		200213
Order No.:			Client Sample Ref.:		WS15
			Client Sample ID.:		D1
			Sample Type:		SOIL
			Top Depth (m):		0.9
			Bottom Depth (m):		
			Date Sampled:		28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type	U	2192		N/A	
Asbestos Identification	U	2192		N/A	
Moisture	N	2030	%	0.020	13
Chromatogram (AA Split)	N			N/A	
pH	U	2010		N/A	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	
Cyanide (Total)	U	2300	mg/kg	0.50	
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	
Sulphate (Total)	U	2430	%	0.010	
Arsenic	U	2450	mg/kg	1.0	7.3
Boron	N	2450	mg/kg	0.40	
Cadmium	U	2450	mg/kg	0.10	0.22
Chromium	U	2450	mg/kg	1.0	21
Copper	U	2450	mg/kg	0.50	21
Mercury	U	2450	mg/kg	0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	29
Lead	U	2450	mg/kg	0.50	37
Selenium	U	2450	mg/kg	0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	50
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Organic Matter	U	2625	%	0.40	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	
Total Aliphatic Hydrocarbons	U	2680	mg/kg	5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	
Aromatic TPH >C21-C35	N	2680	mg/kg	1.0	

Results - Soil

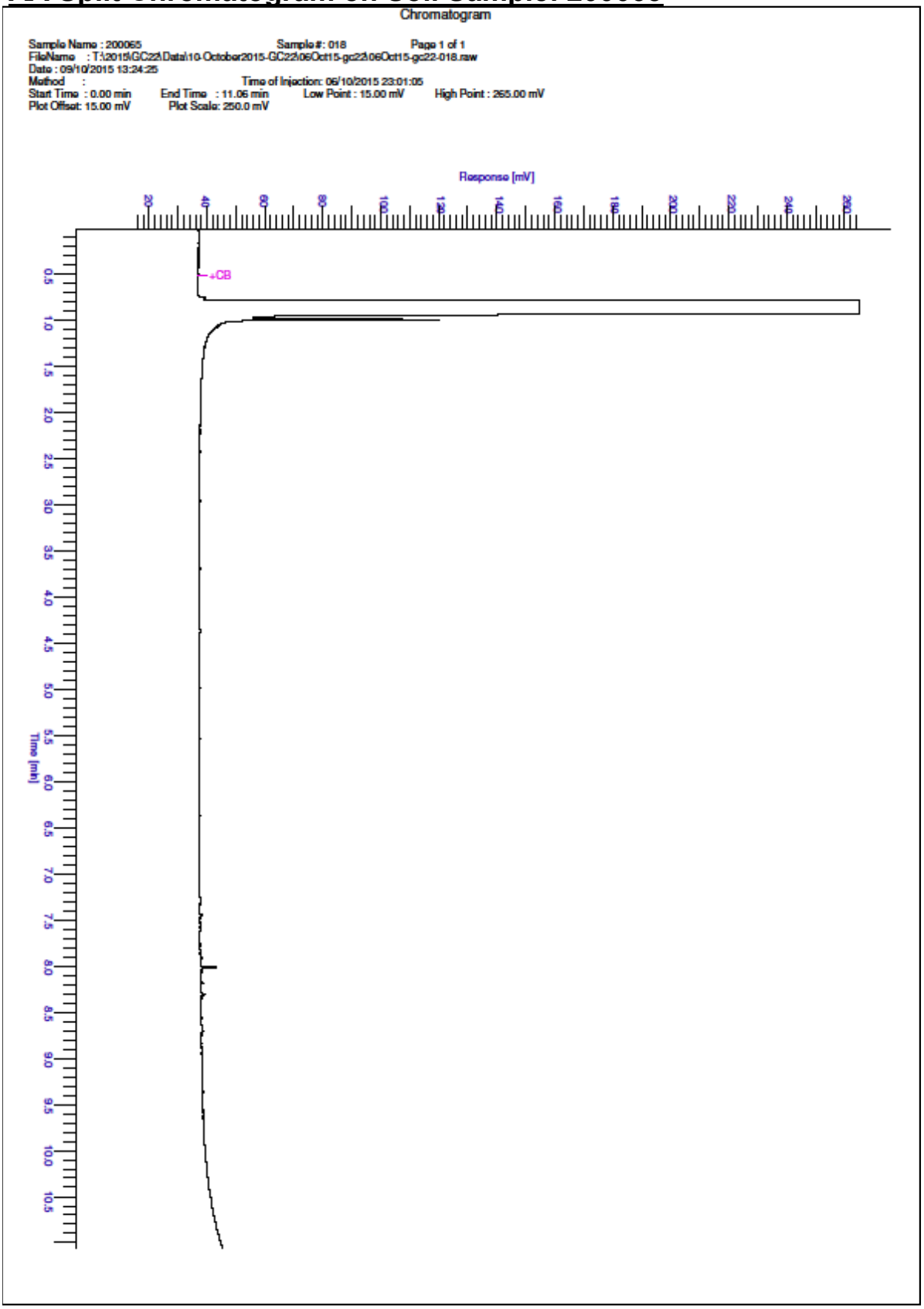
Project: 773135 - Ruabon Park, Wrexham

Client: MLM			Chemtest Job No.:		15-22938
Quotation No.:			Chemtest Sample ID.:		200213
Order No.:			Client Sample Ref.:		WS15
			Client Sample ID.:		D1
			Sample Type:		SOIL
			Top Depth (m):		0.9
			Bottom Depth (m):		
			Date Sampled:		28-Sep-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	
Total Aromatic Hydrocarbons	U	2680	mg/kg	5.0	
Total Petroleum Hydrocarbons	U	2680	mg/kg	10	
Naphthalene	U	2700	mg/kg	0.10	
Acenaphthylene	U	2700	mg/kg	0.10	
Acenaphthene	U	2700	mg/kg	0.10	
Fluorene	U	2700	mg/kg	0.10	
Phenanthrene	U	2700	mg/kg	0.10	
Anthracene	U	2700	mg/kg	0.10	
Fluoranthene	U	2700	mg/kg	0.10	
Pyrene	U	2700	mg/kg	0.10	
Benzo[a]anthracene	U	2700	mg/kg	0.10	
Chrysene	U	2700	mg/kg	0.10	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	
Benzo[a]pyrene	U	2700	mg/kg	0.10	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	
Total Of 16 PAH's	U	2700	mg/kg	2.0	
Total Phenols	U	2920	mg/kg	0.30	

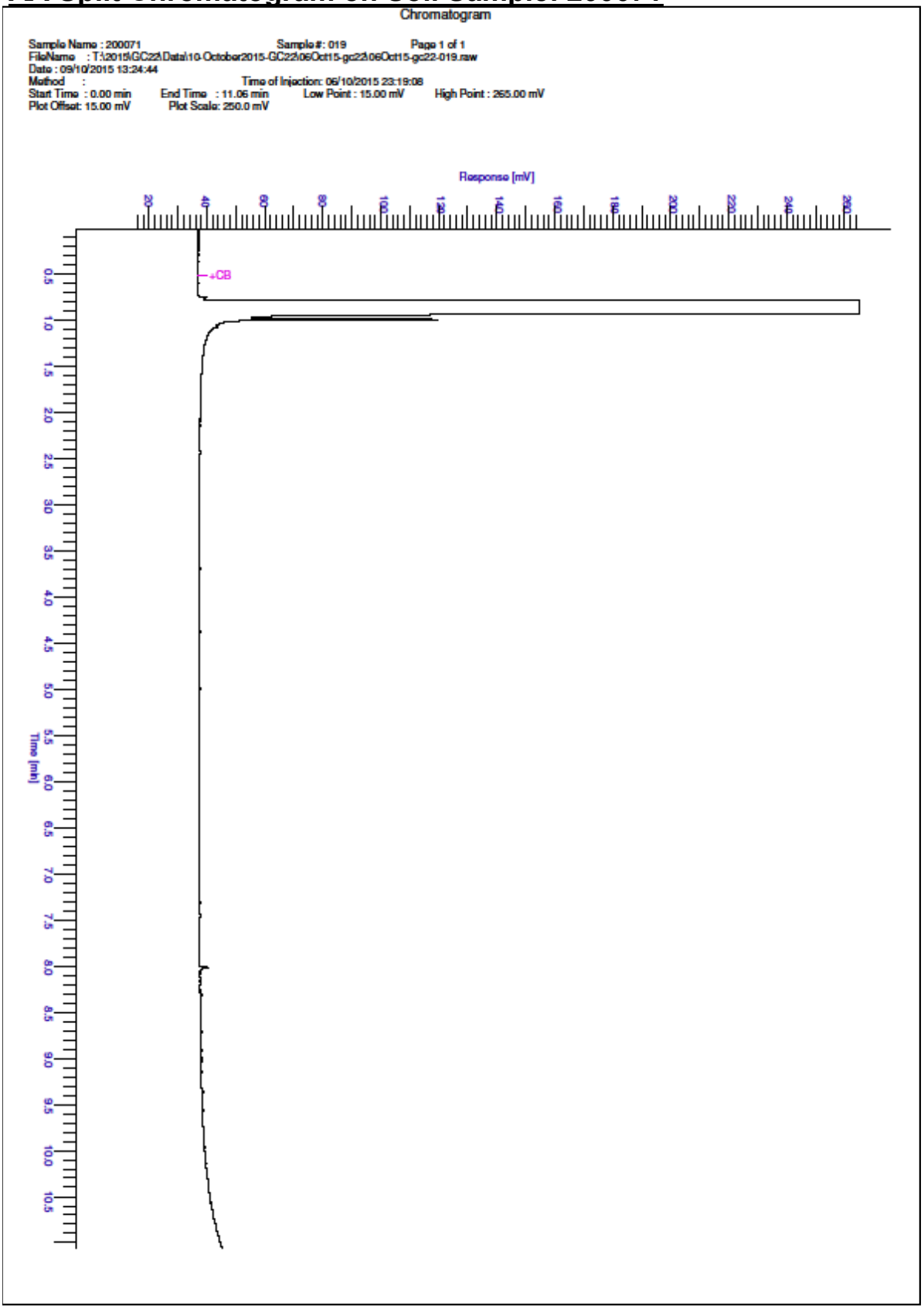
AA-Split Chromatogram on Soil Sample: 200052



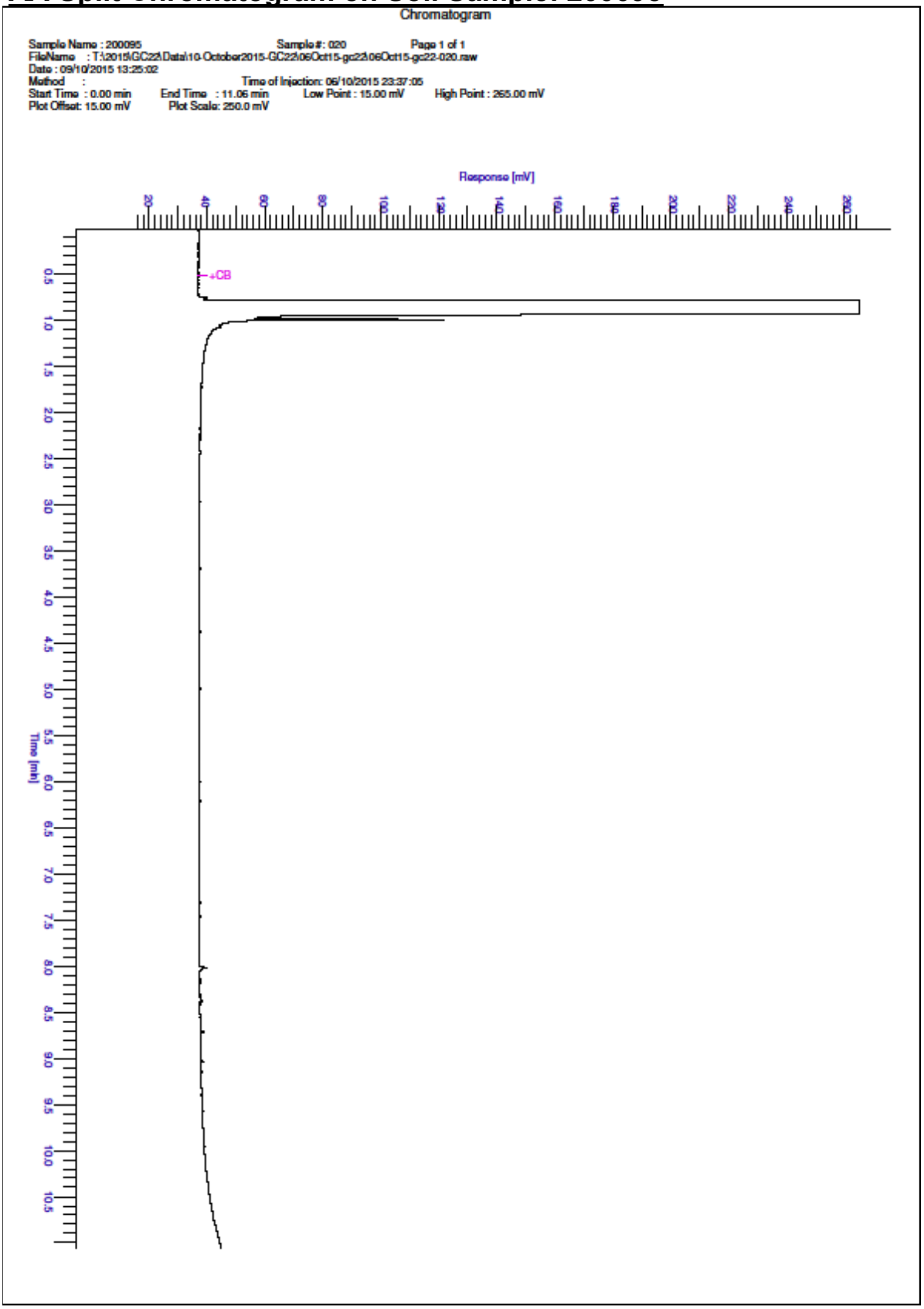
AA-Split Chromatogram on Soil Sample: 200065



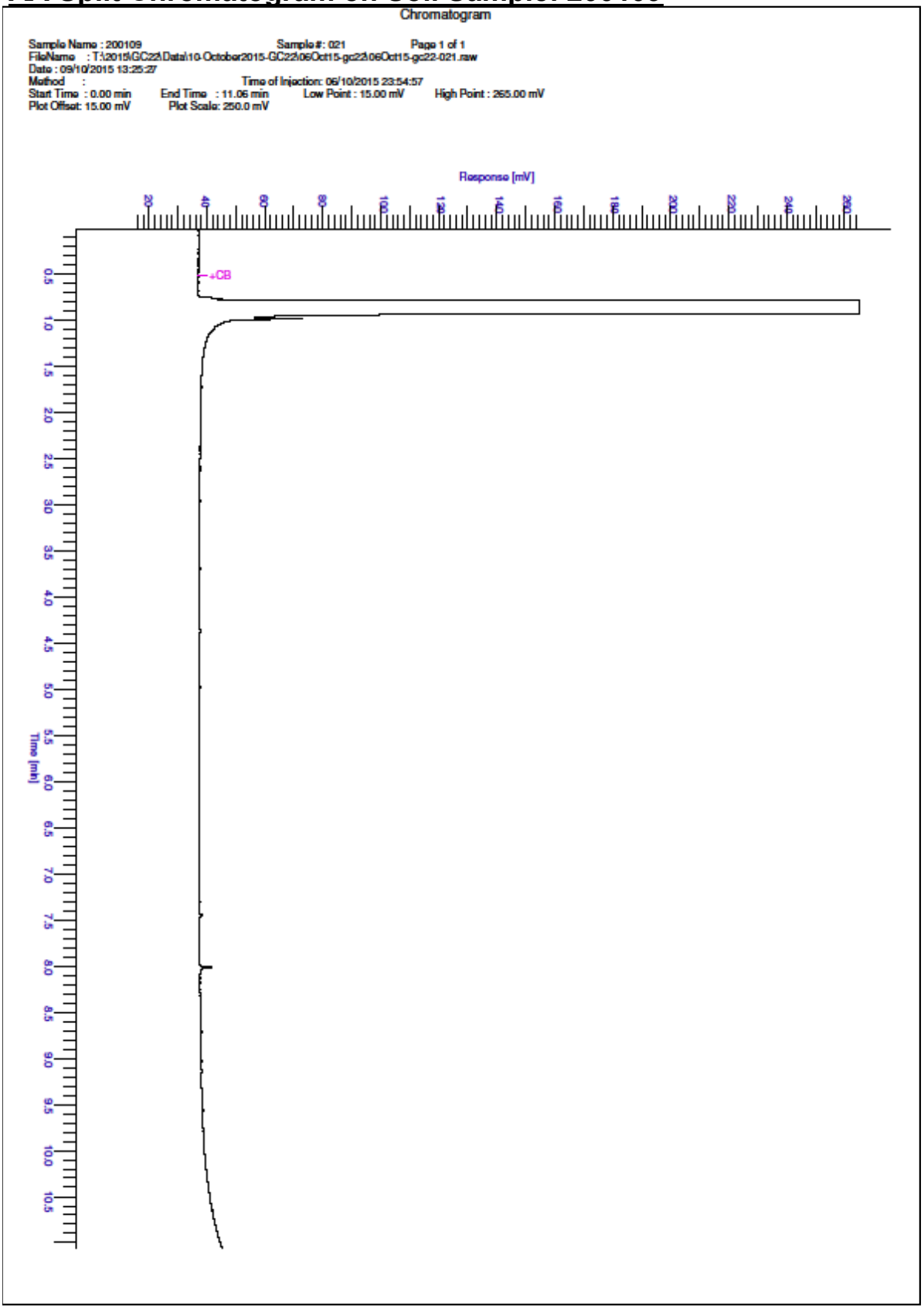
AA-Split Chromatogram on Soil Sample: 200071



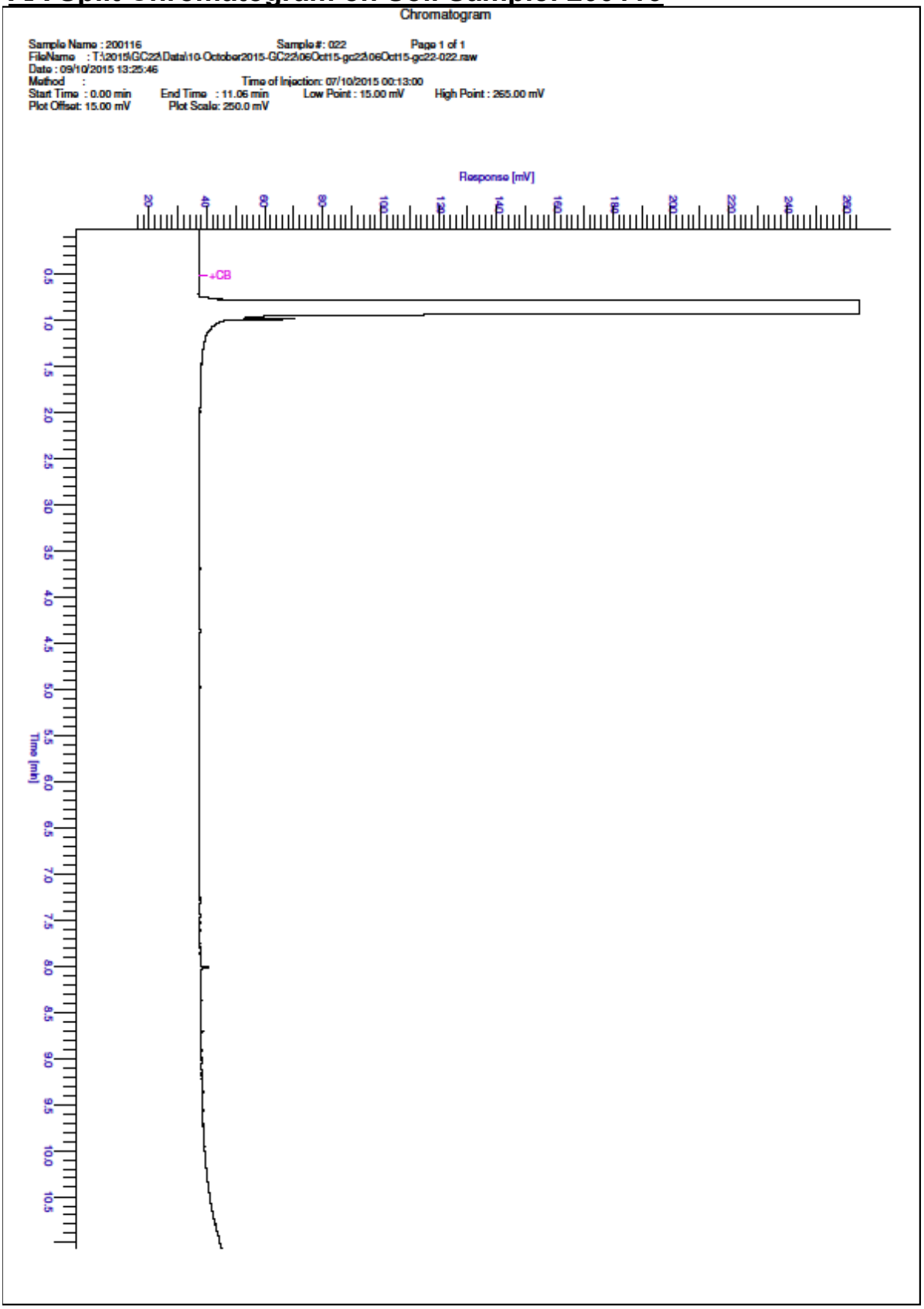
AA-Split Chromatogram on Soil Sample: 200095



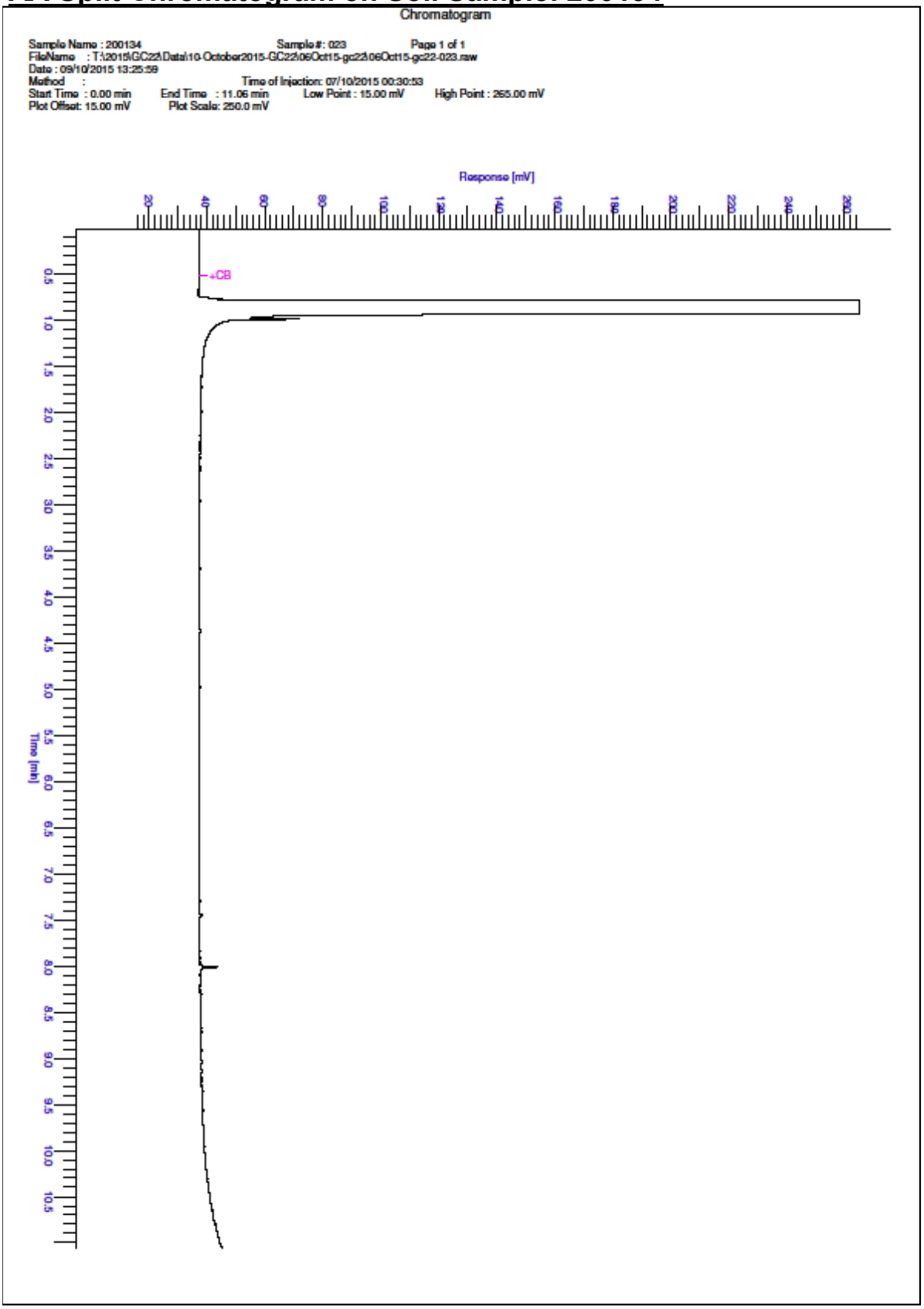
AA-Split Chromatogram on Soil Sample: 200109



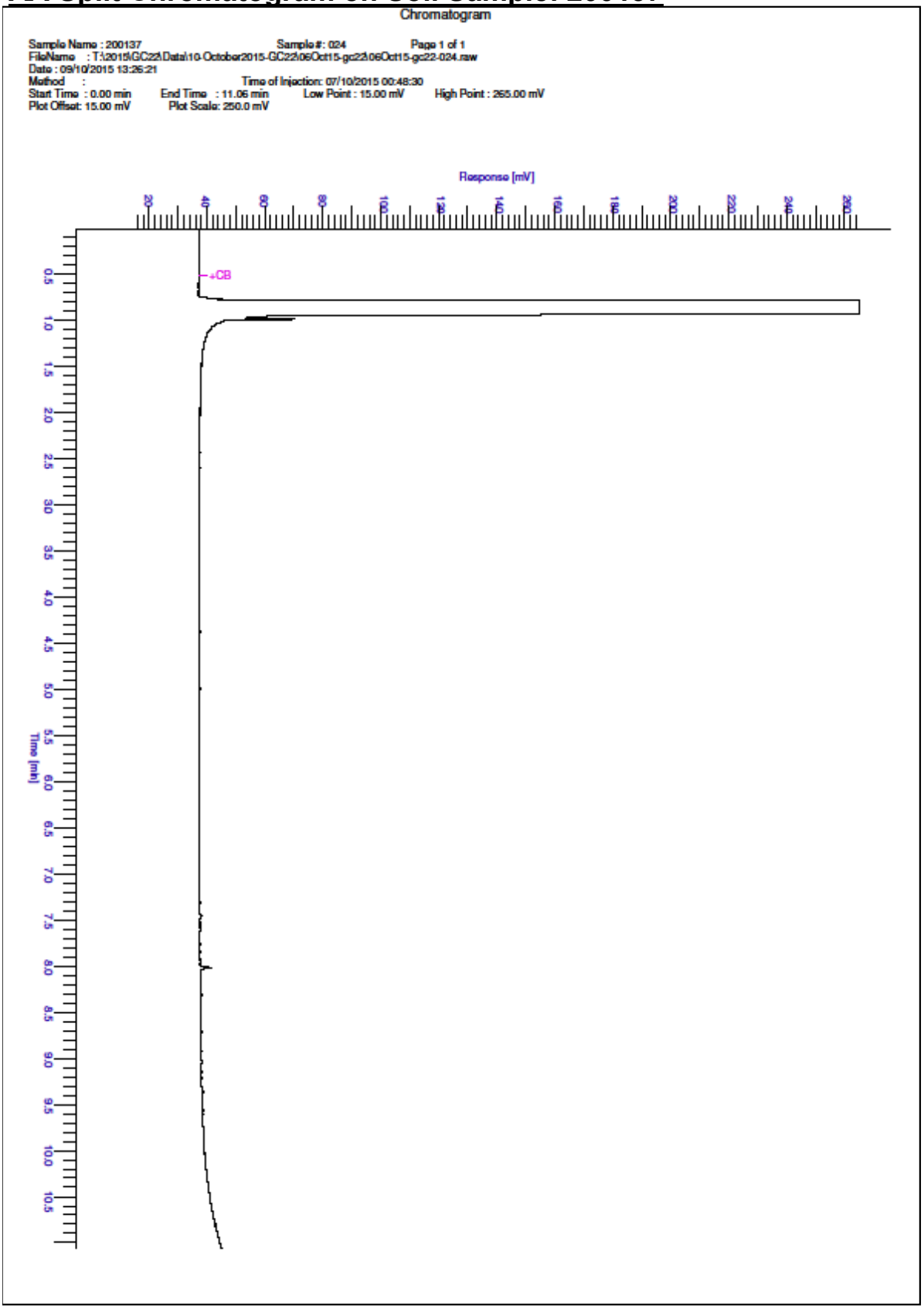
AA-Split Chromatogram on Soil Sample: 200116



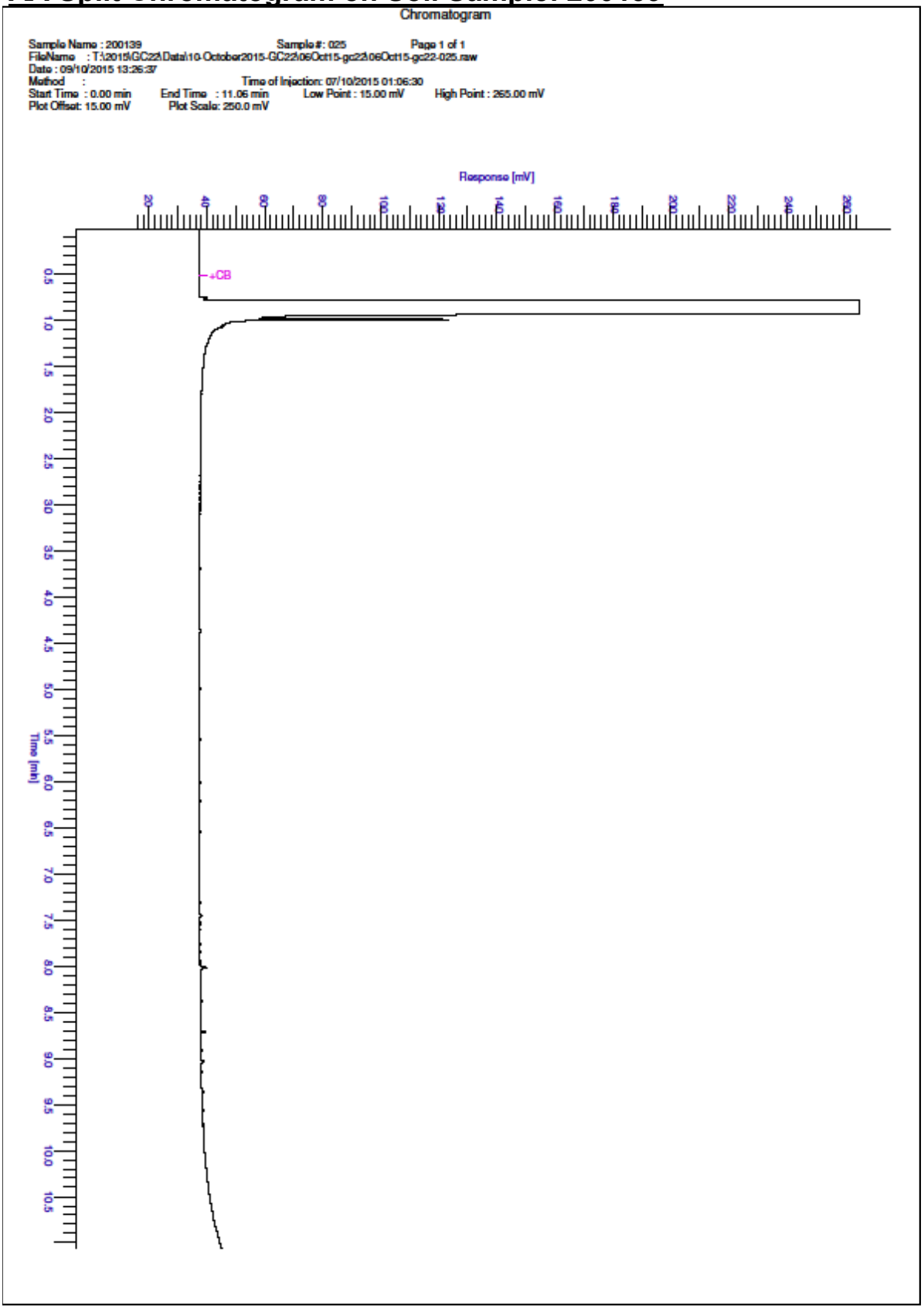
AA-Split Chromatogram on Soil Sample: 200134



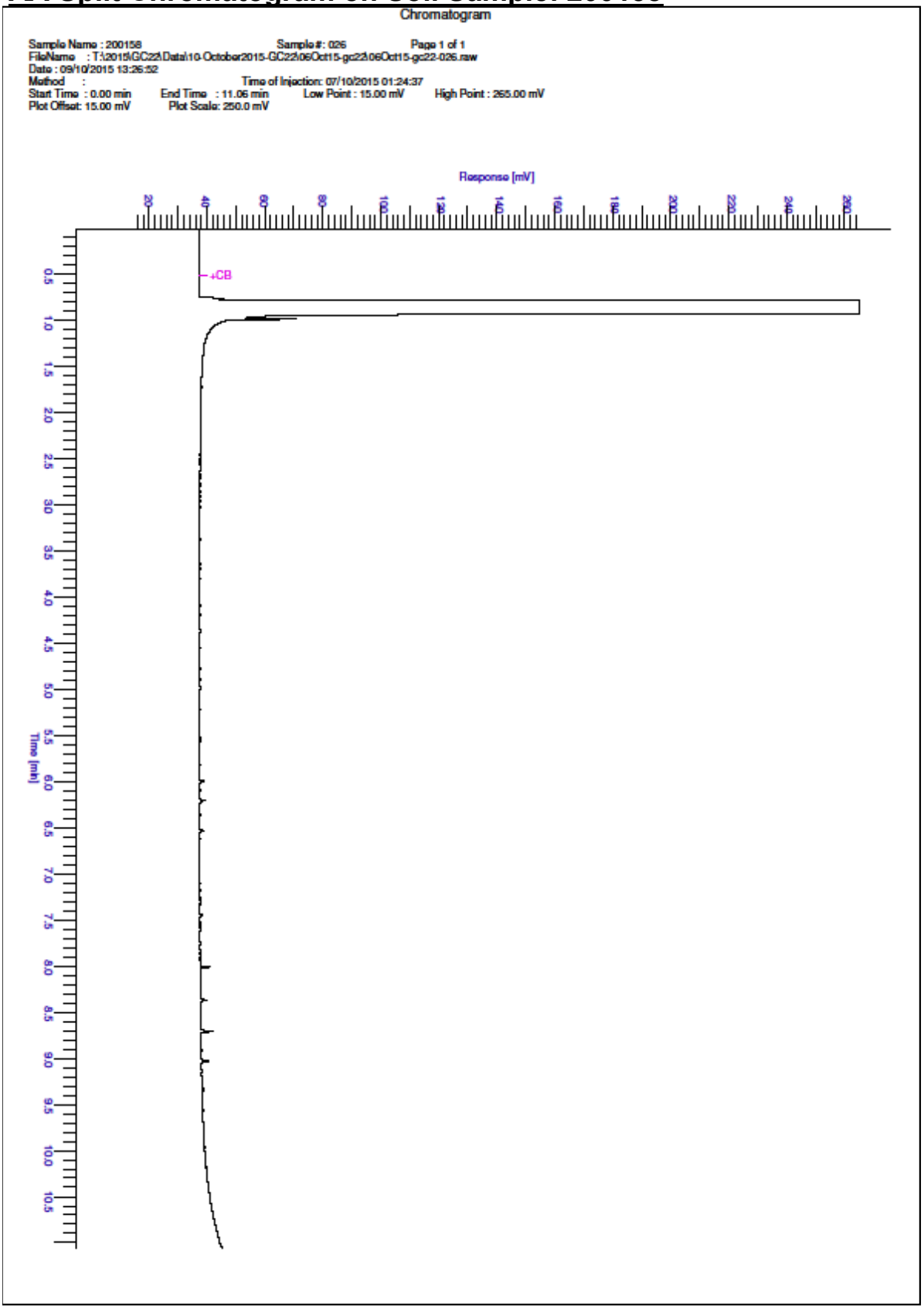
AA-Split Chromatogram on Soil Sample: 200137



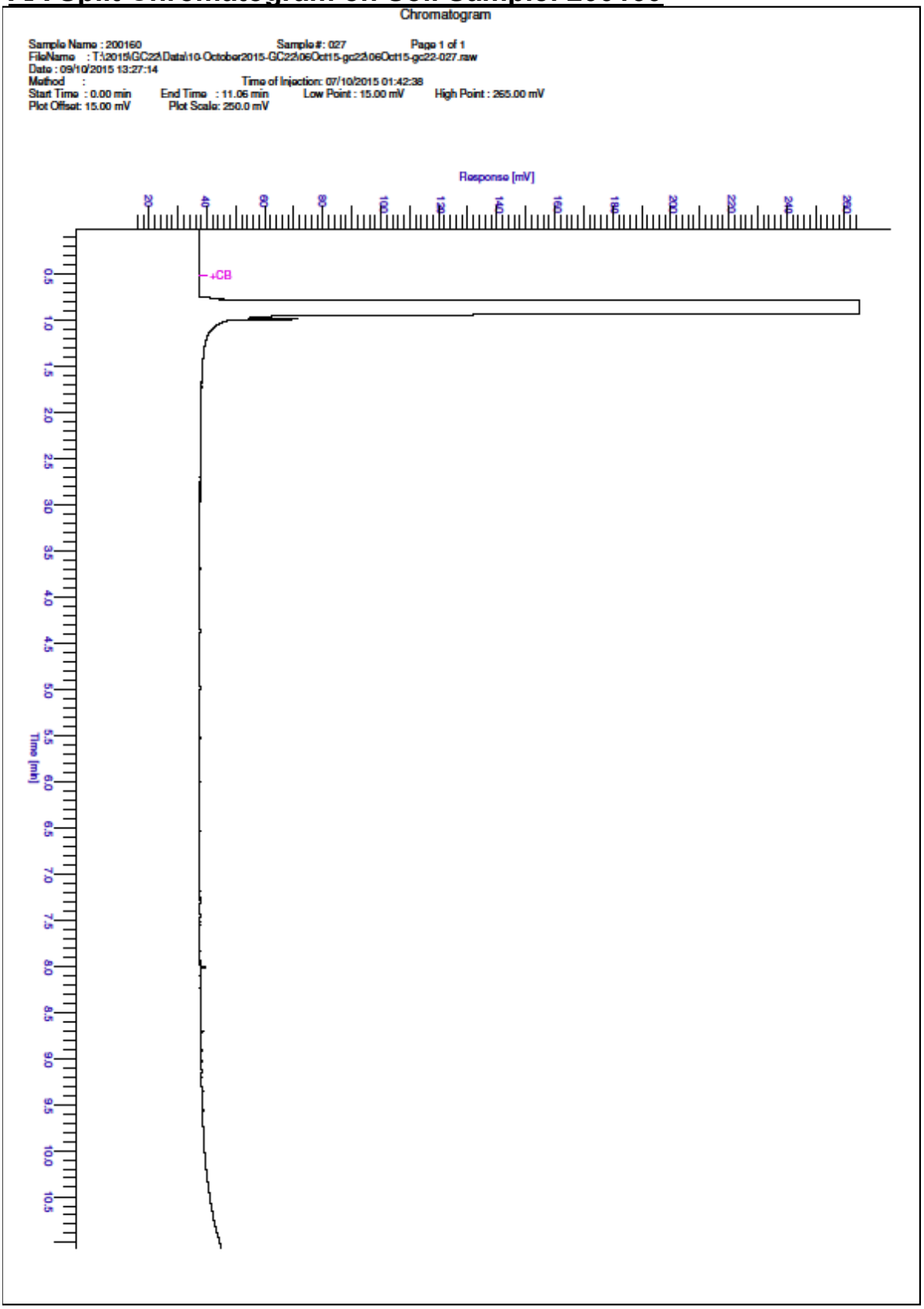
AA-Split Chromatogram on Soil Sample: 200139



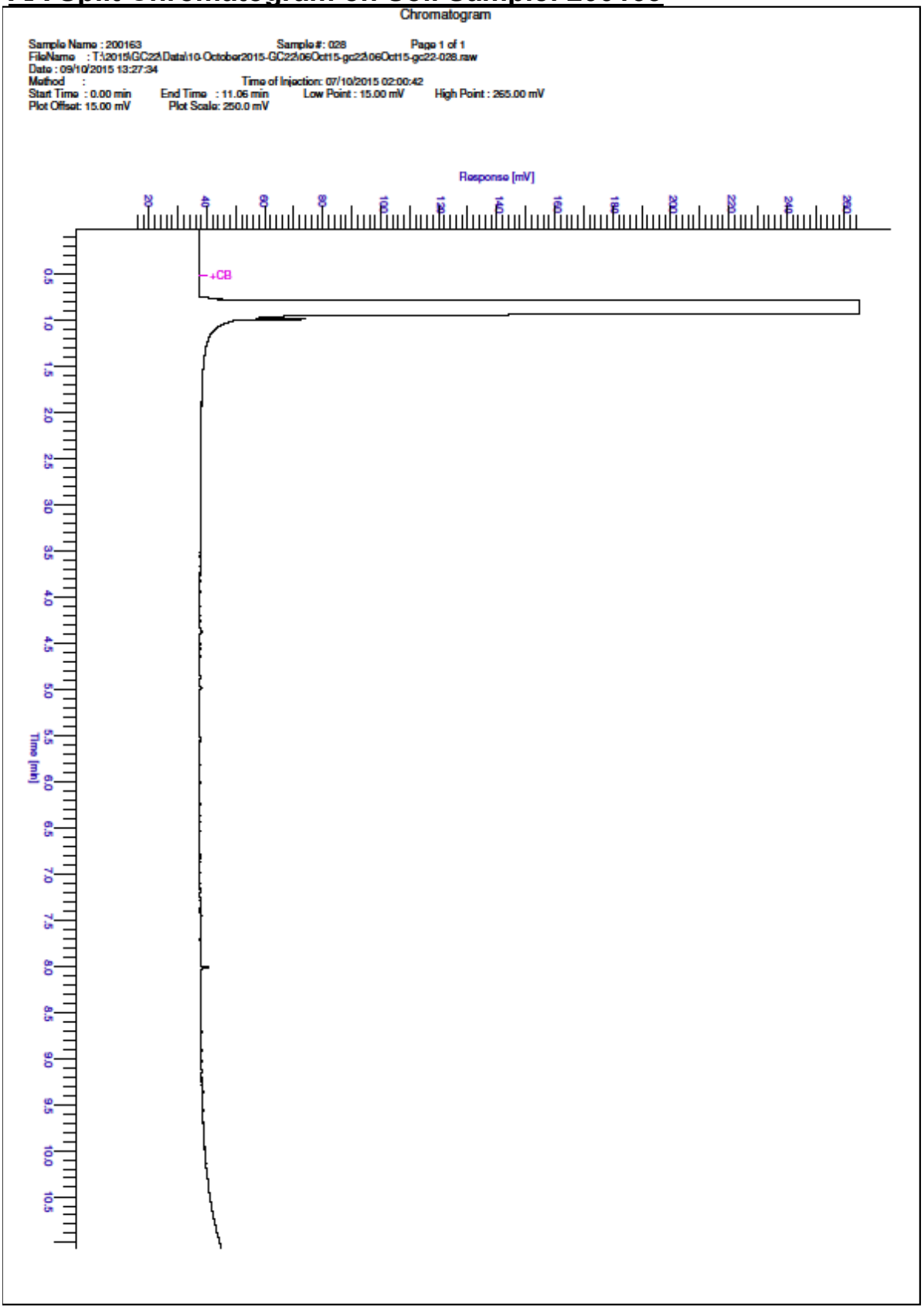
AA-Split Chromatogram on Soil Sample: 200158



AA-Split Chromatogram on Soil Sample: 200160



AA-Split Chromatogram on Soil Sample: 200163



Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

2183

Final Report

Report No.:	15-23813-1
Initial Date of Issue:	15-Oct-2015
Client	MLM
Client Address:	55 Charlotte Street Birmingham B3 1PX
Contact(s):	Michael Maynard
Project	773135 - Ruabon Park

Quotation No.:		**Date Received:**	12-Oct-2015
Order No.:		**Date Instructed:**	12-Oct-2015
No. of Samples:	10	**Target Date:**	16-Oct-2015
Turnaround (Wkdays):	5	**Results Due:**	16-Oct-2015
Date Approved:	15-Oct-2015		

Approved By:



Details: Phil Hellier, Project Director

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Results - Water

Project: 773135 - Ruabon Park

Client: MLM					Chemtest Job No.:	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813
Quotation No.:					Chemtest Sample ID.:	203888	203889	203890	203891	203892	203893	203894	203895	203896
Order No.:					Client Sample Ref.:	WS01	WS02	WS03	WS04	WS07	WS09	WS11	WS13	WS14
					Client Sample ID.:	W1	W1	W1	W1	W1	W1	W1	W1	W1
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Top Depth (m):	3.25	2.79	2.65	2.2	3.0	3.44	3.80	2.10	2.04
					Bottom Depth (m):									
					Date Sampled:	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
pH	U	1010		N/A		8.0	7.2	8.0	8.1	8.0	8.1	8.2	8.3	8.2
Sulphate	U	1220	mg/l	1.0		71	58	170	97	45	66	42	66	47
Hardness	U	1415	mg/l	15		410	670	490	420	370	390	320	320	360
Arsenic (Dissolved)	U	1450	µg/l	1.0		< 1.0	1.3	< 1.0	1.4	< 1.0	1.2	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080		0.17	0.29	0.11	0.18	< 0.080	0.13	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0		1.8	3.9	2.3	1.8	1.5	2.1	2.5	< 1.0	4.2
Copper (Dissolved)	U	1450	µg/l	1.0		< 1.0	3.9	1.0	< 1.0	< 1.0	2.2	1.1	1.1	1.5
Mercury (Dissolved)	U	1450	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0		5.3	9.9	2.4	2.4	2.0	2.0	< 1.0	1.5	1.3
Lead (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0		< 1.0	5.6	< 1.0	< 1.0	1.5	< 1.0	1.1	< 1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0		8.3	21	7.4	5.5	2.1	3.9	2.1	3.2	20
Chromium (Hexavalent)	U	1490	µg/l	20		[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0		[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10		[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0		[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0	[B] < 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10		[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10	[B] < 10
Naphthalene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Chemtest
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Results - Water

Project: 773135 - Ruabon Park

Client: MLM					Chemtest Job No.:	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813	15-23813
Quotation No.:					Chemtest Sample ID.:	203888	203889	203890	203891	203892	203893	203894	203895	203896
Order No.:					Client Sample Ref.:	WS01	WS02	WS03	WS04	WS07	WS09	WS11	WS13	WS14
					Client Sample ID.:	W1	W1	W1	W1	W1	W1	W1	W1	W1
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Top Depth (m):	3.25	2.79	2.65	2.2	3.0	3.44	3.80	2.10	2.04
					Bottom Depth (m):									
					Date Sampled:	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015	07-May-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Fluoranthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

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Results - Water

Project: 773135 - Ruabon Park

Client: MLM			Chemtest Job No.:		15-23813
Quotation No.:			Chemtest Sample ID.:		203897
Order No.:			Client Sample Ref.:		WS15
			Client Sample ID.:		W1
			Sample Type:		WATER
			Top Depth (m):		2.18
			Bottom Depth (m):		
			Date Sampled:		07-May-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
pH	U	1010		N/A	8.1
Sulphate	U	1220	mg/l	1.0	79
Hardness	U	1415	mg/l	15	450
Arsenic (Dissolved)	U	1450	µg/l	1.0	1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	0.095
Chromium (Dissolved)	U	1450	µg/l	1.0	2.2
Copper (Dissolved)	U	1450	µg/l	1.0	1.6
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50
Nickel (Dissolved)	U	1450	µg/l	1.0	1.5
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	6.1
Chromium (Hexavalent)	U	1490	µg/l	20	[B] < 20
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	[B] < 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	[B] < 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	[B] < 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	[B] < 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	[B] < 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	[B] < 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10	[B] < 10
Naphthalene	U	1700	µg/l	0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10

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Results - Water

Project: 773135 - Ruabon Park

Client: MLM			Chemtest Job No.:		15-23813
Quotation No.:			Chemtest Sample ID.:		203897
Order No.:			Client Sample Ref.:		WS15
			Client Sample ID.:		W1
			Sample Type:		WATER
			Top Depth (m):		2.18
			Bottom Depth (m):		
			Date Sampled:		07-May-2015
Determinand	**Accred.**	**SOP**	**Units**	**LOD**	
Fluoranthene	U	1700	µg/l	0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10
Chrysene	U	1700	µg/l	0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	< 2.0

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Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample ID:	Sample Ref:	Sample ID:	Sampled Date:	Deviation Code(s):	Containers Received:
203888	WS01	W1	07-May-2015	B	Coloured Winchester 1000ml
203888	WS01	W1	07-May-2015	B	Plastic Bottle 1000ml
203889	WS02	W1	07-May-2015	B	Coloured Winchester 1000ml
203889	WS02	W1	07-May-2015	B	Plastic Bottle 1000ml
203890	WS03	W1	07-May-2015	B	Coloured Winchester 1000ml
203890	WS03	W1	07-May-2015	B	Plastic Bottle 1000ml
203891	WS04	W1	07-May-2015	B	Coloured Winchester 1000ml
203891	WS04	W1	07-May-2015	B	Plastic Bottle 1000ml
203892	WS07	W1	07-May-2015	B	Coloured Winchester 1000ml
203892	WS07	W1	07-May-2015	B	Plastic Bottle 1000ml
203893	WS09	W1	07-May-2015	B	Coloured Winchester 1000ml
203893	WS09	W1	07-May-2015	B	Plastic Bottle 1000ml
203894	WS11	W1	07-May-2015	B	Coloured Winchester 1000ml
203895	WS13	W1	07-May-2015	B	Coloured Winchester 1000ml
203895	WS13	W1	07-May-2015	B	Plastic Bottle 1000ml
203896	WS14	W1	07-May-2015	B	Coloured Winchester 1000ml
203896	WS14	W1	07-May-2015	B	Plastic Bottle 1000ml
203897	WS15	W1	07-May-2015	B	Coloured Winchester 1000ml
203897	WS15	W1	07-May-2015	B	Plastic Bottle 1000ml

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Appendix E

Soakaway Test Results

SOAKAWAY TEST RESULTS

Based on BRE Digest 365: Soakaway Design (2007)

MLM
www.mlm.uk.com

Project Name: Ruabon Park, Wrexham
Location: Wrexham, Wales
Project Ref: 773135

Test Location: **TP21**

Soil Infiltration Rate (m/sec)	**Test Failed**

Readings:

Time (mins)	Water Level (m bgl)
1	0.40
2	0.41
3	0.41
4	0.42
5	0.42
10	0.44
16	0.46
20	0.48
25	0.49
30	0.50
60	0.58
120	0.67
180	0.80
240	0.83
300	0.90
360	0.96

Trial Pit Dimensions (m)

Length	2.90
Width	0.75
Depth	2.20

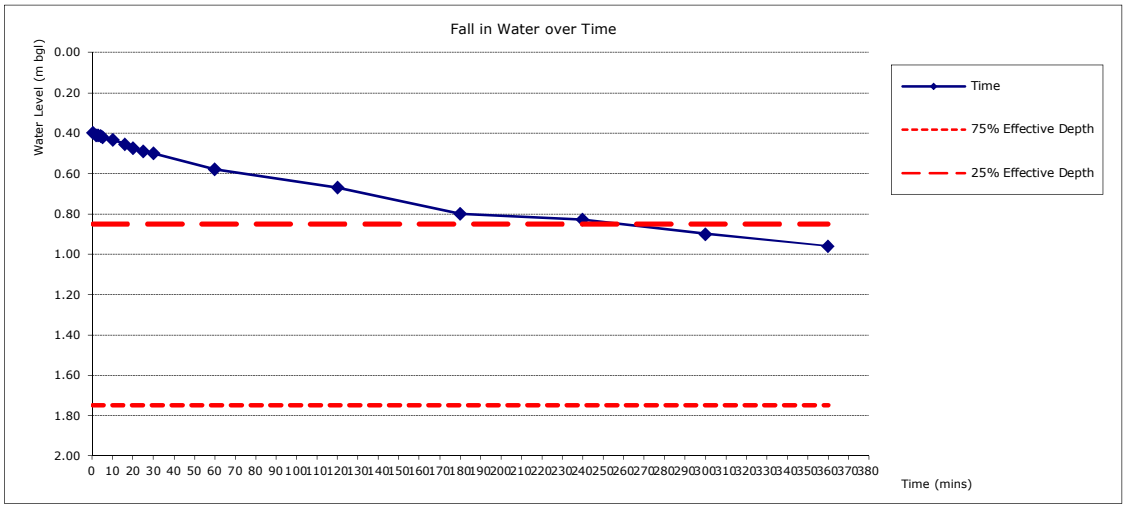
Assumed Invert Level (m bgl)	0.40

Ground Conditions:

	Refer to engineers logs

Was trial pit filled with gravel (Yes/No):	No

Remarks:



Soil Infiltration Rate (m/sec) $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Fill Porosity	Assumed porosity of granular fill material based on CIRIA 156 (%)	0.35
V_{p75-25}	Effective depth storage volume of water in the trial pit between 75% and 25% effective depth	1.96
Revised V_{p75-25}	Reduced effective storage volume as a result of gravel fill	0.69
a_{p50}	The internal surface area of the trial pit up to 50% effective depth and including the base area	8.75
t_{p75-25}	The time for the water level to fall from 75% to 25% effective depth	

Soil Infiltration Rate (m/sec) f 1.958

f **Test Failed**

SOAKAWAY TEST RESULTS

Based on BRE Digest 365: Soakaway Design (2007)

MLM
www.mlm.uk.com

Project Name: Ruabon Park, Wrexham
Location: Wrexham, Wales
Project Ref: 773135

Test Location: **TP12**

Soil Infiltration Rate (m/sec)	**Test Failed**

Readings:

Time (mins)	Water Level (m bgl)
1	0.31
2	0.33
3	0.36
4	0.37
5	0.38
10	0.44
16	0.51
20	0.55
25	0.58
30	0.62
60	0.72
120	0.76
180	1.00
240	1.05
300	1.13
360	1.20

Trial Pit Dimensions (m)

Length	2.80
Width	0.75
Depth	2.00

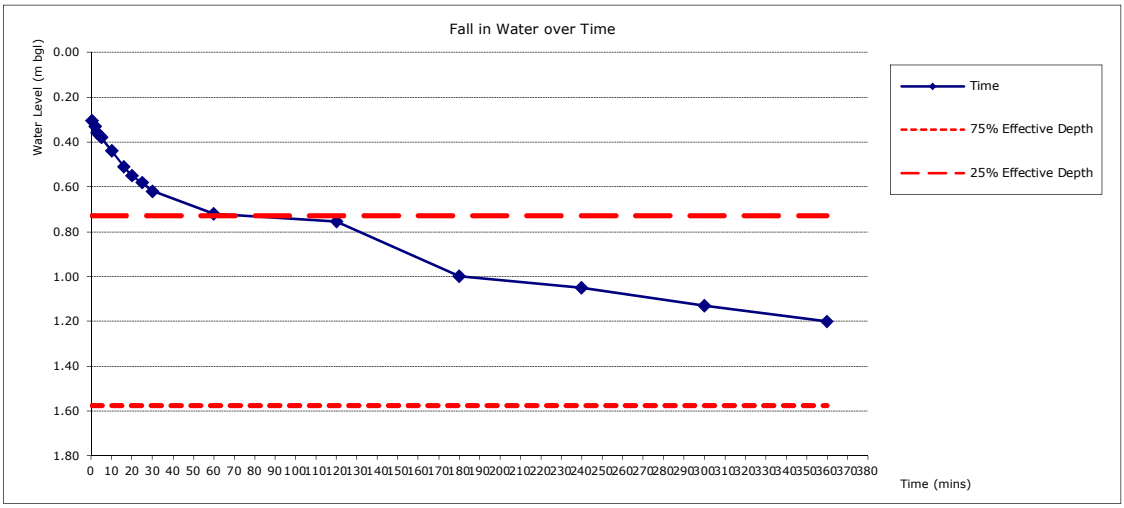
Assumed Invert Level (m bgl)	0.31

Ground Conditions:

	Refer to engineers logs

Was trial pit filled with gravel (Yes/No):	No

Remarks:



Soil Infiltration Rate (m/sec) $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Fill Porosity	Assumed porosity of granular fill material based on CIRIA 156 (%)	0.35
V_{p75-25}	Effective depth storage volume of water in the trial pit between 75% and 25% effective depth	1.78
Revised V_{p75-25}	Reduced effective storage volume as a result of gravel fill	0.62
a_{p50}	The internal surface area of the trial pit up to 50% effective depth and including the base area	8.12
t_{p75-25}	The time for the water level to fall from 75% to 25% effective depth	

Soil Infiltration Rate (m/sec) f 1.780

f **Test Failed**

SOAKAWAY TEST RESULTS

Based on BRE Digest 365: Soakaway Design (2007)

MLM
www.mlm.uk.com

Project Name: Ruabon Park, Wrexham
Location: Wrexham, Wales
Project Ref: 773135

Test Location: **TP33**

Soil Infiltration Rate (m/sec)	**Test Failed**

Readings:

Time (mins)	Water Level (m bgl)
1	0.35
2	0.37
3	0.39
4	0.41
5	0.42
10	0.45
16	0.47
20	0.50
25	0.53
40	0.58
50	0.65
60	0.67
90	0.71
120	0.79
150	0.85
180	0.87
240	1.02
300	1.15

Trial Pit Dimensions (m)

Length	3.30
Width	0.70
Depth	1.90

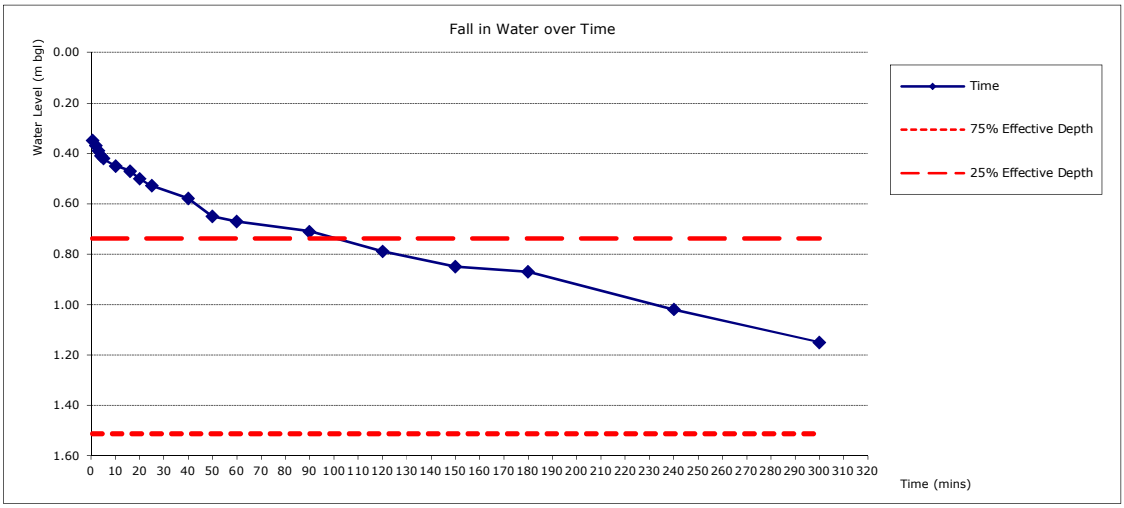
Assumed Invert Level (m bgl)	0.35

Ground Conditions:

	Refer to engineers logs

Was trial pit filled with gravel (Yes/No):	No

Remarks:



Soil Infiltration Rate (m/sec) $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Fill Porosity	Assumed porosity of granular fill material based on CIRIA 156 (%)	0.35
V_{p75-25}	Effective depth storage volume of water in the trial pit between 75% and 25% effective depth	1.79
Revised V_{p75-25}	Reduced effective storage volume as a result of gravel fill	0.63
a_{p50}	The internal surface area of the trial pit up to 50% effective depth and including the base area	8.51
t_{p75-25}	The time for the water level to fall from 75% to 25% effective depth	

Soil Infiltration Rate (m/sec) f 1.790

f **Test Failed**

SOAKAWAY TEST RESULTS

Based on BRE Digest 365: Soakaway Design (2007)

MLM
www.mlm.uk.com

Project Name: Ruabon Park, Wrexham
Location: Wrexham, Wales
Project Ref: 773135

Test Location: **TP32**

Soil Infiltration Rate (m/sec)	**2.96E-04**

Readings:

Time (mins)	Water Level (m bgl)
1	1.34
2	1.37
3	1.40
4	1.42
5	1.49
6	1.51
7	1.53
8	1.58
9	1.62
10	1.67
11	1.71
12	1.76
13	1.80

Trial Pit Dimensions (m)

Length	3.30
Width	0.70
Depth	1.90

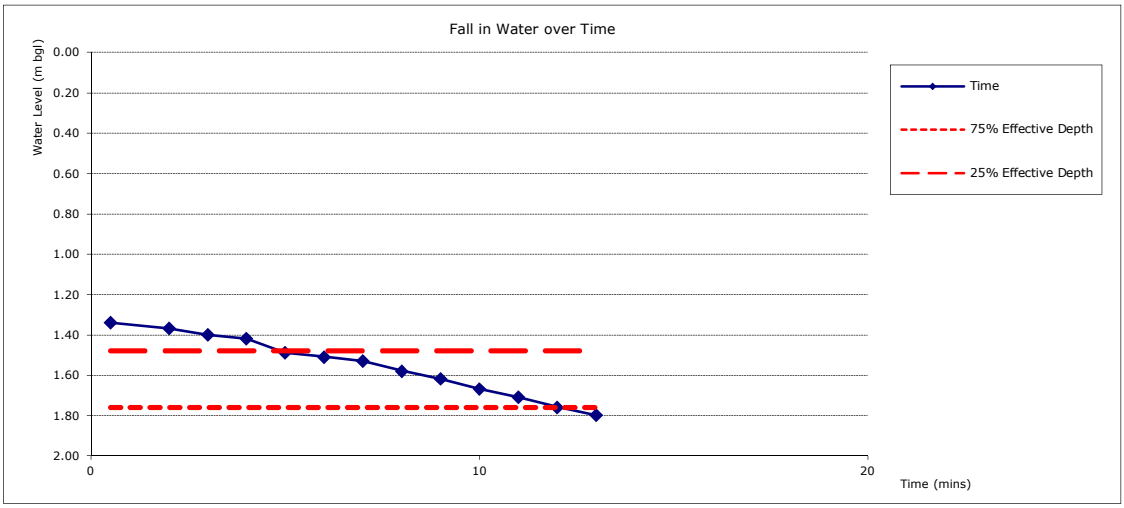
Assumed Invert Level (m bgl)	1.34

Ground Conditions:

	Refer to engineers logs

Was trial pit filled with gravel (Yes/No):	No

Remarks:



Soil Infiltration Rate (m/sec) $f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

Fill Porosity	Assumed porosity of granular fill material based on CIRIA 156 (%)	0.35
V_{p75-25}	Effective depth storage volume of water in the trial pit between 75% and 25% effective depth	0.65
Revised V_{p75-25}	Reduced effective storage volume as a result of gravel fill	0.23
a_{p50}	The internal surface area of the trial pit up to 50% effective depth and including the base area	4.55
t_{p75-25}	The time for the water level to fall from 75% to 25% effective depth	8.00

Soil Infiltration Rate (m/sec) $f = \frac{0.647}{2184}$

f **2.96E-04**

Appendix F

Generic Assessment Criteria

Screening Levels – Human Health (soil)

LQM/CIEH S4UL (except allotments)	Residential		Allotments	Commercial	Public Open Space (residential)	Public Open Space (park)
	With homegrown produce	Without homegrown produce				
	Metals and semi-metals (based on sandy loam soil with SOM 6%)					
Arsenic (inorganic)	37	40	43	640	79	170
Beryllium	1.7	1.7	35	12	2.2	63
Boron	290	1.1e+4	45	2.4e+5	2.1e+4	4.6e+4
Cadmium	11	85	1.9	190	120	532
Chromium III (or total)	910	910	18000	8600	1500	3.3e+4
Chromium VI (hexavalent)	6	6	1.8	33	7.7	220
Copper	2400	7100	520	6.8e+4	1.2e+4	4.4e+4
Mercury (inorganic)	40	56	19	1100	120	240
Nickel	180	180	230	980	230	3400
Selenium	250	430	88	1.2e+4	1100	1800
Vanadium	410	1200	91	9000	2000	5000
Zinc	3700	4.0e+4	620	7.3e+5	8.1e+4	1.7e+5
Lead (Defra C4SL used in the absence of a published S4UL)	200	310	80	2330	630	1300
	Polycyclic Aromatic Hydrocarbons (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
Acenaphthene	210 510 1100	3000 4700 6000	34 85 200	8.4e+4 9.7e+4 1.0e+5	1.5e+4	2.9e+4 3.0e+4 3.0e+4
Acenaphthylene	170 420 920	2900 4600 6000	28 69 160	8.3e+4 9.7e+4 1.0e+5	1.5e+4	2.9e+4 3.0e+4 3.0e+4
Anthracene	2400 5400 1.1e+4	3.1e+4[vap (1.17)] 3.5e+4 3.7e+4	380 950 2200	5.2e+5 5.4e+5 5.4e+5	7.4e+4	1.5e+5
Benzo[a]anthracene	7.2 11 13	11 14 15	2.9 6.5 13	170 170 180	29	49 56 62
Benzo[a]pyrene	2.2 2.7 3.0	3.2	0.97 2.0 3.5	35 35 36	5.7	11 12 13
Benzo[b]fluoranthene	2.6 3.3 3.7	3.9 4.0 4.0	0.99 2.1 3.9	44 44 45	7.1 7.2 7.2	13 15 16
Benzo[ghi]perylene	320 340 350	360	290 470 640	3900 4000 4000	640	1400 1500 1600
Benzo[k]fluoranthene	77 93 100	110	37 75 130	1200	190	370 410 440
Chrysene	15 22 27	30 31 32	4.1 9.4 19	350	57	93 110 120
Dibenzo[ah]anthracene	0.24 0.28 0.30	0.31 0.32 0.32	0.14 0.27 0.43	3.5 3.6 3.6	0.57 0.57 0.58	1.1 1.3 1.4
Fluoranthene	280 560 890	1500 1600 1600	52 130 290	2.3e+4	3100	6300 6300 6400
Fluorene	170 400 860	2800 3800 4500	27 67 160	6.3+4 6.8e+4 7.1e+4	9900	2.0e+4
Indeno[123-cd]pyrene	27 36 41	45 46 46	9.5 21 39	500 510 510	82	150 170 180
Naphthalene	2.3 5.6 13	2.3 5.6 13	4.1 10 24	190 460 1100	4900	1200 1900 3000
Phenanthrene	95 220 440	1300 1500 1500	15 38 90	2.2e+4 2.2e+4 2.3e+4	3100	6200 6200 6300
Pyrene	620 1200 2000	3700 3800 3800	110 270 620	5.4e+4	7400	1.5e+4

Screening Levels – Human Health (soil)

LQM/CIEH S4UL (except allotments)	**Residential**		**Allotments**	**Commercial**	**Public Open Space (residential)**	**Public Open Space (park)**
	With homegrown produce	**Without homegrown produce**				
	BTEX (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
Benzene	0.087 0.17 0.37	0.38 0.7 1.4	0.017 0.034 0.075	27 47 90	72 72 73	90 100 110
Toluene	130 290 660	880 (vap 869) 1900 3900	22 51 120	5.6e+4 (vap (869)) 1.1e+5 (vap (1920)) 1.8e+5 (vap (4360))	5.6e+4 5.6e+4 5.6e+4	8.7e+4 (vap (869)) 9.5e+4 (vap (1920)) 1.0e+5 (vap (4360))
Ethylbenzene	47 110 260	83 190 440	16 39 91	5700 (vap (518)) 1.3e+4 (vap (1220)) 2.7e+4 (vap (2840))	2.4e+4 2.4e+4 2.5e+4	1.7e+4 (vap (518)) 2.2e+4 (vap (1220)) 2.7e+4 (vap (2840))
m- & p-xylene	56 130 310	79 180 430	29 69 160	5900 1.4e+4 3.0e+4	4.1e+4 4.2e+4 4.3e+4	1.7e+4 2.3e+4 3.1e+4
o-xylene	60 140 330	88 210 480	28 67 160	6600 1.5e+4 3.3e+4	4.1e+4 4.2e+4 4.3e+4	1.7e+4 2.3e+4 3.3e+4
	Petroleum Hydrocarbons (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
TPH aliphatic EC>5-6	42 78 160	42 78 160	730 1700 3900	3200 5900 1.2e+4	5.7e+5 5.9e+5 6.0e+5	9.5e+4 1.3e+5 1.8e+5
TPH aliphatic EC>6-8	100 230 530	100 230 530	2300 5600 1.3e+4	7800 1.7e+4 4.0e+4	6.0e+5 6.1e+5 6.2e+5	1.5e+5 2.2e+5 3.2e+5
TPH aliphatic EC>8-10	27 65 150	27 65 150	320 770 1700	2000 4800 (vap (190)) 1.1e+4 (vap (451))	1.3e+4	1.4e+4 1.8e+4 (vap (190)) 2.1e+4 (vap (451))
TPH aliphatic EC>10-12	130 (vap (48)) 330 (vap (118)) 760 (vap (283))	130 (vap (48)) 330 (vap (118)) 770 (vap (283))	2200 4400 7300	9700 2.3e+4 (vap (118)) 4.7e+4 (vap (283))	1.3e+4	2.1e+4 2.3e+4 (vap (118)) 2.4e+4 (vap (283))
TPH aliphatic EC>12-16	1100 2400 4300	1100 2400 4400	1.1e+4 1.3e+4 1.3e+4	5.9e+4 8.2e+4 9.0e+4 [s]	1.3e+4	2.5e+4 2.5e+4 2.6e+4
TPH aliphatic EC>16-35	6.5e+4 9.2e+4 1.1e+5	6.5e+4 9.2e+4 1.1e+5	2.6e+5 2.7e+5 2.7e+5	1.6e+6 1.7e+6 1.8e+6	2.5e+5	4.5e+5 4.8e+5 4.9e+5
TPH aliphatic EC>35-44	6.5e+4 9.2e+4 1.1e+5	6.5e+4 9.2e+4 1.1e+5	2.6e+5 2.7e+5 2.7e+5	1.6e+6 1.7e+6 1.8e+6	2.5e+5	4.5e+5 4.8e+5 4.9e+5
TPH aromatic EC>5-7	70 140 300	370 690 1400	13 27 57	2.6e+4 4.6e+4 8.6e+4	5.6e+4	7.6e+4 8.4e+4 9.2e+4 [s]
TPH aromatic EC>7-8	130 290 660	860 1800 3900	22 51 120	5.6e+4 (vap (869)) 1.1e+5 1.8e+5 (vap (4360))	5.6e+4	8.7e+4 (vap (869)) 9.5e+4 1.0e+5 (vap (4360))
TPH aromatic EC>8-10	34 83 190	47 110 270	8.6 21 51	3500 (vap (613)) 8100 (vap (1500)) 1.7e+4 (vap (3580))	5000	7200 (vap (613)) 8500 (vap (1500)) 9300 (vap (3580))
TPH aromatic EC>10-12	74 180 380	250 590 1200	13 31 74	1.6e+4 2.8e+4 3.4e+4	5000	9200 9700 1.0e+4
TPH aromatic EC>12-16	140 330 660	1800 2300 2500	23 57 130	3.6e+4 3.7e+4 3.8e+4	5100 5100 5000	1.0e+4
TPH aromatic EC>16-21	260 540 930	1900	46 110 260	2.8e+4	3800	7600 7700 7800
TPH aromatic EC>21-35	1100 1500 1700	1900	370 820 1600	2.8e+4	3800	7800 7800 7900
TPH aromatic EC>35-44	1100 1500 1700	1900	370 820 1600	2.8e+4	3800	7800 7800 7900
	Phenols (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
Phenol	120 200 380	440 690 1200	23 42 83	440 690 1300	440 690 1300	440 690 1300
Chlorophenols (except pentachlorophenol)	0.87 2.0 4.5	94 150 210	0.13 0.30 0.70	3500 4000 4300	620	1100
Pentachlorophenol	0.22 0.52 1.2	27 (vap (16.4)) 29 31	0.03 0.08 0.19	400	60	110 120 120

Screening Levels – Human Health (soil)

LQM/CIEH S4UL (except allotments)	**Residential**		**Allotment**	**Commercial**	**Public Open Space (residential)**	**Public Open Space (park)**
	With homegrown produce	**Without homegrown produce**				
	Volatile Organic Compounds (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
1,2-Dichloroethane	0.0071 0.011 0.019	0.0092 0.013 0.023	0.0046 0.0083 0.016	0.67 0.97 1.7	29	21 24 28
1,1,1-Trichloroethane	8.8 18 39	9.0 18 40	48 110 240	660 1300 3000	1.4e+5	5.7e+4 vap (1425) 7.6e+4 vap (2915) 1.0e+5 vap (6392)
1,1,2,2-Tetrachloroethane	1.6 3.4 7.5	3.9 8.0 17	0.41 0.89 2.0	270 550 1100	1400	1800 2100 2300
1,1,1,2-Tetrachloroethane	1.2 2.8 6.4	1.5 3.5 8.2	0.79 1.9 4.4	110 250 560	1400	1500 1800 2100
Tetrachloroethene (PCE)	0.18 0.39 0.90	0.18 0.40 0.92	0.65 1.5 3.6	19 42 95	1400	810 1100 1500
Tetrachloromethane	0.026 0.056 0.13	0.026 0.056 0.13	0.45 1.0 2.4	2.9 6.3 14	890 920 950	190 270 400
Trichloroethene (TCE)	0.016 0.034 0.075	0.017 0.036 0.080	0.041 0.091 0.21	1.2 2.6 5.7	120	70 91 120
Trichloromethane (chloroform)	0.91 1.7 3.4	1.2 2.1 4.2	0.42 0.83 1.7	99 170 350	2500	2600 2800 3100
Chloroethene (vinyl chloride)	0.00064 0.00087 0.0014	0.00077 0.0010 0.0015	0.00055 0.0010 0.0018	0.059 0.077 0.12	3.5	4.8 5.0 5.4
Chlorobenzene	0.46 1.0 2.4	0.46 1.0 2.4	5.9 14 32	56 130 290	1.1e+4 1.3e+4 1.4e+4	1300 2000 2900
1,2-Dichlorobenzene	23 55 130	24 57 130	94 230 540	2000 4800 1.1e+4	9.0e+4 9.5e+4 9.8e+4	2.4e+4 3.6e+4 5.1e+4
1,3-Dichlorobenzene	0.4 1.0 2.3	0.44 1.1 2.5	0.25 0.6 1.5	30 73 170	300	390 440 470
1,4-Dichlorobenzene	61 150 350	61 150 350	15 37 88	4400 vap (224) 1.0e+4 vap (540) 2.5e+4 vap (1280)	1.7e+4	3.6e+4 vap (224) 3.6e+4 vap (540) 3.6e+4 vap (1280)
1,2,3-Trichlorobenzene	1.5 3.6 8.6	1.5 3.7 8.8	4.7 12 28	102 250 590	1800	770 vap (134) 1100 vap (330) 1600 vap (789)
1,2,4-Trichlorobenzene	2.6 6.4 15	2.6 6.4 15	55 140 320	220 530 1300	1.5e+4 1.7e+4 1.9e+4	1700 vap (318) 2600 vap (786) 4000 vap (1880)
1,3,5-Trichlorobenzene	0.33 0.81 1.9	0.33 0.81 1.9	4.7 12 28	23 55 130	1700 1700 1800	380 vap (37) 580 vap (91) 860 vap (217)
1,2,3,4-Tetrachlorobenzene	15 36 78	24 56 120	4.4 11 26	1700 vap (122) 3080 vap (304) 4400 vap (728)	830	1500 vap (122) 1600 1600
1,2,3,5-Tetrachlorobenzene	0.66 1.6 3.7	0.75 1.9 4.3	0.38 0.90 2.2	49 vap (39) 120 vap (98) 240 vap (235)	78 79 79	110 vap (39) 120 130
1,2,4,5-Tetrachlorobenzene	0.33 0.77 1.6	0.73 1.7 3.5	0.06 0.16 0.37	42 72 96	13	25 26 26
Pentachlorobenzene	5.8 12 22	19 30 38	1.2 3.1 7.0	640 770 830	100	190
Hexachlorobenzene	1.8 vap (0.2) 3.3 vap (0.5) 4.9	4.1 vap (0.2) 5.7 vap (0.5) 6.7	0.47 1.1 2.5	110 vap (0.2) 120 vap (0.5) 120	16	30
Carbon disulphide	0.14 0.29 0.62	0.14 0.29 0.62	4.8 10 23	11 22 47	1.1e+4 1.1e+4 1.2e+4	1300 1900 2700
Hexachlorobutadiene	0.29 0.7 1.6	0.32 0.78 1.8	0.25 0.61 1.4	31 66 120	25	48 50 51

Screening Levels – Human Health (soil)

	Pesticides (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
Aldrin	5.7 6.6 7.1	7.3 7.4 7.5	3.2 6.1 9.6	170	18	30 31 31
Dieldrin	0.97 2.0 3.5	7.0 7.3 7.4	0.17 0.41 0.96	170	18	30 30 31
Atrazine	3.3 7.6 17.4	610 620 620	0.50 1.2 2.7	9300 9400 9400	1200	2300 2400 2400
Dichlorvos	0.032 0.066 0.14	6.4 6.5 6.6	0.0049 0.010 0.022	140	16	26 26 27
Endosulfan	7.4 18 41	160 280 410	1.2 2.9 6.8	5600 7400 8400	1200	2400 2400 2500
HCH (including Lindane)	0.23 0.55 1.2	6.9 9.2 11	0.035 0.087 0.21	170 180 180	24	47 48 48
	Explosives (based on sandy loam soil with SOM 1%, 2.5% or 6%)					
2,4,6-Trinitrotoluene	1.6 3.7 8.1	65 66 66	0.24 0.58 1.40	1000	130	260 270 270
RDX	120 250 540	1.3e+4	17 38 85	2.1e+5	2.6e+4 2.6e+4 2.7e+4	4.9e+4 5.1e+4 5.3e+4
HMX	5.7 13 26	6700	0.86 1.9 3.9	1.1e+5	1.3e+4	2.3e+4 vap (0.35) 2.3e+4 vap (0.39) 2.4e+4 vap (0.48)

Assessment Criteria – Controlled Waters

Substance	EQS			DWS	Substance	EQS	DWS
List 1							
	Fresh	Estuary	Marine				
Mercury	1	0.5	0.3	1	Endrin	0.005	0.1
Cadmium	5	5	2.5	5	Total 'Drins	0.03	-
Hexachlorocyclohexane	0.1	0.02	0.02	-	Hexachlorobenzene	0.03	-
Carbon tetrachloride	12			-	Hexachlorobutadiene	0.1	-
Total DDT	0.025			0.5	Chloroform	12	-
pp DDT	0.01			-	1,2-dichloroethane	10	-
Pentachlorophenol	2			0.1	Trichlorethylene	10	-
Dieldrin	0.01			0.03	Perchlorethylene	10	-
Isodrin	0.005			0.1	Trichlorobenzene	0.4	-
Aldrin	0.01			0.03			
List 2							
1,1,1-Trichloroethane	100			-	Fenitrothion	0.01	0.1
1,1,2-Trichloroethane	400			-	Flucofuron	1	0.1
2,4-D (ester)	1			-	Iron	1000	200
2,4-D (non-ester)	40			-	Linuron	2	0.1
2,4-Dichlorophenol	20			-	Malathion	0.01	0.1
2-Chlorophenol	50			-	Mecoprop	20	0.1
4-Chloro-3-methyl-phenol	40			-	Mevinphos	0.02	0.1
Arsenic	50			10	Naphthalene	10	0.1
Atrazine &Simazine	2			0.1	Omethoate	0.01	0.1
Azinphos-methyl	0.01			0.1	PCSDs	0.05	0.1
Bentazone	500			0.1	Permethrin	0.01	0.1
Benzene	30			1	pH	6 - 9	6.5 - 10
Biphenyl	25			-	Sulcofuron	25	0.1
Boron	2000			1000	Toluene	50	0.1
Chloronitrotoluenes	10			-	Triazaphos	0.005	0.1
Cyfluthrin	0.001			0.1	Tributyltin	0.02	0.1
Demeton	0.5			0.1	Trifluralin	0.1	0.1
Dichlorvos	0.001			0.1	Triphenyltin	0.02	0.1
Dimethoate	1			0.1	Xylene (m and p, o)	30	-
Endosulphan	0.003			0.1	TPH	30	10

List 2 (hardness related)							
Hardness (mg/l $CaCO_3$)	0-50	>50 -100	>100 -150	>150 -200	>200 -250	>250	
Suitable for all fish							
Copper	1	6	10	10	10	28	2000
Nickel	50	100	150	150	200	200	20
Vanadium	20	20	20	20	60	60	-
Suitable for salmonid (game) fish							
Chromium	5	10	20	20	50	50	50
Lead	4	10	10	20	20	20	25
Zinc	8	50	75	75	75	125	-
Suitable for Cyprinid (coarse) fish							
Chromium	150	175	200	200	250	250	50
Lead	20	125	125	250	250	250	25
Zinc	75	175	250	250	250	500	-

Other Compounds			
Acrylamide	0.1	Tetrachloroethene and Trichloroethene	10
Antimony	5	Trihalomethanes(ii)	100
Benzo(a)pyrene	0.01	Vinyl chloride	0.5
Bromate	10	Aluminium	200
Cyanide	50	Iron	200
1, 2-dichloroethane	3	Manganese	50
Epichlorohydrin	0.1	Sodium	200
Fluoride	1.5	Tetrachloromethane	3
Heptachlor	0.03	Ammonium	0.5 mg/l
Heptachlor epoxide (iii)	0.03	Nitrate	50 mg/l
Other pesticides	0.1	Nitrite	0.5 mg/l
Pesticides (total)	0.5	Chloride	250 mg/l
PAHs(i)	0.1	Sulphate	250 mg/l
Selenium	10	TPH (1989 Regs)	10

Notes:
i. Specified compounds are benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]-perylene, indeno[1,2,3-c,d]pyrene.
ii. Specified compounds are chloroform, bromoform, dibromochloromethane, bromodichloro-methane.

Unless stated otherwise all units µg l^{-1}

Assessment Criteria –Water Supply Pipes

Substance [1]	WRAS (withdrawn)	Anglian Water	UK WIR	
			PE	PVC
Organic compounds				
TPH	50	50 – 1000 [2]	-	
TPH >C5-C10	-	-	2	1.4
TPH >C11-C20	-	-	10	NL
TPH >C21-C40	-	-	500	NL
Extended VOC suite	-	-	0.5	0.125
Extended SVOC suite	-	-	2	1.4
BTEX + MTBE	-	-	0.1	0.03
Chlorinated hydrocarbons				
Dichloromethane	-	1	-	-
1,2-dichloroethane	-	0.2	-	-
1,1,1-trichloroethane	-	8	-	-
1,2-dichloropropane	-	0.1	-	-
Tetrachloromethane	-	0.15	-	-
Trichloroethene	-	1.5	-	-
Tetrachloroethene	-	0.5	-	-
Vinyl chloride	-	0.1	-	-
Methyl bromide	-	10	-	-
Total	-	7	-	-
Aromatic hydrocarbons				
Benzene	-	0.5	0.1	0.03
Ethylbenzene	-	0.5	0.1	0.03
Trimethyl benzene	-	0.1	-	-
Propylbenzene	-	2	-	-
Toluene	-	0.25	0.1	0.03
Xylenes	-	0.5	0.1	0.03
Phenol	5	1	2	0.4
Cresol	-	1	2	0.04
Total	-	7	-	-
Chlorinated phenols				
Chlorophenols	-	0.5	-	-
Dichlorophenols	-	0.5	-	-
Trichlorophenols	-	0.5	-	-
2,4,6-trichlorophenol	-	0.5	-	-
Pentachlorophenol	-	0.5	-	-
Total	-	1	2	0.04
Chlorinated aromatic hydrocarbons				
Chlorobenzene	-	0.5	-	-
Dichlorobenzene	-	0.5	-	-
Trichlorobenzene	-	0.5	-	-
Pentachlorobenzene	-	0.5	-	-
Total	-	1	-	-
Polyaromatic hydrocarbons				
Naphthalene	-	5	-	-
Anthracene	-	10	-	-
Phenanthrene	-	10	-	-
Fluoranthene	-	10	-	-
Pyrene	-	10	-	-
Benzo[a]pyrene	-	1	-	-
Total	50	20	2	1.4
Other organic compounds				
Tetrahydrafurane	-	4	-	-
Styrene	-	5	-	-
Pyridine	-	2	-	-
Ethers	-	-	0.5	1
Nitrobenzene	-	-	0.5	0.4
Ketones	-	-	0.5	0.02
Aldehydes	-	-	0.5	0.02
Amines	-	-	Detected	NL

Notes:
1. All units mg/kg in soil.
2 The threshold for TPH is 1000mg/kg provided no other organic compounds are present. If the TPH level exceeds 50mg/kg then the sum of TPH plus other organic compounds must not be greater than the upper threshold. If the other compounds are not tested for then the threshold for TPH must be set at the lower threshold.
3. All UKWIR TV's (except BTEX and MTBE) are based on taste and odour detection threshold.
4. PE – polyethylene; PVC – polyvinyl chloride

Appendix G

Defining Risk

Identification of Unacceptable Risk

The method for risk evaluation is qualitative and is developed from the model provided in CIRIA C552 *Contaminated Land Risk Assessment – a guide to good practice* (DETR 2001). It involves classifying risk in terms of (a) magnitude of the potential consequence (severity) of occurrence and (b) the probability (likelihood) of occurrence. The risk rating derived is used to determine what action, if any, is needed to further investigate that risk and/or remediate to reduce risk to an acceptable level.

Task 1: Classification of Consequence

Classification	Definition	Examples
Severe	• Short-term (acute) risk to human health likely to result in "significant harm" (as defined in EPA90 Part 2a). • Short-term (acute) risk of pollution of sensitive water resource. • Short-term (acute) risk to an ecosystem, or organism forming part of an ecosystem.	Unusually high concentration of toxic substance on the surface of a garden or recreation area. Major spillage of contamination from the site into controlled waters. EA Category 1 pollution incident. Closure of an abstraction point. Explosion, causing building collapse (and death if occupied).
Medium	• Chronic damage to human health likely to result in "significant harm". • Pollution of sensitive water resource. • Significant change in a particular ecosystem, or organism forming part of such ecosystem.	Concentration of contaminant from site exceeds generic or site-specific assessment criteria for human health or water supply pipes. Presence of asbestos. Leaching of contaminants from a site to a principal or secondary (A) aquifer. Concentration exceeds DWS or EQS in Inner Source Protection Zone (SPZ1). EA Category 2 pollution incident. Death of a species or loss of habitat within an area of national importance.
Mild	• Exposure is unlikely to result in "significant harm" to human health. • Pollution of non-sensitive water resource. • Damage to sensitive buildings, structures and services or the environment.	Concentration of contaminant from site below generic or site-specific assessment criteria. Pollution of secondary (B or undifferentiated) aquifer. EA Category 3 pollution incident. Damage to a building rendering it unsafe to occupy. Death of a species or loss of habitat within an area of local importance. Loss of plants in garden or landscape areas (BS3882 limits exceeded).
Minor	• Harm (but not significant harm) resulting in a financial loss or expenditure to resolve. • Non-permanent human health effects. • Easily repairable damage to buildings, structures and services.	Pollution of unproductive strata.

Task 2: Classification of Probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term or there is actual evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur in the very long term.

Task 3: Risk Estimation

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	**Very high risk**	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Low risk	Low risk
	Low Likelihood	Moderate risk	Low risk	Low risk	Very low risk
	Unlikely	Low risk	Low risk	Very low risk	Very low risk
	No linkage	No risk			

Task 4: Description of the Estimated Risks and Likely Action Required

Risk	Action
Very high risk	There is a high probability that severe harm could arise or there is evidence that severe harm is currently happening. This risk, if realised, is likely to result in substantial liability. **Urgent investigation and remediation are required for the site in its existing state and for development.**
High risk	Harm is likely to arise. Realisation of the risk is likely to present a significant liability. **Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term. Remediation will be required for development.**
Moderate risk	A potential linkage is identifiable. However, it is either relatively unlikely that harm would be severe or, if any harm were to occur, it is more likely that the harm would be relatively mild. **Investigation is required to quantify the risk and determine potential liability. Remediation will be required for development.**
Low risk	It is possible that harm could arise but it is likely that this harm, if realised, would at worst normally be mild. **Investigation is not normally required but could be useful to confirm a preliminary assessment. Remedial works are unlikely to be required or will be limited.**
Very low risk	There is a low possibility that harm could arise. In the event of such harm being realised it is not likely to be severe. Site is not capable of being determined under Part 2a. **No further action recommended.**