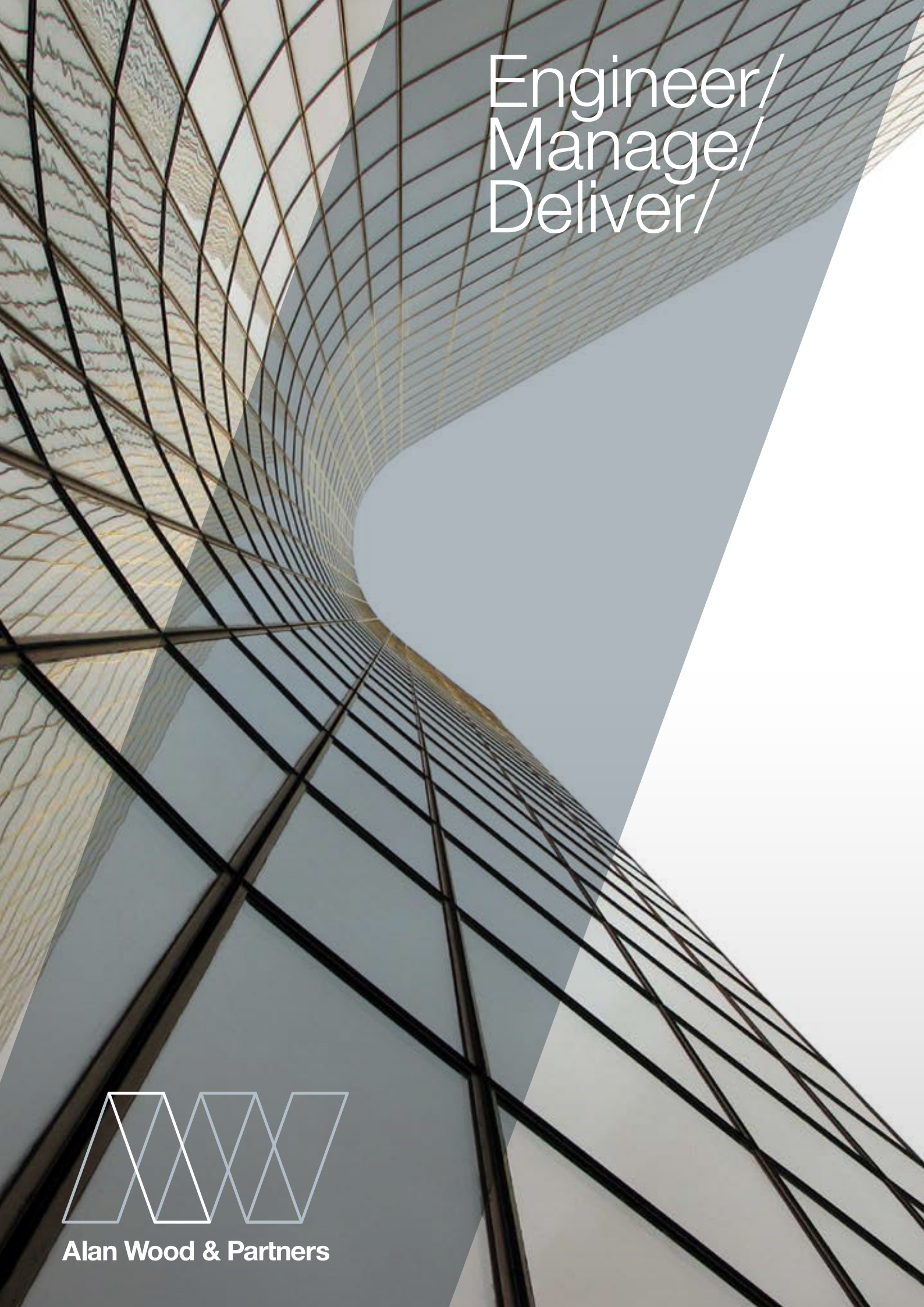


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PHASE II GEO-ENVIRONMENTAL INVESTIGATION REPORT

For

Various Sites, Royston

Project Reference: JMS/DA/40400-Rp-001

Prepared by: D. Ashton, *Mgeosci*

Signed: .....

Date: 12th February 2018

Approved by: J. M. Saunders, BSc (Hons), MSc (Eng), CEng, MIMMM, FGS

Signed: .....

Date: 12th February 2018

Issue	Revision	Revised by	Approved by	Revised Date

For the avoidance of doubt, the parties confirm that these conditions of engagement shall not and the parties do not intend that these conditions of engagement shall confer on any party any rights to enforce any term of this Agreement pursuant of the Contracts (Rights of third Parties) Act 1999.
The Appointment of Alan Wood & Partners shall be governed by and construed in all respects in accordance with the laws of England & Wales and each party submits to the exclusive jurisdiction of the Courts of England & Wales

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40400/002 **SITE LOCATION PLAN – MANOR GROVE**

40400/002 **SITE LOCATION PLAN – WEST END AVENUE**

40400/006 **SITE LOCATION PLAN – DOLES CRESCENT**

40400/003	**GROUND INVESTIGATION LOCATION PLAN – MEADSTEAD DRIVE**
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APPENDICES

APPENDIX A: HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – MEADSTEAD DRIVE – 23-24-18-1-6006/DSR3 – JULY 2017

APPENDIX B: HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – MANOR GROVE – 23-24-18-1-6006/DSR2 – JUNE 2017

APPENDIX C: HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – WEST END AVENUE – 23-24-18-1-6006/DSR1 – JUNE 2017

APPENDIX D: HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – DOLES CRESCENT – 23-24-18-1-6007/DSR1 – JULY 2017

APPENDIX E: GROUND INVESTIGATION LOGS

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APPENDIX H: AWP GENERIC ASSESSMENT CRITERIA

EXECUTIVE SUMMARY

Site Location & Description	The report covers 4 no. sites within the south western portion of Royston, Barnsley. These can be found off Meadstead Drive, Manor Grove, West End Avenue and Doles Crescent. Meadstead Drive and Manor Grove are currently unused grassed land, while West End Avenue and Doles Crescent are used as private standalone garages with associated access.
Historical Land Use	Meadstead Drive has remained as open undeveloped land since the earliest available OS map. Manor Grove remained as undeveloped land until c. 1970's when 2 no. structures were constructed on site which were later demolished between 2002 and 2010. Both West End Avenue and Doles Crescent remained as undeveloped land until c. 1970's when the current standalone garages were constructed.
Geology	The geology of all 4 no. sites comprised no superficial deposits over the Mexborough Rock of the Pennine Middle Coal Measures.
Hydrogeology	The bedrock is classified as a 'Secondary A' aquifer.
Mining Assessment	No voids or disturbed ground was encountered within any of the constructed boreholes therefore the risk from shallow coal workings is considered to be low
Geotechnical Assessment	Encountered ground conditions typically comprised either a sandy, gravelly clay or a clayey, gravelly sand over weathered Pennine Middle Coal Measures. Made ground deposits were encountered on Manor Grove and Doles Crescent these typically comprised demolition rubble recovered as either a sandy, gravelly clay or a sand and gravel.
Environmental Assessment	Elevated organic contaminants were encountered on 2 no. of the 4 no. sites these being Manor Grove and Doles Crescent. The elevated contaminants were encountered either within the topsoil or near surface made ground deposits and are likely to be removed as part of the site preparation works, therefore risk to human health is considered to be low.
Foundations	It is considered, where competent undisturbed natural strata is encountered at founding depth that, for structures of typical construction, shallow strip or trench-fill foundations should be suitable. A minimum footing depth of 750mm for sites 2 – 4 and 1000mm for site 1 will be appropriate when in cohesive soils and outside the zone of influence of trees. Footings will need to be deepened in accordance with NHBC Standards within the zone of influence of existing or proposed trees.
Ground Slabs	Ground bearing slabs could be used where ground conditions allow and no precautionary measures associated with soft and unstable soils are required. A suspended floor system incorporating a sub-floor void, such as beam and block, will be required for all structures where the foundations lie within the heave zone of trees as defined by NHBC Standards (Chapter 4.2), or where seasonally desiccated soils are present at the time of construction. Suspended floor slabs would also be needed where in excess of 600mm of unsuitable material (made ground) is present below floor slabs following site preparation/regrading.
Precautions near Trees	There are several trees around the boundaries of Site 1, so precautions are likely to be required where structures lie within influencing distance given the underlying (clay) ground conditions that prevail on Site; this will

	be subject to a tree survey and plot specific foundation schedule. Precautions are unlikely to be required on the remaining given the predominantly granular nature of the underlying deposits.
Drainage	4 no. soakaways were undertaken, none of which sufficiently drained away in order to undertake the calculations. Therefore soakaways are not considered to be suitable for use on sites.
Sulphate	Design Sulphate classification of DS-1 should be suitable along with an ACEC class of AC-1s. Where made ground is encountered and is to remain on site, DS2 sulphate precautions may need to be adopted.
Potable Water Supplies	Risk to potable water supply pipes is considered to be low. On the basis of available test results, it is unlikely that protective measures will be required. Consultation should however be undertaken with the local water authority with respect to any precautions they may require, prior to construction.
Obstruction & Excavations	Localised obstructions to excavations or shallow hard rock are not anticipated given the geology and lack of previous development.
Boundary Conditions	Where excavations are proposed close to site boundaries and there is the possibility of weak/unstable ground passing across that boundary and beneath adjacent structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability where necessary.
Roads	On the basis of visual observation, it is considered that the near surface soils are likely to have a minimum CBR value of around 2-3%, perhaps higher, but this should be confirmed.
Further Works	Tree Survey; and Plot specific foundation design.

NB. The Executive Summary presented above is an overview of the key findings and conclusions of the report. There may be other information contained within the body of the report which puts into context the findings of the Executive Summary. No reliance should therefore be placed on the Executive Summary until the report as a whole has been read in full.

1 INTRODUCTION

1.1 Appointment

1.1.1 Alan Wood and Partners were appointed by NPS Barnsley (the 'Client') to undertake a Phase I/II geo-environmental investigation of 4 no. parcels of land located within Royston, Barnsley. The 4 no sites are known as Meadstead Avenue (Site 1), Manor Grove (Site 2), West End Avenue (Site 3) and Doles Crescent (Site 4), these are all situated within the south eastern portion of Royston.

1.1.2 The report has been prepared for the sole use and reliance of NPS Barnsley. No other third party may rely on, reproduce or redistribute any content of this report without the prior written consent of Alan Wood and Partners. Any unauthorised third parties using the information presented in this report do so entirely at their own risk and are duly excluded from any warranty, duty of care or skill.

1.2 Development Proposals

1.2.1 It is understood that the site is to be redeveloped for ‘residential with plant uptake’ comprising bungalows with associated parking and soft landscaping. A proposed preliminary development layout was provided to Alan Wood and Partners for all 4 no. sites and are appended to this report.

1.3 Report Status

1.3.1 The geo-environmental investigation of the site has been carried out in two phases. These works have comprised the review of a Phase I preliminary assessment (desk-based study) undertaken by Hamson Barron Smith in July 2017 and a subsequent Phase II (intrusive) investigation, the results of which are presented in this report.

1.3.2 The Phase I assessment consisted of a study of information surrounding the site's geo-environmental setting and that provided by the Environment Agency, Groundsure, the British Geological Survey and the Coal Authority, so that an initial Conceptual Site Model (CSM) and Risk Assessment (RA) could be completed. The scope of the intrusive investigation was formulated based on information obtained from the Phase I assessment.

1.4 Objectives of the Investigation

1.4.1 The scope of works undertaken as part of this appraisal was to:

- Carry out a physical inspection of the site (walkover survey):
- Review any pre-existing documentation relating to ground conditions (geotechnical and environmental);
- Investigate the ground conditions present on-site and identify their geotechnical properties in relation to the site's proposed end use;
- Investigate the presence of any shallow ground workings;
- Investigate the hydrogeological regime beneath the site wherever possible;
- Investigate the potential risks to the development from hazardous ground gas sources (to be reported under separate cover);
- Identify the nature and concentration of any contamination within the on-site soils and undertake a tiered risk assessment to establish likely risks to sensitive receptors. Defining a Conceptual Site Model of potential contaminant linkages relevant to the proposed redevelopment of the site;
- Carry out *in-situ* permeability tests to assess the potential for soakaway use at the site;
- Provide preliminary advice in relation to any environmental or geotechnical issues associated with the site including foundation recommendations and other recommendations needed to facilitate the proposed redevelopment, including, where necessary, identifying any additional phases of work or remediation that need to be carried out.

1.5 Site Works

1.5.1 The findings and recommendations given in this report are based on fieldwork undertaken between the 15th January and the 17th January 2018 and the 7th February and the 8th February, this comprising 8 no. mechanically excavated trial

pits, 4 no. in-situ permeability tests, 12 no. windowless sampler boreholes and 7 no. rotary openhole boreholes.

1.6 Limitations of Study

1.6.1 This report presents factual and interpretative geotechnical and environmental information, along with provisional construction proposals and recommendations relevant to the objectives of the investigation for the site end-use given above. The report has been prepared for the titled project and Alan Wood and Partners can accept no responsibility or liability for the consequences of the use of this document, wholly or in part, for any other purpose than that for which it was commissioned.

1.6.2 For the purposes of this report and thus defining risk to the proposed development from an environmental point of view, a 'residential with plant uptake' end use scenario has been adopted. Interpretation and recommendations should not be assumed valid for alternate land uses. Where the proposed site usage changes, the findings of this report should be re-assessed to accommodate the change in proposed end-use.

1.6.3 The conclusions and recommendations presented in this report are based on site-specific information obtained during the desk study, ground conditions encountered and laboratory analysis and are considered reasonable on the basis of available information at the time the assessment was carried out. They should not necessarily be relied upon to represent site conditions at a substantially later date.

1.6.4 The findings and opinions provided in this report are given in good faith and are subject to the limitations and constraints imposed by the methods and information sources described. Factual information has been obtained from a variety of sources. Alan Wood and Partners assumes that third party data is reliable but has not independently confirmed this. The validity and accuracy of this information is therefore outside the control of Alan Wood and Partners. Professional judgement and experience is however used to ensure that uncertainties are reduced to a level appropriate to the site conditions, the purpose of the investigation and the resources devoted to it by the Client.

1.6.5 Whilst every effort has been made to carry out an assessment that enables a realistic characterisation of the geotechnical and environmental parameters at the site, the possibility of significant spatial variation in actual ground, groundwater and environmental (gas and contamination) conditions existing between or beyond

exploratory hole locations cannot be discounted. Where information or opinion is given this is for guidance only. Further information, ground investigation, construction activities, change of site use or the passage of time may reveal conditions that were not indicated in the data and therefore could not have been considered in the preparation of this report. Where such information might impact upon stated opinions, Alan Wood and Partners cannot accept responsibility for conditions not encountered and reserves the right to modify or retract the opinions expressed in this report. Where opinions expressed are based on current available guidelines and legislation, no liability can be accepted by AWP for the effects of any future changes to such guidelines and legislation. New information of improved practices and changes in legislation may require reinterpretation of the report as a whole, or in part.

1.6.6 This report does not constitute an archaeological or ecological assessment, nor does it constitute an asbestos inspection. A suitably qualified consultant should be consulted where these aspects of work are required.

1.6.7 A flood risk assessment in accordance with Planning Policy Statement 25, Development and Flood Risk (2010) has not been undertaken as part of this commission.

1.6.8 All ground investigation works and soil descriptions were undertaken in general accordance with BS EN ISO 14688-1 ‘Geotechnical Investigation and Testing – Identification and Classification of Soil’ (2002), BS10175 (2011), BS 5930 (2010) and/or BS EN 1997-1:2004 (Part 1, General Rules) and BS EN 1997-2:2007 (Part 2, Ground Investigation and Testing).

2 SITE DETAILS AND DESCRIPTION

2.1 Introduction

2.1.1 Published environmental, geological and historical data relating to the site area has been reviewed, in conjunction with a walkover survey undertaken on 15th January 2018, the findings of which are presented below. The principal considerations of immediate relevance are presented in the following sections.

2.2 Site Location & Description

Meadstead Drive

2.2.1 The site is located off Meadstead Drive, Royston, Barnsley and is centred at approximate National Grid Reference (NGR) 435662, 411397. A site location plan is presented as Figure 40400/001. The site is roughly rectangular in plan with an approximate area of 0.26 hectares (0.64 acres).

2.2.2 The site was noted to slope gently from the north to south and is of a similar level to that of the surrounding land.

2.2.3 The site was noted to be predominantly covered by rough unmaintained vegetation with a compact gravel access track running along the western site boundary. This access track was noted to be the only access for the site and can be accessed from Meadstead Drive. The access track was noted to supply garages to the council houses to the west.

2.2.4 The eastern, southern and western boundaries were denoted by wooden fencing with the western boundary containing several gates to allow access to the neighbouring garages. The northern boundary had no discernible boundary between the open land to the north and the site.

Manor Grove

2.2.5 The site is located off Manor Grove, Royston, Barnsley and is centred at approximate National Grid Reference (NGR) 435494, 411380. A site location plan is presented as Figure 40400/002.

2.2.6 The site is noted to be irregular in plan with an approximate area of 0.25 hectares (0.62 acres).

2.2.7 The site was noted to be relatively flat and is of a similar level to that of the surrounding land.

2.2.8 The site was noted to be covered by grass with a tarmac footpath along the eastern site boundary. The site can be accessed from Manor Grove. A large depression was noted within the centre of the site which appeared to line up with known services therefore it was considered to be a collapsed manhole or service trench.

2.2.9 The northern, eastern and western boundaries were denoted by brick walls. The southern boundary was denoted by Manor Grove.

West End Avenue

2.2.10 The site is located off West End Avenue, Royston, Barnsley and is centred at approximate National Grid Reference (NGR) 435437, 411343. A site location plan is presented as Figure 40400/002.

2.2.11 The site is noted to be roughly square in plan with an approximate area of <0.10 hectares (0.13 acres).

2.2.12 The site was noted to slope gently from the north east to south west and is of a similar level to that of the surrounding land.

2.2.13 The site was noted to be covered by grass on the eastern portion of the site with the western portion comprising standalone garages with a tarmac access track running north – south through the centre of the site. The garage roofs were constructed of a corrugated material which is suspected to be an asbestos containing material (ACM). The site can be accessed off West End Crescent to the north.

2.2.14 The southern and western boundaries were denoted by a wooden fence. The northern boundary was denoted by West End Crescent with the eastern boundary being denoted by West End Avenue.

Doles Crescent

2.2.15 The site is located off Doles Crescent, Royston, Barnsley and is centred at approximate National Grid Reference (NGR) 435506, 411247. A site location plan is presented as Figure 40400/006.

2.2.16 The site is noted to be roughly square in plan with an approximate area of 0.05 hectares (0.12 acres).

2.2.17 The site was noted to be relatively flat and is of a similar level to that of the surrounding land.

2.2.18 The site was noted to be predominantly covered by hard standing comprising tarmac and concrete slabs. Areas of soft landscaping were noted within south eastern, north western and south western corners of the site. Remnant concrete floor slabs were noted along the southern site boundary likely relating to former stand-alone garages. The garage roofs were constructed of a corrugated material which is suspected to be an asbestos containing material (ACM). The site can be accessed via Doles Crescent to the east of the site.

2.2.19 The northern site boundary is denoted by wooden fencing between concrete posts, with the southern boundary being denoted by a brick wall. The western site boundary is denoted by a mixture of wooden fencing and metal palisade fencing. The eastern site boundary is denoted be Doles Crescent.

3 REVIEW OF HAMSON BARRON SMITH (HBS) REPORT 23-24-18-1-6006/DSR3 JULY 2017 – MEADSTEAD DRIVE

3.1 Anticipated Geology, Hydrogeology & Mining

3.1.1 A summary of the available published geological, hydrogeological and environmental information is provided in Table 3.1 and 3.2 below and overleaf. A review of the following information was undertaken:

- British Geological Survey 1:50,000 scale series, Sheet 80 (Barnsley), Solid & Drift Edition;
- British Geological Survey on-shore borehole records database;
- Coal Authority database on coal mining reporting areas from the following web pages:
  - http://coal.decc.gov.uk/en/coal/cms/publications/data/map;
  - http://coal.decc.gov.uk/en/coal/cms/services/planning/strategy;
- Environment Agency online aquifer designation database; and
- Hamson Barron Smith report 23-24-18-1-6006/DSR3 July 2017 – Meadstead Drive – Appendix A.

Table 3.1 - General Geological Information

Made Ground	No made ground recorded as being present on site.
Superficial and Solid Geology	There are no superficial deposits recorded as being present on site. Bedrock is recorded as being Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Hydrogeology	With respect to site specific information presented on the Environment Agency's website and Groundsure report, the following has been identified: **Superficial Deposits:** N/A **Bedrock:** 'Secondary A' aquifer. **Source Protection:** The site doesn't within a source protection zone.
Hydrology	The nearest water course is situated 295m to the south east and is recorded as being a tertiary river.
Radon	The site lies in an area where **basic** radon protection measures are required.
Coal Mining	HBS obtained a coal mining report for the site as well as a SYMAS report. These indicated the site to be underlain by 6 no. worked seams from a depth of between 280m and 560m, last worked in 1980. It states therefore any movement in the ground due to coal mining activity should have stopped. It states there are no known mine entries within 20m of the site and the site does not lie within the boundary of an opencast site. The SYMAS report indicates the Royston coal seam to outcrop to the south of the site, therefore is anticipated at a shallow depth beneath the site. However, is states the seam is rarely worked

	historically, therefore the likelihood of encountering historic ground workings is considered to be low.
Natural Cavities	The site is not considered to be at risk from natural cavities.

Table 3.2 - Environmental Data

Discharge Consents	There are 2 no. recorded discharge consents within 500m of the site boundary. The nearest of which 413m to the south east of the site relating to sewage discharge into the Boulderbridge Dyke.
Pollution Incidents to Controlled Waters	1 no. pollution incident has been recorded within 250m of the site this being 152m to the north west of the site. This related to inorganic chemicals causing a category 3 (minor) impact to air on the 3rd December 2001.
Landfill Sites, Waste Management / Transfer / Treatment and Disposal Sites	There are no landfill sites or waste management sites within 500m of the site boundary.
Flood	The site does not lie within 250m of a zone 2 or 3 floodplain.
Groundwater and Surface Water Abstractions	There are no ground or surface water abstractions within 1km of the site boundary.
Public Register of Contaminated Land: Part 2A (EPA 1990)	There are no Part 2A sites within 500m of the site boundary.
Invasive Plant Species	No invasive weeds were noted during the site walkover; however, the site was noted to be largely overgrown.

3.2 Historical Land Use

3.2.1 HBS undertook a study of historical Ordnance Survey maps had been undertaken to identify any potentially contaminative former land-uses at the site. The main historical features of the site and surrounding area are summarised below.

3.2.2 The site has remained as undeveloped agricultural land, including pasture land, until present day.

3.2.3 The surrounding land use was found to be typically undeveloped farmland becoming a mixture of agricultural and residential properties. A former pond was noted 250m west of the site and was shown to be backfilled c. 1930.

3.2.4 Ordnance Survey map editions may not however be complete and it is possible, therefore, that additional land uses to those presented in the plans have occurred.

3.3 Phase I Geotechnical Appraisal

3.4 Made Ground

3.4.1 The site has remained under agricultural end use until present day, however the surrounding areas have undergone several phases of re-development therefore made ground deposits may be encountered although the likelihood is considered to be low.

3.4.2 The presence, type and extent of any made ground soils will need to be established through ground investigation.

3.5 Natural Strata

3.5.1 There are no superficial deposits recorded as being present on site.

3.5.2 The underlying solid geology is recorded as being the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measure. These typically comprise Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams.

3.6 Groundwater

3.6.1 No significant perched groundwater is anticipated, although some percolating waters may be encountered where more granular soil horizons exist within the overlying deposits.

3.6.2 True groundwater will be present within the underlying sandstone bedrock at depth.

3.7 Stability Issues

3.7.1 HBS noted the site to slope gently from north to south and stated no particular risk in relation to slope instability should occur on site, but consideration will need to be given to boundaries that are raised and where near surface material type has not yet been characterised. Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.

3.7.2 Where changes in gradient result across the site these will need to be adjusted by minor earthworks. It is anticipated that future ground profiles are unlikely to require earth retaining structures; if this changes, further advice may be required when more information is available.

3.7.3 With respect to natural ground subsidence, the site has been classified as having a 'Negligible' risk rating for running sand hazards, ground dissolution hazards, compressible deposits and a 'Very Low' risk rating for landslides, collapsible deposits and shrink/swell clay.

3.7.4 Made ground deposits, where present, are anticipated to be unstable. Stability issues should also be anticipated within any near surface natural deposits, particularly where these are soft or weak or have been exposed to periods of heavy rainfall.

3.8 Coal Mining Induced Subsidence

3.8.1 The site is known to be underlain by 6 no. worked seams at depths of between 280m and 560m, any movement in the ground due to coal mining activity should have ceased.

3.8.2 It is considered unlikely that foundations will need to be reinforced / strengthened to accommodate any potential movement associated with historic coal mining activity and any ground instability that may occur post development.

3.9 Excavation Conditions

3.9.1 No excavation problems are anticipated. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

3.9.2 It is likely that excavations should be relatively stable in the short term. However, some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support or battering of excavation sides.

3.9.3 It is considered unlikely that dewatering will be required for shallow short-term excavations. Anticipated groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) are likely to be adequate to control water ingress on a routine basis. However, it is recommended that provision for the drainage of surface water is allowed for to prevent surface water ponding or collection both during and post construction, as this may lead to deterioration of the founding stratum.

3.10 Phase I Environmental Assessment

3.11 Introduction

3.11.1 The following section summaries the Preliminary Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third-party information. The CSM summarises the understanding of surface and sub-surface features, the potential sources of contamination, pathways and receptors in order to support the identification and assessment of plausible contaminant linkages.

3.12 Initial Conceptual Site Model & Risk Assessment

3.12.1 The risk assessment has been carried out to assess the likelihood of risk to human health and the wider environment, on the basis of information reviewed. The risk

assessment is a qualitative source-pathway-receptor assessment and its function is to assess the likelihood that each possible linkage exists and to decide whether they pose potentially unacceptable risks to identified receptors (i.e. people, structures, water bodies or ecosystems) that may be harmed.

3.12.2 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is dependent on-site use, as well as environmental conditions: if no contaminant linkage(s) can be proven, then the risk(s) may be discounted.

3.13 Site Summary & Environmental Sensitivity

3.13.1 A review of available desk study information indicates that the proposed development area and the adjacent land were largely under agricultural and low rise residential. Currently the site appears to be used as open pasture.

3.13.2 The underlying geology is indicated to comprise the Mexborough Rock of Pennine Middle Coal Measures.

3.13.3 Some perched/shallow groundwater may be present within the near surface granular deposits, but this is likely to be localised.

3.13.4 It is considered possible that elevated concentrations of CO2 and CH4 may be present as a result of landfilling to the west, and possible coal deposits situated underneath the site. On this basis, it was considered prudent to assess the potential for fugitive ground gas migration through a period of monitoring appropriate to the site's proposed end use.

3.13.5 Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos contaminants and fuel oil/diesel/petrol are not anticipated however.

3.13.6 The potential leaching of mobile contaminants of concern to the underlying sandstone aquifer is considered to be low, given the lack of previous development on site.

3.13.7 In summary, given the site history, the anticipated contaminant load within the on-site soils, its underlying geology, gassing potential and the nature of controlled waters receptors, sensitivity of the site is considered, at this stage, to be low. The nature and concentration of any contamination will need to be confirmed through testing.

3.14 Potential Sources

3.14.1 A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause pollution of controlled waters'.

3.14.2 The following potential contaminants that may be associated with the site are summarised in Table 3.3 below.

Table 3.3 - Summary of Potential Contaminant Sources

Potential Sources	**Associated Potential Contaminants** (*not limited to*)	
	Metals, inorganics and other contaminants	*Organics*
Potentially contaminated made ground soils originating from previous development within the vicinity of the site and/or perched groundwater	Heavy metals/metalloids, phytotoxic contaminants, sulphate,	PAH
Fugitive ground gases	CO_2 and CH_4	

3.15 Summary of Potential Receptors

3.15.1 A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused.

3.15.2 The potential sensitive receptors with respect to the potential contamination hazards identified above are considered below.

Table 3.4 - Summary of Potential Receptors

Potential Receptor	**Comment**
Human Health	Site end-users Site operatives (during construction phase only)
Construction	Potable water supply pipes
	Foundations

Underlying natural strata	Near surface soils and/or any perched groundwater

3.16 Plausible Pathways

3.16.1 Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows in Table 3.5 below.

Table 3.5 - Summary of Plausible Pathways

Potential Source	Pathway
Potentially contaminated made ground soils, perched groundwater / surface water ditches	Direct ingestion, dermal contact, dust and/or vapour inhalation
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with foundations and potable water supply pipes. Lateral migration of contaminants through preferential pathways
Ground gases	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or underlying permeable natural strata

3.17 Risk Assessment

3.17.1 The potential contaminant linkages listed above are based on available data and the features noted during the 'walkover'. Therefore, the linkages identified are tentative in nature and are subject to the following uncertainties (to be followed up through ground investigation):

- Nature and extent of the made ground at the site;
- Nature of the underlying natural strata at the site;
- The actual distribution of contaminants within the made ground and underlying natural soils;
- The hydrogeological regime beneath the site.

3.17.2 The assessment presented herein assumes that the site end-use is to be 'residential with plant uptake' The assessment is not valid for other land uses. Should the proposed end-use of the site change, the assessment contained herein would need to be revised to accommodate this.

3.17.3 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA publication C552 'Contaminated Land Risk Assessment: A Guide to Good Practice', 2001.

3.17.4 Risk is regarded as a combination of the likelihood of an 'event' occurring and its severity: both elements must be taken into account when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA C552:2001, the magnitude of the potential 'severity' of risk occurring may be assessed against:

- **Severe**: short term risk to human health likely to result in significant harm as defined under EPA 1990, Part IIA. Short term risk of pollution to sensitive water receptor;
- **Medium**: significant harm to human health, pollution of sensitive water resource or significant change to an ecosystem or specific organism;
- **Mild**: pollution of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment;
- **Minor**: harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures and services.

3.17.5 Similarly, the classification of the magnitude of the 'probability' of the risk occurring may be assessed against:

- **High Likelihood**: a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or pollution is causing harm at the receptor;
- **Likely**: a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely over the long term;
- **Low Likelihood**: a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time, but it is less likely in the short term;
- **Unlikely**: a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

3.17.6 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active contaminant linkage.

3.17.7 The risk categories which can be assigned are presented in Table 3.6 overleaf and range between 'very high risk' to 'very low risk'; NB - it is not possible to classify an identified risk as 'no-risk'.

Table 3.6 - Risk Categories

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly Likely**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Reproduced from Table 6.5, CIRIA C552/2001

- **Very High** – severe harm could arise to a designated receptor or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur to a designated receptor and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term;
- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term;
- **Low** – possible that harm could occur, but if it did, at worst it would be mild;
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

3.17.8 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting contaminant linkages are presented in Table 3.7.

Table 3.7 - Summary of Phase I Conceptual Site Model & Risk Assessment

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Initial Risk Rating	Provisional Solution
Potentially contaminated made ground, near surface / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	Unlikely	Medium	**Low**	Soil capping or removal of contaminated soils where necessary
		Direct ingestion and/or dermal contact with liquid contaminants	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	Unlikely	Severe	**Moderate/Low**	Appropriate removal and disposal, burial at depth or soil capping where necessary
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	Low likelihood	Mild	**Low**	Upgraded water pipes/clean backfill material where necessary
	Construction (Foundations)	Direct contact/leaching	Low likelihood	Mild	**Low**	Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	Low likelihood	Mild	**Low**	Low risk anticipated due to lack of previous development
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	Low likelihood	Medium	**Moderate/Low**	tbc subject to monitoring results

3.17.9 The preliminary conceptual site model (CSM) presented above has indicated that several contaminant linkages may exist on-site.

3.17.10 In order to investigate any unacceptable risk presented by these, intrusive investigation is required. The intrusive works will provide information on actual contaminants present on-site and plausible pathways to potentially sensitive receptors.

4 REVIEW OF HAMSON BARRON SMITH (HBS) REPORT 23-24-18-1-6006/DSR2 JULY 2017 – LAND OFF MANOR GROVE

4.1 Anticipated Geology, Hydrogeology & Mining

4.1.1 A summary of the available published geological, hydrogeological and environmental information is provided in Table 4.1 and 4.2 below and overleaf. A review of the following information was undertaken:

- British Geological Survey 1:50,000 scale series, Sheet 80 (Barnsley), Solid & Drift Edition;
- British Geological Survey on-shore borehole records database;
- Coal Authority database on coal mining reporting areas from the following web pages:
  - http://coal.decc.gov.uk/en/coal/cms/publications/data/map;
  - http://coal.decc.gov.uk/en/coal/cms/services/planning/strategy;
- Environment Agency online aquifer designation database; and
- Hamson Barron Smith report 23-24-18-1-6006/DSR2 July 2017 – Land off Manor Grove – Appendix B

Table 4.1 - General Geological Information

Made Ground	No made ground recorded as being present on site. However, the site has been previously developed therefore made ground deposits are anticipated.
Superficial and Solid Geology	There are no superficial deposits recorded as being present on site. Bedrock is recorded as being Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Hydrogeology	With respect to site specific information presented on the Environment Agency's website and Groundsure report, the following has been identified: **Superficial Deposits:** N/A **Bedrock:** 'Secondary A' aquifer. **Source Protection:** The site doesn't within a source protection zone.
Hydrology	The nearest water course is situated 315m to the south and is recorded as being a tertiary river.
Radon	The site lies in an area where **no** radon protection measures are required.
Coal Mining	HBS obtained a coal mining report for the site as well as a SYMAS report. These indicated the site to be underlain by 6 no. worked seams from a depth of between 270m and 560m, last worked in 1979. It states therefore any movement in the ground due to coal mining activity should have stopped. It states there are no known mine entries within 20m of the site and the site does not lie within the boundary of an opencast site.

	The SYMAS report indicates the Royston coal seam to outcrop to the south of the site, therefore is anticipated at a shallow depth beneath the site. However, it states the seam is rarely worked historically, therefore the likelihood of encountering historic ground workings is considered to be low.
Natural Cavities	The site is not considered to be at risk from natural cavities.

Table 4.2 - Environmental Data

Discharge Consents	There are 2 no. recorded discharge consents within 500m of the site boundary. The nearest of which 382m to the west of the site relating to sewage discharge into the Bleakley Dyke.
Pollution Incidents to Controlled Waters	1 no. pollution incident has been recorded within 250m of the site this being 88m to the north of the site. This related to inorganic chemicals causing a category 3 (minor) impact to air on the 3rd December 2001.
Landfill Sites, Waste Management / Transfer / Treatment and Disposal Sites	There are no landfill sites or waste management sites within 500m of the site boundary.
Flood	The site does not lie within 250m of a zone 2 or 3 floodplain.
Groundwater and Surface Water Abstractions	There are no ground or surface water abstractions within 1km of the site boundary.
Public Register of Contaminated Land: Part 2A (EPA 1990)	There are no Part 2A sites within 500m of the site boundary.
Invasive Plant Species	No invasive weeds were noted during the site walkover; however, the site was noted to be largely overgrown.

4.2 Historical Land Use

4.2.1 HBS undertook a study of historical Ordnance Survey maps this had been undertaken in order to identify any potentially contaminative former land-uses at the site. The main historical features of the site and surrounding area are summarised below.

4.2.2 The site had remained as undeveloped agricultural land until the 1970's, when 2 no. structures relating to Manor Court were constructed. These structures were shown to have been demolished between 2002 and 2010. including pasture land, until present day.

4.2.3 The surrounding land use was found to be typically undeveloped farmland becoming a mixture of agricultural and residential properties. A former pond was noted 60m north west of the site and was shown to be backfilled c. 1930.

4.2.4 Ordnance Survey map editions may not however be complete and it is possible, therefore, that additional land uses to those presented in the plans have occurred.

4.3 Phase I Geotechnical Appraisal

4.4 Made Ground

4.4.1 The site has undergone a single phase of development where 2 no. structures were constructed and later demolished. The surrounding areas have also undergone several phases of re-development, therefore made ground deposits are anticipated.

4.4.2 The presence, type and extent of any made ground soils will need to be established through ground investigation.

4.5 Natural Strata

4.5.1 There are no superficial deposits recorded as being present on site.

4.5.2 The underlying solid geology is recorded as being the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measure. These typically comprise Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams.

4.6 Groundwater

4.6.1 No significant perched groundwater is anticipated, although some percolating waters may be encountered where more granular soil horizons exist within the overlying deposits.

4.6.2 True groundwater will be present within the underlying sandstone bedrock at depth.

4.7 Stability Issues

4.7.1 HBS noted the site to slope gently from north west to south east and stated no particular risk in relation to slope instability should occur on site, but consideration will need to be given to boundaries that are raised and where near surface material type has not yet been characterised. Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.

4.7.2 Where changes in gradient result across the site these will need to be adjusted by minor earthworks. It is anticipated that future ground profiles are unlikely to require earth retaining structures; if this changes further advice may be required when more information is available.

4.7.3 With respect to natural ground subsidence, the site has been classified as having a 'Negligible' risk rating for running sand hazards, ground dissolution hazards, compressible deposits and a 'Very Low' risk rating for landslides, collapsible deposits and shrink/swell clay.

4.7.4 Made ground deposits, where present, are anticipated to be unstable. Stability issues should also be anticipated within any near surface natural deposits, particularly where these are soft or weak or have been exposed to periods of heavy rainfall.

4.8 Coal Mining Induced Subsidence

4.8.1 The site is known to be underlain by 6 no. worked seams at depths of between 270m and 560m, any movement in the ground due to coal mining activity should have ceased.

4.8.2 It is considered unlikely that foundations will need to be reinforced / strengthened to accommodate any potential movement associated with historic coal mining activity and any ground instability that may occur post development.

4.9 Excavation Conditions

4.9.1 No excavation problems are anticipated. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

4.9.2 It is likely that excavations should be relatively stable in the short term. However, some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support or battering of excavation sides.

4.9.3 It is considered unlikely that dewatering will be required for shallow short-term excavations. Anticipated groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) are likely to be adequate to control water ingress on a routine basis. However, it is recommended that provision for the drainage of surface water is allowed for to prevent surface water ponding or collection both during and post construction, as this may lead to deterioration of the founding stratum

4.10 Phase I Environmental Assessment

4.11 Introduction

4.11.1 The following section summaries the Preliminary Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third-party information. The CSM summarises the understanding of surface and sub-surface features, the potential sources of contamination, pathways and receptors in order to support the identification and assessment of plausible contaminant linkages.

4.12 Initial Conceptual Site Model & Risk Assessment

4.12.1 The risk assessment has been carried out to assess the likelihood of risk to human health and the wider environment, on the basis of information reviewed. The risk assessment is a qualitative source-pathway-receptor assessment and its function is

to assess the likelihood that each possible linkage exists and to decide whether they pose potentially unacceptable risks to identified receptors (i.e. people, structures, water bodies or ecosystems) that may be harmed.

4.12.2 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is dependent on site use, as well as environmental conditions: **if no contaminant linkage(s) can be proven, then the risk(s) may be discounted.**

4.13 Site Summary & Environmental Sensitivity

4.13.1 A review of available desk study information indicates that the proposed development area and the adjacent land were largely under agricultural and low rise residential. Currently the site appears to be open grassed land.

4.13.2 The underlying geology is indicated to comprise the Mexborough Rock of Pennine Middle Coal Measures.

4.13.3 Some perched/shallow groundwater may be present within the near surface granular deposits, but this is likely to be localised.

4.13.4 It is considered possible that elevated concentrations of CO2 and CH4 may be present as a result of landfilling to the west, and possible coal deposits situated underneath the site. On this basis, it was considered prudent to assess the potential for fugitive ground gas migration through a period of monitoring appropriate to the site's proposed end use.

4.13.5 Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos contaminants and fuel oil/diesel/petrol may be encountered given the age of the demolished structures and the presence of car parking and garages to the north.

4.13.6 The potential leaching of mobile contaminants of concern to the underlying sandstone aquifer is considered to be low to moderate, given the anticipated granular nature of the underlying deposits and the previous development undertaken on site.

4.13.7 In summary, given the site history, the anticipated contaminant load within the on-site soils, its underlying geology, gassing potential and the nature of controlled waters receptors, sensitivity of the site is considered, at this stage, to be low to moderate. The nature and concentration of any contamination will need to be confirmed through testing.

4.14 Potential Sources

4.14.1 A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause pollution of controlled waters'.

4.14.2 The following potential contaminants that may be associated with the site are summarised in Table 4.3 below.

Table 4.3 - Summary of Potential Contaminant Sources

Potential Sources	**Associated Potential Contaminants** (*not limited to*)	
	Metals, inorganics and other contaminants	*Organics*
Potentially contaminated made ground soils originating from previous development and/or perched groundwater	Heavy metals/metalloids, phytotoxic contaminants, sulphate, asbestos	PAH, TPH, BTEX
Fugitive ground gases	CO_2 and CH_4	

4.15 Summary of Potential Receptors

4.15.1 A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused.

4.15.2 The potential sensitive receptors with respect to the potential contamination hazards identified above are considered below.

Table 4.4 - Summary of Potential Receptors

Potential Receptor	**Comment**
Human Health	Site end-users Site operatives (during construction phase only)
Construction	Potable water supply pipes
	Foundations

Underlying natural strata	Near surface soils and/or any perched groundwater

4.16 Plausible Pathways

4.16.1 Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows in Table 4.5 below.

Table 4.5 - Summary of Plausible Pathways

Potential Source	Pathway
Potentially contaminated made ground soils, perched groundwater	Direct ingestion, dermal contact, dust and/or vapour inhalation
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with foundations and potable water supply pipes. Lateral migration of contaminants through preferential pathways
Ground gases	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or underlying permeable natural strata

4.17 Risk Assessment

4.17.1 The potential contaminant linkages listed above are based on available data and the features noted during the 'walkover'. Therefore, the linkages identified are tentative in nature and are subject to the following uncertainties (to be followed up through ground investigation):

- Nature and extent of the made ground at the site;
- Nature of the underlying natural strata at the site;
- The actual distribution of contaminants within the made ground and underlying natural soils;
- The hydrogeological regime beneath the site.

4.17.2 The assessment presented herein assumes that the site end-use is to be 'residential with plant uptake' The assessment is not valid for other land uses. Should the proposed end-use of the site change, the assessment contained herein would need to be revised to accommodate this.

4.17.3 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA publication C552 'Contaminated Land Risk Assessment: A Guide to Good Practice', 2001.

4.17.4 Risk is regarded as a combination of the likelihood of an 'event' occurring and its severity: both elements must be taken into account when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA C552:2001, the magnitude of the potential 'severity' of risk occurring may be assessed against:

- **Severe**: short term risk to human health likely to result in significant harm as defined under EPA 1990, Part IIA. Short term risk of pollution to sensitive water receptor;
- **Medium**: significant harm to human health, pollution of sensitive water resource or significant change to an ecosystem or specific organism;
- **Mild**: pollution of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment;
- **Minor**: harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures and services.

4.17.5 Similarly, the classification of the magnitude of the 'probability' of the risk occurring may be assessed against:

- **High Likelihood**: a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or pollution is causing harm at the receptor;
- **Likely**: a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely

over the long term;

- **Low Likelihood**: a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time, but it is less likely in the short term;
- **Unlikely**: a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

4.17.6 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active contaminant linkage.

4.17.7 The risk categories which can be assigned are presented in Table 4.6 below and range between 'very high risk' to 'very low risk'; *NB - it is not possible to classify an identified risk as 'no-risk'.*

Table 4.6 - Risk Categories

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly Likely**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Reproduced from Table 6.5, CIRIA C552/2001

- **Very High** – severe harm could arise to a designated receptor or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur to a designated receptor and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term;

- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term;
- **Low** – possible that harm could occur, but if it did, at worst it would be mild;
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

4.17.8 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting contaminant linkages are presented in Table 4.7.

Table 4.7 - Summary of Phase I Conceptual Site Model & Risk Assessment

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Initial Risk Rating	Provisional Solution
Potentially contaminated made ground, near surface / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	Low likelihood	Medium	**Moderate/Low**	Soil capping or removal of contaminated soils where necessary
		Direct ingestion and/or dermal contact with liquid contaminants	Unlikely	Mild	**Very Low**	
		Direct inhalation of asbestos fibres	Unlikely	Severe	**Moderate/Low**	Appropriate removal and disposal, burial at depth or soil capping where necessary
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	Low likelihood	Mild	**Low**	Upgraded water pipes/clean backfill material where necessary
	Construction (Foundations)	Direct contact/leaching	Low likelihood	Mild	**Low**	Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	Low likelihood	Medium	**Moderate/Low**	Appropriate removal and disposal.
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	Low likelihood	Medium	**Moderate/Low**	tbc subject to monitoring results

4.17.9 The preliminary conceptual site model (CSM) presented above has indicated that several contaminant linkages may exist on-site.

4.17.10 In order to investigate any unacceptable risk presented by these, intrusive investigation is required. The intrusive works will provide information on actual contaminants present on-site and plausible pathways to potentially sensitive receptors.

5 REVIEW OF HAMSON BARRON SMITH (HBS) REPORT 23-24-18-1-6006/DSR1 JULY 2017 – LAND OFF WEST END AVENUE

5.1 Anticipated Geology, Hydrogeology & Mining

5.1.1 A summary of the available published geological, hydrogeological and environmental information is provided in Table 5.1 and 5.2 below and overleaf. A review of the following information was undertaken:

- British Geological Survey 1:50,000 scale series, Sheet 80 (Barnsley), Solid & Drift Edition;
- British Geological Survey on-shore borehole records database;
- Coal Authority database on coal mining reporting areas from the following web pages:
  - http://coal.decc.gov.uk/en/coal/cms/publications/data/map;
  - http://coal.decc.gov.uk/en/coal/cms/services/planning/strategy;
- Environment Agency online aquifer designation database; and
- Hamson Barron Smith report 23-24-18-1-6006/DSR1 July 2017 – Land off West End Avenue – Appendix C

Table 5.1 - General Geological Information

Made Ground	No made ground recorded as being present on site.
Superficial and Solid Geology	There are no superficial deposits recorded as being present on site. Bedrock is recorded as being Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Hydrogeology	With respect to site specific information presented on the Environment Agency's website and Groundsure report, the following has been identified: **Superficial Deposits:** N/A **Bedrock:** 'Secondary A' aquifer. **Source Protection:** The site doesn't within a source protection zone.
Hydrology	The nearest water course is situated 310m to the south and is recorded as being a tertiary river.
Radon	The site lies in an area where **no** radon protection measures are required.
Coal Mining	HBS obtained a coal mining report for the site as well as a SYMAS report. These indicated the site to be underlain by 6 no. worked seams from a depth of between 270m and 560m, last worked in 1979. It states therefore any movement in the ground due to coal mining activity should have stopped. It states there are no known mine entries within 20m of the site and the site does not lie within the boundary of an opencast site. The SYMAS report indicates the Royston coal seam to outcrop to the south of the site, therefore is anticipated at a shallow depth beneath the site. However it states the seam is rarely worked

	historically, therefore the likelihood of encountering historic ground workings is considered to be low.
Natural Cavities	The site is not considered to be at risk from natural cavities.

Table 5.2 - Environmental Data

Discharge Consents	There are 2 no. recorded discharge consents within 500m of the site boundary. The nearest of which 358m to the north west of the site relating to sewage discharge into the Bleakley Dyke.
Pollution Incidents to Controlled Waters	1 no. pollution incident has been recorded within 250m of the site this being 157m to the north of the site. This related to inorganic chemicals causing a category 3 (minor) impact to air on the 3rd December 2001.
Landfill Sites, Waste Management / Transfer / Treatment and Disposal Sites	There are no landfill sites or waste management sites within 500m of the site boundary.
Flood	The site does not lie within 250m of a zone 2 or 3 floodplain.
Groundwater and Surface Water Abstractions	There are no ground or surface water abstractions within 1km of the site boundary.
Public Register of Contaminated Land: Part 2A (EPA 1990)	There are no Part 2A sites within 500m of the site boundary.
Invasive Plant Species	No invasive weeds were noted during the site walkover; however, the site was noted to be largely overgrown.

5.2 Historical Land Use

5.2.1 HBS undertook a study of historical Ordnance Survey maps this had been undertaken in order to identify any potentially contaminative former land-uses at the site. The main historical features of the site and surrounding area are summarised below.

5.2.2 The site had remained as undeveloped agricultural land until the 1970's, when the existing garages were constructed.

5.2.3 The surrounding land use was found to be typically undeveloped farmland becoming a mixture of agricultural and residential properties. A former pond was noted 75m north west of the site and was shown to be backfilled c. 1930.

5.2.4 Ordnance Survey map editions may not however be complete and it is possible, therefore, that additional land uses to those presented in the plans have occurred.

5.3 Phase I Geotechnical Appraisal

5.4 Made Ground

5.4.1 The site had remained under agricultural end use until the 1970's when the present-day garages were constructed, therefore made ground is anticipated but is likely limited to the garage development.

5.4.2 The presence, type and extent of any made ground soils will need to be established through ground investigation.

5.5 Natural Strata

5.5.1 There are no superficial deposits recorded as being present on site.

5.5.2 The underlying solid geology is recorded as being the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measure. These typically comprise Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams.

5.6 Groundwater

5.6.1 No significant perched groundwater is anticipated, although some percolating waters may be encountered where more granular soil horizons exist within the overlying deposits.

5.6.2 True groundwater will be present within the underlying sandstone bedrock at depth.

5.7 Stability Issues

5.7.1 HBS noted the site to be relatively flat and stated no particular risk in relation to slope instability should occur on site, but consideration will need to be given to boundaries that are raised and where near surface material type has not yet been characterised. Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.

5.7.2 Where changes in gradient result across the site these will need to be adjusted by minor earthworks. It is anticipated that future ground profiles are unlikely to require earth retaining structures; if this changes, further advice may be required when more information is available.

5.7.3 With respect to natural ground subsidence, the site has been classified as having a 'Negligible' risk rating for running sand hazards, ground dissolution hazards, compressible deposits and a 'Very Low' risk rating for landslides, collapsible deposits and shrink/swell clay.

5.7.4 Made ground deposits, where present, are anticipated to be unstable. Stability issues should also be anticipated within any near surface natural deposits, particularly where these are soft or weak or have been exposed to periods of heavy rainfall.

5.8 Coal Mining Induced Subsidence

5.8.1 The site is known to be underlain by 6 no. worked seams at depths of between 270m and 560m, any movement in the ground due to coal mining activity should have ceased.

5.8.2 It is considered unlikely that foundations will need to be reinforced / strengthened to accommodate any potential movement associated with historic coal mining activity and any ground instability that may occur post development.

5.9 Excavation Conditions

5.9.1 No excavation problems are anticipated. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

5.9.2 It is likely that excavations should be relatively stable in the short term. However, some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support or battering of excavation sides.

5.9.3 It is considered unlikely that dewatering will be required for shallow short-term excavations. Anticipated groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) are likely to be adequate to control water ingress on a routine basis. However, it is recommended that provision for the drainage of surface water is allowed for to prevent surface water ponding or collection both during and post construction, as this may lead to deterioration of the founding stratum

5.10 Phase I Environmental Assessment

5.11 Introduction

5.11.1 The following section summaries the Preliminary Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third-party information. The CSM summarises the understanding of surface and sub-surface features, the potential sources of contamination, pathways and receptors in order to support the identification and assessment of plausible contaminant linkages.

5.12 Initial Conceptual Site Model & Risk Assessment

5.12.1 The risk assessment has been carried out to assess the likelihood of risk to human health and the wider environment, on the basis of information reviewed. The risk assessment is a qualitative *source-pathway-receptor* assessment and its function is

to assess the likelihood that each possible linkage exists and to decide whether they pose potentially unacceptable risks to identified receptors (i.e. people, structures, water bodies or ecosystems) that may be harmed.

5.12.2 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is dependent on-site use, as well as environmental conditions: **if no contaminant linkage(s) can be proven, then the risk(s) may be discounted**.

5.13 Site Summary & Environmental Sensitivity

5.13.1 A review of available desk study information indicates that the proposed development area and the adjacent land were largely under agricultural and low rise residential. Currently the site appears to be used for private garages with associated access.

5.13.2 The underlying geology is indicated to comprise the Mexborough Rock of Pennine Middle Coal Measures.

5.13.3 Some perched/shallow groundwater may be present within the near surface granular deposits, but this is likely to be localised.

5.13.4 It is considered possible that elevated concentrations of CO2 and CH4 may be present as a result of landfilling to the north west, and possible coal deposits situated underneath the site. On this basis, it was considered prudent to assess the potential for fugitive ground gas migration through a period of monitoring appropriate to the site's proposed end use.

5.13.5 Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos contaminants and fuel oil/diesel/petrol are not anticipated however.

5.13.6 The potential leaching of mobile contaminants of concern to the underlying sandstone aquifer is considered to be low to moderate, given the previous development.

5.13.7 In summary, given the site history, the anticipated contaminant load within the on-site soils, its underlying geology, gassing potential and the nature of controlled waters

receptors, sensitivity of the site is considered, at this stage, to be **low to moderate**. The nature and concentration of any contamination will need to be confirmed through testing.

5.14 Potential Sources

5.14.1 A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause pollution of controlled waters'.

5.14.2 The following potential contaminants that may be associated with the site are summarised in Table 5.3 below.

Table 5.3 - Summary of Potential Contaminant Sources

Potential Sources	**Associated Potential Contaminants** (*not limited to*)	
	Metals, inorganics and other contaminants	*Organics*
Potentially contaminated made ground soils originating from previous development and/or perched groundwater	Heavy metals/metalloids, phytotoxic contaminants, sulphate, asbestos	PAH, TPH, BTEX
Fugitive ground gases	CO_2 and CH_4	

5.15 Summary of Potential Receptors

5.15.1 A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused.

5.15.2 The potential sensitive receptors with respect to the potential contamination hazards identified above are considered below.

Table 5.4 - Summary of Potential Receptors

Potential Receptor	**Comment**
Human Health	Site end-users Site operatives (during construction phase only)
Construction	Potable water supply pipes
	Foundations

Underlying natural strata	Near surface soils and/or any perched groundwater

5.16 Plausible Pathways

5.16.1 Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows in Table 5.5 below.

Table 5.5 - Summary of Plausible Pathways

Potential Source	Pathway
Potentially contaminated made ground soils, perched groundwater / surface water ditches	Direct ingestion, dermal contact, dust and/or vapour inhalation
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with foundations and potable water supply pipes. Lateral migration of contaminants through preferential pathways
Ground gases	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or underlying permeable natural strata

5.17 Risk Assessment

5.17.1 The potential contaminant linkages listed above are based on available data and the features noted during the 'walkover'. Therefore, the linkages identified are tentative in nature and are subject to the following uncertainties (to be followed up through ground investigation):

- Nature and extent of the made ground at the site;
- Nature of the underlying natural strata at the site;
- The actual distribution of contaminants within the made ground and underlying natural soils;
- The hydrogeological regime beneath the site.

5.17.2 The assessment presented herein assumes that the site end-use is to be *'residential with plant uptake'* The assessment is not valid for other land uses. Should the proposed end-use of the site change, the assessment contained herein would need to be revised to accommodate this.

5.17.3 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA publication C552 '*Contaminated Land Risk Assessment: A Guide to Good Practice*', 2001.

5.17.4 Risk is regarded as a combination of the likelihood of an 'event' occurring and its severity: both elements must be taken into account when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA C552:2001, the magnitude of the potential 'severity' of risk occurring may be assessed against:

- **Severe**: short term risk to human health likely to result in significant harm as defined under EPA 1990, Part IIA. Short term risk of pollution to sensitive water receptor;
- **Medium**: significant harm to human health, pollution of sensitive water resource or significant change to an ecosystem or specific organism;
- **Mild**: pollution of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment;
- **Minor**: harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures and services.

5.17.5 Similarly, the classification of the magnitude of the 'probability' of the risk occurring may be assessed against:

- **High Likelihood**: a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or pollution is causing harm at the receptor;
- **Likely**: a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely over the long term;
- **Low Likelihood**: a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time but it is less likely in the short term;
- **Unlikely**: a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

5.17.6 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active contaminant linkage.

5.17.7 The risk categories which can be assigned are presented in Table 5.6 below and range between 'very high risk' to 'very low risk'; *NB - it is not possible to classify an identified risk as 'no-risk'*.

Table 5.6 - Risk Categories

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly Likely**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Reproduced from Table 6.5, CIRIA C552/2001

- **Very High** – severe harm could arise to a designated receptor or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur to a designated receptor and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term;
- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term;
- **Low** – possible that harm could occur, but if it did, at worst it would be mild;
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

5.17.8 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting contaminant linkages are presented in Table 5.7.

Table 5.7 - Summary of Phase I Conceptual Site Model & Risk Assessment

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Initial Risk Rating	Provisional Solution
Potentially contaminated made ground, near surface / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	Low likelihood	Medium	**Moderate/Low**	Soil capping or removal of contaminated soils where necessary
		Direct ingestion and/or dermal contact with liquid contaminants	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	Unlikely	Severe	**Moderate/Low**	Appropriate removal and disposal, burial at depth or soil capping where necessary
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	Low likelihood	Mild	**Low**	Upgraded water pipes/clean backfill material where necessary
	Construction (Foundations)	Direct contact/leaching	Low likelihood	Mild	**Low**	Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	Low likelihood	Mild	**Low**	Removal of contaminated soils where necessary
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	Low likelihood	Medium	**Moderate/Low**	tbc subject to monitoring results

5.17.9 The preliminary conceptual site model (CSM) presented above has indicated that several contaminant linkages may exist on-site.

5.17.10 In order to investigate any unacceptable risk presented by these, intrusive investigation is required. The intrusive works will provide information on actual contaminants present on-site and plausible pathways to potentially sensitive receptors.

6 REVIEW OF HAMSON BARRON SMITH (HBS) REPORT 23-24-18-1-6007/DSR1 JULY 2017 – DOLES CRESCENT

6.1 Anticipated Geology, Hydrogeology & Mining

6.1.1 A summary of the available published geological, hydrogeological and environmental information is provided in Table 6.1 and 6.2 below and overleaf. A review of the following information was undertaken:

- British Geological Survey 1:50,000 scale series, Sheet 80 (Barnsley), Solid & Drift Edition;
- British Geological Survey on-shore borehole records database;
- Coal Authority database on coal mining reporting areas from the following web pages:
  - http://coal.decc.gov.uk/en/coal/cms/publications/data/map;
  - http://coal.decc.gov.uk/en/coal/cms/services/planning/strategy;
- Environment Agency online aquifer designation database; and
- Hamson Barron Smith report 23-24-18-1-6007/DSR1 July 2017 – Doles Crescent – Appendix D

Table 6.1 - General Geological Information

Made Ground	No made ground recorded as being present on site.
Superficial and Solid Geology	There are no superficial deposits recorded as being present on site. Bedrock is recorded as being Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Hydrogeology	With respect to site specific information presented on the Environment Agency's website and Groundsure report, the following has been identified: **Superficial Deposits:** N/A **Bedrock:** 'Secondary A' aquifer. **Source Protection:** The site doesn't within a source protection zone.
Hydrology	The nearest water course is situated 200m to the south and is recorded as being a tertiary river.
Radon	The site lies in an area where **no** radon protection measures are required.
Coal Mining	HBS obtained a coal mining report for the site as well as a SYMAS report. These indicated the site to be underlain by 6 no. worked seams from a depth of between 280m and 580m, last worked in 1979. It states therefore any movement in the ground due to coal mining activity should have stopped. It states there are no known mine entries within 20m of the site and the site does not lie within the boundary of an opencast site. The SYMAS report indicates the Royston coal seam to outcrop to the south of the site, therefore is anticipated at a shallow depth beneath the site. However it states the seam is rarely worked

	historically, therefore the likelihood of encountering historic ground workings is considered to be low.
Natural Cavities	The site is not considered to be at risk from natural cavities.

Table 6.2 - Environmental Data

Discharge Consents	There are 2 no. recorded discharge consents within 500m of the site boundary. The nearest of which 468m to the north west of the site relating to sewage discharge into the Bleakley Dyke.
Pollution Incidents to Controlled Waters	1 no. pollution incident has been recorded within 250m of the site this being 242m to the north of the site. This related to inorganic chemicals causing a category 3 (minor) impact to air on the 3rd December 2001.
Landfill Sites, Waste Management / Transfer / Treatment and Disposal Sites	There are no landfill sites or waste management sites within 500m of the site boundary.
Flood	The site does not lie within 250m of a zone 2 or 3 floodplain.
Groundwater and Surface Water Abstractions	There are no ground or surface water abstractions within 1km of the site boundary.
Public Register of Contaminated Land: Part 2A (EPA 1990)	There are no Part 2A sites within 500m of the site boundary.
Invasive Plant Species	No invasive weeds were noted during the site walkover; however, the site was noted to be largely overgrown.

6.2 Historical Land Use

6.2.1 HBS undertook a study of historical Ordnance Survey maps had been undertaken to identify any potentially contaminative former land-uses at the site. The main historical features of the site and surrounding area are summarised below.

6.2.2 The site has remained as undeveloped agricultural land until the early 1970's when a series of 11 no. garages were constructed. It was noted that all 11 no. garages were still present on the oldest available OS map dated 1993, however during the walkover only 4 no. garages were noted to still be present.

6.2.3 The surrounding land use was found to be typically undeveloped farmland becoming a mixture of agricultural and residential properties. A former pond was noted 350m north west of the site and was shown to be backfilled c. 1930.

6.2.4 Ordnance Survey map editions may not however be complete and it is possible, therefore, that additional land uses to those presented in the plans have occurred.

6.3 Phase I Geotechnical Appraisal

6.4 Made Ground

6.4.1 The site has remained under agricultural end use until present day, however the surrounding areas have undergone several phases of re-development therefore made ground deposits may be encountered although the likelihood is considered to be low.

6.4.2 The presence, type and extent of any made ground soils will need to be established through ground investigation.

6.5 Natural Strata

6.5.1 There are no superficial deposits recorded as being present on site.

6.5.2 The underlying solid geology is recorded as being the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measure. These typically comprise Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams.

6.6 Groundwater

6.6.1 No significant perched groundwater is anticipated, although some percolating waters may be encountered where more granular soil horizons exist within the overlying deposits.

6.6.2 True groundwater will be present within the underlying sandstone bedrock at depth.

6.7 Stability Issues

6.7.1 HBS noted the site to be relatively flat and stated no particular risk in relation to slope instability should occur on site, but consideration will need to be given to boundaries that are raised and where near surface material type has not yet been characterised. Where excavations are proposed close to site boundaries, properties and/or any other existing retaining structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability.

6.7.2 Where changes in gradient result across the site these will need to be adjusted by minor earthworks. It is anticipated that future ground profiles are unlikely to require earth retaining structures; if this changes further advice may be required when more information is available.

6.7.3 With respect to natural ground subsidence, the site has been classified as having a 'Negligible' risk rating for running sand hazards, ground dissolution hazards, compressible deposits and a 'Very Low' risk rating for landslides, collapsible deposits and shrink/swell clay.

6.7.4 Made ground deposits, where present, are anticipated to be unstable. Stability issues should also be anticipated within any near surface natural deposits, particularly where these are soft or weak or have been exposed to periods of heavy rainfall.

6.8 Coal Mining Induced Subsidence

6.8.1 The site is known to be underlain by 6 no. worked seams at depths of between 270m and 580m, any movement in the ground due to coal mining activity should have ceased.

6.8.2 It is considered unlikely that foundations will need to be reinforced / strengthened to accommodate any potential movement associated with historic coal mining activity and any ground instability that may occur post development.

6.9 Excavation Conditions

6.9.1 No excavation problems are anticipated. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

6.9.2 It is likely that excavations should be relatively stable in the short term. However, some materials such as granular soils and made ground are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support or battering of excavation sides.

6.9.3 It is considered unlikely that dewatering will be required for shallow short-term excavations. Anticipated groundwater conditions suggest that simple dewatering techniques (e.g. sump pumping) are likely to be adequate to control water ingress on a routine basis. However, it is recommended that provision for the drainage of surface water is allowed for to prevent surface water ponding or collection both during and post construction, as this may lead to deterioration of the founding stratum.

6.10 Phase I Environmental Assessment

6.11 Introduction

6.11.1 The following section summaries the Preliminary Phase I Conceptual Site Model (CSM), which has been produced following the review of available pertinent desk study and third-party information. The CSM summarises the understanding of surface and sub-surface features, the potential sources of contamination, pathways and receptors in order to support the identification and assessment of plausible contaminant linkages.

6.12 Initial Conceptual Site Model & Risk Assessment

6.12.1 The risk assessment has been carried out to assess the likelihood of risk to human health and the wider environment, on the basis of information reviewed. The risk

assessment is a qualitative *source-pathway-receptor* assessment and its function is to assess the likelihood that each possible linkage exists and to decide whether they pose potentially unacceptable risks to identified receptors (i.e. people, structures, water bodies or ecosystems) that may be harmed.

6.12.2 Risk can be defined as the combination of the consequence of a harmful effect and the probability of its occurrence. The existence of a contaminant linkage is dependent on-site use, as well as environmental conditions: **if no contaminant linkage(s) can be proven, then the risk(s) may be discounted**.

6.13 Site Summary & Environmental Sensitivity

6.13.1 A review of available desk study information indicates that the proposed development area and the adjacent land were largely under agricultural and low rise residential. Currently the site appears to be used as private garages with associated access.

6.13.2 The underlying geology is indicated to comprise the Mexborough Rock of Pennine Middle Coal Measures.

6.13.3 Some perched/shallow groundwater may be present within the near surface granular deposits, but this is likely to be localised.

6.13.4 It is considered possible that elevated concentrations of CO2 and CH4 may be present as a result of landfilling to the west, and possible coal deposits situated underneath the site. On this basis, it was considered prudent to assess the potential for fugitive ground gas migration through a period of monitoring appropriate to the site's proposed end use.

6.13.5 Although the likely sources of significant contamination are expected to be limited, there remains the potential for on-site soils to contain elevated concentrations of metals and metalloids (e.g. arsenic), non-metal inorganics and organic contamination (e.g. PAH). Asbestos contaminants and fuel oil/diesel/petrol are not anticipated however.

6.13.6 The potential leaching of mobile contaminants of concern to the underlying sandstone aquifer is considered to be low to moderate, given the previous development on site.

In summary, given the site history, the anticipated contaminant load within the on-site soils, its underlying geology, gassing potential and the nature of controlled waters receptors, sensitivity of the site is considered, at this stage, to be **low to moderate**. The nature and concentration of any contamination will need to be confirmed through testing.

6.14 Potential Sources

6.14.1 A potential source is defined as 'a contaminant which is in, or under the land and has the potential to cause harm to human health or to cause pollution of controlled waters'.

6.14.2 The following potential contaminants that may be associated with the site are summarised in Table 6.3 below.

Table 6.3 - Summary of Potential Contaminant Sources

Potential Sources	**Associated Potential Contaminants** (*not limited to*)	
	Metals, inorganics and other contaminants	*Organics*
Potentially contaminated made ground soils originating from previous development within the vicinity of the site and/or perched groundwater	Heavy metals/metalloids, phytotoxic contaminants, sulphate, asbestos	PAH, TPH, BTEX
Fugitive ground gases	CO_2 and CH_4	

6.15 Summary of Potential Receptors

6.15.1 A receptor is the potential target of the source contaminant, to which either significant harm or deterioration in quality may be caused.

6.15.2 The potential sensitive receptors with respect to the potential contamination hazards identified above are considered below.

Table 6.4 - Summary of Potential Receptors

Potential Receptor	**Comment**
Human Health	Site end-users Site operatives (during construction phase only)
Construction	Potable water supply pipes

	Foundations
Underlying natural strata	Near surface soils and/or any perched groundwater

6.16 Plausible Pathways

6.16.1 Migration pathways are routes by which contaminant sources may come into contact with receptors. Potential pathways for different types of contaminants vary depending on the properties of the contaminant, the mechanism of its release and the nature of the receptor. The principal potential pollution pathways by which receptors might become exposed to potential contamination at the site are summarised as follows in Table 6.5 below.

Table 6.5 - Summary of Plausible Pathways

Potential Source	Pathway
Potentially contaminated made ground soils, perched groundwater / surface water ditches	Direct ingestion, dermal contact, dust and/or vapour inhalation
	Direct ingestion and/or dermal contact with liquid contaminants
	Leaching and direct contact with foundations and potable water supply pipes. Lateral migration of contaminants through preferential pathways.
Ground gases	Migration of gases and/or accumulation in void spaces via transport through service conduit, any permeable made ground and/or underlying permeable natural strata

6.17 Risk Assessment

6.17.1 The potential contaminant linkages listed above are based on available data and the features noted during the 'walkover'. Therefore, the linkages identified are tentative in nature and are subject to the following uncertainties (to be followed up through ground investigation):

- Nature and extent of the made ground at the site;
- Nature of the underlying natural strata at the site;
- The actual distribution of contaminants within the made ground and underlying natural soils;
- The hydrogeological regime beneath the site.

6.17.2 The assessment presented herein assumes that the site end-use is to be *'residential with plant uptake'* The assessment is not valid for other land uses. Should the proposed end-use of the site change, the assessment contained herein would need to be revised to accommodate this.

6.17.3 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The risk classification has been estimated in accordance with those methods prescribed in CIRIA publication C552 '*Contaminated Land Risk Assessment: A Guide to Good Practice*', 2001.

6.17.4 Risk is regarded as a combination of the likelihood of an 'event' occurring and its severity: both elements must be taken into account when assessing risk. The method for risk assessment, or evaluation, is purely qualitative. As defined in CIRIA C552:2001, the magnitude of the potential 'severity' of risk occurring may be assessed against:

- **Severe**: short term risk to human health likely to result in significant harm as defined under EPA 1990, Part IIA. Short term risk of pollution to sensitive water receptor;
- **Medium**: significant harm to human health, pollution of sensitive water resource or significant change to an ecosystem or specific organism;
- **Mild**: pollution of non-sensitive water resource but significant damage to crops, buildings, structures and services or the environment;
- **Minor**: harm, which may result in financial loss, or expenditure to resolve. Non-permanent effects to human health. Easily repairable effects of damage to buildings, structures and services.

6.17.5 Similarly, the classification of the magnitude of the 'probability' of the risk occurring may be assessed against:

- **High Likelihood**: a contaminant linkage exists and an event appears very likely in the short term, or almost inevitable in the long term, or pollution is causing harm at the receptor;
- **Likely**: a contaminant linkage exists and it is probable that an event will occur. An event may not occur, but it is possible in the short term and likely

over the long term;

- **Low Likelihood**: a contaminant linkage exists and it is possible that an event will occur. It is not certain that an event will occur over time, but it is less likely in the short term;
- **Unlikely**: a contaminant linkage exists but it is not possible to say if an event will occur even over a very long time.

6.17.6 Following completion of the severity and probability assessment, classifications can be compared to indicate the actual risk each contaminant linkage presents: this can only be undertaken where there is a possibility of there being an active contaminant linkage.

6.17.7 The risk categories which can be assigned are presented in Table 6.6 below and range between 'very high risk' to 'very low risk'; *NB - it is not possible to classify an identified risk as 'no-risk'*.

Table 6.6 - Risk Categories

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly Likely**	Very High	High	Moderate	Moderate / Low
	Likely	High	Moderate	Moderate / Low	Low
	Low Likelihood	Moderate	Moderate / Low	Low	Very Low
	Unlikely	Moderate / Low	Low	Very Low	Very Low

Reproduced from Table 6.5, CIRIA C552/2001

- **Very High** – severe harm could arise to a designated receptor or that severe harm is occurring. Urgent investigation and remediation is likely to be required;
- **High** – harm could occur to a designated receptor and that urgent investigation and remediation may be needed in the short term, but are likely over the longer term;

- **Moderate** – harm could occur. It is unlikely to be severe, most probably relatively mild. Investigation is normally required to clarify the risk with some remedial works being required in the longer term;
- **Low** – possible that harm could occur, but if it did, at worst it would be mild;
- **Very Low** – low possibility of harm arising, and that if it does it is not likely to be severe.

6.17.8 The identified potential contaminants and receptors have been considered in relation to the pathways that may link them. The resulting contaminant linkages are presented in Table 6.7.

Table 6.7 - Summary of Phase I Conceptual Site Model & Risk Assessment

Potential Source	Potential Receptor	Plausible Pathway	Probability	Severity	Initial Risk Rating	Provisional Solution
Potentially contaminated made ground, near surface / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	Low likelihood	Medium	**Moderate/Low**	Soil capping or removal of contaminated soils where necessary
		Direct ingestion and/or dermal contact with liquid contaminants	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	Unlikely	Severe	**Moderate/Low**	Appropriate removal and disposal, burial at depth or soil capping where necessary
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	Low likelihood	Mild	**Low**	Upgraded water pipes/clean backfill material where necessary
	Construction (Foundations)	Direct contact/leaching	Low likelihood	Mild	**Low**	Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	Low likelihood	Mild	**Low**	Removal of contaminated soils where necessary
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	Low likelihood	Medium	**Moderate/Low**	tbc subject to monitoring results

6.17.9 The preliminary conceptual site model (CSM) presented above has indicated that several contaminant linkages may exist on-site.

6.17.10 In order to investigate any unacceptable risk presented by these, intrusive investigation is required. The intrusive works will provide information on actual contaminants present on-site and plausible pathways to potentially sensitive receptors.

7 GROUND INVESTIGATION FIELDWORK

7.1 Introduction

7.1.1 The investigation requirements at the site were twofold: to undertake a geotechnical investigation and an environmental investigation. Therefore, a site-wide ground investigation was carried out on all 4 no. sites to identify geotechnical and environmental liabilities in relation to the proposed development work at the site.

7.1.2 The positions of the exploratory locations are limited to areas of the site, within the site boundary, that were accessible during the works.

7.1.3 Alan Wood and Partners scoped the intrusive investigation on the basis of information submitted in the desk study report and in general accordance with guidance given in BS5930:1999+A2:2010, BS10175:2011+A1:2013 and BS EN 1997:2004 and 2007.

7.2 Site Works

7.2.1 The findings and recommendations given in this report are based on fieldwork undertaken between the 15th January and 17th January 2018 and the 7th and 8th of February 2018.

7.2.2 The positions of the exploratory holes are shown on the appended ground investigation plans, Figures 40400/003, 40400/004 and 40400/005. They were positioned on the basis of the findings of the site conceptual model and distributed in general accordance with the requirements of BS10175:2011+A1:2013 and the working site conditions at the time each phase of investigation was completed.

7.2.3 No specific areas of interest were targeted from either a geotechnical or environmental point of view.

7.3 Geotechnical Investigation

7.3.1 The scope of works undertaken is outlined in Table 7.1 below.

Table 7.1 - Summary of Works

Method of Investigation	No.	Maximum Recorded Depth (m bgl)
Machine excavated trial pits	8	3.10
Windowless sampler boreholes*	12	3.00
Rotary openhole boreholes	7	15.00
In situ permeability testing	4	2.60

*Boreholes BH102, 104, 201, 203, 302 and 402 were installed for ground gas monitoring.

7.3.2 A development-wide geotechnical investigation was carried out on all 4 no. sites to identify liabilities in relation to the proposed construction works at the site and aid the design of appropriate foundation solutions. The following objectives of the ground investigation were therefore to:

- Confirm the lateral and vertical extent of any made ground soils, the nature of the underlying natural ground and the depth to bedrock at selected positions across the area under investigation;
- Account or discount the presence of shallow underground workings;
- Determine the depth to groundwater and the stability of excavation;
- Recover bulk samples for geotechnical testing where necessary;
- Undertake *in situ* hand shear vane testing (in cohesive soils in trial holes) where encountered and this test could be undertaken (i.e. within soils that were not friable or gravelly) and in situ Standard Penetration Testing (SPT) in the boreholes to determine soil strength and that of the underlying bedrock;
- Assess the potential for soakaway use as a means of surface water disposal through *in situ* permeability testing.

7.3.3 Standard strata descriptions of the soils encountered are in general compliance with BS EN 1997:2004, BS EN 1997:2007, BS EN ISO 14688:2002, BS EN ISO

14688:2004 and BS EN ISO 14689:2003. The individual strata depths recorded on each trial pit or borehole log are those from existing ground levels.

7.3.4 Geotechnical laboratory testing was undertaken on a selection of soil samples in accordance with those techniques outlined in BS 1377:1990 'Methods of Test for Soils for Civil Engineering Purposes' at the laboratory of Professional Soils Laboratory in Doncaster. This laboratory is a fully UKAS compliant laboratory.

7.4 Environmental Investigation

7.4.1 The environmental investigation was designed so that site-specific data could be obtained with respect to any potential soil and groundwater contamination associated with the site so that risks could be quantified in relation to the *source-pathway-receptor* scenarios and plausible contaminant linkages postulated in the initial Conceptual Site Model summarised above.

7.4.2 Given the potentially historic contaminative nature of the on-site soils, it was considered possible that, when considered within the context of proposed end-use, the on-site soils may present an (albeit low) unacceptable risk to human health and/or the wider environment.

7.4.3 The scope of works undertaken, were therefore to:

- Inspect and identify the general soil conditions that prevail across the site;
- Assess the potential for soil contamination within any made ground, the underlying natural strata or groundwater;
- Recover soil samples to test for heavy metals, metalloids, non-metal inorganics, organics and asbestos fibres;
- Install ground gas and ground water monitoring instrumentation to allow for the assessment of risk from fugitive ground gases.

7.4.4 Representative samples of the on-site soils were therefore recovered from the trial pits that were positioned to provide coverage of the site area under investigation. Sampling was undertaken in accordance with those guidelines prescribed in BS 10175:2011. All environmental samples were collected in 500ml plastic tubs with sealable lids, 250ml glass amber jars or vials (subject to analytical requirements). Care was taken to

minimise cross contamination (i.e. wiping of equipment) between sampling. Environmental samples were packed into cool boxes with ice packs and transported by courier to Chemtech, an MCERTS and UKAS accredited laboratory for analysis and subsequent storage.

7.4.5 The analytical strategy adopted for the environmental investigation was designed to provide an overall assessment of potential contaminants thought to likely be present within the on-site soils. Whilst no specific contaminants of concern were anticipated in significant concentrations, the soil testing undertaken was for a suite of contaminants in general accordance with NHBC Standards Chapter 4.1 'Land Quality – Managing Ground Conditions' and CLR 8 'Potential Contaminants for the Assessment of Land' (withdrawn but used for reference purposes where applicable). The testing of the following analytes was scheduled on selected samples:

- Heavy metals suite (including As, Cd, Cr, Cu, Hg, Pb, Ni, Zn);
- Speciated Polycyclic Aromatic Hydrocarbons;
- Speciated Total Petroleum Hydrocarbons (TPHCWG);
- BTEX and MTBE;
- Cyanide (free and total) and Thiocyanate;
- Phenol (total);
- Sulphates (Total and Water Soluble);
- Asbestos fibres;
- Soil leachate;
- Sulphide; and
- pH.

7.4.6 Ground gas monitoring installations were installed in 6 no. of the 12 no. boreholes. A single round of ground gas monitoring was suggested within the HBS phase I reports for all 4 no. sites. This round was undertaken on the 1st February 2018 and was undertaken in accordance with CIRIA C665:2007. The results of the gas monitoring are reported in section 11.

8 PHASE II GEOTECHNICAL APPRAISAL

8.1 Ground Conditions

8.1.1 The ground conditions encountered in the exploratory holes completed across the sites have been reviewed. A summary of the lithologies encountered is given in the tables below, while discussion about each one is given in the following paragraphs.

8.1.2 A copy of the ground investigation logs are presented in Appendix E.

Table 8.1 - Summary of Ground Conditions (Site 1)

Lithology	Exploration Location	Approximate proven depth (m) to base from existing ground level	Approximate Thickness (m)	Allowable Safe Bearing Capacity (kN/m²)
Topsoil	All Locations	0.20-0.40		N/A
Firm to stiff cohesive deposits	All Locations bar TP104	1.00-2.10	0.80-1.70	120
Medium dense to dense granular deposits	BH103 & 104 TP104	0.65-1.50	0.10-1.30	120
Weathered Pennine Middle Coal Measures	BH101 & 102 TP102, 103 & 104	1.40-4.00	0.60-Base Not Proven	200+
Coal	RO101, 102	2.30-3.60	0.05-0.20	N/A
Pennine Middle Coal Measures	RO101 – 103	15.00+	Base Not Proven	200+
Groundwater	Slow ingress noted within TP103 & 104 at depth of 2.20m & 1.90m bgl.			

8.1.3 **Topsoil**: A relatively thin layer of topsoil was encountered across the site to a maximum depth of 0.40m bgl. This typically comprised a brown very clayey sand.

8.1.4 **Natural Strata**: The underlying natural strata typically comprised cohesive deposits, comprising sandy gravelly clay, the gravel component comprising fine to coarse, angular and sub-angular sandstone. This was found to generally be underlain by

weathered Pennine Middle Coal Measures recovered as fine to coarse, angular and sub-angular sandy sandstone gravels.

8.1.5 In accordance with Table 6 of BS EN ISO 14688-2:2004+A1:2013 the consistency index (IC) of the underlying cohesive soils may be described as firm to stiff.

8.1.6 Weathered Pennine Middle Coal Measures were encountered within 5 no. of the 8 no. exploratory holes from depths of 1.50m bgl within the northern portion of the site and 0.65m bgl within the southern portion of the site.

8.1.7 **Groundwater**: Slow ingress was noted within TP103 & 104 at 2.20m bgl and 1.90m bgl respectively.

Table 8.2 - Summary of Ground Conditions (Site 2)

Lithology	Exploration Location	Approximate proven depth (m) to base from existing ground level	Approximate Thickness (m)	Allowable Safe Bearing Capacity (kN/m^2)
Topsoil	All Locations	0.10-0.40		N/A
Made Ground	All Locations	0.70-1.10	0.60-0.90	N/A
Made Ground (Concrete Slab)	TP202	1.00	0.20	N/A
Weathered Pennine Middle Coal Measures	BH201 & 202 RO201 - 203 TP102, 103 & 104	4.70-5.60	2.60-Base Not Proven	200+
Pennine Middle Coal Measures	RO201 – 203	15.00+	Base Not Proven	200+
Groundwater	Water ingress was encountered within all 3 no. trial pits at depths between 1.00m to 2.70m bgl.			

8.1.8 **Topsoil**: A relatively thin layer of topsoil was encountered across the site to a maximum depth of 0.40m bgl. This typically comprised a brown very clayey sand.

8.1.9 **Made Ground**: A layer of made ground was encountered across the site and typically comprised a sandy gravelly clay. The gravel component typically comprised fine to coarse, angular and sub-angular brick, concrete, clinker, coal and sandstone.

8.1.10 **Natural Strata:** The underlying natural strata typically comprised weathered Pennine Middle Coal Measures recovered as dense clayey, gravelly sand, the gravel component typically comprised fine to coarse, angular and sub-angular sandstone.

8.1.11 In accordance with Table 6 of BS EN ISO 14688-2:2004+A1:2013 the consistency index (I_C) of the underlying granular soils may be described as dense.

8.1.12 Weathered Pennine Middle Coal Measures were encountered within 6 no. of the 7 no. exploratory holes from approximate depth of 0.80m bgl.

8.1.13 **Groundwater**: Slow ingress was noted within TP201 & 203 at 2.70m bgl and 1.00m bgl respectively, fast ingress was noted within TP202 at a depth of 1.40m bgl.

Table 8.3 - Summary of Ground Conditions (Site 3)

Lithology	Exploration Location	Approximate proven depth (m) to base from existing ground level	Approximate Thickness (m)	Allowable Safe Bearing Capacity (kN/m^2)
Topsoil	All Locations	0.10-0.20		N/A
Dense clayey, gravelly sand	All Locations	1.95-2.00+	1.75-Base Not Proven	150
Coal	BH302 RO301	2.00+-3.40	0.10-Base Not Proven	N/A
Pennine Middle Coal Measures	RO301	15.00+	Base Not Proven	200+
Groundwater	None encountered.			

8.1.14 **Topsoil:** A relatively thin layer of topsoil was encountered across the site to a maximum depth of 0.20m bgl. This typically comprised a brown very clayey sand.

8.1.15 **Natural Strata**: The underlying natural strata typically comprised a dense clayey, gravelly sand, the gravel component comprised fine to coarse, angular and sub-angular sandstone. Coal was encountered within the base of BH302 recovered as fine angular gravel.

8.1.16 In accordance with Table 6 of BS EN ISO 14688-2:2004+A1:2013 the consistency index (I_C) of the underlying granular soils may be described as medium dense to dense.

8.1.17 **Groundwater**: No groundwater was encountered during the site investigation works.

Table 8.4 - Summary of Ground Conditions (Site 4)

Lithology	Exploration Location	Approximate proven depth (m) to base from existing ground level	Approximate Thickness (m)	Allowable Safe Bearing Capacity (kN/m²)
Topsoil	BH401	0.15		N/A
Tarmac	BH402	0.08		N/A
Made Ground	All Locations	0.35-0.5	0.27-0.40	N/A
Dense clayey, gravelly sand	All Locations	1.50-2.40	1.00-1.50	150
Coal	BH402 TP401	2.05-3.00	0.15-Base Not Proven	N/A
Weathered Pennine Middle Coal Measures	All Locations	3.10+	Base Not Proven	200+
Groundwater	None encountered.			

8.1.18 **Topsoil**: A relatively thin layer of topsoil was encountered within the south eastern portion of the site to a depth of 0.15m bgl. This comprised a brown very clayey sand.

8.1.19 **Made Ground:** Made ground deposits were encountered across the site and typically comprised fine and medium, angular limestone gravel under the tarmac (sub-base) and red brick sand and gravels underneath old garage footings.

8.1.20 **Natural Strata:** The underlying natural strata typically comprised a dense clayey, gravelly sand, the gravel component comprised fine to coarse, angular and sub-angular sandstone. Coal was encountered within TP401 and BH402 at depths of 1.90m and 2.90m respectively.

8.1.21 In accordance with Table 6 of BS EN ISO 14688-2:2004+A1:2013 the consistency index (IC) of the underlying granular soils may be described as dense.

8.1.22 Weathered Pennine Middle Coal Measures were encountered within all 3 no. exploratory holes from approximate depths of 1.50m bgl.

8.1.23 **Groundwater**: Slow ingress was noted within TP401 at a depth of 1.90m bgl.

8.2 Visual & Olfactory Evidence of Contamination

8.2.1 No visual or olfactory evidence of gross contamination, such as hydrocarbons, was recorded during the ground investigations.

8.3 Geotechnical Testing & Material Properties

Standard Penetration Testing

8.3.1 *In situ* standard penetration testing was undertaken in all 12 no. windowless sampler boreholes so that an assessment on material strength and an approximate safe bearing capacity of the ground could be ascertained.

8.3.2 The field test is useful for comparing variability of backfill materials as well as undisturbed natural soils to check for possible differential settlement problems. SPT tests were carried out at 1.0m centres throughout the vertical profile of each borehole.

8.3.3 A summary of the test results is given in the following tables, Table 8.5 below.

Table 8.5 - Summary of *In-Situ* Standard Penetration Test (SPT) Results

Borehole 'N' Value	Depth in m bgl		
	1m	2m	3m
BH101	26	50	-
BH102	14	50	-
BH103	13	50	-
BH104	31	50	-
BH201	7	50	-
BH202	9	50	-
BH203	9	10	50 (2.6m)
BH204	19	23	50
BH301	10	50	-
BH302	18	50	-
BH401	8	20	50
BH402	12	18	50
Average N_{60} Value	14.5	39	50
	N60 = (Er / 60) x N Value = $1.32E_r$ Energy Ratio (79%)		

Atterbergs, Moisture Content & Volume Change Potential

8.3.4 The geotechnical laboratory testing was carried out on 5 samples of cohesive soil by PSL LTD. A copy of the test results are presented in Appendix E but are summarised in Tables 8.6 to 8.8.

Table 8.6 - Plasticity Index Test Results (Site 1)

Borehole Number	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Volume Change Potential*
BH101	0.40-0.60	76	33	43	98	42
BH103	0.50-0.60	49	25	24	86	21

$$I'_p = I_p \times \frac{\%\ Particles\ Passing\ 0.425\ mm}{100\ \%}$$

* VCP: 10-19% = Low, 20-39% = Medium, 40% and greater = High (after NHBC:2018).

8.3.5 The Plasticity Index (Ip) of a soil is a measure of its Volume Change Potential (VCP) and is determined by Atterberg Limits tests, the results of which are given in the above table. All tests to determine the liquid limit (w_L) and plastic limit (w_p) were also performed by PSL LTD. A Modified Plasticity Index (I'p) has been calculated for the samples tested, which is defined as the Plasticity Index multiplied by the percentage of particles less than 425µm. The conversion factor applied is presented in NHBC Standards (2018), Chapter 4.2.

8.3.6 The calculated modified plasticity index (NHBC Chapter 4.2) was found to be between 21% and 42%, which is equivalent to a medium to **high** volume change potential, according to the NHBC guidelines. The highest recorded worst-case VCP (**high**) should be adopted for design purposes however to allow for variation in ground conditions across the development area.

Table 8.7 - Plasticity Index Test Results (Site 2)

Borehole Number	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Volume Change Potential*
BH203	0.50-0.70	49	27	22	81	18
BH204	0.10-0.30	45	25	20	80	16

$$I'_p = I_p \times \frac{\%\ Particles\ Passing\ 0.425\ mm}{100\ \%}$$

* VCP: 10-19% = Low, 20-39% = Medium, 40% and greater = High (after NHBC:2018).

8.3.7 The Plasticity Index (Ip) of a soil is a measure of its Volume Change Potential (VCP) and is determined by Atterberg Limits tests, the results of which are given in the above table. All tests to determine the liquid limit (w_L) and plastic limit (w_p) were also performed by PSL LTD. A Modified Plasticity Index (I'p) has been calculated for the samples tested, which is defined as the Plasticity Index multiplied by the percentage of particles less than 425µm. The conversion factor applied is presented in NHBC Standards (2018), Chapter 4.2.

8.3.8 The calculated modified plasticity index (NHBC Chapter 4.2) was found to be between 16% and 18%, which is equivalent to a **low** volume change potential, according to the NHBC guidelines.

Table 8.8 - Plasticity Index Test Results (Site 4)

Borehole Number	Depth (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425mm (%)	Volume Change Potential*
BH402	0.35-0.50	48	27	21	84	18
$I'_P = I_P \times \frac{\%\ Particles\ Passing\ 0.425\ mm}{100\ \%}$						

* VCP: 10-19% = Low, 20-39% = Medium, 40% and greater = High (after NHBC:2018).

8.3.9 The Plasticity Index (Ip) of a soil is a measure of its Volume Change Potential (VCP) and is determined by Atterberg Limits tests, the results of which are given in the above table. All tests to determine the liquid limit (w_L) and plastic limit (w_p) were also performed by PSL LTD. A Modified Plasticity Index (I'p) has been calculated for the samples tested, which is defined as the Plasticity Index multiplied by the percentage of particles less than 425µm. The conversion factor applied is presented in NHBC Standards (2018), Chapter 4.2.

8.3.10 The calculated modified plasticity index (NHBC Chapter 4.2) was found to be 18%, which is equivalent to a **low** volume change potential, according to the NHBC guidelines.

Hand Shear Vane Testing

8.3.11 Field examination hand shear vane readings were taken in the base of the the trial pits. Recorded undrained shear strengths returned 140+kN/m2.

8.3.12 The mean and median undrained shear strengths were calculated as 140kN/m2 and140kN/m2 and are generally indicative of high strength soils in accordance with Table 5 of BS EN ISO 14688-2:2004+A1:2013.

Contamination and Performance of Building Materials (Cementitious Products)

8.3.13 12 no. soil samples were analysed for a suite of contaminants consistent with BRE Special Digest 1 'Concrete in Aggressive Ground' (2005). A copy of the individual test results is given in the appended laboratory certificates in Appendix G.

8.3.14 The pH values recorded for the soil samples ranged between 6.2 and 8.2 (pH units) with an average of 7.4, indicating near neutral (slightly alkaline) conditions prevail within the on-site soils.

8.3.15 Water soluble sulphate analysis of the soils yielded concentrations between <13mg/l and 181mg/l in the samples (60mg/l on average). An assessment of the data was carried out in accordance with Section C4 '*Site Investigation for Aggressive Ground Conditions'* and the procedure prescribed in Section C5 '*Classification of Site Locations for Chemicals Aggressive to Concrete'* of BRE SD1 (2005) to assess whether ground conditions at the site are potentially aggressive to buried concrete products. The results of the assessment indicate that a Design Sulphate classification of DS-1 may be adopted along with an ACEC class of AC-1s. However, it is recommended that where made ground is encountered DS2 sulphate precautions should be adopted in foundation construction.

8.3.16 Static groundwater conditions have been assumed in this assessment.

9 LABORATORY CHEMICAL TESTING

9.1 Preamble

9.1.1 12 no. representative samples of soil from within the near surface and at depth from across all 4 no. sites were analysed for the suite of contaminants outlined in Section 7.4.5 above. This was in order to assess the general degree and nature of contamination within the on-site soils in relation to the site's proposed redevelopment.

9.1.2 A summary of the test results is given in the following tables, whilst a copy of the individual test results is presented in full in Appendix G.

9.2 Guidance for Analytical Results - Assessment Criteria

Soil

9.2.1 With reference to the proposed end use of the site, the results of the chemical testing were assessed as part of an environmental risk assessment against a number of potential receptors, considering risks to human health, environmental quality and the built environment. Such risk assessment comprises the initial comparison of the measured soil concentrations with Generic Assessment Criteria (GAC), which in this instance are considered protective of a *commercial* end use.

9.2.2 Recent changes to UK human health risk assessment has seen the introduction of DEFRAs Category 4 Screening Levels (2014) and the LQM/CIEH Suitable 4 Use Levels (2015). Both set out to provide generic assessment criteria on the basis of updated assumptions relating to the modelling of human exposure to soil contaminants for the standard land uses: residential (with and without home-grown produce), allotments, commercial and public open space.

9.2.3 The general consensus between contaminated land practitioners is that the C4SL values, which are based on the low level of toxicological concern (LLTC), are less cautious than the newly revised GAC values published by LQM/CIEH and may not, therefore, be wholly applicable for use outside the context of Part 2A Statutory Guidance. Although both publications in no way undermine the validity of existing Environment Agency guidance presented in, for example, SR2, SR3 and the existing CLEA software, we are of the mind that the LQM/CIEH S4UL values, which are

based on Health Criteria that represents minimal or tolerable levels of risks to health (as described in the Environment Agency's SR2 guidance) but incorporates the updated exposure assumptions presented in DEFRAs C4SL guidance, provide a better starting point from which to generate generic assessment criteria that can be applied to brownfield development sites and are 'suitable for use' under the planning system.

9.2.4 It should be noted that both approaches are based on sandy loam soil with 6% soil organic matter (SOM). Whilst this does not present a problem for metals, as they are not dependent on soil type or SOM, the algorithms used to model plant uptake and volatilisation for organic contaminants do take account of SOM content in the soil. The GAC values for metals in the standard land uses may therefore be directly applied, whether these are C4SL or S4UL derived, whilst independent GAC values for organics (e.g. PAH, TPH) have been generated using CLEA Version 1.071 and the toxicological updates presented in the aforementioned documents. These have also been adjusted for soil type and are calculated for SOM contents at 1%, 2.5% and 6% for a sandy soil.

9.2.5 A summary of the generic assessment criteria values is presented in Appendix H.

Soil Leachate

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

9.2.7 For the assessment of test results, the Groundwater Threshold Values or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate or groundwater test results. These are presented in full in The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. When the most sensitive receptor is considered to be the aquifer (i.e. groundwater) the Groundwater Threshold Values will be adopted as the Tier 1 screening values, whilst where the receptor is a surface water feature (e.g. stream, drain or river) the EQS values will be used to define the Tier I Screening values.

9.3 Test Results – Meadstead Drive

9.3.1 The chemical analysis results and screening criteria are summarised in Tables 9.1 and 9.2 below and overleaf.

Table 9.1 - Summary of Total Soil Concentrations

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Metals						
Arsenic (inorganic)	37	7.4	12	4	0	PASS
Cadmium	22	<0.2	0.3	4	0	PASS
Chromium (III)	910**	39	44	4	0	PASS
Copper	2,400**	13	28	4	0	PASS
Mercury (inorganic)	40**	<0.5	<0.5	4	0	PASS
Nickel	130**	17	29	4	0	PASS
Lead	200	13	60	4	0	PASS
Selenium	250**	0.6	0.9	4	0	PASS
Zinc	3,700**	61	105	4	0	PASS

* DEFRA (2014). Development of Category 4 Screening Levels (SP1010);
** LQM/CIEH (2015). S4UL for Human Health Risk Assessment.

Table 9.2 - Summary of Chemical Test Results (PAH)

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Naphthalene	2.3	<0.01	0.05	4	0	PASS
Acenaphthylene	400	<0.01		4	0	PASS

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Acenaphthene	490	<0.01		4	0	PASS
Fluorene	390	<0.01		4	0	PASS
Phenanthrene	220	<0.02	0.28	4	0	PASS
Anthracene	5,400	<0.02	0.09	4	0	PASS
Fluoranthene	560	<0.02	0.55	4	0	PASS
Pyrene	1,200	<0.02	0.47	4	0	PASS
Benzo(a)anthracene	11	<0.02	0.28	4	0	PASS
Chrysene	22	<0.01	0.25	4	0	PASS
Benzo(b)fluoranthene	3.3	<0.02	0.29	4	0	PASS
Benzo(k)fluoranthene	93	<0.02	0.14	4	0	PASS
Benzo(a)pyrene	2.7	<0.02	0.25	4	0	PASS
Dibenzo(a,h)anthracene	0.28	<0.02		4	0	PASS
Indeno(1,2,3-cd)pyrene	36	<0.02	0.16	4	0	PASS
Benzo(g,h,i)perylene	340	<0.02	0.12	4	0	PASS

* [CLEA/LQM/CIEH, 2015] Calculated for residential with plant uptake end-use scenario in CLEA v1.071. GAC range for 2.5% SOM used unless stated otherwise. Values will be more conservative for cohesive soils.

Metals, Metalloids and Other Inorganic Analytes

9.3.2 A total of 4 no. soil samples were analysed. Assessment of the soils data indicates that there are no elevated concentrations of potential contaminants of concern that exceed relevant GAC criteria.

9.3.3 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to metals, metalloids and non-metal inorganics is therefore not anticipated.

Organics (PAH, TPH)

9.3.4 A total of 4 no. soil samples were analysed. None of the samples analysed for PAH and TPH returned concentrations above relevant GAC's. The test results for organic contaminants within the on-site soils were either at, or below laboratory detection limits. Low level PAH concentrations were measured within the sample of ground recovered from BH 101, although the measured concentrations are below residential with plant uptake GAC values.

9.3.5 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to organic contaminants is therefore not anticipated.

Asbestos

9.3.6 A total of 4 no. soil samples were analysed. No asbestos fibres were detected in the samples tested.

9.3.7 Risk associated with asbestos containing materials is therefore not anticipated.

UKWIR

9.3.8 It is recommended that consultation be held with the water authority to confirm any specific requirements they may have.

9.4 Test Results – Manor Grove (Site 2)

9.4.1 The chemical analysis results and screening criteria are summarised in Tables 9.3 and 9.4 below and overleaf.

Table 9.3 - Summary of Total Soil Concentrations

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Metals						
Arsenic (inorganic)	37	12	19	4	0	PASS
Cadmium	22	0.3	0.6	4	0	PASS
Chromium (III)	910**	51	112	4	0	PASS
Copper	2,400**	21	69	4	0	PASS
Mercury (inorganic)	40**	<0.5		4	0	PASS
Nickel	130**	20	27	4	0	PASS
Lead	200	44	339	4	1	FAIL
Selenium	250**	0.8	1.0	4	0	PASS
Zinc	3,700**	81	179	4	0	PASS

* DEFRA (2014). Development of Category 4 Screening Levels (SP1010);
** LQM/CIEH (2015). S4UL for Human Health Risk Assessment.

Table 9.4 - Summary of Chemical Test Results (PAH)

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Naphthalene	2.3	<0.01	0.14	4	0	PASS
Acenaphthylene	400	<0.01	0.10	4	0	PASS
Acenaphthene	490	<0.01	0.29	4	0	PASS
Fluorene	390	<0.01	0.35	4	0	PASS

Phenanthrene	220	<0.02	4.84	4	0	PASS
Anthracene	5,400	<0.02	1.48	4	0	PASS
Fluoranthene	560	0.03	9.50	4	0	PASS
Pyrene	1,200	<0.02	7.78	4	0	PASS
Benzo(a)anthracene	11	0.03	3.81	4	0	PASS
Chrysene	22	<0.01	3.49	4	0	PASS
Benzo(b)fluoranthene	3.3	<0.02	4.05	4	1	FAIL
Benzo(k)fluoranthene	93	<0.02	1.77	4	0	PASS
Benzo(a)pyrene	2.7	<0.02	3.47	4	1	FAIL
Dibenzo(a,h)anthracene	0.28	<0.02	0.48	4	1	FAIL
Indeno(1,2,3-cd)pyrene	36	<0.02	2.28	4	0	PASS
Benzo(g,h,i)perylene	340	<0.02	1.94	4	0	PASS

* [CLEA/LQM/CIEH, 2015] Calculated for residential with plant uptake end-use scenario in CLEA v1.071. GAC range for 2.5% SOM used unless stated otherwise. Values will be more conservative for cohesive soils.

Metals, Metalloids and Other Inorganic Analytes

9.4.2 A total of 4 no. soil samples were analysed. Assessment of the soils data indicates that a single sample contained elevated concentrations of lead this was located within the topsoil collected from BH 201. There are no other elevated concentrations of potential contaminants of concern that exceed relevant GAC criteria.

9.4.3 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to metals, metalloids and non-metal inorganics is however not anticipated, as the topsoil material is likely to be removed as part of the site preparation works.

Organics (PAH, TPH)

9.4.4 A total of 4 no. soil samples were analysed. A single sample returned elevated concentrations of benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene, this was encountered within the topsoil at the location of BH203. No other samples analysed for PAH and TPH returned concentrations above relevant GAC's.

9.4.5 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to organic contaminants is however not anticipated, as the topsoil material is likely to be removed as part of the site preparation works.

Asbestos

9.4.6 A total of 4 no. soil samples were analysed. No asbestos fibres were detected in the samples tested.

9.4.7 Risk associated with asbestos containing materials is therefore not anticipated.

UKWIR

9.4.8 It is recommended that consultation be held with the water authority to confirm any specific requirements they may have.

9.5 Test Results – West End Avenue (Site 3)

9.5.1 The chemical analysis results and screening criteria are summarised in Tables 9.5 and 9.6 below and overleaf.

Table 9.5 - Summary of Total Soil Concentrations

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Metals						
Arsenic (inorganic)	37	12	13	2	0	PASS
Cadmium	22	<0.2		2	0	PASS
Chromium (III)	910**	41	42	2	0	PASS
Copper	2,400**	9.9	18	2	0	PASS
Mercury (inorganic)	40**	<0.5		2	0	PASS
Nickel	130**	14	24	2	0	PASS
Lead	200	12	50	2	0	PASS
Selenium	250**	0.6	0.7	2	0	PASS
Zinc	3,700**	46	70	2	0	PASS

* DEFRA (2014). Development of Category 4 Screening Levels (SP1010);
** LQM/CIEH (2015). S4UL for Human Health Risk Assessment.

Table 9.6 - Summary of Chemical Test Results (PAH)

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Naphthalene	1	<0.01	0.04	2	0	PASS
Acenaphthylene	170	<0.01		2	0	PASS
Acenaphthene	200	<0.01		2	0	PASS
Fluorene	165	<0.01		2	0	PASS

Phenanthrene	95	<0.02	0.17	2	0	PASS
Anthracene	2,300	<0.02	0.06	2	0	PASS
Fluoranthene	280	<0.02	0.44	2	0	PASS
Pyrene	620	<0.02	0.39	2	0	PASS
Benzo(a)anthracene	7.5	<0.02	0.27	2	0	PASS
Chrysene	15	<0.01	0.21	2	0	PASS
Benzo(b)fluoranthene	2.6	<0.02	0.25	2	0	PASS
Benzo(k)fluoranthene	77	<0.02	0.11	2	0	PASS
Benzo(a)pyrene	2.2	<0.02	0.22	2	0	PASS
Dibenzo(a,h)anthracene	0.24	<0.02		2	0	PASS
Indeno(1,2,3-cd)pyrene	27	<0.02	0.10	2	0	PASS
Benzo(g,h,i)perylene	315	<0.02	0.09	2	0	PASS

* [CLEA/LQM/CIEH, 2015] Calculated for residential with plant uptake end-use scenario in CLEA v1.071. GAC range for 1.0% SOM used unless stated otherwise. Values will be more conservative for cohesive soils.

Metals, Metalloids and Other Inorganic Analytes

9.5.2 A total of 2 no. soil samples were analysed. Assessment of the soils data indicates that there are no elevated concentrations of potential contaminants of concern that exceed relevant GAC criteria.

9.5.3 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to metals, metalloids and non-metal inorganics is therefore not anticipated.

Organics (PAH, TPH)

9.5.4 A total of 2 no. soil samples were analysed. None of the samples analysed for PAH and TPH returned concentrations above relevant GAC's. The test results for organic contaminants within the on-site soils were either at, or below laboratory detection limits. Low level PAH concentrations were measured within the topsoil sample recovered from BH 302, although the measured concentrations are below residential with plant uptake GAC values.

9.5.5 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to organic contaminants is therefore not anticipated.

Asbestos

9.5.6 A total of 2 no. soil samples were analysed. No asbestos fibres were detected in the samples tested.

9.5.7 Risk associated with asbestos containing materials is therefore not anticipated.

UKWIR

9.5.8 It is recommended that consultation be held with the water authority to confirm any specific requirements they may have.

9.6 Test Results – Doles Crescent (Site 4)

9.6.1 The chemical analysis results and screening criteria are summarised in Tables 9.7 and 9.8 below and overleaf.

Table 9.7 - Summary of Total Soil Concentrations

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Metals						
Arsenic (inorganic)	37	8.6	12	2	0	PASS
Cadmium	22	<0.2	0.2	2	0	PASS
Chromium (III)	910**	38	51	2	0	PASS
Copper	2,400**	17	20	2	0	PASS
Mercury (inorganic)	40**	<0.5		2	0	PASS
Nickel	130**	22	24	2	0	PASS
Lead	200	16	24	2	0	PASS
Selenium	250**	0.9	1.5	2	0	PASS
Zinc	3,700**	79	644	2	0	PASS

* DEFRA (2014). Development of Category 4 Screening Levels (SP1010);
** LQM/CIEH (2015). S4UL for Human Health Risk Assessment.

Table 9.8 - Summary of Chemical Test Results (PAH)

Contaminant of Concern	GAC* (mg/kg)	Contaminant Concentrations (mg/kg)		No. of Samples Tested	No. of Samples >GAC	Pass/Fail Tier 1 GAC Screen
		Min	Max			
Naphthalene	1	<0.01	0.05	2	0	PASS
Acenaphthylene	170	<0.01	0.09	2	0	PASS
Acenaphthene	200	<0.01	0.43	2	0	PASS
Fluorene	165	<0.01	0.43	2	0	PASS

Phenanthrene	95	0.02	10.21	2	0	PASS
Anthracene	2,300	<0.02	4.58	2	0	PASS
Fluoranthene	280	0.05	42.78	2	0	PASS
Pyrene	620	0.04	36.03	2	0	PASS
Benzo(a)anthracene	7.5	0.05	19.06	2	1	PASS
Chrysene	15	0.03	17.23	2	1	PASS
Benzo(b)fluoranthene	2.6	0.02	20.20	2	1	PASS
Benzo(k)fluoranthene	77	<0.02	8.79	2	0	PASS
Benzo(a)pyrene	2.2	<0.02	17.26	2	1	PASS
Dibenzo(a,h)anthracene	0.24	<0.02	2.33	2	1	PASS
Indeno(1,2,3-cd)pyrene	27	<0.02	9.89	2	0	PASS
Benzo(g,h,i)perylene	315	0.04	8.38	2	0	PASS

* [CLEA/LQM/CIEH, 2015] Calculated for residential with plant uptake end-use scenario in CLEA v1.071. GAC range for 1.0% SOM used unless stated otherwise. Values will be more conservative for cohesive soils.

Metals, Metalloids and Other Inorganic Analytes

9.6.2 A total of 2 no. soil samples were analysed. Assessment of the soils data indicates that there are no elevated concentrations of potential contaminants of concern that exceed relevant GAC criteria.

9.6.3 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to metals, metalloids and non-metal inorganics is therefore not anticipated.

Organics (PAH, TPH)

9.6.4 A total of 2 no. soil samples were analysed. A single sample returned elevated concentrations of benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene, this was encountered within the near surface made ground at the location of BH401. No other samples analysed for PAH and TPH returned concentrations above relevant GAC's.

9.6.5 Potential unacceptable risk to human health in a residential with plant uptake land use scenario with respect to organic contaminants is however not anticipated, as the topsoil material is likely to be removed as part of the site preparation works.

Asbestos

9.6.6 A total of 4 no. soil samples were analysed. No asbestos fibres were detected in the samples tested.

9.6.7 Risk associated with asbestos containing materials is therefore not anticipated.

UKWIR

9.6.8 It is recommended that consultation be held with the water authority to confirm any specific requirements they may have.

10 PHASE II ENVIRONMENTAL APPRAISAL

10.1 Introduction

10.1.1 The preliminary CSM given above presented our initial understanding of the site, being based on available geological information, site location, likely contamination status and the overall risk it presented to the identified receptors through various pollution pathways.

10.1.2 This section revises the initial CSM in light of the ground investigation findings and chemical analysis results presented above.

10.1.3 The revised conceptual site model has been developed for the proposed future residential with plant uptake land use. This summarises our understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors assuming that no remediation has been undertaken at the site.

10.2 Ground Conditions - Summary

10.2.1 Made ground soils were encountered on Site 2 and Site 4 and typically comprised demolition rubble. Although no made ground was encountered within the exploratory holes undertaken on Site 3 it is anticipated that limited made ground will be encountered within the western portion of the site relating to the construction of the standalone garages. No made ground was encountered on Site 1.

10.2.2 The natural soils encountered across all 4 no. sites typically comprised either a sandy gravelly clay or a clayey gravelly sand overlaying weathered Pennine Middle Coal Measures.

10.2.3 Groundwater was encountered on Site 1 at depths of between 1.90m and 2.20m bgl. Groundwater was encountered on Site 2 at depths of between 1.00m and 2.70m bgl. Groundwater was encountered on Site 4 at a depth of 1.90m bgl. No groundwater was encountered was Site 3.

10.2.4 Elevated contaminants were encountered on Sites 2 and 4 which related to organic compounds. The contaminated soils were encountered within the topsoil or near surface made ground deposits, therefore it is anticipated these soils will be removed

as part of site preparation works and no further works will be required. No elevated contaminants were encountered on Sites 1 and 3.

10.3 Qualitative Contaminated Land Risk Assessment

10.3.1 Current UK legislation on contaminated land is principally contained in Sections 78(A) to (YC) in Part 2A of the Environmental Protection Act 1990, which was retrospectively inserted by Section 57 of the Environment Act 1995. The Contaminated Land Regulations 2000 were amended in 2005. The Environmental Protection Act 1990: Part 2A Contaminated Land, Statutory Guidance, Edition 2, 2006, promulgates the revised statutory guidance with respect to the operation of the Contaminated Land Regime following the implementation of the Contaminated Land Regulations, 2005.

10.3.2 The definition of contaminated land is central to the operation of Part 2A. Legislation adopts the principle of a 'suitable for use' approach for the assessment of contaminated land, the rationale reflected in the site-specific risk assessment and determination of remedial strategy. Action is only required if unacceptable risks are posed to human health or to the environment, taking into account the current land use and geo-environmental setting.

10.3.3 The legislation places a responsibility on the Local Authority to determine whether the land under its jurisdiction is contaminated by consideration of whether:

- Significant harm is being caused;
- There is a significant possibility of significant harm being caused;
- Significant pollution of controlled waters is being caused or is likely to be caused.

10.4 Assessment Framework

10.4.1 The statutory guidance describes a risk assessment methodology in terms of ‘significant contaminants’ and ‘contaminant linkages’, using ‘source-pathway-receptor’ scenarios for the site. Contaminant linkages are formed when there is a linkage between a contaminant source and a receptor by means of a pathway. Each element has to be present, or no linkage can be formed.

10.4.2 Risk assessment and the procedure of identifying sources, pathways and receptors is recognised as an approach to determine the extent and significance of contamination

either within the context of Part 2A (when assessing current site status or when considering the acquisition of an existing development) or the planning process (for the redevelopment of an existing site, or when considering the acquisition of a site for redevelopment purposes). Either way, the 'suitable for use' approach is adopted when assessing risk and the source-pathway-receptor assessment defines the conceptual model for the site.

10.4.3 Within the context of this report therefore, the revised risk assessment has been undertaken on the basis that the 'suitable for use' approach remains aligned with the site being redeveloped for the end use given above.

10.5 Summary of Identified Contaminant Linkages

10.5.1 On the basis of the ground investigation and laboratory test results, it is evident that the on-site soils encountered on Site 1 and Site 3 do not contain elevated concentrations of inorganic and/or organic contaminants in excess of the adopted GACs. A single sample collected from Site 2 and Site 4 did however return elevated organic contaminants.

10.5.2 Risk to human health, the development and the wider environment, with respect to the identified levels of contaminants within the on-site soils, is however not anticipated to be significant. As all elevated contaminants were encountered within either the topsoil or near surface made ground deposits which are likely to be removed from site as part of the site preparation works.

10.5.3 A summary of the revised risk assessments are given in Tables 10.1, 10.2, 10.3 and 10.4.

Table 10.1 - Summary of Revised Conceptual Site Model & Risk Assessment – Meadstead Drive

Potential Source	Potential Receptor	Plausible Pathway	Initial Risk Rating	Probability	Severity	Revised Risk Rating	Solution
Potentially contaminated made ground, near surface natural strata / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	**Low**	Unlikely	Medium	**Low**	No risk anticipated
		Direct ingestion and/or dermal contact with liquid contaminants	**Very Low**	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	**Moderate/Low**	Unlikely	Severe	**Moderate/Low**	No risk anticipated. *Revised risk rating cannot be downgraded given severity*
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	**Low**	Low likelihood	Mild	**Low**	No significant risk anticipated
	Construction (Foundations)	Direct contact/leaching	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated. Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	**Moderate/Low**	Unlikely	Medium	**Low**	No risk anticipated.

Table 10.2 - Summary of Revised Conceptual Site Model & Risk Assessment – Manor Grove

Potential Source	Potential Receptor	Plausible Pathway	Initial Risk Rating	Probability	Severity	Revised Risk Rating	Solution
Potentially contaminated made ground, near surface natural strata / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	**Moderate/Low**	Low likelihood	Medium	**Moderate/Low**	Removal of contaminated soils, likely to be undertaken as part of the site prep works
		Direct ingestion and/or dermal contact with liquid contaminants	**Very Low**	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	**Moderate/Low**	Unlikely	Severe	**Moderate/Low**	No risk anticipated. *Revised risk rating cannot be downgraded given severity*
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	**Low**	Low likelihood	Mild	**Low**	No significant risk anticipated. Localised PAH in made ground soils. Excavate and dispose.
	Construction (Foundations)	Direct contact/leaching	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated. Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	**Moderate/Low**	Unlikely	Medium	**Low**	No risk anticipated
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	**Moderate/Low**	Low likelihood	Medium	**Moderate/Low**	No risk anticipated.

Table 10.3 - Summary of Revised Conceptual Site Model & Risk Assessment – West End Avenue

Potential Source	Potential Receptor	Plausible Pathway	Initial Risk Rating	Probability	Severity	Revised Risk Rating	Solution
Potentially contaminated made ground, near surface natural strata / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	**Moderate/Low**	Unlikely	Medium	**Low**	No risk anticipated
		Direct ingestion and/or dermal contact with liquid contaminants	**Very Low**	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	**Moderate/Low**	Unlikely	Severe	**Moderate/Low**	No risk anticipated. *Revised risk rating cannot be downgraded given severity*
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	**Low**	Low likelihood	Mild	**Low**	No significant risk anticipated.
	Construction (Foundations)	Direct contact/leaching	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated. Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	**Moderate/Low**	Low likelihood	Medium	**Moderate/Low**	No risk anticipated.

Table 10.4 - Summary of Revised Conceptual Site Model & Risk Assessment – Doles Crescent

Potential Source	Potential Receptor	Plausible Pathway	Initial Risk Rating	Probability	Severity	Revised Risk Rating	Solution
Potentially contaminated made ground, near surface natural strata / perched groundwater	Human Health Site end-users, inc. maintenance and site workers (short term risk during construction)	Direct ingestion or dermal contact with soil, dust and/or vapour inhalation	**Moderate/Low**	Low likelihood	Medium	**Moderate/Low**	Removal of contaminated soils
		Direct ingestion and/or dermal contact with liquid contaminants	**Very Low**	Unlikely	Mild	**Very Low**	
		Direct ingestion and/or inhalation of asbestos fibres	**Moderate/Low**	Unlikely	Severe	**Moderate/Low**	No risk anticipated. *Revised risk rating cannot be downgraded given severity*
	Construction (Potable Water Supply Pipes)	Direct contact/leaching (tainting)	**Low**	Low likelihood	Mild	**Low**	No significant risk anticipated. Localised PAH in made ground soils. Excavate and dispose.
	Construction (Foundations)	Direct contact/leaching	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated. Appropriate concrete specification
	Controlled Waters	Surface run-off / lateral migration	**Low**	Unlikely	Mild	**Very Low**	No risk anticipated
Adjacent in-landfilled land/coal measures	Human Health	Inhalation (via ingress and accumulation)	**Moderate/Low**	Low likelihood	Medium	**Moderate/Low**	No risk anticipated.

11 CONCLUSIONS AND RECOMMENDATIONS

11.1 General

11.1.1 This geo-environmental appraisal has been carried out in relation to the redevelopment of various sites within Royston, Barnsley

11.1.2 It has been assumed in the production of this report that the sites are to be redeveloped for a residential with plant uptake end use.

11.2 Soil Contamination - Risk Evaluation

11.2.1 The revised Conceptual Site Model confirms that no significant potential contaminant linkages exist at the site in relation to existing on-site soils.

Human Health Receptors

11.2.2 Although several elevated concentrations of potential contaminants of concern were noted on Site 2 and Site 4 above relevant residential with plant uptake GAC values within the on-site soils and risk to future end users of the site is considered to be low, given the affected materials are likely to be removed from site as part of the site preparation works. It may be that a short-term risk (acute) to construction workers from PAH contamination may exist where localised made ground soils are present within Site 2 and Site 4.

11.2.3 Any potential risks to construction workers must be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislative requirements and follow appropriate guidance (e.g. HSE, 1991; CIRIA, 1996).

Controlled Waters Receptors

11.2.4 Although elevated contaminants of concern have been noted within the near surface deposits on Site 2 and Site 4 these are situated within the unsaturated zone and are anticipated to be removed as part of the site preparation works. Therefore, risk to controlled waters (underlying aquifer) receptors is considered to be low, but it may be that some localised excavation and disposal of made ground may be required during construction to alleviate any potential issue that may arise.

Ecological Receptors

11.2.5 There are no ecological receptors on any of the 4 no. sites.

Utilities

11.2.6 It is recommended that the results of the chemical testing and details of the proposed redevelopment of the site are provided to the appropriate utility companies to determine the necessity for service protection.

Potable Water Supplies

11.2.7 Risk to potable water supply pipes is considered to be low. On the basis of available test results, it is unlikely that protective measures will be required. Consultation should however be undertaken with the local water authority with respect to any precautions they may require, prior to construction.

Ground Gas Risk

11.2.8 The potential for ground gas generation was considered to be low, however given the presence of infilled ground to the north of the sites it was recommended that a single round of monitoring be undertaken.

11.2.9 The single round of monitoring was undertaken on the 1st February and showed the site to be a Characteristic Situation 1 (very low) as shown by the below results.

Monitoring Point	Methane (% v/v)	CO2 (% v/v)	O2 (% v/v)	Flow Rate (l/hr)	GSV (l/hr)	Water Level (m bgl)	H2S	Barrow metric Pressure
BH102	0.2	0.7	21.5	0	0	1.3	0	996
BH104	0.2	0.5	21.3	0.1	0.0005	1.45	0	996
BH201	0.2	0.1	22.3	0.1	0.0002	0.94	0	996
BH203	0.2	0.3	22.2	0	0	1.54	0	996

BH302	0.2	0.2	21.1	0.1	0.0002	0.57	0	994
BH402	0.2	0.3	20.2	0	0	1.13	0	995
AIR	0.2	0.1	22.4	-	-	-	0	996

Asbestos Containing Materials

11.2.10 No asbestos fibres were identified in the samples near surface soils analysed by the laboratory. Risks to construction workers and site end users are considered to be low.

Radon Precautions

11.2.11 No radon protection measures are required in construction.

11.3 Construction - Risk Evaluation

Site Preparation

11.3.1 A significant part of the enabling works will comprise the removal/stripping and stockpiling of existing topsoil from beneath development areas, along with the potential re-grading of the ground to achieve finished ground levels.

11.3.2 It may be that these works will need to be undertaken to an approved earthworks specification.

Sulphate Attack

11.3.3 Soil sulphate concentrations measured during the investigations have been compared to levels within the BRE Special Paper SD1:2005. In considering the sulphate values, the site has been assessed as 'brownfield'.

11.3.4 The on-site soils are not considered to be at risk from containing pyrite.

11.3.5 Design Sulphate classification of DS-1 should be suitable along with an ACEC class of AC-1s. However, this does not make any necessary allowance for the requirements of structural strength, or requirements for durability of concrete. Further consultation

should be made with the designing engineer with respect to the site-specific sulphate resistant concrete to be used.

11.3.6 Where made ground is encountered and is to remain on site, DS2 sulphate precautions may need to be adopted.

Mining Risk

11.3.7 The mining risk was assessed by advancing 7 no. rotary openhole boreholes to 15m bgl. 3 no. holes were advanced on sites 1 and 2 and 1 no. hole was advanced on site 3. No holes were advanced on site 4 as it lies outside the zone of influence of the underlying Royston coal seam. No voids or disturbed ground were encountered within any of the constructed boreholes and therefore the risk from shallow coal workings is considered to be low and no further precautions are required.

Foundations

11.3.8 Made ground soils of any type are **not** suitable founding stratum.

11.3.9 It is considered, where competent undisturbed natural strata is encountered at founding depth that, for structures of typical construction, shallow unreinforced strip or trench-fill foundations should be suitable. A minimum footing depth of 750mm for sites 2 – 4 and 1000mm for site 1 in this instance will probably be adequate when in cohesive soils and outside the zone of influence of trees (see below).

11.3.10 The widening, strengthening and reinforcement of foundations in accordance with NHBC Standards would be required where footings are found to straddle strata of different type (e.g. sand, clay, silt) or where soft and/or where locally unstable ground is encountered at founding depth.

11.3.11 Where ground disturbance is encountered during construction, for example where historic chalk pits are uncovered, an assessment of the ground and its implication on foundation design will need to be undertaken. In this instance it is envisaged that some ground improvement may be required with foundations being suitably strengthened/reinforced or an alternate foundation solution being implemented. This risk is likely to be low, but a watching brief should be undertaken during construction.

Floor Slabs

11.3.12 Ground bearing slabs could be used where ground conditions allow and no precautionary measures associated with soft and unstable soils are required.

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

needed where in excess of 600mm of unsuitable material (made ground) is present below floor slabs following site preparation/regrading.

11.3.14 Where ground bearing slabs are implemented, care must be taken to ensure that shallow strata do not become heavily disturbed by site clearance/construction activities (especially during inclement weather). Where this occurs, this could result in an increased requirement for suspended floor slabs.

Precautions Near Trees

11.3.15 There are several trees around the boundaries of Site 1, so precautions are likely to be required where structures lie within influencing distance given the underlying (clay) ground conditions that prevail on Site; this will be subject to a tree survey and plot specific foundation schedule. Precautions are unlikely to be required on the remaining given the predominantly granular nature of the underlying deposits.

11.3.16 In addition, precautions would be required where trees are to be removed or where new planting is proposed. All foundations should be constructed in accordance with NHBC Standards (i.e. Chapter 4.2).

Drainage and Soakaways

11.3.17 *In situ* permeability testing was carried out in six trial holes. The location of the tests is shown on Figures 40400/003 and 40400/004.

11.3.18 The results of the permeability testing is summarised in the table below.

Location	Soakage Area Dimensions (average m)	Test Depth (m bcgl)	Test Number	Infiltration Rate (m/sec)	Drainage Characteristics
SA1 – TP101	1.70 x 0.40	2.20	1	*	Practically Impermeable
SA2 – TP104	2.10 x 0.40	2.25	1	*	Practically Impermeable
SA3 – TP202	1.90 x 0.40	2.45	1	*	Practically Impermeable

SA4 – TP203	2.00 x 0.40	2.23	1	*	Practically Impermeable

* Unable to obtain infiltration due to a fall in water level from 75% to 25% not achieved. However, it can be inferred that the infiltration rate would be less than 1.0 x10-9 m/s.

11.3.19 Soakaways undertaken within TP202 encountered shallow perched groundwater seepage above the water infill line, causing the pit to fill up rather than soakaway.

11.3.20 Given that the soils encountered beneath the site comprised weathered Pennine Middle Coal Measures, the soakage rates obtained during the investigation are considered characteristic of such soils. On this basis, it is considered that soakaways are not suitable for use on the sites.

Roads and Car Parks

11.3.21 No *in situ* CBR testing has been carried out to date as the final development levels at the site are unknown.

11.3.22 On the basis of visual observation, it is considered that the near surface soils are likely to have a minimum CBR value of around 2-3%, perhaps higher, but this could be confirmed by testing if required.

11.3.23 Highways Agency document HD25 Interim Advice Note 73/06 Revision 1 (2009) states that where a subgrade has a CBR lower than 2.5%, it is considered unsuitable support for a pavement foundation since it would tend to deform under construction traffic and must be improved. All road design should be discussed with the local authority if highways are to be subject to a Section 38 agreement.

G*round Stability*

11.3.24 No significant ground instability is anticipated, although some should be anticipated within the near surface if granular or weak strata are present, or where excavations are left open during prolonged periods of wet weather (e.g. in service trenches). The underlying horizons of sand, where encountered at depth, were also observed to be unstable once exposed. This situation is likely to be exacerbated by water ingress. Allowance for instability in this material should be made where necessary.

11.3.25 An adequate drainage system for surface water may need to be installed by a competent contractor in order to prevent surface water ponding or collection, both during and post construction, as this may lead to deterioration and weakening of the founding stratum.

11.3.26 Where excavations are proposed close to site boundaries and there is the possibility of weak/unstable ground passing across that boundary and beneath adjacent structures, a risk assessment of the integrity/stability should be undertaken prior to such works being carried out. Designed and engineered temporary/permanent measures should be adopted to ensure their continued stability where necessary.

Excavations

11.3.27 Localised obstructions to excavations or shallow hard rock are not anticipated given the geology and lack of previous development.

11.3.28 Should remnant foundations or road base construction be encountered, in addition to that proven in the south-eastern corner, the braking-out of obstructions for either foundations or other construction requirements should be allowed for. Excavation of the materials encountered should be easily achieved using conventional hydraulic excavation techniques.

11.3.29 No man entry into unsupported excavations should be allowed without an appropriate risk assessment. Reference to CIRIA report 97 (1983) should be made to establish suitable means of support or battering of excavation sides.

Outline Remediation Requirements

11.3.30 On the basis of available information, it is considered that no particular remediation is required at the site, as it is likely that contaminated material is to be removed as part of the site preparation works.

11.3.31 Confirmation of the chemical condition of any materials brought to site should be confirmed prior to importation and be in accordance with YALPAG Guidance version 8.2 (February 2017).

Disposal of Soils

11.3.32 Should brightly coloured or odorous soil be encountered during the proposed construction works, Alan Wood and Partners should be notified immediately. An experienced geo-environmental engineer will visit site for further sampling, analysis and risk assessment, where required.

11.3.33 Any materials removed from site should be undertaken in accordance with the Duty of Care Regulations 1991 and the Hazardous Waste Regulations 2005. There will also be a requirement to classify the waste in accordance with the European Waste Catalogue. The waste should also be subject to Waste Acceptance Criteria (WAC) testing.

12 REGULATORY APPROVAL

12.1.1 The conclusions and recommendations presented in this report are considered reasonable based on available information and the assessment of the site as carried out by Alan Wood and Partners.

12.1.2 It should be noted however that the works undertaken cannot be guaranteed to gain approval by the Regulatory Authorities and your Warranty Provider, so copies of this report should be made available to the relevant organisations (as appropriate) for their comment and approval, prior to undertaking any irrecoverable works associated with the site.

13 INFORMATION SOURCES

In addition to the specific references cited in the text, the following references have been referred to in the production of this report, where relevant to the defined project objectives.

1 BRE *BR211* (2007) *Radon: guidance on protective measures for new dwellings*;

2 BRE GBG 75 (2009), '*Radon Protection for New Large Buildings';*

3 BS5930 (1999), *Code of practice for site investigations*;

4 BS:8576 (2013), *Guidance on Investigations for Ground Gas - Permanent Gases and Volatile Organic Compounds (VOCs)*;

5 BSEN 1997-1 (2004), *Geotechnical Design Part 1 – General Rules*;

6 BSEN 1997-2 (2007), *Geotechnical Design Part 2 – Ground investigation and testing*;

7 Chartered Institute of Environmental Health (CIEH): *Professional Practice Note: Reviewing human health risk assessment reports invoking contaminant oral bioavailability measurements or estimates* (2009);

8 CIRIA C552 (2001), *Contaminated Land Risk Assessment, A Guide to Good Practice*;

9 CIRIA C665 (2007), *Assessing risks posed by hazardous ground gases to buildings*;

10 CL: AIRE / EIC / AGS: *Soil Generic Assessment Criteria for Human Health Risk Assessment* (updated January 2010 version);

11 Coal Authority, *www.coal.decc.gov.uk*;

12 DEFRA SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document*, December 2014;

13 DETR Circular 02/2000 (2000). *Environmental Protection Act 1990 Part IIA. Contaminated Land.* Department of the Environment, Transport and the Regions, Circular 02/2000, Dated 20th March 2000;

14 Environment Agency (EA) & DEFRA: Model Procedures for the Management of Land Contamination – Contaminated Land Report 11 (CLR11) (2004);

15 Environment Agency, *www.environment-agency.org.uk*;

16 Environment Agency (2009). *Human Health Toxicological Assessment of Contaminants in Soil*, Science Report SC050021/SR2;

17 Environment Agency (2009). *Updated Technical Background to the CLEA Model*, Science Report SC050021/SR3;

18 Land Quality Management / CIEH: *The LQM/CIEH S4UL's for Human Health Risk Assessment*, Land Quality Press, Nottingham, 2015. Publication Number S4UL3286;

19 NHBC Chapter 4.2 (2018), *Building near trees,* NHBC Publication, July 2018.

20 Hamson Barron Smith – Preliminary land contamination and geotechnical risk assessment – Meadstead Drive – 23-24-18-1-6006/DSR3 –July 2017

21 Hamson Barron Smith – Preliminary land contamination and geotechnical risk assessment – Manor Grove – 23-24-18-1-6006/DSR2 –June 2017

22 Hamson Barron Smith – Preliminary land contamination and geotechnical risk assessment – West End Avenue – 23-24-18-1-6006/DSR1 –June 2017

24 Hamson Barron Smith – Preliminary land contamination and geotechnical risk assessment – Doles Crescent – 23-24-18-1-6007/DSR1 –July 2017

FIGURES



DO NOT SCALE

Approximate Red Line Boundary

N

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Site Location Plan Meadstead Avenue		
Date. 04.01.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 001	Rev.	



DO NOT SCALE

Approximate Red Line Boundary Manor Grove

Approximate Red Line Boundary West End Avenue

N

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Site Location Plan Manor Grove & West End Avenue		
Date. 04.01.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 002	Rev.	



DO NOT SCALE

Approximate Red Line Boundary

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Site Location Plan Doles Crescent		
Date. 06.02.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 006	Rev.	



DO NOT SCALE

Approximate Red Line Boundary

Proposed Rotary Borehole Locations

Windowless Sampler Borehole Locations 15th January 2018

Trial Pit Locations 16th January 2018

Soakaway Locations 16th January 2018

N

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Exploratory Hole Location Plan Meadstead Avenue		
Date. 24.01.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 003	Rev. A	



DO NOT SCALE

Approximate Red Line Boundary Manor Grove

Approximate Red Line Boundary West End Avenue

Proposed Rotary Borehole Locations

Windowless Sampler Borehole Locations 16th January 2018

Trial Pit Locations 17th January 2018

Soakaway Locations 17th January 2018

N

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Exploratory Hole Location Plan Manor Grove & West End Avenue		
Date. 24.01.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 004	Rev. A	



DO NOT SCALE

Approximate Red Line Boundary

Windowless Sampler Borehole Locations 17th January 2018

Trial Pit Locations 17th January 2018

N

Alan Wood & Partners

Client.	NPS Barnsley Limited		
Project.	NPS Barnsley, Royston, Various Sites		
Drawing.	Exploratory Hole Location Plan Doles Crescent		
Date. 24.01.18		Scale. NTS	
Drawn by. DA	Check by.	Approved by.	
Status:	FINAL		
Job no. 40400	Fig. no. 005	Rev. A	

APPENDIX A:

HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – MEADSTEAD DRIVE – 23-24-18-1-6006/DSR3 – JULY 2017

Architecture
Surveying
Building Services Engineering
Engineering
Strategic Development & Consultancy



Meadstead Drive
Barnsley

Preliminary Land Contamination and Geotechnical Risk Assessment

On behalf of Barnsley Metropolitan Borough Council

Report 23-24-18-1-6006/DSR3
July 2017

Report Issue Record

Project No.:	23-24-18-1-6006
Project Title:	Meadstead Drive
Site Location:	Royston, Barnsley
Client:	Barnsley Council
Report Title:	Preliminary Land Contamination and Geotechnical Risk Assessment
Issue Date:	13 July 2017
Report No.:	23-24-18-1-6006/DSR3
Revision:	-

	Written	Reviewed and Approved
Name	**Catherine Riley** BEng, BSc, CEng, CEnv, MCIWEM	**Craig Roberts** BSc, FIEnvSc, CEnv
Signature		
Position	Senior Geo-Environmental Engineer	Technical Director

Contents

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3 Site Description 4
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5 Geotechnical Assessment 11
6 Contamination Risk Assessment 14
7 Conclusions and Recommendations 21
8 Limitations and Uncertainties 24
9 General Notes 25

Appendices

A Proposed Development Plan
B Historic Maps
C Groundsure EnviroInsight Report
D Groundsure GeoInsight Report
E Coal Authority and SYMAS Report

Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Meadstead Drive
Location	Royston, Barnsley, S71 4JS. NGR 435662, 411397.
Approximate area	0.26Ha
Topography	Elevations range from approximately 72.5m OD in the north to 67.4m OD in the south.
Current land use	Disused pasture land
Proposed development	Low rise residential.

SITE SETTING	
Geology	Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Radon	No radon protective measures are required.
Hydrogeology	Secondary A Aquifer. The site does not lies within a source protection zone.
Hydrology	Tertiary watercourse 295m south east.
Landfill sites	No landfills located within 500m of the site.
History	Ordnance Survey plans suggest the site has comprised undeveloped agricultural / pasture land until the present time.
Previous site investigations	Hamson Barron Smith have not been made aware of any previous investigations which may have been undertaken at this site.
Anticipated ground conditions	Clayey sands or sandy clays derived from weathering of the sandstone bedrock. Sandstone bedrock at shallow depth.

GEOTECHNICAL	
Foundations	Shallow spread foundations should be suitable. Bearing capacity to be determined from site investigation, but are likely to be sufficient for conventional low rise structures.
Shrinkable soils	Soils are likely to be non shrinkable.
Buried concrete	Significant concrete protection measures unlikely to be required.
Floor slabs	Ground bearing floor slab likely to be suitable.
Slope stability	Gradients are considered generally stable but careful assessment of changes of elevation or construction near existing slopes would still be needed.
Pavement	CBR values likely to be adequate for road and car park construction.
Soakaways	Underlying geology likely to be suitable for soakaway drainage, subject to full scale testing to confirm and calculate infiltration rates.
Natural cavities	None expected.
Mining	The Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth (>8m bgl) beneath the site. The SYAMS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore the likelihood if historical ground workings being present is considered to be low.

CONTAMINATION	
Human health	No significant risks identified.
Controlled waters	No significant risks identified.
Gas protection	No significant risks identified. No radon protective measures are required.

1 Introduction

In May 2017, Hamson Barron Smith (HBS) was commissioned by Barnsley Council to undertake a Preliminary Land Contamination and Geotechnical Risk Assessment at Meadstead Drive, Royston, Barnsley for the proposed redevelopment of the site.

It is understood that the site is being considered for residential redevelopment comprising seven bungalows. A sketch layout has been provided by NPS Barnsley and is presented in Appendix A.

The site comprises an overgrown field. The location of the site is shown on Figure 1.

1.1 Project Requirements

The overall objectives of this Phase I assessment are to determine the potential risks from contamination and to identify potential geotechnical risks and constraints.

The objectives of the Phase I report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Review historical and recent land uses to assess the potential for contamination to be present from past and current land-use.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities that may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks.
- Develop a ground model for the site.

1.2 Information Sources

During the production of this report the following sources have been reviewed:

- An EnviroInsight Report prepared by Groundsure (Report Number GS-3977681 dated 12th June 2017).
- A GeoInsight Report prepared by Groundsure (Report Number GS-3977682 dated 12th June 2017).

- A CON29M Non-Residential Mining Report prepared by the Coal Authority (Report Number 51001479636001 dated 12th June 2017).
- A Mineral Report prepared by South Yorkshire Mining Advisory Service (SYMAS) (Report Number M230/8 dated 18th November 2014)
- Historic Ordnance Survey maps.
- British Geological Survey maps.
- British Geological Survey borehole records.
- Environment Agency landfill records.
- Environment Agency groundwater data.

1.3 Previous Investigations

HBS has not been made aware of any previous investigations which may have been undertaken at this site.

2 Site Location

Address: Meadstead Drive, Royston, Barnsley.

Post Code: S71 4JS.

National Grid Reference: 435662, 411397.

The site location is shown on Figure 1 and a more detailed plan on Figure 2.

Full details of the site's features and land use are presented in Section 3.

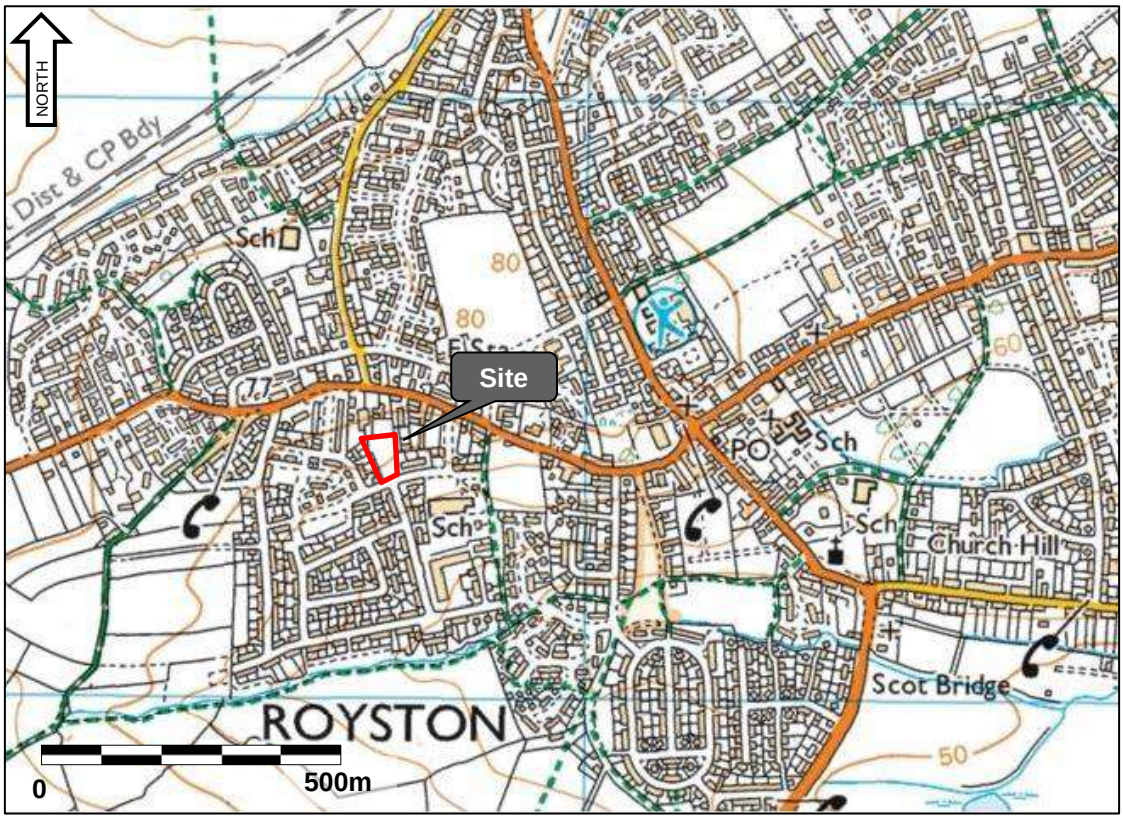


Figure 1 Site location plan

3 Site Description

The site lies to the north of Meadstead Drive in the town of Royston. The site occupies an area of 0.26Ha and there is a slight fall in topography from 72.5m in the north to 67.4m in the south.

A site walkover survey was undertaken on 13th June 201 by HBS. Access to the site is gained via a track to the west of the site. The site is disused and is overgrown.

3.1 Adjacent land Use

The site is bounded on all sides by residential premises. Figure 2 shows the site setting.

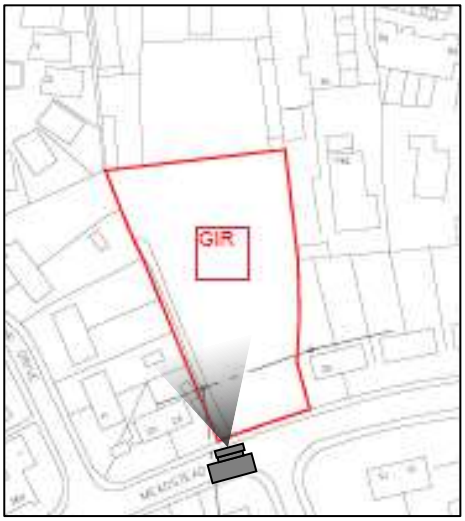


Figure 2 Site layout

3.2 Photographs

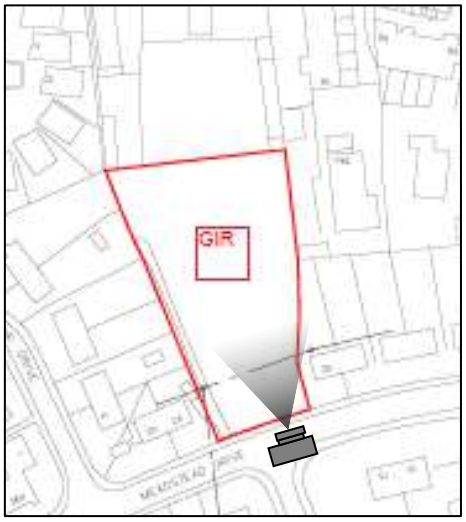


Photograph 1 Access track to west of site, looking north.





Photograph 2 The site, looking north.



4 Environmental Setting

4.1 Geology

The 1:50,000 scale British Geological Survey (BGS) geological mapping indicates the site to be underlain by the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures, which outcrop immediately south of the site. No superficial deposits are anticipated beneath the site.

The Pennine Middle Coal Measures are described by the BGS as "*Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit*".

There are no BGS borehole records in the vicinity of the site.

4.2 Soil Geochemistry

BGS estimated soil geochemistry information is included as part of the Groundsure GeoInsight report. The BGS digital estimated soil chemistry data indicates the estimated geometric mean concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Nickel and Lead in topsoil derived by spatial interpolation of the point source soil chemistry data. The original samples were collected and analysed as part of the BGS Geochemical Baseline Survey of the Environment (G-BASE) project.

Table 1 summarises the typical estimated concentrations of each determinant in topsoil in the locality of the site.

Table 1: Summary of BGS Estimated Soil Geochemistry

Determinant	Concentration Range (mg/kg)
Arsenic	<15
Cadmium	<1.8
Chromium	90 – 120
Lead	<100
Nickel	15 – 30

4.3 Hydrogeology

The Environment Agency classifies the Pennine Middle Coal Measures at the site to be a Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater abstractions within 2km.

This would suggest that groundwater would be of low sensitivity to any potential sources of on-site contamination.

4.4 Hydrology

The nearest surface water is an unnamed tertiary river which lies circa 295m south east at its nearest point. The distance of the site from the surface water feature would suggest that surface water is considered to be of low sensitivity to any potential sources of contamination.

4.5 Landfill Sites

There are no recorded current or historical landfill sites within 500m.

4.6 Radon

The Groundsure radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

4.7 Sensitive Land Uses and Designated Areas

The site is in a Nitrate Vulnerable Zone.

There are no other sensitive land uses or designate sites within 1km.

4.8 Land Use History

The historical land uses of the site and its surrounding area have been established from superseded editions of Ordnance Survey maps and are detailed in Table 2. Copies of the maps are included in Appendix B.

Table 2: Summary of Historical Maps

Date	On Site	Offsite
1854	The site is part of a larger agricultural field.	The general surrounding land use is agricultural with residential properties in the village of Royston present to the north. A pond marked “brick pond” lies 250m west.
1891-1893	No significant changes are evident.	No significant changes are evident.
1904-1906	No significant changes are evident.	A quarry is present c.320m east and a smithy c.410m south east.
1918	No significant changes are evident.	Limited Mapping: No significant changes are evident.
1930-1938	No significant changes are evident.	The village of Royston has expanded. The quarry and smithy are no longer marked. The pond is no longer marked and some residential development has occurred in its vicinity.
1948	No significant changes are evident.	No significant changes are evident.
1951	No significant changes are evident.	No significant changes are evident.
1960-1966	No significant changes are evident.	A housing estate is present surrounding the site.
1970-1976	No significant changes are evident.	Further housing development has occurred and the school has been constructed.
1978-1983	No significant changes are evident.	No significant changes are evident.
1988-1993	No significant changes are evident.	No significant changes are evident.
2002	No significant changes are evident.	No significant changes are evident.
2010	No significant changes are evident.	No significant changes are evident.
2014	No significant changes are evident.	No significant changes are evident.

4.8.1 Summary of Development History

On site

The site has remained undeveloped agricultural land, including pasture land, until the present.

Off Site

The surrounding land use was typically undeveloped farmland becoming a mixture of agricultural land and residential properties. A former pond was located 250m west of the site. This pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The nature of material used to backfill the pond is not known.

4.9 Statutory Authority Records

A review of public registers contained within the Groundsure EnviroInsight report has been undertaken. These entries relate to trade directories, pollution control registers, hazardous sites, enforcement notices etc. None of the entries are considered to be of relevance to the site, for full details of all entries, reference should be made to the EnviroInsight report in Appendix C.

5 Geotechnical Assessment

The published geological information (Section 4.1) indicates that the site is likely to be underlain by underlain by clayey sands or sandy clays of weathered sandstone bedrock of the Pennine Middle Coal Measures.

An assessment of potential geotechnical risks based on the information from the Groundsure GeoInsight Report and available geological information is presented in the following sections. The risks are summarised in Table 4. The Report is reproduced in Appendix D.

5.1 Deep Made Ground

The site has never been developed therefore Made Ground resulting from infilling or significant raising of levels is considered unlikely.

5.2 Buried Structures

The site has never been developed.

5.3 Compressible Soils

The Groundsure GeoInsight report states that the Compressible Ground risk at the site is “negligible”. Based on the expected geology, compressible soils are not anticipated.

5.4 Shrinking / Swelling Clay

The Groundsure GeoInsight report states that the Shrinking or Swelling Clay risk at the site is “negligible” to “very low”. This is based on the anticipated Mexborough Rock. However, the near surface soils may comprise clays derived from weathering of the bedrock and therefore may potentially be shrinkable.

5.5 Collapsible soils

The Groundsure GeoInsight report states that the Collapsible Ground risk at the site is “very low”. Based on the anticipated ground conditions, collapsible soils are not expected.

5.6 Aggressive Ground Conditions for Concrete

Based on the published geology, the anticipated soils are not expected to contain significantly elevated concentrations of soluble sulphates or pyritic materials which may oxidise to form soluble sulphates.

5.7 Running Sands / Excavation Instability

The Groundsure GeoInsight report states that the Running Sand risk at the site is "negligible". Based on the anticipated ground conditions, running sands are not expected.

5.8 Groundwater

No evidence of a high water table (such as ponding water, hydrophilic plants, soft ground etc.) was noted during the site walkover.

5.9 Slope Stability

The Groundsure GeoInsight report states that the Landslide risk at the site is "Very low".

The site slopes gently from north to south. Provided no significant alterations to the site's topography are made no issues with stability are anticipated. Any proposed slopes or temporary cutting for retaining systems should be carefully assessed however.

5.10 Solution Features / Natural Cavities

The site is expected to be underlain by sandstone of the Mexborough Rock which is not prone to dissolution.

The Groundsure GeoInsight report states that the Ground Dissolution risk at the site is "negligible" and no solution features are recorded within 1km.

5.11 Underground Mining

The GeoInsight report states that the site is within an area affected by coal mining. A Coal Authority Mining Report was obtained by HBS, this report confirmed:

- The property is in an area that could be affected by underground mining from six seams of coal at 280m to 560m depth, and last worked in 1980. Any movement in the ground due to coal mining activity should have stopped.
- There are no known mine entries on or within 20m of the site.
- 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.
- The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.
- The Coal Authority has no record of a mine gas emission requiring action.

The SYMAS Report indicates that the Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site. From Manor Grove eastwards, the seam outcrop has been proven during past investigation to deviate further southward from the conjectured line on published geology maps. This would mean that the coal seam would be expected at a greater depth beneath this site, possible in excess of 8m.

The report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefor the likelihood if historical ground workings being present is considered to be low.

The report confirms that deep mining has occurred in the area, however it concludes that the site can be regarded as stable from deep mine workings.

The Coal Authority and Mine Entry Interpretative Reports are presented in Appendix E.

6 Contamination Risk Assessment

6.1 Legislative Background

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

Part 2A

Part 2A provides a regulatory regime for the identification and remediation of contaminated land and is the primary mechanism in the contaminated land regime. Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

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

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

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

Part 2A is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'.

In applying the definition of Contaminated Land, Part 2A states that 'the Local Authority must:

- Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
- Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as 'contaminated land'.

NPPF

NPPF States that 'to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.'

Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

NPPF also states that after any required remediation, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

6.2 Preliminary Conceptual Site Model

Following a review of the desk based geo-environmental information on the site and a site reconnaissance, a preliminary CSM has been formulated to identify potential

sources of contamination, likely receptors and potential pathways on and in the immediate vicinity of the site.

It should be noted that some uncertainties exist due to the limited site specific data available. However, potential contaminants and receptors have been identified based on this Phase 1 desk study review. Pathways have been established on reasonable scientific knowledge of the behaviour of the contaminants in the ground.

It should also be noted that because the assessment is based on documentary evidence contaminants may be identified, which in practice are not present and contaminants may be present which have not been identified.

The guidance provided in CLR11 indicates the CSM should identify those contaminants, pathways and receptors which are 'likely' to represent an 'unacceptable' risk either to human health or the surrounding environment.

6.3 Potential Contaminant Sources

6.3.1 Onsite

No significant areas of potential concern were identified from the site walkover and there are no historical uses that may have resulted in significant contamination identified.

6.3.2 Off site

The surrounding land use was principally farmland becoming mix of farmland, allotments and residential properties. A pond was recorded in the early 1900s approximately 250m north west.

6.3.3 Infilled Pond

A pond is shown on the early historical mapping approximately 250m west of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled.

The materials used to fill the pond are not known, infill materials may have the potential to act as a source of soil and or groundwater contamination.

If the materials used to backfill the site contain putrescible materials then there is the potential for the filled pit to act as a source of landfill gas. Although there is the potential for the landfilling of materials to act as source of gas it is considered given the size of the feature and the date of filling that it is unlikely to represent significant on-going source of landfill gas.

6.3.4 Potential Contaminants of Concern

In the absence of any specific potential sources, a general suite of common brownfield contaminants should suffice in assessing actual risks.

6.4 Landfill gas

No current or historical landfills are known to exist within 500m of the site. No organic soils are anticipated to lie beneath the site. It is noted that an infilled pond is locate approximately 250m west of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The materials used to fill the pond are not known. Given the size of the feature, the date of filling and the distance from the site it is considered unlikely that the infilled pond will represent a significant on going source of landfill gases. Consequently, the risks to end users from explosive or asphyxiating gases is considered low.

No sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development. However, as the site lies within an area where coal resources are present, it is recommended that a minimum of one round of gas monitoring is undertaken as part of the site investigation to validate this assumption.

6.4.1 Radon

The Groundsure GeoInsight report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

6.5 Receptors

It is understood that the site will be redeveloped with low rise residential properties. Future Residents are assumed therefore to occupy the site full time and may be exposed directly to soils within the site. Construction workers would be directly exposed to soils, however this would only be short term.

- Future Residents
- Construction workers
- Construction materials (including services)
- Groundwater – Secondary A Aquifer.
- Surface Water - nearby secondary River 295m south east
- Flora and fauna.

6.6 Preliminary Risk Assessment

A preliminary risk assessment was undertaken based on a qualitative assessment of the likely presence of a pollutant linkage. A pollutant linkage is the relationship between a source (or contaminant), a pathway and a target (or receptor). Unless all three elements of a pollutant linkage are present, a significant risk is not considered to exist. The approach adopted is to screen each site based on assigning a simple low, medium or high category.

The preliminary risk assessment is shown in Table 3 overleaf.

Table 3 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
No onsite or off site sources identified.	Human Health – future residents.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
		Indirect Contact - Vapour inhalation.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
		Hydrocarbon tainting of potable water supply pipes.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
		Indirect Contact - Vapour inhalation.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
	Controlled Waters – No surface water lies within 250m of the site.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Unlikely – no sources identified and no surface water lies within 250m of the site.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Unlikely – Underlying geology not anticipated to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Ground gases.	Human Health – future residents.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: High Magnitude: **Low Risk**
	Flora	Displacement of oxygen from root systems	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Radon.	Human Health – future residents.	Permeation through ground floor.	Unlikely - No protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

7 Conclusions and Recommendations

7.1 Geotechnical Risks

The potential for geotechnical hazards are summarised in Table 4.

Table 4: Summary of Geotechnical Hazards.

Potential Geological Hazard	Impact on proposed development	Likelihood of presence
Deep Made Ground	High	Unlikely
Buried structures	Moderate	Unlikely
Compressible ground	Moderate	Unlikely
Shrinking / swelling clay	Moderate	Unlikely
Collapsible ground	High	Unlikely
Aggressive ground conditions for concrete	Low	Unlikely
Running sands / excavation instability	Moderate	Unlikely
High water table / groundwater inflows.	High	Unlikely
Slope stability	Moderate	Unlikely
Underground mining	High	Unlikely
Ground dissolution / natural cavities	High	Unlikely

Based on the anticipated ground conditions, conventional spread foundations should be suitable for the proposed development.

The near surface soils are not anticipated to comprise significant thicknesses of shrinkable soils and foundations are therefore unlikely to require deepening in the vicinity of trees. A ground bearing ground floor slab may be suitable.

The soils may be sufficiently permeable to allow soakaway drainage to be used. The Local Authority are likely to require full scale testing in accordance with BRE 365 (2016) obtain infiltration rates for design.

7.2 Land Contamination

The site appears to have comprised undeveloped land to the present date, with no evidence of potentially contaminative processes or materials within or adjacent to the site.

Therefore, the site is considered to be low risk with regards to contamination or landfill gas and no remedial measures are considered to be necessary in this regard.

The potential risks are based on the worst case assumption that the sources may have occurred. It must be noted that there is no evidence to suggest that this may have occurred. The actual risks to the receptors would need to be determined by undertaking an intrusive ground investigation and laboratory analysis. The scope of such an investigation should be discussed and agreed with the local authority.

7.3 Ground Gas

7.3.1 Landfill gas

No sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation, it is currently envisaged that no gas protection measures will be required to be incorporated into the future development. However, as the site lies within an area where coal resources are present, it is recommended that a minimum of one round of gas monitoring is undertaken as part of the site investigation to validate this assumption.

7.3.2 Radon

No radon protective measures are required in the construction of new developments or extensions.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

7.4 Coal Mining

The mining assessment has confirmed the site is underlain by deep mining, which was last undertaken in 1980. Any movement in the ground due to coal mining activity should have stopped therefore the site should be stable with respect of deep mine workings. However, the site is in an area where shallow coal is anticipated which may have been worked sometime in the past.

Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth (anticipated to be >8m) beneath the site.

The SYMAS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore, the likelihood if historical ground workings being present is considered to be low.

7.5 Summary

The aim of this report was to assess the potential geotechnical and geo-environmental issues at the proposed development site. No significant potential sources of contamination have been identified from the Preliminary Risk Assessment. To enable the knowledge of the contaminating potential and land quality of this site to be developed further a Phase II Site Investigation would be required.

In general, where any new building is proposed an intrusive investigation should be carried out so that geotechnical parameters and sub-surface ground conditions can be determined to assist in the design of the structure. Any potential abnormal geotechnical risks identified in this report should be properly investigated so that the actual level of risk and any remedial measures required can be determined. While the provision of a detailed specification for any Phase II investigation was not part of the Client's brief for this report, it should be noted that any intrusive investigation should address any specific contamination and geotechnical risks highlighted in this report. Where any potential sources of contamination have been identified these should be thoroughly investigated to determine actual risks to any identified receptors. Even where no potential sources of contamination have been identified, it would be prudent to undertake confirmatory testing of soils during any geotechnical investigation.

8 Limitations and Uncertainties

8.1 General

It should be noted that the levels of risk identified in this report are perceived risks based on the information reviewed. No physical investigation or testing has been carried out; actual risks can only be assessed following a physical investigation of the site. Further work, including physical investigation, laboratory testing and ground gas monitoring may be required by the appropriate regulators to confirm actual conditions.

This report has been prepared by Hamson Barron Smith with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions.

The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Hamson Barron Smith reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Hamson Barron Smith.

Hamson Barron Smith disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

9 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Hamson Barron Smith Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Hamson Barron Smith Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Hamson Barron Smith Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the conditions encountered in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the assessment, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either

visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

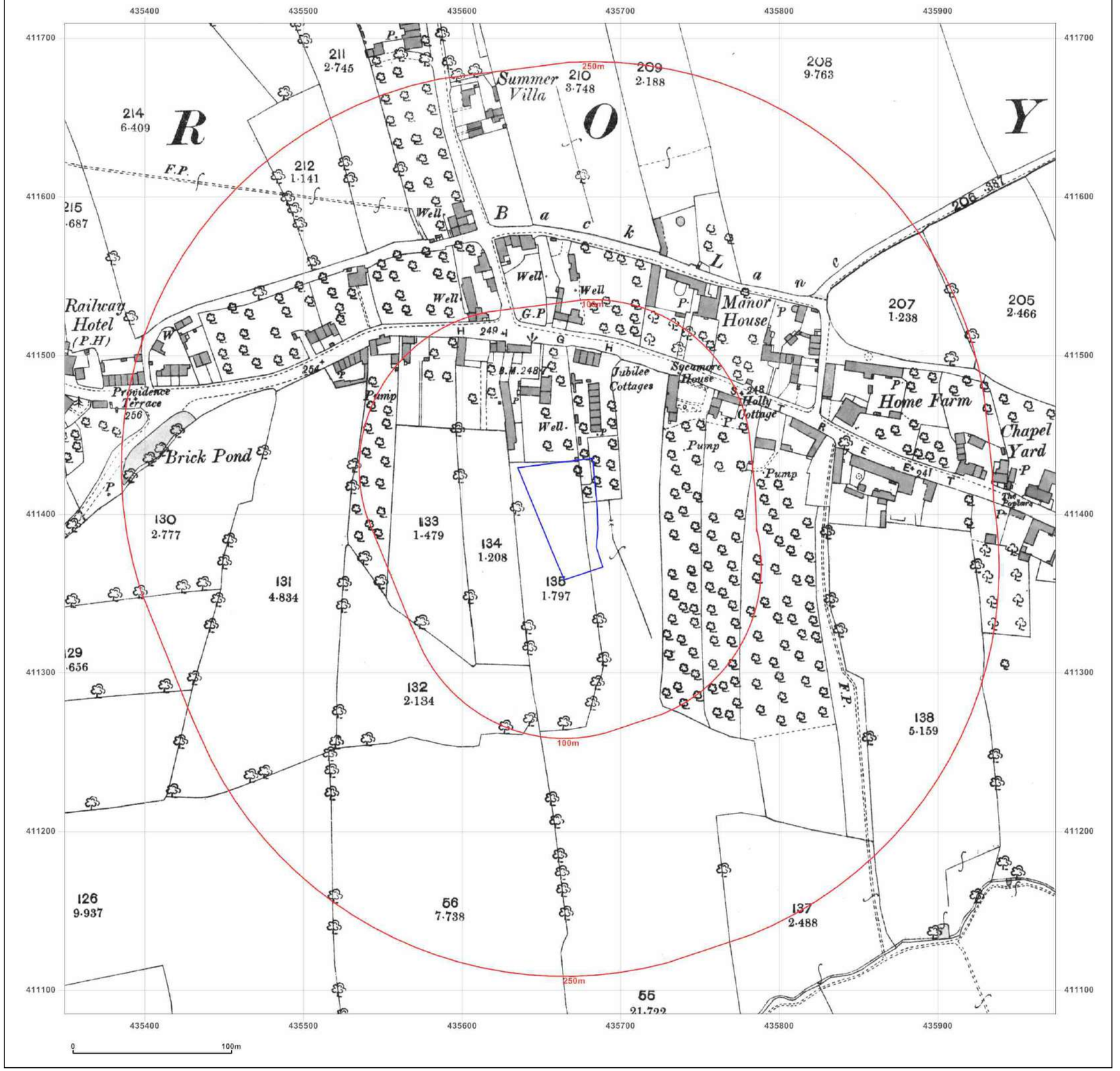
Proposed Development Plan



1:500 Meadstead Drive: 5no. 2 Bed 3p./ 2no 2 Bed (TBC) 7 Bungalows.

Appendix B

Historic Maps



Groundsure INSIGHTS

Site Details:

MEADSTEAD DRIVE,
BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1893**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A

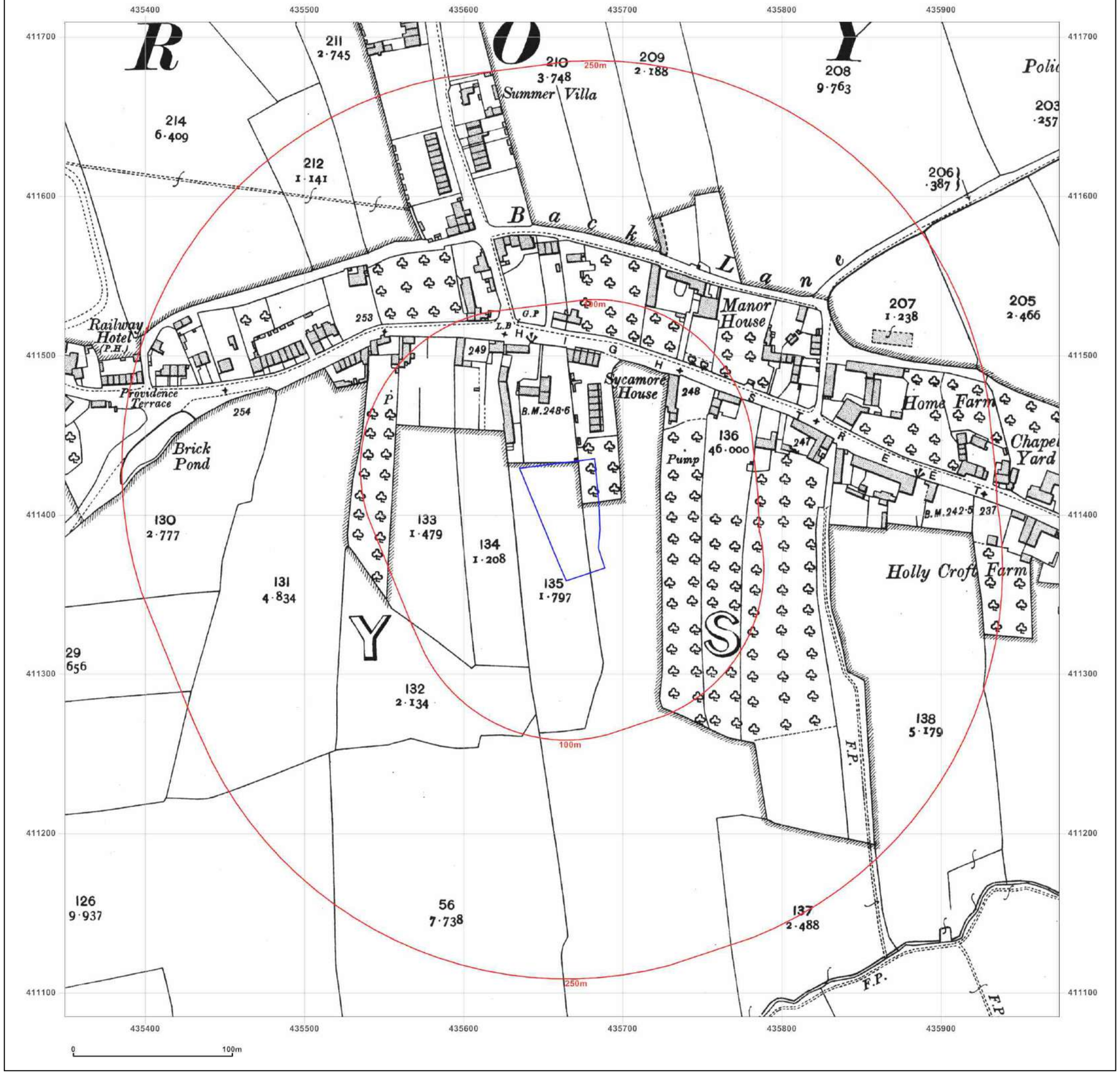
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Site Details:

MEADSTEAD DRIVE,
BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1906**

Scale: 1:2,500

Printed at: 1:2,500

N
W E
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Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

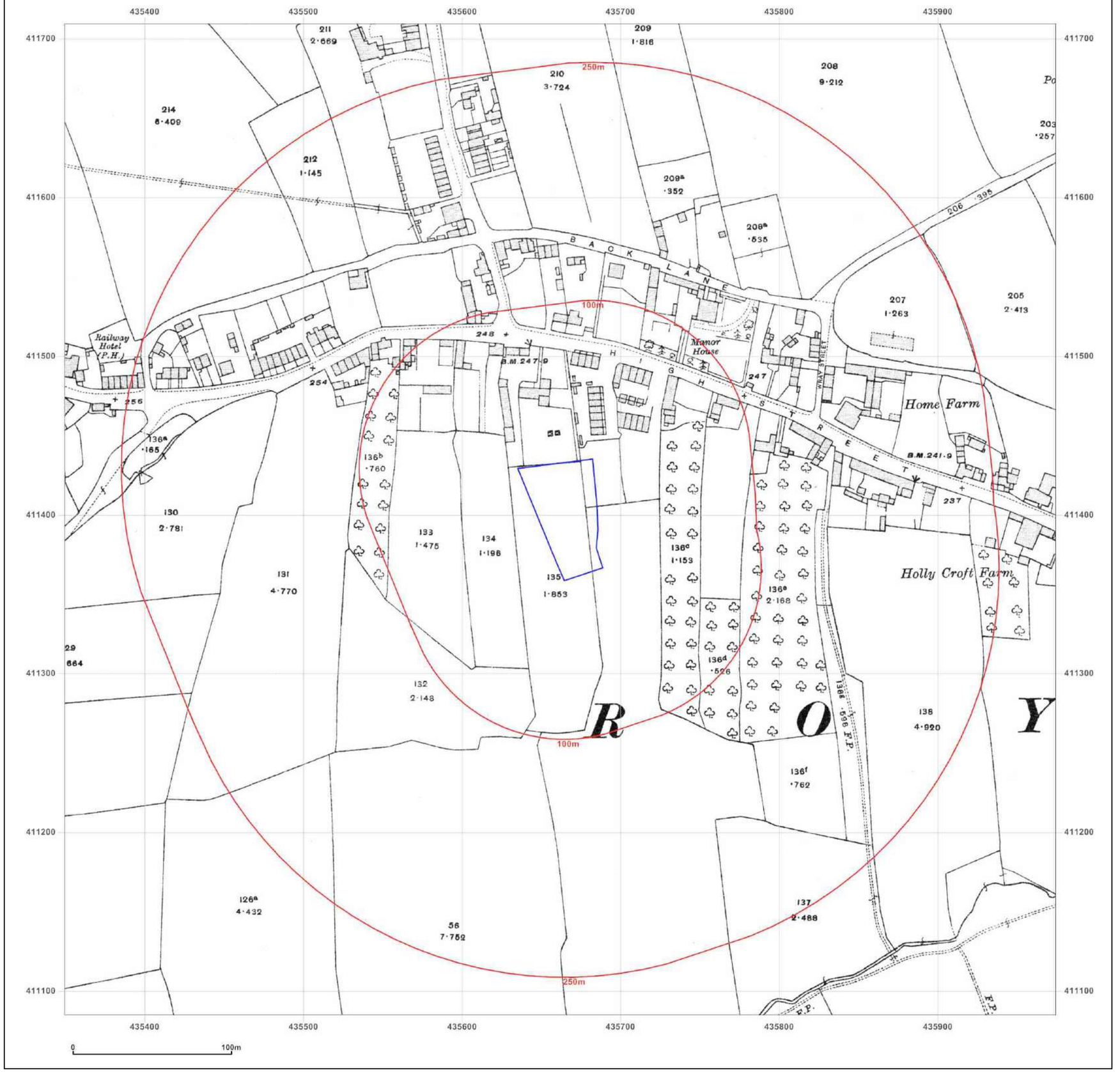
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1918**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1891
Revised 1914
Edition 1918
Copyright N/A
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MEADSTEAD DRIVE,
BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1960**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
Levelled 1959

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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

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Edition N/A
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MEADSTEAD DRIVE,
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1976**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1975 Revised 1975 Edition N/A Copyright 1976 Levelled 1964	Surveyed 1975 Revised 1975 Edition N/A Copyright 1976 Levelled 1964
Surveyed 1975 Revised 1975 Edition N/A Copyright 1976 Levelled 1964	Surveyed 1975 Revised 1975 Edition N/A Copyright 1976 Levelled 1964

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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid
Map date: **1978-1983**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1981
Levelled 1964

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

Surveyed 1964
Revised 1983
Edition N/A
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Site Details:

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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

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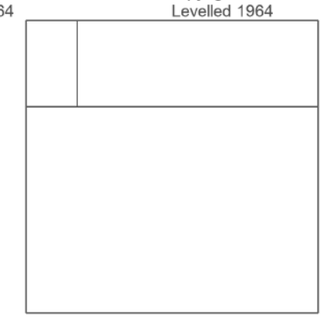
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Surveyed 1975
Revised 1984
Edition N/A
Copyright 1986
Levelled 1964

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1986
Levelled 1964



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Site Details:

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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

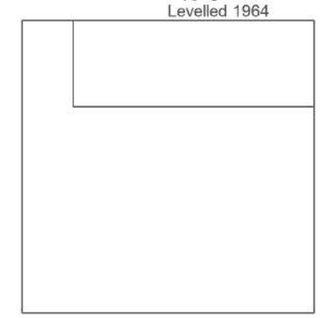
Map date: **1986**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1964
Revised 1986
Edition N/A
Copyright 1986
Levelled 1964



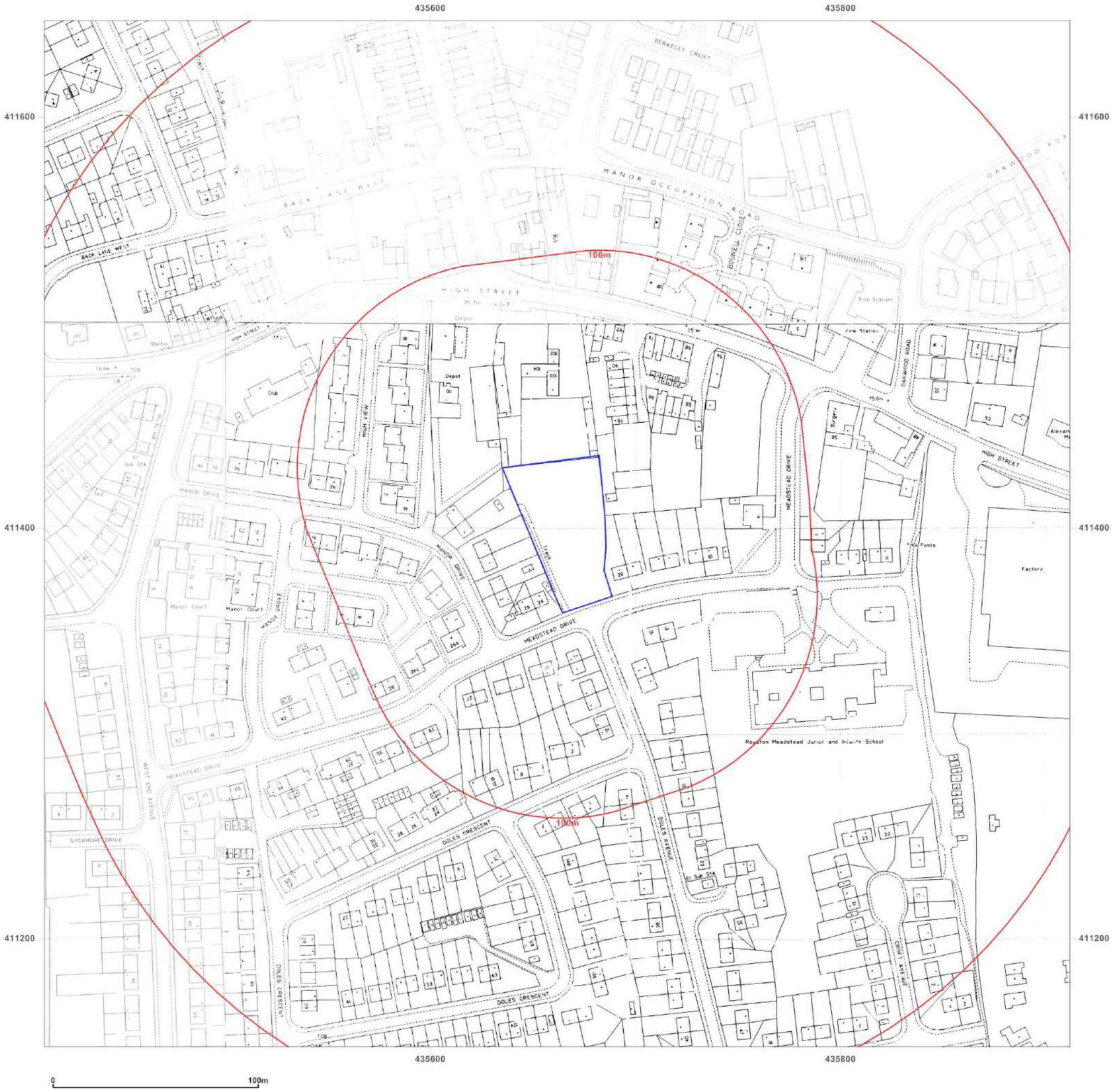
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid
Map date: **1988-1993**
Scale: 1:1,250
Printed at: 1:2,000

N
W E
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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed N/A Revised N/A Edition N/A Copyright 1988 Levelled N/A
Surveyed 1993 Revised 1993 Edition N/A Copyright N/A Levelled N/A	Surveyed 1993 Revised N/A Edition N/A Copyright 1993 Levelled N/A

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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
S

Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

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

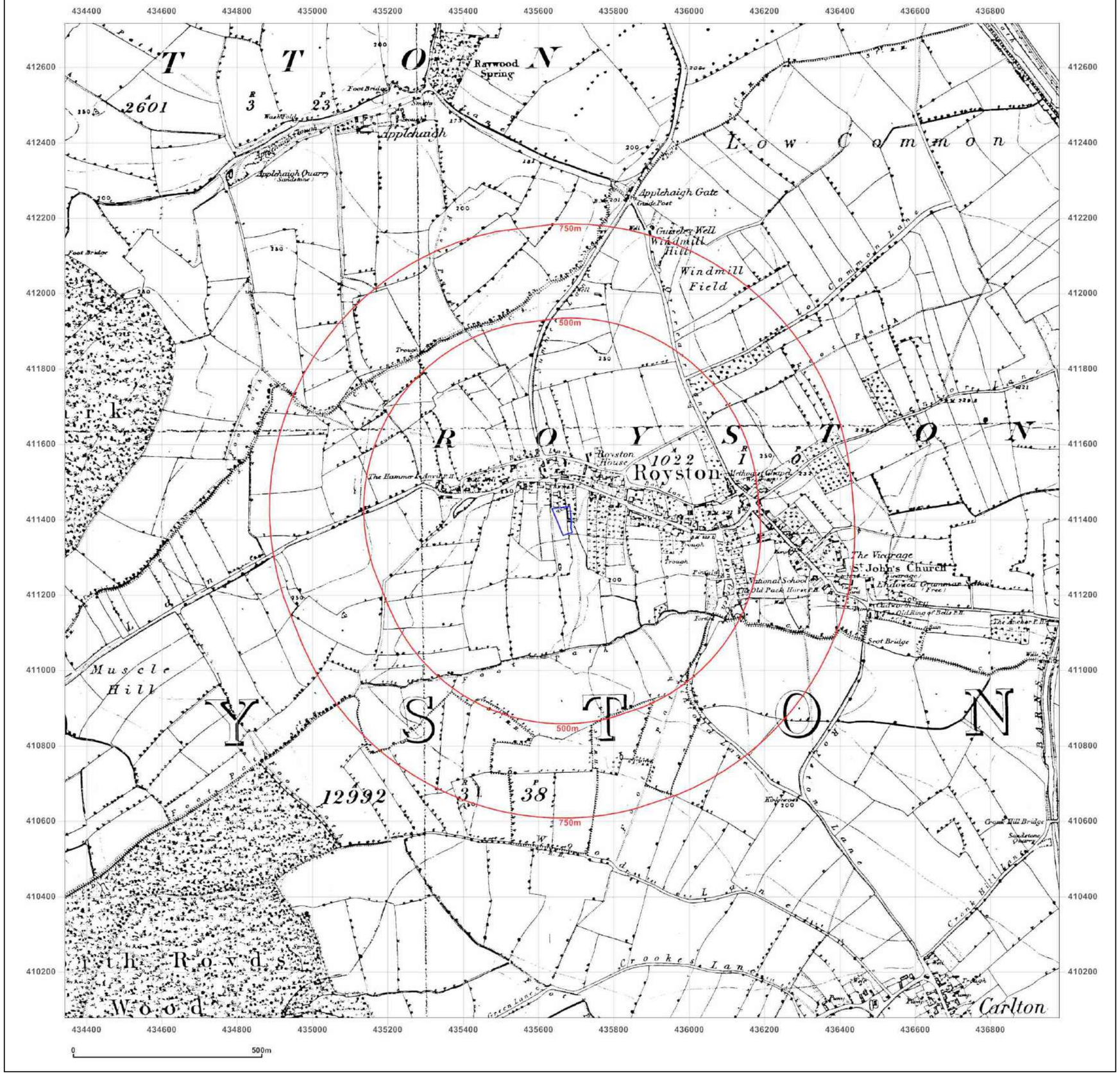
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1854**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

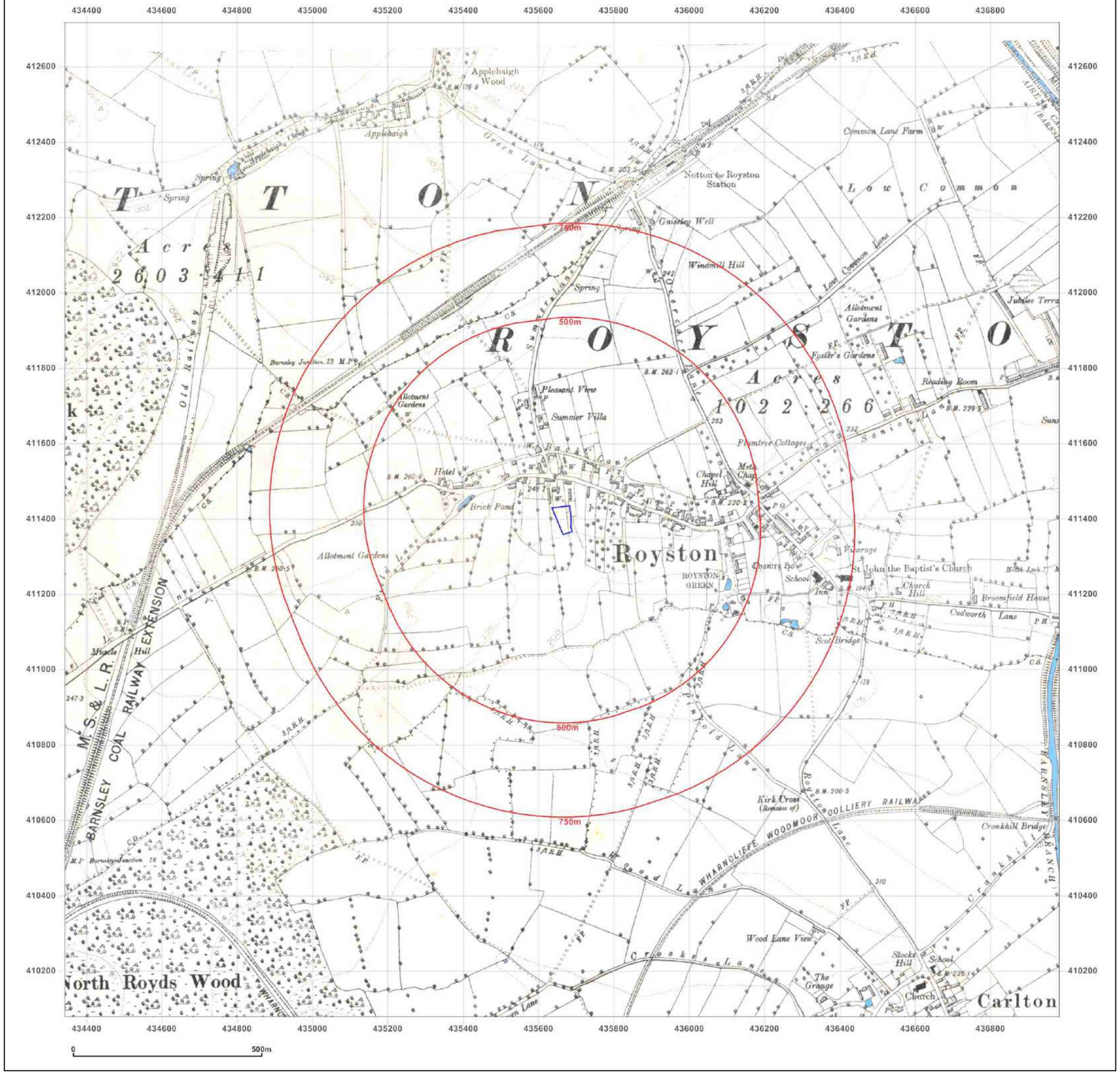
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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1891**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1891
Revised 1891
Edition 1891
Copyright N/A
Levelled N/A

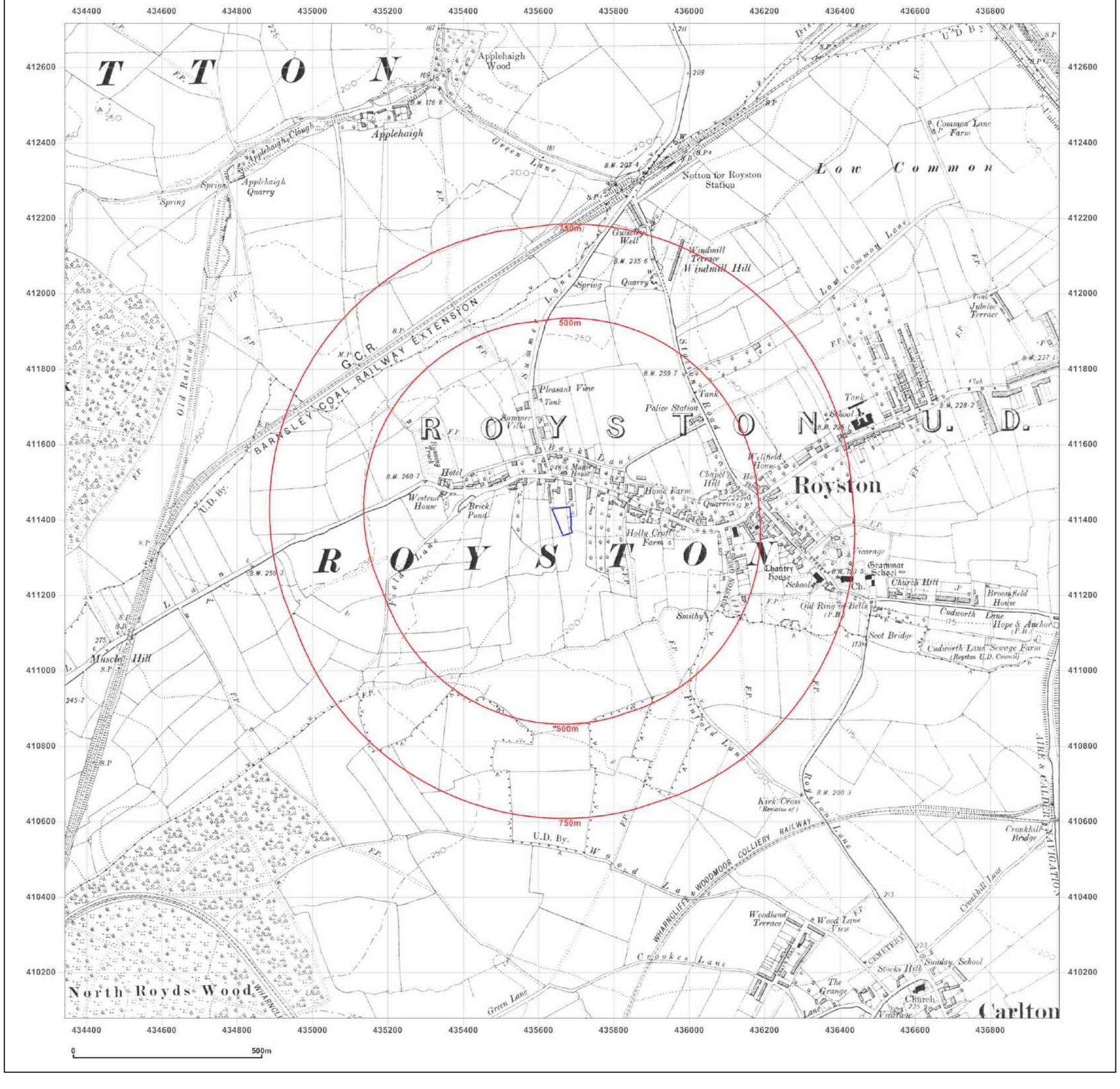
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

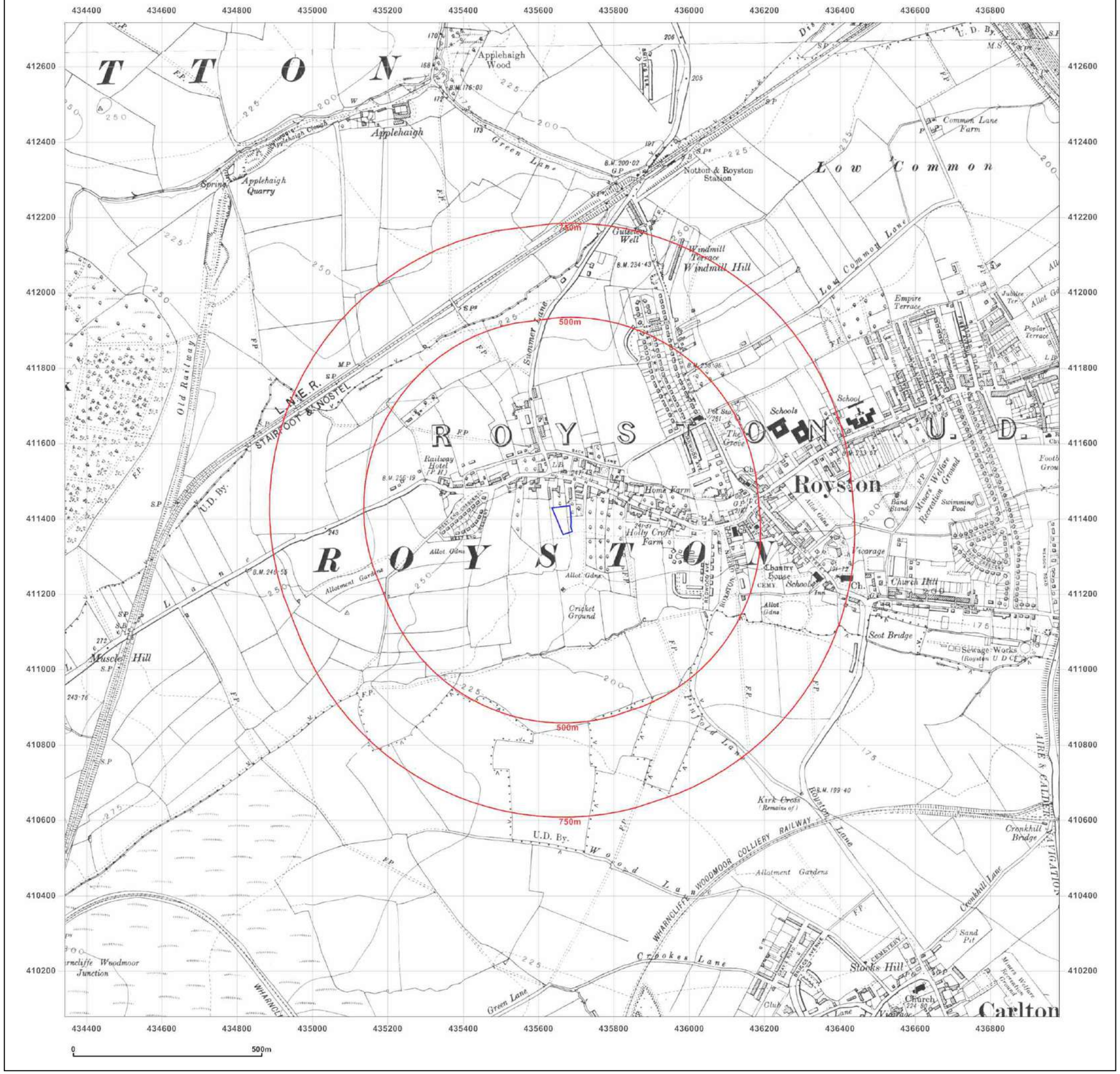
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

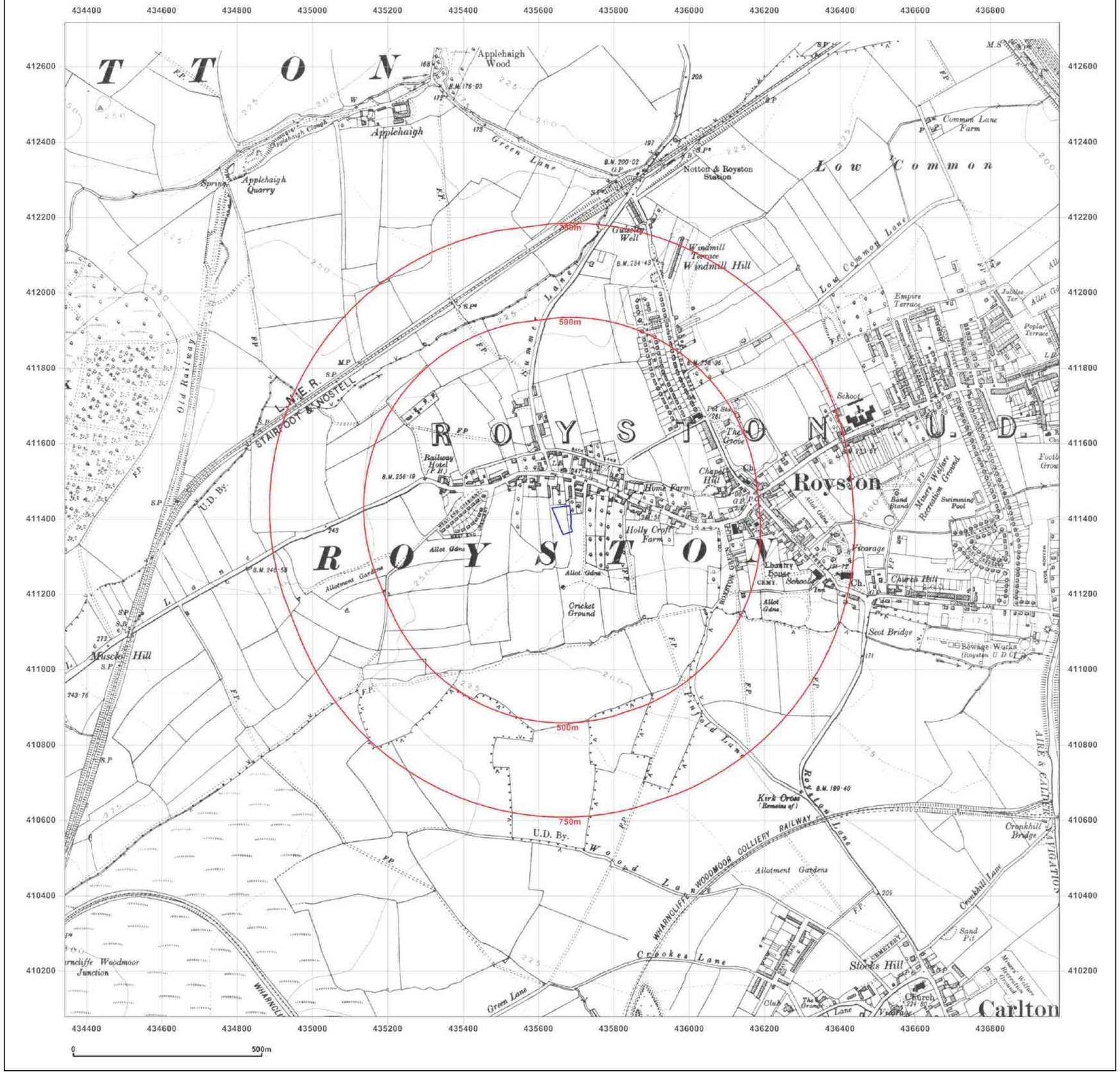
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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

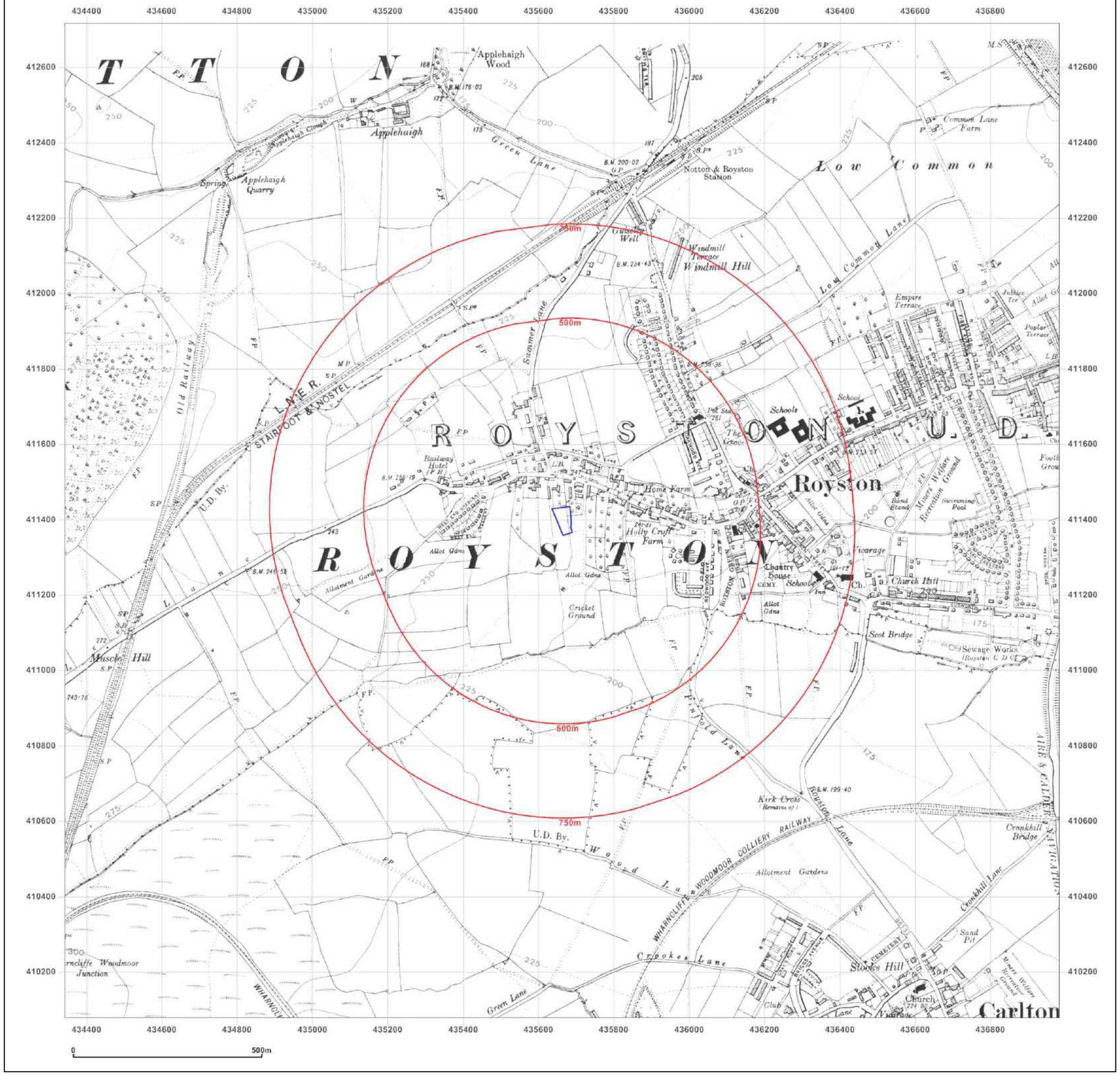
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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1938
Edition 1938
Copyright N/A
Levelled 1929

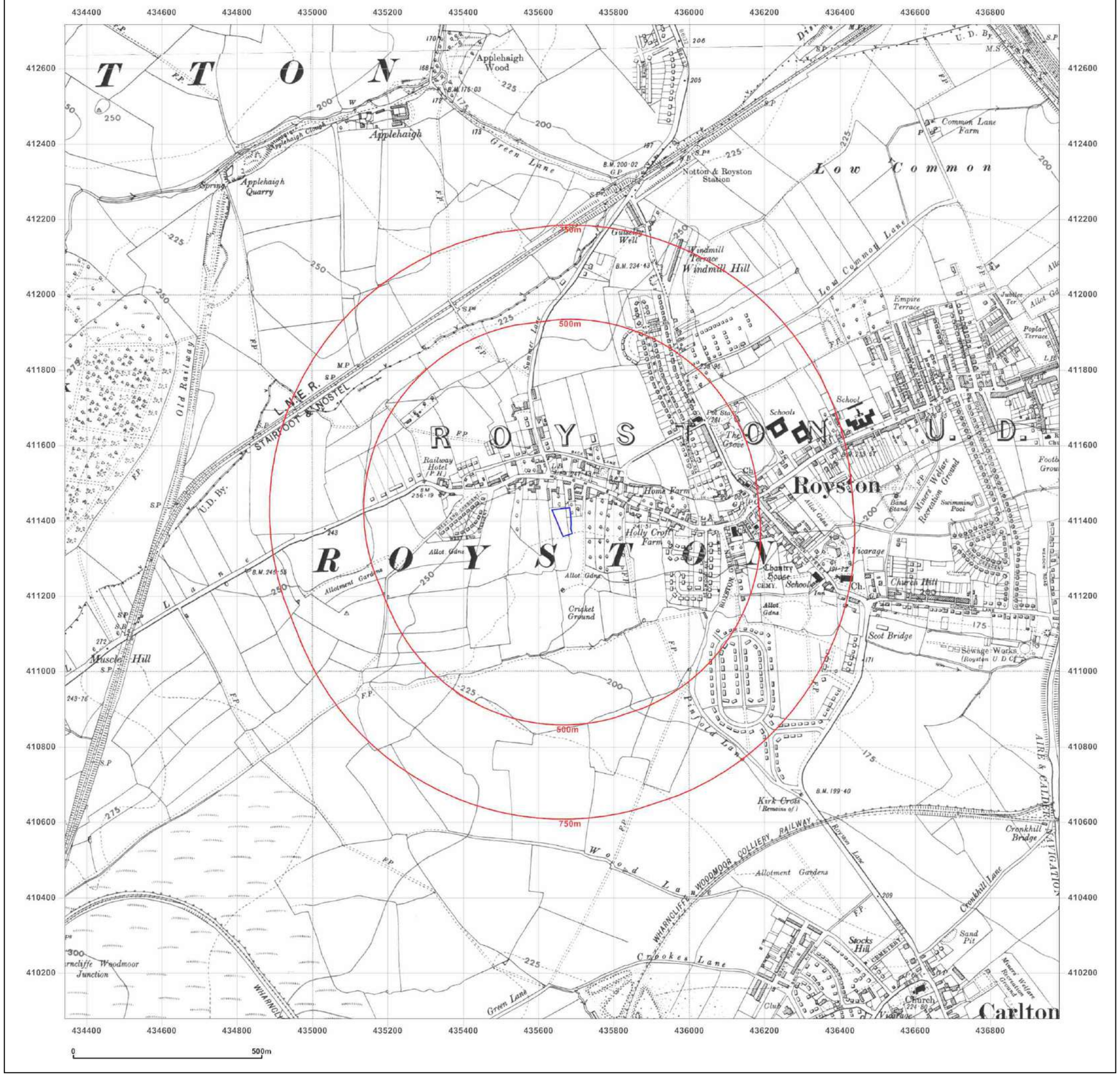
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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: County Series

Map date: **1948**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

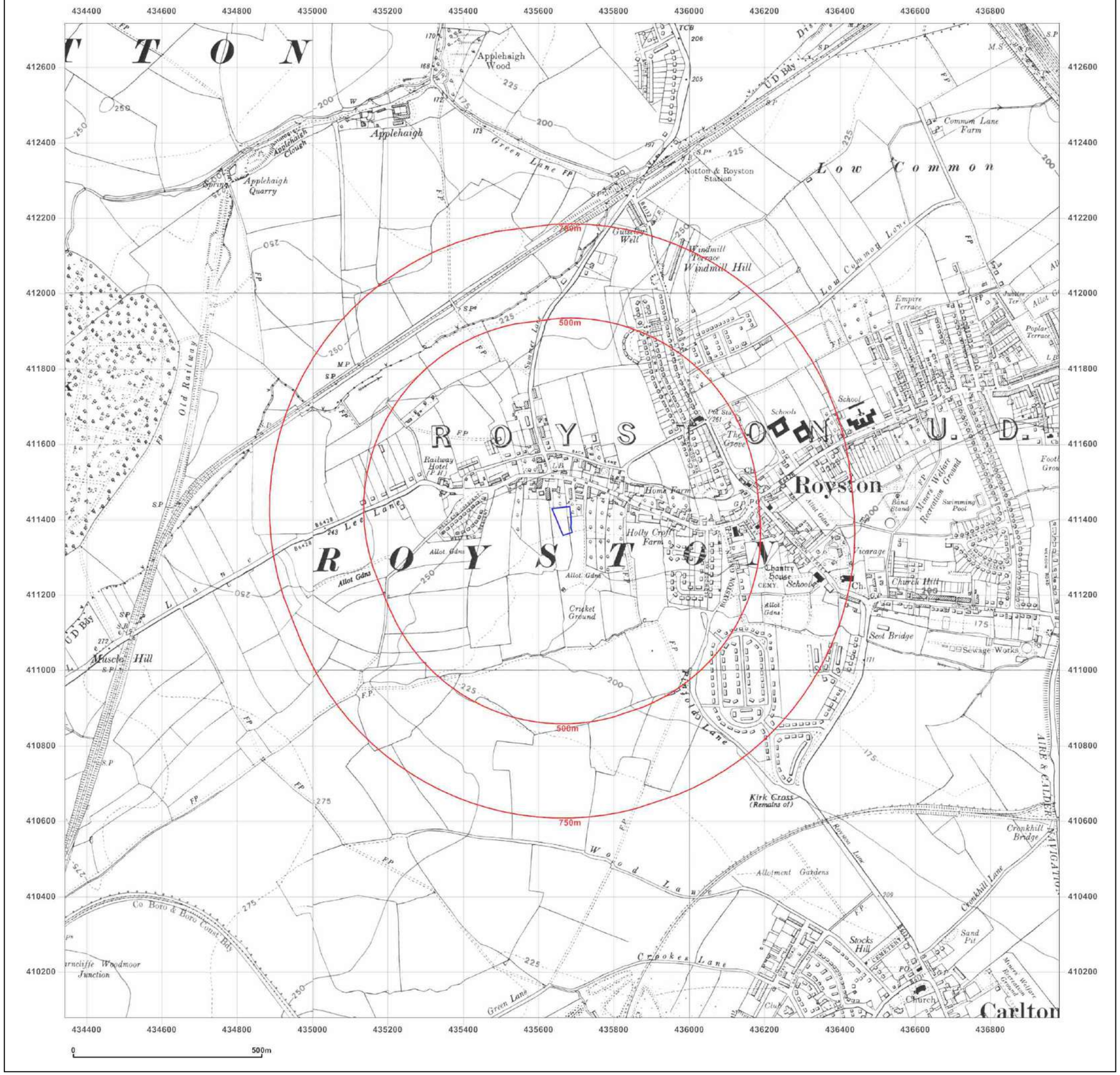
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BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: Provisional

Map date: **1951**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

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

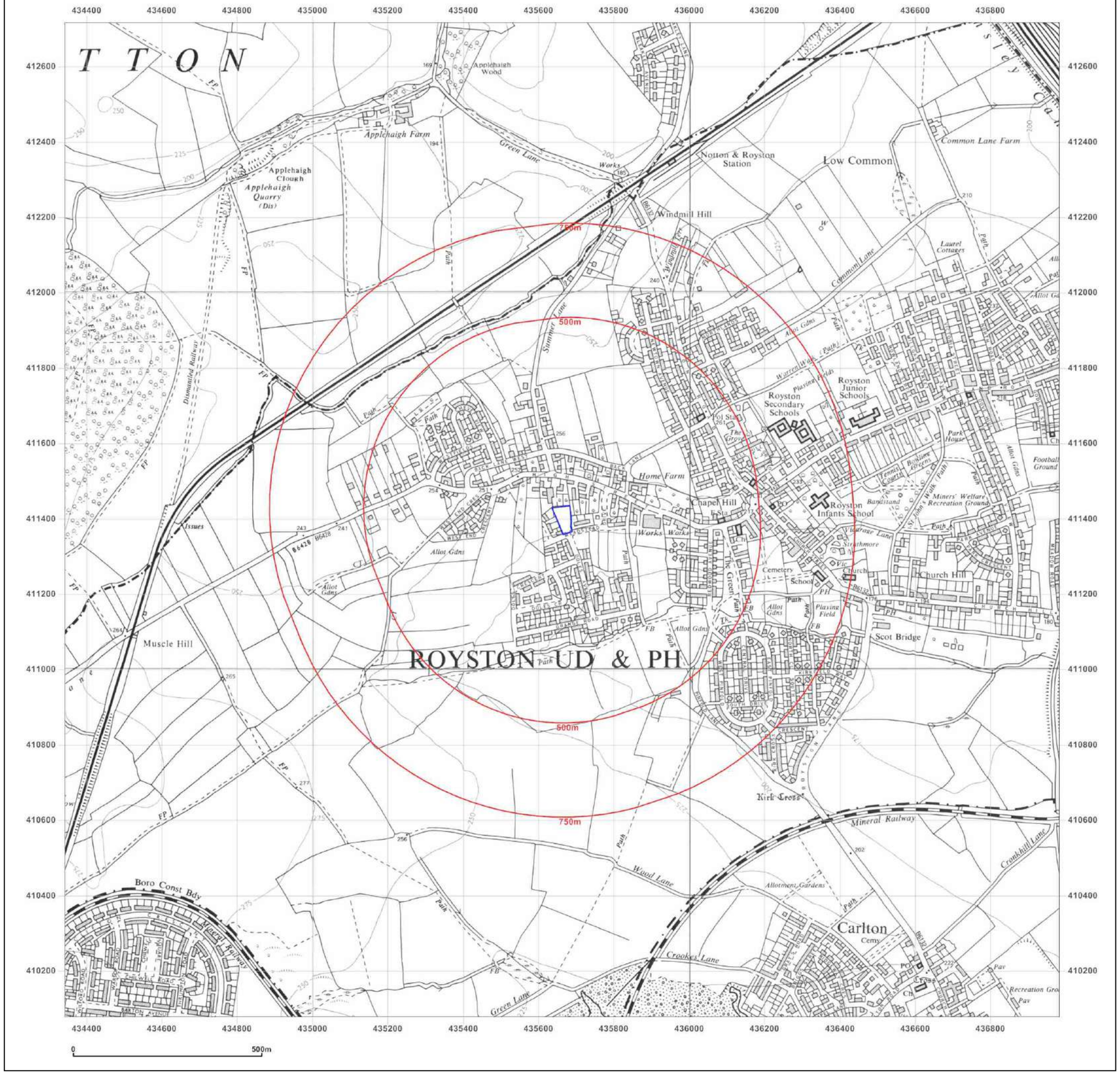
Surveyed 1951
Revised 1951
Edition N/A
Copyright 1951
Levelled N/A

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MEADSTEAD DRIVE,
BARNSLEY, S71 4JS

Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: Provisional

Map date: **1965-1966**

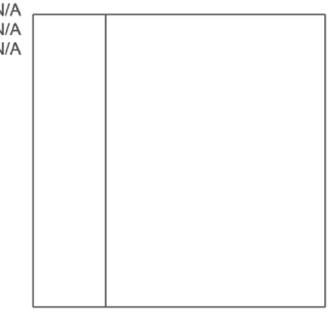
Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1965
Revised 1965
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1966
Revised 1966
Edition N/A
Copyright 1966
Levelled N/A



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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1978**

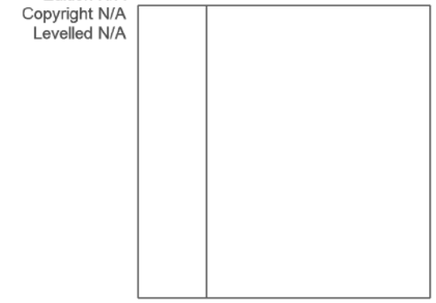
Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1977
Revised 1978
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1976
Revised 1978
Edition N/A
Copyright 1979
Levelled 1978



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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **1989-1990**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1983
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1984
Revised 1989
Edition N/A
Copyright 1990
Levelled 1978

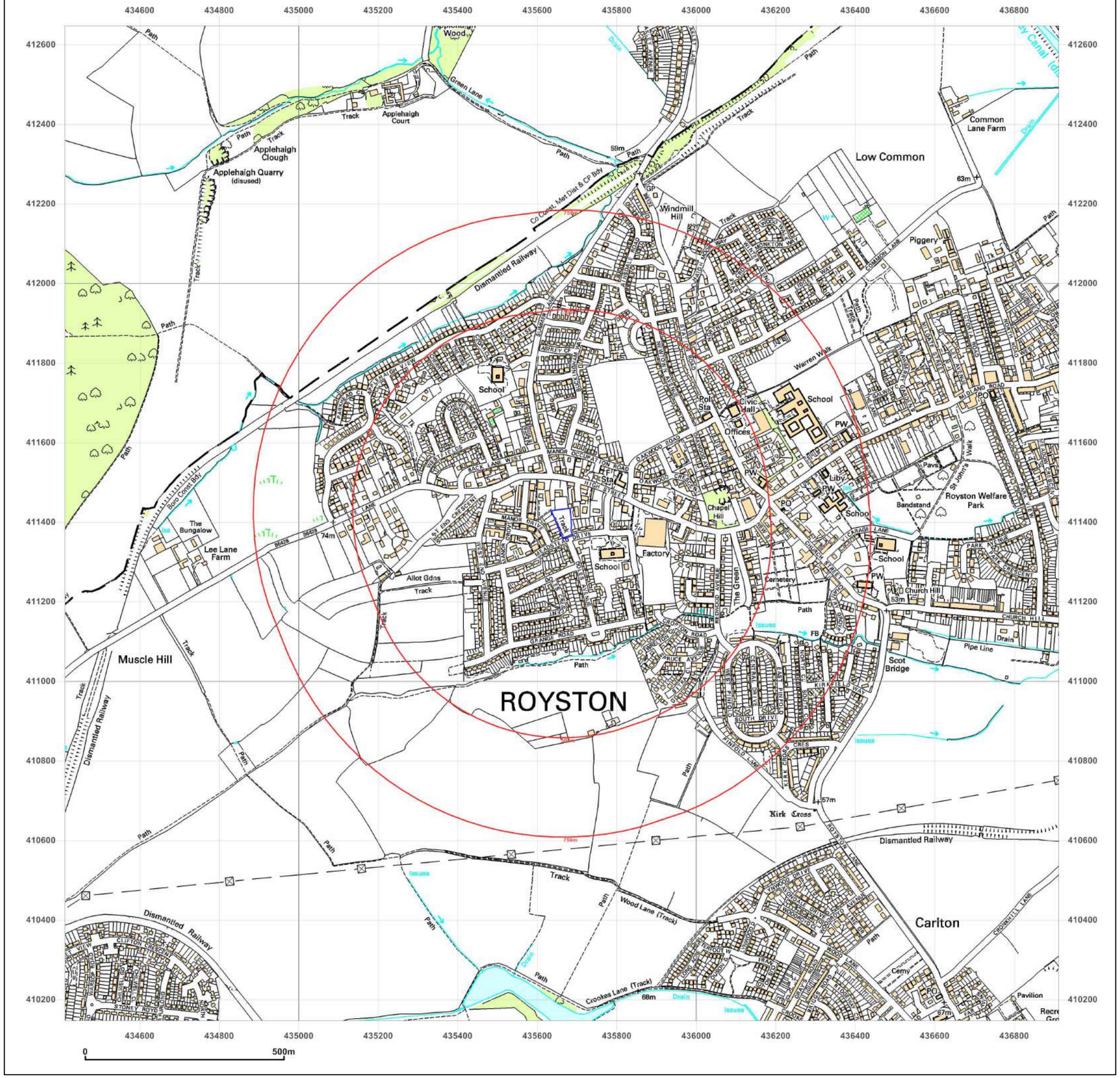
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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2002

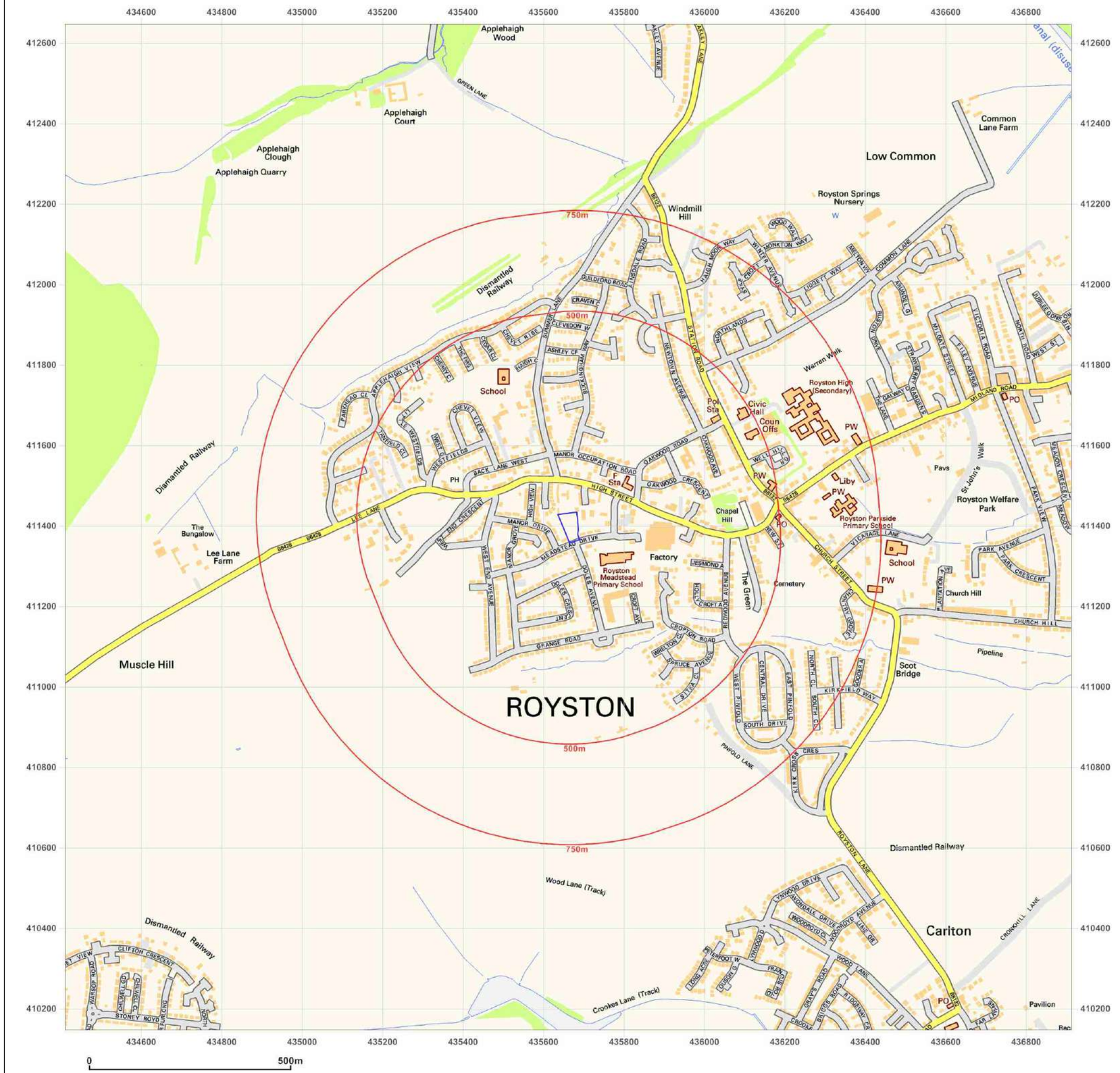
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Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2010

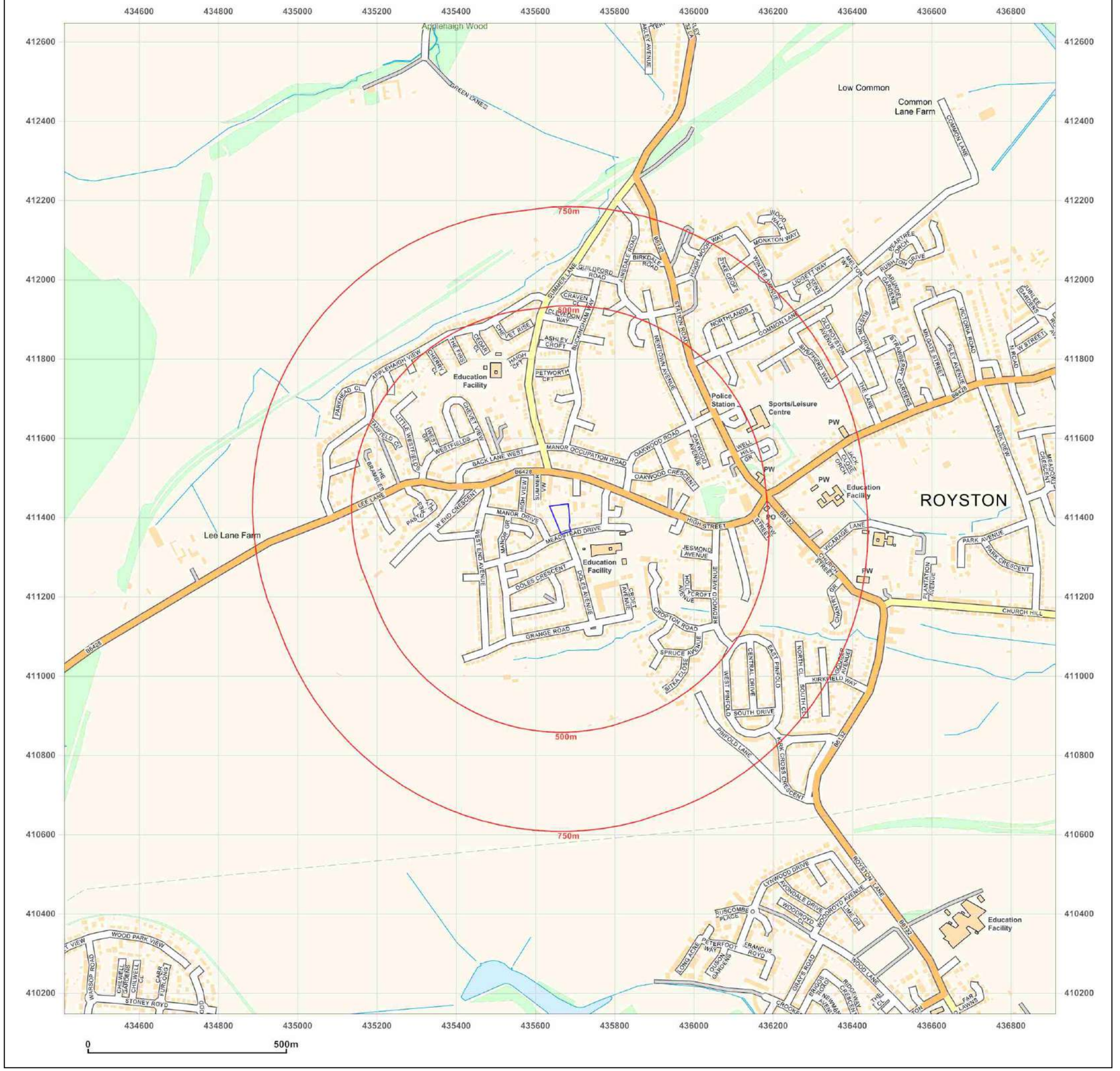
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Client Ref: 18-6006_Meadstead_Drive_PO23001793
Report Ref: GS-3977683
Grid Ref: 435662, 411397

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2014

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Appendix C

Groundsure EnviroInsight Report

Groundsure
LOCATION INTELLIGENCE

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977681
Your Reference:	18-6006_Meadstead_Drive_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

Address: MEADSTEAD DRIVE, BARNSLEY, S71 4JS

Dear Sir/ Madam,

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

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

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**MEADSTEAD DRIVE, BARNSLEY, S71 4JS**
Date:	**12 Jun 2017**
Reference:	**GS-3977681**
Client:	**Hamson Barron Smith Ltd**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435666,411402
Site Size:	0.26ha

Report Reference: GS-3977681
Client Reference: 18-6006_Meadstead_Drive_PO23001793

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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	0	0	8	33
1.2 Additional Information – Historical Tank Database	0	0	1	2
1.3 Additional Information – Historical Energy Features Database	0	0	7	22
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	2
1.6 Potentially Infilled Land	0	0	2	11

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	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	2	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	0	1
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	2	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?	None
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	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
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)	1	0	0	1	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	7	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	No	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/Natural Resources Wales 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?	Limited potential
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	3
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	1
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
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	1	0	1	0	0	1
8.14 Records of Green Belt land	0	0	0	1	1	3

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?	Negligible
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 5 and 10% 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?	Basic 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.

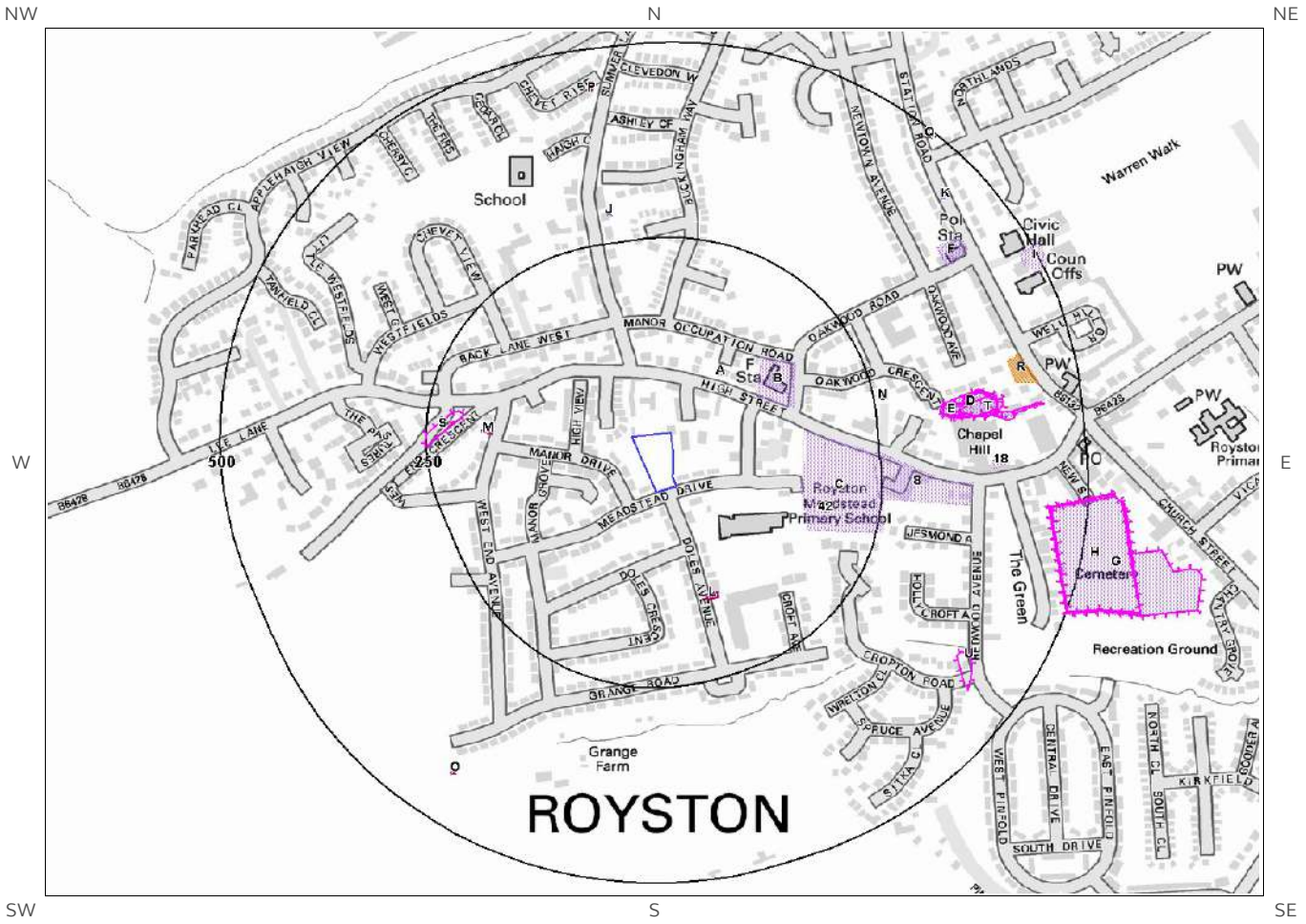
Note: Maps

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



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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: 41

ID	Distance [m]	Direction	Use	Date
1A	94	NE	Unspecified Pump	1854
2A	103	NE	Unspecified Pump	1854
3B	113	NE	Fire Station	1978
4B	124	NE	Fire Station	1989
5C	151	E	Unspecified Factory	1989
6C	151	E	Unspecified Factory	1978
7C	169	E	Unspecified Works	1966
8	242	E	Unspecified Works	1966
9J	284	N	Unspecified Tank	1904
10D	328	E	Unspecified Quarry	1938
11D	328	E	Unspecified Quarry	1948
12E	329	E	Unspecified Pit	1930
13E	329	E	Unspecified Pit	1930
14E	329	E	Unspecified Pit	1930
15E	329	E	Unspecified Pit	1930
16D	331	E	Unspecified Quarry	1951
17T	345	E	Unspecified Quarries	1904
18	386	E	Fire Station	1966
19F	396	NE	Police Station	1904
20F	396	NE	Police Station	1948
21F	399	NE	Police Station	1951
22F	399	NE	Police Station	1938
23U	408	SE	Smithy	1904
24F	408	NE	Police Station	1978
25F	408	NE	Police Station	1989
26F	408	NE	Police Station	1966
27K	446	NE	Unspecified Tank	1904
28H	453	E	Cemetery	1948
29G	455	E	Cemetery	1989
30G	455	E	Cemetery	1978
31G	455	E	Cemetery	1951
32G	455	E	Cemetery	1966
33H	456	E	Cemetery	1938
34H	456	E	Cemetery	1930

35H	456	E	Cemetery	1930
36H	456	E	Cemetery	1930
37H	456	E	Cemetery	1930
38I	480	NE	Police Station	1930
39I	480	NE	Police Station	1930
40I	480	NE	Police Station	1930
41I	480	NE	Police Station	1930

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: 3

ID	Distance (m)	Direction	Use	Date
42	182	E	Unspecified Tank	1993
43J	286	N	Unspecified Tank	1906
44K	444	NE	Unspecified Tank	1906

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: 29

ID	Distance (m)	Direction	Use	Date
45L	142	S	Electricity Substation	1983
46L	143	S	Electricity Substation	1993
47L	143	S	Electricity Substation	1976
48L	143	S	Electricity Substation	1970
49M	168	W	Electricity Substation	1970
50M	169	W	Electricity Substation	1993
51M	170	W	Electricity Substation	1976
52N	257	E	Electricity Substation	1993
53N	257	E	Electricity Substation	1983
54N	258	E	Electricity Substation	1976
55N	258	E	Electricity Substation	1970
56O	429	SW	Electricity Substation	1970
57O	431	SW	Electricity Substation	1976
58O	431	SW	Electricity Substation	1993

59O	434	SW	Electricity Substation	1993
60O	435	SW	Electricity Substation	1985
61P	445	N	Electricity Substation	1970
62P	446	N	Electricity Substation	1976
63P	446	N	Electricity Substation	1986
64P	446	N	Electricity Substation	1986
65P	446	N	Electricity Substation	1988
66P	447	N	Electricity Substation	1996
67Q	488	NE	Electricity Substation	1986
68Q	488	NE	Electricity Substation	1986
69Q	488	NE	Electricity Substation	1988
70Q	488	NE	Electricity Substation	1996
71Q	488	NE	Electricity Substation	1976
72Q	493	NE	Electricity Substation	1977
73Q	494	NE	Electricity Substation	1995

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: 2

ID	Distance (m)	Direction	Use	Date
74R	418	E	Garage	1977
75R	418	E	Garage	1995

1.6 Potentially Infilled Land

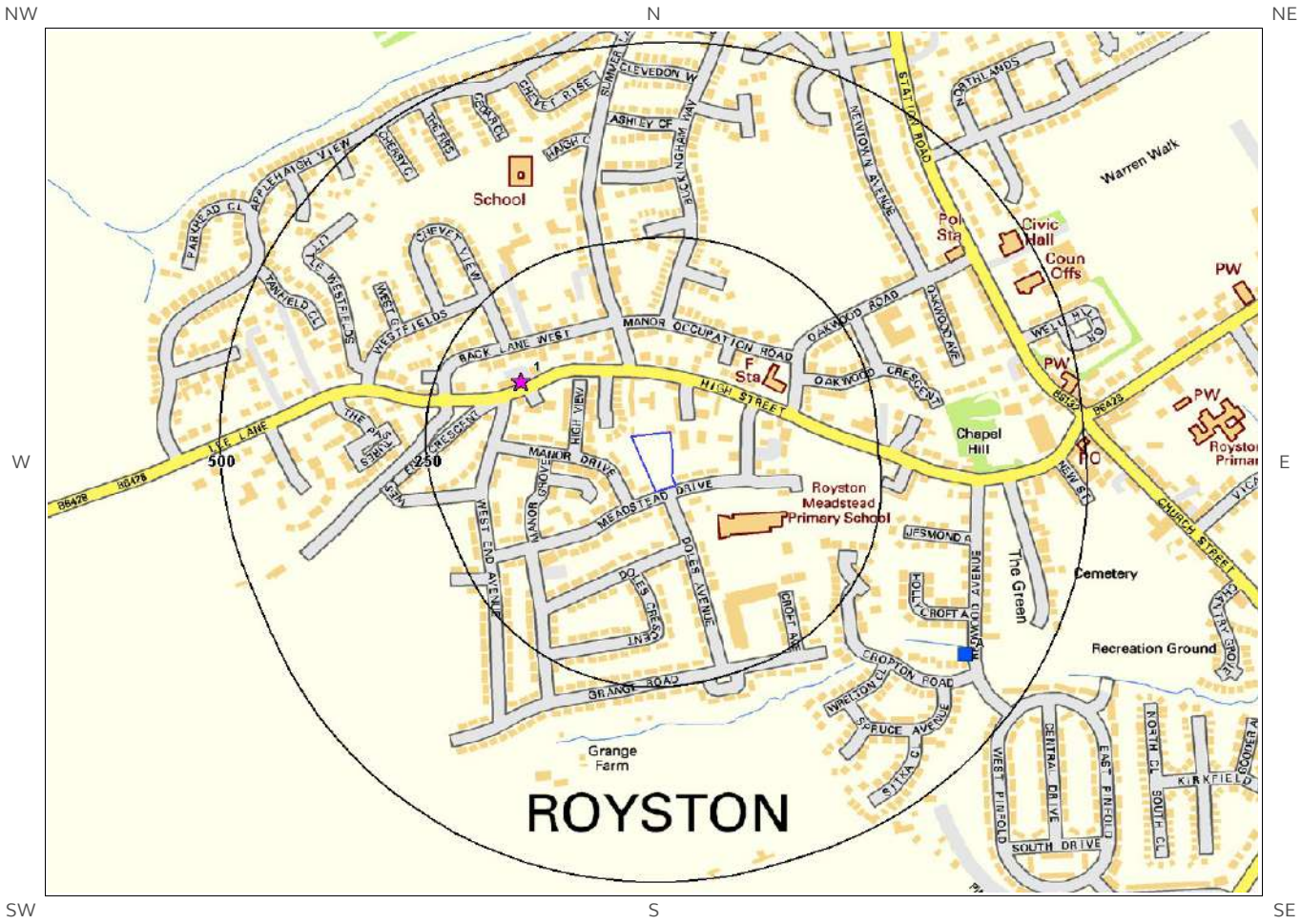
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 13

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

ID	Distance(m)	Direction	Use	Date
76S	207	W	Pond	1904

77S	207	W	Pond	1891
78T	328	E	Unspecified Quarry	1938
79D	328	E	Unspecified Quarry	1948
80D	331	E	Unspecified Quarry	1951
81T	345	E	Unspecified Quarries	1904
82U	403	SE	Pond	1951
83H	453	E	Cemetery	1948
84G	455	E	Cemetery	1978
85G	455	E	Cemetery	1989
86G	455	E	Cemetery	1966
87G	455	E	Cemetery	1951
88H	456	E	Cemetery	1938

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) (250, 500)
- Recorded Pollution Incident
- 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/Natural Resources Wales 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:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details	
2A	413	SE	436040 411150	Address: REDWOOD AVENUE SPS, REDWOOD AVENUE, ROYSTON, BARNSLEY, SOUTH YORKSHIRE Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC347 Permit Version: 2	Receiving Water: BOULDERBRIDGE DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 14/04/2009 Effective Date: 14-Apr-2009 Revocation Date: -
3A	413	SE	436040 411150	Address: REDWOOD AVENUE SPS, REDWOOD AVENUE, ROYSTON, BARNSLEY, SOUTH YORKSHIRE Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC347 Permit Version: 1	Receiving Water: BOULDERBRIDGE DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 02/11/1989 Effective Date: 02-Nov-1989 Revocation Date: 13/04/2009

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

0

Database searched and no data found.

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

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/Natural Resources Wales Recorded Pollution Incidents

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

1

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	152	NW	435500 411500	Incident Date: 03-Dec-2001 Incident Identification: 46273 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

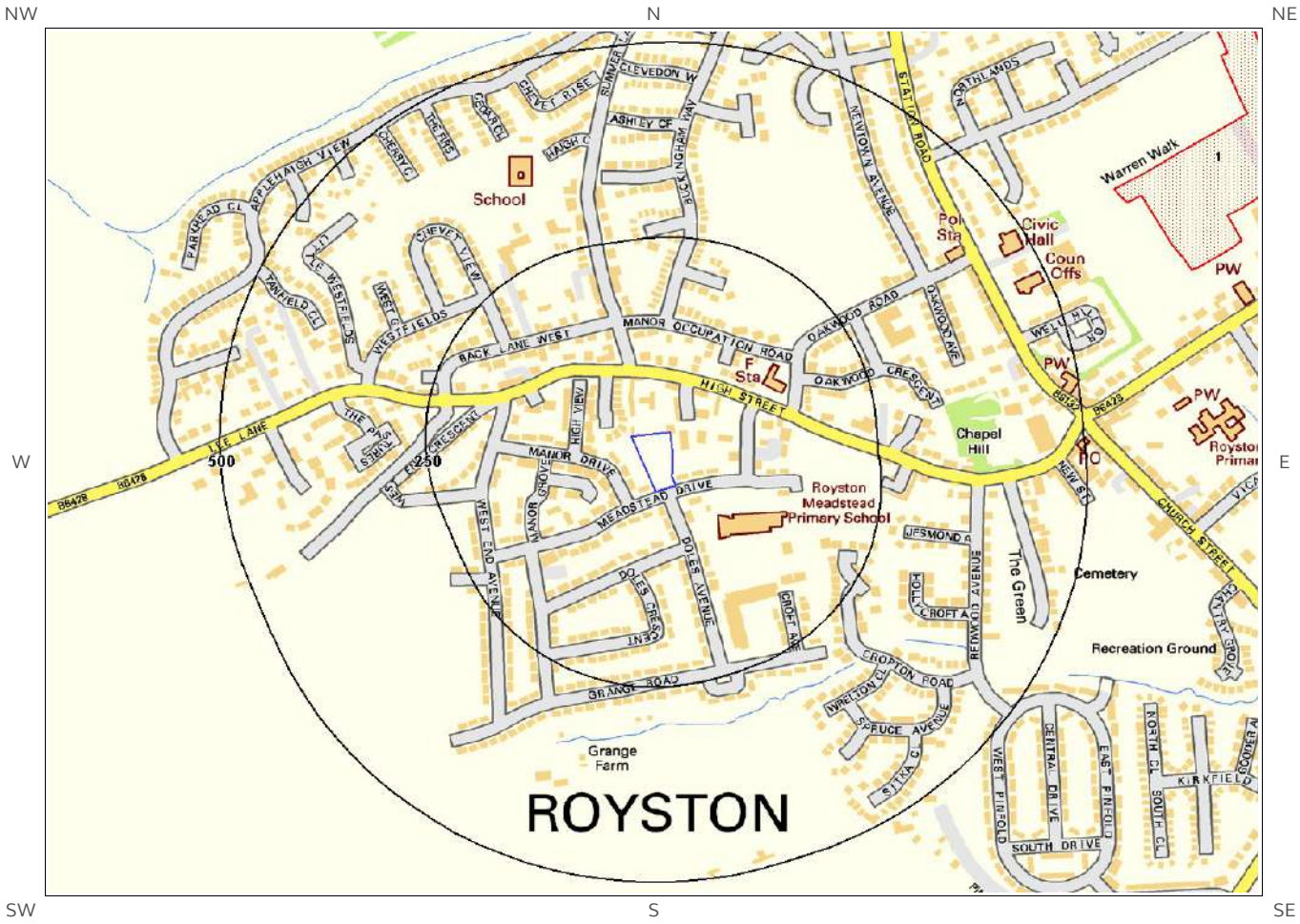
Database searched and no data found.

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



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Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW 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/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

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

7

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	
1	623	NE	436300 411700	Site Address: Warren Walk, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B16 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 21-Jun-1994 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Barnsley Metropolitan Borough Council First Recorded: - Last Recorded: -
Not shown	970	SE	436600 410800	Site Address: Land between Royston Lane and Cronkhill Lane, Carlton, Barnsley Waste Licence: Yes Site Reference: WD20 B457, 4400/B457, 20B457(95) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 18-Feb-1985 Licence Surrendered: 20-Jan-1993 Licence Holder Address: Stud Farm, Carlton, Barnsley Operator: E Maw and Son Licence Holder: E Maw First Recorded: 18-Feb-1985 Last Recorded: 20-Jan-1993
Not shown	1365	E	437000 410800	Site Address: Land off Cronkhill Lane, Carlton, Royston, Barnsley Waste Licence: Yes Site Reference: WD20 B513, 4400/B513, 20B513(101) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 24-Mar-1986 Licence Surrendered: 12-Sep-1990 Licence Holder Address: 4 Vicarage Lane, Royston, Barnsley, South Yorkshire Operator: Edward Thomas Broad Colin P White Licence Holder: E Borad and C White First Recorded: 31-Mar-1986 Last Recorded: 12-Sep-1990

ID	Distance (m)	Direction	NGR	Details	
Not shown	1440	E	437100 412000	Site Address: Poplar Terrace, Royston, Barnsley Waste Licence: Yes Site Reference: 2B5(6), 4400/B5, WD2 B5 Waste Type: Inert, Industrial, Commercial, Household, Liquid, sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 03-Nov-1976 Licence Surrendered: 31-Dec-1980 Licence Holder Address: - Operator: Barnsley Metropolitan Borough Council Licence Holder: Royston Urban District Council / Barnsley Metropolitan Borough Council First Recorded: 31-Dec-1949 Last Recorded: 31-Dec-1980
Not shown	1485	E	437100 411800	Site Address: Land off Midland Road, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B768, 20B768 Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 05-Sep-1990 Licence Surrendered: Licence Holder Address: Midland Road, Royston, Barnsley Operator: Burns Construction Limited Licence Holder: Burns Construction Limited First Recorded: 05-Sep-1990 Last Recorded: 31-Dec-1997
Not shown	1485	E	437100 411700	Site Address: Business Premises off Midland Road, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B428, 20B428(92), WD20 B428 Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 11-Jun-1984 Licence Surrendered: 22-Dec-1986 Licence Holder Address: Off Midland Road, Royston, Barnsley Operator: Burns Construction Limited Licence Holder: Burns Construction Limited First Recorded: 11-Jun-1984 Last Recorded: 22-Dec-1986
Not shown	1499	E	437100 410800	Site Address: Land off Cronkhill Lane, Carlton, Royston, Barnsley Waste Licence: Yes Site Reference: WD20 B417, 4400/B417, 20B417(89) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 03-Mar-1984 Licence Surrendered: 20-Jan-1993 Licence Holder Address: Stud Farm, Carlton, Barnsley Operator: E Maw and Son Licence Holder: E Maw and Son First Recorded: 08-Mar-1984 Last Recorded: 31-Oct-1990

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:

1

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

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
Not shown	1443	E	437094 411953	Refuse Tip	1976 mapping	Polygon

3.2 Other Waste Sites

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

0

Database searched and no data found.

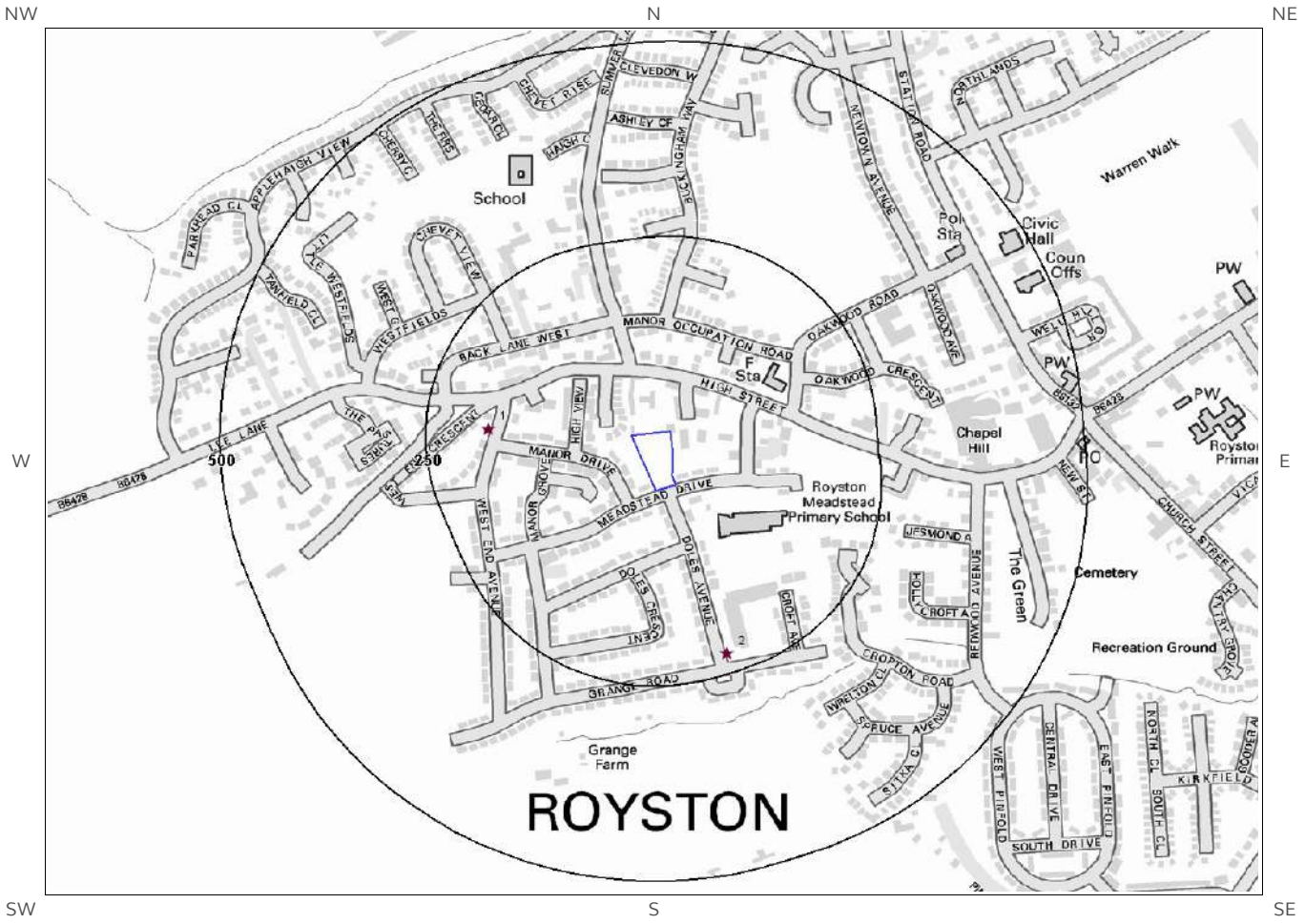
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

0

Database searched and no data found.

---

4. Current Land Use Map



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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: 2

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	175	W	Electricity Sub Station	435460 411439	Electricity Sub Station, S71	Electrical Features	Infrastructure and Facilities
2	224	S	Electricity Sub Station	435750 411151	Electricity Sub Station, S71	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

Database searched and no data found.

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

5.3 Bedrock and Solid Geology

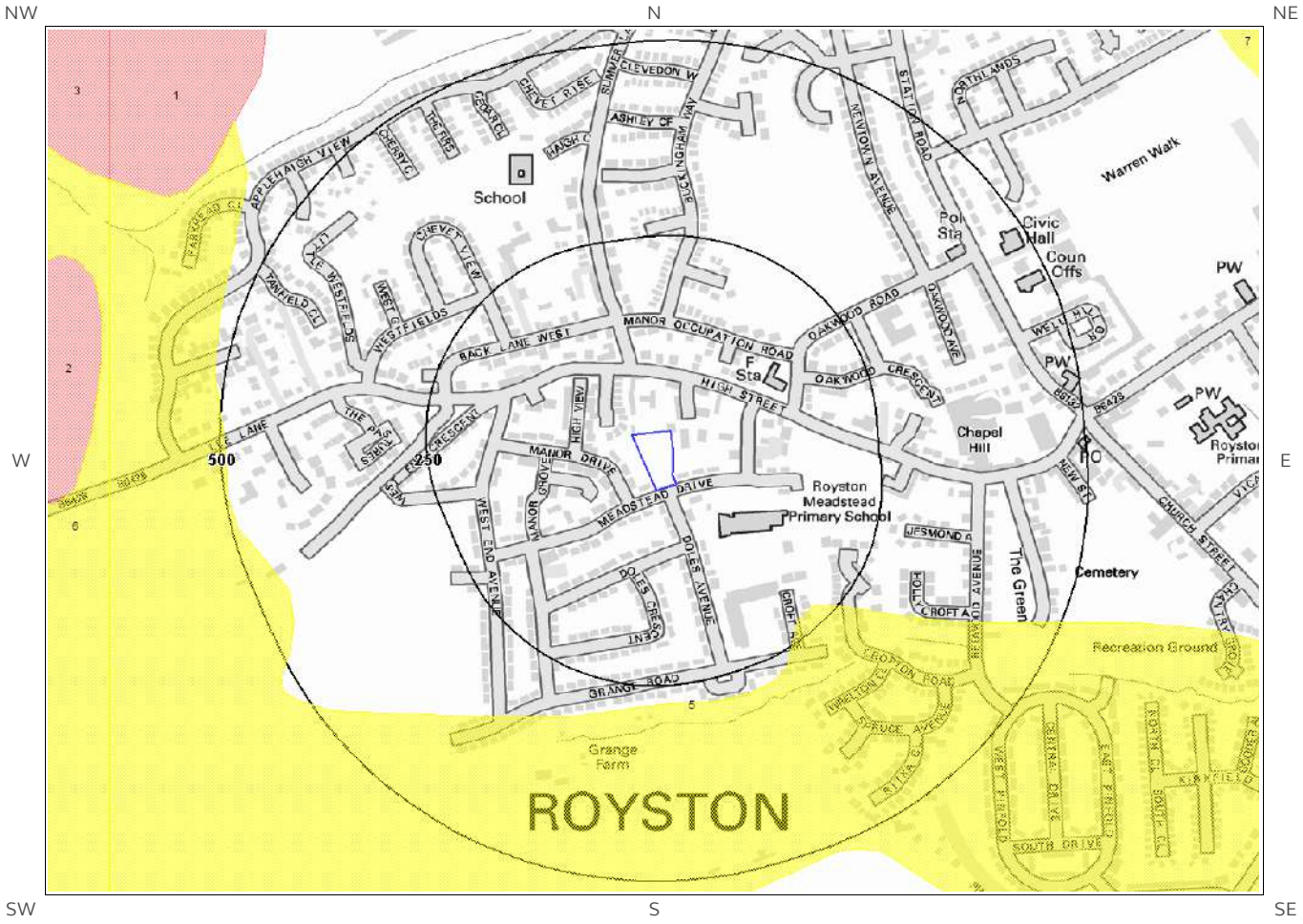
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
MXR-SDST	MEXBOROUGH ROCK	SANDSTONE

(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
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

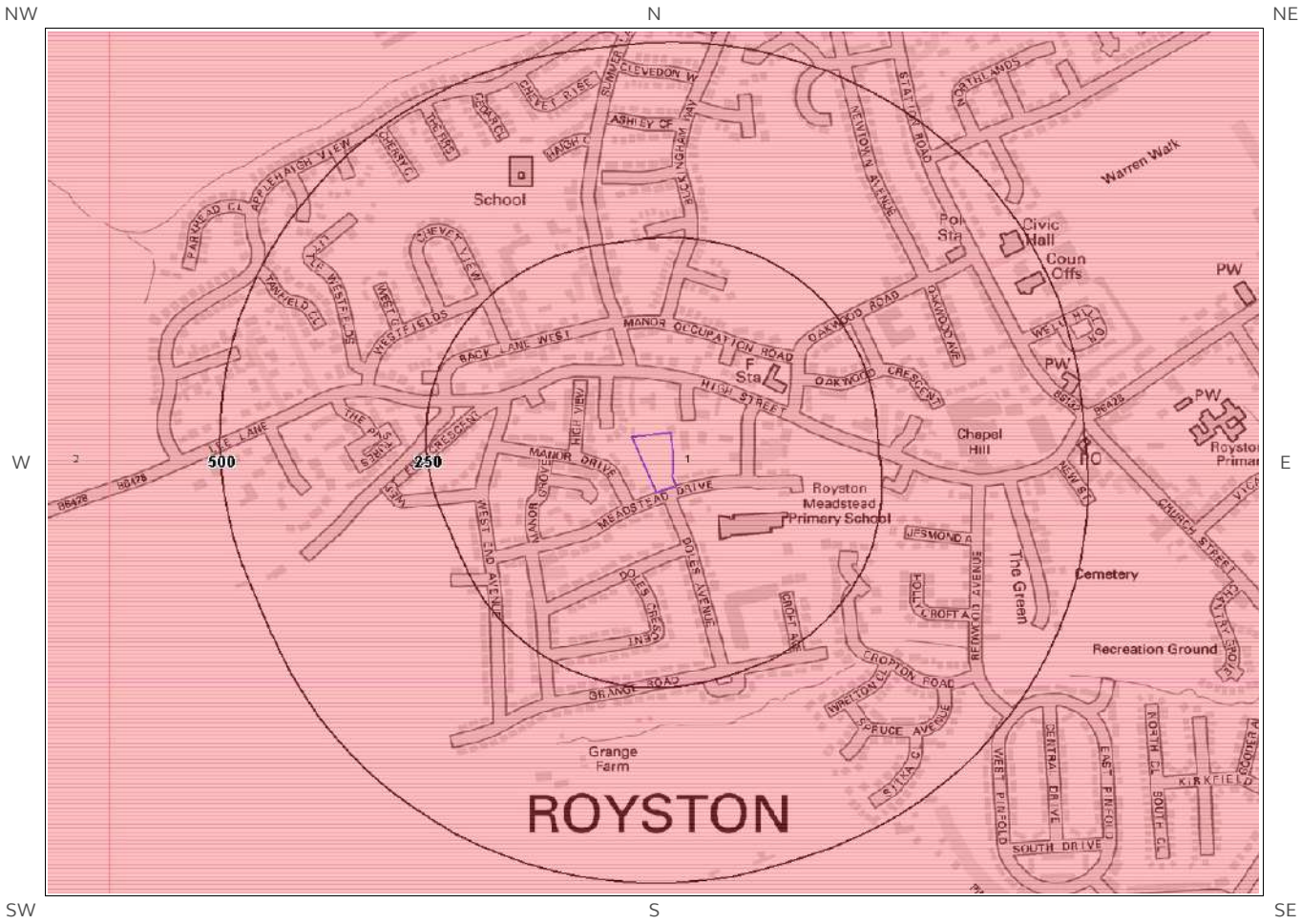
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

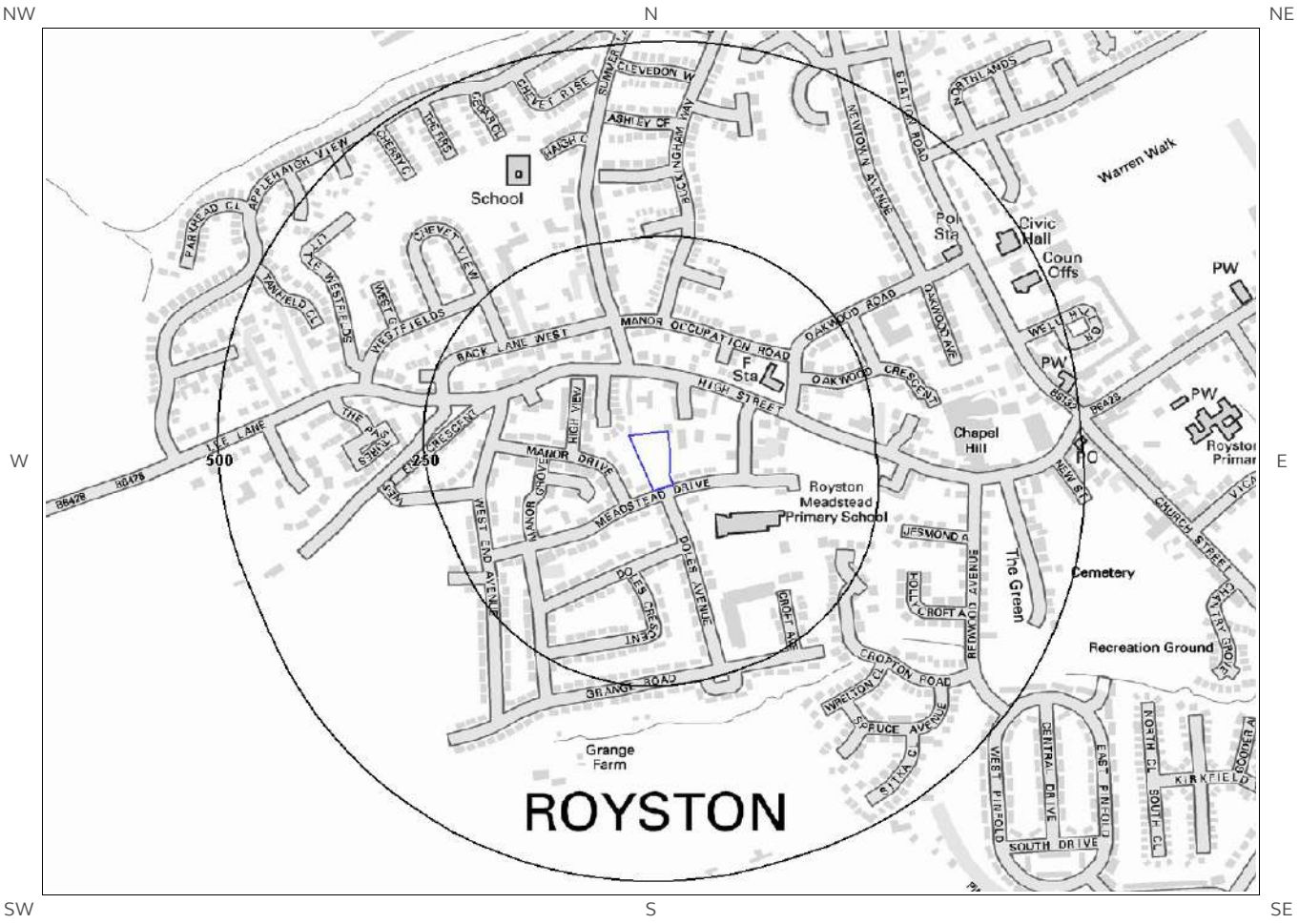
Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licenses



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



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Site Outline

250 / 500 Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

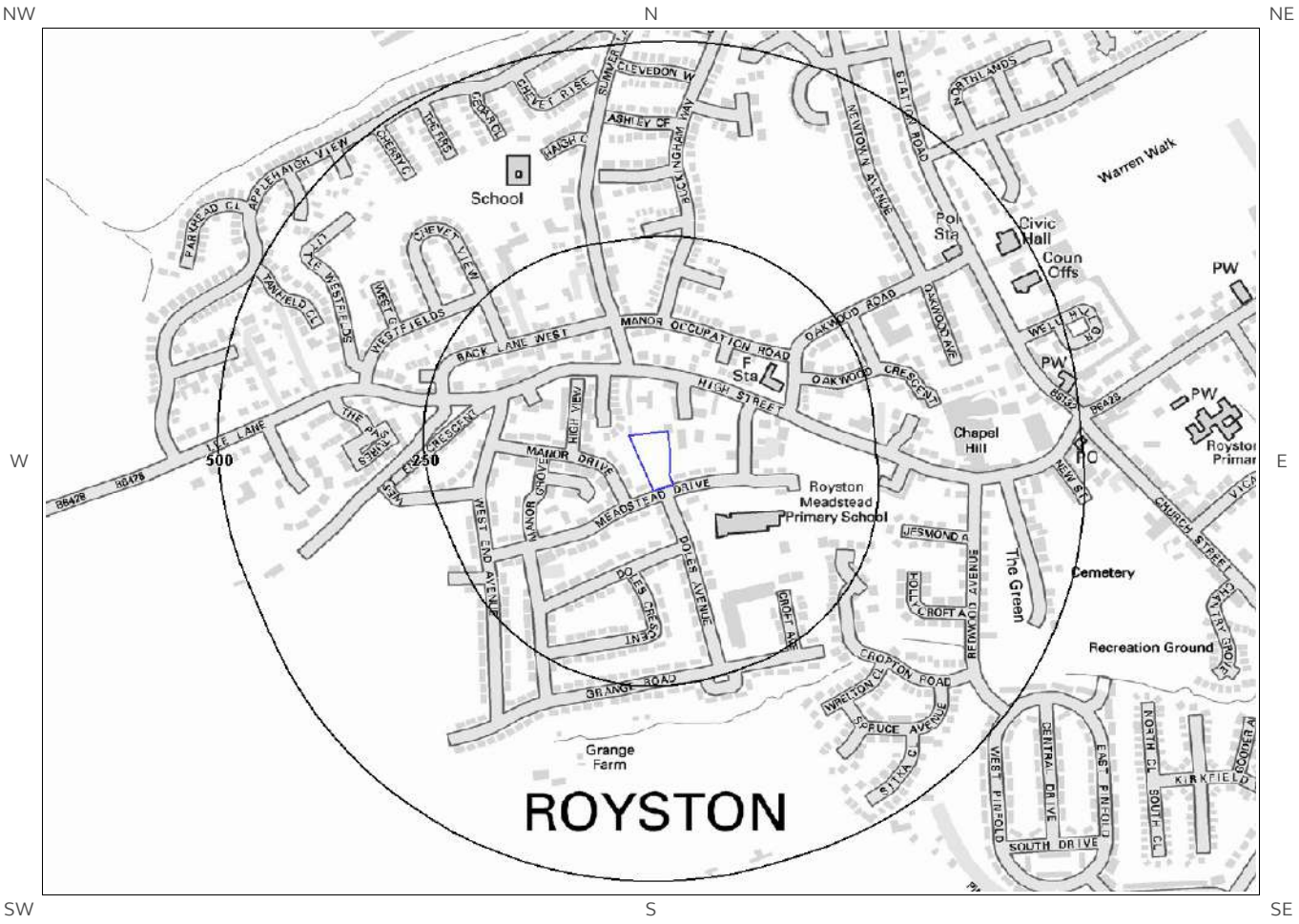
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

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

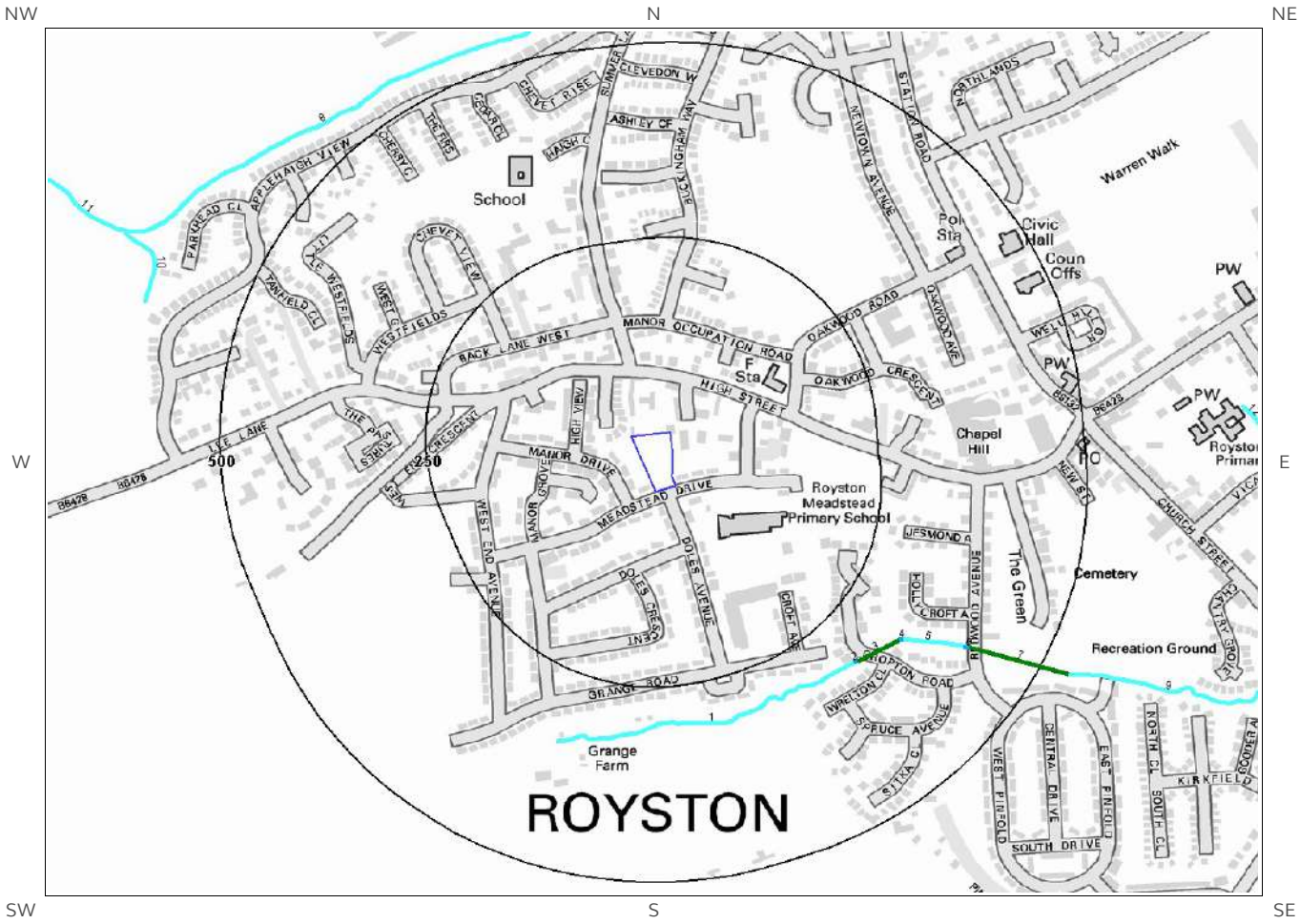
Source Protection Zone 3C - Total Catchment within Confined Aquifer

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

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

ID	Distance (m)	Direction	Designation	Description
5	227	SE	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

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

Database searched and no data found.

6.4 Surface Water Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1682	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL COMPANY LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1394 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 27/3/1998 Version End Date:
Not shown	1682	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Use Relating To Secondary Category (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL CO LTD	Annual Volume (m^3): 110000 Max Daily Volume (m^3): 2742 Application No: 1394-V860 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 102 Version Start Date: 21/1/2008 Version End Date:

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	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.
338	S	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

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):

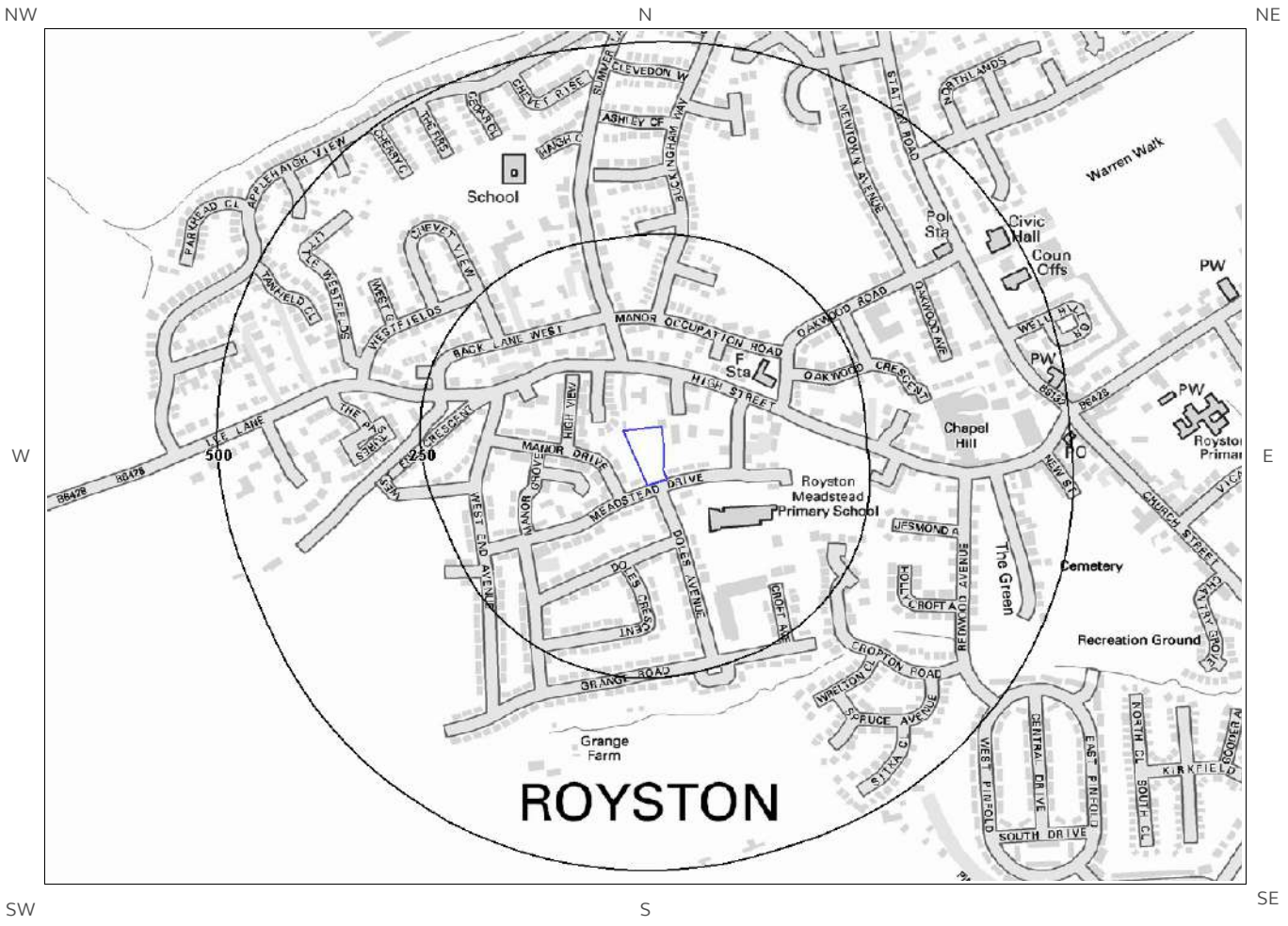
ID	Distance (m)	Direction	Details	
1	295	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	314	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
3	315	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
4	336	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
5	340	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	405	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7	412	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? No

Database searched and no data found.

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



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Site Outline

Search Buffers (m)
100
250

Zone 2 Floodplain

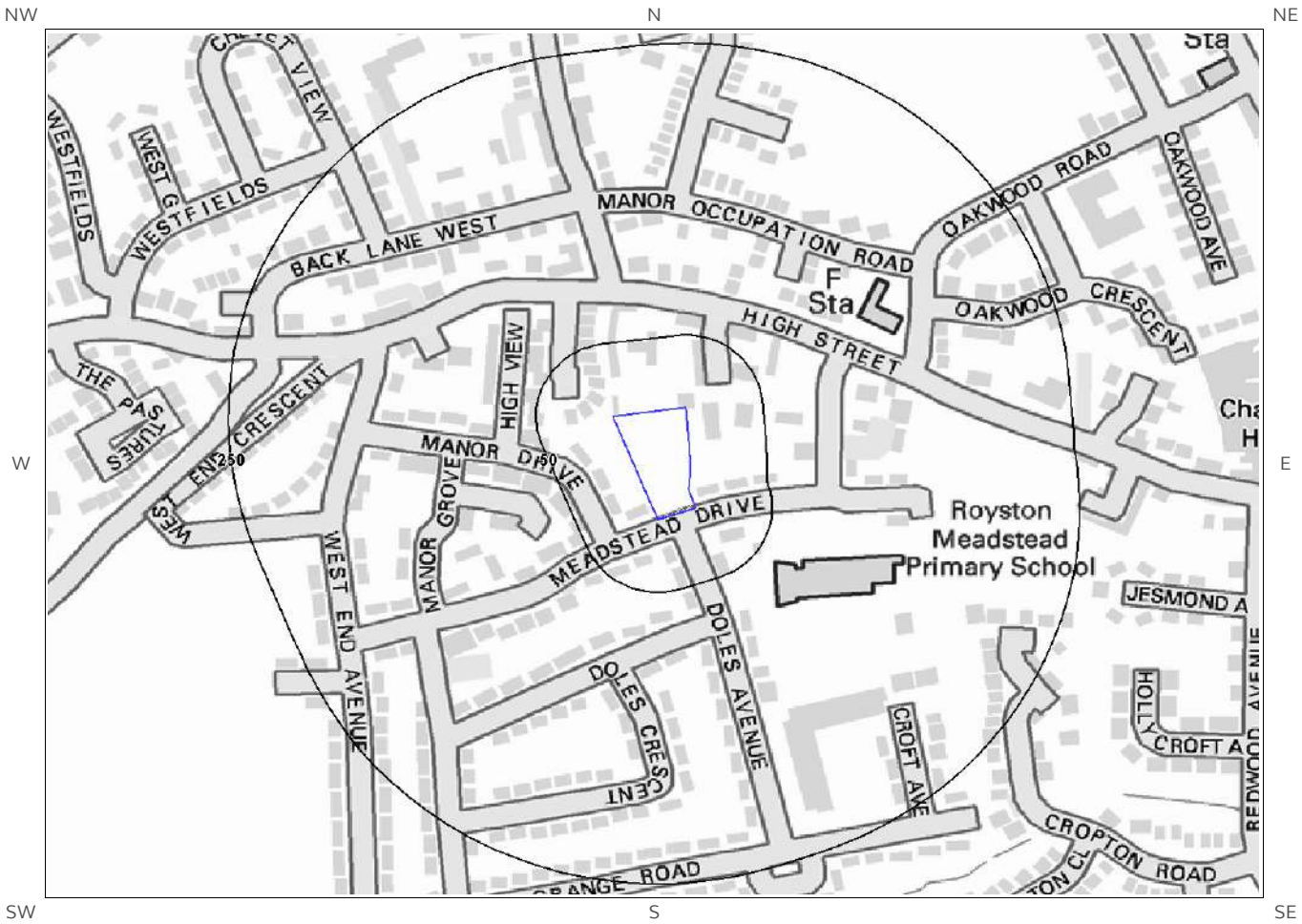
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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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/Natural Resources Wales Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales 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/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

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

7.4 Flood Defences

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

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

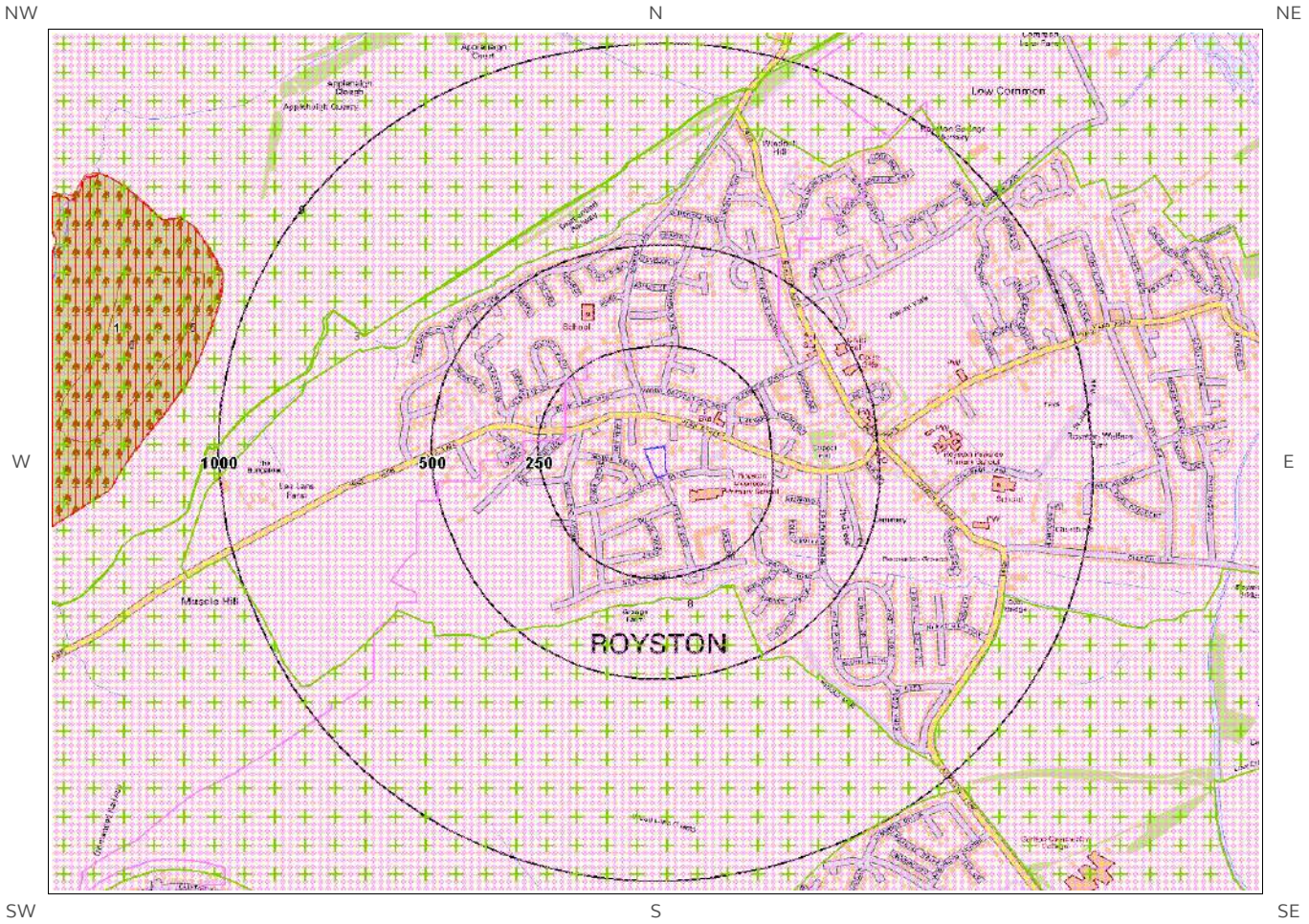
7.8 Groundwater Flooding Confidence Areas

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

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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Site Outline

100
250
Search Buffers (m)

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:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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
5	1059	W	UNKNOWN	Ancient and Semi-Natural Woodland
6	1106	W	UNKNOWN	Ancient Replanted Woodland
Not shown	1660	W	UNKNOWN	Ancient Replanted Woodland

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

1

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
1	1061	W	Notton Wood	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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:

3

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
2	0	On Site	Existing	DEFRA
3	186	W	Existing	DEFRA
Not shown	1359	S	Existing	DEFRA

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

5

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
8	299	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
9	604	NW	Liverpool, Manchester and West Yorks Greenbelt	Wakefield District (B)
Not shown	1359	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1834	SE	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1990	SW	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

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

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

Hazard
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.

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 5 and 10% 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? Basic radon protective measures are necessary.

10. Mining

10.1 Coal Mining

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

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

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

10.2 Non-Coal Mining

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

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

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

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: 03708 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: Barnsley Metropolitan Borough Council
Phone: 01226 770770
Web: http://www.barnsley.gov.uk/
Address: PO Box 634, Barnsley, South Yorkshir, S70 9GG

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

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https://www.groundsure.com/terms-and-conditions-sept-2016

Appendix D

Groundsure GeoInsight Report

Groundsure
LOCATION INTELLIGENCE

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977682
Your Reference:	18-6006_Meadstead_Drive_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Geo Insight

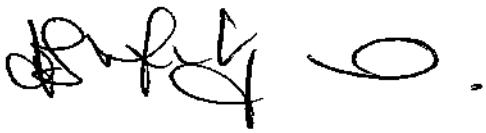
Address: MEADSTEAD DRIVE, BARNSLEY, S71 4JS

Dear Sir/ Madam,

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

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

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**MEADSTEAD DRIVE, BARNSLEY, S71 4JS**
Date:	**12 Jun 2017**
Reference:	**GS-3977682**
Client:	**Hamson Barron Smith Ltd**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435666,411402
Site Size:	0.26ha

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

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

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

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

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

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is 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 5 and 10% of properties are above the Action Level.
	3.2Radon Protection	Basic radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	2	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	1	0	3	4
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Negligible

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	3

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	1	1	0

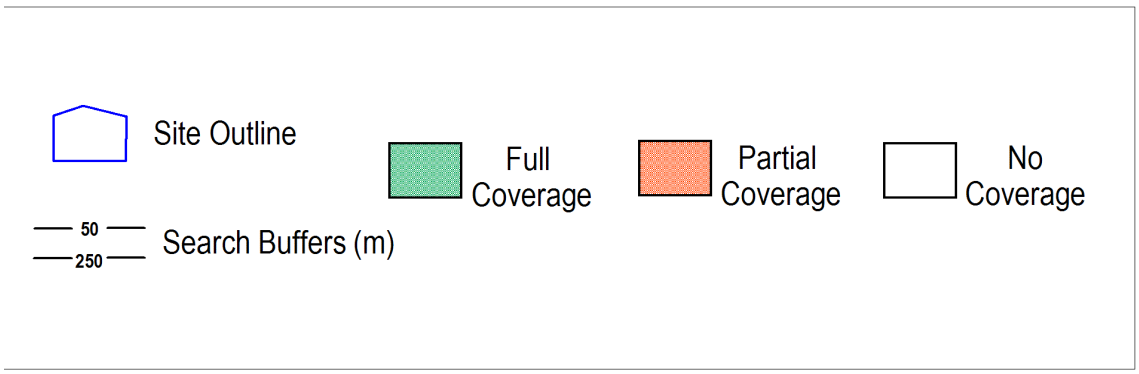
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

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

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	635.0	Some deposits are mapped	Full	Full	No coverage
N3	1359.0	Some deposits are mapped	Full	Full	No coverage
N4	1512.0	Some deposits are mapped	Full	Full	Some deposits are mapped

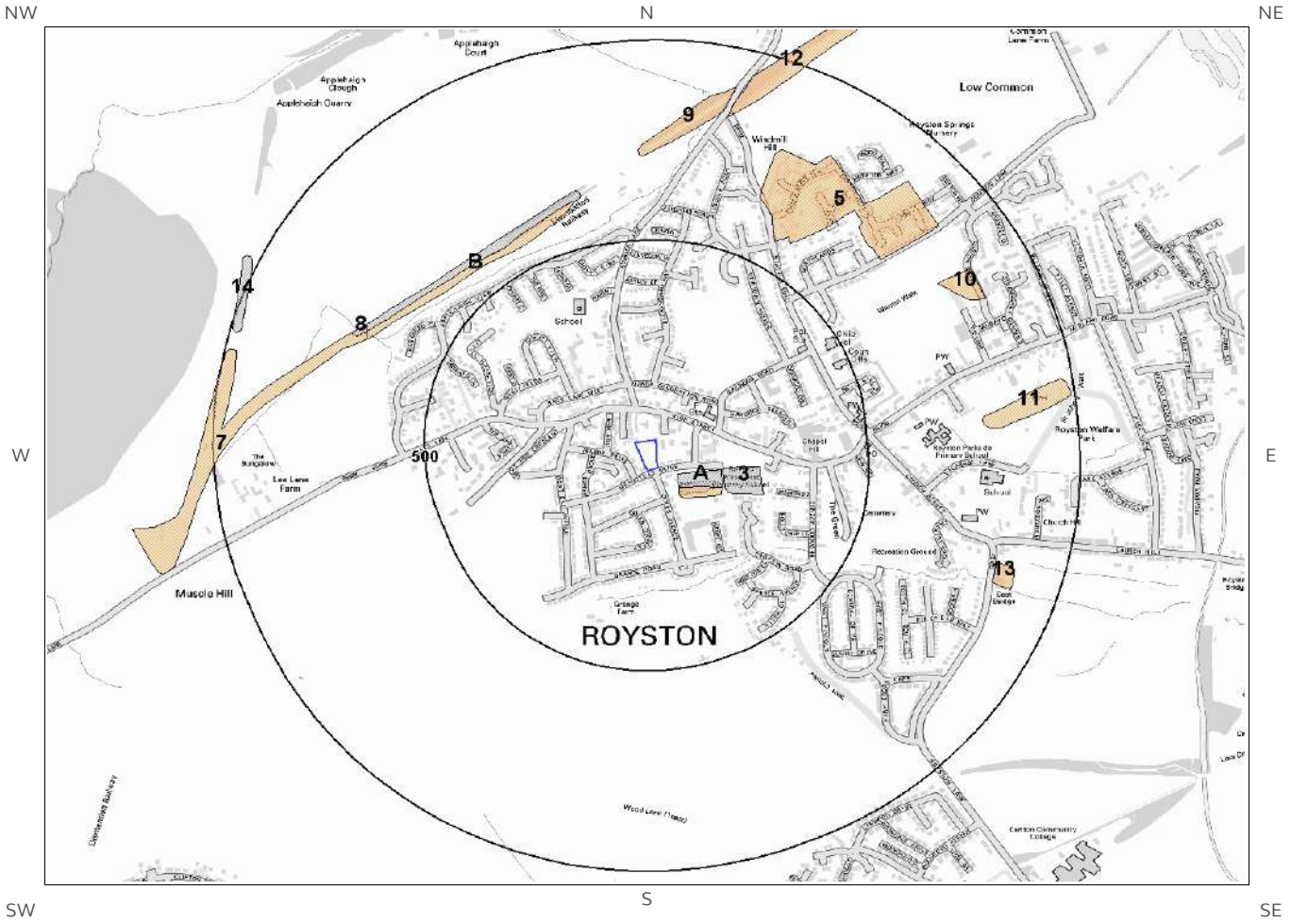
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not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

The definitions of coverage are as follows:

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

1 Geology (1:10,000 scale).

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



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Artificial Ground Legend

Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

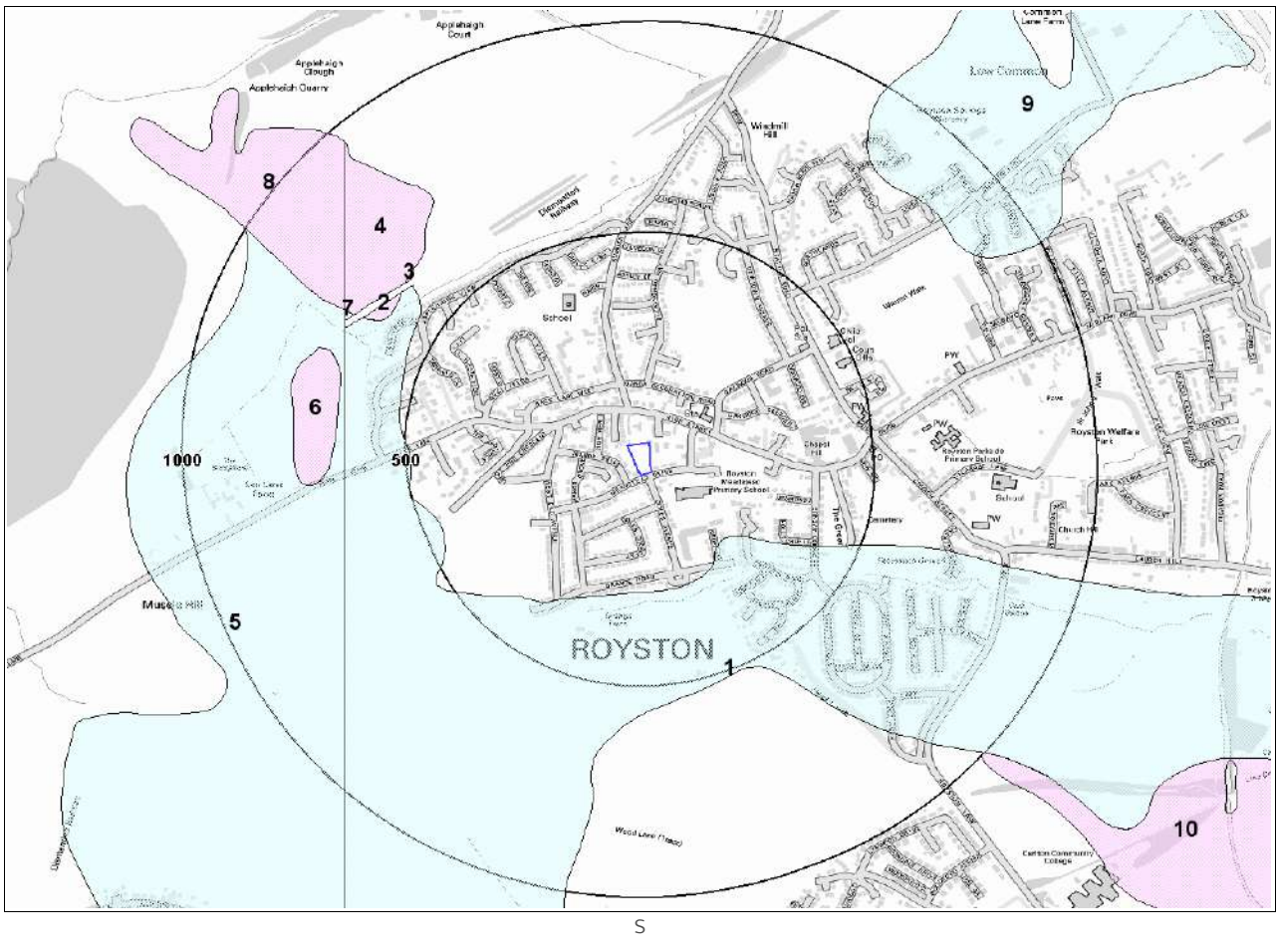
1.1 Artificial Ground

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

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1A	48.0	E	WGR-VOID	Worked Ground (Undivided)	Void
2A	69.0	SE	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	154.0	E	WGR-VOID	Worked Ground (Undivided)	Void

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



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

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

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	225.0	SE	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

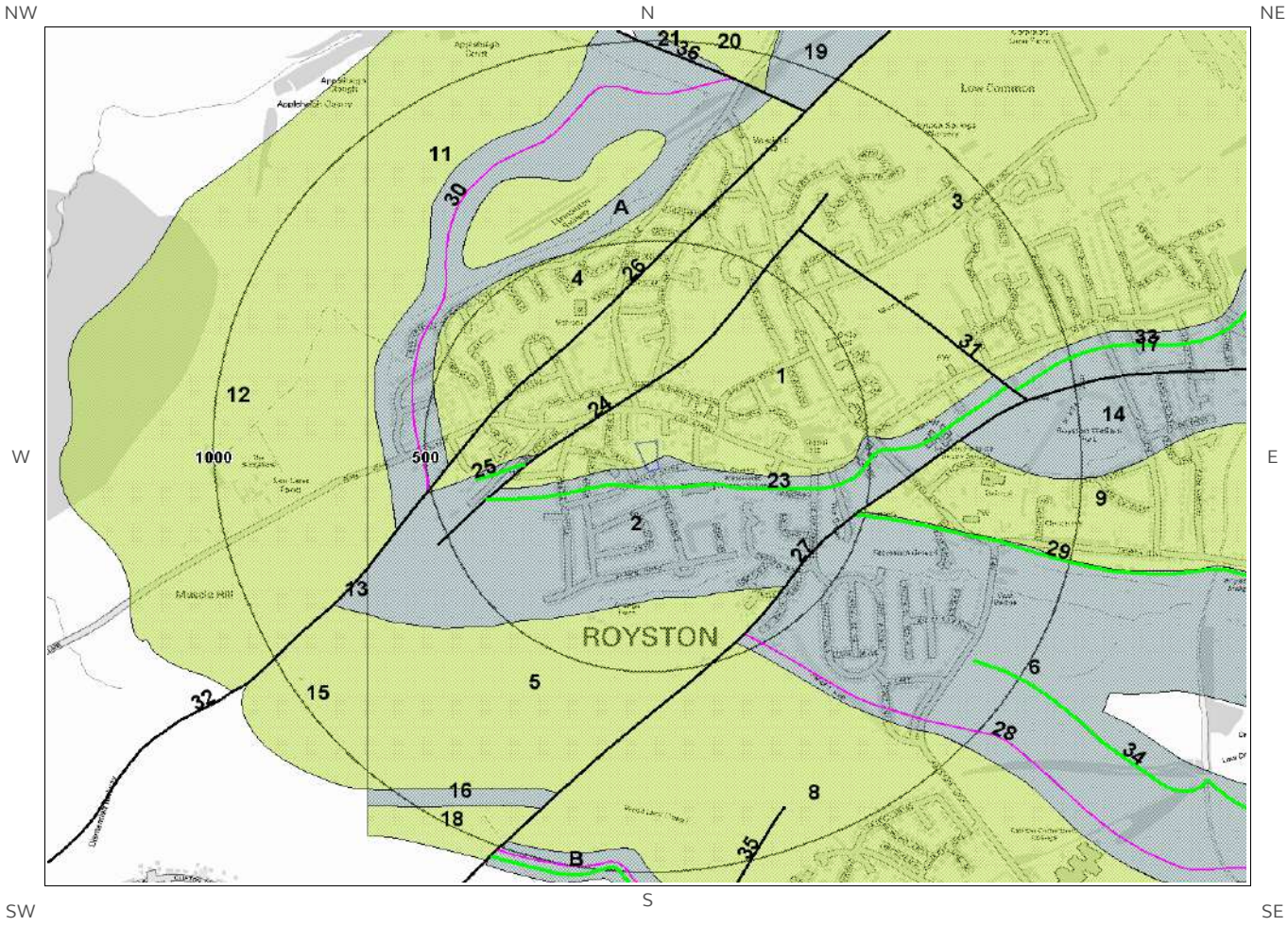
No

Database searched and no data found.

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

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

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



Bedrock and Faults Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

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

1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
2	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
3	105.0	NW	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
4	292.0	NW	ACR-SDST	Ackton Rock - Sandstone	Bolsovian Sub-age
5	317.0	S	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
6	414.0	SE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
7A	449.0	W	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
8	471.0	S	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
9	484.0	E	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian Sub-age - Duckmantian Sub-age

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

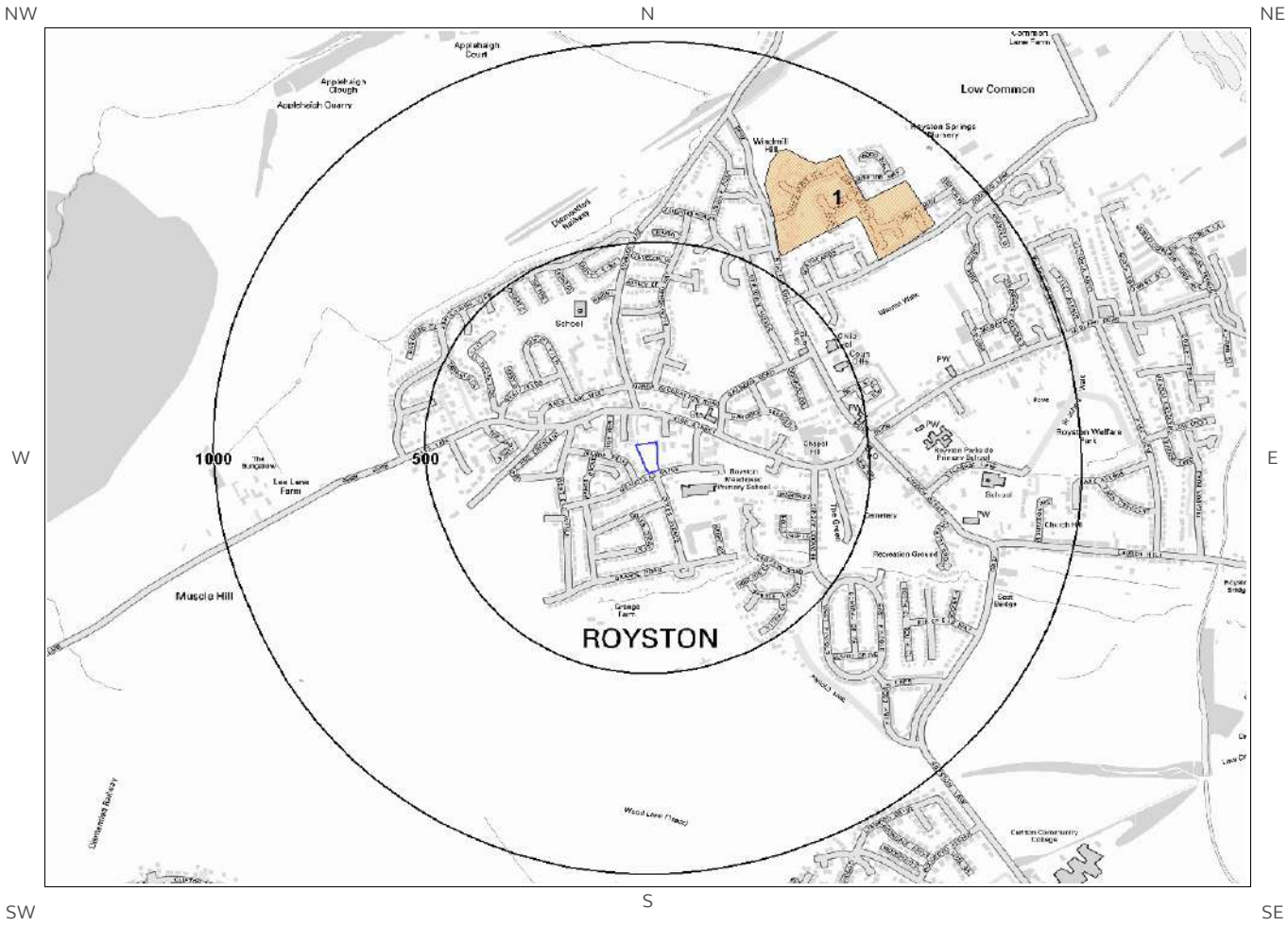
ID	Distance (m)	Direction	Category Description	Feature Description
23	39.0	S	ROCK	Coal seam, inferred
24	105.0	NW	FAULT	Normal fault, inferred
25	265.0	W	ROCK	Coal seam, inferred
26	292.0	NW	FAULT	Normal fault, inferred
27	414.0	SE	FAULT	Normal fault, inferred
28	459.0	SE	FOSSIL_HORIZON	Fossil horizon, marine band
29	475.0	E	ROCK	Coal seam, inferred

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

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

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.1.1 Artificial/ Made Ground

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

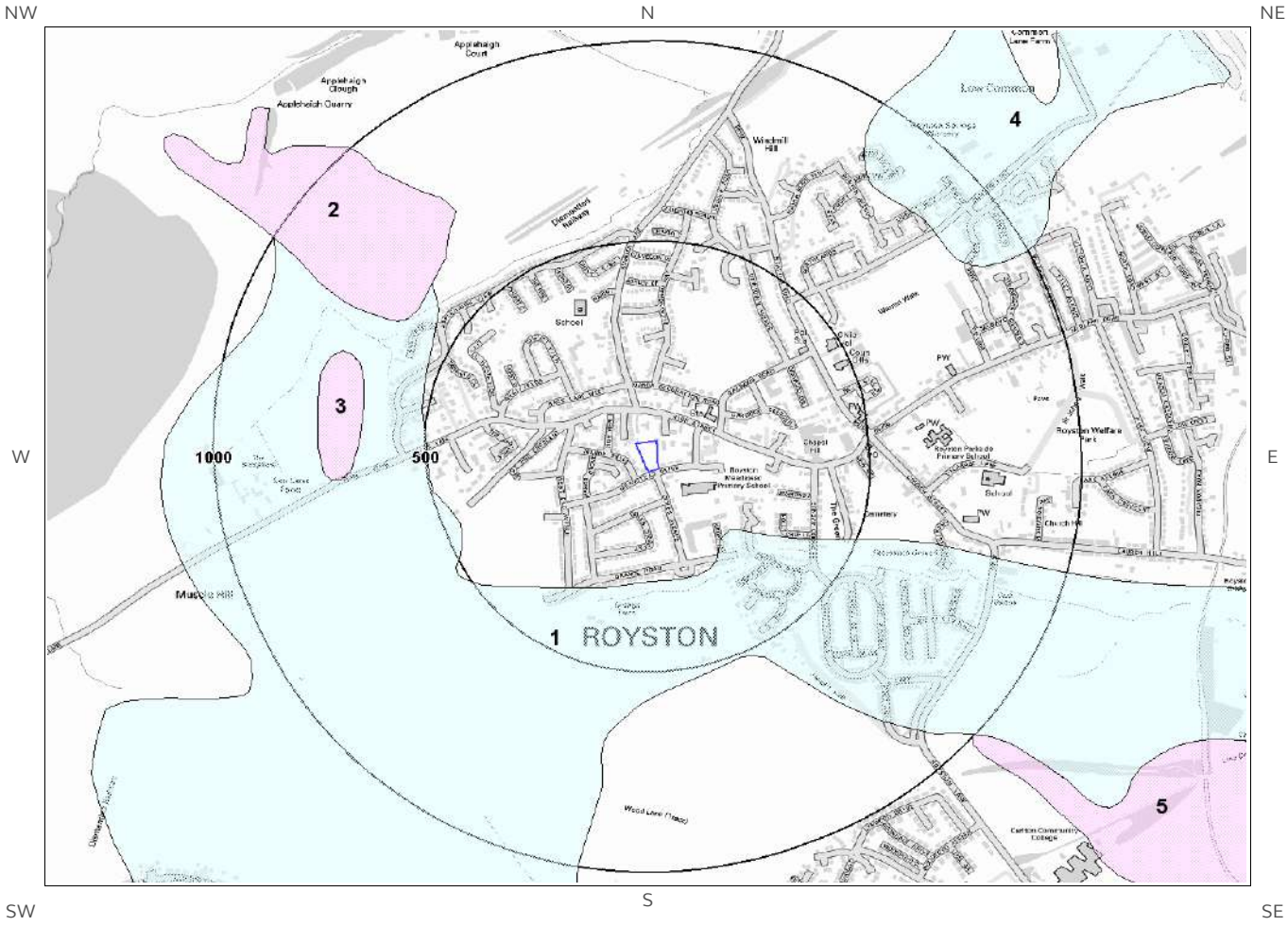
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	227.0	SE	TILMP-DMTN	TILL, MID PLEISTOCENE	DIAMICTON

2.2.2 Permeability of Superficial Ground

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

Database searched and no data found.

2.2.3 Landslip

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

Database searched and no data found.

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

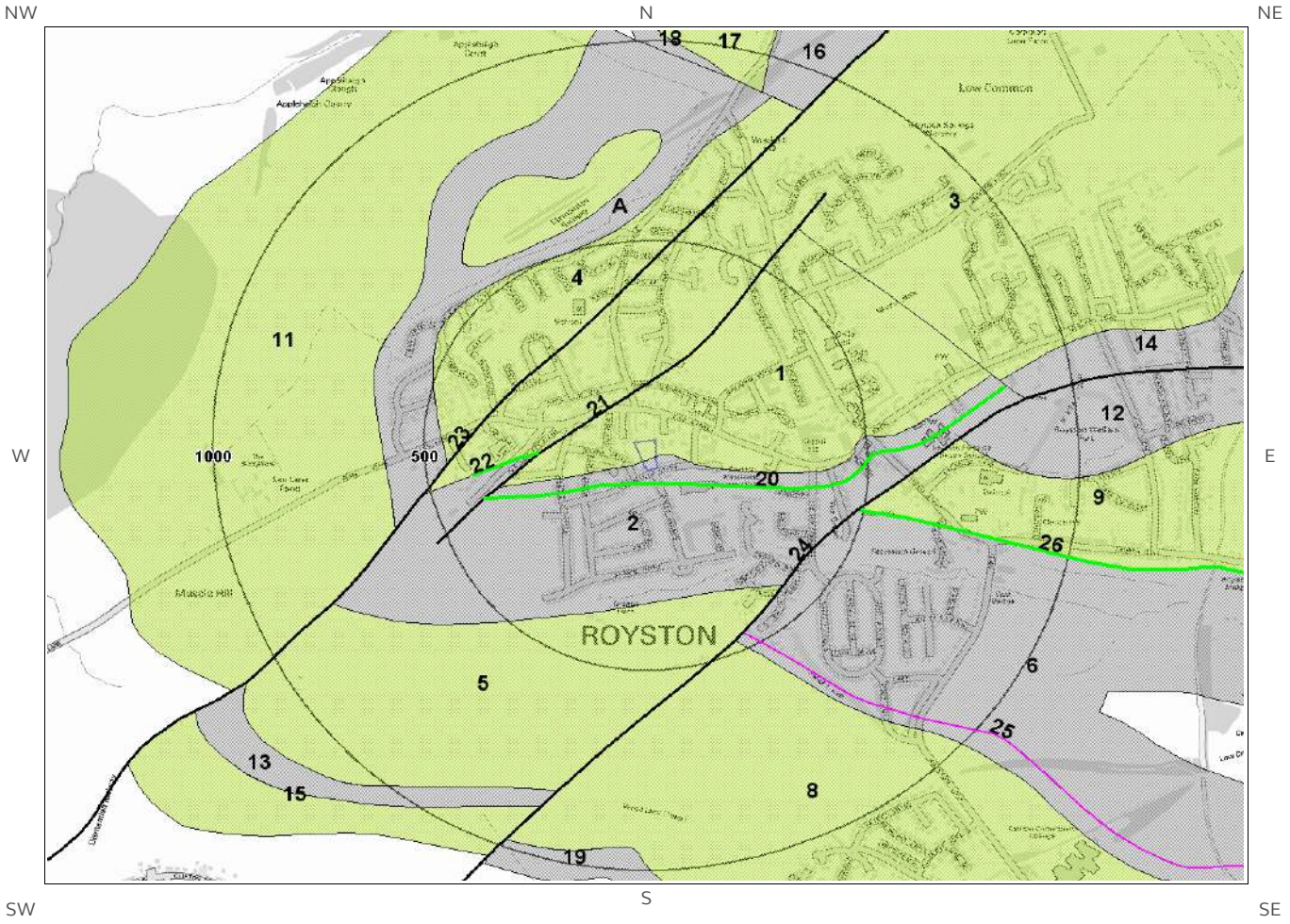
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
2	0.0	On Site	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
3	105.0	NW	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
4	292.0	NW	ACR-SDST	ACKTON ROCK - SANDSTONE	WESTPHALIAN
5	326.0	S	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
6	415.0	SE	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
7A	448.0	W	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
8	470.0	SE	OR-SDST	OAKS ROCK - SANDSTONE	WESTPHALIAN
9	485.0	E	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN

2.3.2 Permeability of Bedrock Ground

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

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

2.3.3 Faults

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

ID	Distance	Direction	Category Description	Feature Description
20	34.0	S	ROCK	Coal seam, inferred
21	105.0	NW	FAULT	Fault, inferred
22	229.0	W	ROCK	Coal seam, inferred
23	292.0	NW	FAULT	Fault, inferred
24	414.0	SE	FAULT	Fault, inferred
25	459.0	SE	FOSSIL_HORIZON	Marine band
26	485.0	E	ROCK	Coal seam, inferred

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

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

3 Radon Data

3.1 Radon Affected Areas

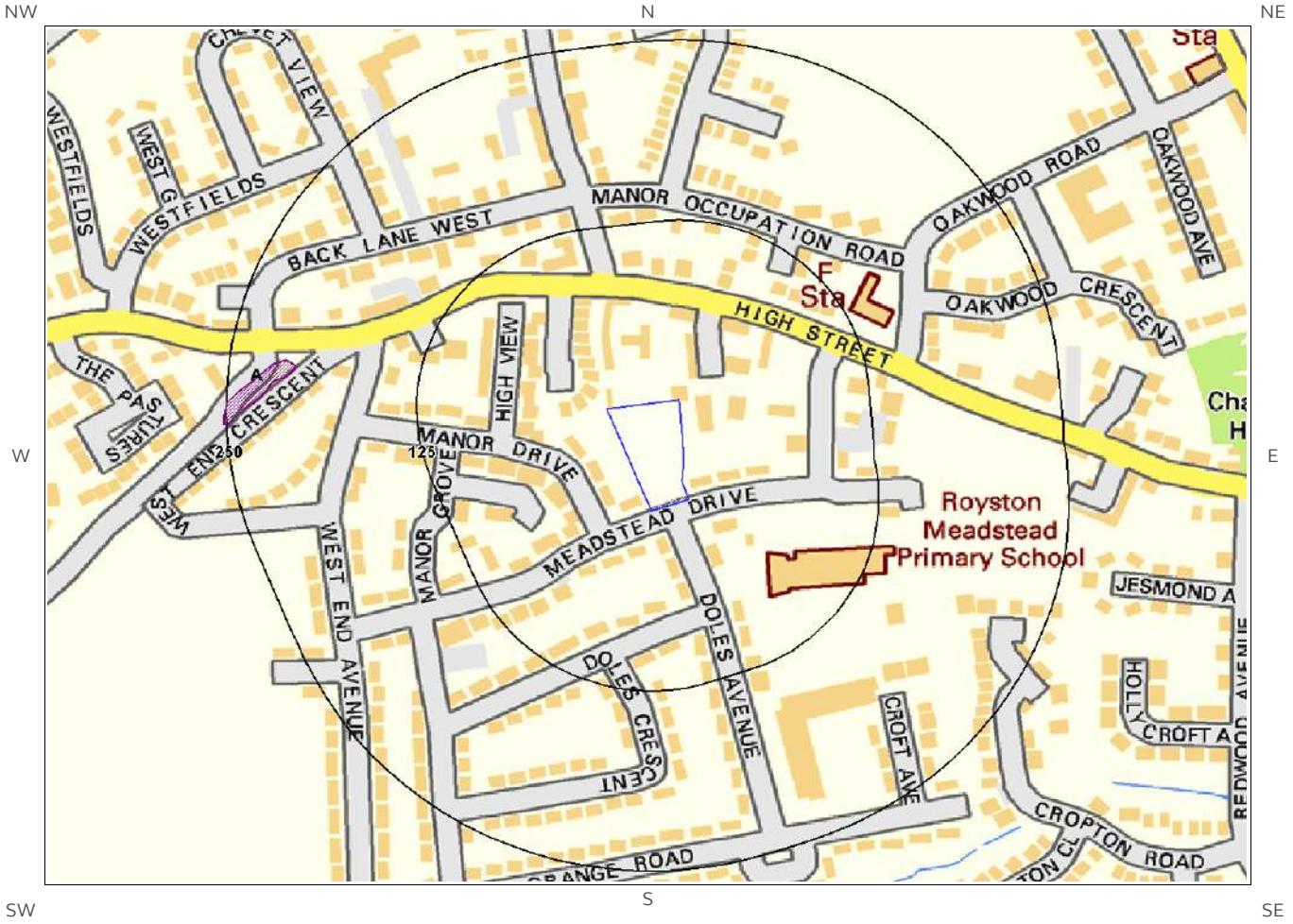
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 5 and 10% of properties are above the Action Level.

3.2 Radon Protection

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

---

4 Ground Workings Map



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

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

ID	Distance (m)	Direction	NGR	Use	Date
1A	207.0	W	435407 411441	Pond	1891
2A	207.0	W	435407 411441	Pond	1904

4.2 Historical Underground Working Features derived from Historical Mapping

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

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

Database searched and no data found.

4.3 Current Ground Workings

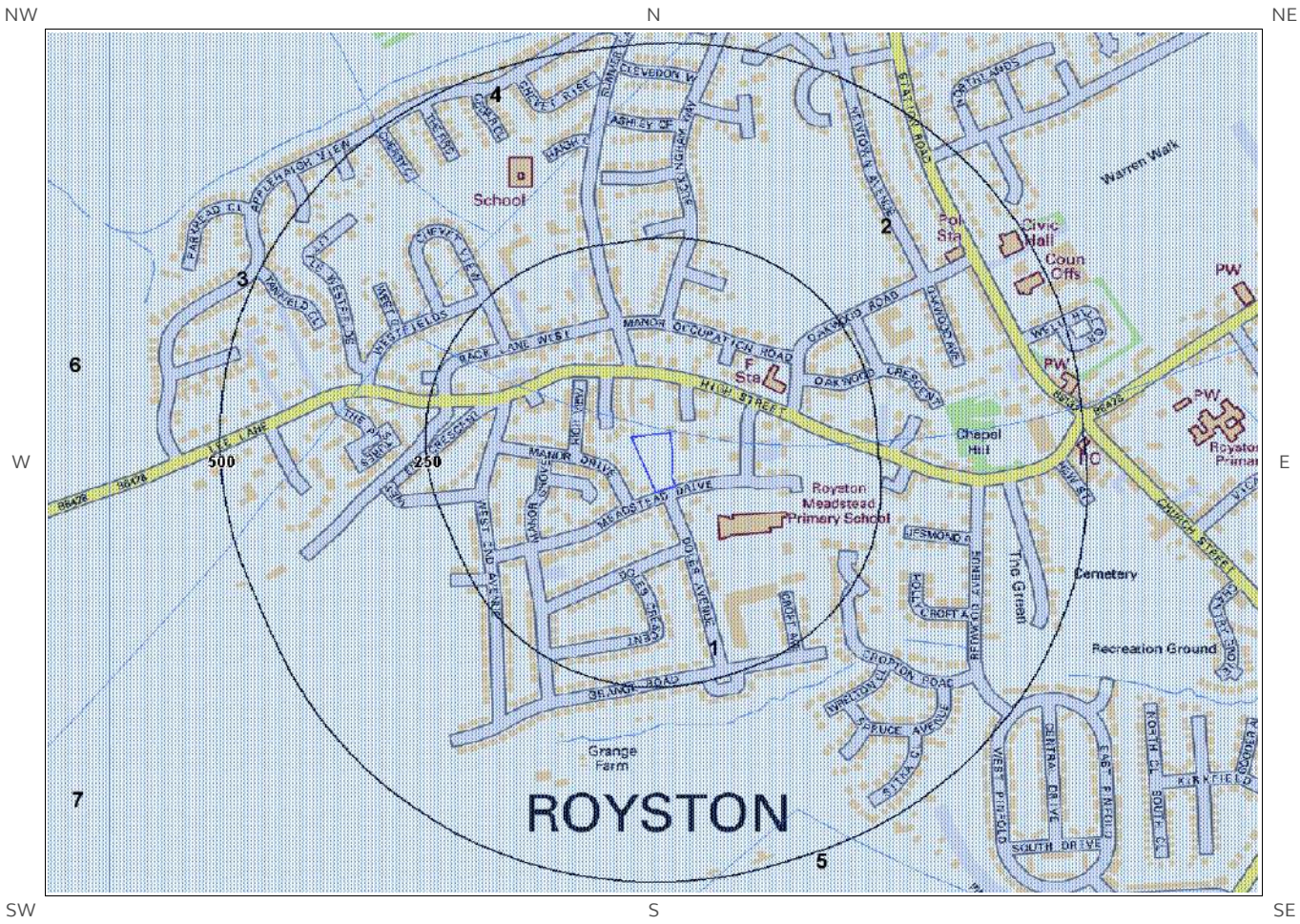
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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

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

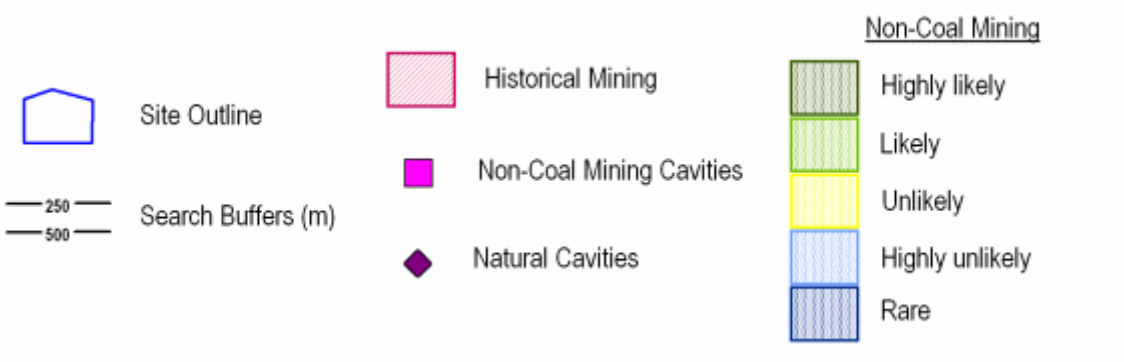
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	642.0	N	435909 412036	Sandstone	Windmill Hill	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

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

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

Database searched and no data found.

5.2 Coal Mining

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

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

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

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

5.3 Johnson Poole and Bloomer

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

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

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

5.4 Non-Coal Mining

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

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

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	3.0	N	Sheffield Area	Iron Ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
3	299.0	NW	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	310.0	NW	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
5	439.0	S	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
6	635.0	W	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	706.0	W	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	825.0	S	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	825.0	S	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

5.6 Natural Cavities

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

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

Database searched and no data found.

5.7 Brine Extraction

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

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

Database searched and no data found.

5.8 Gypsum Extraction

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

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

Database searched and no data found.

5.9 Tin Mining

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

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

Database searched and no data found.

5.10 Clay Mining

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

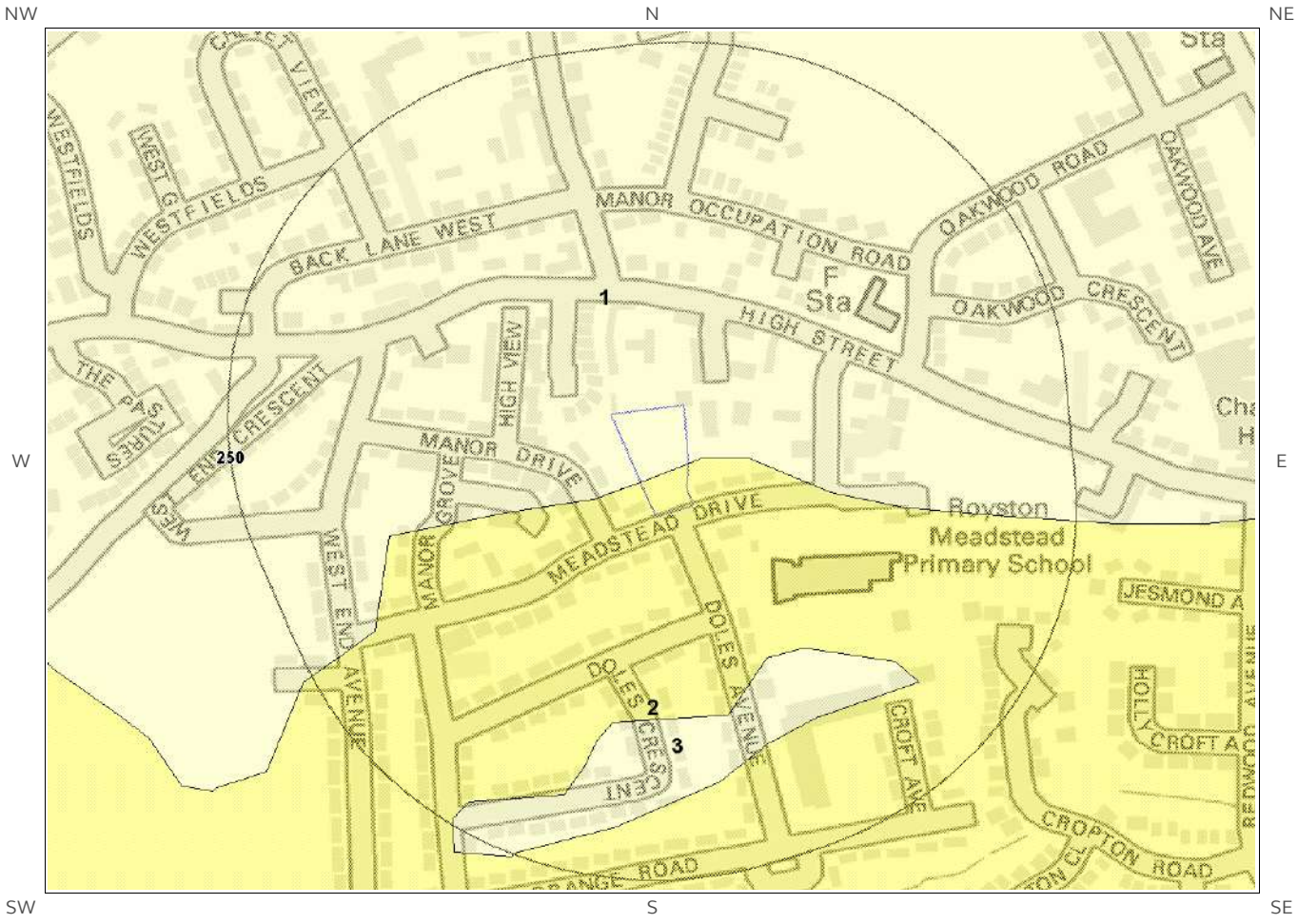
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

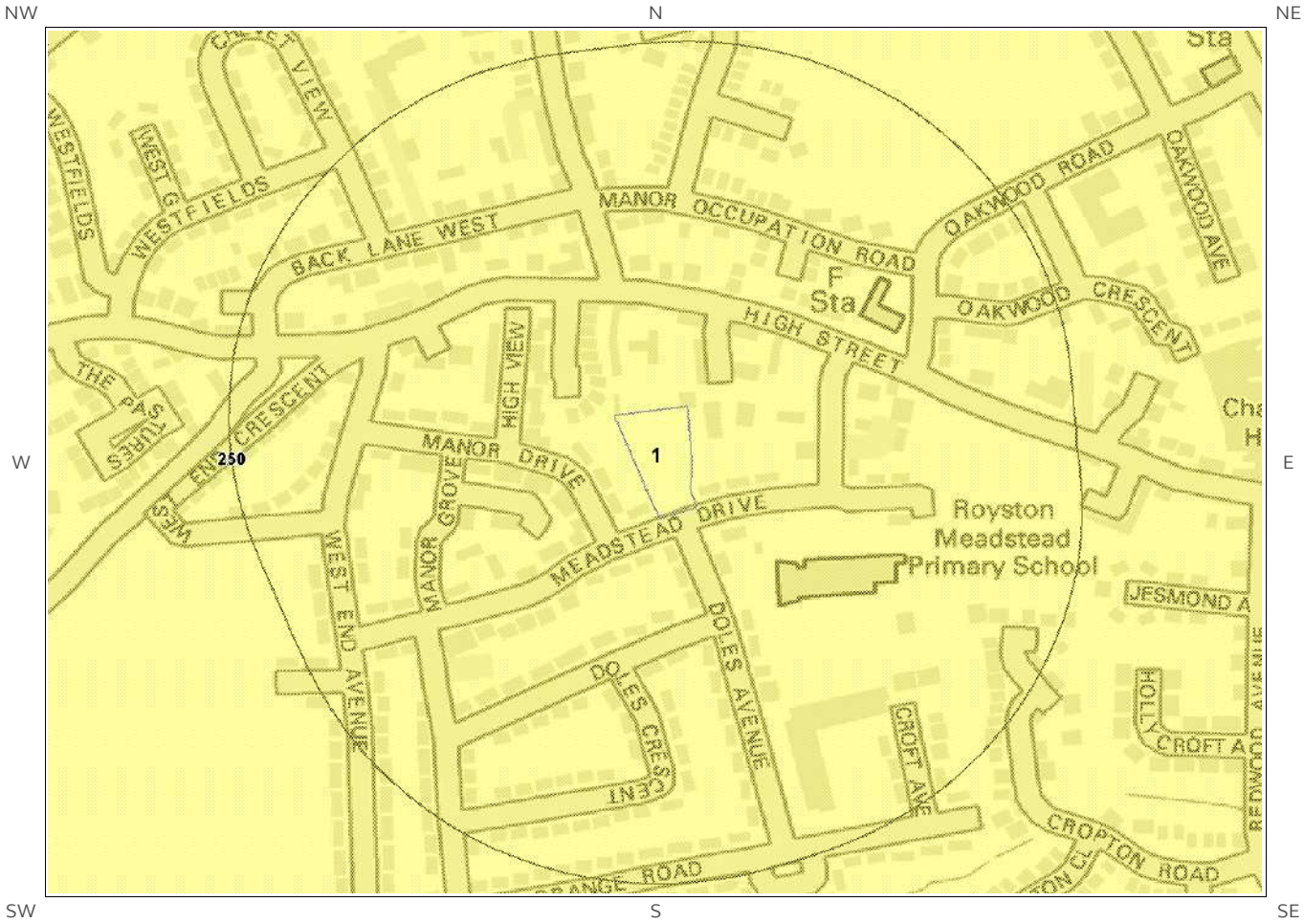


Shrink Swell Clay Legend

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6.2 Landslides Map



Landslides Legend

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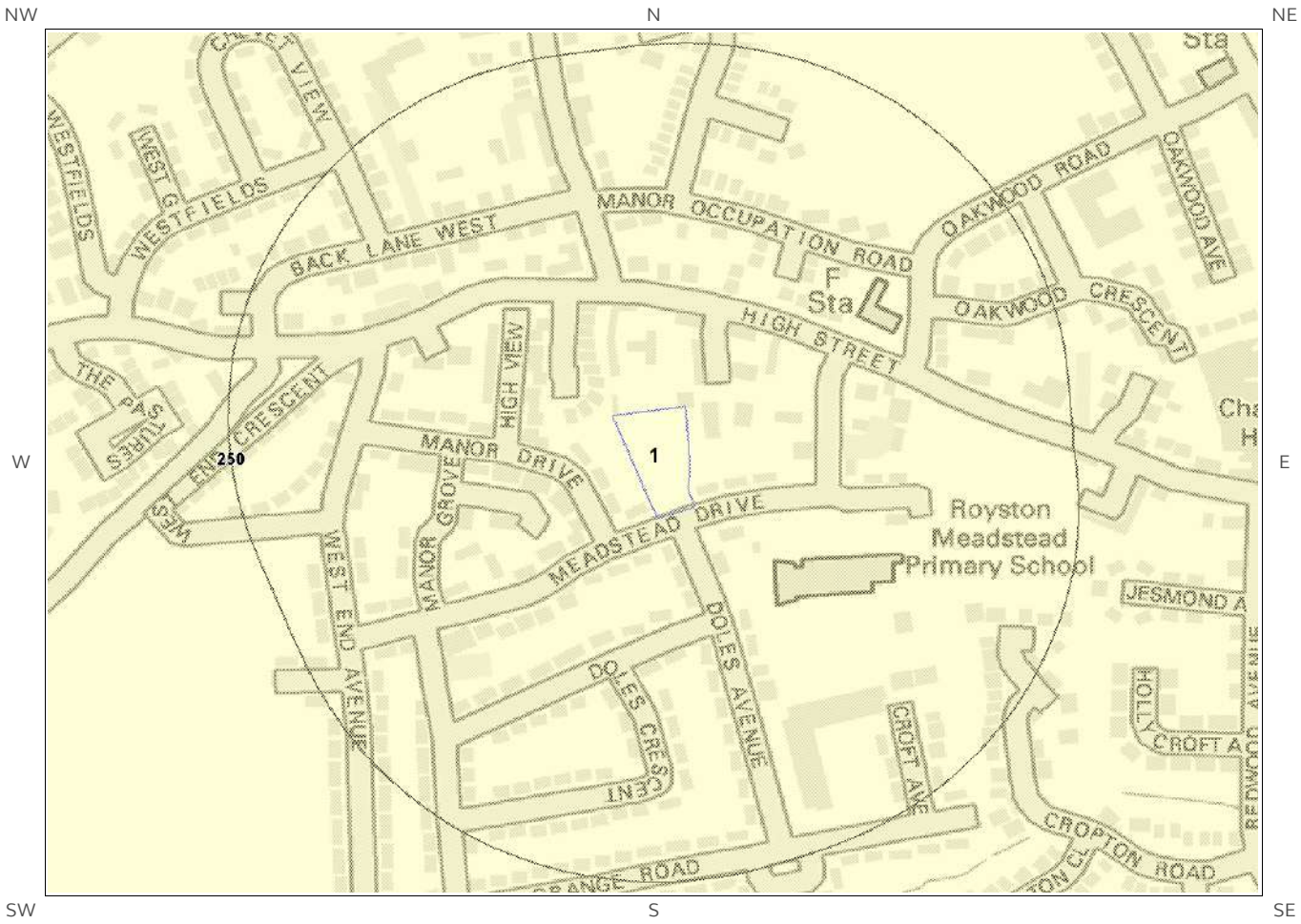
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks Map

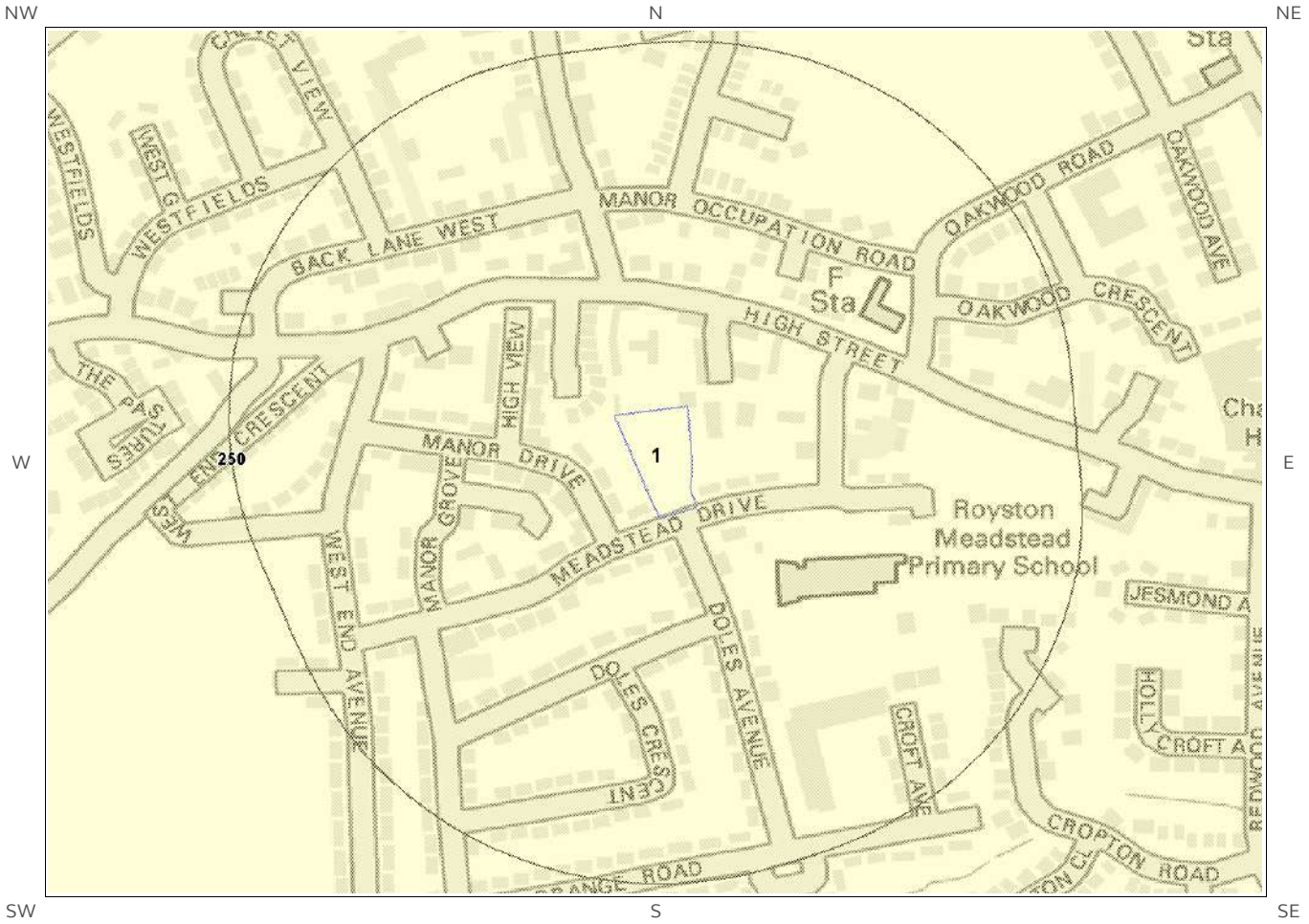


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Ground Dissolution
Soluble Rocks Legend



6.4 Compressible Deposits Map

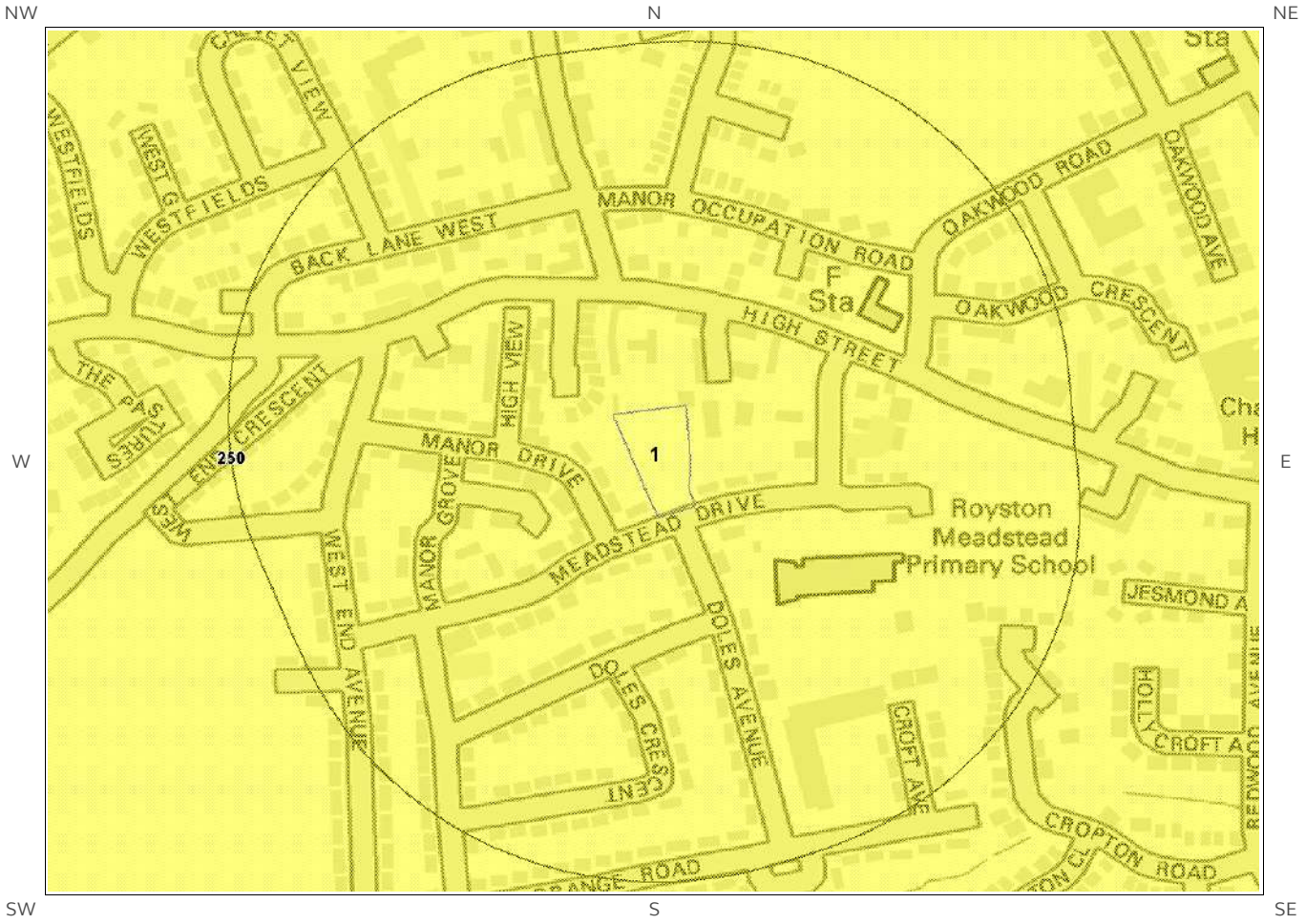


Compressible Deposits Legend

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6.5 Collapsible Deposits Map

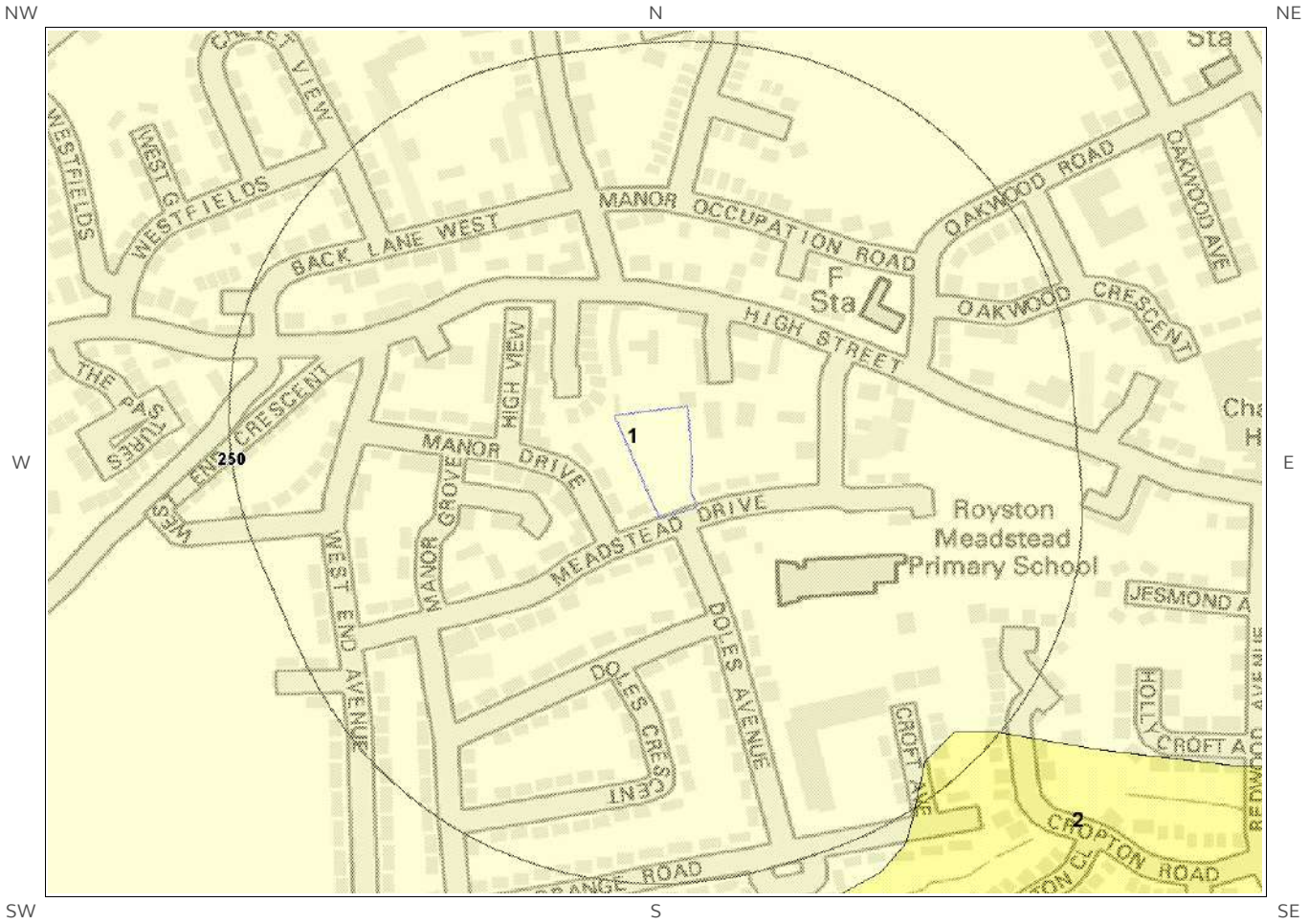


Collapsible Deposits Legend

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6.6 Running Sand Map



Running Sand Legend

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Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6 Natural Ground Subsidence

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

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

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

6.1 Shrink-Swell Clays

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

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

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

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

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

6.3 Ground Dissolution of Soluble Rocks

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

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

6.4 Compressible Deposits

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

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

6.5 Collapsible Deposits

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

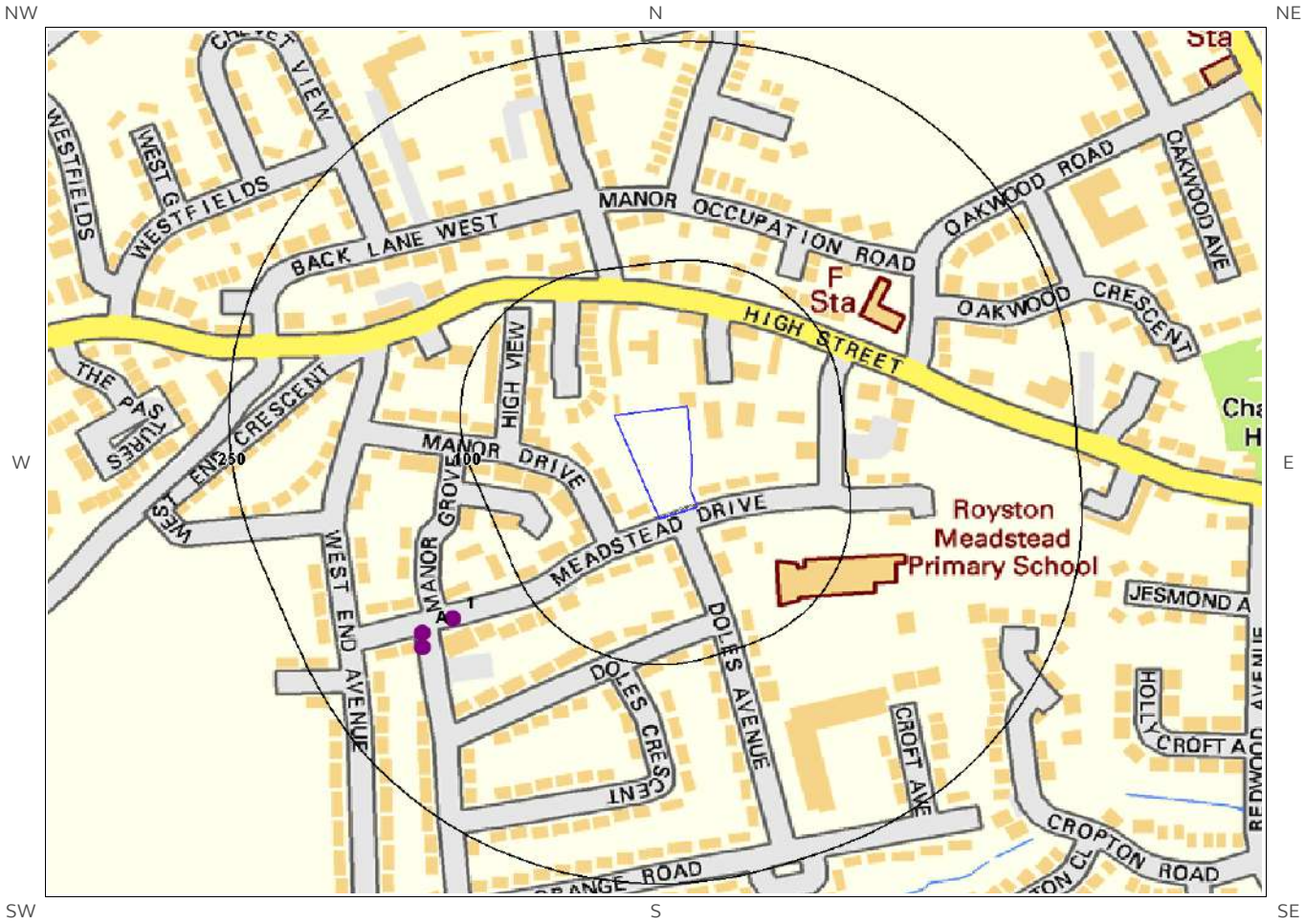
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

6.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	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.

7 Borehole Records Map



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

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

Records of boreholes within 250m of the study site boundary: 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	151.0	SW	435530 411290	SE31SE120	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP1
2A	173.0	SW	435510 411280	SE31SE121	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP2
3A	178.0	SW	435510 411270	SE31SE122	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP3

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.

8 Estimated Background Soil Chemistry

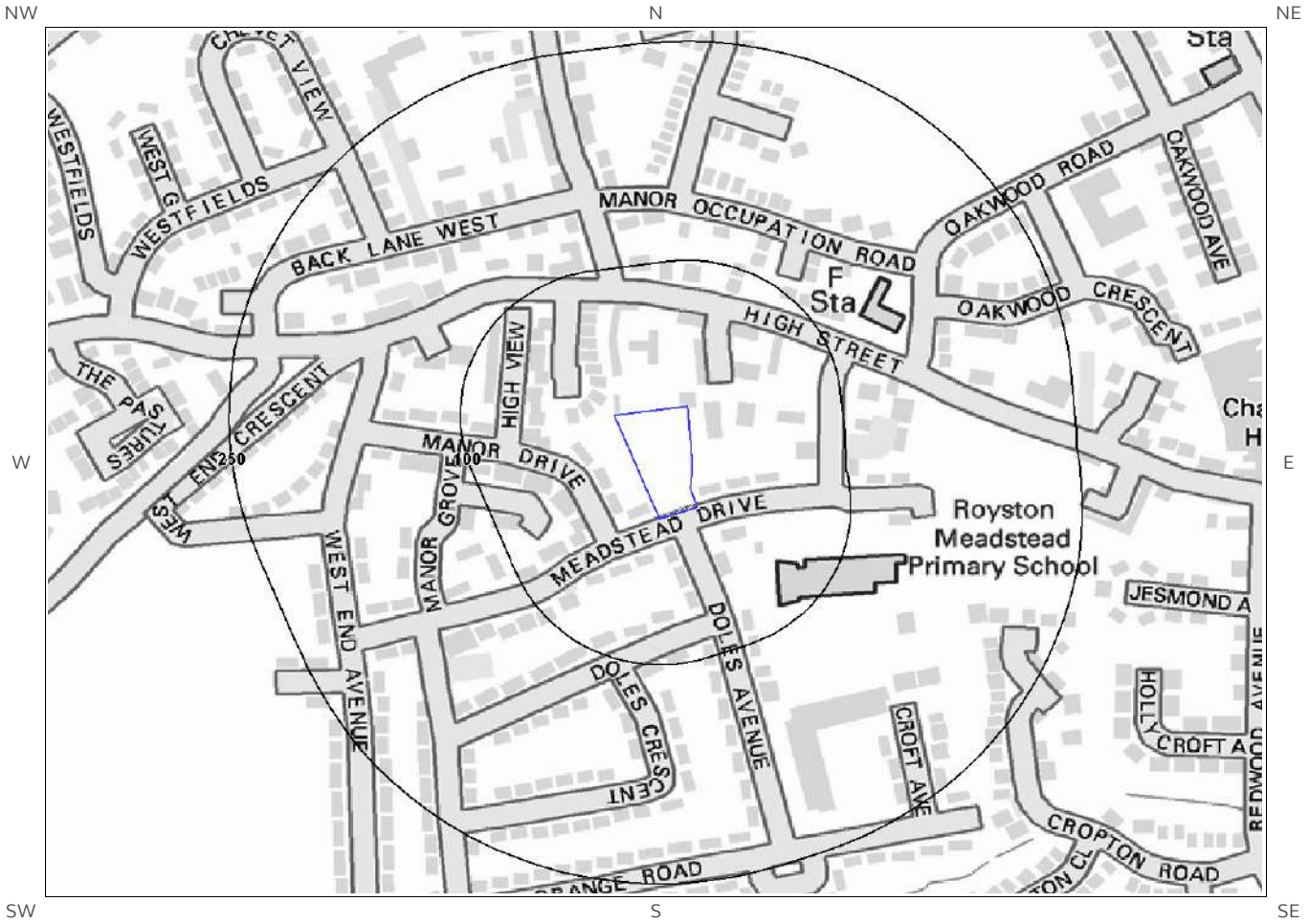
Records of background estimated soil chemistry within 250m of the study site boundary: 2

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
3.0	N	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	30 - 45 mg/kg	<100 mg/kg

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

9 Railways and Tunnels Map



Railways and Tunnels Legend

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- Site Outline
- 250 / 500 — Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

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

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

Database searched and no data found.

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

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

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

Database searched and no data found.

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

9.2 Historical Railway and Tunnel Features

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

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

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

9.3 Historical Railways

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

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

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

Database searched and no data found.

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

9.4 Active Railways

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

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

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

Database searched and no data found.

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

9.5 Railway Projects

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

Is the study site within 5km of the route of the High Speed 2 rail project? Yes

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

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

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

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

Contact Details

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

British Gypsum

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East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

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

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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DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

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Website:**http://www1.getmapping.com/**

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Website:**http://www.peterbrett.com/home**

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Standard Terms and Conditions

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

Appendix E

Coal Authority and SYMAS Report

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report







MEADSTEAD DRIVE
BARNSLEY
SOUTH YORKSHIRE
S71 4JS

Date of enquiry:	12 June 2017
Date enquiry received:	12 June 2017
Issue date:	12 June 2017
Our reference:	51001479636001
Your reference:	GS-3977684

CON29M Non-Residential Mining Report

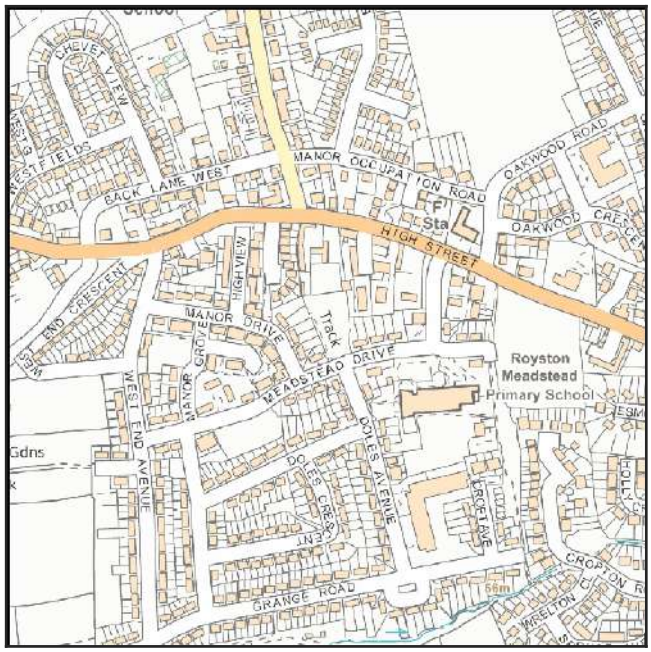
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

GROUNDSURE LIMITED

Enquiry address

MEADSTEAD DRIVE, BARNSLEY, SOUTH YORKSHIRE, S71 4JS



Approximate position of property

Map data

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+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 4 seams of coal at 280m to 560m depth, and last worked in 1980.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

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

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

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

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

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is in an area where a notice to withdraw support was given in 1977.

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

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

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In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

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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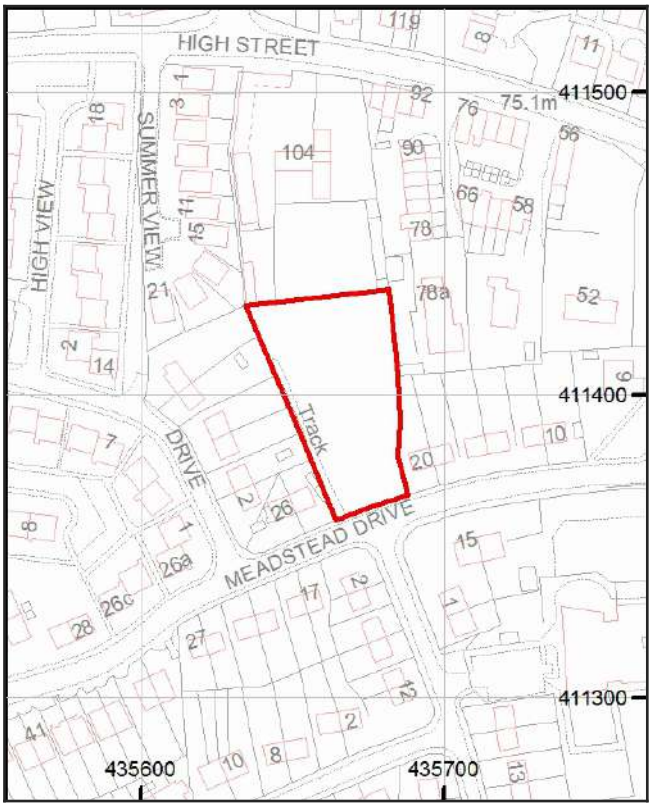
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



Map data

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DEC DIRECTORATE
South Yorkshire Mining Advisory Service

BARNSLEY
Metropolitan Borough Council

To:	NPS		**FAO:**	Steven Chitty	
My Ref:	M230/8		**Your Ref:**		
Date:	18th November 2014	**Enquiries to:**	Mr. M. Lyons	**Ext:**	2690
Subject:	LAND AT MANOR GROVE, MANOR DRIVE AND MEADSTEAD DRIVE, ROYSTONE, BARNSLEY.				

Further to your consultation request of the 11th November 2014, regarding development opportunity at the three above named locations, I am pleased to provide our report as per below.

SITUATION

The three sites under consideration at Royston are shown edged orange on the attached plan no. M230/8A.

GEOLOGY

Geological records show that the sites are located mainly on the Mexborough Rock Sandstone of the Middle Coal Measures which dips generally in a north-easterly direction in this vicinity. Geological faulting is conjectured to the north-west and the sandstone bedrock may be fissured both naturally and mining induced by the past deep operations as detailed below.

The Royston (or Sharlston Top) coal seam is conjectured to outcrop to the south of the sites as indicated on plan. According to the available information this seam is of around 0.5m thickness in this locality. From Manor Grove eastwards, the actual seam outcrop position has been proved, during past investigations, to deviate further southwards from that conjectured – as illustrated on plan. This would mean that the coal seam would be expected at a greater depth beneath the Meadstead Drive site, possibly in excess of 8m.

MINING

Shallow Mining

The shallow coal seam in this area is rarely known to have been worked historically at shallow depth in the wider vicinity. The likelihood therefore of any historic underground workings being present within this coal is considered as Low.

Deep Mining

The site has been affected by deep coal mining on several occasions, the latest being around 1979. Settlement from these mining operations will now be long complete and as the site is remote from any active coalfield it will not be affected by deep mining subsidence for the foreseeable future.

MINE ENTRIES

None known in this vicinity and the likelihood of any unchartered mine entries being encountered at this location is considered as Low.

FORMER LAND USE

The relevant Ordnance Survey Sheets and National Grid Sheets have been checked and there is no evidence of past industrial use in the vicinity of these sites.

LANDFILL

According to the Borough Landfill Register the site does not lie within 250m of any landfill operation.

CONCLUSIONS

1). The site is stable from the deep mining subsidence aspect and as the scheme is remote from any currently active coalfield it should remain so for the foreseeable future.

2). Although the Royston coal seam may be at shallow depth beneath the site, the likelihood of historic underground workings causing a stability issue at the surface is considered as **LOW** in this instance.

3). Considering the mining and geological details for this location, the likelihood for encountering an old unchartered mine entry within the site is considered as **LOW.**

4). The site is underlain by sandstone that may be fissured both naturally and/or mining induced. Future development may require suitably designed foundations where any weak ground is encountered, and treatment works to stabilise the feature may also be required in sever instances.

5). Historical plan information indicates there has been no evidence of former industrial land use in the vicinity of the site which could cause contamination problems and no landfill sites are recorded with 250m.

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This report was prepared by Mark Lyons on the 18th November 2014.



P. James
Principal Mining Engineer.

DRAWING TITLE

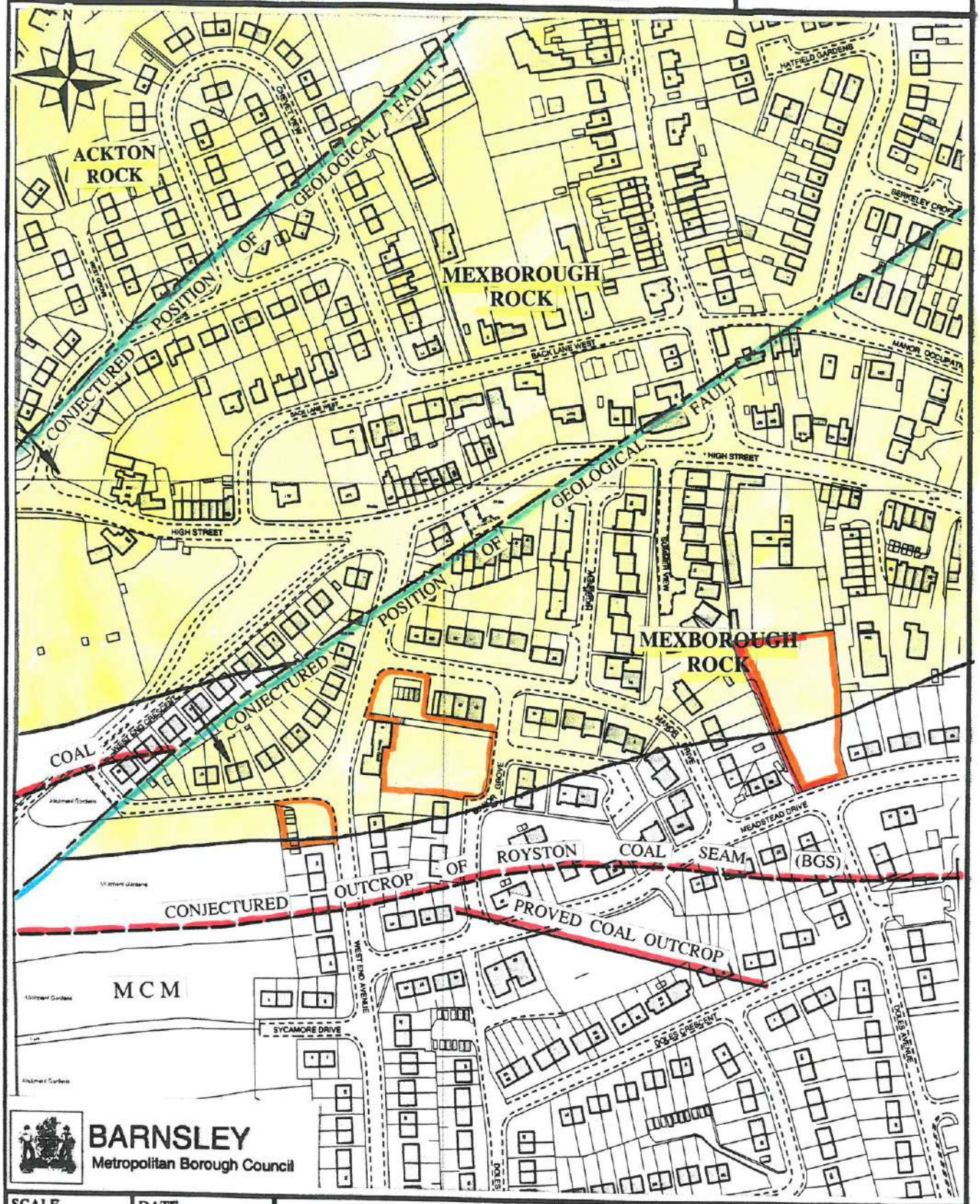
SITES AT MANOR GROVE,

MEADSTEAD DRIVE AND WEST END AVENUE

ROYSTON, BARNSLEY.

DRAWING NO.

M230/8A



BARNSLEY
Metropolitan Borough Council

SCALE	DATE		O.S REFERENCE
1:2500	14 / 11 / 14	SOUTH YORKSHIRE MINING ADVISORY SERVICE	SE 3511
DRAWN BY: AS	CHECKED BY: MAC		P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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APPENDIX B:

HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – MANOR GROVE – 23-24-18-1-6006/DSR2 – JUNE 2017

Architecture
Surveying
Building Services Engineering
Engineering
Strategic Development & Consultancy



Land Off Manor Grove Barnsley

Preliminary Land Contamination and Geotechnical Risk Assessment

On behalf of Barnsley Metropolitan Borough Council

Report 23-24-18-1-6006/DSR2
June 2017

Report Issue Record

Project No.:	23-24-18-1-6006
Project Title:	Land Off Manor Grove
Site Location:	Royston, Barnsley
Client:	Barnsley Metropolitan Borough Council
Report Title:	Preliminary Land Contamination and Geotechnical Risk Assessment
Issue Date:	30 June 2017
Report No.:	23-24-18-1-6006/DSR2
Revision:	-

	Written	Reviewed and Approved
Name	**Catherine Riley** BEng, BSc, CEng, CEnv, MCIWEM	**Craig Roberts** BSc, FIEnvSc, CEnv
Signature		
Position	Senior Geo-Environmental Engineer	Technical Director

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2 Site Location 3
3 Site Description 4
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5 Geotechnical Assessment 16
6 Contamination Risk Assessment 19
7 Conclusions and Recommendations 27
8 Limitations and Uncertainties 31
9 General Notes 32

Appendices

A Proposed Development Plan
B Historic Maps
C Groundsure EnviroInsight Report
D Groundsure GeoInsight Report
E Coal Mining and SYMAS Reports

Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Land Off Manor Grove
Location	Royston, Barnsley, S71 4LL. NGR 435494, 411380.
Approximate area	0.25Ha
Topography	Elevations range from approximately 74m in the north west to 70m in the south east.
Current land use	Derelict land, existing garages and car parking in north west corner.
Proposed development	Low rise residential. Demolish existing garages and replace with one detached and two pairs of semi-detached bungalows.

SITE SETTING	
Geology	Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Radon	No radon protective measures are required.
Hydrogeology	Secondary A Aquifer. The site does not lies within a source protection zone.
Hydrology	Tertiary watercourse 315m south.
Landfill sites	No landfills located within 500m of the site.
History	The site was undeveloped agricultural land until the 1970s, when Manor Court was constructed. Two of the buildings which comprised Manor Court were present within the site. The building appear to have been demolished in the later 2000s.
Previous site investigations	Hamson Barron Smith have not been made aware of any previous investigations which may have been undertaken at this site.
Anticipated ground conditions	Made Ground is anticipated from the former site development. Clayey sands or sandy clays derived from weathering of the sandstone bedrock. Sandstone bedrock at shallow depth.

GEOTECHNICAL	
Foundations	Shallow spread foundations should be suitable, depending the depth of Made Ground at the site. Bearing capacity to be determined from site investigation, but are likely to be sufficient for conventional low rise structures.
Shrinkable soils	Soils are likely to be non shrinkable.
Buried concrete	Significant concrete protection measures unlikely to be required.
Floor slabs	If Made Ground is present a suspended floor slab likely to be required.
Slope stability	Gradients are considered generally stable but careful assessment of changes of elevation or construction near existing slopes would still be needed. A series of small <1.5m high retaining walls are present in the north and west of the site.
Pavement	CBR values likely to be adequate for road and car park construction.
Soakaways	Underlying geology likely to be suitable for soakaway drainage, subject to full scale testing to confirm and calculate infiltration rates.
Natural cavities	None expected.
Mining	The Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site. The SYAMS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore the likelihood if historical ground workings being present is considered to be low.

CONTAMINATION	
Human health	Possible risks identified.
Controlled waters	Possible risks identified.
Gas protection	Risks from ground gases are considered to be low. No radon protection measures required.

1 Introduction

In May 2017, Hamson Barron Smith (HBS) was commissioned by Barnsley Metropolitan Borough Council to undertake a Preliminary Land Contamination and Geotechnical Risk Assessment at Land Off Manor Grove, Royston, Barnsley for the proposed redevelopment of the site.

It is understood that the site is being considered for residential redevelopment comprising one detached bungalow and four semi-detached bungalows. A sketch layout has been provided by NPS Barnsley and is presented in Appendix A.

The site comprises an area of parking and private garages to the north west with the remainder of the site undeveloped. The location of the site is shown on Figure 1.

1.1 Project Requirements

The overall objectives of this Phase I assessment are to determine the potential risks from contamination and to identify potential geotechnical risks and constraints.

The objectives of the Phase I report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Review historical and recent land uses to assess the potential for contamination to be present from past and current land-use.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities that may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks.
- Develop a ground model for the site.

1.2 Information Sources

During the production of this report the following sources have been reviewed:

- An EnviroInsight Report prepared by Groundsure (Report Number GS3977784 dated 12th June 2017).

- A GeoInsight Report prepared by Groundsure (Report Number GS397774 dated 12th June 2017).
- A CON29M Non-Residential Mining Report prepared by the Coal Authority (Report Number 51001485229001 dated 12th June 2017).
- A Mineral Report prepared by South Yorkshire Mining Advisory Service (SYMAS) (Report Number M230/8 dated 18th November 2014)
- Historic Ordnance Survey maps.
- British Geological Survey maps.
- British Geological Survey borehole records.
- Environment Agency landfill records.
- Environment Agency groundwater data.

1.3 Previous Investigations

HBS has not been made aware of any previous investigations which may have been undertaken at this site.

2 Site Location

Address: Land Off Manor Grove, Royston, Barnsley.

Post Code: S71 4LL.

National Grid Reference: 435494, 411380.

The site location is shown on Figure 1 and a more detailed plan on Figure 2.

Full details of the site's features and land use are presented in Section 3.

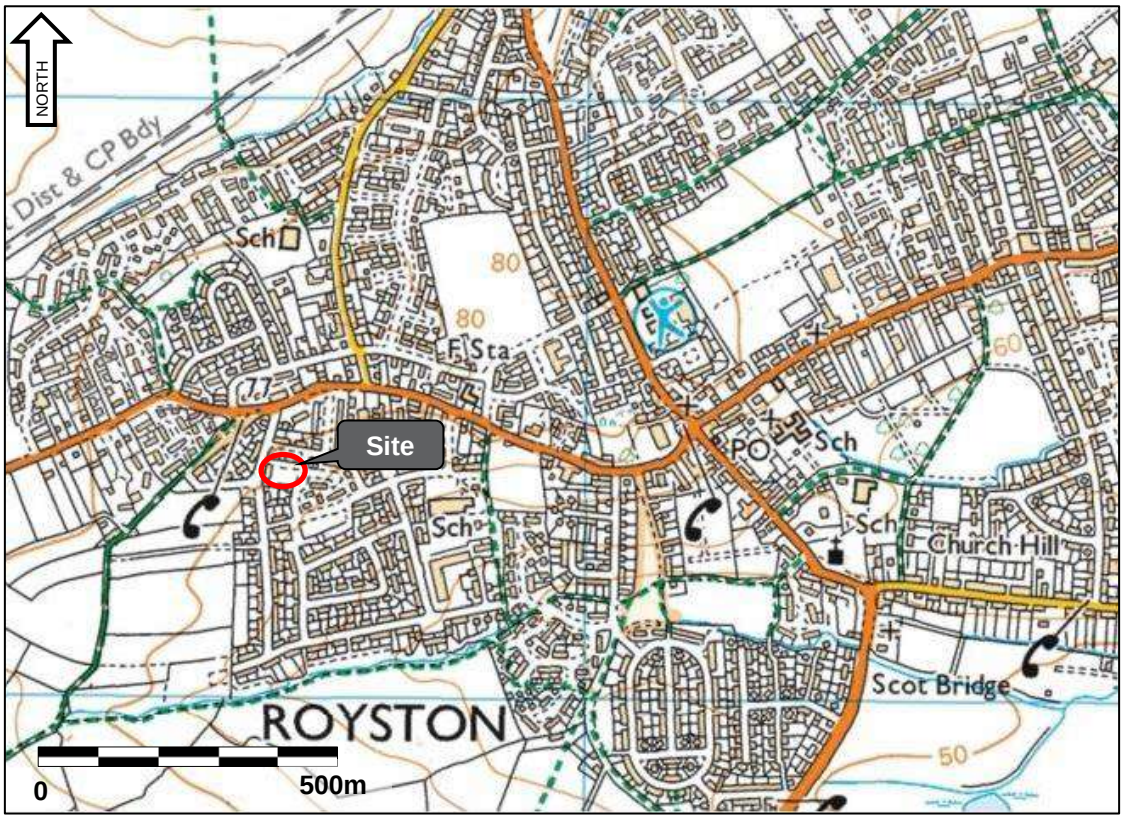


Figure 1 Site location plan

3 Site Description

The site is located between Manor Grove, Manor Drive and West End Avenue in the town of Royston. The site occupies an area of 0.25Ha and there is a slight fall in topography from 74m in the north west to 70m in the south east.

A site walkover survey was undertaken on 13th June 201 by HBS.

Access to north western corner of the site is from West End Avenue; in this location the site lies at the same elevation as the adjacent road and is currently utilised as an area of tarmacked car parking.

Immediately to the east of the area of car parking the site falls to an elevation of 72.6m OD. The changes in elevation is accommodated by a 1m high retaining. Access to this are of the site is via a ramp from Manor Drive to the north. There is a row of four private garages to the east with hardstanding (tarmac and concrete) to the front (west) of the garages. A tarmacked lane runs east from the garages behind a row of shops which lie immediately north of the site.

The main area of the site is disused and overgrown with access off Manor Grove to the east. This area of land falls gently to the south east from an elevation of 73.5m OD adjacent to the garages to 70.7m OD in the south east on Manor Grove.

3.1 Adjacent land Use

The site is bounded to the north by shops, the south and east by residential premises and to the west by Manor Court a Berneslai Homes community building.

Figure 2 shows the site setting.

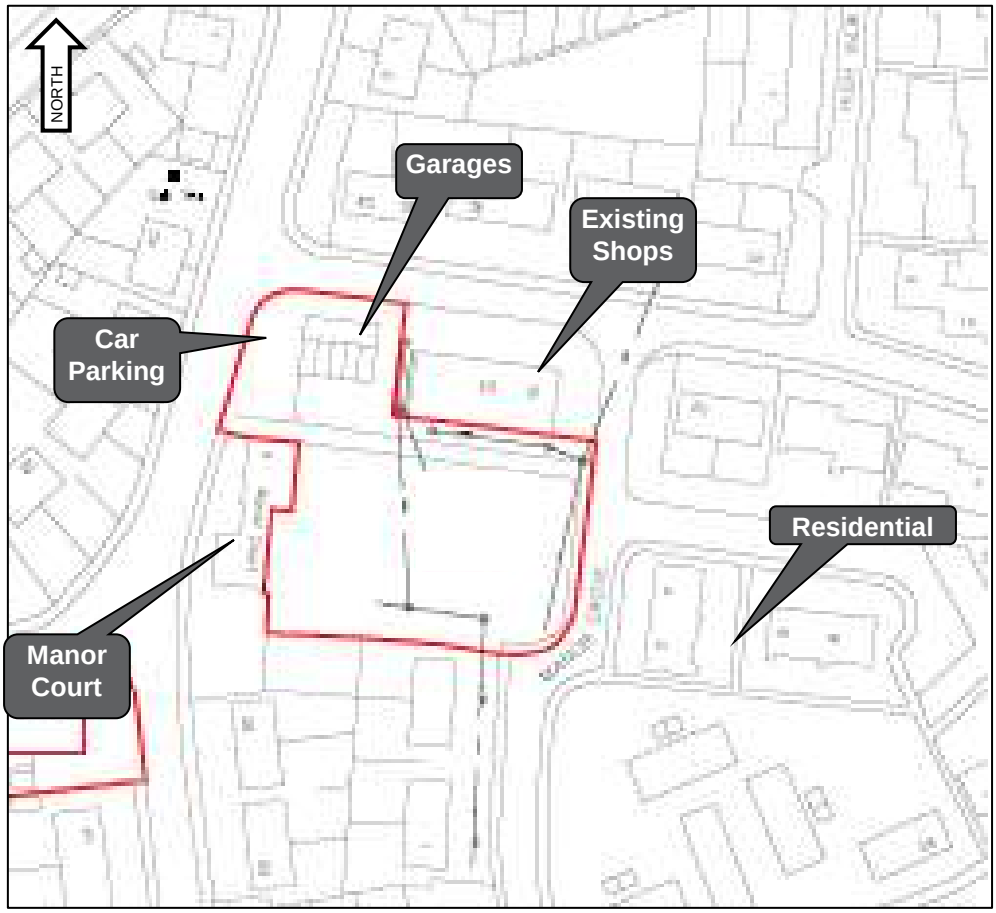
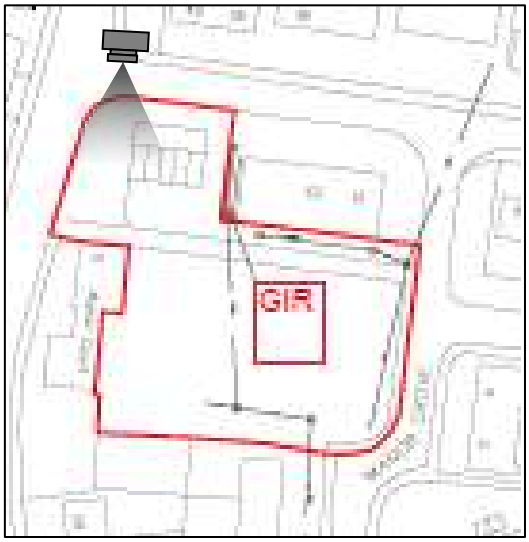


Figure 2 Site layout

3.2 Photographs



Photograph 1 Car parking areas to north west of site, looking south.



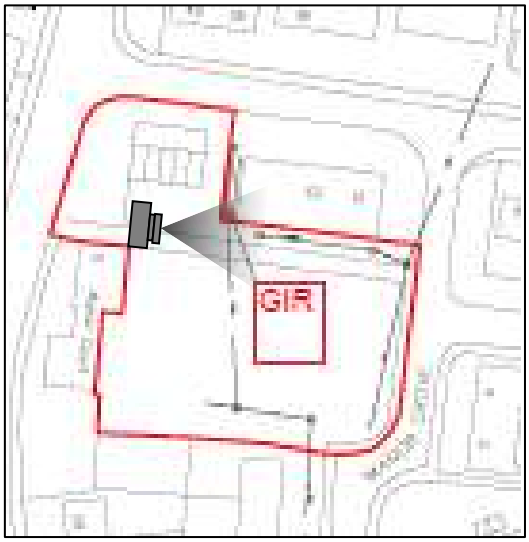


Photograph 2 Area of garages with the existing shops to the east, looking south east.



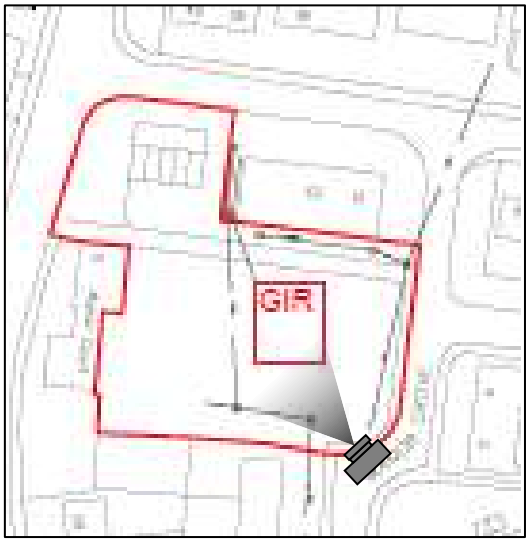


Photograph 3 Tarmacked lane to the rear of the shops, looking east.



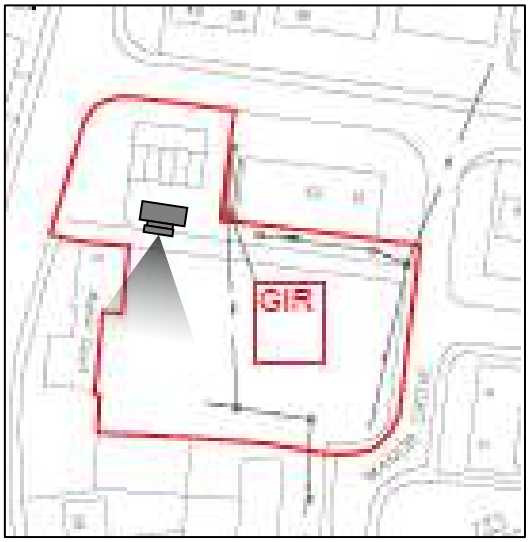


Photograph 4 The main area of the site from Manor Grove, looking north east.





Photograph 5 The western edge of the site, looking south.





Photograph 6 The main area of the site, looking north east.



4 Environmental Setting

4.1 Geology

The 1:50,000 scale British Geological Survey (BGS) geological mapping indicates the site to be underlain by the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures, which outcrop immediately south of the site. No superficial deposits are anticipated beneath the site.

The Pennine Middle Coal Measures are described by the BGS as "*Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit*".

There are no BGS borehole records in the vicinity of the site.

4.2 Soil Geochemistry

BGS estimated soil geochemistry information is included as part of the Groundsure GeoInsight report. The BGS digital estimated soil chemistry data indicates the estimated geometric mean concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Nickel and Lead in topsoil derived by spatial interpolation of the point source soil chemistry data. The original samples were collected and analysed as part of the BGS Geochemical Baseline Survey of the Environment (G-BASE) project.

Table 1 summarises the typical estimated concentrations of each determinant in topsoil in the locality of the site.

Table 1: Summary of BGS Estimated Soil Geochemistry

Determinant	Concentration Range (mg/kg)
Arsenic	15 – 25
Cadmium	<1.8
Chromium	90 – 120
Lead	<150
Nickel	15 – 30

4.3 Hydrogeology

The Environment Agency classifies the Pennine Middle Coal Measures at the site to be a Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater abstractions within 2km.

This would suggest that groundwater would be of low sensitivity to any potential sources of on-site contamination.

4.4 Hydrology

The nearest surface water is a tertiary river which lies circa 315m south at its nearest point. The distance of the site from the surface water feature would suggest that surface water is considered to be of low sensitivity to any potential sources of contamination.

4.5 Landfill Sites

There are no recorded current or historical landfill sites within 500m.

4.6 Radon

The Groundsure radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

4.7 Sensitive Land Uses and Designated Areas

The site is in a Nitrate Vulnerable Zone. Notton Wood a Local Nature Reserve and area of Ancient and Semi Natural Woodland lies circa 910m west.

4.8 Land Use History

The historical land uses of the site and its surrounding area have been established from superseded editions of Ordnance Survey maps and are detailed in Table 2. Copies of the maps are included in Appendix B.

Table 2: Summary of Historical Maps

Date	On Site	Offsite
1854	The site is part of a larger agricultural field.	The general surrounding land use is agricultural with residential properties in the village of Royston present c.80m north. A pond marked “brick pond” lies 60m north west.
1891-1893	No significant changes are evident.	No significant changes are evident.
1904-1906	No significant changes are evident.	A quarry is present c.500m east and a smithy c.600m south east.
1918	No significant changes are evident.	No significant changes are evident.
1930-1938	No significant changes are evident.	The village of Royston has expanded. The quarry and smithy are no longer marked. The pond is no longer marked and some residential development has occurred to the north west.
1948	No significant changes are evident.	No significant changes are evident.
1951	No significant changes are evident.	No significant changes are evident.
1960-1966	No significant changes are evident.	Significant residential development has occurred in Royston to the east and south.
1970-1978	Two buildings (marked Manor Court) are present on the main areas of the site with garages in the north west corner.	A third building marked Manor court lies immediately west of the site. By 1970 a housing estate has been constructed around the site. The shops to the north also appear to have been constructed.
1988-1993	No significant changes are evident.	No significant changes are evident.
2002	No significant changes are evident.	No significant changes are evident.
2010	Manor Court appears to no longer be present on the site.	The third building marked Manor Court is still present immediately west of the site.
2014	No significant changes are evident.	No significant changes are evident.

4.8.1 Summary of Development History

On site

The site was undeveloped agricultural land until the 1970s, when Manor Court was constructed. Two of the buildings which comprised Manor Court were present within the site. The building appear to have been demolished in the between 2002 and 2010.

Off Site

The surrounding land use was typically undeveloped farmland becoming a mixture of agricultural land and residential properties. A former quarry was located 60m north west of the site. This pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is

assumed that it was backfilled. The nature of material used to backfill the pond is not known.

4.9 Statutory Authority Records

A review of public registers contained within the Groundsure EnviroInsight report has been undertaken. These entries relate to trade directories, pollution control registers, hazardous sites, enforcement notices etc. None of the entries are considered to be of relevance to the site, for full details of all entries, reference should be made to the EnviroInsight report in Appendix C.

5 Geotechnical Assessment

The published geological information (Section 4.1) indicates that the site is likely to be underlain by underlain by clayey sands or sandy clays of weathered sandstone bedrock of the Pennine Middle Coal Measures.

An assessment of potential geotechnical risks based on the information from the Groundsure GeoInsight Report and available geological information is presented in the following sections. The risks are summarised in Table 4. The Report is reproduced in Appendix D.

5.1 Deep Made Ground

It is likely that some Made Ground would be present, resulting from the former development of the site. Deep Made Ground resulting from infilling or significant raising of levels is considered unlikely however.

5.2 Buried Structures

Former foundations associated with the previous development of the site may be present. Foundations associated with the current development of the site will also be present.

5.3 Compressible Soils

The Groundsure GeoInsight report states that the Compressible Ground risk at the site is “negligible”. Based on the expected geology, compressible soils are not anticipated.

5.4 Shrinking / Swelling Clay

The Groundsure GeoInsight report states that the Shrinking or Swelling Clay risk at the site is “negligible” to “very low. This is based on the anticipated Mexborough Rock. However, the near surface soils may comprise clays derived from weathering of the bedrock and therefore may potentially be shrinkable.

5.5 Collapsible soils

The Groundsure GeoInsight report states that the Collapsible Ground risk at the site is “very low”. Based on the anticipated ground conditions, collapsible soils are not expected.

5.6 Aggressive Ground Conditions for Concrete

Based on the published geology, the anticipated soils are not expected to contain significantly elevated concentrations of soluble sulphates or pyritic materials which may oxidise to form soluble sulphates.

5.7 Running Sands / Excavation Instability

The Groundsure GeoInsight report states that the Running Sand risk at the site is "negligible". Based on the anticipated ground conditions, running sands are not expected.

5.8 Groundwater

No evidence of a high water table (such as ponding water, hydrophilic plants, soft ground etc) was noted during the site walkover.

5.9 Slope Stability

The Groundsure GeoInsight report states that the Landslide risk at the site is "Very low".

The current development of the site has been accommodated by a series of terraces and slopes. Provided no significant alterations to the sites topography are made no issues with stability are anticipated. Any proposed slopes or temporary cuttings for retaining systems should be carefully assessed however.

5.10 Solution Features / Natural Cavities

The site is expected to be underlain by sandstone of the Mexborough Rock that is not prone to dissolution.

The Groundsure GeoInsight report states that the Ground Dissolution risk at the site is "negligible" and no solution features are recorded within 1km.

5.11 Underground Mining

The GeoInsight report states that the site is within an area affected by coal mining. A Coal Authority Mining Report was obtained by HBS, this report confirmed:

- The property is in a surface areas that could be affected by underground mining in six seams of coal at 270m to 560m depth, and last worked in 1979. Any movement in the ground due to coal mining activity should have stopped.
- There are no known mine entries on or within 20m of the site.
- 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.
- The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994..
- The Coal Authority has no record of a mine gas emission requiring action.

The SYMAS Report indicates that the Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site. From Manor Grove eastwards, the seam outcrop has been proven during past investigation to deviate further southward from the conjectured line on published geology maps.

The report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefor the likelihood if historical ground workings being present is considered to be low.

The report confirms that deep mining has occurred in the area, however it concludes that the site can be regarded as stable from deep mine workings.

The Coal Authority and Mine Entry Interpretative Reports are presented in Appendix E.

6 Contamination Risk Assessment

6.1 Legislative Background

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

Part 2A

Part 2A provides a regulatory regime for the identification and remediation of contaminated land and is the primary mechanism in the contaminated land regime. Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

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

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

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

Part 2A is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'.

In applying the definition of Contaminated Land, Part 2A states that 'the Local Authority must:

- Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
- Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as 'contaminated land'.

NPPF

NPPF States that 'to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.'

Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

NPPF also states that after any required remediation, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

6.2 Preliminary Conceptual Site Model

Following a review of the desk based geo-environmental information on the site and a site reconnaissance, a preliminary CSM has been formulated to identify potential

sources of contamination, likely receptors and potential pathways on and in the immediate vicinity of the site.

It should be noted that some uncertainties exist due to the limited site specific data available. However, potential contaminants and receptors have been identified based on this Phase 1 desk study review. Pathways have been established on reasonable scientific knowledge of the behaviour of the contaminants in the ground.

It should also be noted that because the assessment is based on documentary evidence contaminants may be identified, which in practice are not present and contaminants may be present which have not been identified.

The guidance provided in CLR11 indicates the CSM should identify those contaminants, pathways and receptors which are 'likely' to represent an 'unacceptable' risk either to human health or the surrounding environment.

6.3 Potential Contaminant Sources

6.3.1 Onsite

No significant areas of potential concern were identified from the site walkover. There are a number of minor features that may require specific investigation however:

- Suspected asbestos corrugated sheets on garage roofs.
- Potential for waste oils and fuels from vehicle repair / leaks to enter drainage system or soils.
- Potential for Made Ground from the former development of the site.

6.3.2 Garages

The site contains four garages. These would have been used for storage of motor vehicles as well as allowed servicing and repair of vehicles. The latter would have entailed the use of lubricating oils, coolants, hydraulic fluids, paints and solvents.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system.

Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils should be considered to be a potential localised sources of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system. It must be noted that there is no evidence to suggest that this may have occurred.

The quantities of liquids that may have been released are likely to be small (in comparison to prolonged leakage from large storage tanks for example) and any impacted soils are likely to exist as isolated hotspots, rather than widespread gross contamination.

6.3.3 Off site

The surrounding land use was principally farmland becoming mix of farmland, allotments and residential properties. A pond was recorded in the early 1900s approximately 60m north west.

6.3.4 Infilled Pond

A pond is shown on the early historical mapping approximately 60m north west of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled.

The materials used to fill the pond are not known, infill materials may have the potential to act as a source of soil and or groundwater contamination.

If the materials used to backfill the site contain putrescible materials then there is the potential for the filled pit to act as a source of landfill gas. Although there is the potential for the landfilling of materials to act as source of gas it is considered given the size of the feature and the date of filling that it is unlikely to represent significant on-going source of landfill gas.

6.3.5 Potential Contaminants of Concern

A general suite of common contaminants including speciated aliphatic, aromatic and ploy-aromatic hydrocarbons should suffice in assessing actual risks Suite of metals

6.4 Landfill gas

No current or historical landfills are known to exist within 500m of the site. No organic soils are anticipated to lie beneath the site. It is noted that an infilled pond is locate approximately 75m north of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The materials used to fill the pond are not known, Given the size of the feature, the date of filling and the distance from the site it is considered unlikely that the infilled pond will represent a significant on going source of landfill gases. Consequently, the risks to end users from explosive or asphyxiating gases is considered low.

No other sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development. However, as the site lies within an area where coal resources are present, it is recommended that a minimum of one round of gas monitoring is undertaken as part of the site investigation to validate this assumption.

6.4.1 Radon

The Groundsure GeoInsight report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

6.5 Receptors

It is understood that the site will be redeveloped with low rise residential properties. Future Residents are assumed therefore to occupy the site full time and may be exposed directly to soils within the site. Construction workers would be directly exposed to soils, however this would only be short term.

- Future Residents
- Construction workers
- Construction materials (including services)

- Groundwater – Secondary A Aquifer.
- Surface Water - nearby secondary River 315m south to the south
- Flora and fauna.

6.6 Preliminary Risk Assessment

A preliminary risk assessment was undertaken based on a qualitative assessment of the likely presence of a pollutant linkage. A pollutant linkage is the relationship between a source (or contaminant), a pathway and a target (or receptor). Unless all three elements of a pollutant linkage are present, a significant risk is not considered to exist. The approach adopted is to screen each site based on assigning a simple low, medium or high category.

The preliminary risk assessment is shown in Table 3 overleaf.

Table 3 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Localised sources of hydrocarbons, solvents Potential for hydrocarbons to enter soil or drainage. Made Ground e.g. metals, hydrocarbons, polycyclic aromatic hydrocarbons and asbestos.	Human Health – future residents.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
		Hydrocarbon tainting of potable water supply pipes.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium** **Risk**
	Controlled Waters – No surface water lies within 250m of the site.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Possible - if fuels or solvents discharged but no surface water lies within 250m of the site.	Probability: Possible Consequence: Medium Magnitude: **Low Risk**

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Underlying geology unlikely to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Ground gases.	Human Health – future residents.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no significant sources identified..	Probability: Unlikely Consequence: High Magnitude: **Low Risk**
	Flora	Displacement of oxygen from root systems	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Radon.	Human Health – future residents.	Permeation through ground floor.	Unlikely - no protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

7 Conclusions and Recommendations

7.1 Geotechnical Risks

The potential for geotechnical hazards are summarised in Table 4.

Table 4: Summary of Geotechnical Hazards.

Potential Geological Hazard	Impact on proposed development	Likelihood of presence
Deep Made Ground	High	Possible
Buried structures	Moderate	Possible
Compressible ground	Moderate	Unlikely
Shrinking / swelling clay	Moderate	Unlikely
Collapsible ground	High	Unlikely
Aggressive ground conditions for concrete	Low	Unlikely
Running sands / excavation instability	Moderate	Unlikely
High water table / groundwater inflows.	High	Unlikely
Slope stability	Moderate	Unlikely
Underground mining	High	Unlikely
Ground dissolution / natural cavities	High	Unlikely

Based on the anticipated ground conditions, conventional spread foundations should be suitable for the proposed development depending on the depth of Made Ground / ground disturbance due to the former site development.

The near surface soils are not anticipated to comprise significant thicknesses of shrinkable soils and foundations are therefore unlikely to require deepening in the vicinity of trees. A ground bearing ground floor slab may be suitable. If Made Ground is present to greater than 600mm or clay soils present then a suspended floor slab may be required.

The soils may be sufficiently permeable to allow soakaway drainage to be used. The Local Authority are likely to require full scale testing in accordance with BRE 365 (2016) obtain infiltration rates for design.

7.2 Land Contamination

The site contains a block of four private garages in the north west corner and the former development was demolished in the later 2000s.

The garages would have been used for storage of motor vehicles as well as allowed servicing and repair of vehicles. The latter would have entailed the use of lubricating oils, coolants, hydraulic fluids, paints and solvents. These products must therefore be considered to be potential localised sources of contamination.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils must be considered to be a potential source of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system.

The potential risks are based on the worst case assumption that the sources may have caused fuels, oils and solvents to ingress into the underlying soils. It must be noted that there is no evidence to suggest that this may have occurred. The actual risks to the receptors would need to be determined by undertaking an intrusive ground investigation and laboratory analysis.

The scope of such an investigation should be discussed and agreed with the local authority.

7.3 Ground Gas

7.3.1 Landfill gas

No sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development.

7.3.2 Radon

No radon protective measures are required in the construction of new developments or extensions.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

7.4 Coal Mining

The mining assessment has confirmed the site is underlain by deep mining, which was last undertaken in 1979. Any movement in the ground due to coal mining activity should have stopped therefore the site should be stable with respect of deep mine workings. However, the site is in an area where shallow coal is anticipated which may have been worked sometime in the past.

Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site.

The SYMAS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore, the likelihood if historical ground workings being present is considered to be low.

7.5 Summary

The aim of this report was to assess the potential geotechnical and geo-environmental issues at the proposed development site. Only limited potential sources of contamination have been identified from the Preliminary Risk Assessment. To enable the knowledge of the contaminating potential and land quality of this site to be developed further a Phase II Site Investigation would be required.

In general, where any new building is proposed an intrusive investigation should be carried out so that geotechnical parameters and sub-surface ground conditions can be determined to assist in the design of the structure. Any potential abnormal geotechnical risks identified in this report should be properly investigated so that the actual level of risk and any remedial measures required can be determined. While the provision of a detailed specification for any Phase II investigation was not part of the Client's brief for this report, it should be noted that any intrusive investigation should

address any specific contamination and geotechnical risks highlighted in this report. Where any potential sources of contamination have been identified these should be thoroughly investigated to determine actual risks to any identified receptors. Even where no potential sources of contamination have been identified, it would be prudent to undertake confirmatory testing of soils during any geotechnical investigation.

8 Limitations and Uncertainties

8.1 General

It should be noted that the levels of risk identified in this report are perceived risks based on the information reviewed. No physical investigation or testing has been carried out; actual risks can only be assessed following a physical investigation of the site. Further work, including physical investigation, laboratory testing and ground gas monitoring may be required by the appropriate regulators to confirm actual conditions.

This report has been prepared by Hamson Barron Smith with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions.

The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Hamson Barron Smith reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Hamson Barron Smith.

Hamson Barron Smith disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

8.2 Site Specific

No access was available to the garages.

9 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Hamson Barron Smith Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Hamson Barron Smith Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Hamson Barron Smith Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the conditions encountered in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the assessment, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either

visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

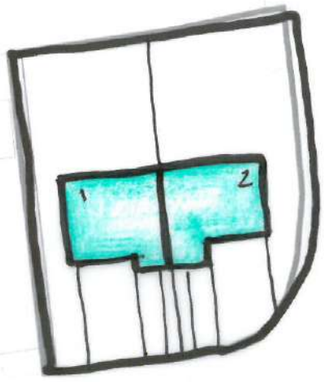
Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

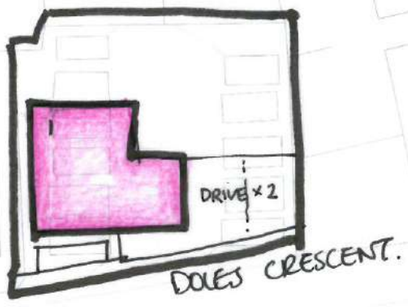
The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

Proposed Development Plan





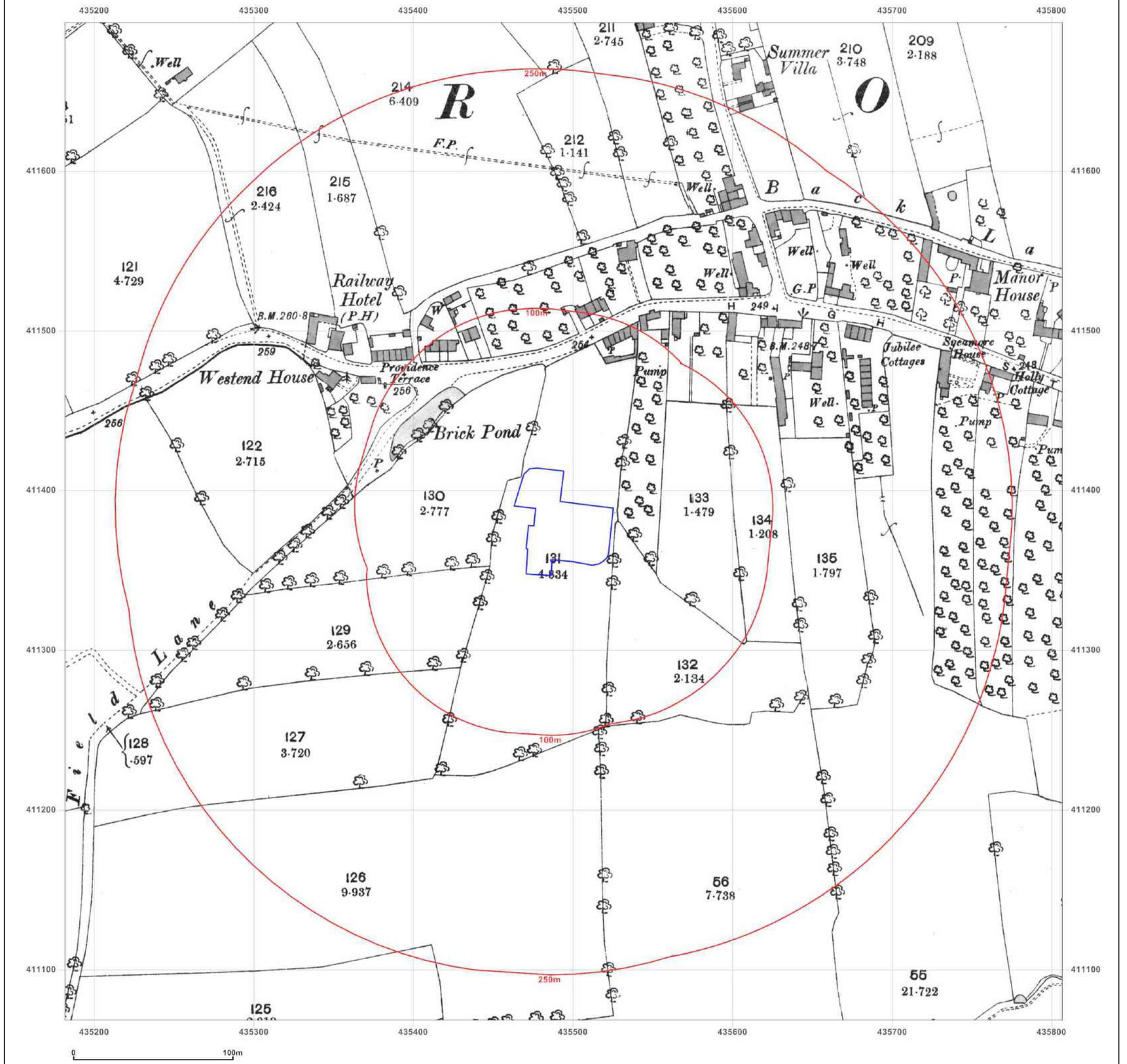


3/4 Bed detached Bungalow

2 Bed/3p Semi detached Bungalows.

Appendix B

Historic Maps



Groundsure INSIGHTS

Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1893**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A

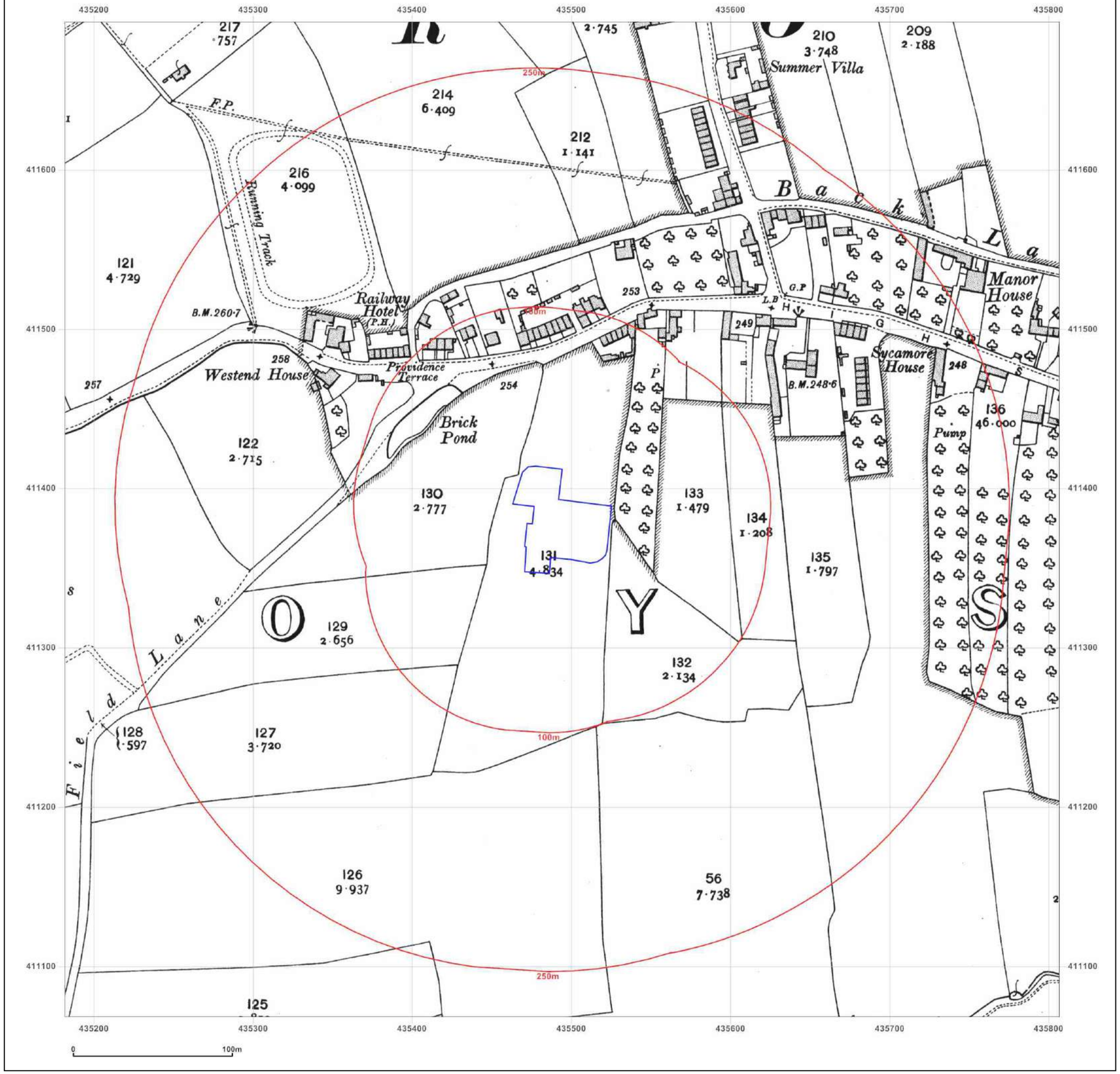
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Site Details:

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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1906**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

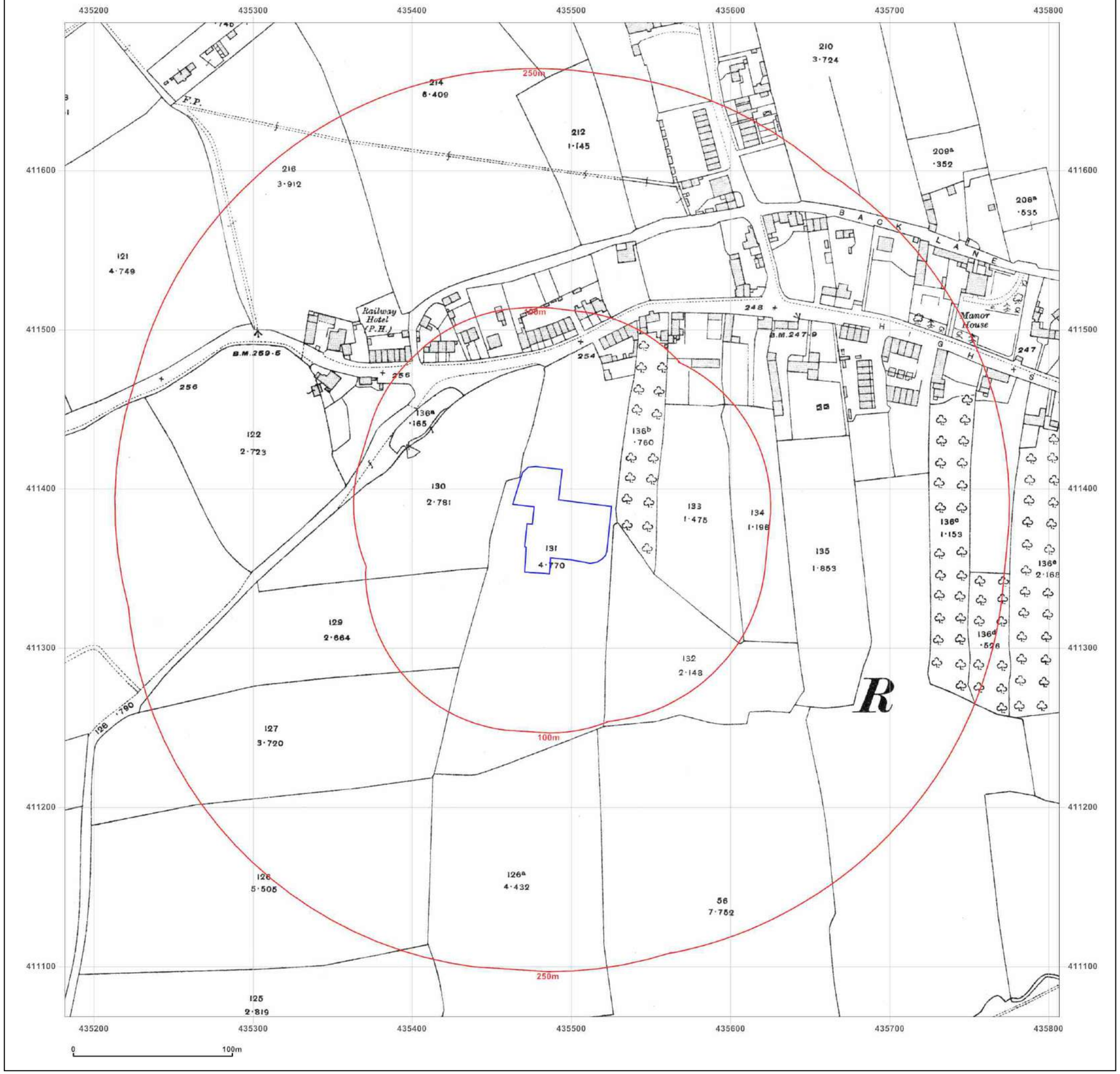
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1918**

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Printed at: 1:2,500

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Surveyed 1891
Revised 1914
Edition 1918
Copyright N/A
Levelled 1915

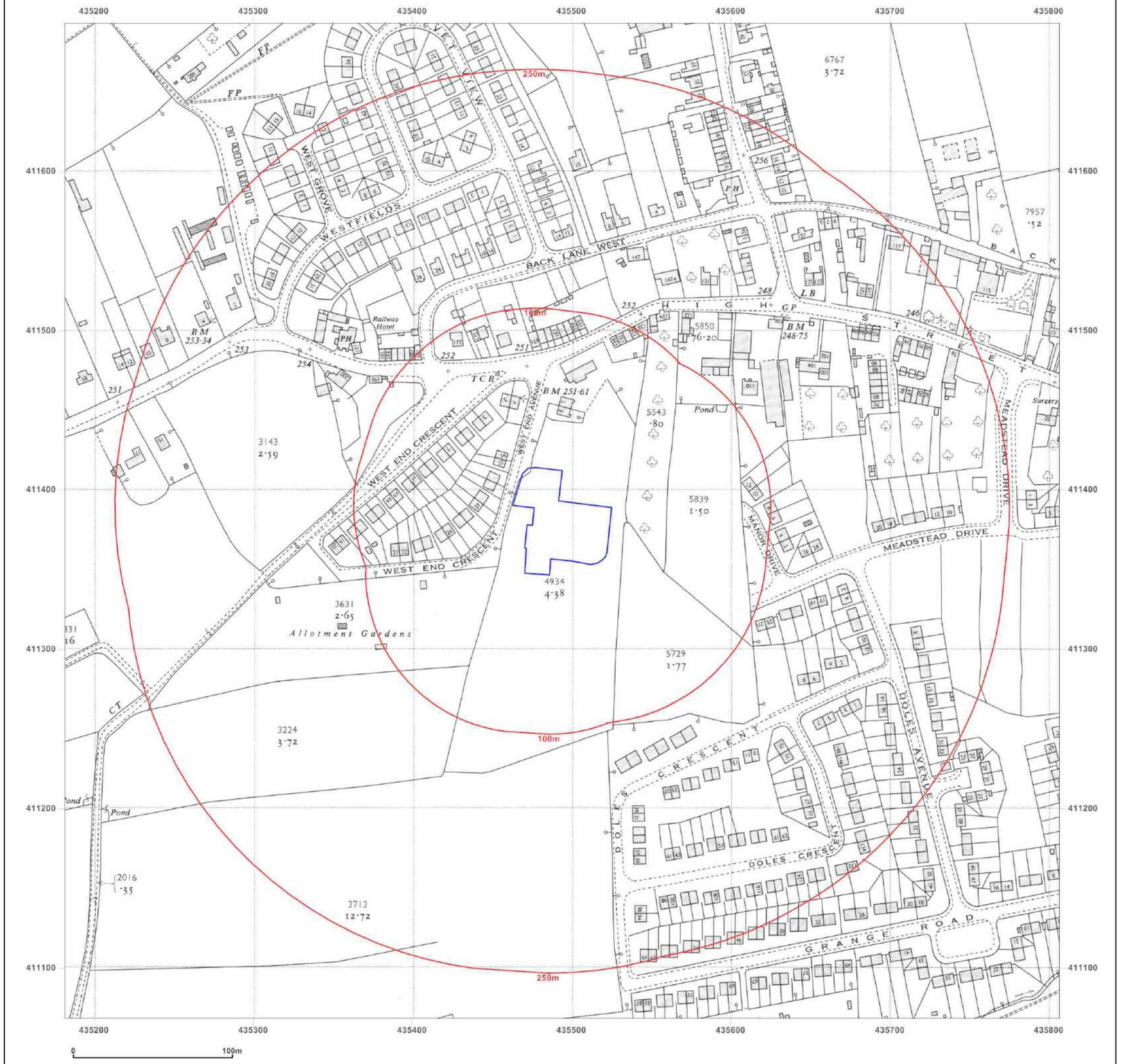
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **1960**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

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Surveyed 1970
Revised 1970
Edition N/A
Copyright 1970
Levelled 1964

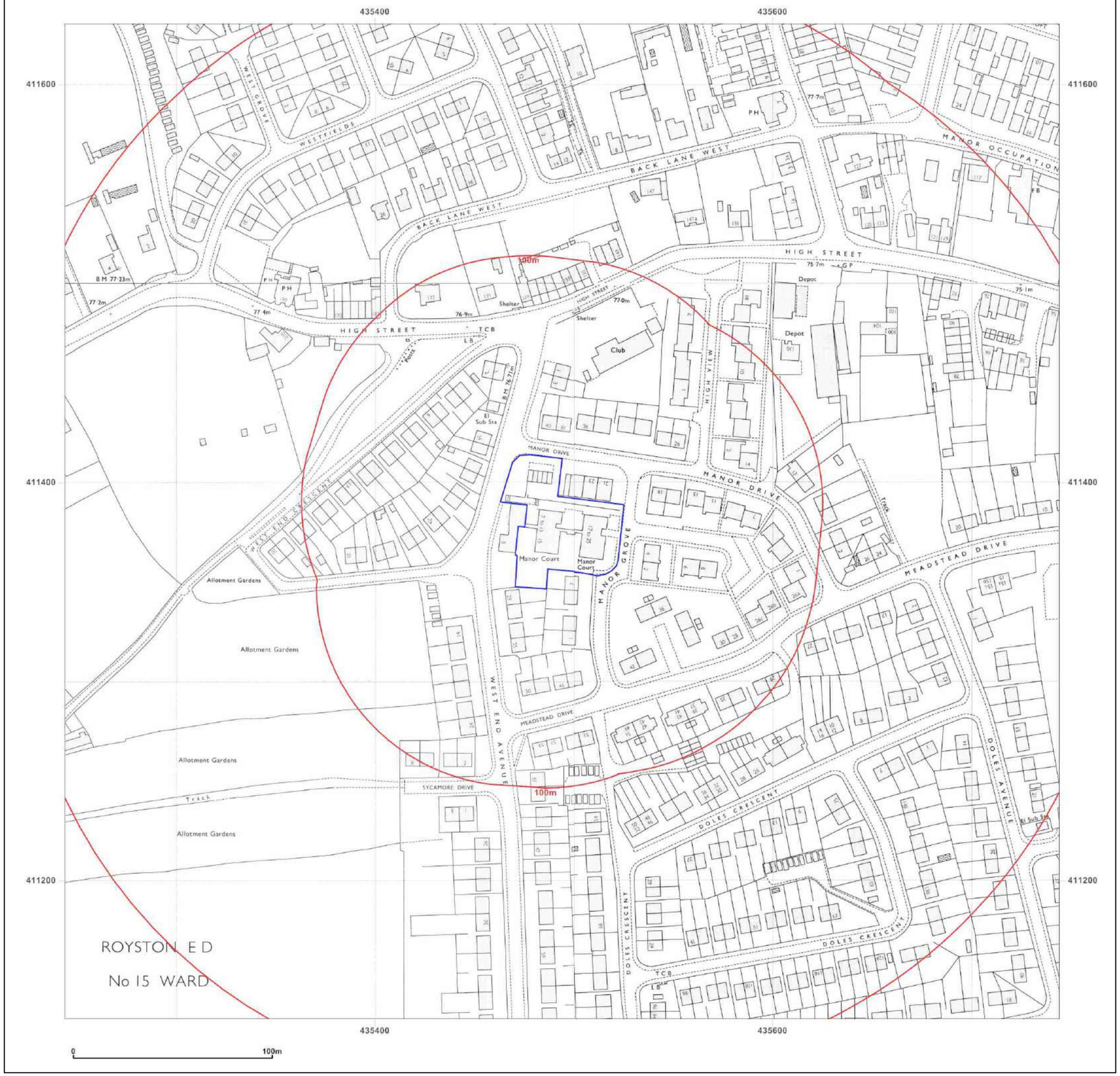
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
Map date: **1976**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
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Levelled 1964

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Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
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Scale: 1:1,250
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1981
Levelled 1964

Surveyed N/A
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Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1964
Revised 1983
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Levelled 1964

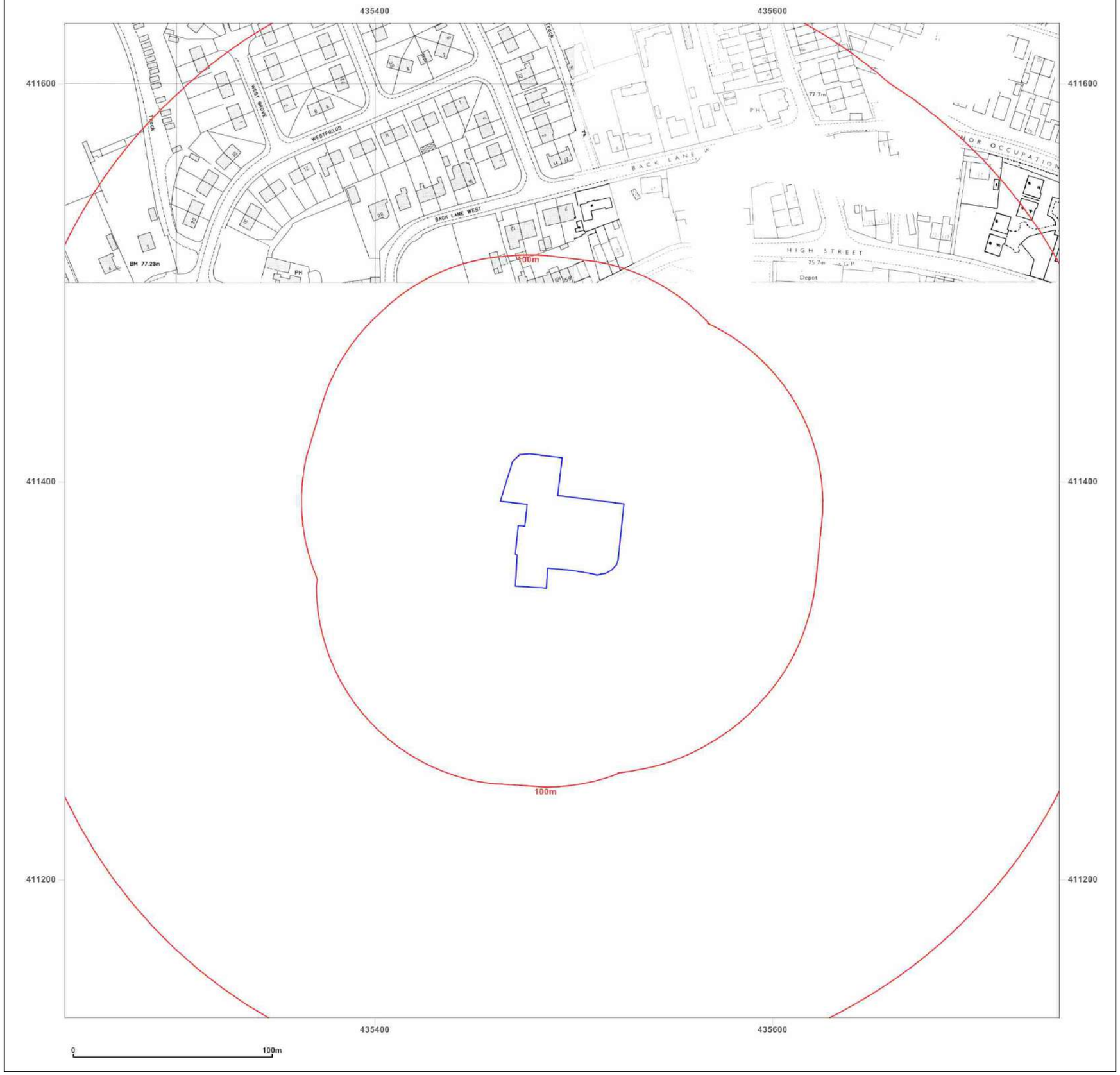
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MANOR GROVE, BARNSLEY,
S71 4LL

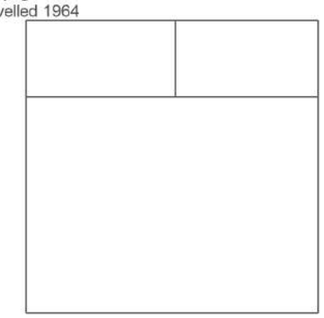
Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
Map date: **1986**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1975
Revised 1984
Edition N/A
Copyright 1986
Levelled 1964

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1986
Levelled 1964



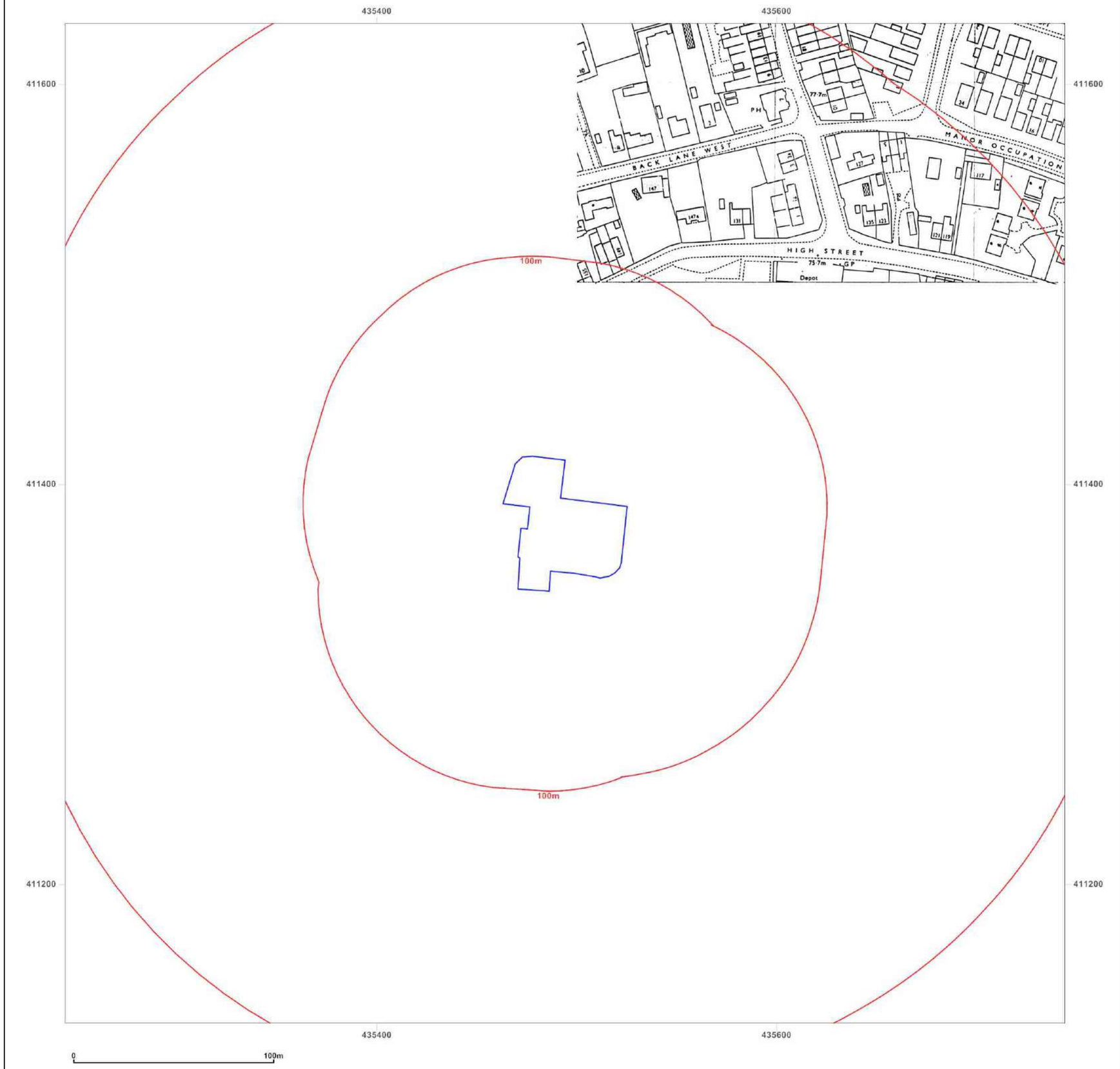
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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

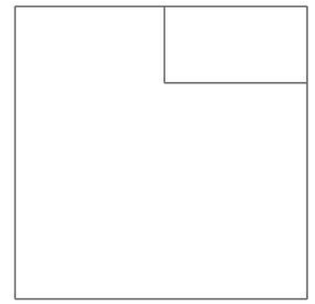
Map date: **1986**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed 1964
Revised 1986
Edition N/A
Copyright 1986
Levelled 1964



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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **1988-1993**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1988
Levelled N/A

Surveyed 1993
Revised 1993
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed 1993 Revised N/A Edition N/A Copyright 1993 Levelled N/A
	Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A

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Site Details:

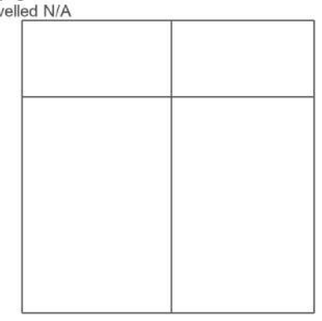
MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
Map date: **1993**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A



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

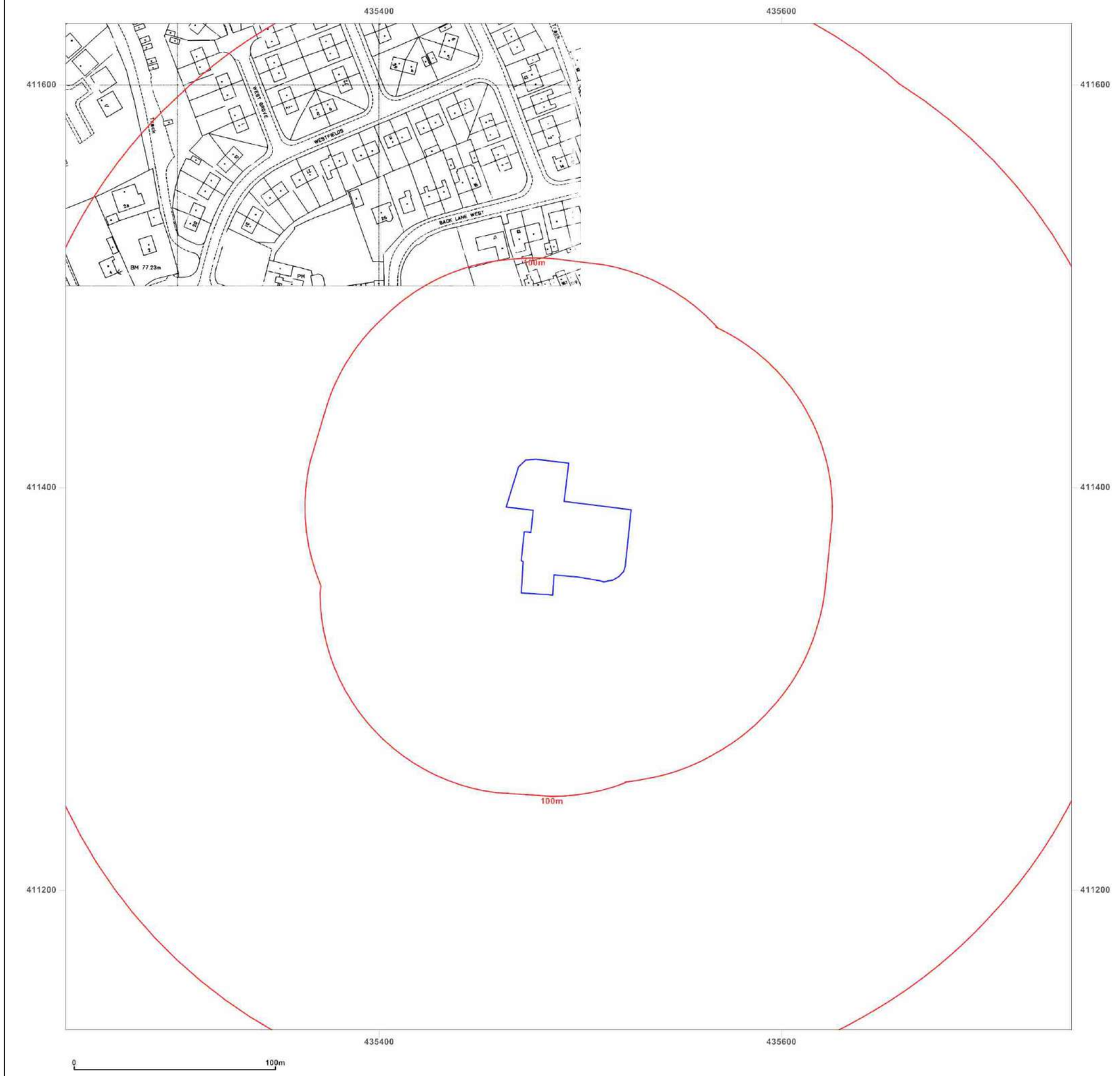
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Site Details:

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S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

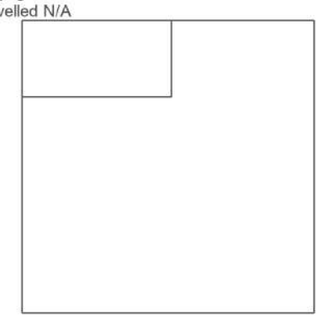
Map date: **1995**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1995
Levelled N/A



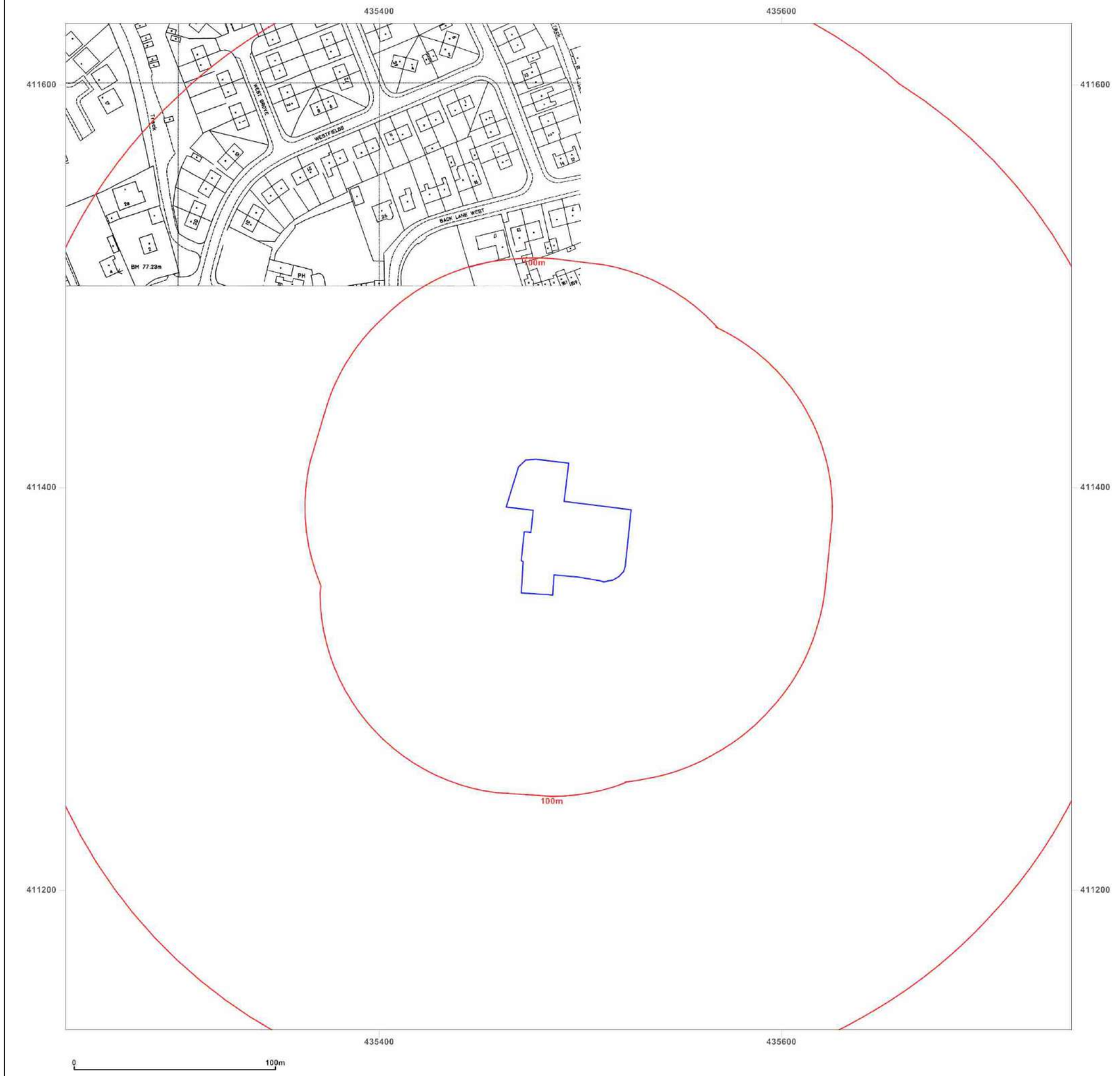
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Site Details:

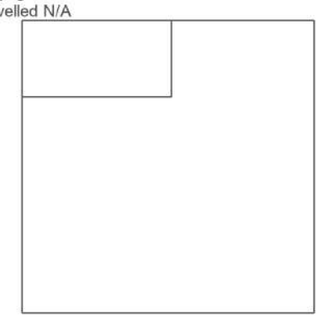
MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid
Map date: **1995**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed 1995
Revised 1995
Edition N/A
Copyright 1995
Levelled N/A



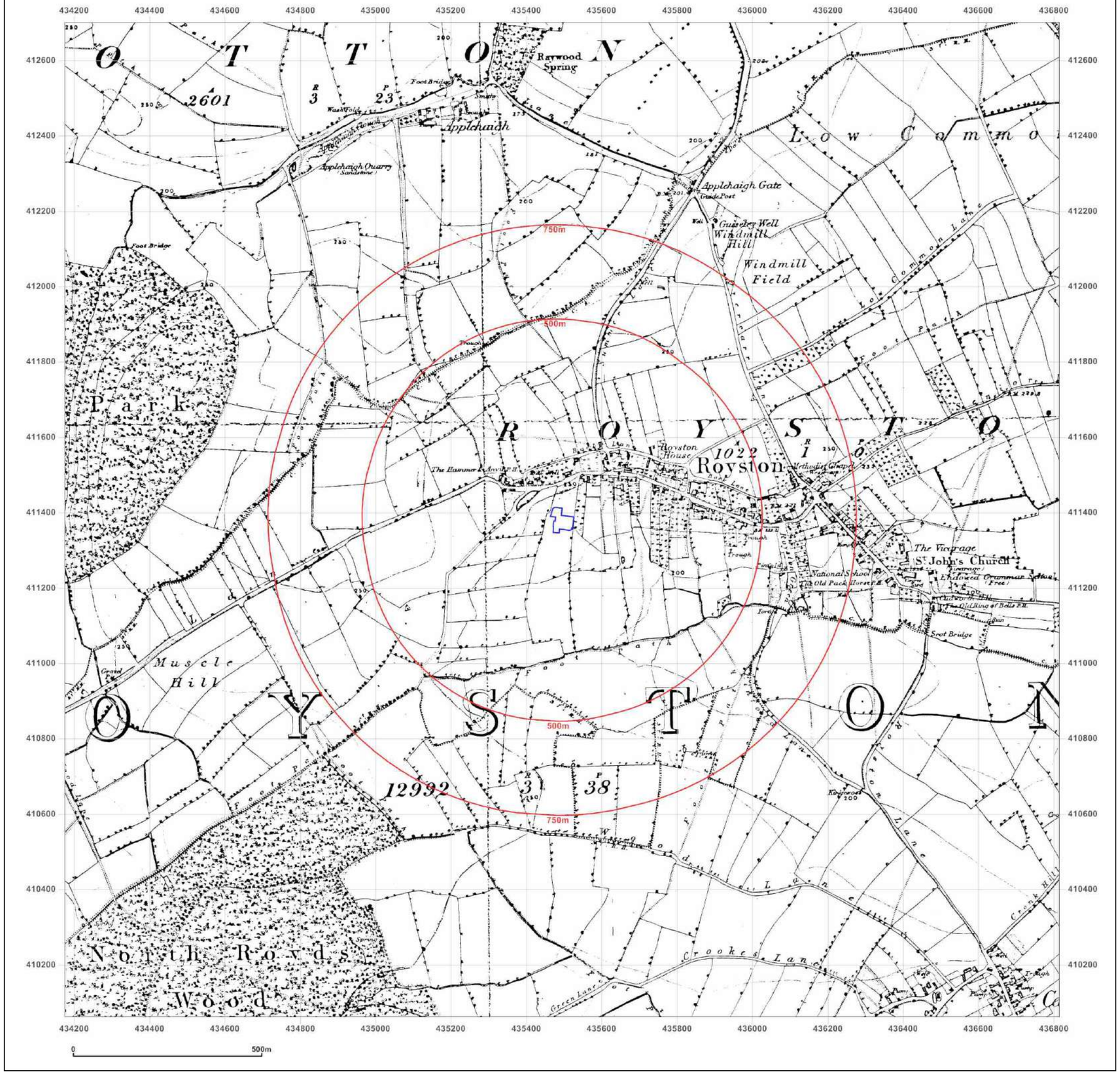
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Site Details:

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S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1854**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

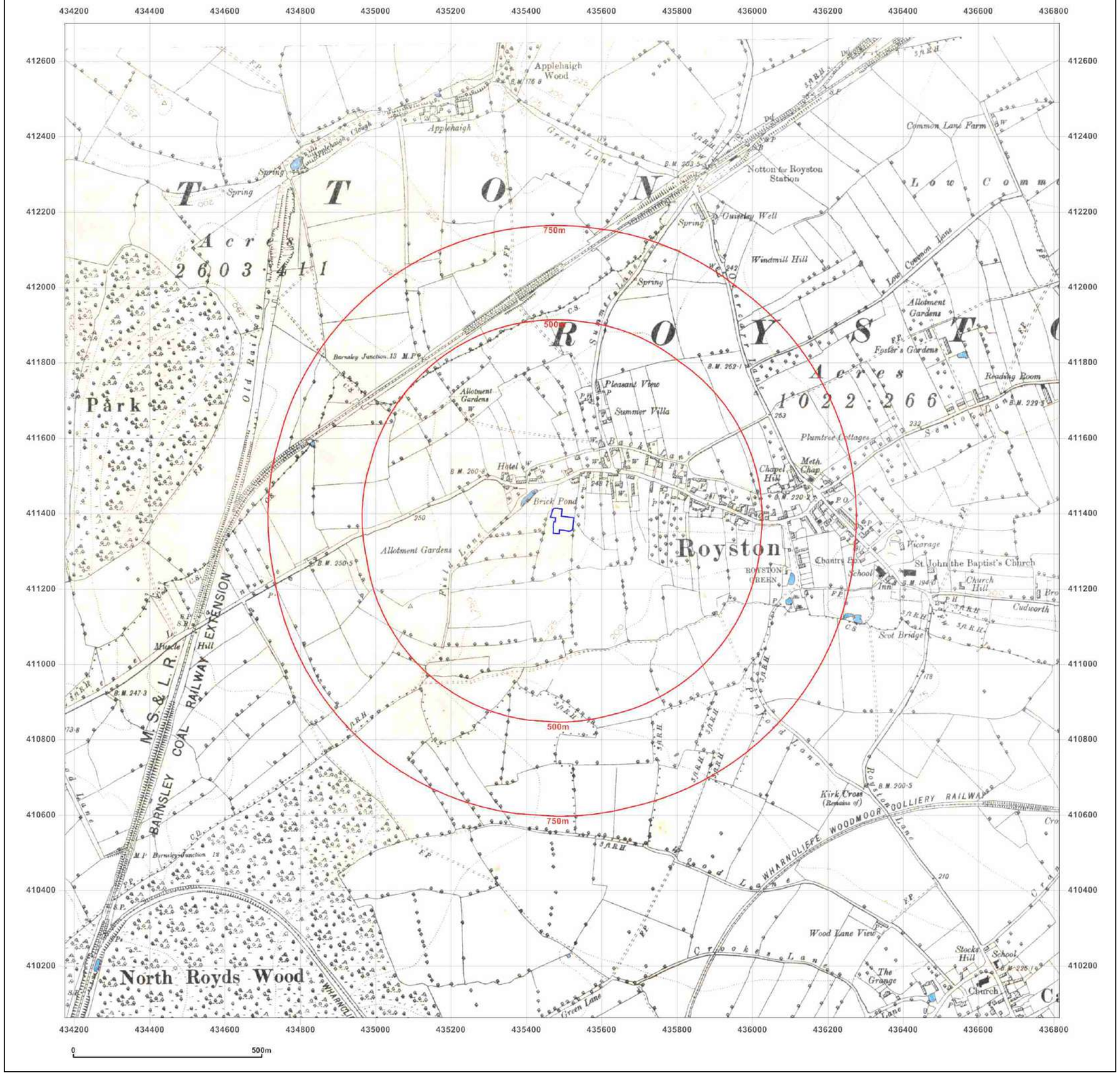
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Site Details:

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S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1891**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1891
Revised 1891
Edition 1891
Copyright N/A
Levelled N/A

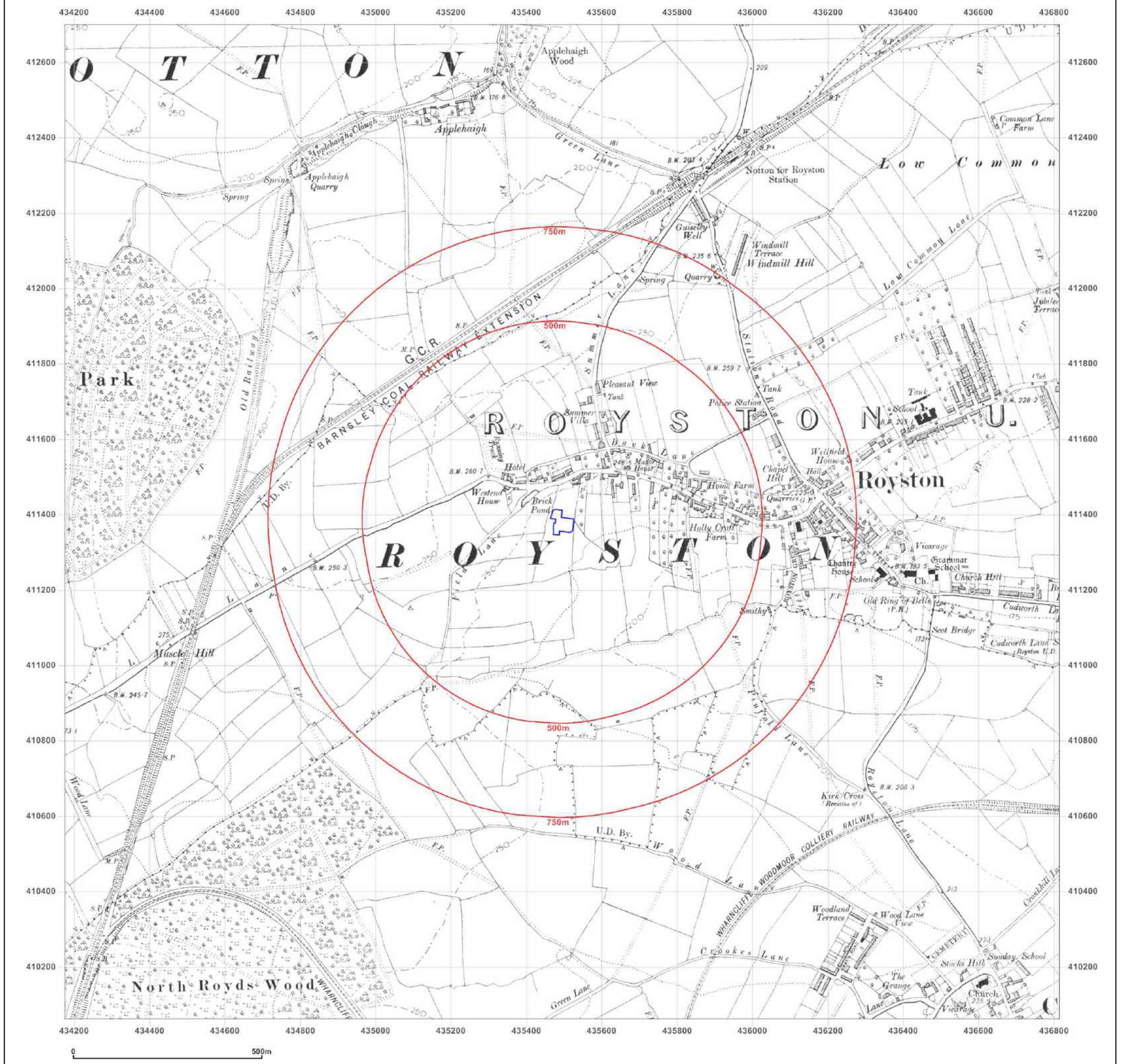
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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

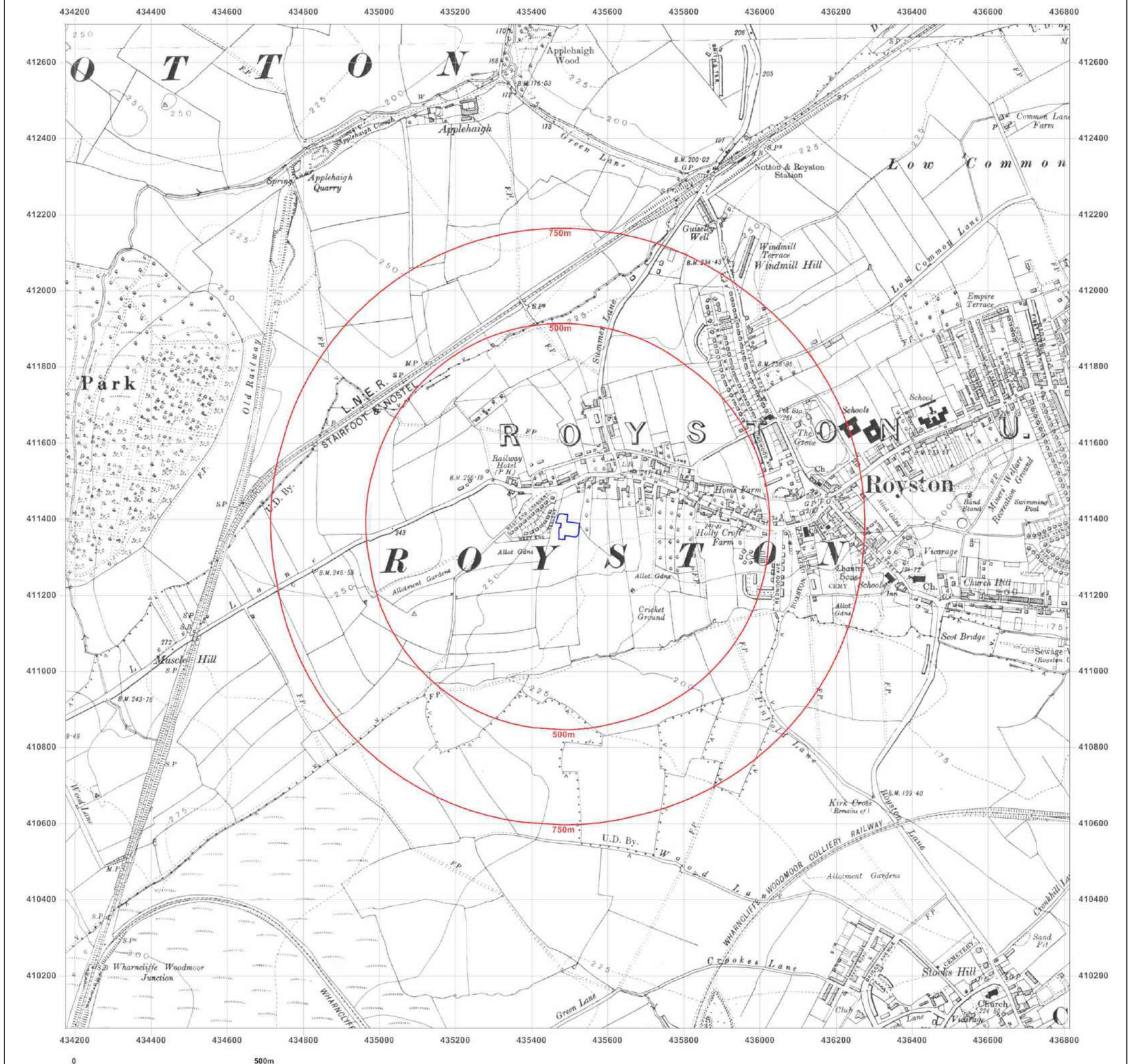
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Site Details:

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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

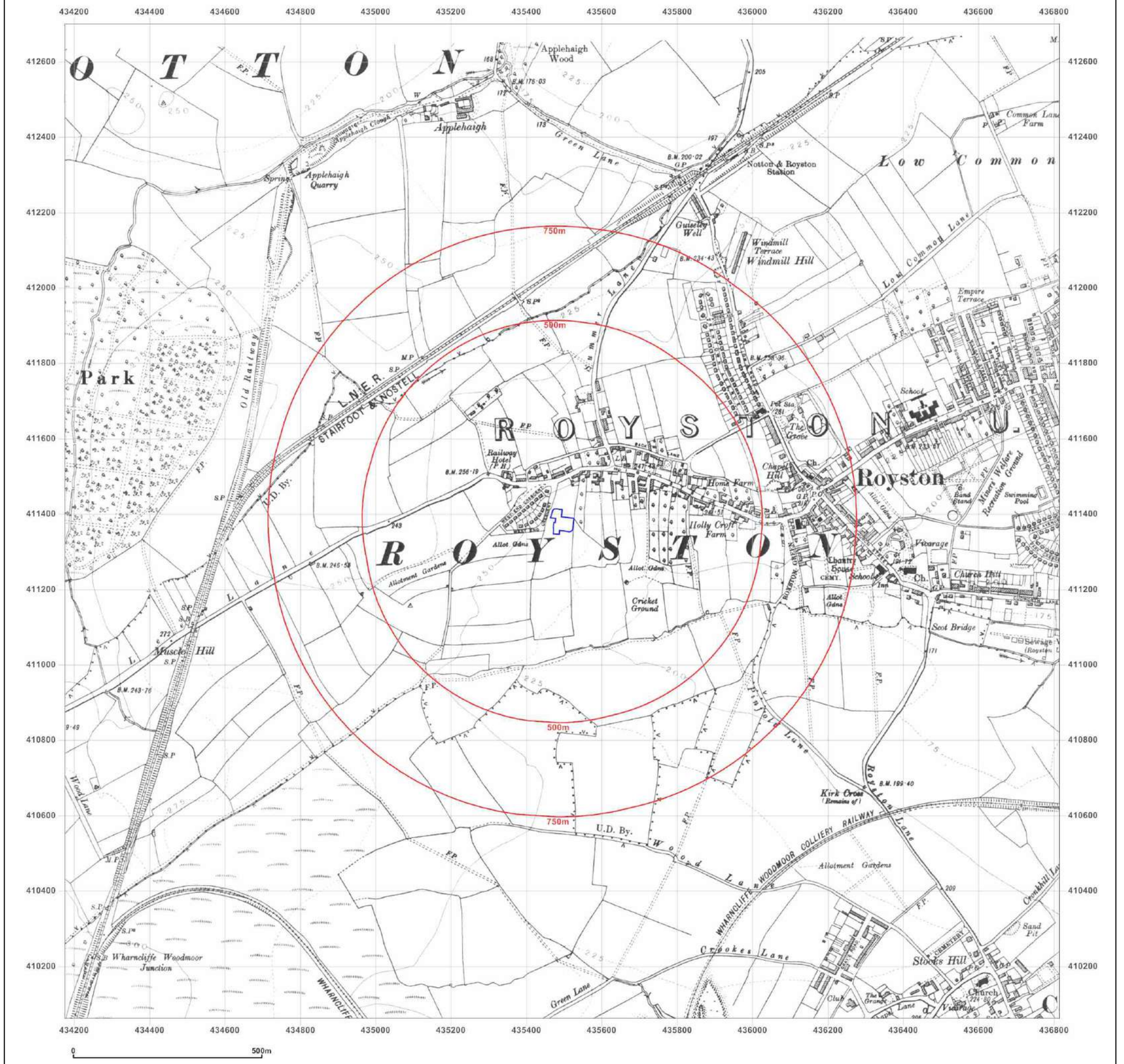
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Site Details:

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S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

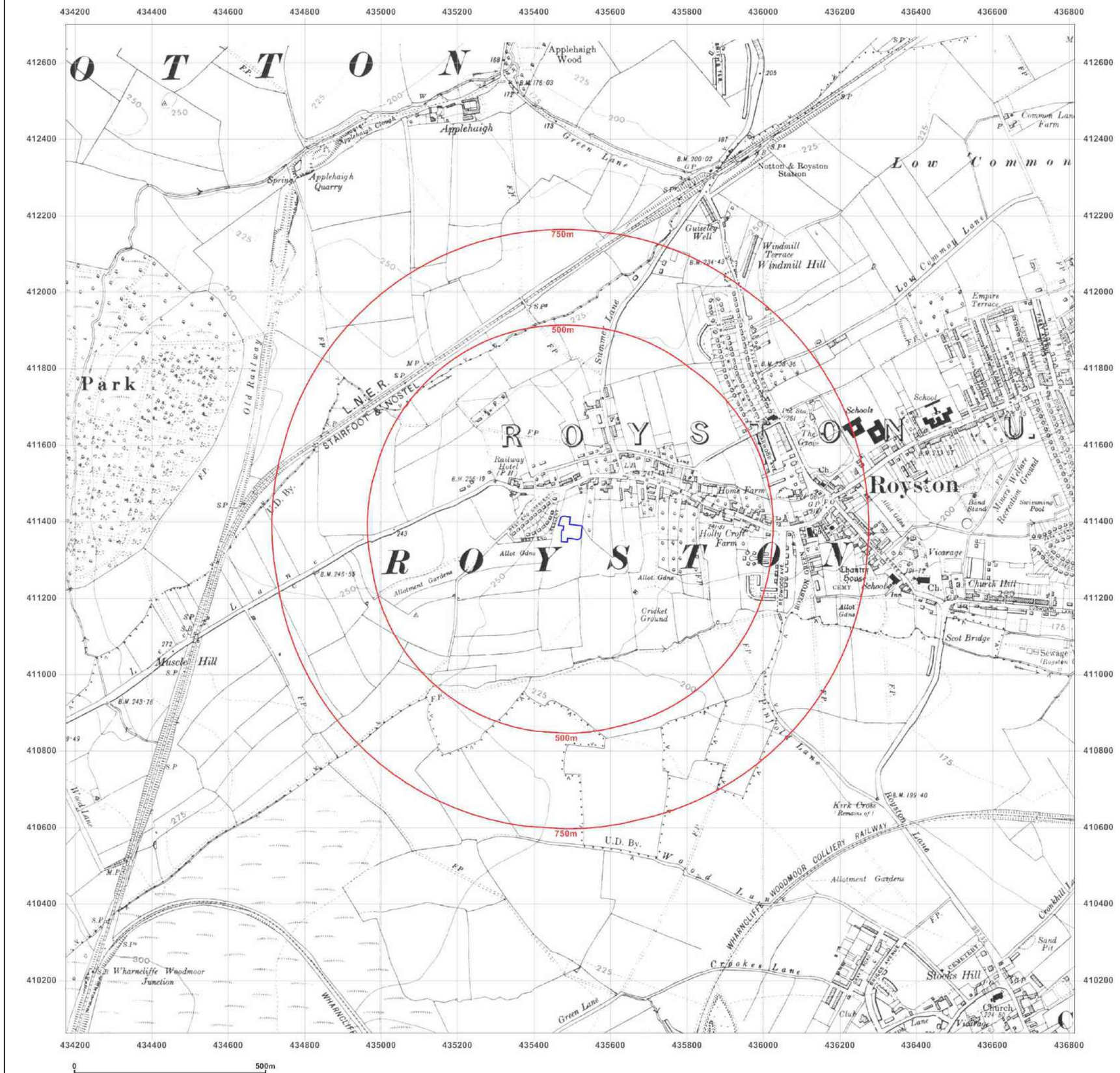
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Production date: 12 June 2017

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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1938
Edition 1938
Copyright N/A
Levelled 1929

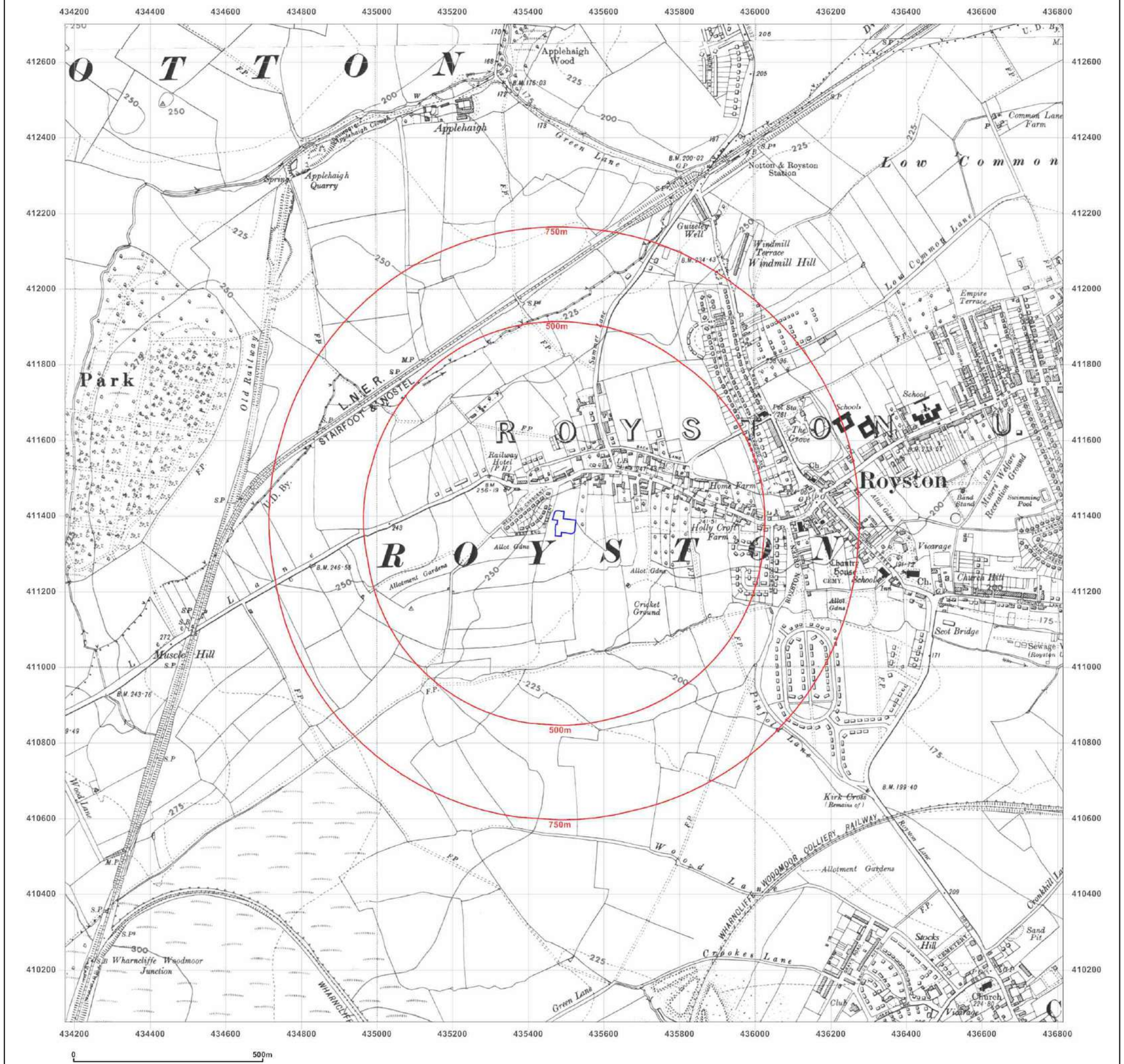
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Production date: 12 June 2017

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Groundsure INSIGHTS

Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: County Series

Map date: **1948**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

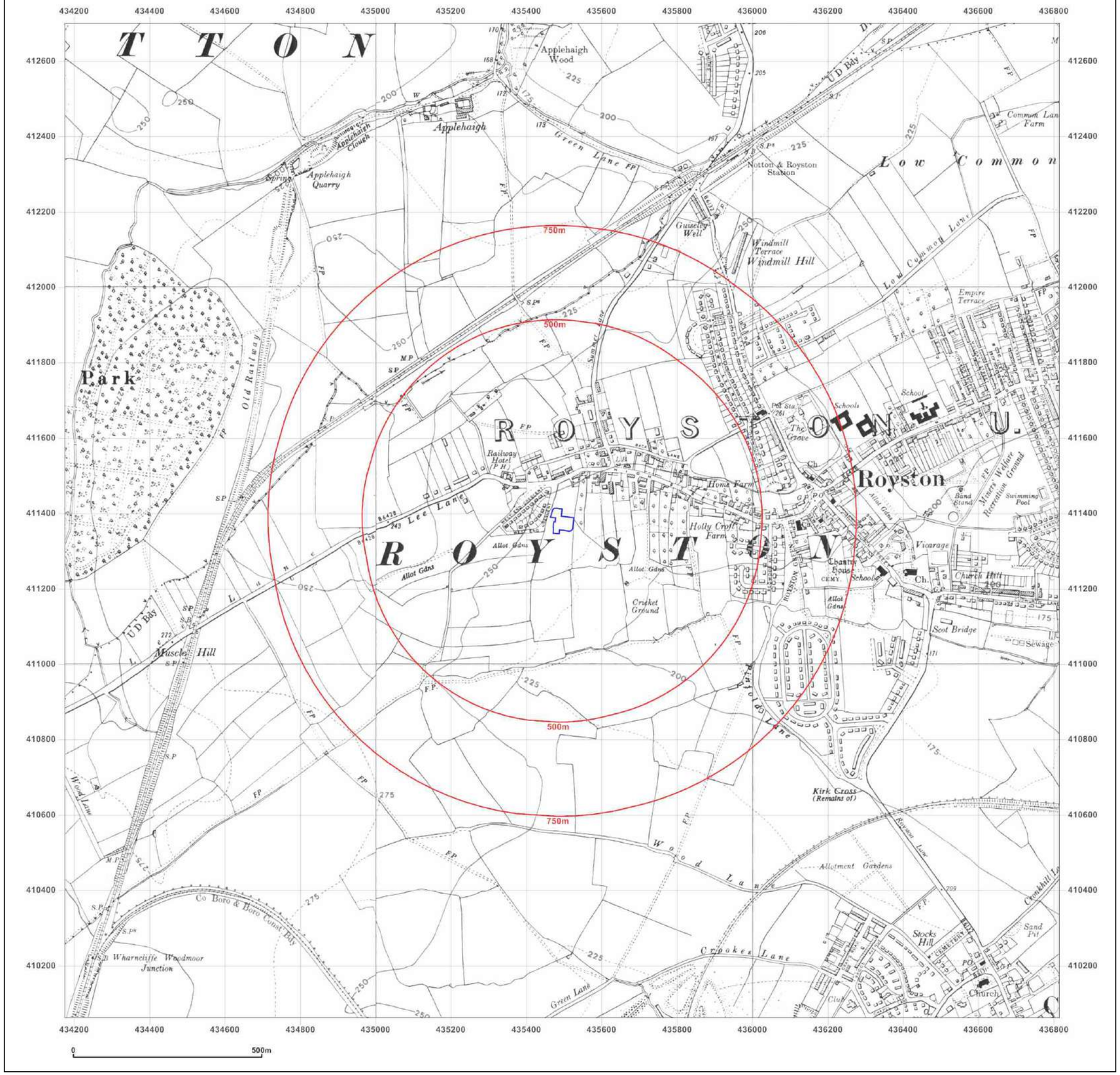
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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: Provisional

Map date: **1951**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

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

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Site Details:

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Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: Provisional

Map date: **1965-1966**

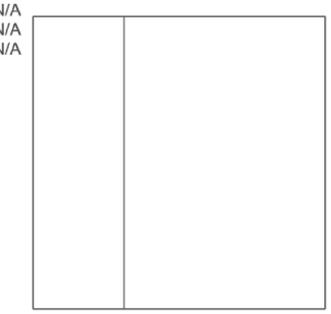
Scale: 1:10,560

Printed at: 1:10,560

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

Surveyed 1966
Revised 1966
Edition N/A
Copyright 1966
Levelled N/A



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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **1978**

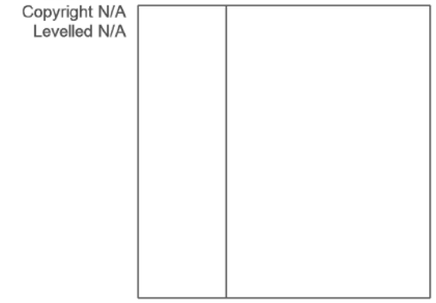
Scale: 1:10,000

Printed at: 1:10,000

N
W E
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Surveyed 1977
Revised 1978
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1976
Revised 1978
Edition N/A
Copyright 1979
Levelled 1978



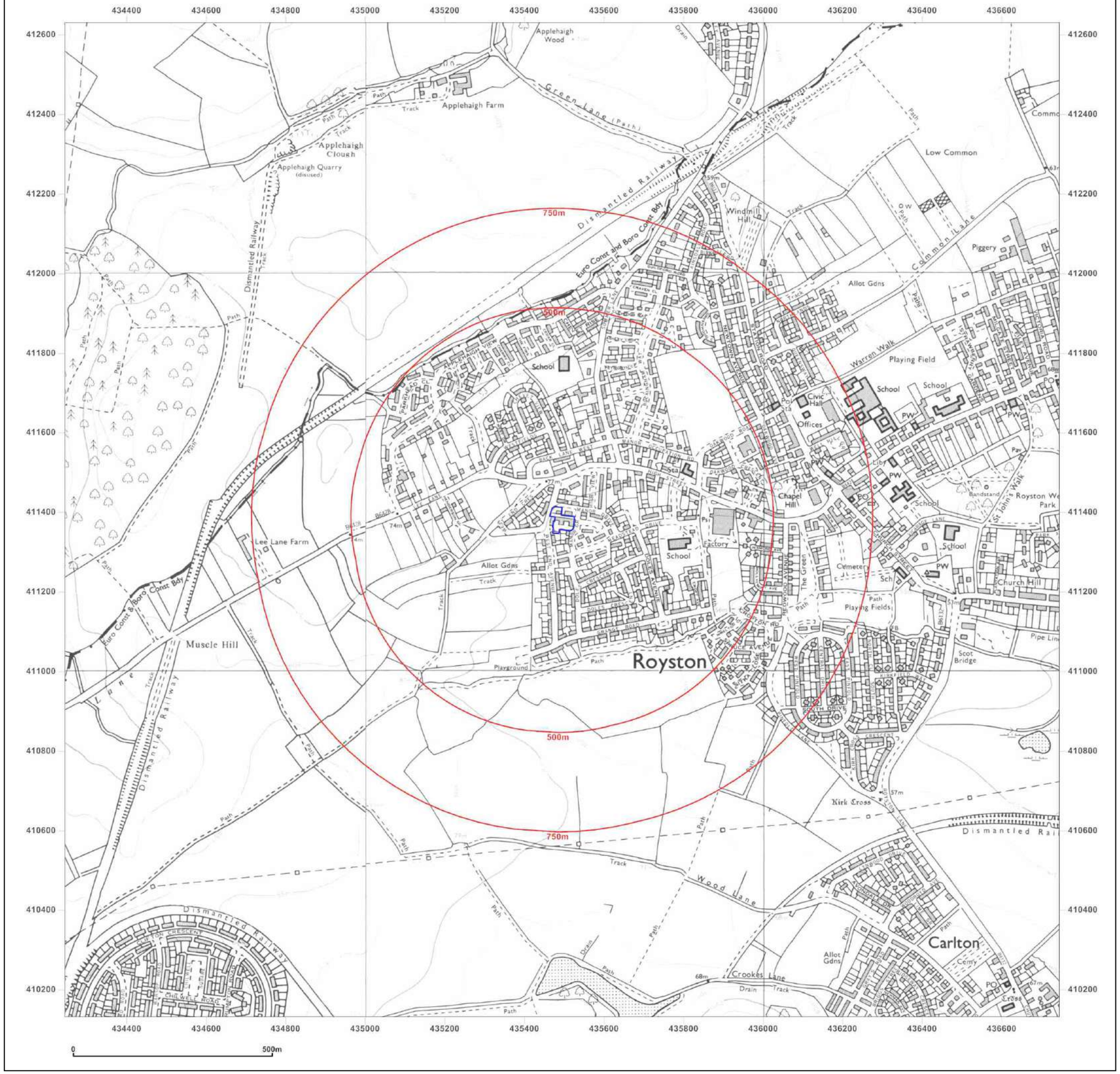
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Groundsure INSIGHTS

Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **1989-1990**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1983
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1984
Revised 1989
Edition N/A
Copyright 1990
Levelled 1978

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Groundsure INSIGHTS

Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: 1:10,000 Raster
Map date: **2002**
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2002

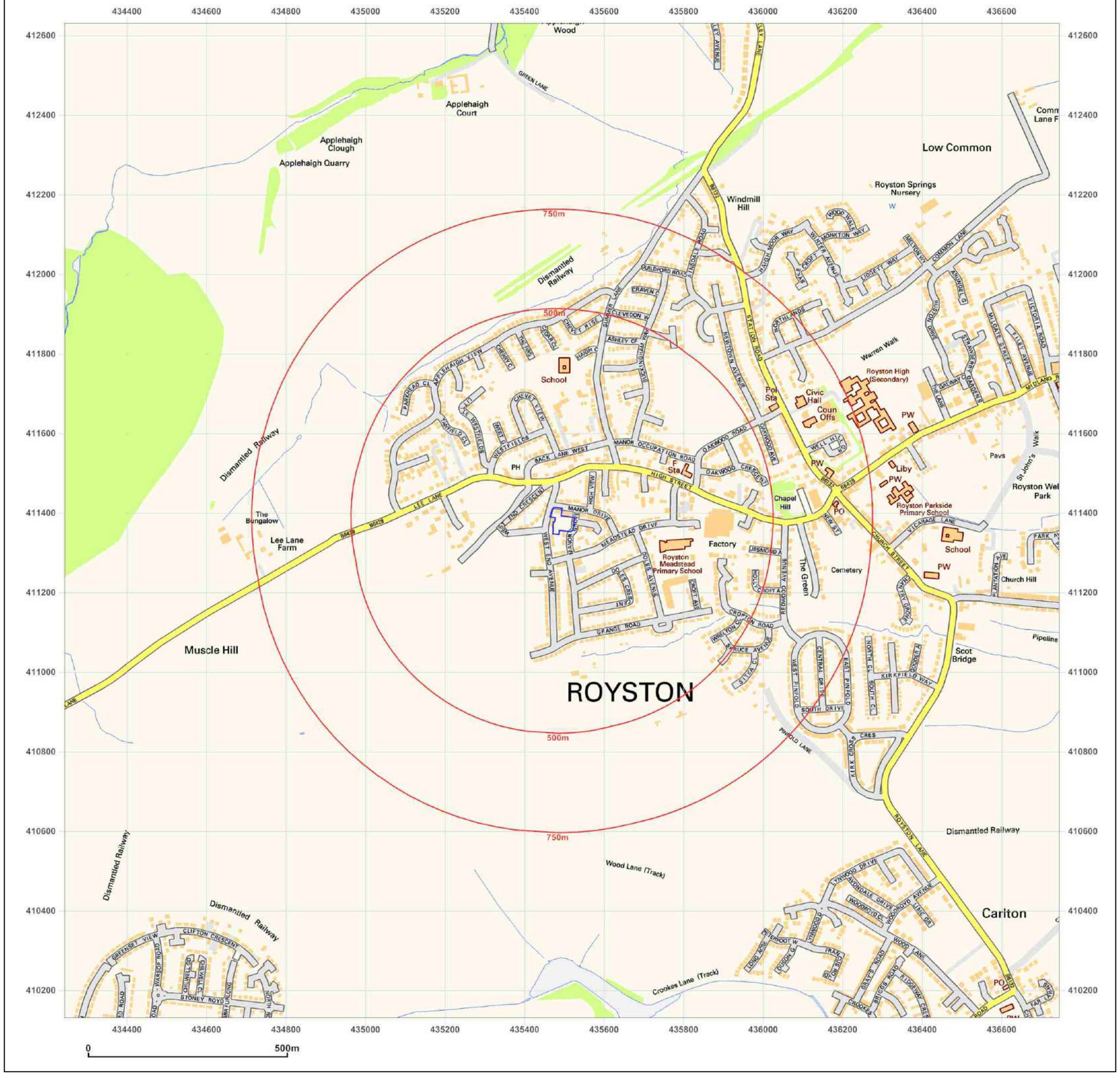
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Site Details:

MANOR GROVE, BARNSLEY,
S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

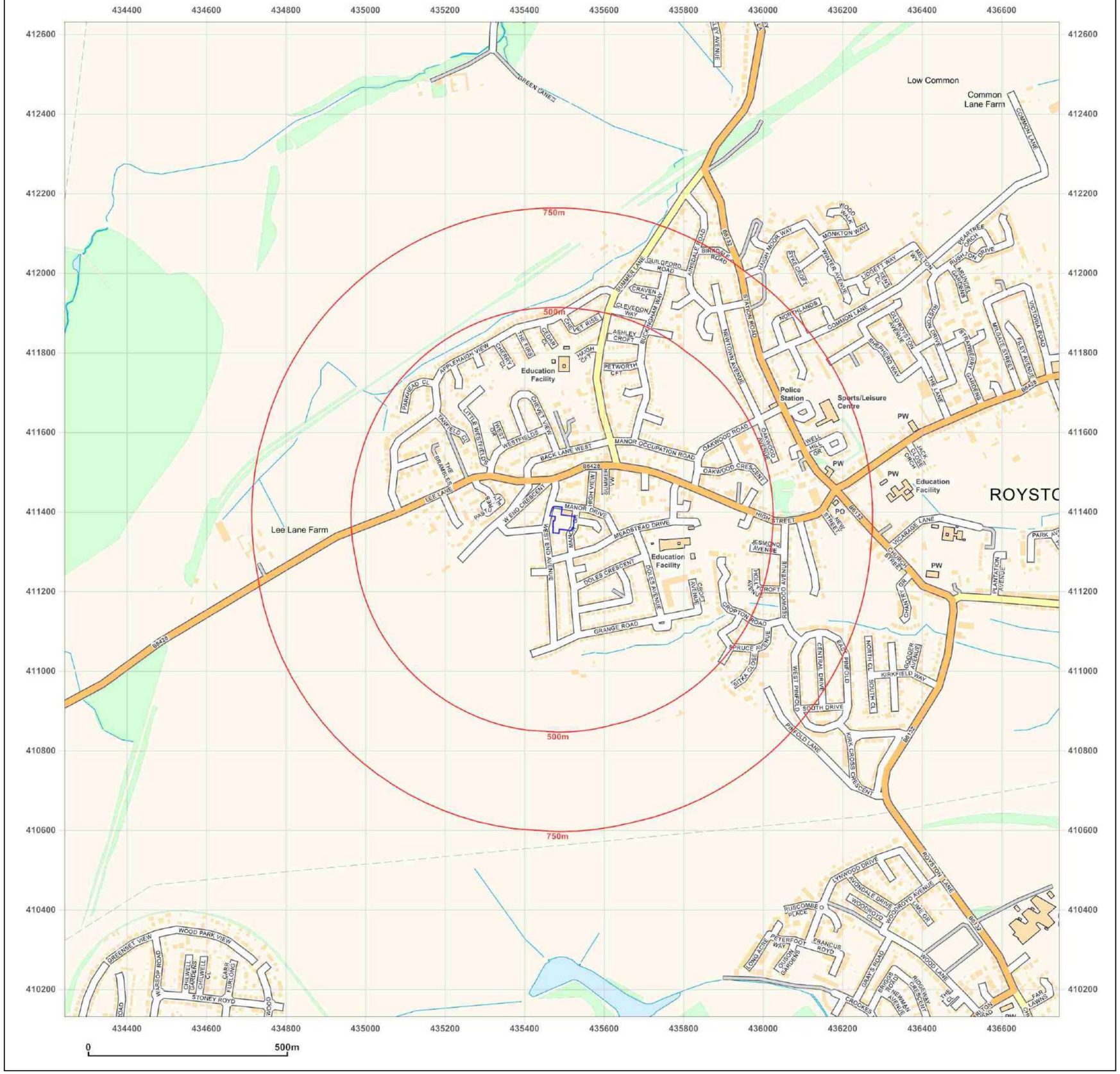
2010

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Site Details:

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S71 4LL

Client Ref: 18-6006_Manor_Grove_PO23001793
Report Ref: GS-3977786
Grid Ref: 435494, 411380

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
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2014

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Appendix C

Groundsure EnviroInsight Report

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977784
Your Reference:	18-6006_Manor_Grove_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

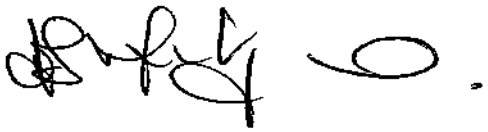
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Address:	**MANOR GROVE, BARNSLEY, S71 4LL**
Date:	**12 Jun 2017**
Reference:	**GS-3977784**
Client:	**Hamson Barron Smith Ltd**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435494,411378
Site Size:	0.25ha

Report Reference: GS-3977784
Client Reference: 18-6006_Manor_Grove_PO23001793

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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	0	0	1	15
1.2 Additional Information – Historical Tank Database	0	0	0	2
1.3 Additional Information – Historical Energy Features Database	0	3	4	18
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	0
1.6 Potentially Infilled Land	0	0	2	3

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	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	2
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	1	1
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	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	1	1	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?	None
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	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
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)	1	0	0	2	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	7	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	No	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/Natural Resources Wales 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?	Limited potential
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	2	1
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	1	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
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	1	1	0	0	0	2
8.14 Records of Green Belt land	0	0	0	1	1	3

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?	Negligible
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 1 and 3% 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?	No 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.

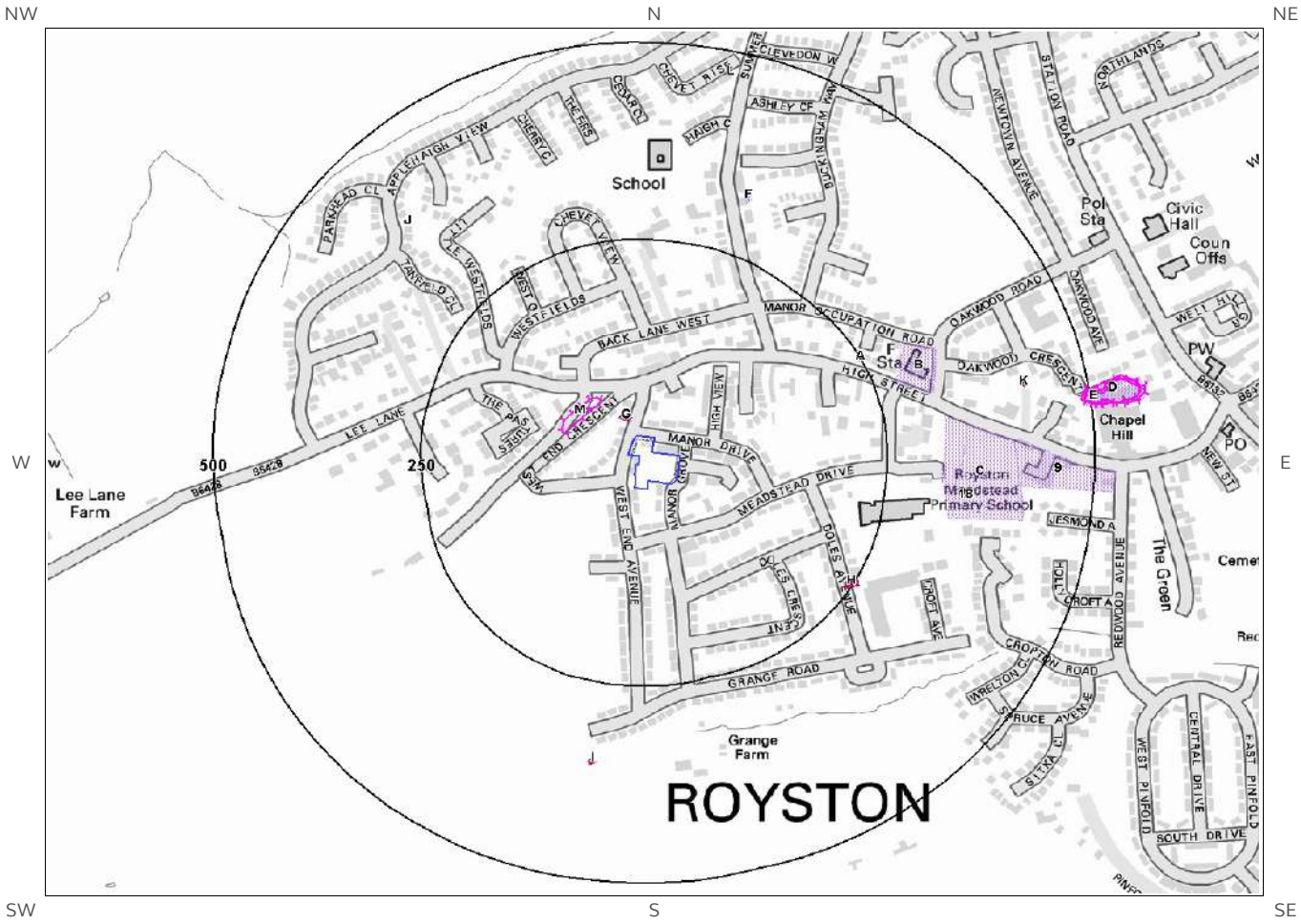
Note: Maps

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



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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: 16

ID	Distance [m]	Direction	Use	Date
1A	246	NE	Unspecified Pump	1854
2A	252	NE	Unspecified Pump	1854
3B	276	E	Fire Station	1978
4B	285	NE	Fire Station	1989
5C	315	E	Unspecified Factory	1989
6C	315	E	Unspecified Factory	1978
7F	320	N	Unspecified Tank	1904
8C	334	E	Unspecified Works	1966
9	403	E	Unspecified Works	1966
10D	490	E	Unspecified Quarry	1938
11D	490	E	Unspecified Quarry	1948
12E	491	E	Unspecified Pit	1930
13E	491	E	Unspecified Pit	1930
14E	491	E	Unspecified Pit	1930
15E	491	E	Unspecified Pit	1930
16D	492	E	Unspecified Quarry	1951

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: 2

ID	Distance (m)	Direction	Use	Date
17F	322	N	Unspecified Tank	1906
18	346	E	Unspecified Tank	1993

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: 25

ID	Distance (m)	Direction	Use	Date
19G	20	N	Electricity Substation	1970
20G	22	NW	Electricity Substation	1976
21G	23	N	Electricity Substation	1993
22H	240	SE	Electricity Substation	1983
23H	241	SE	Electricity Substation	1976
24H	241	SE	Electricity Substation	1970
25H	241	SE	Electricity Substation	1993
26I	346	S	Electricity Substation	1970
27I	348	S	Electricity Substation	1976
28I	348	S	Electricity Substation	1993
29I	352	S	Electricity Substation	1993
30I	352	S	Electricity Substation	1985
31J	383	NW	Electricity Substation	1986
32J	384	NW	Electricity Substation	1995
33J	386	NW	Electricity Substation	1981
34K	420	E	Electricity Substation	1993
35K	420	E	Electricity Substation	1983
36K	421	E	Electricity Substation	1976
37K	421	E	Electricity Substation	1970
38L	468	N	Electricity Substation	1970
39L	469	N	Electricity Substation	1976
40L	469	N	Electricity Substation	1988
41L	469	N	Electricity Substation	1986
42L	469	N	Electricity Substation	1986
43L	470	N	Electricity Substation	1996

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: 0

Database searched and no data found.

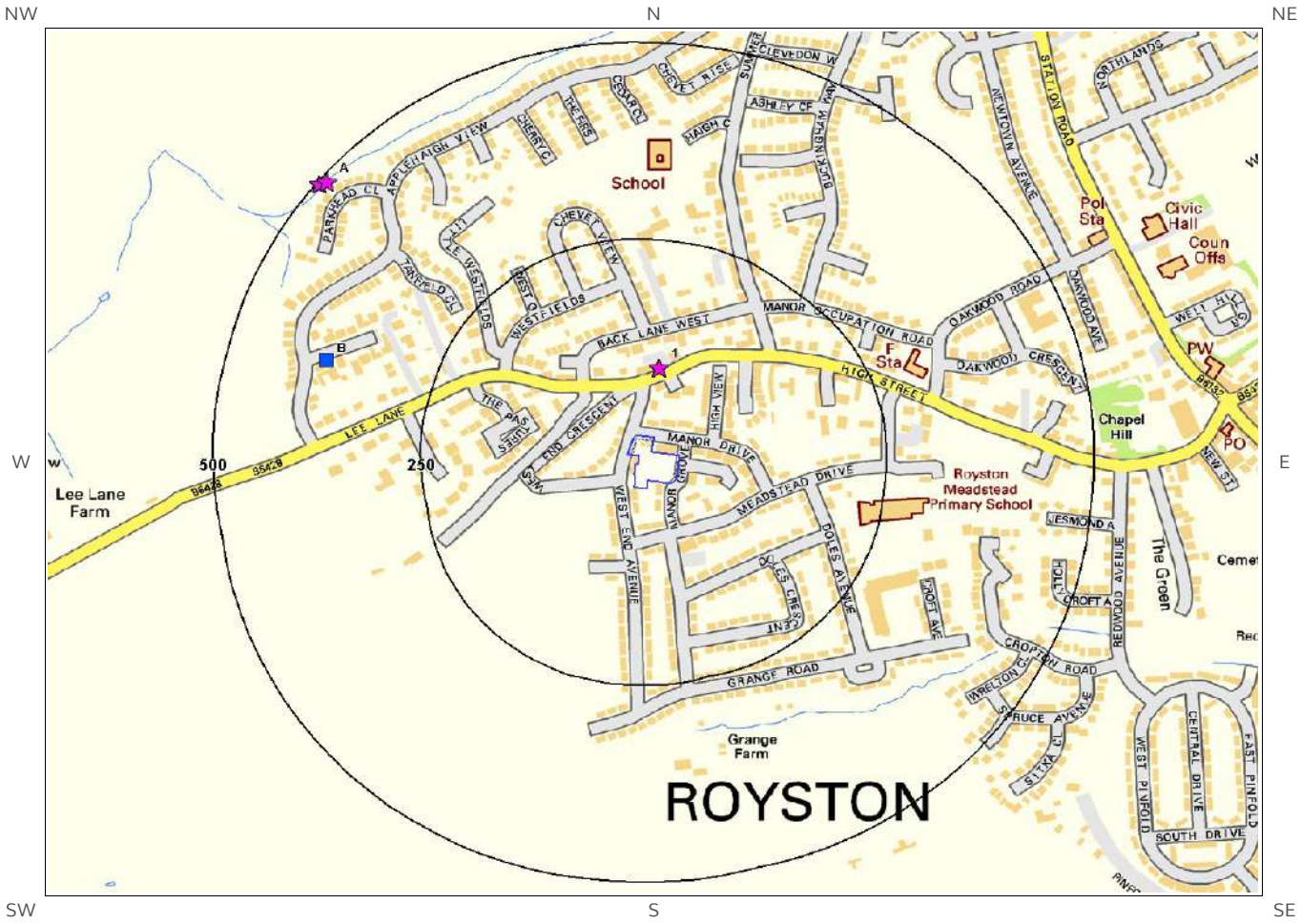
1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 5

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

ID	Distance(m)	Direction	Use	Date
44M	60	NW	Pond	1904
45M	60	NW	Pond	1891
46D	490	E	Unspecified Quarry	1938
47D	490	E	Unspecified Quarry	1948
48D	492	E	Unspecified Quarry	1951

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) (250, 500)
- Recorded Pollution Incident
- 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/Natural Resources Wales 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:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details	
4B	382	W	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 2	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 14/04/2009 Effective Date: 14-Apr-2009 Revocation Date: -
5B	382	W	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 1	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 02/11/1989 Effective Date: 02-Nov-1989 Revocation Date: 13/04/2009

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

0

Database searched and no data found.

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

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/Natural Resources Wales Recorded Pollution Incidents

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

3

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	88	N	435500 411500	Incident Date: 03-Dec-2001 Incident Identification: 46273 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)
2A	492	NW	435100 411736	Incident Date: 17-Mar-2003 Incident Identification: 143659 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3A	498	NW	435091 411734	Incident Date: 05-Jun-2002 Incident Identification: 82915 Pollutant: Contaminated Water Pollutant Description: Other Contaminated Water	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

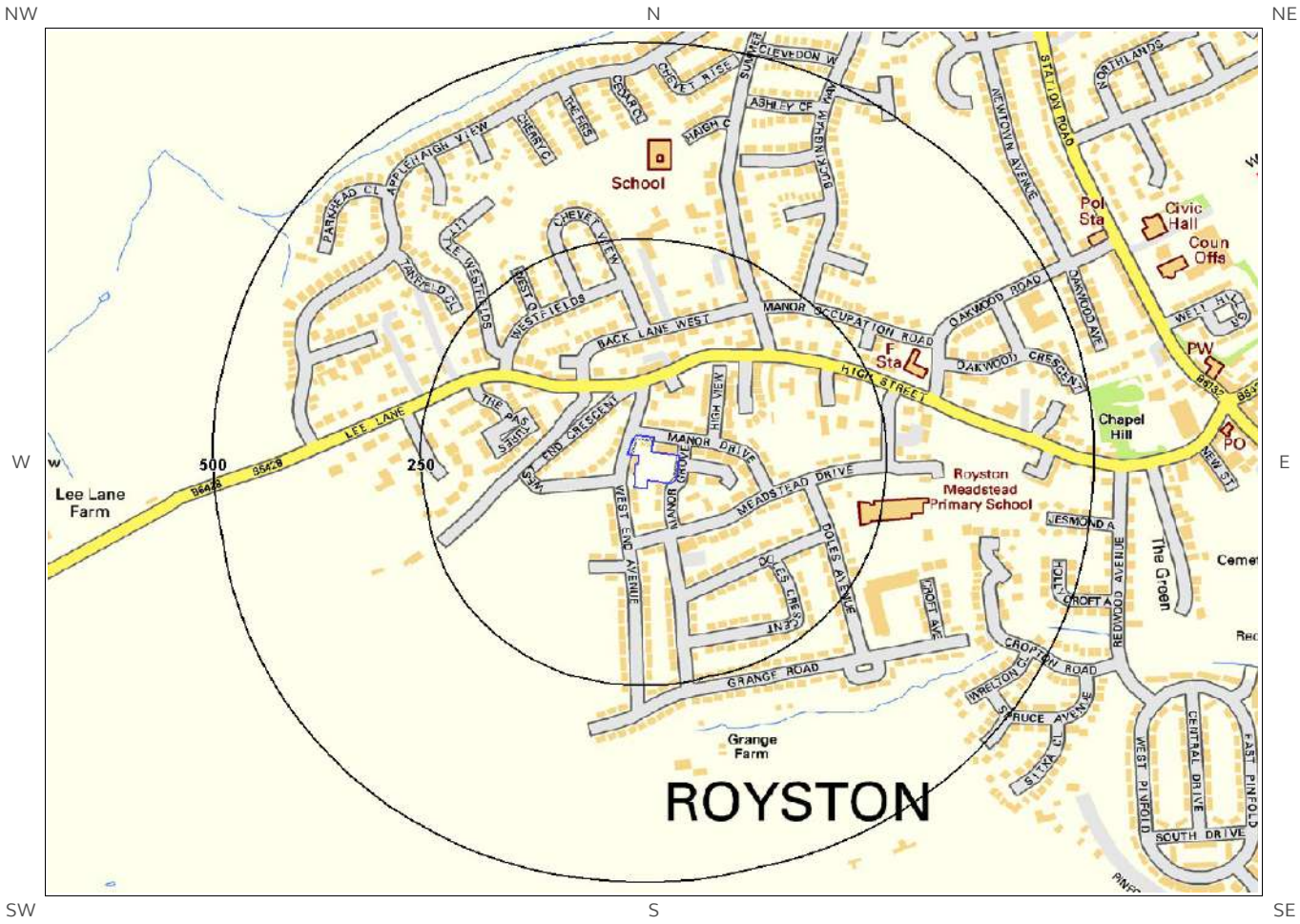
Database searched and no data found.

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



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Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW 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/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

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

2

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	
1	783	NE	436300 411700	Site Address: Warren Walk, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B16 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 21-Jun-1994 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Barnsley Metropolitan Borough Council First Recorded: - Last Recorded: -
Not shown	1113	SE	436600 410800	Site Address: Land between Royston Lane and Cronkhill Lane, Carlton, Barnsley Waste Licence: Yes Site Reference: WD20 B457, 4400/B457, 20B457(95) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 18-Feb-1985 Licence Surrendered: 20-Jan-1993 Licence Holder Address: Stud Farm, Carlton, Barnsley Operator: E Maw and Son Licence Holder: E Maw First Recorded: 18-Feb-1985 Last Recorded: 20-Jan-1993

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:

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

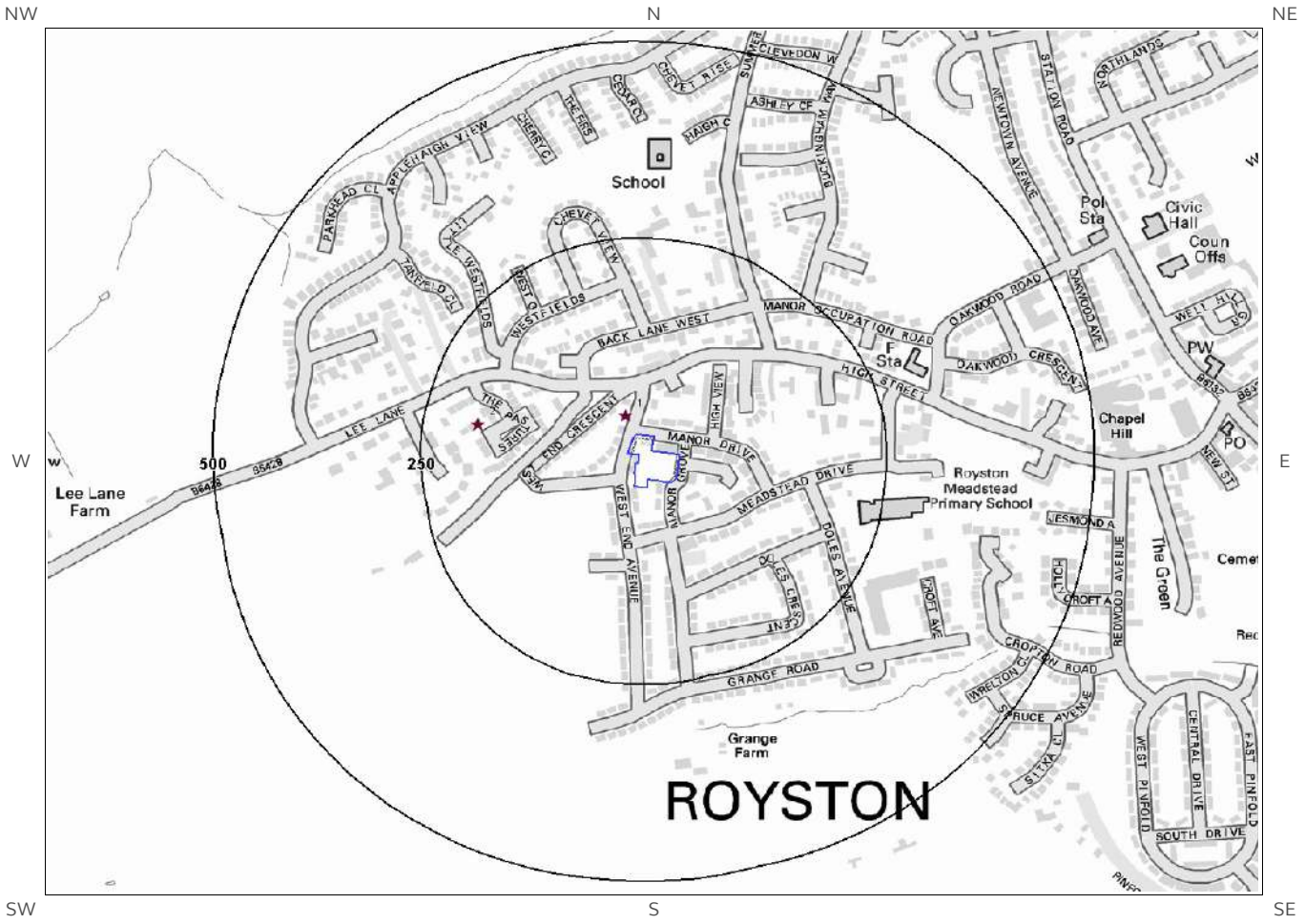
Database searched and no data found.

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

0

Database searched and no data found.

4. Current Land Use Map



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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: 2

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	28	NW	Electricity Sub Station	435460 411439	Electricity Sub Station, S71	Electrical Features	Infrastructure and Facilities
2	185	W	A1 Caravan Care	435281 411428	A1 Caravan Care, 8, The Pastures, Royston, Barnsley, S71 4RQ	Sports and Leisure Equipment Repair	Repair and Servicing

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

Database searched and no data found.

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

5.3 Bedrock and Solid Geology

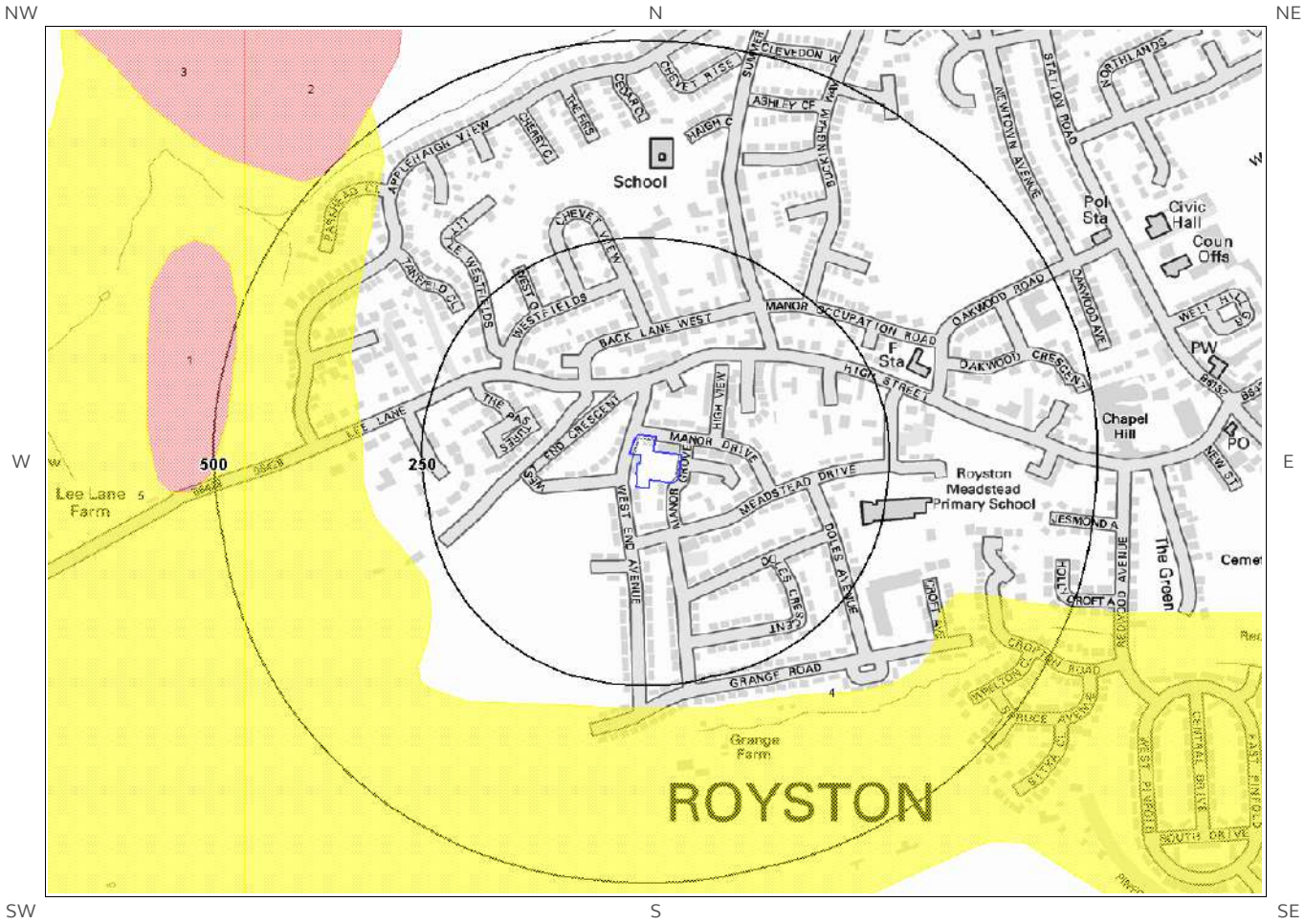
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MXR-SDST	MEXBOROUGH ROCK	SANDSTONE
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
MXR-SDST	MEXBOROUGH ROCK	SANDSTONE

(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
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

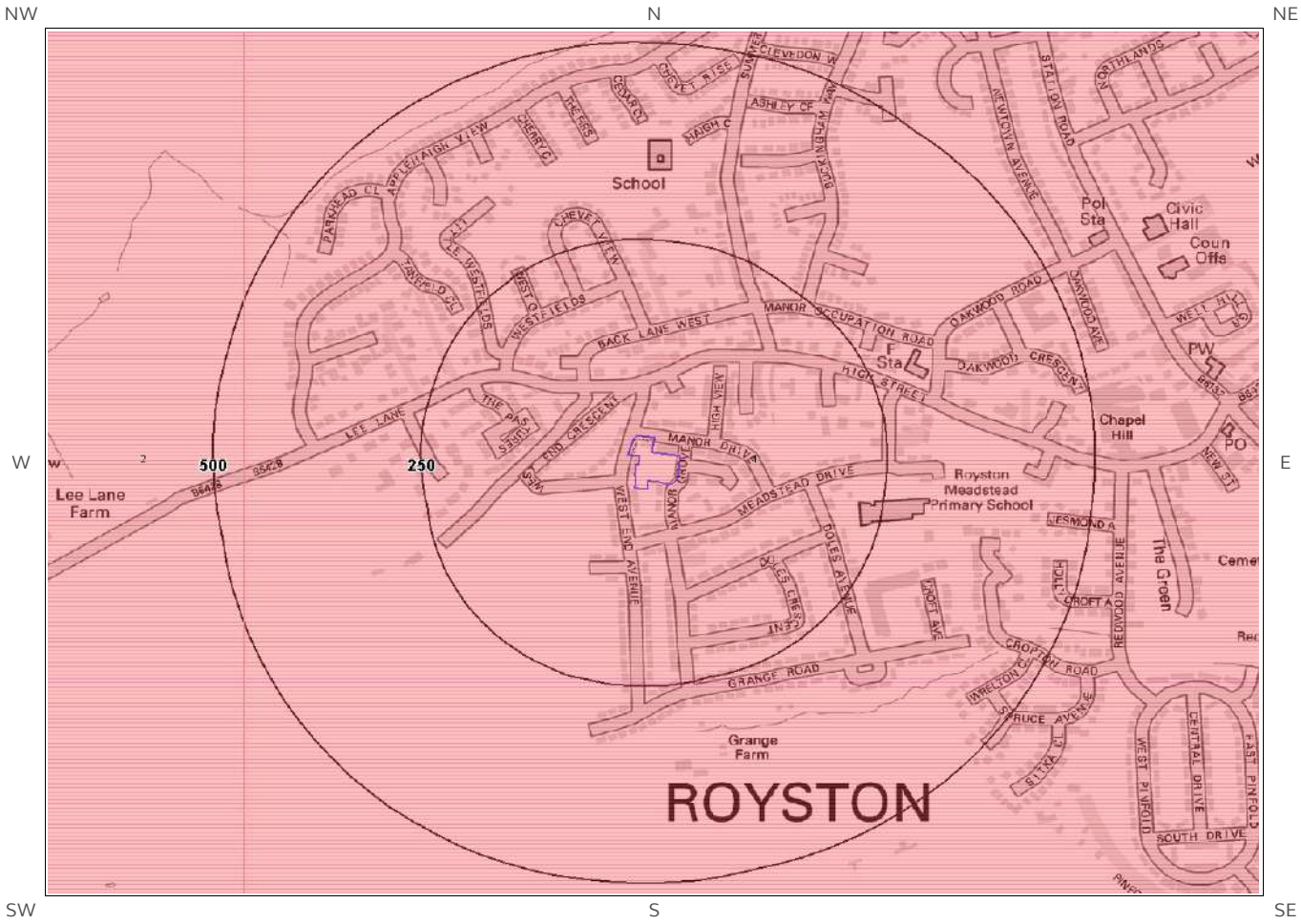
Secondary (B) Aquifer - Lower Permeability Layers

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

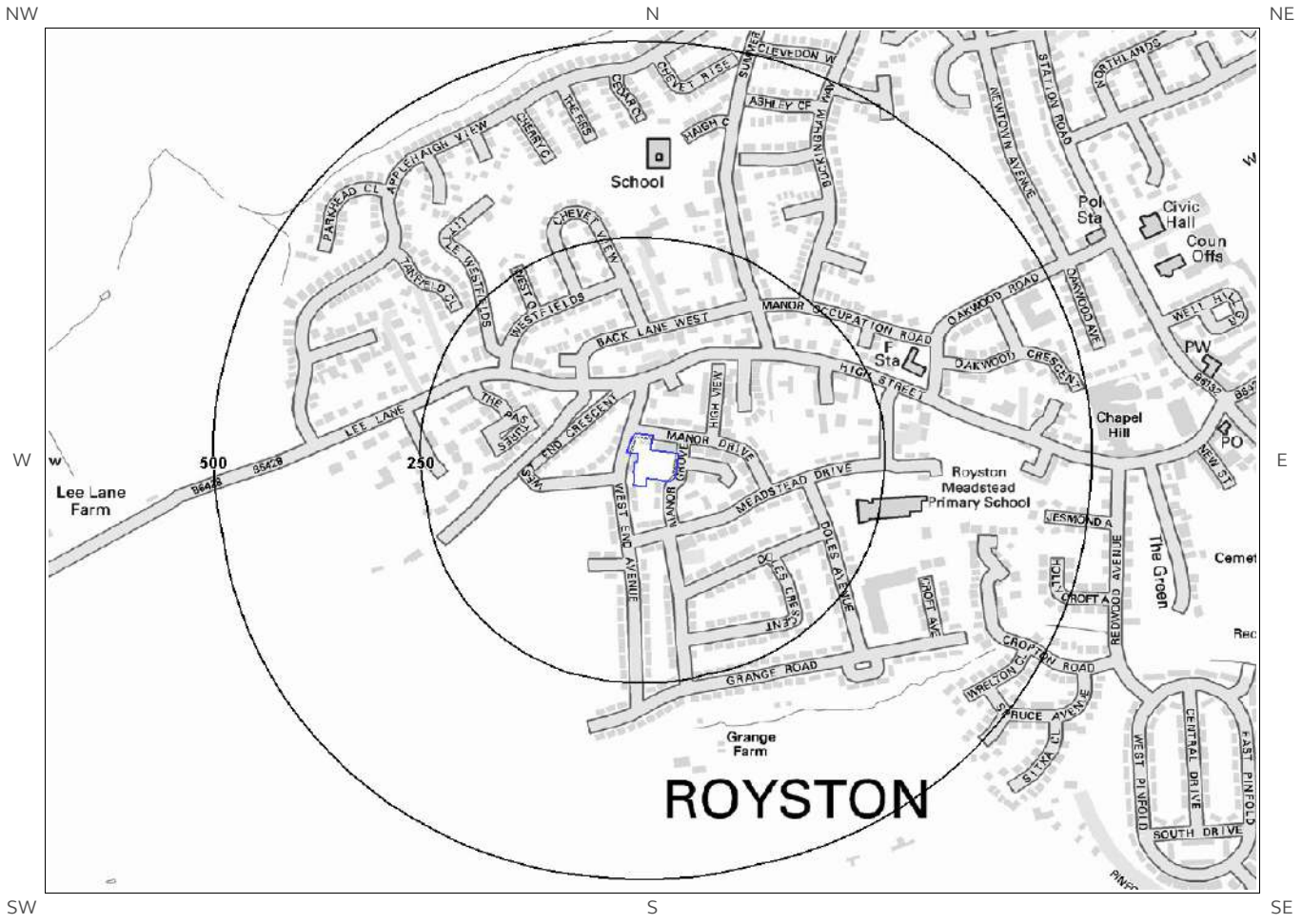
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

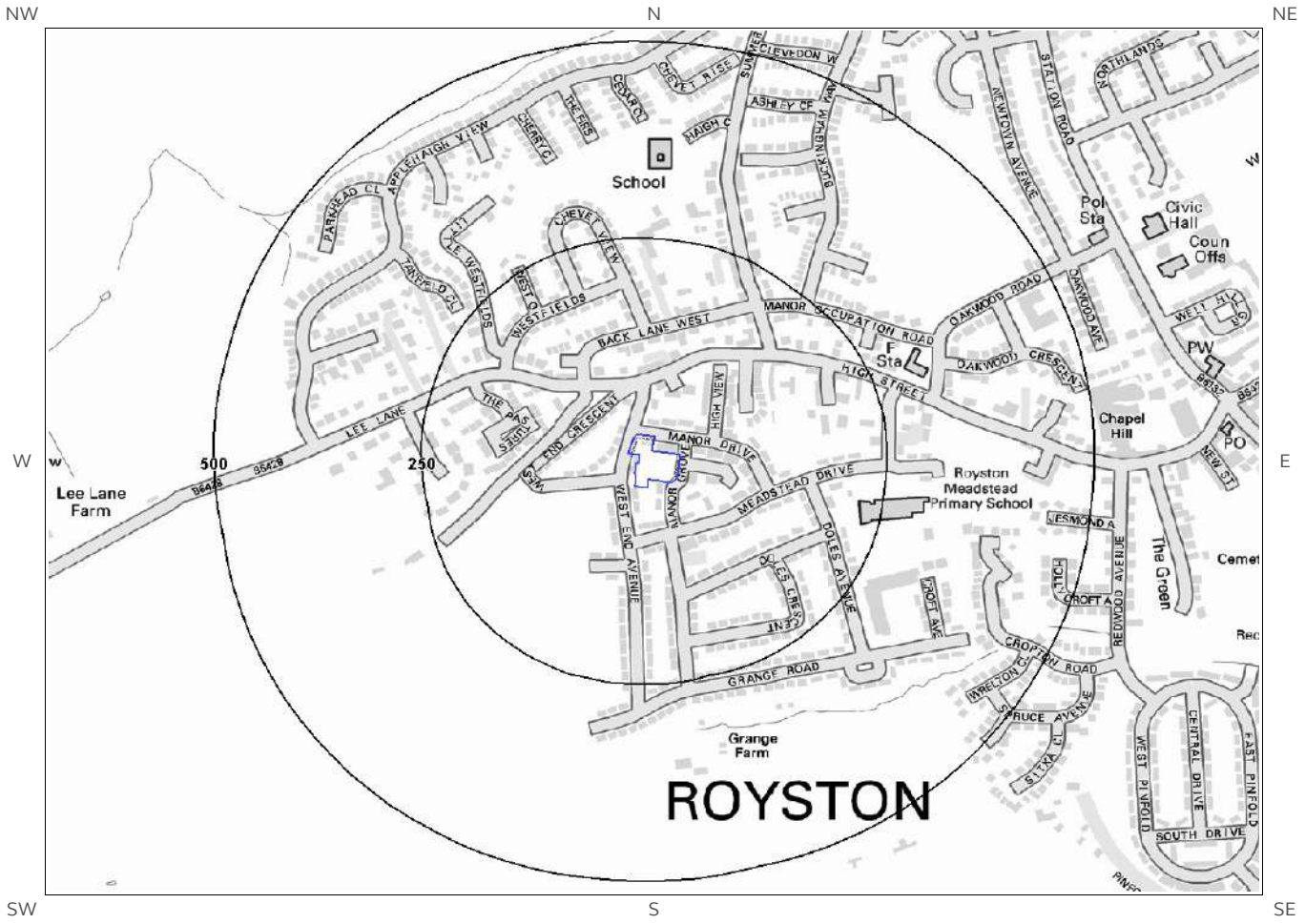
Surface Water Abstraction Licence

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



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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

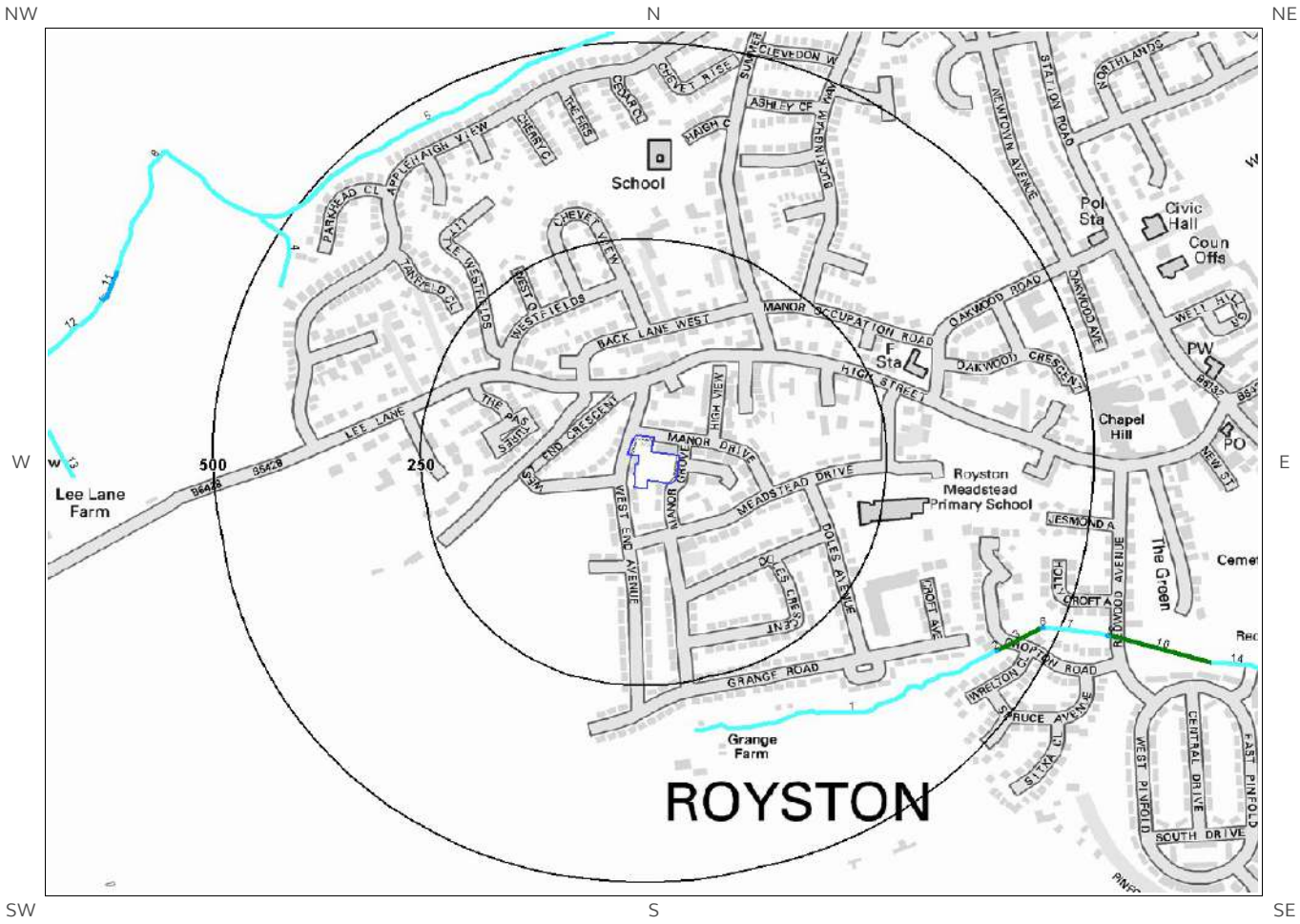
Source Protection Zone 3C - Total Catchment within Confined Aquifer

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

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

ID	Distance (m)	Direction	Designation	Description
4	277	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
5	463	W	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
1	485	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	498	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	463	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

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

Database searched and no data found.

6.4 Surface Water Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1839	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL COMPANY LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1394 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 27/3/1998 Version End Date:
Not shown	1839	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Use Relating To Secondary Category (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL CO LTD	Annual Volume (m^3): 110000 Max Daily Volume (m^3): 2742 Application No: 1394-V860 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 102 Version Start Date: 21/1/2008 Version End Date:

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	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.
311	W	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.
421	NW	Minor Aquifer/High Leaching Potential	H3	Coarse textured or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

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):

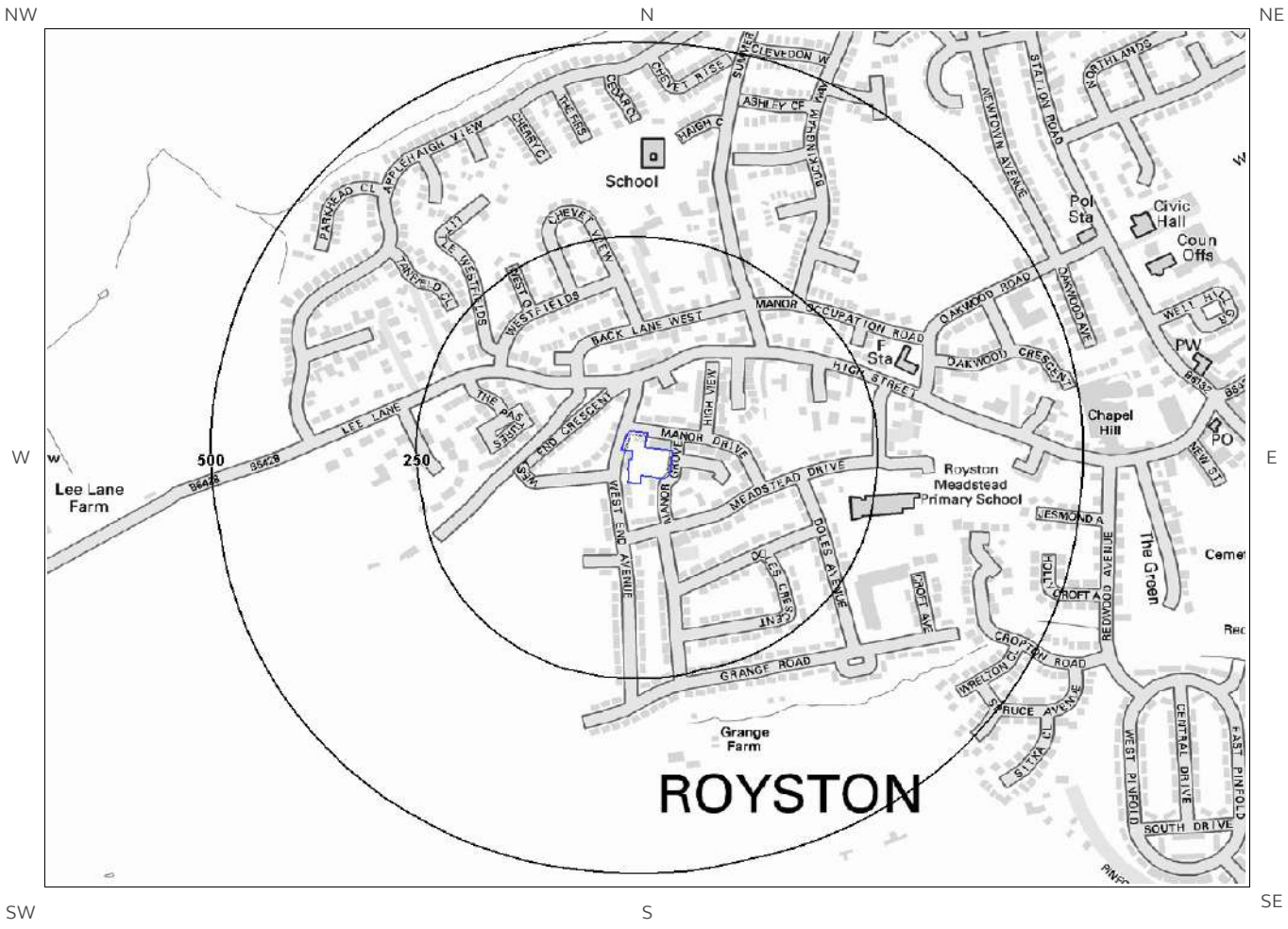
ID	Distance (m)	Direction	Details	
1	313	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	442	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
3	444	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
4	466	NW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	467	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	478	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7	483	SE	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? No

Database searched and no data found.

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

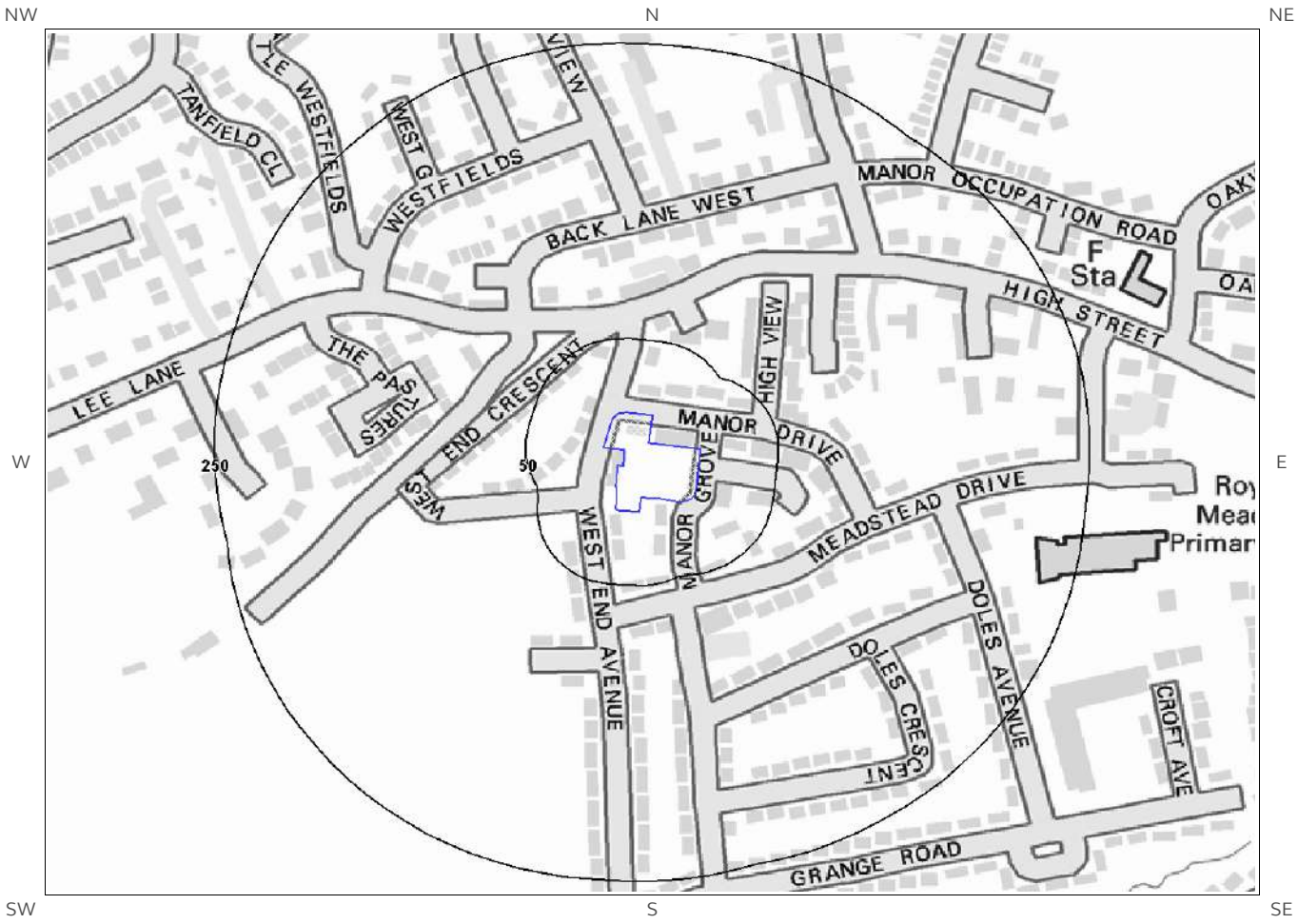
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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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/Natural Resources Wales Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales 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/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

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

7.4 Flood Defences

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

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

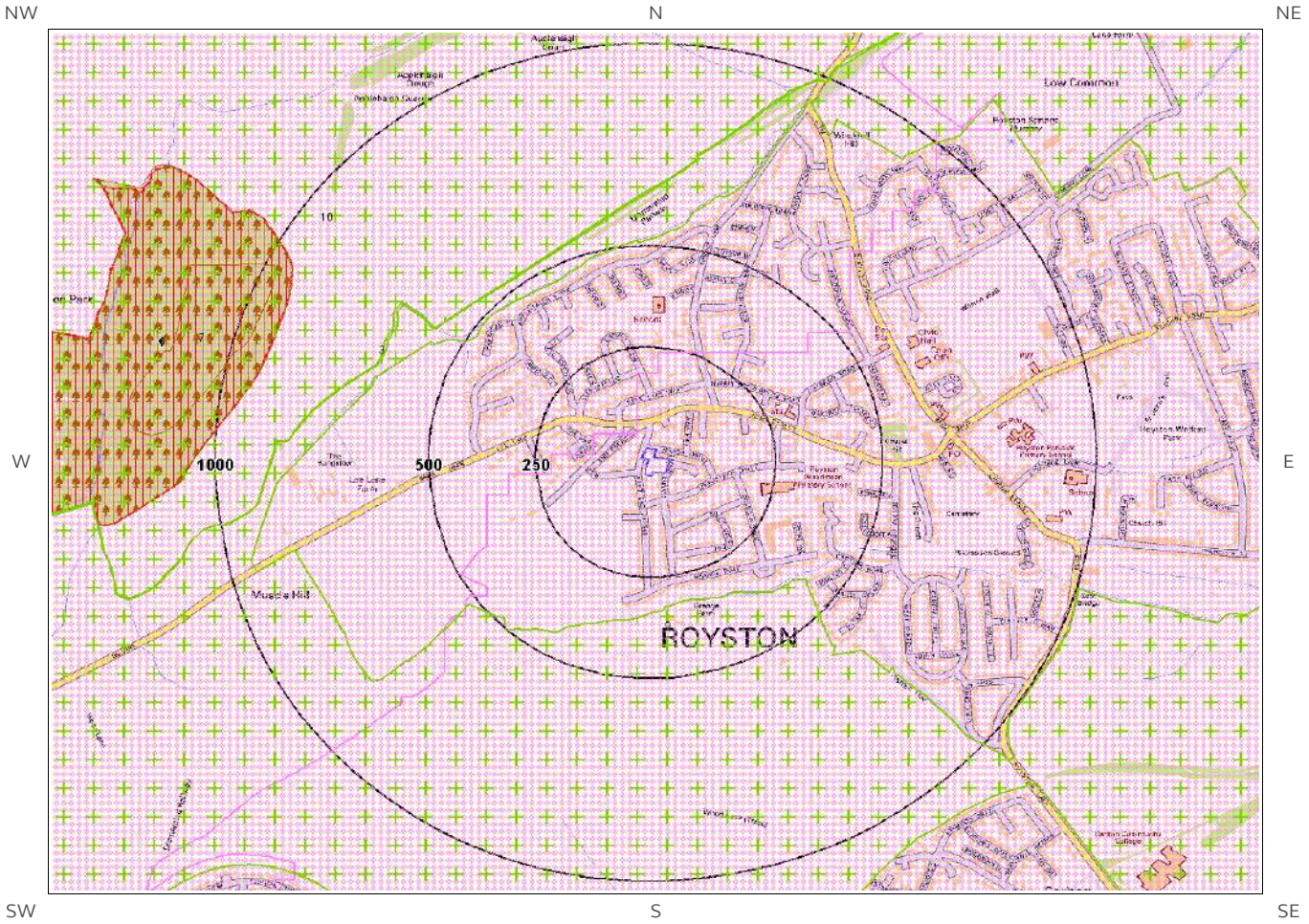
7.8 Groundwater Flooding Confidence Areas

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

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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Site Outline

100
250
Search Buffers (m)

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:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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
6	909	W	UNKNOWN	Ancient and Semi-Natural Woodland
7	958	NW	UNKNOWN	Ancient Replanted Woodland
Not shown	1484	W	UNKNOWN	Ancient Replanted Woodland

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

1

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
1	910	W	Notton Wood	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
2	0	On Site	Existing	DEFRA
3	43	NW	Existing	DEFRA
Not shown	1347	S	Existing	DEFRA
Not shown	1878	SW	Existing	DEFRA

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

5

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
9	317	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
10	524	NW	Liverpool, Manchester and West Yorks Greenbelt	Wakefield District (B)
Not shown	1347	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1845	SW	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1944	SE	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

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

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

Hazard
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.

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 1 and 3% 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? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

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

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

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

10.2 Non-Coal Mining

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

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

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

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: 03708 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: Barnsley Metropolitan Borough Council
Phone: 01226 770770
Web: http://www.barnsley.gov.uk/
Address: PO Box 634, Barnsley, South Yorkshir, S70 9GG

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

Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.
PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].
This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

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

Appendix D

Groundsure GeoInsight Report

Groundsure
LOCATION INTELLIGENCE

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977785
Your Reference:	18-6006_Manor_Grove_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Geo Insight

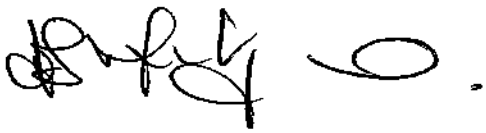
Address: MANOR GROVE, BARNSLEY, S71 4LL

Dear Sir/ Madam,

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

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

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**MANOR GROVE, BARNSLEY, S71 4LL**
Date:	**12 Jun 2017**
Reference:	**GS-3977785**
Client:	**Hamson Barron Smith Ltd**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435494,411378
Site Size:	0.25ha

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

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

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

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

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

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	2	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	2	2	4
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

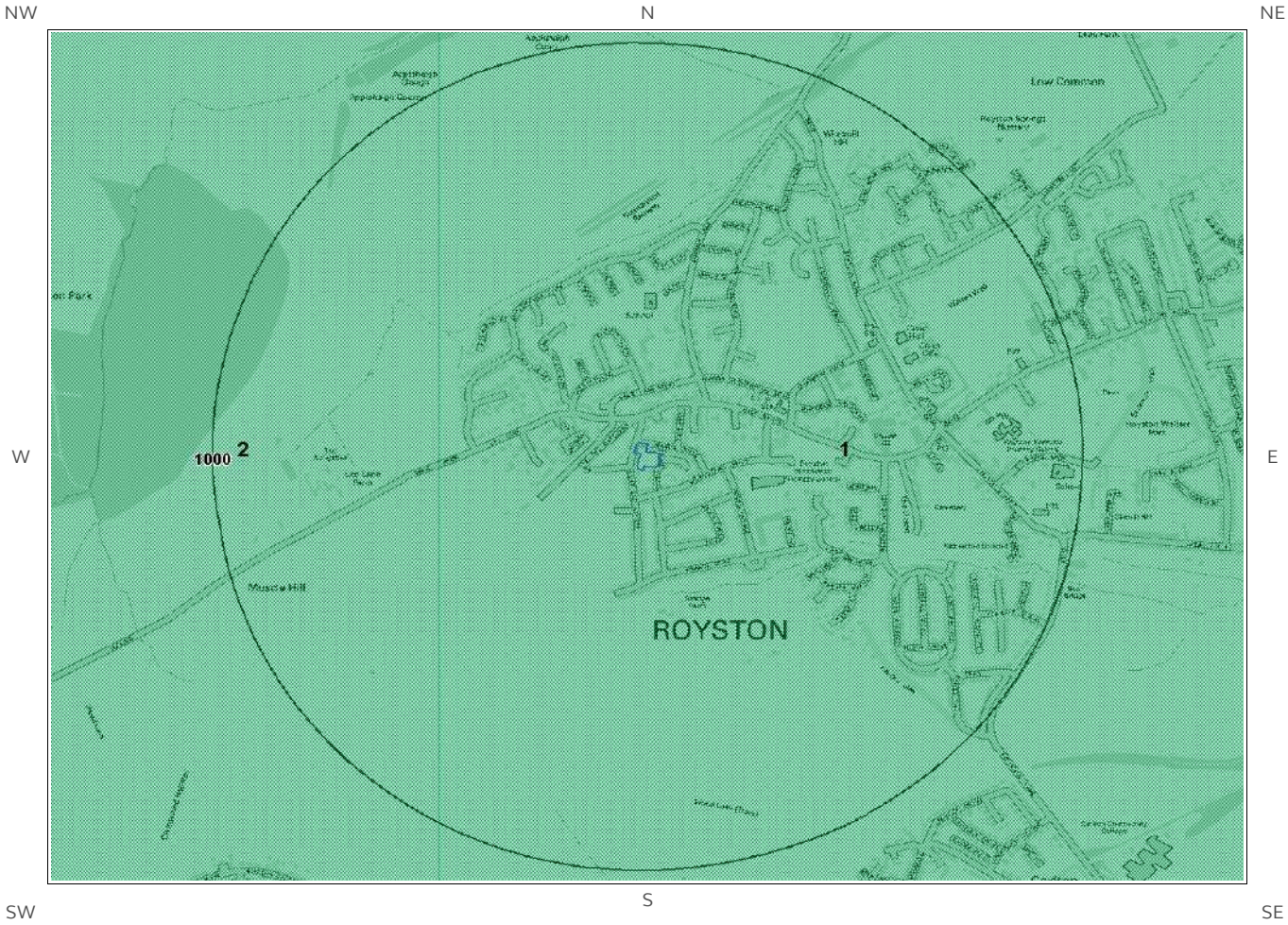
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Negligible

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	3

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	3	0	0

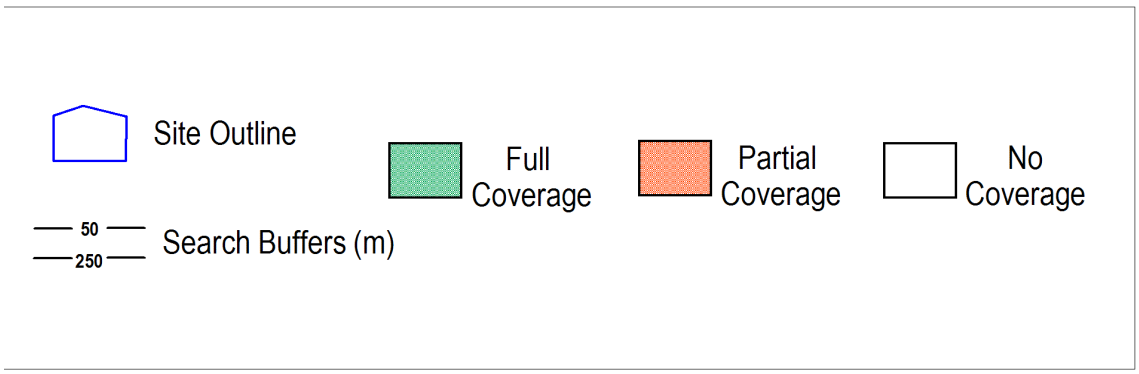
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

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

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	463.0	Some deposits are mapped	Full	Full	No coverage
N3	1347.0	Some deposits are mapped	Full	Full	No coverage
N4	1428.0	Some deposits are mapped	Full	Full	Some deposits are mapped

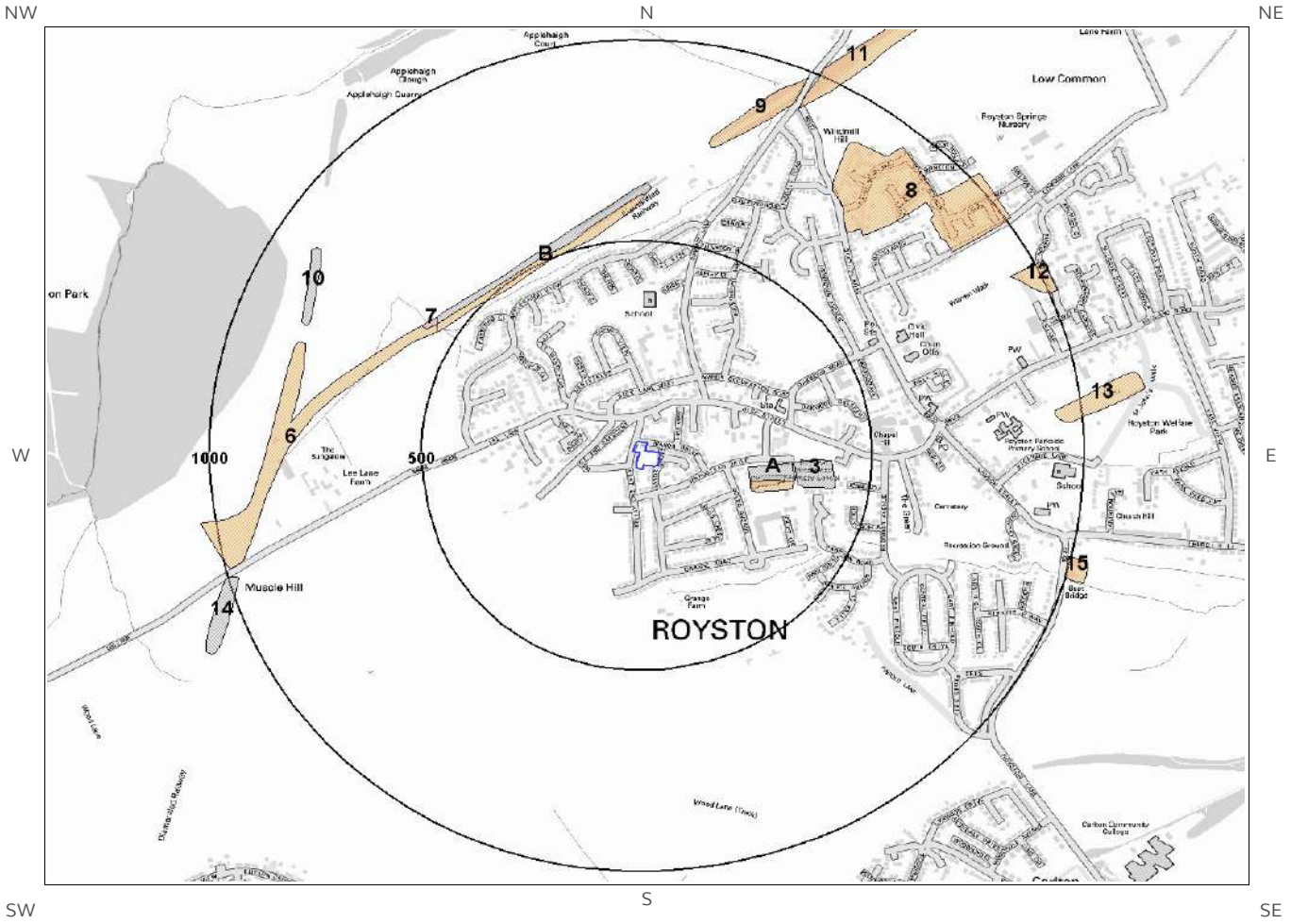
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not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

The definitions of coverage are as follows:

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

1 Geology (1:10,000 scale).

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



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Artificial Ground Legend

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 1:10,000 scale

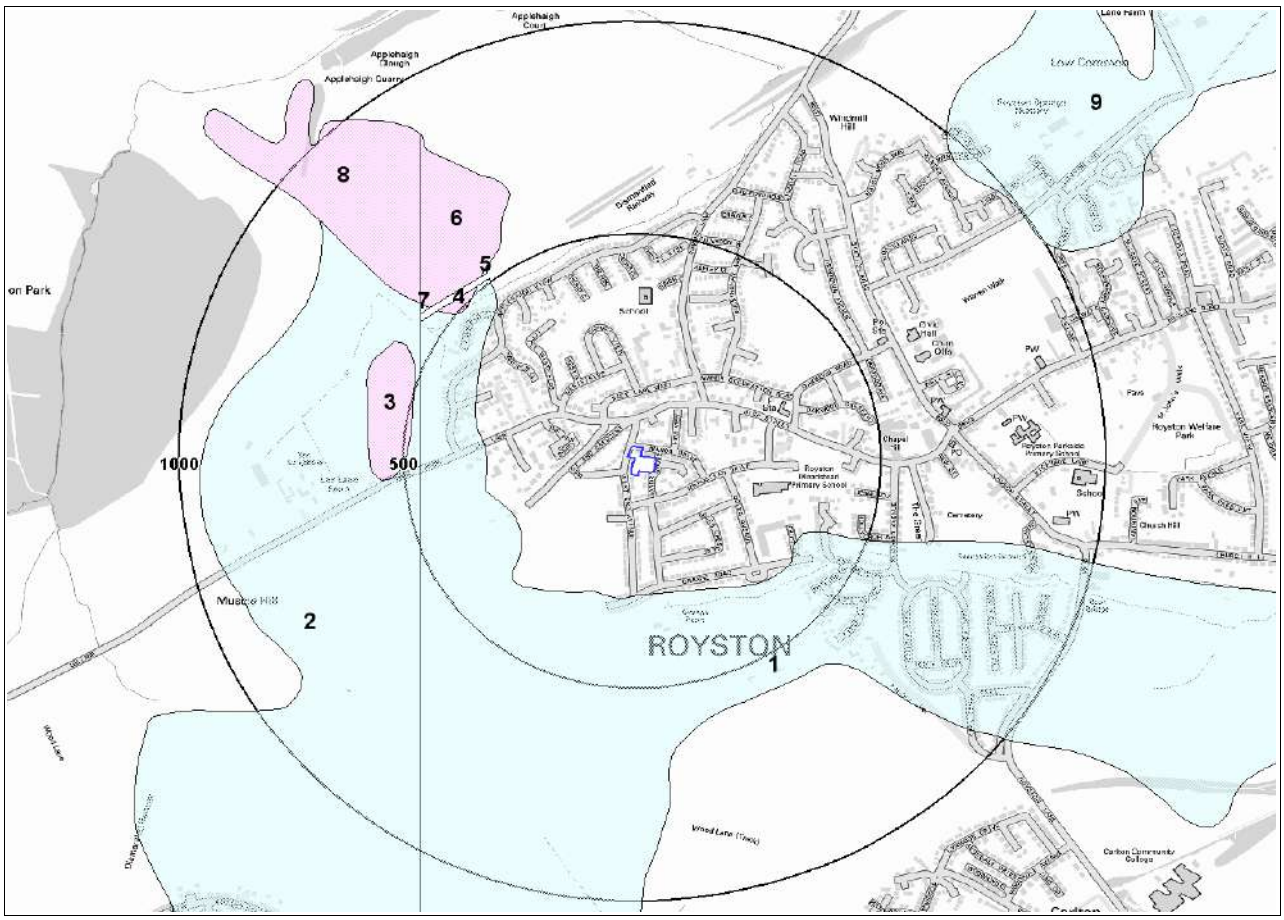
1.1 Artificial Ground

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

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1A	212.0	E	WGR-VOID	Worked Ground (Undivided)	Void
2A	219.0	E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	319.0	E	WGR-VOID	Worked Ground (Undivided)	Void
4B	488.0	NW	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit

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



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

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

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	278.0	W	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton
2	463.0	W	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton
3	487.0	W	GFDMP-XSV	Glaciofluvial Deposits, Mid Pleistocene - Sand And Gravel	Sand And Gravel
4	494.0	NW	GFDMP-XSV	Glaciofluvial Deposits, Mid Pleistocene - Sand And Gravel	Sand And Gravel

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

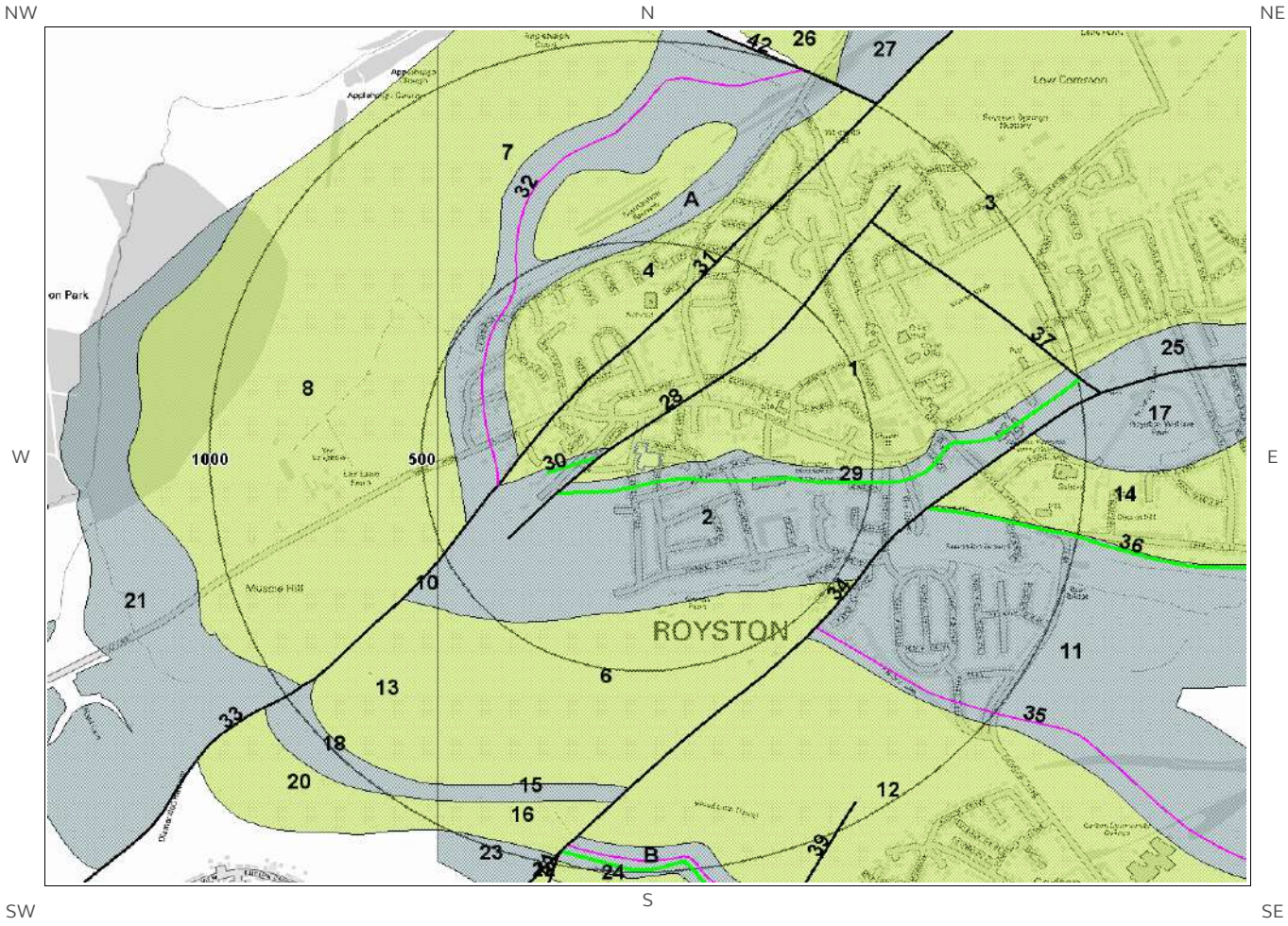
No

Database searched and no data found.

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

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

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



Bedrock and Faults Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

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

1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
2	4.0	S	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
3	26.0	NW	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
4	193.0	NW	ACR-SDST	Ackton Rock - Sandstone	Bolsovian Sub-age
5A	274.0	W	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
6	339.0	S	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
7	416.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
8	463.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
9A	499.0	NW	ACR-SDST	Ackton Rock - Sandstone	Bolsovian Sub-age

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

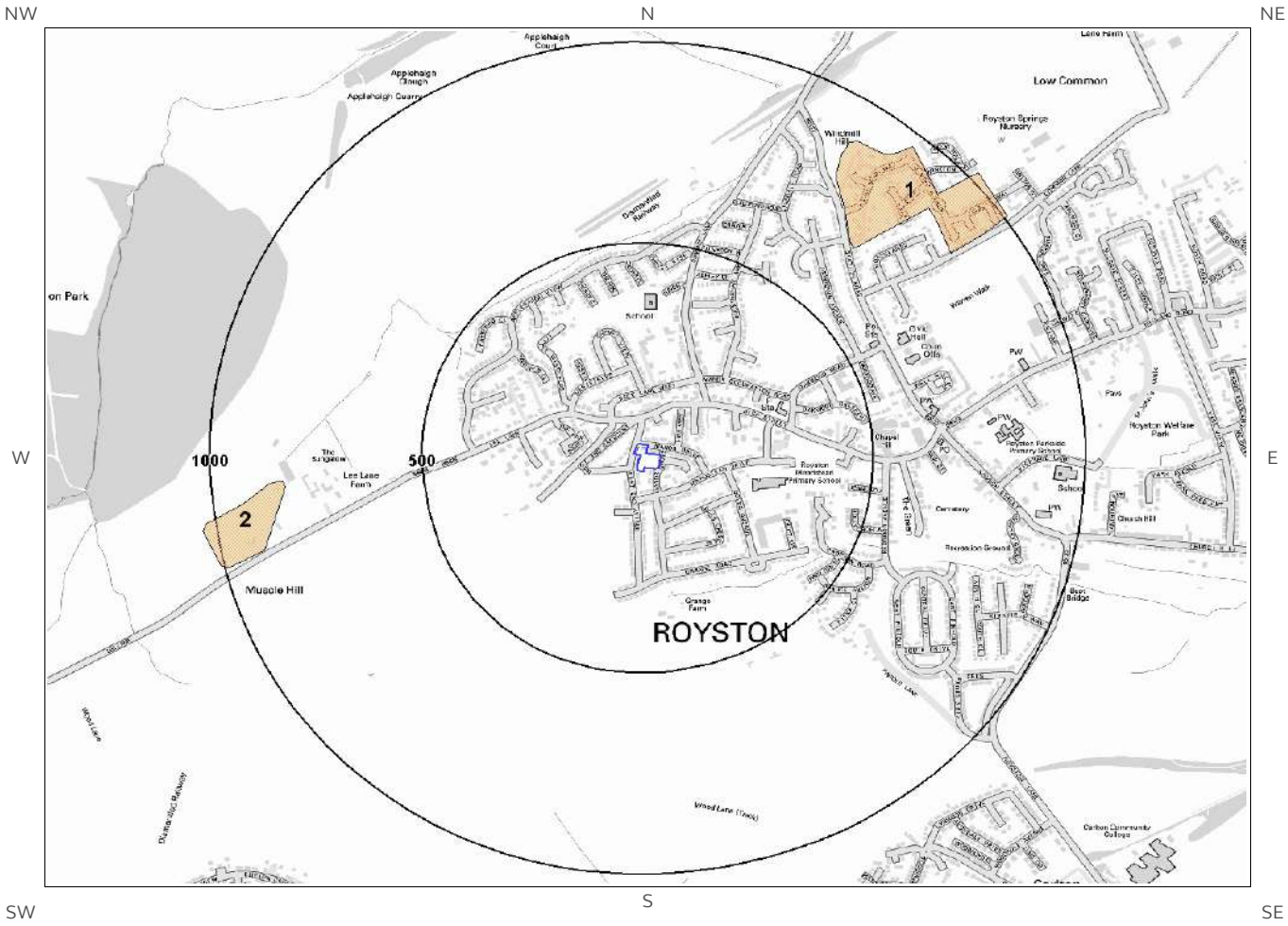
ID	Distance (m)	Direction	Category Description	Feature Description
28	26.0	NW	FAULT	Normal fault, inferred
29	36.0	S	ROCK	Coal seam, inferred
30	89.0	W	ROCK	Coal seam, inferred
31	193.0	NW	FAULT	Normal fault, inferred
32	326.0	W	FOSSIL_HORIZON	Fossil horizon, marine band

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

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

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.1.1 Artificial/ Made Ground

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

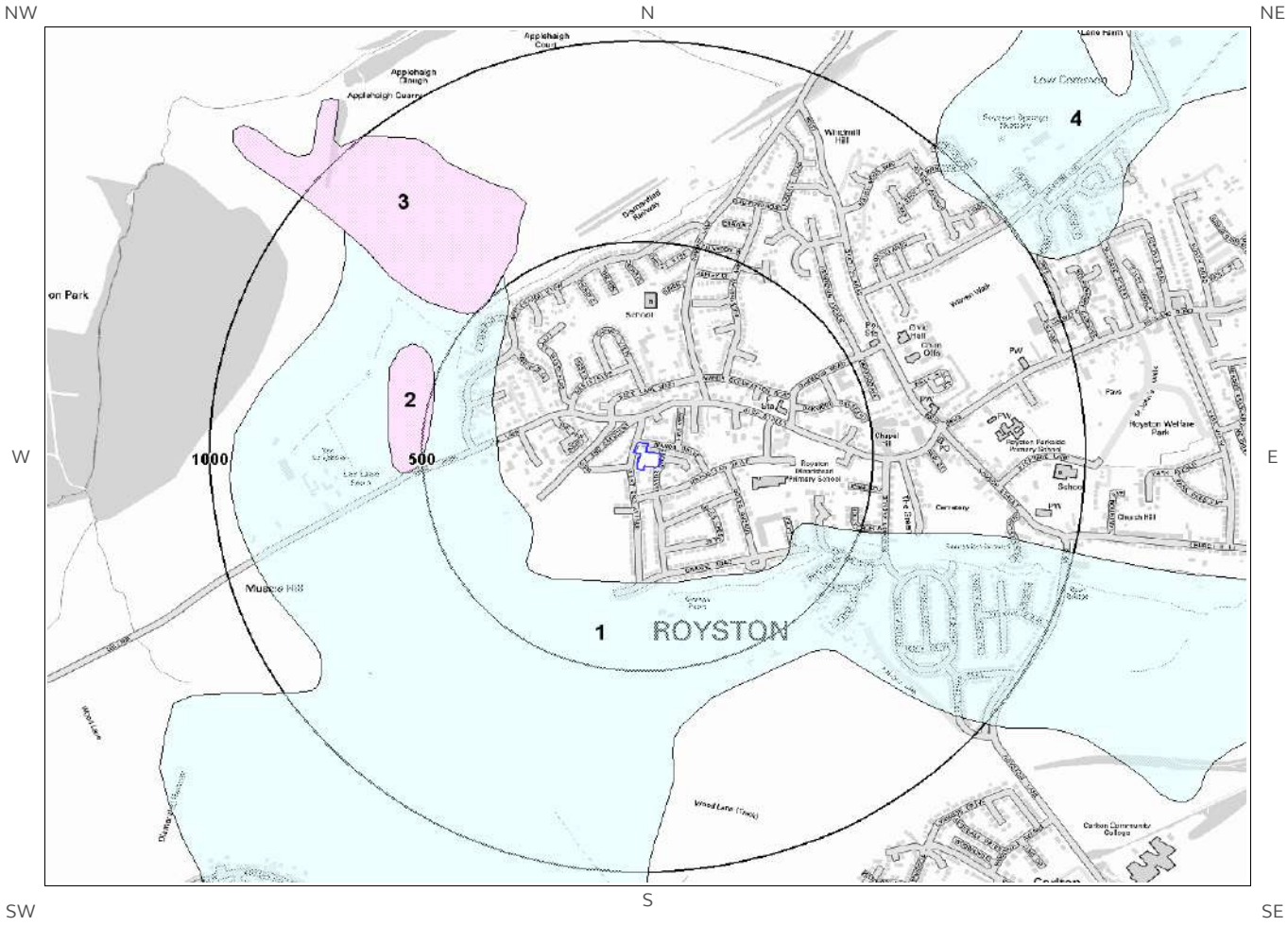
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	277.0	SW	TILMP-DMTN	TILL, MID PLEISTOCENE	DIAMICTON
2	485.0	W	GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL
3	498.0	NW	GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL

2.2.2 Permeability of Superficial Ground

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

Database searched and no data found.

2.2.3 Landslip

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

Database searched and no data found.

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

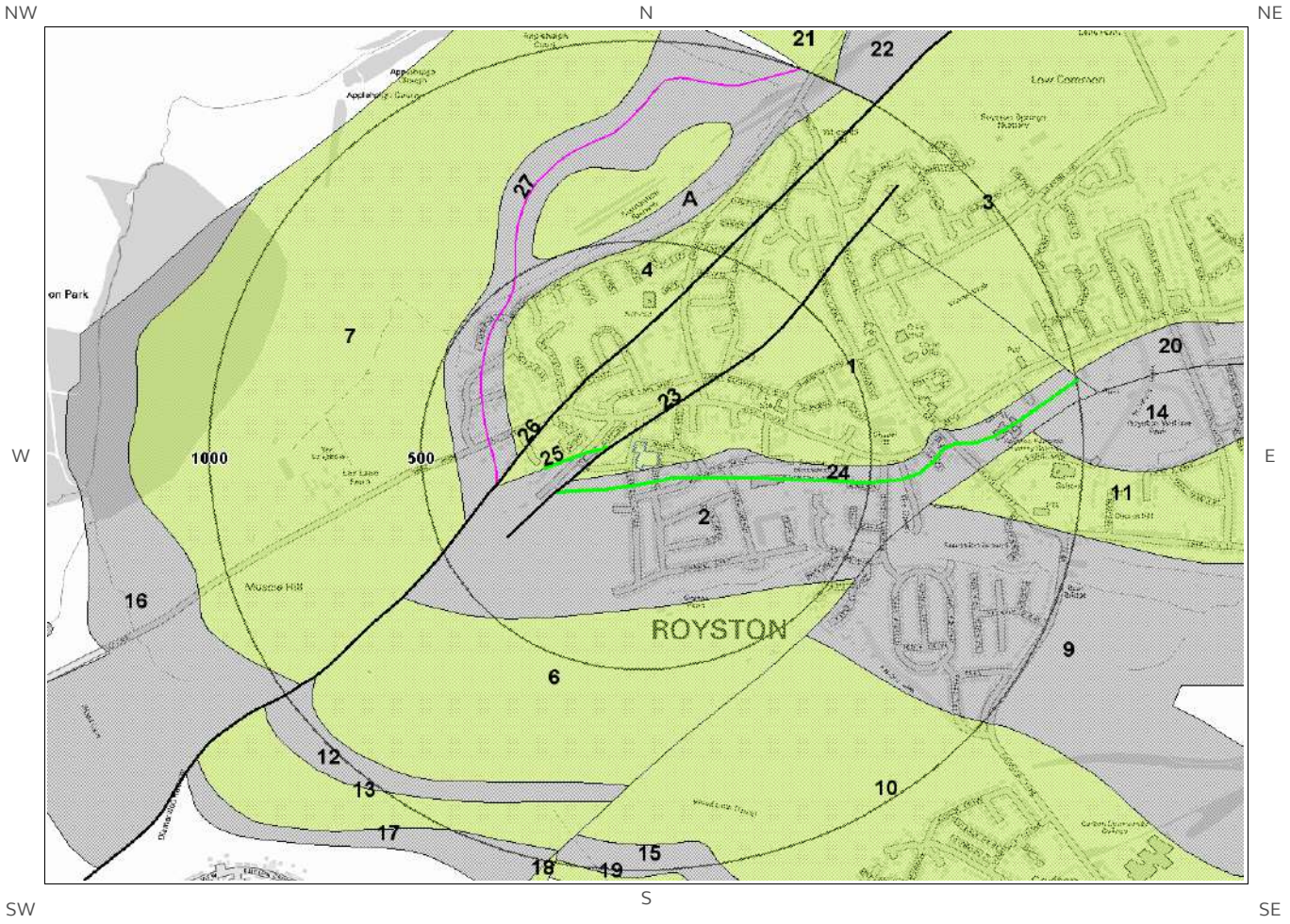
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
2	2.0	S	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
3	27.0	NW	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
4	193.0	NW	ACR-SDST	ACKTON ROCK - SANDSTONE	WESTPHALIAN
5A	273.0	W	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
6	345.0	S	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
7	416.0	W	OR-SDST	OAKS ROCK - SANDSTONE	WESTPHALIAN
8A	499.0	N	ACR-SDST	ACKTON ROCK - SANDSTONE	WESTPHALIAN

2.3.2 Permeability of Bedrock Ground

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

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

2.3.3 Faults

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

ID	Distance	Direction	Category Description	Feature Description
23	27.0	NW	FAULT	Fault, inferred
24	37.0	S	ROCK	Coal seam, inferred
25	56.0	W	ROCK	Coal seam, inferred
26	193.0	NW	FAULT	Fault, inferred
27	326.0	W	FOSSIL_HORIZON	Marine band

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

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

3 Radon Data

3.1 Radon Affected Areas

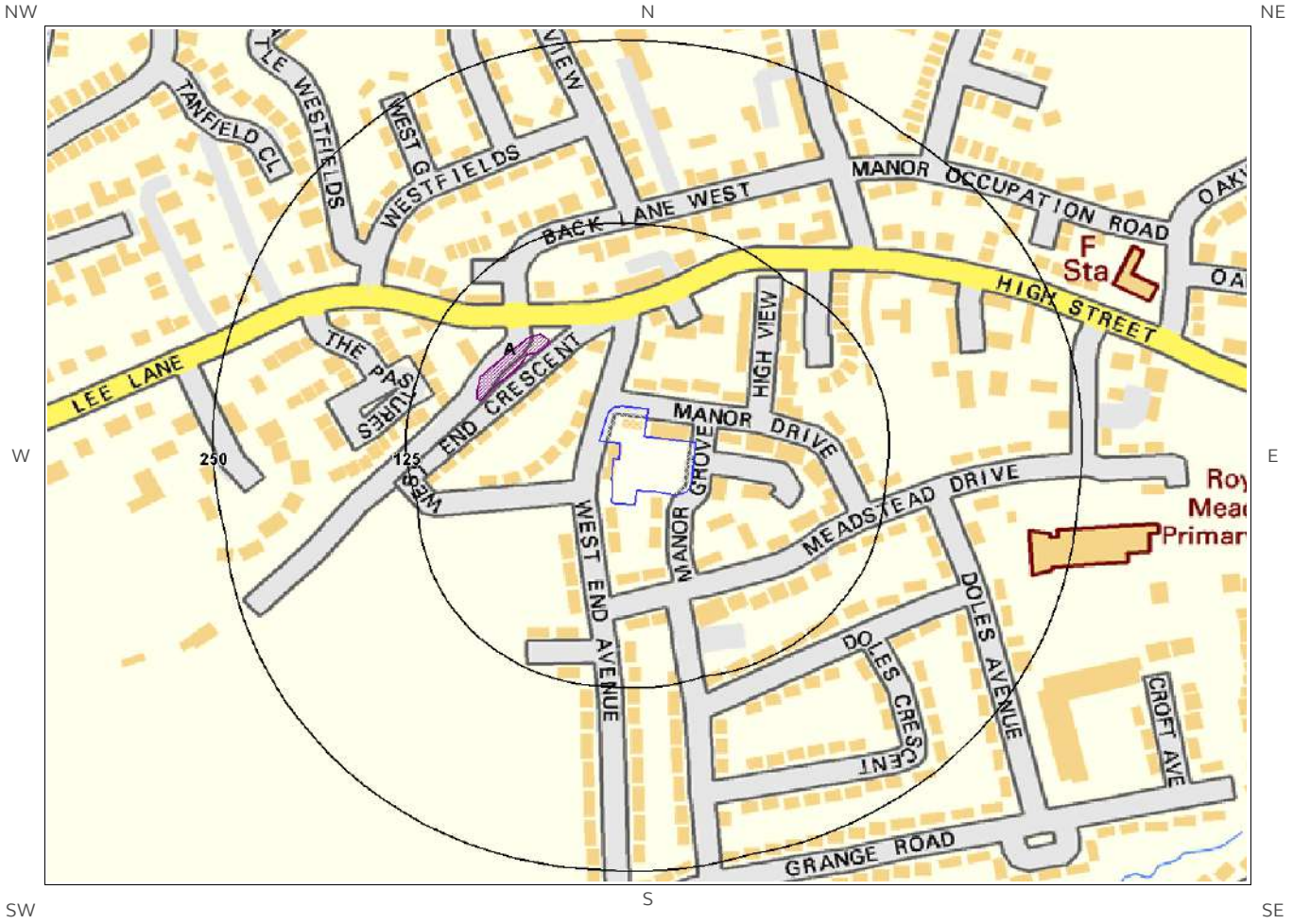
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

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

---

4 Ground Workings Map



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

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

ID	Distance (m)	Direction	NGR	Use	Date
1A	60.0	NW	435407 411441	Pond	1891
2A	60.0	NW	435407 411441	Pond	1904

4.2 Historical Underground Working Features derived from Historical Mapping

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

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

Database searched and no data found.

4.3 Current Ground Workings

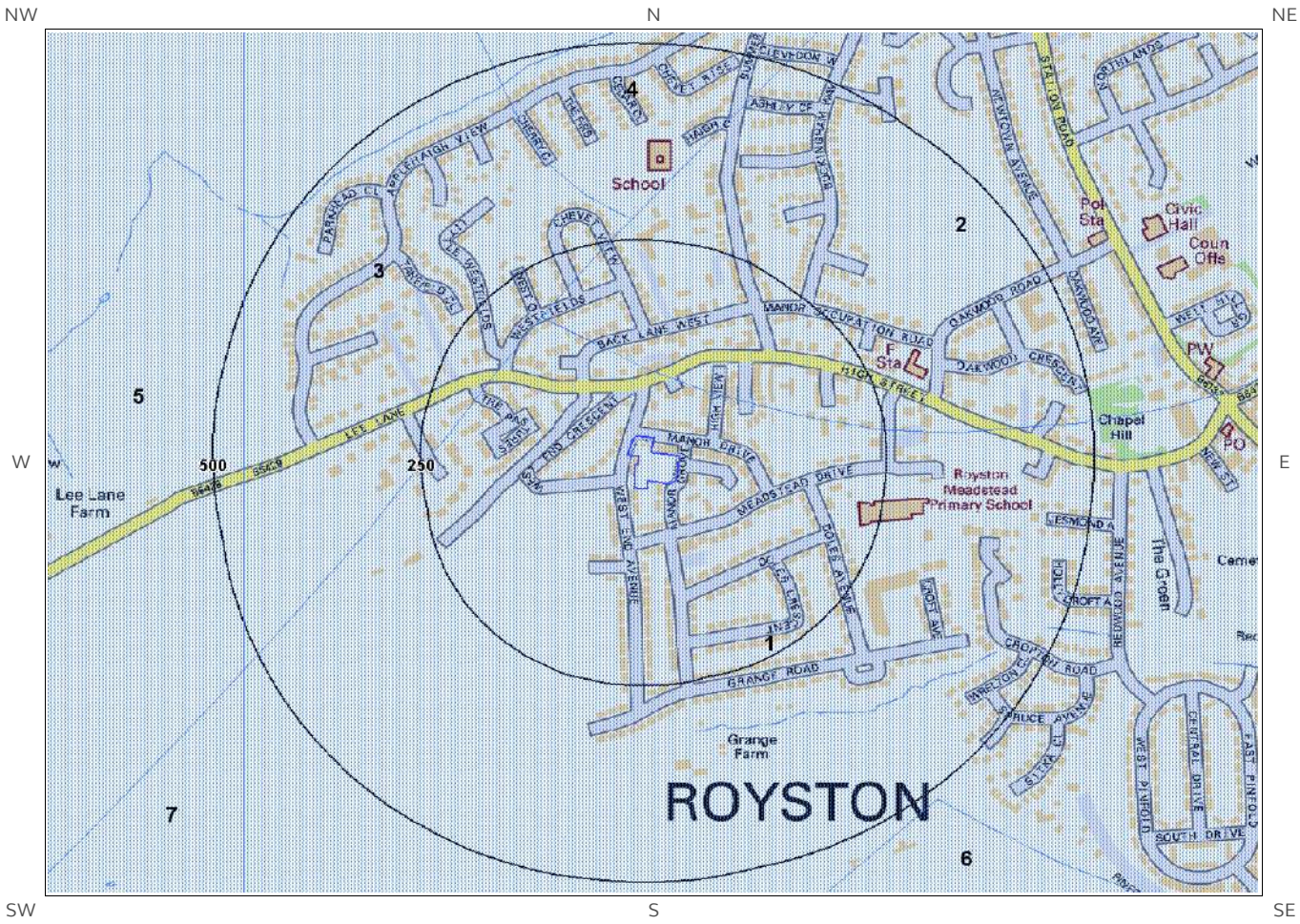
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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

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

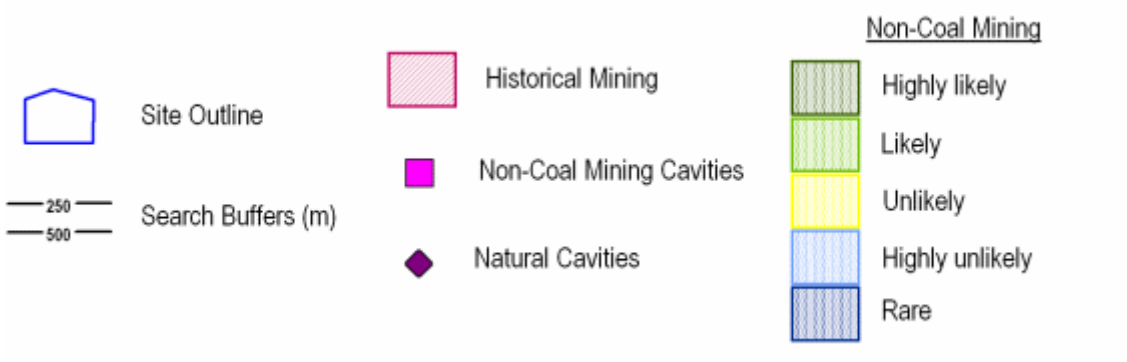
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	749.0	NE	435909 412036	Sandstone	Windmill Hill	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

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

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

Database searched and no data found.

5.2 Coal Mining

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

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

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

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

5.3 Johnson Poole and Bloomer

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

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

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

5.4 Non-Coal Mining

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

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

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	79.0	N	Sheffield Area	Iron Ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
3	182.0	NW	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	276.0	N	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
5	463.0	W	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
6	513.0	SE	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	524.0	SW	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	774.0	S	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	774.0	S	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

5.6 Natural Cavities

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

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

Database searched and no data found.

5.7 Brine Extraction

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

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

Database searched and no data found.

5.8 Gypsum Extraction

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

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

Database searched and no data found.

5.9 Tin Mining

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

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

Database searched and no data found.

5.10 Clay Mining

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

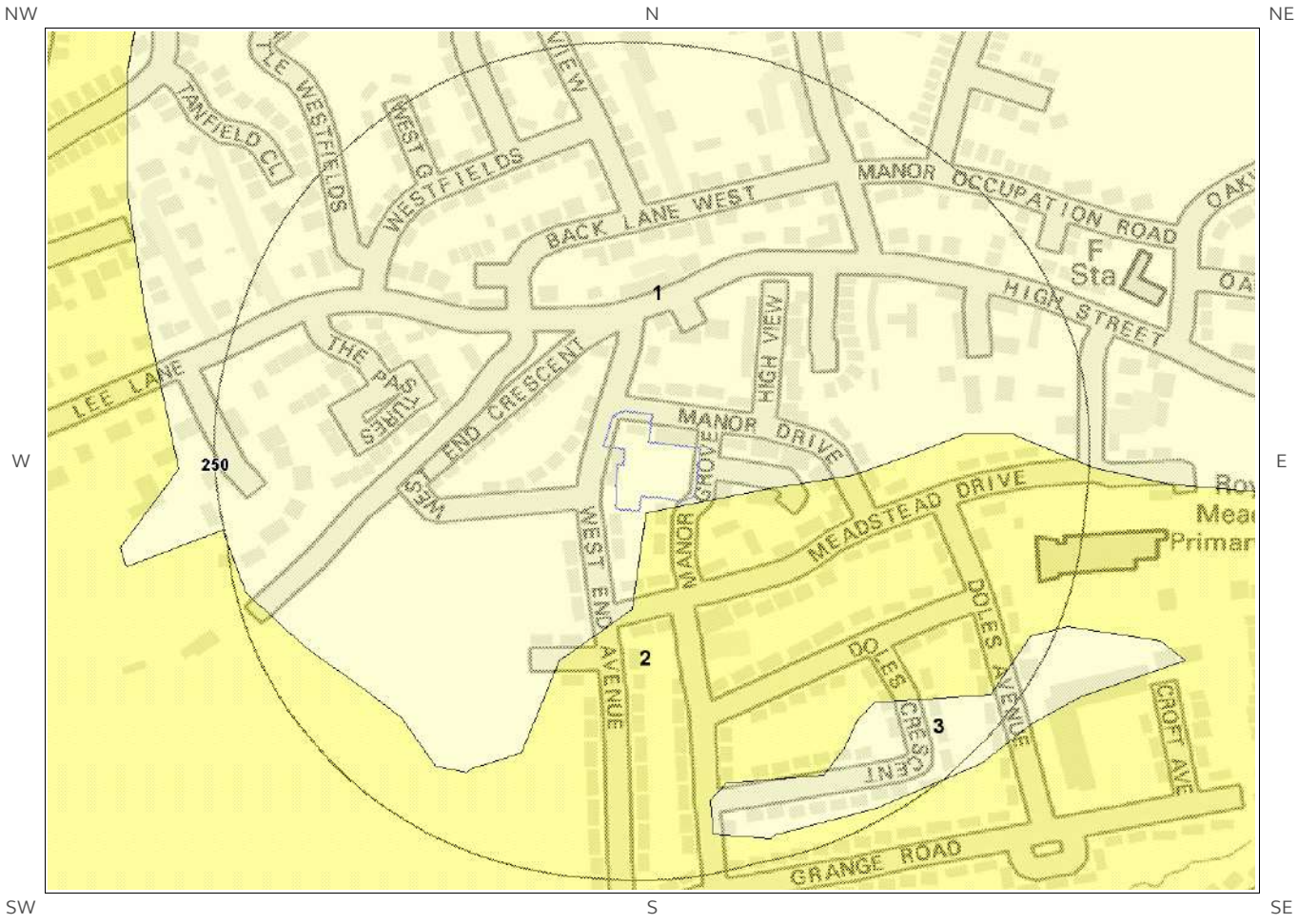
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

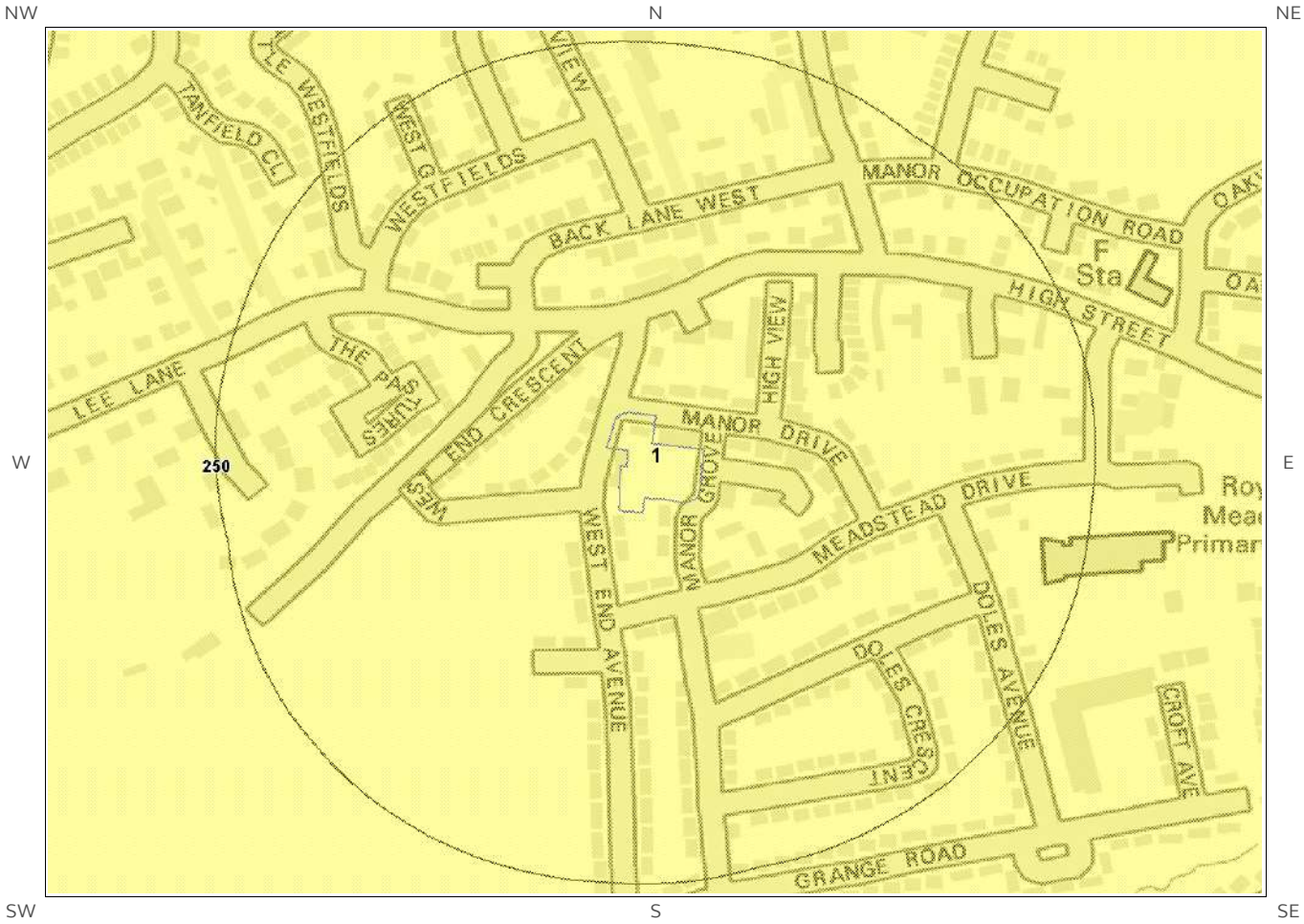


Shrink Swell Clay Legend

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6.2 Landslides Map

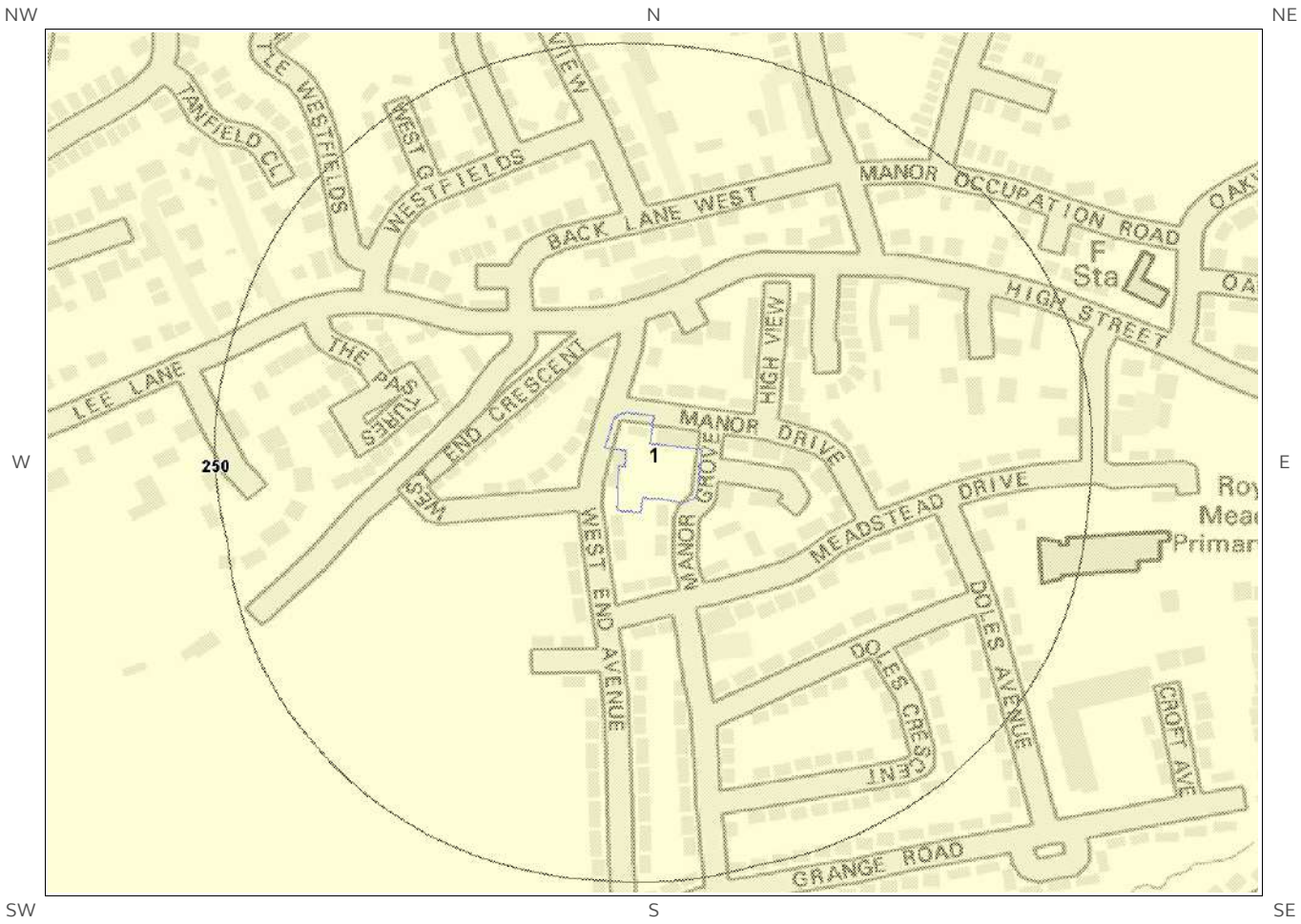


Landslides Legend

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6.3 Ground Dissolution of Soluble Rocks Map

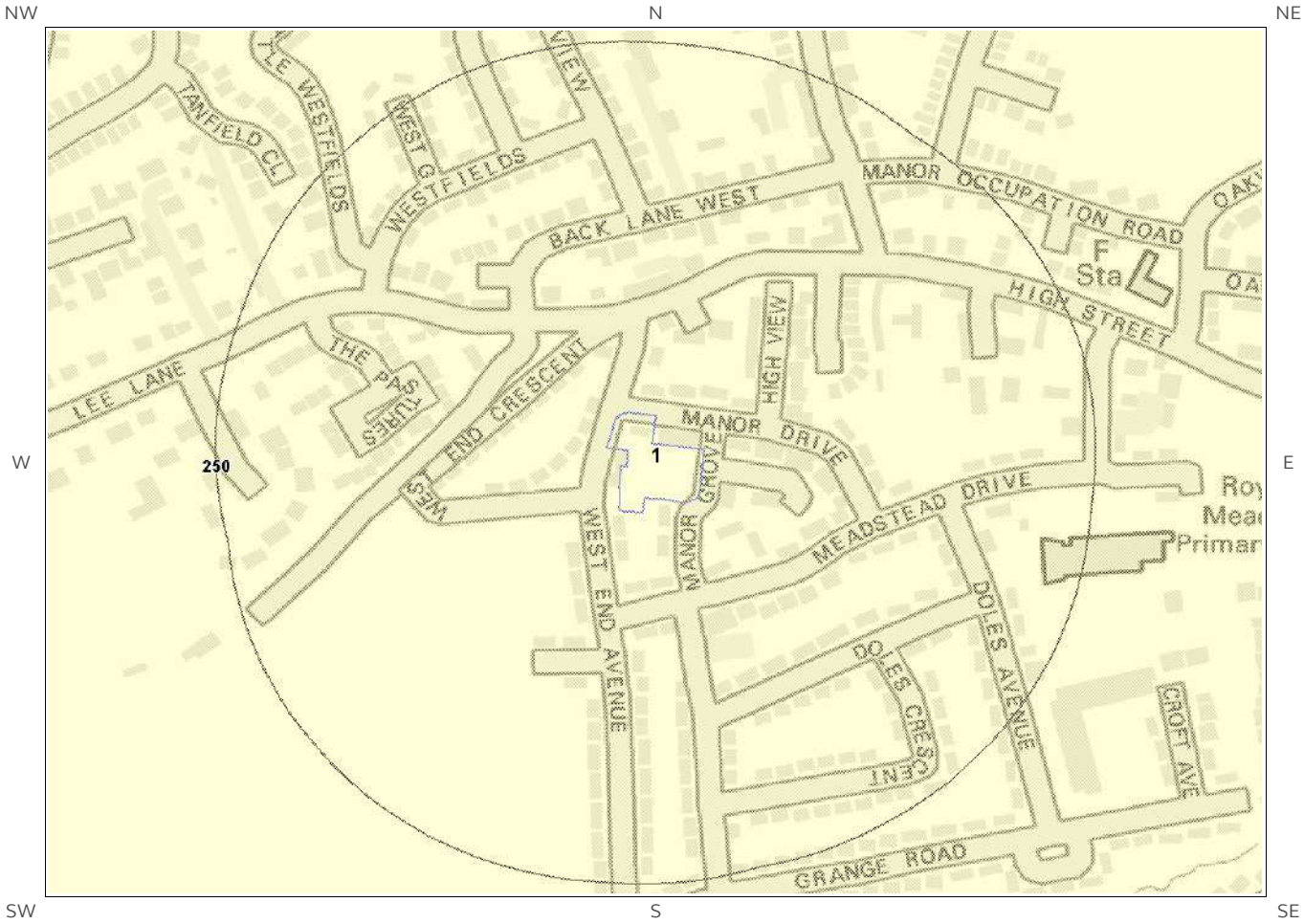


Ground Dissolution Soluble Rocks Legend

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6.4 Compressible Deposits Map

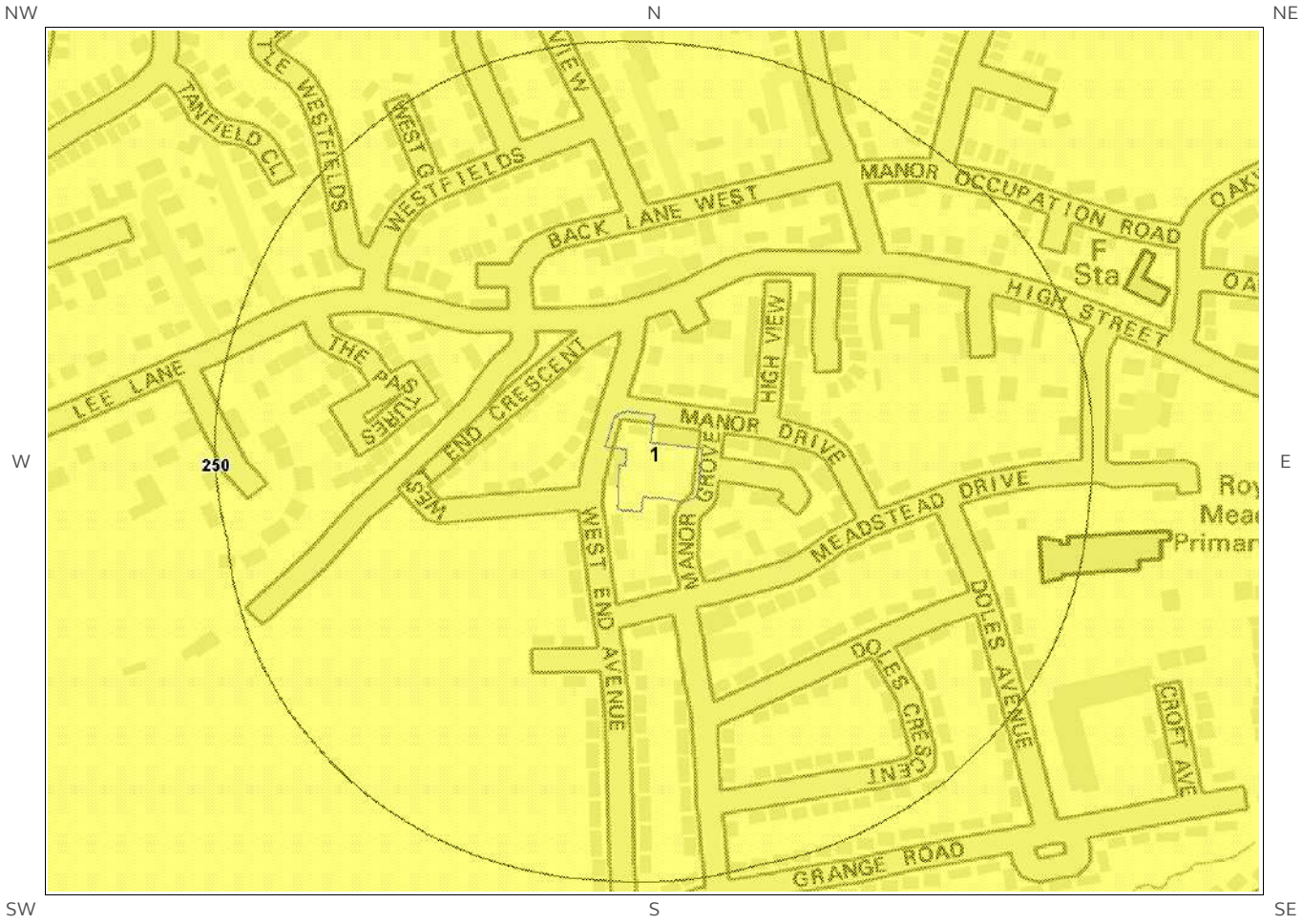


Compressible Deposits Legend

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6.5 Collapsible Deposits Map

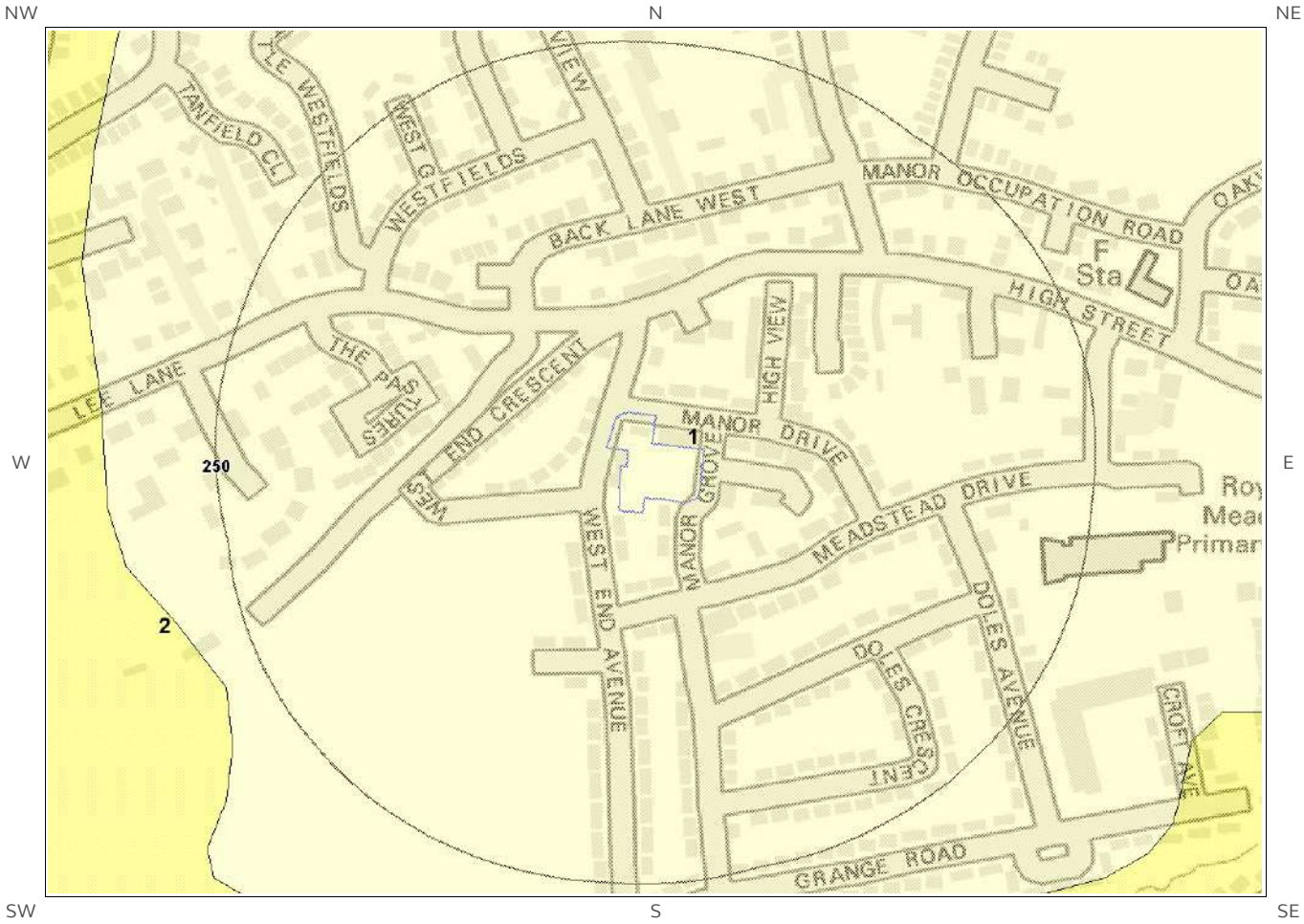


Collapsible Deposits Legend

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6.6 Running Sand Map



Running Sand Legend

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6 Natural Ground Subsidence

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

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

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

6.1 Shrink-Swell Clays

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	3.0	S	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

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

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

6.3 Ground Dissolution of Soluble Rocks

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

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

6.4 Compressible Deposits

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

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

6.5 Collapsible Deposits

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

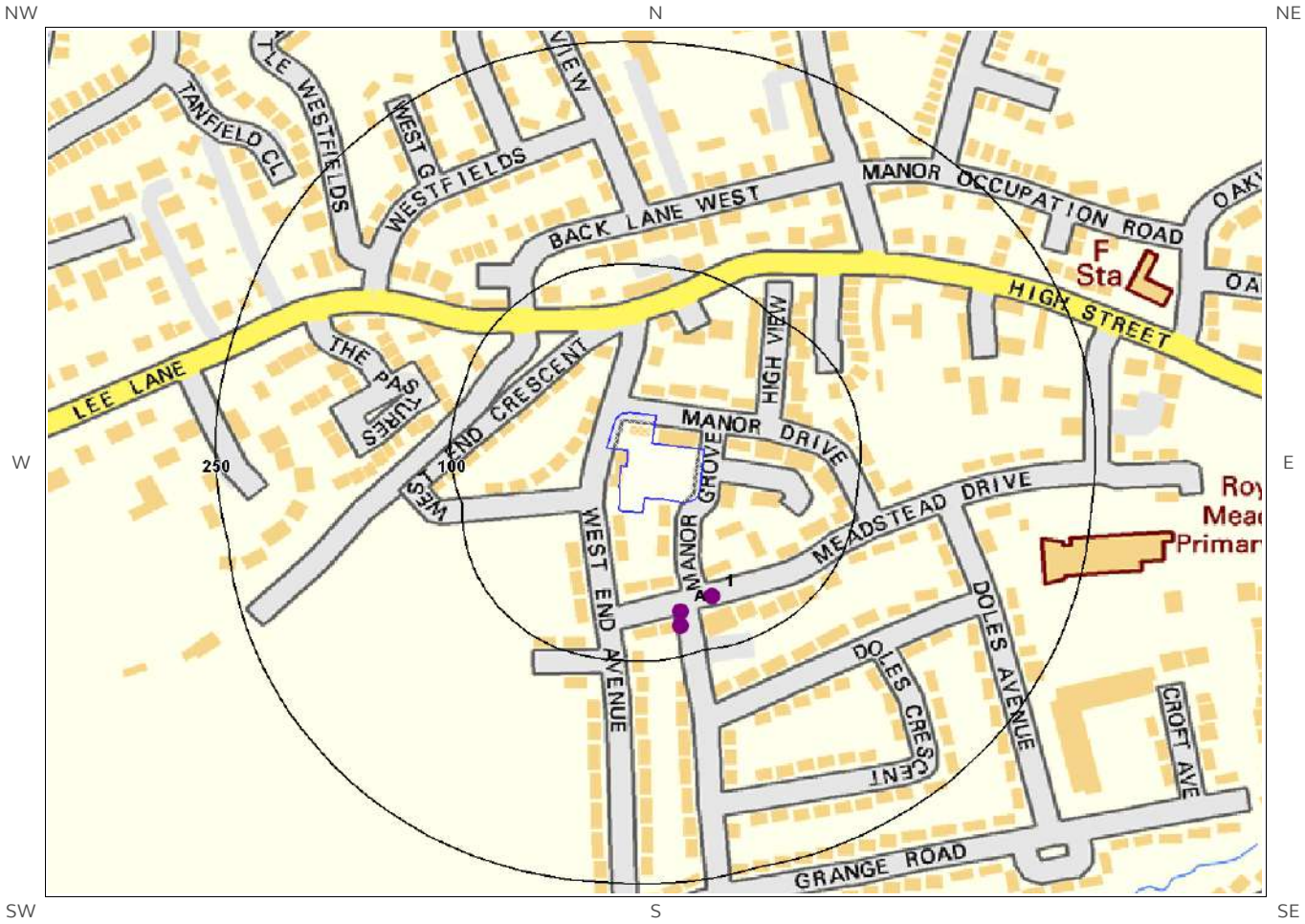
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

6.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	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.

7 Borehole Records Map



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

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

Records of boreholes within 250m of the study site boundary: 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	66.0	S	435530 411290	SE31SE120	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP1
2A	71.0	S	435510 411280	SE31SE121	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP2
3A	80.0	S	435510 411270	SE31SE122	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP3

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.

8 Estimated Background Soil Chemistry

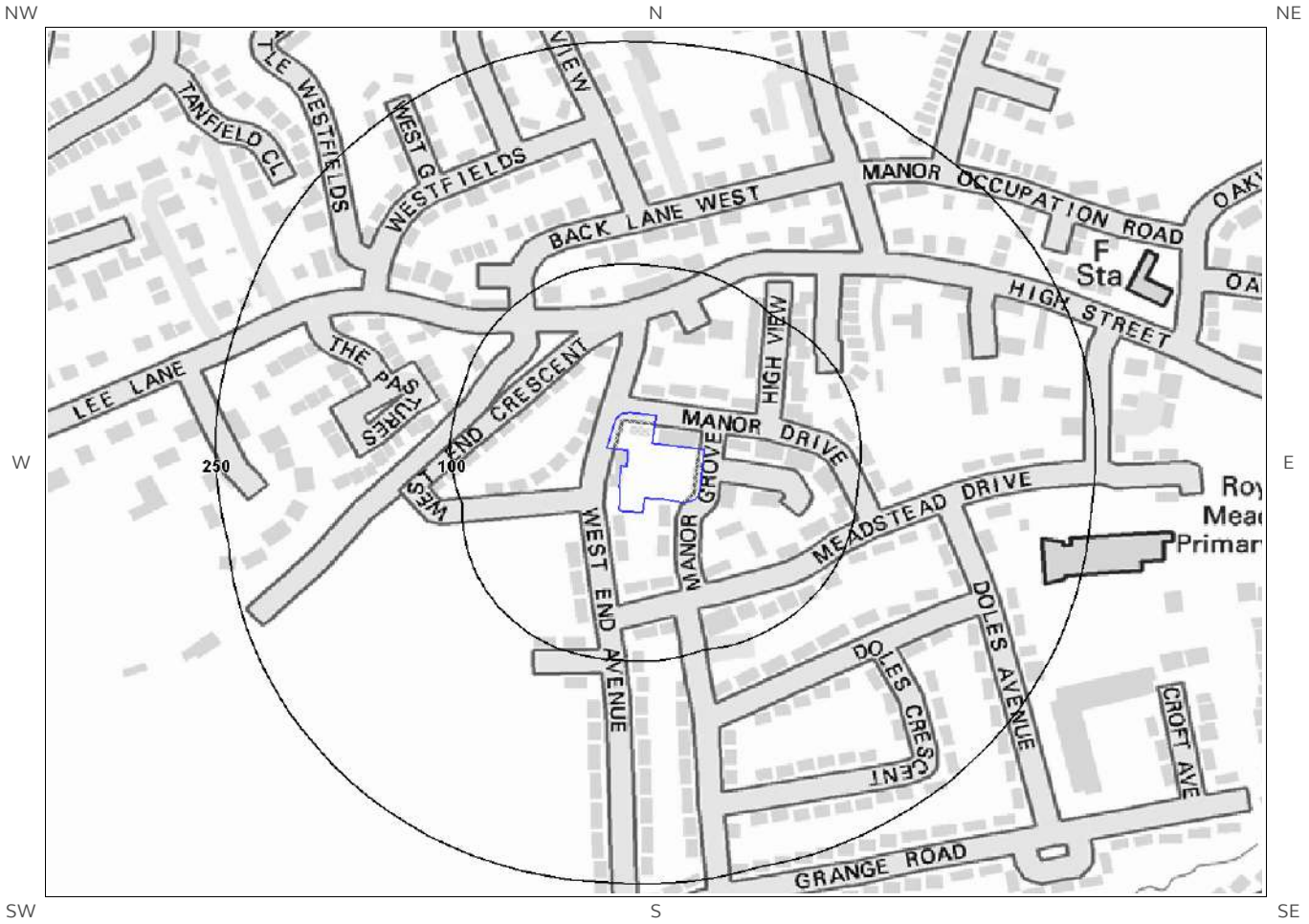
Records of background estimated soil chemistry within 250m of the study site boundary: 3

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	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	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg

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

9 Railways and Tunnels Map



Railways and Tunnels Legend

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- Site Outline
- Search Buffers (m): 250, 500
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

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

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

Database searched and no data found.

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

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

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

Database searched and no data found.

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

9.2 Historical Railway and Tunnel Features

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

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

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

9.3 Historical Railways

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

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

Database searched and no data found.

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

9.4 Active Railways

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

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

Database searched and no data found.

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

9.5 Railway Projects

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

Is the study site within 5km of the route of the High Speed 2 rail project?	Yes
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

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

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

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

Contact Details

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

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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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Tel: +44 (0) 1384 262 000
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Website:**http://www1.getmapping.com/**

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

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Standard Terms and Conditions

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

Appendix E

Coal Mining and SYMAS Reports

DEC DIRECTORATE
South Yorkshire Mining Advisory Service

BARNSLEY
Metropolitan Borough Council

To:	NPS		**FAO:**	Steven Chitty	
My Ref:	M230/8		**Your Ref:**		
Date:	18th November 2014	**Enquiries to:**	Mr. M. Lyons	**Ext:**	2690
Subject:	LAND AT MANOR GROVE, MANOR DRIVE AND MEADSTEAD DRIVE, ROYSTONE, BARNSLEY.				

Further to your consultation request of the 11th November 2014, regarding development opportunity at the three above named locations, I am pleased to provide our report as per below.

SITUATION

The three sites under consideration at Royston are shown edged orange on the attached plan no. M230/8A.

GEOLOGY

Geological records show that the sites are located mainly on the Mexborough Rock Sandstone of the Middle Coal Measures which dips generally in a north-easterly direction in this vicinity. Geological faulting is conjectured to the north-west and the sandstone bedrock may be fissured both naturally and mining induced by the past deep operations as detailed below.

The Royston (or Sharlston Top) coal seam is conjectured to outcrop to the south of the sites as indicated on plan. According to the available information this seam is of around 0.5m thickness in this locality. From Manor Grove eastwards, the actual seam outcrop position has been proved, during past investigations, to deviate further southwards from that conjectured – as illustrated on plan. This would mean that the coal seam would be expected at a greater depth beneath the Meadstead Drive site, possibly in excess of 8m.

MINING

Shallow Mining

The shallow coal seam in this area is rarely known to have been worked historically at shallow depth in the wider vicinity. The likelihood therefore of any historic underground workings being present within this coal is considered as Low.

Deep Mining

The site has been affected by deep coal mining on several occasions, the latest being around 1979. Settlement from these mining operations will now be long complete and as the site is remote from any active coalfield it will not be affected by deep mining subsidence for the foreseeable future.

MINE ENTRIES

None known in this vicinity and the likelihood of any unchartered mine entries being encountered at this location is considered as Low.

FORMER LAND USE

The relevant Ordnance Survey Sheets and National Grid Sheets have been checked and there is no evidence of past industrial use in the vicinity of these sites.

LANDFILL

According to the Borough Landfill Register the site does not lie within 250m of any landfill operation.

CONCLUSIONS

1). The site is stable from the deep mining subsidence aspect and as the scheme is remote from any currently active coalfield it should remain so for the foreseeable future.

2). Although the Royston coal seam may be at shallow depth beneath the site, the likelihood of historic underground workings causing a stability issue at the surface is considered as **LOW** in this instance.

3). Considering the mining and geological details for this location, the likelihood for encountering an old unchartered mine entry within the site is considered as **LOW.**

4). The site is underlain by sandstone that may be fissured both naturally and/or mining induced. Future development may require suitably designed foundations where any weak ground is encountered, and treatment works to stabilise the feature may also be required in sever instances.

5). Historical plan information indicates there has been no evidence of former industrial land use in the vicinity of the site which could cause contamination problems and no landfill sites are recorded with 250m.

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This report was prepared by Mark Lyons on the 18th November 2014.



P. James
Principal Mining Engineer.

DRAWING TITLE

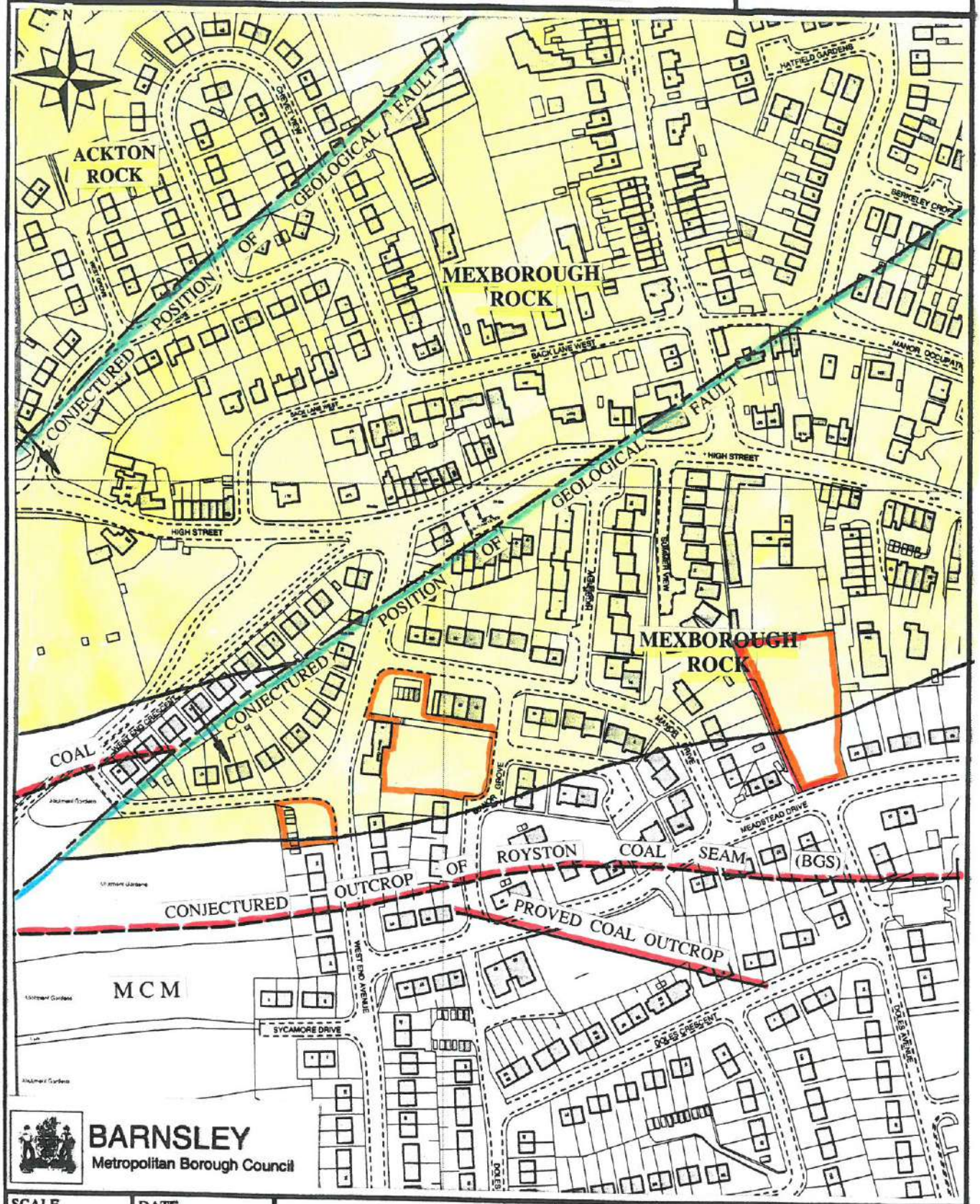
SITES AT MANOR GROVE,

MEADSTEAD DRIVE AND WEST END AVENUE

ROYSTON, BARNSLEY.

DRAWING NO.

M230/8A



BARNSLEY
Metropolitan Borough Council

SCALE	DATE		O.S REFERENCE
1:2500	14 / 11 / 14	SOUTH YORKSHIRE MINING ADVISORY SERVICE	SE 3511
DRAWN BY: AS	CHECKED BY: MAC		P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report





MANOR GROVE
BARNSLEY
SOUTH YORKSHIRE
S71 4LL



Date of enquiry:	12 June 2017
Date enquiry received:	12 June 2017
Issue date:	12 June 2017
Our reference:	51001485229001
Your reference:	GS-3977787

CON29M Non-Residential Mining Report

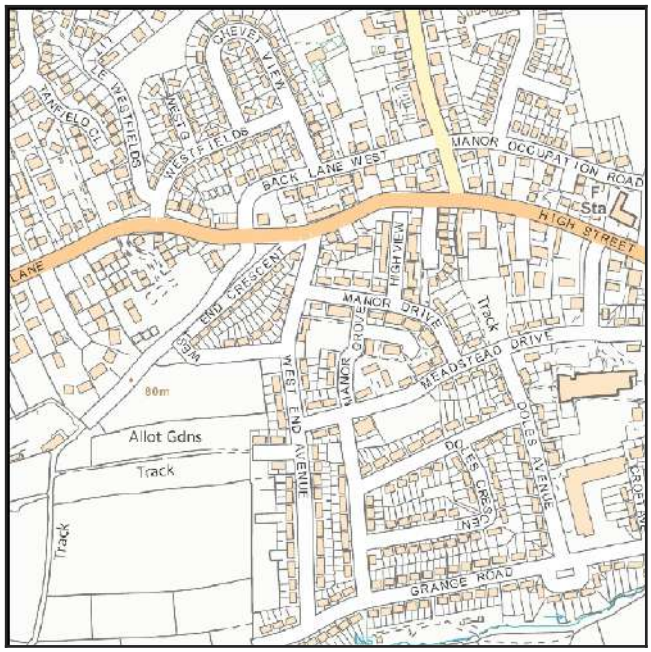
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

GROUNDSURE LIMITED

Enquiry address

MANOR GROVE, BARNSLEY, SOUTH YORKSHIRE, S71 4LL



Approximate position of property

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/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 6 seams of coal at 270m to 560m depth, and last worked in 1980.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

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

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

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

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

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

8. Future opencast coal mining
There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

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

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

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

10. Mine gas
The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining
The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support
The property is in an area where notices to withdraw support were given in 1947, 1977.

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

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

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In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

A site investigation was carried out in March 2013 by Solmek. 12 Yarm Road, Stockton on Tees, TS18 3NA on behalf of Bernard Williams Associates.

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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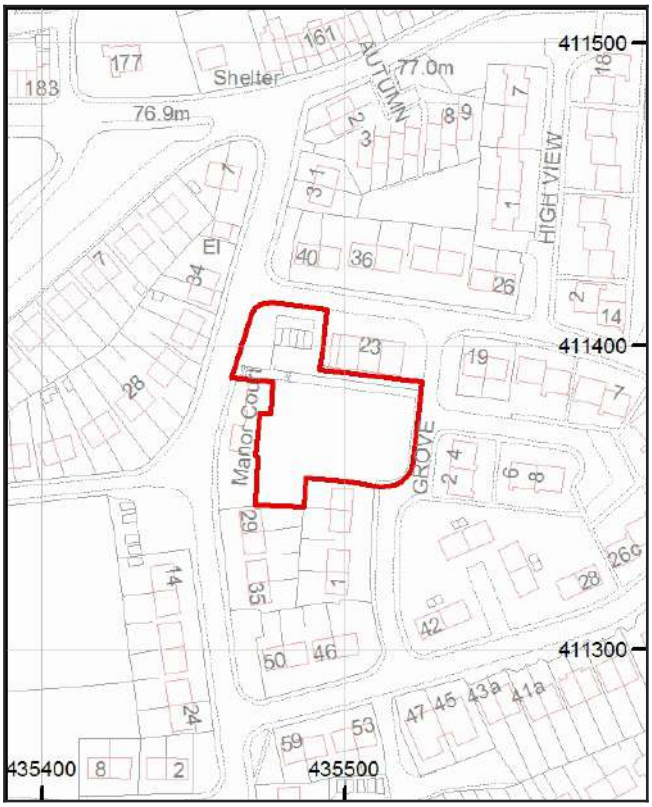
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



Map data

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APPENDIX C:

HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – WEST END AVENUE – 23-24-18-1-6006/DSR1 – JUNE 2017

Architecture
Surveying
Building Services Engineering
Engineering
Strategic Development & Consultancy



Land off West End Avenue Barnsley

Preliminary Land Contamination and Geotechnical Risk Assessment

On behalf of Barnsley Council

Report 23-24-18-1-6006/DSR1
June 2017

Report Issue Record

Project No.:	23-24-18-1-6006
Project Title:	Land off West End Avenue
Site Location:	Royston, Barnsley
Client:	Barnsley Council
Report Title:	Preliminary Land Contamination and Geotechnical Risk Assessment
Issue Date:	30 June 2017
Report No.:	23-24-18-1-6006/DSR1
Revision:	-

	Written	Reviewed and Approved
Name	**Catherine Riley** BEng, BSc, CEng, CEnv, MCIWEM	**Craig Roberts** BSc, FIEnvSc, CEnv
Signature		
Position	Senior Geo-Environmental Engineer	Technical Director

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1 Introduction 1
2 Site Location 3
3 Site Description 4
4 Environmental Setting 8
5 Geotechnical Assessment 12
6 Contamination Risk Assessment 15
7 Conclusions and Recommendations 23
8 Limitations and Uncertainties 26
9 General Notes 27

Appendices

A Potential Layout
B Historic Maps
C Groundsure EnviroInsight Report
D Groundsure GeoInsight Report
E Coal Authority and SYMAS Reports

Executive Summary

SITE INFORMATION	
Client	Barnsley Council.
Site	Land off West End Avenue.
Location	Royston, Barnsley, S71 4LN. NGR 435437, 411343.
Approximate area	<0.1Ha
Topography	The site is topographically flat lying at an elevation of approximately 75m OD.
Current land use	Private garages.
Proposed development	Low rise residential. Demolish existing garages and replaced with a pair of semi detached bungalows.

SITE SETTING	
Geology	Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures.
Radon	No radon protective measures are required.
Hydrogeology	Secondary A Aquifer. The site does not lies within a source protection zone.
Hydrology	An unnamed tertiary river lies circa 310m south.
Landfill sites	No landfills located within 500m of the site.
History	The site was undeveloped agricultural land until the 1970s, when the existing garages were constructed.
Previous site investigations	Hamson Barron Smith have not been made aware of any previous investigations which may have been undertaken at this site.
Anticipated ground conditions	Medium dense sands derived from weathering of the sandstone bedrock. Sandstone bedrock at shallow depth.

GEOTECHNICAL	
Foundations	Shallow spread foundations should be suitable. Bearing capacity to be determined from site investigation, but are likely to be sufficient for conventional low rise structures.
Shrinkable soils	Soils are likely to be non shrinkable.
Buried concrete	Significant concrete protection measures unlikely to be required.
Floor slabs	Ground bearing floor slab likely to be suitable.
Slope stability	Site and adjacent area are level and therefore no risks.
Pavement	CBR values likely to be adequate for road and car park construction.
Soakaways	Underlying geology likely to be suitable for soakaway drainage, subject to full scale testing to confirm and calculate infiltration rates.
Natural cavities	None expected.
Mining	The Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site. The SYAMS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore the likelihood if historical ground workings being present is considered to be low.

CONTAMINATION	
Human health	Potential localised localises hydrocarbons and solvents associated with car maintenance and potential asbestos containing roofing sheets have been identified. If present, it is considered that these may pose a low to medium risk to identified human receptors.
Controlled waters	Potential localised sources of hydrocarbons and solvents associated with car maintenance pose low to medium risk to the underlying a Secondary A Aquifer. Risks to the surface water, are given the distance from the site considered low.
Gas protection	Risks from ground gases are considered to be low. No radon protection measures required.

1 Introduction

In May 2017, Hamson Barron Smith (HBS) was commissioned by Barnsley Council to undertake a Preliminary Land Contamination and Geotechnical Risk Assessment at Land off West End Avenue, Royston, Barnsley for the proposed redevelopment of the site.

It is understood that the site is being considered for residential redevelopment. A provisional development sketch has been provided by Barnsley Metropolitan Borough Council and is presented in Appendix A.

The site comprises of four private garages associated with nearby residential properties. The location of the site is shown on Figure 1.

1.1 Project Requirements

The overall objectives of this Phase I assessment are to determine the potential risks from contamination and to identify potential geotechnical risks and constraints.

The objectives of the Phase I report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Review historical and recent land uses to assess the potential for contamination to be present from past and current land-use.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities that may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks, including mining.
- Develop a ground model for the site.

1.2 Information Sources

During the production of this report the following sources have been reviewed:

- An EnviroInsight Report prepared by Groundsure (Report Number GS3977677 dated 12th June 2017).

- A GeoInsight Report prepared by Groundsure (Report Number GS3977678 dated 12th June 2017
- A CON29M Non-Residential Mining Report prepared by the Coal Authority (Report Number 51001479605001 dated 12th June 2017).
- A Mineral Report prepared by South Yorkshire Mining Advisory Service (SYMAS) (Report Number M230/8 dated 18th November 2014)
- Historic Ordnance Survey maps.
- British Geological Survey maps.
- British Geological Survey borehole records.
- Environment Agency landfill records.
- Environment Agency groundwater data.

1.3 Previous Investigations

HBS has not been made aware of any previous investigations which may have been undertaken at this site.

2 Site Location

Address: Land off West End Avenue, Royston, Barnsley.

Post Code: S71 4LN.

National Grid Reference: 435437, 411343.

The site location is shown on Figure 1 and a more detailed plan on Figure 2.

Full details of the site's features and land use are presented in Section 3.

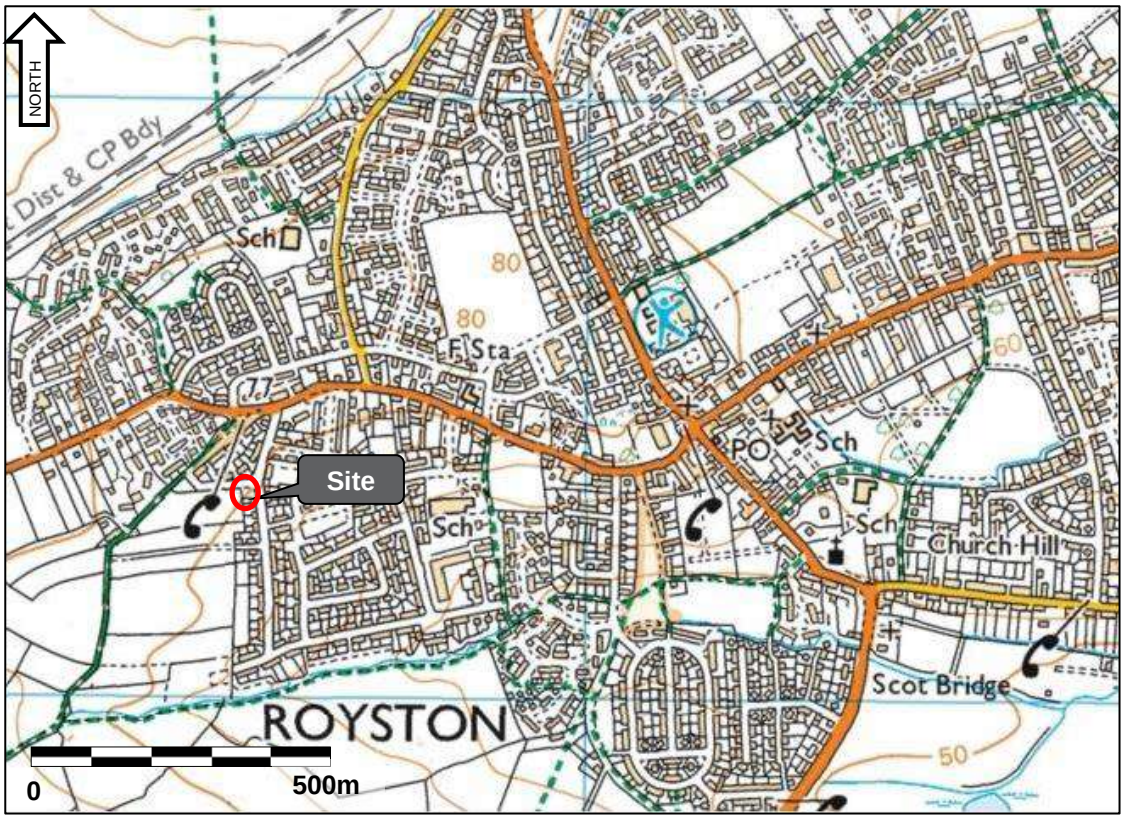


Figure 1 Site location plan

3 Site Description

The site consists of a row of four private garages to the west of West End Avenue in the village of Royston. The site occupies an area of <0.1Ha and the site is topographically level with an elevation of around 75m OD.

A site walkover survey was undertaken on 13th June 2017 by HBS. The site consists of a row of four garages to the west of the site with a small tarmacked track running from the north of the site in front of the garages. The remainder of the site comprises an area of grass.

3.1 Adjacent land Use

The site is bounded to the north and south by residential premises. To the west by Allotment gardens and to the east by West End Avenue with Manor Court a Berneslai Homes community building, and residential premises beyond.

Figure 2 shows the site setting.

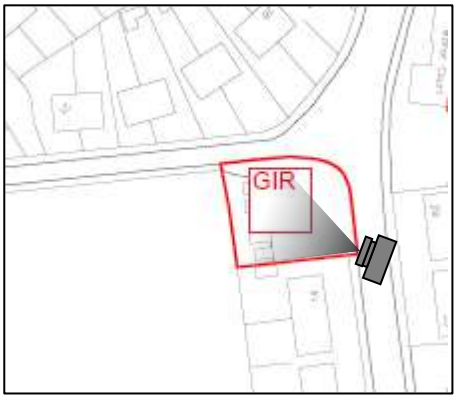


Figure 2 Site layout

3.2 Photographs

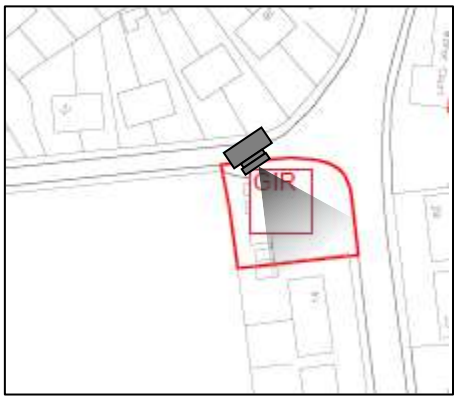


Photograph 1 The site from West End Avenue, looking north west.



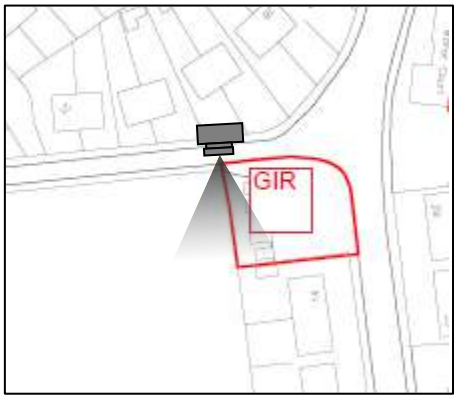


Photograph 2 The site, looking south east.





Photograph 3 The rear of the garages, looking south.



4 Environmental Setting

4.1 Geology

The 1:50,000 scale British Geological Survey (BGS) geological mapping indicates the site to be underlain by the Mexborough Rock a sandstone flag of the Pennine Middle Coal Measures, which outcrop immediately south of the site. No superficial deposits are anticipated beneath the site.

The Pennine Middle Coal Measures are described by the BGS as "*Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit*".

There are no BGS borehole records in the vicinity of the site.

4.2 Soil Geochemistry

BGS estimated soil geochemistry information is included as part of the Groundsure GeoInsight report. The BGS digital estimated soil chemistry data indicates the estimated geometric mean concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Nickel and Lead in topsoil derived by spatial interpolation of the point source soil chemistry data. The original samples were collected and analysed as part of the BGS Geochemical Baseline Survey of the Environment (G-BASE) project.

Table 1 summarises the typical estimated concentrations of each determinant in topsoil in the locality of the site.

Table 1: Summary of BGS Estimated Soil Geochemistry

Determinant	Concentration Range (mg/kg)
Arsenic	15 – 25
Cadmium	<1.8
Chromium	60 – 90
Lead	<100
Nickel	15 – 30

4.3 Hydrogeology

The Environment Agency classifies the Pennine Middle Coal Measures at the site to be a Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater abstractions within 2km.

This would suggest that groundwater would be of low sensitivity to any potential sources of on-site contamination.

4.4 Hydrology

The nearest surface water is a unnamed tertiary river which lies circa 310m south at its nearest point. The distance of the site from the surface water feature would suggest that surface water is considered to be of low sensitivity to any potential sources of contamination.

4.5 Landfill Sites

There are no recorded current or historical landfill sites within 500m.

4.6 Radon

The Groundsure radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

4.7 Sensitive Land Uses and Designated Areas

The site is in a Nitrate Vulnerable Zone. Notton Wood a Local Nature Reserve and area of Ancient and Semi Natural Woodland lies circa 885m west.

4.8 Land Use History

The historical land uses of the site and its surrounding area have been established from superseded editions of Ordnance Survey maps and are detailed in Table 2. Copies of the maps are included in Appendix B.

Table 2: Summary of Historical Maps

Date	On Site	Offsite
1854	The site is a part of a larger undeveloped agricultural field.	The general surrounding land use is agricultural with residential properties in the village of Royston present c. 110m north. A pond marked “brick pond” lies c.90m north east.
1891-1893	No significant changes are evident.	No significant changes are evident.
1904-1906	No significant changes are evident.	A quarry is present c.600m east and a smithy c.650m south east.
1918	No significant changes are evident.	No significant changes are evident
1930-1938	No significant changes are evident.	The village of Royston has expanded. The land to the south east of the site is marked as allotment gardens. The quarry and smithy are no longer marked. The pond is no longer marked and development has occurred with a new estate present immediately north of the site.
1948-1951	No significant changes are evident.	No significant changes are evident
1960-1966	No significant changes are evident.	Further residential development has occurred in the surroundings.
1970-1978	By 1976 the garages are present on the western edge of the site.	By 1970 the housing estate to the east and south has been constructed.
1983	No significant changes are evident.	No significant changes are evident.
1990-1993	No significant changes are evident.	No significant changes are evident.
2002	No significant changes are evident.	No significant changes are evident.
2010	No significant changes are evident.	No significant changes are evident.
2014	No significant changes are evident.	No significant changes are evident.

4.8.1 Summary of Development History

On site

The site was undeveloped agricultural land until the 1970s, when the existing garages were constructed.

Off Site

The surrounding land use was typically undeveloped farmland becoming a mixture of agricultural land and residential properties. A former pond was located 75m north west of the site. This pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The nature of material used to backfill the pond is not known.

4.9 Statutory Authority Records

A review of public registers contained within the Groundsure EnviroInsight report has been undertaken. These entries relate to trade directories, pollution control registers, hazardous sites, enforcement notices etc. None of the entries are considered to be of relevance to the site, for full details of all entries, reference should be made to the EnviroInsight report in Appendix C.

5 Geotechnical Assessment

The published geological information (Section 4.1) indicates that the site is likely to be underlain by clayey sands or sandy clays of weathered sandstone bedrock of the Pennine Middle Coal Measures.

An assessment of potential geotechnical risks based on the information from the Groundsure GeoInsight Report and available geological information is presented in the following sections. The risks are summarised in Table 4. The Report is reproduced in Appendix D.

5.1 Deep Made Ground

It is likely that some Made Ground would be present, resulting from the current development of the site (series of garages). Deep Made Ground resulting from infilling or significant raising of levels is considered unlikely however.

5.2 Buried Structures

Foundations associated with the current development of the site will be present.

5.3 Compressible Soils

The Groundsure GeoInsight report states that the Compressible Ground risk at the site is “negligible”. Based on the expected geology, compressible soils are not anticipated.

5.4 Shrinking / Swelling Clay

The Groundsure GeoInsight report states that the Shrinking or Swelling Clay risk at the site is “negligible” to “very low”. This is based on the anticipated Pennine Middle Coal Measures. However, the near surface soils may comprise clays derived from weathering of the bedrock and therefore may potentially be shrinkable.

5.5 Collapsible soils

The Groundsure GeoInsight report states that the Collapsible Ground risk at the site is “very low”. Based on the bedrock anticipated ground conditions, collapsible soils are not expected.

5.6 Aggressive Ground Conditions for Concrete

Based on the published geology, the anticipated soils are not expected to contain significantly elevated concentrations of soluble sulphates or pyritic materials which may oxidise to form soluble sulphates.

5.7 Running Sands / Excavation Instability

The Groundsure GeoInsight report states that the Running Sand risk at the site is "negligible". Based on the anticipated ground conditions, running sands are not expected.

5.8 Groundwater

No evidence of a high water table (such as ponding water, hydrophilic plants, soft ground etc.) was noted during the site walkover.

5.9 Slope Stability

The Groundsure GeoInsight report states that the Landslide risk at the site is "Very low".

The site is topographically flat. Provided no significant alterations to the site's topography are made no issues with stability are anticipated. Any proposed slopes or temporary cutting for retaining systems should be carefully assessed however.

5.10 Solution Features / Natural Cavities

The site is expected to be underlain by a sandstone flag of the Pennine Middle Coal Measures which is not prone to dissolution.

The Groundsure GeoInsight report states that the Ground Dissolution risk at the site is "negligible" and no solution features are recorded within 1km.

5.11 Underground Mining

The GeoInsight report states that the site is within an area affected by coal mining. A Coal Authority Mining Report was obtained by HBS, this report confirmed:

- The property is in a surface areas that could be affected by underground mining in six seams of coal at 270m to 560m depth, and last worked in 1979. Any movement in the ground due to coal mining activity should have stopped.
- There are no known mine entries on or within 20m of the site.
- 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.
- The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.
- The Coal Authority has no record of a mine gas emission requiring action.

The SYMAS Report indicates that the Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site. From Manor Grove eastwards, the seam outcrop has been proven during past investigation to deviate further southward from the conjectured line on published geology maps.

The report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore the likelihood if historical ground workings being present is considered to be low.

The report confirms that deep mining has occurred in the area, however it concludes that the site can be regarded as stable from deep mine workings.

The Coal Authority and SYMAS Reports are presented in Appendix E.

6 Contamination Risk Assessment

6.1 Legislative Background

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

Part 2A

Part 2A provides a regulatory regime for the identification and remediation of contaminated land and is the primary mechanism in the contaminated land regime. Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

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

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

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

Part 2A is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'.

In applying the definition of Contaminated Land, Part 2A states that 'the Local Authority must:

- Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
- Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as 'contaminated land'.

NPPF

NPPF States that 'to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.'

Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

NPPF also states that after any required remediation, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

6.2 Preliminary Conceptual Site Model

Following a review of the desk based geo-environmental information on the site and a site reconnaissance, a preliminary CSM has been formulated to identify potential

sources of contamination, likely receptors and potential pathways on and in the immediate vicinity of the site.

It should be noted that some uncertainties exist due to the limited site specific data available. However, potential contaminants and receptors have been identified based on this Phase 1 desk study review. Pathways have been established on reasonable scientific knowledge of the behaviour of the contaminants in the ground.

It should also be noted that because the assessment is based on documentary evidence contaminants may be identified, which in practice are not present and contaminants may be present which have not been identified.

The guidance provided in CLR11 indicates the CSM should identify those contaminants, pathways and receptors which are 'likely' to represent an 'unacceptable' risk either to human health or the surrounding environment.

6.3 Potential Contaminant Sources

6.3.1 Onsite

No significant areas of potential concern were identified from the site walkover. There are a number of minor features that may require specific investigation however:

- Suspected asbestos corrugated sheets on garage roofs.
- Potential for waste oils and fuels from vehicle repair / leaks to enter drainage system or soils.

The site contains four garages. These would have been used for storage of motor vehicles as well as allowed servicing and repair of vehicles. The latter could have entailed the use of lubricating oils, coolants, hydraulic fluids, paints and solvents.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system.

Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils should be considered to be a potential localised sources of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system. It must be noted that there is no evidence to suggest that this may have occurred.

The quantities of liquids that may have been released are likely to be small (in comparison to prolonged leakage from large storage tanks for example) and any impacted soils are likely to exist as isolated hotspots, rather than widespread gross contamination.

6.3.2 Off site

The surrounding land use was principally farmland becoming mix of farmland, allotments and residential properties. A pond was recorded in the early 1900s approximately 75m north.

6.3.3 Infilled Pond

A pond is shown on the early historical mapping approximately 75m north of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled.

The materials used to fill the pond are not known, infill materials may have the potential to act as a source of soil and or groundwater contamination.

If the materials used to backfill the site contain putrescible materials then there is the potential for the filled pit to act as a source of landfill gas. Although there is the potential for the landfilling of materials to act as source of gas it is considered given the size of the feature and the date of filling that it is unlikely to represent significant on-going source of landfill gas.

6.4 Landfill gas

No current or historical landfills are known to exist within 500m of the site. No organic soils are anticipated to lie beneath the site. It is noted that an infilled pond is locate approximately 75m north of the site. The pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The materials used to fill the pond are not known, Given the size of the feature, the date of filling and the distance from the site it is

considered unlikely that the infilled pond will represent a significant on going source of landfill gases. Consequently, the risks to end users from explosive or asphyxiating gases is considered low.

No other sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development. However, as the site lies within an area where coal resources are present, it is recommended that a minimum of one round of gas monitoring is undertaken as part of the site investigation to validate this assumption.

6.4.1 Radon

The Groundsure GeoInsight report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between 1% and 3%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

6.5 Receptors

It is understood that the site will be redeveloped with low rise residential properties. Future Residents are assumed therefore to occupy the site full time and may be exposed directly to soils within the site. Construction workers would be directly exposed to soils, however this would only be short term.

- Future Residents
- Construction workers
- Construction materials (including services)
- Groundwater – Secondary A Aquifer.
- Surface Water - nearby secondary River 310m south to the south
- Flora and fauna.

6.6 Preliminary Risk Assessment

A preliminary risk assessment was undertaken based on a qualitative assessment of the likely presence of a pollutant linkage. A pollutant linkage is the relationship between a source (or contaminant), a pathway and a target (or receptor). Unless all three elements of a pollutant linkage are present, a significant risk is not considered to exist. The approach adopted is to screen each site based on assigning a simple low, medium or high category.

The preliminary risk assessment is shown in Table 3 overleaf.

Table 3 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Localised sources of hydrocarbons, solvents Made Ground e.g. metals, hydrocarbons, polycyclic aromatic hydrocarbons and asbestos.	Human Health – future residents.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Hydrocarbon tainting of potable water supply pipes.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Controlled Waters – No surface water lies within 250m of the site.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Possible - if fuels or solvents discharged but no surface water lies within 250m of the site.	Probability: Possible Consequence: Medium Magnitude: **Low Risk**
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Underlying geology unlikely to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Ground gases.	Human Health – future residents.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: High Magnitude: **Low Risk**
	Flora	Displacement of oxygen from root systems	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Radon.	Human Health – future residents.	Permeation through ground floor.	Unlikely - No protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

7 Conclusions and Recommendations

7.1 Geotechnical Risks

The potential for geotechnical hazards are summarised in Table 4.

Table 4: Summary of Geotechnical Hazards.

Potential Geological Hazard	Impact on proposed development	Likelihood of presence
Deep Made Ground	High	Unlikely
Buried structures	Moderate	Possible
Compressible ground	Moderate	Unlikely
Shrinking / swelling clay	Moderate	Unlikely
Collapsible ground	High	Unlikely
Aggressive ground conditions for concrete	Low	Unlikely
Running sands / excavation instability	Moderate	Unlikely
High water table / groundwater inflows.	High	Unlikely
Slope stability	Moderate	Unlikely
Underground mining	High	Unlikely
Ground dissolution / natural cavities	High	Unlikely

Based on the anticipated ground conditions, conventional spread foundations should be suitable for the proposed development.

The near surface soils are not anticipated to comprise significant thicknesses of shrinkable soils and foundations are therefore unlikely to require deepening in the vicinity of trees. A ground bearing ground floor slab may be suitable.

The soils may be sufficiently permeable to allow soakaway drainage to be used. The Local Authority are likely to require full scale testing in accordance with BRE 365 (2016) obtain infiltration rates for design.

7.2 Land Contamination

The site contains a block of four private garages. These would have been used for storage of motor vehicles as well as allowed servicing and repair of vehicles. The latter would have entailed the use of lubricating oils, coolants, hydraulic fluids, paints and

solvents. These products must therefore be considered to be potential localised sources of contamination.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils must be considered to be a potential source of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system.

The potential risks are based on the worst case assumption that the sources may have caused fuels, oils and solvents to ingress into the underlying soils. It must be noted that there is no evidence to suggest that this may have occurred. The actual risks to the receptors would need to be determined by undertaking an intrusive ground investigation and laboratory analysis.

The scope of such an investigation should be discussed and agreed with the local authority.

7.3 Ground Gas

7.3.1 Landfill gas

No sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development.

7.3.2 Radon

No radon protective measures are required in the construction of new developments or extensions.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

7.4 Coal Mining

The mining assessment has confirmed the site is underlain by deep mining, which was last undertaken in 1979. Any movement in the ground due to coal mining activity should have stopped therefore the site should be stable with respect of deep mine workings. However, the site is in an area where shallow coal is anticipated which may have been worked sometime in the past.

Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site and therefore may be present at shallow depth beneath the site.

The SYMAS report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore, the likelihood if historical ground workings being present is considered to be low.

7.5 Summary

The aim of this report was to assess the potential geotechnical and geo-environmental issues at the proposed development site. Only limited potential sources of contamination have been identified from the Preliminary Risk Assessment. To enable the knowledge of the contaminating potential and land quality of this site to be developed further a Phase II Site Investigation would be required.

In general, where any new building is proposed an intrusive investigation should be carried out so that geotechnical parameters and sub-surface ground conditions can be determined to assist in the design of the structure. Any potential abnormal geotechnical risks identified in this report should be properly investigated so that the actual level of risk and any remedial measures required can be determined. While the provision of a detailed specification for any Phase II investigation was not part of the Client's brief for this report, it should be noted that any intrusive investigation should address any specific contamination and geotechnical risks highlighted in this report. Where any potential sources of contamination have been identified these should be thoroughly investigated to determine actual risks to any identified receptors. Even where no potential sources of contamination have been identified, it would be prudent to undertake confirmatory testing of soils during any geotechnical investigation.

8 Limitations and Uncertainties

8.1 General

It should be noted that the levels of risk identified in this report are perceived risks based on the information reviewed. No physical investigation or testing has been carried out; actual risks can only be assessed following a physical investigation of the site. Further work, including physical investigation, laboratory testing and ground gas monitoring may be required by the appropriate regulators to confirm actual conditions.

This report has been prepared by Hamson Barron Smith with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions.

The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Hamson Barron Smith reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Hamson Barron Smith.

Hamson Barron Smith disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

8.2 Site Specific

No access was available to the garages.

9 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Hamson Barron Smith Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Hamson Barron Smith Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Hamson Barron Smith Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the conditions encountered in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the assessment, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either

visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

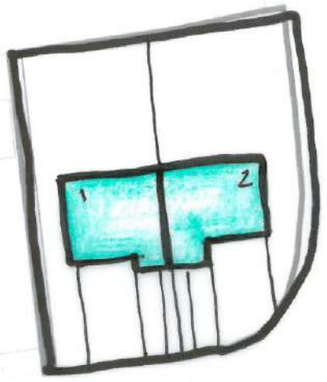
Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

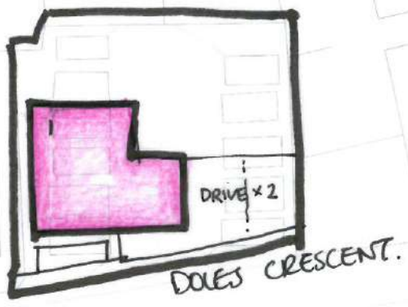
The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

Potential Layout





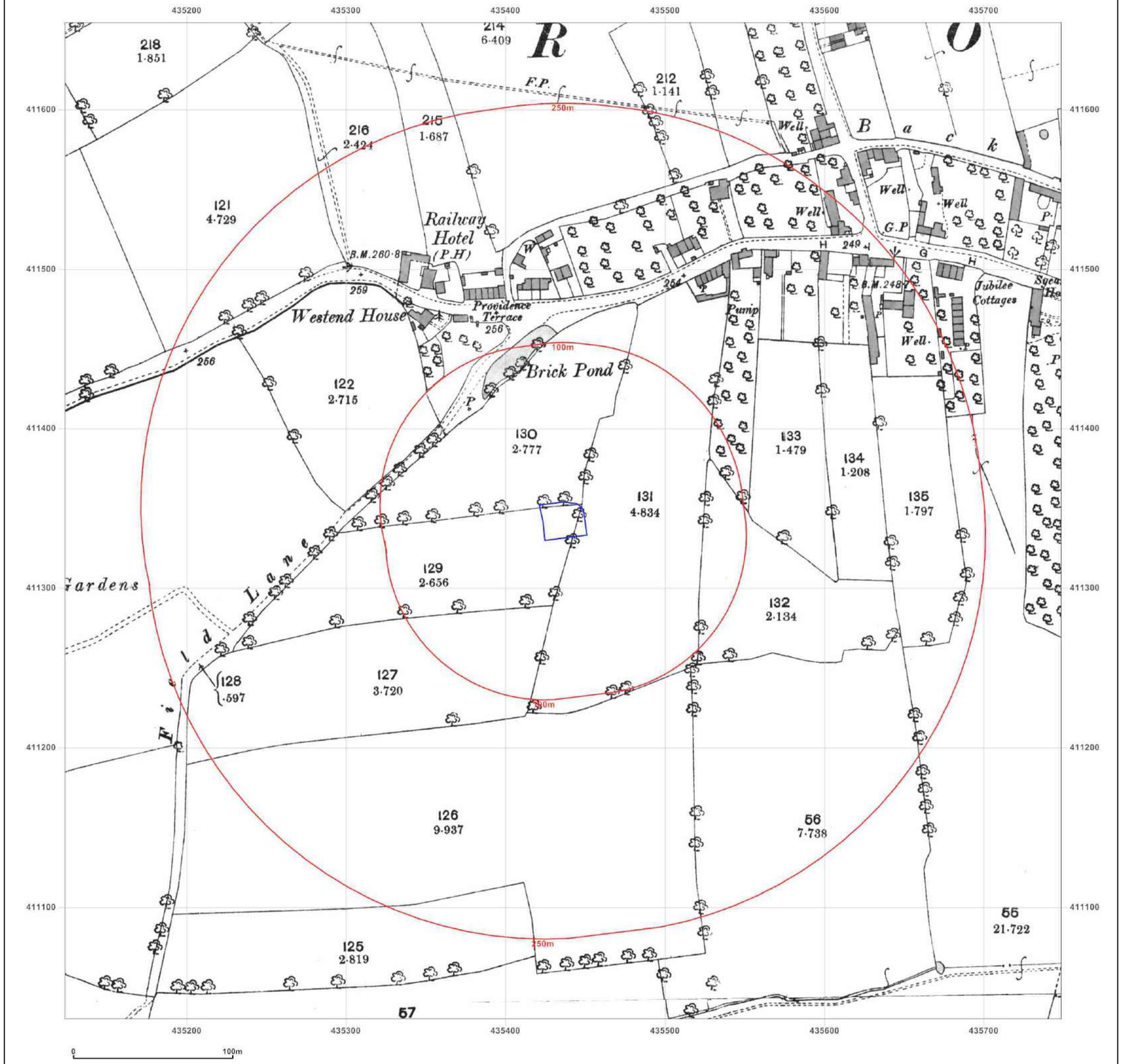


3/4 Bed detached Bungalow

2 Bed/3p Semi detached Bungalows.

Appendix B

Historic Maps



Groundsure INSIGHTS

Site Details:

WEST END AVENUE,
BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

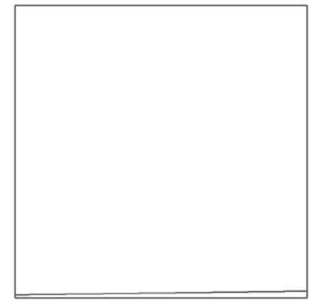
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Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A



Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A

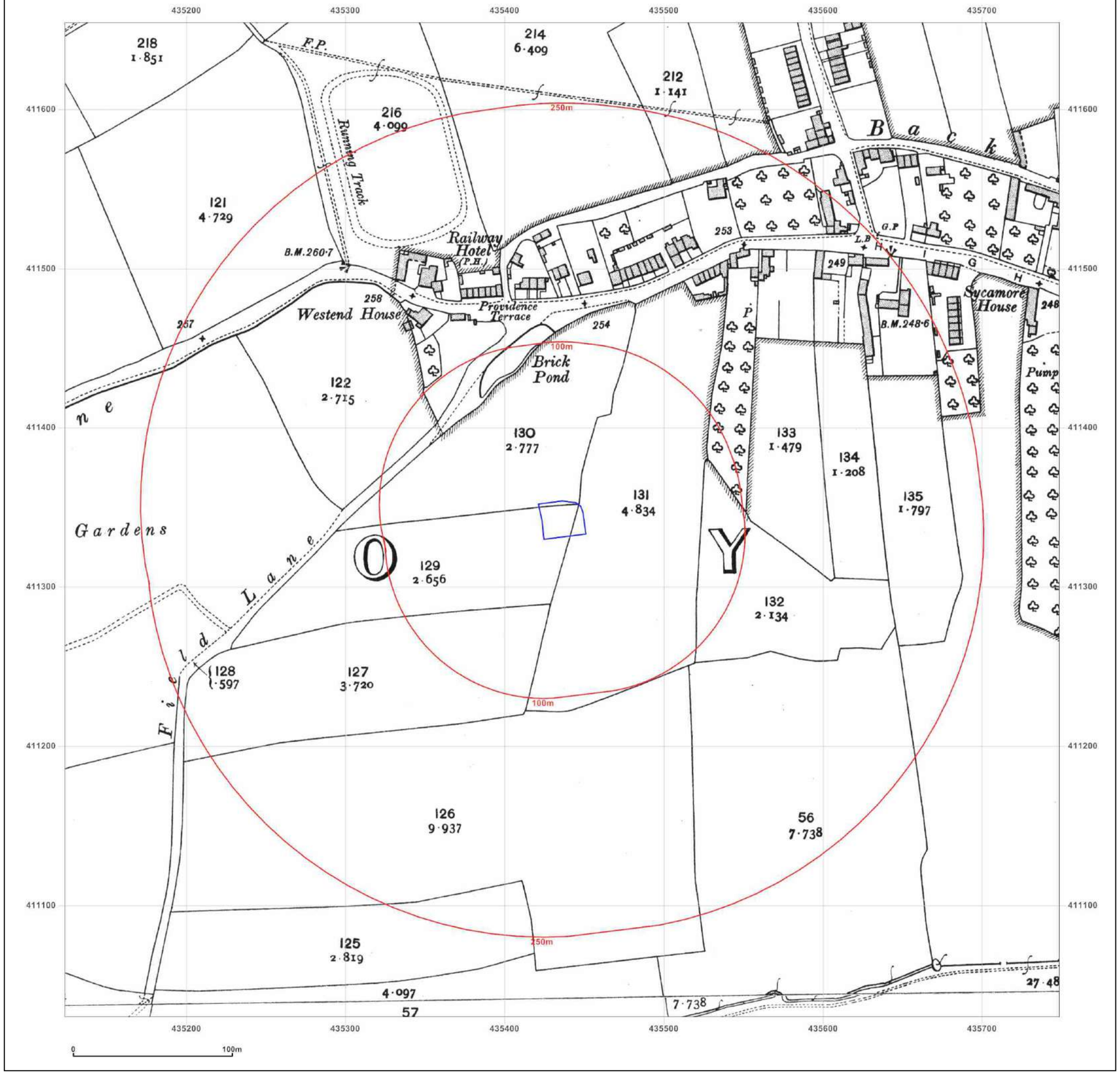
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Production date: 12 June 2017

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Site Details:

WEST END AVENUE,
BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

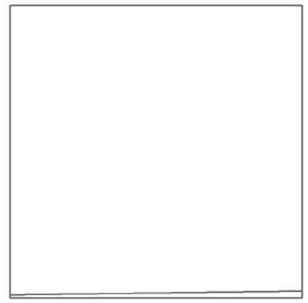
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Printed at: 1:2,500

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Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

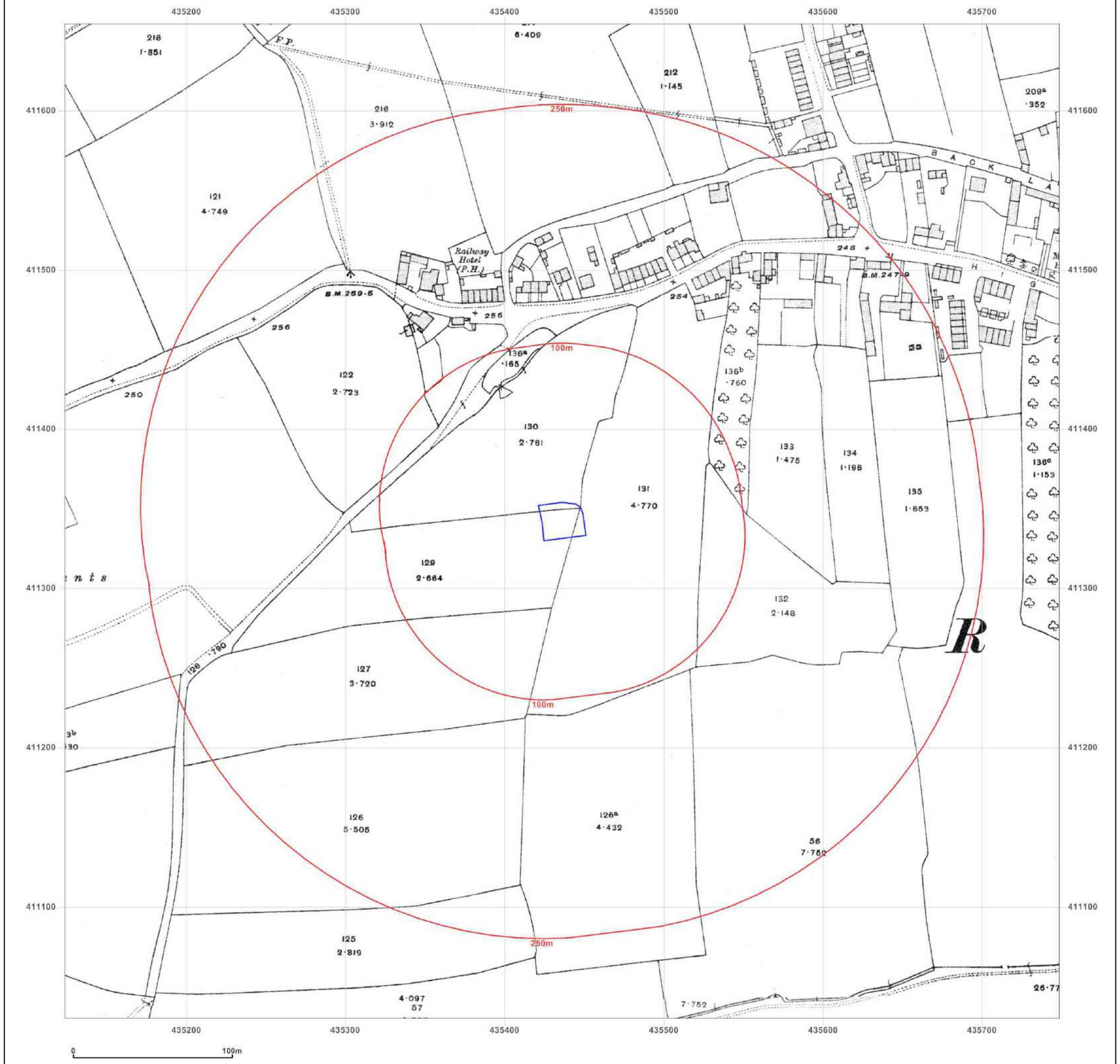
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Site Details:

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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

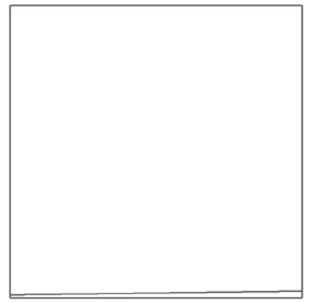
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Surveyed 1891
Revised 1914
Edition 1918
Copyright N/A
Levelled 1915



Surveyed 1891
Revised 1914
Edition 1918
Copyright N/A
Levelled 1915

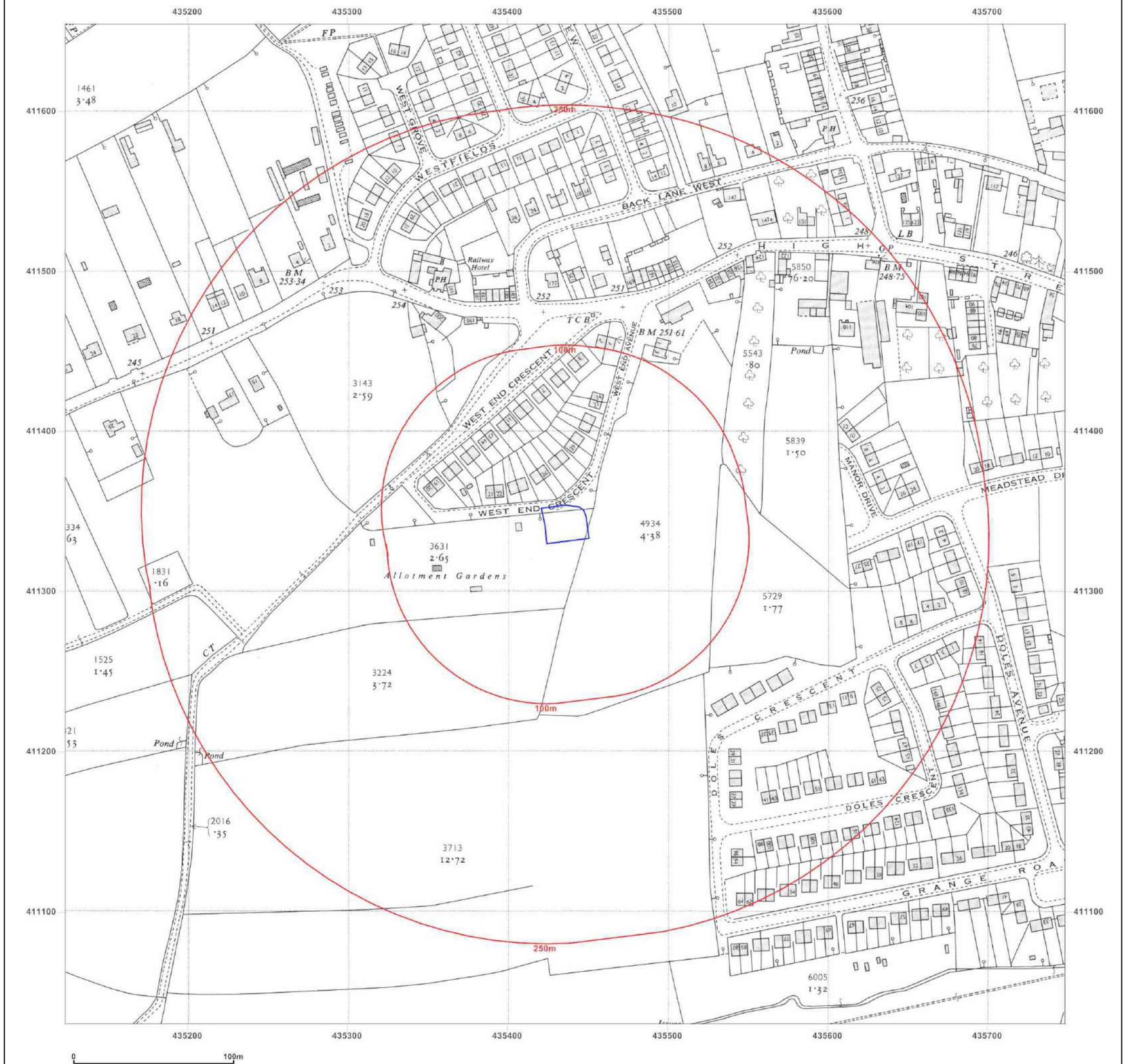
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Groundsure INSIGHTS

Site Details:

WEST END AVENUE,
BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1960**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
Levelled 1959

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Groundsure INSIGHTS

Site Details:

WEST END AVENUE,
BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1970
Revised 1970
Edition N/A
Copyright 1970
Levelled 1964

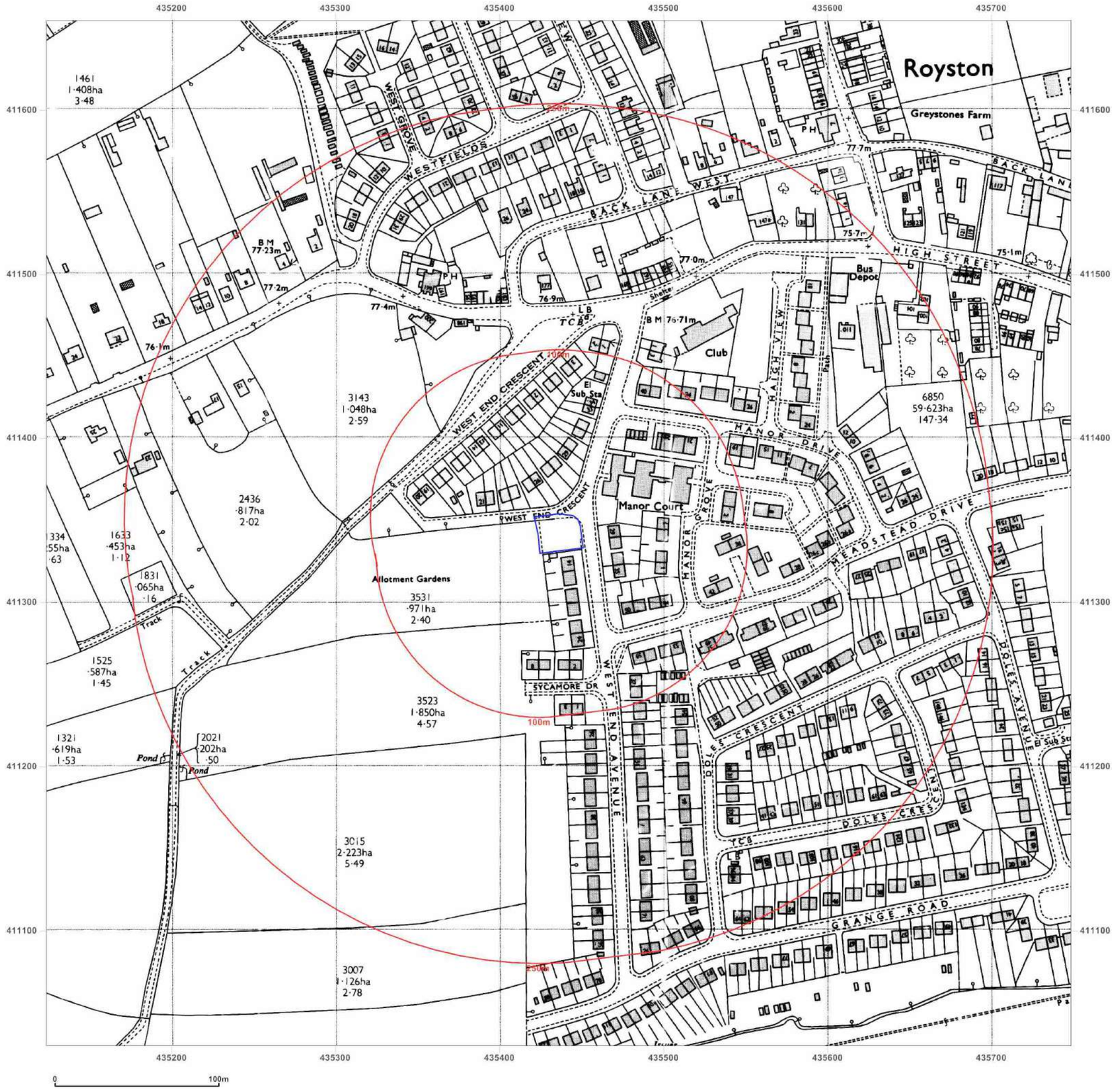
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Groundsure INSIGHTS

Site Details:

WEST END AVENUE,
BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1970**

Scale: 1:2,500

Printed at: 1:2,500

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

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Groundsure INSIGHTS

Site Details:

WEST END AVENUE,
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1976**

Scale: 1:1,250

Printed at: 1:2,000

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Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

Surveyed 1975
Revised 1975
Edition N/A
Copyright 1976
Levelled 1964

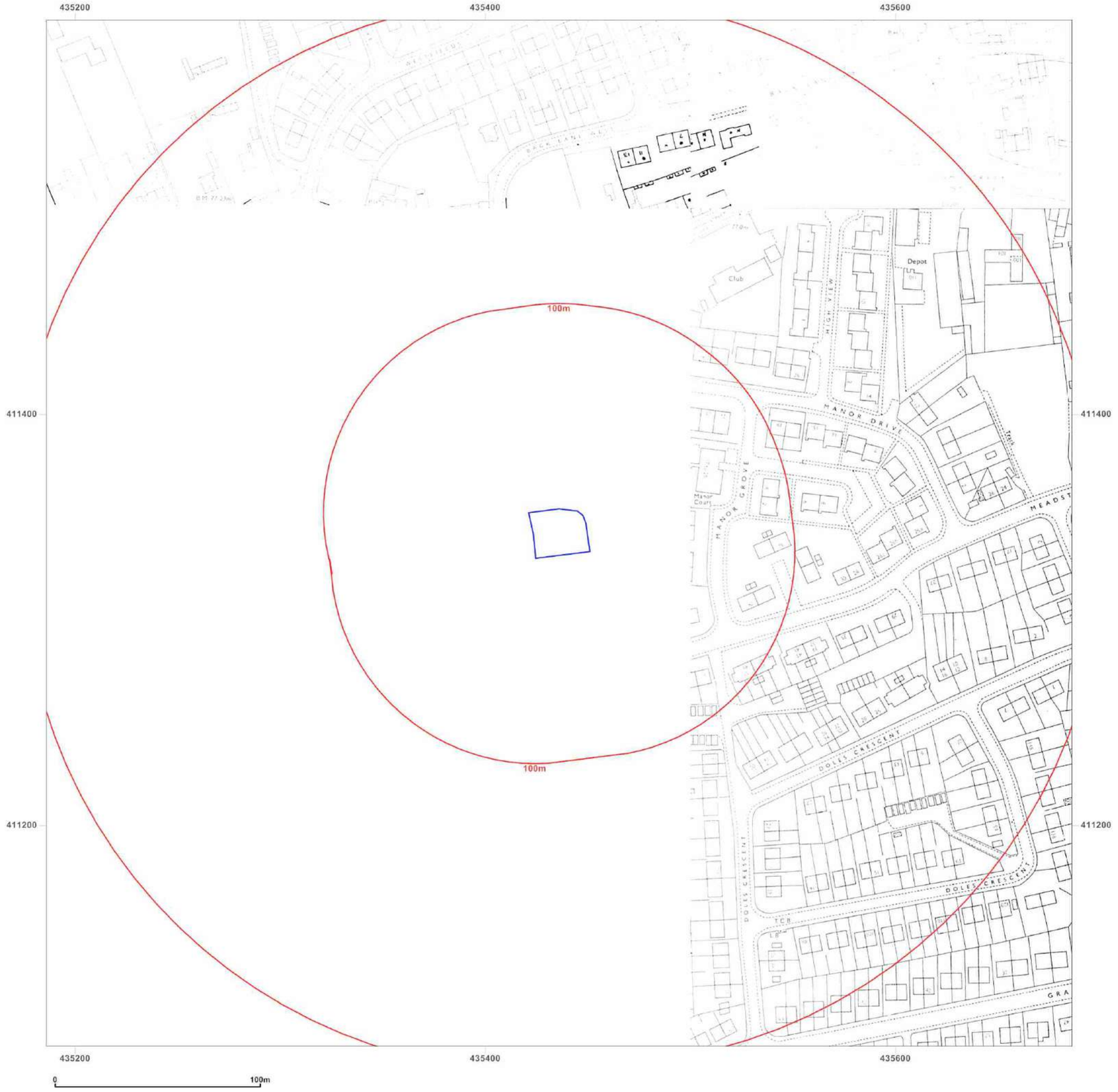
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid
Map date: **1978-1983**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1981
Levelled 1964

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

Surveyed 1964
Revised 1983
Edition N/A
Copyright 1983
Levelled 1964

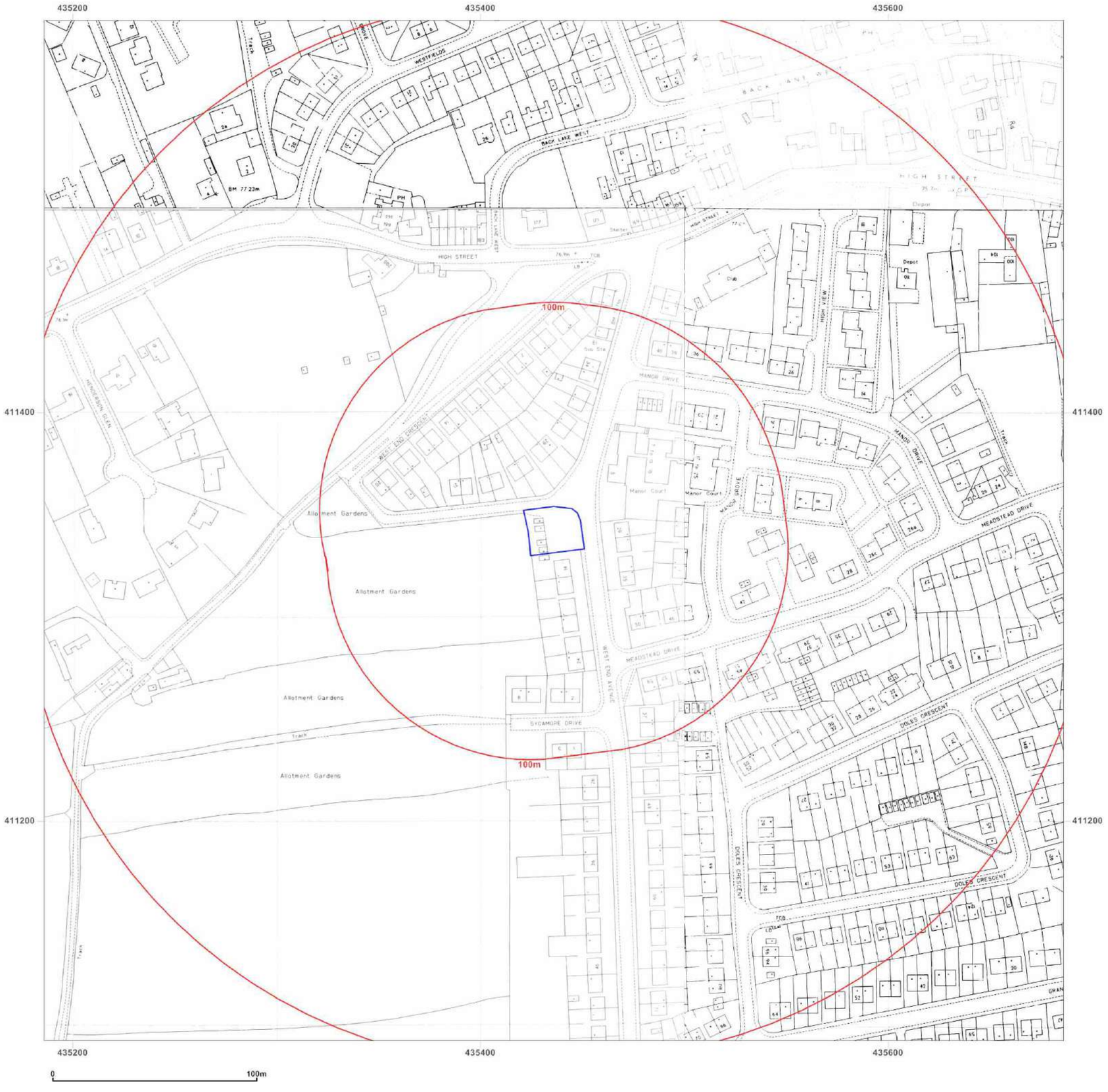
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid
Map date: **1988-1993**
Scale: 1:1,250
Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1988
Levelled N/A

Surveyed 1993
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Edition N/A
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Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A

Surveyed 1993
Revised N/A
Edition N/A
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Levelled N/A

Surveyed N/A
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Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1993**

Scale: 1:1,250

Printed at: 1:2,000

N
W E
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Surveyed 1993
Revised 1993
Edition N/A
Copyright 1993
Levelled N/A

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

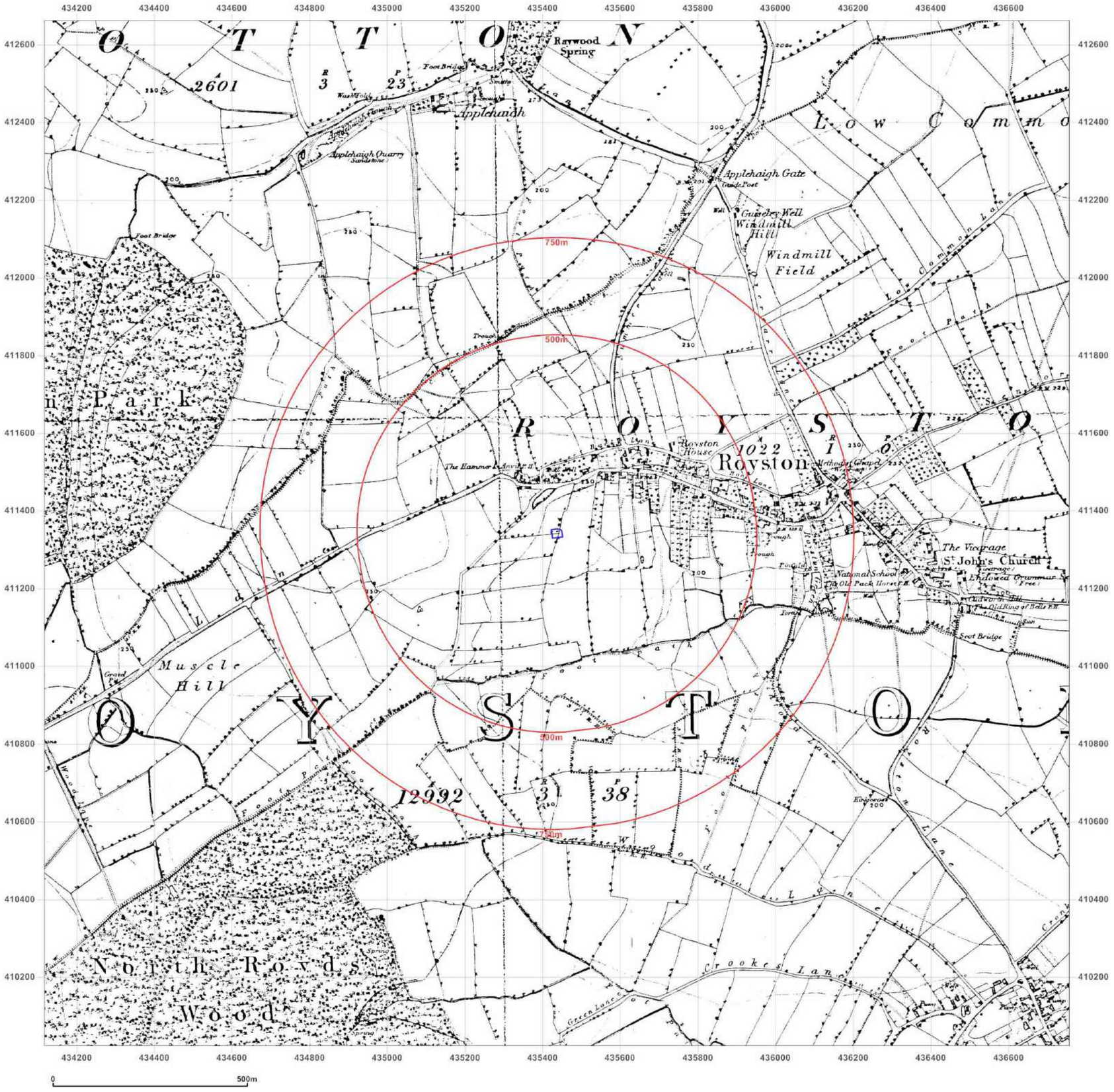
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1854**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

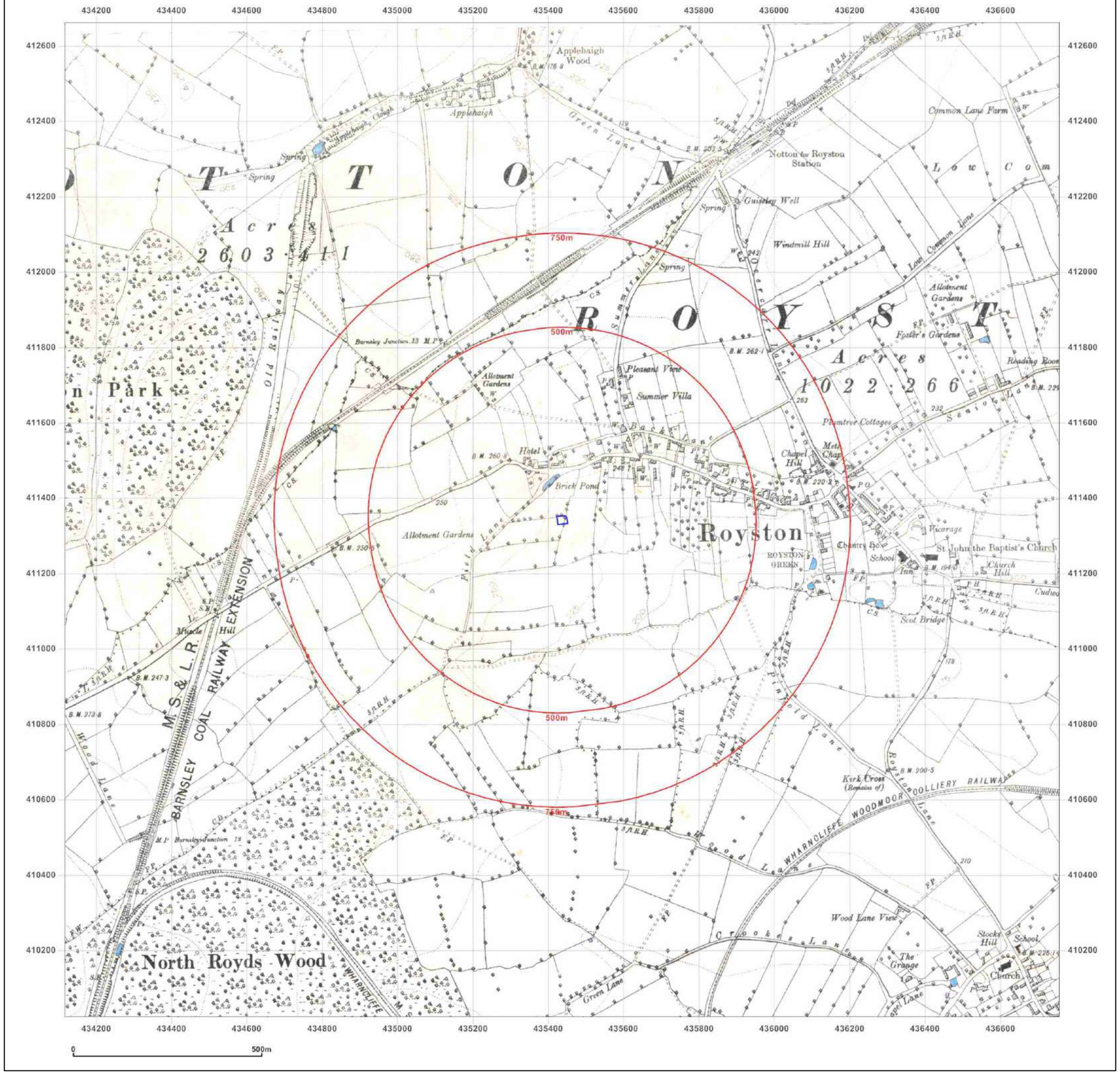
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1891**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
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Surveyed 1891
Revised 1891
Edition 1891
Copyright N/A
Levelled N/A

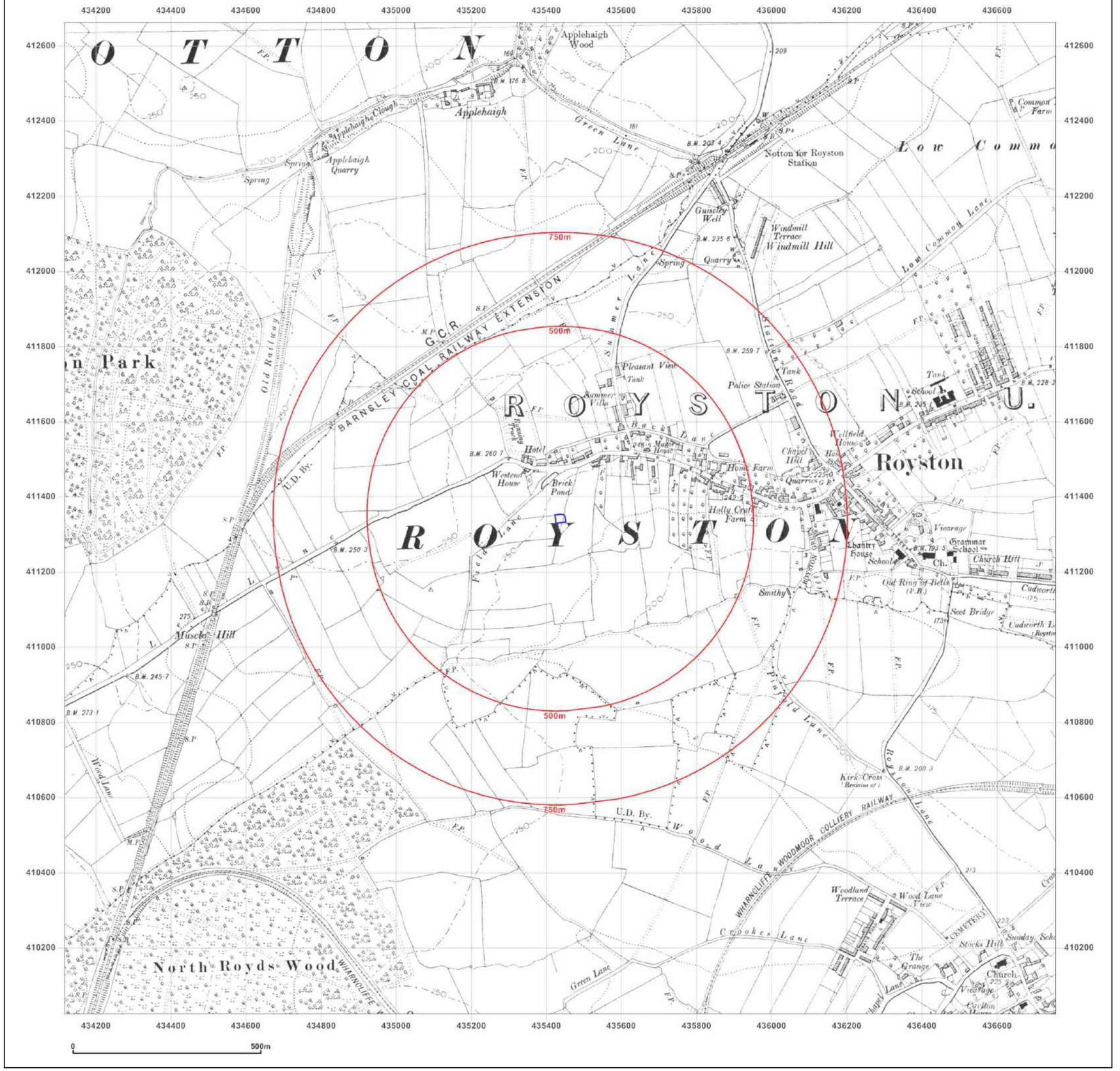
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1904**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

Surveyed 1891
Revised 1904
Edition 1904
Copyright N/A
Levelled N/A

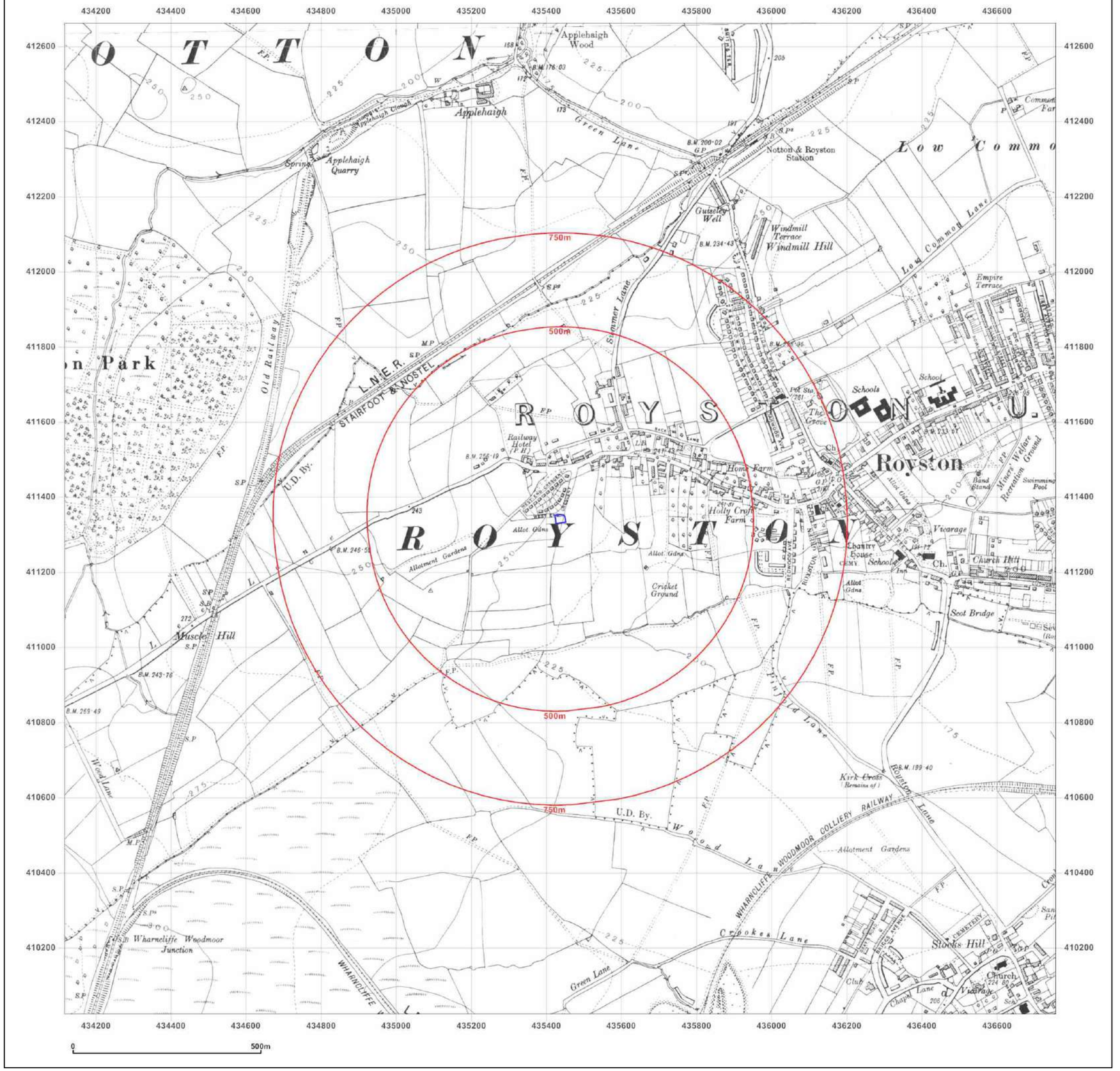
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

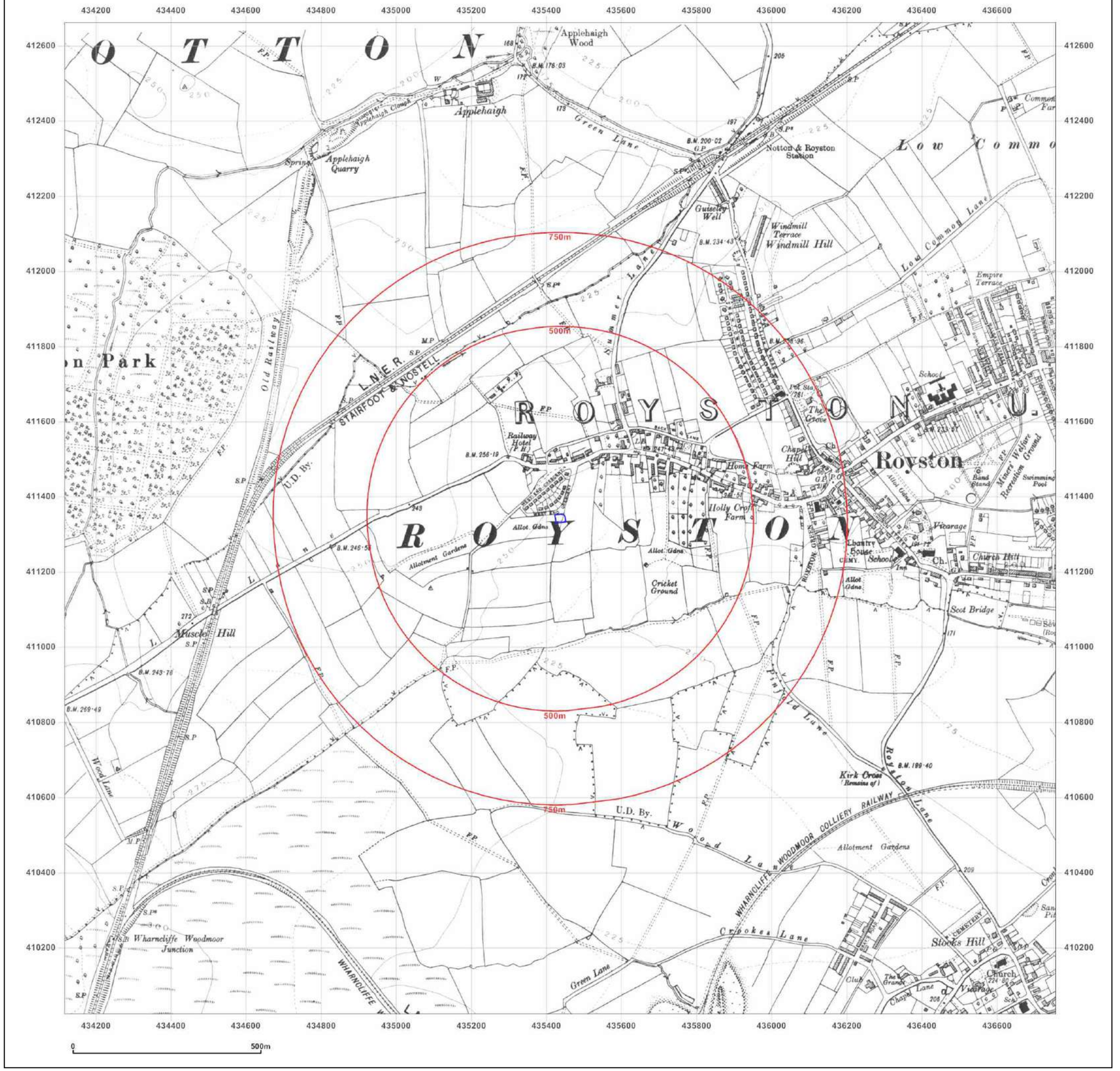
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

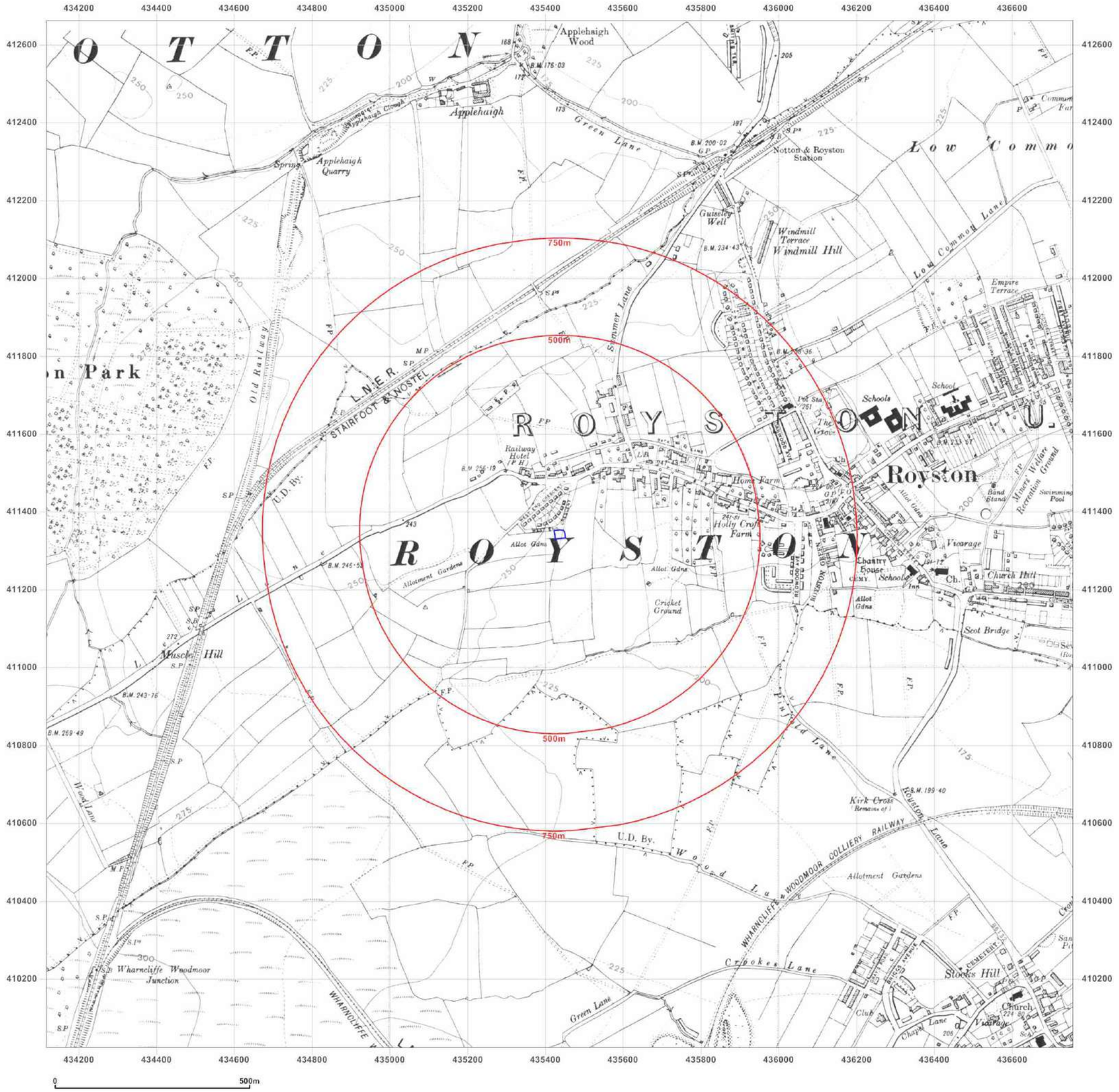
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BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1851
Revised 1938
Edition 1938
Copyright N/A
Levelled 1929

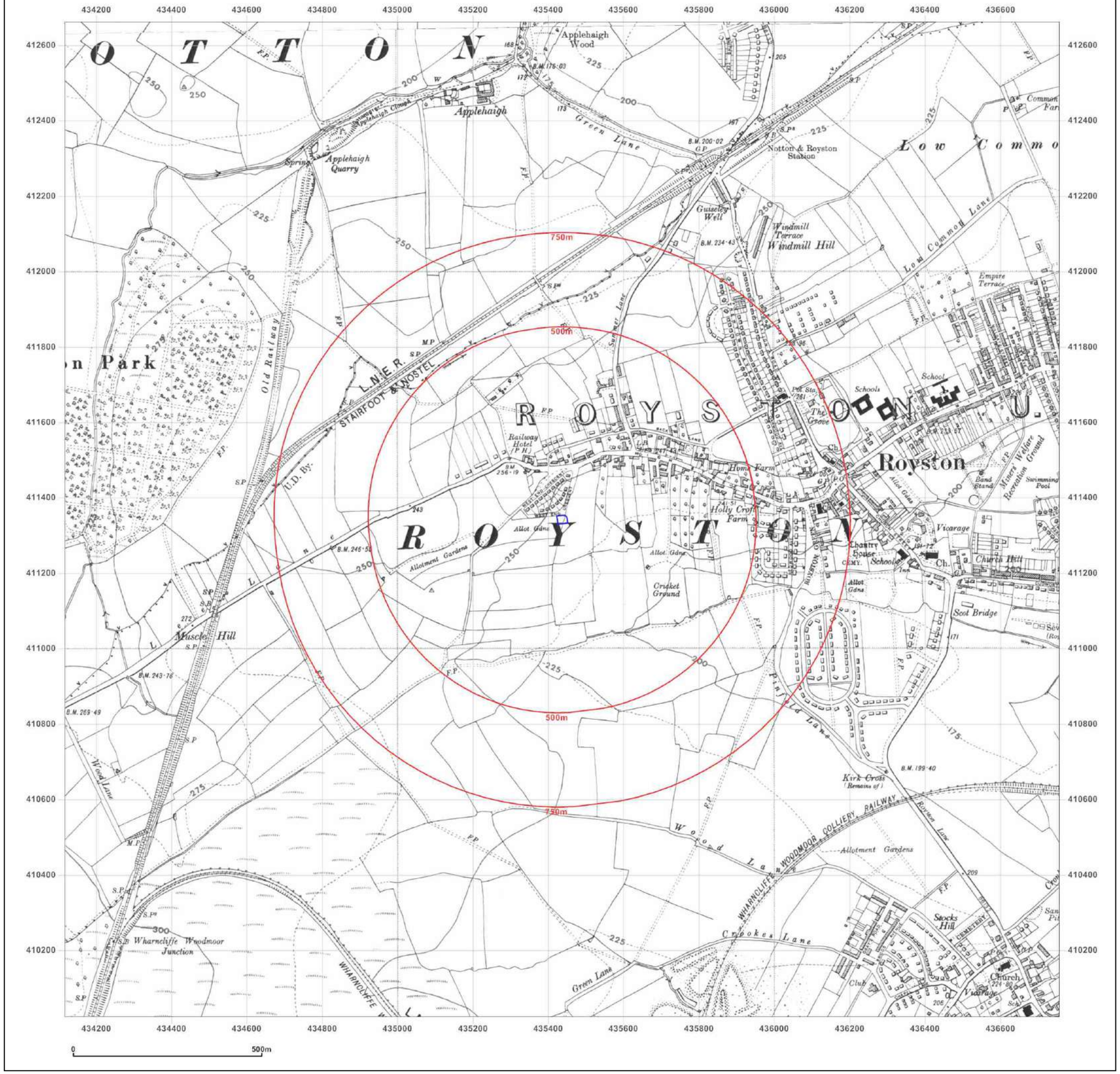
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BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: County Series

Map date: **1948**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1850
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

Surveyed 1851
Revised 1948
Edition 1948
Copyright N/A
Levelled 1929

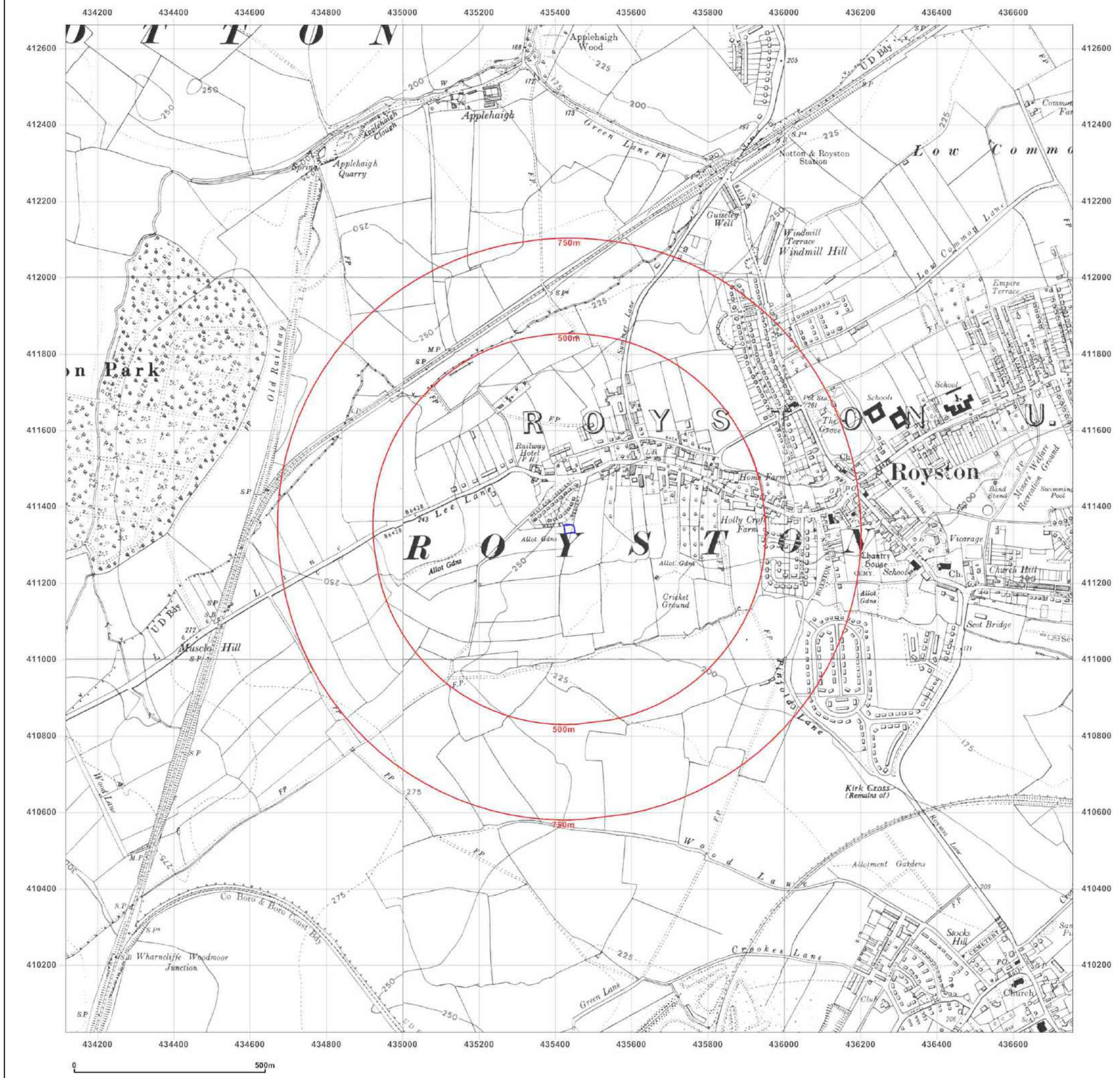
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: Provisional

Map date: **1951**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

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

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

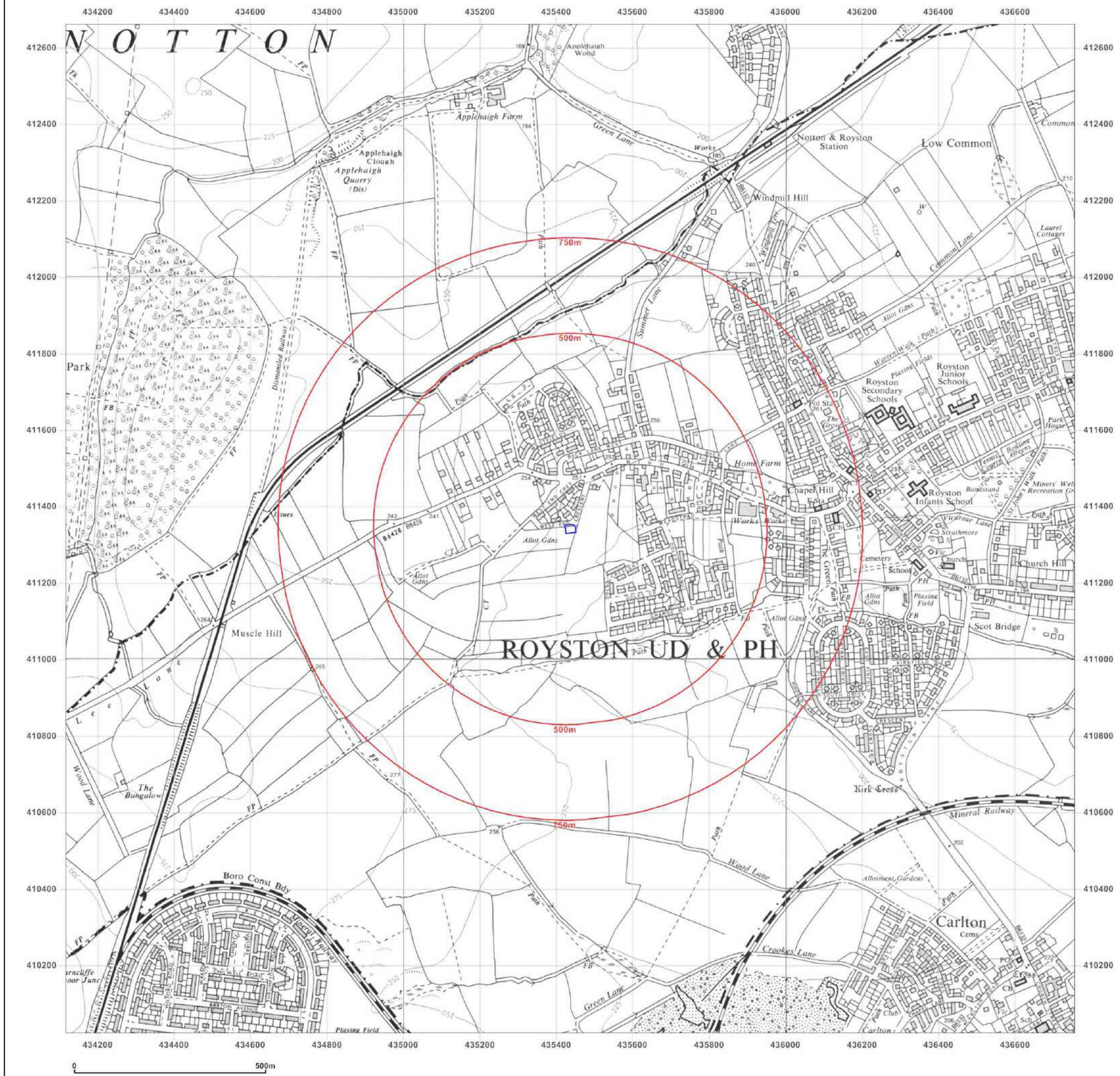
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Site Details:

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BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: Provisional

Map date: **1965-1966**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

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

Surveyed 1966
Revised 1966
Edition N/A
Copyright 1966
Levelled N/A

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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1978**

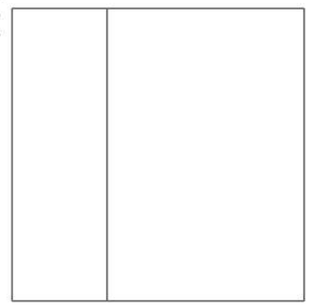
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Printed at: 1:10,000

N
W E
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Surveyed 1977
Revised 1978
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1976
Revised 1978
Edition N/A
Copyright 1979
Levelled 1978



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Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **1989-1990**

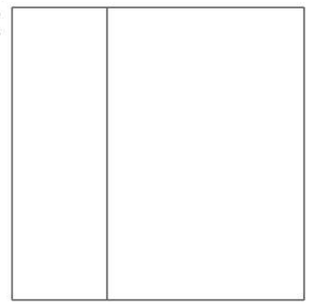
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Printed at: 1:10,000

N
W E
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Surveyed 1983
Revised 1990
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1984
Revised 1989
Edition N/A
Copyright 1990
Levelled 1978



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BARNSLEY, S71 4LN

Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2002

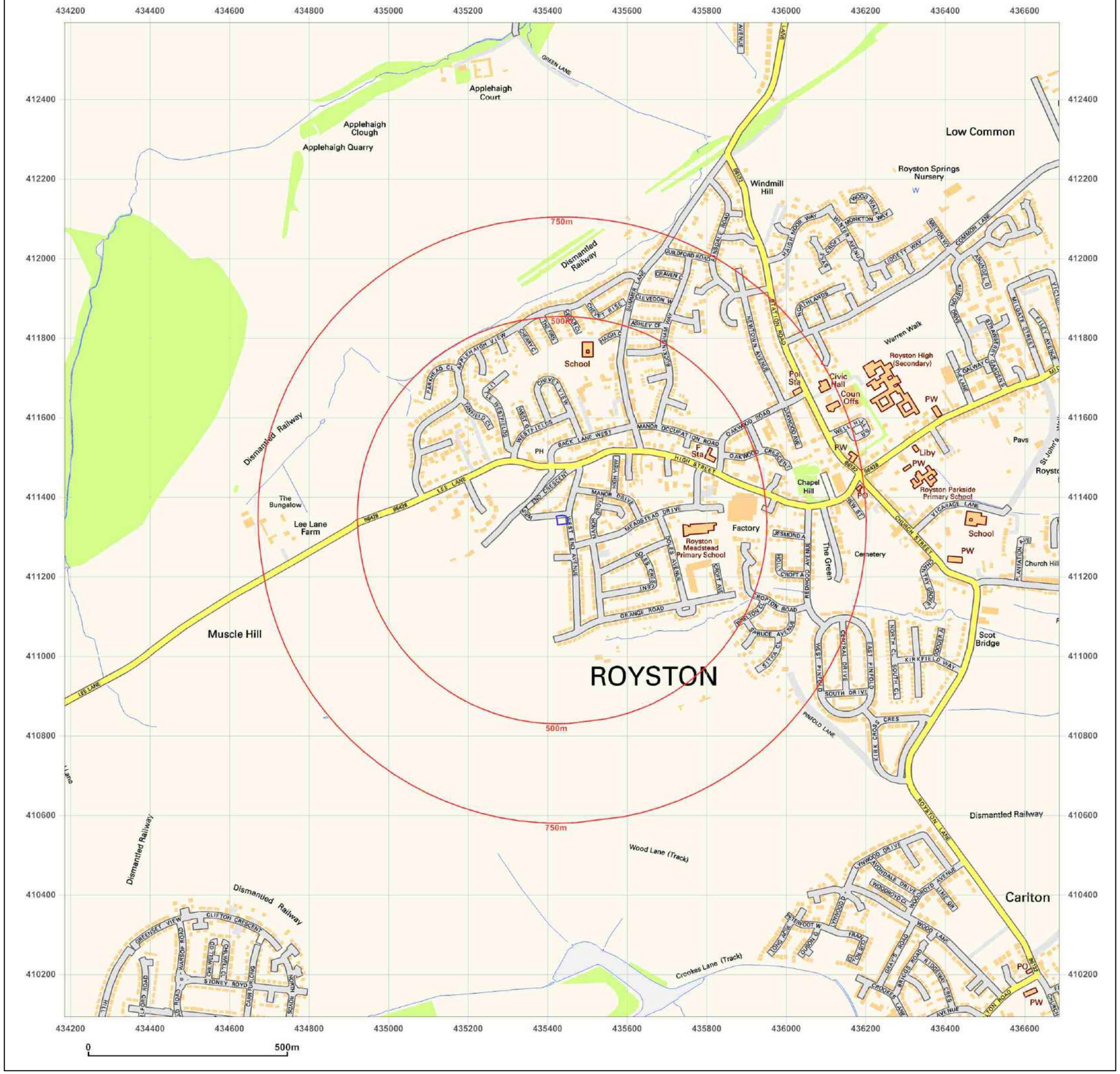
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Client Ref: 18-6003_West_End_Avenue_PO23001793
Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid
Map date: 2010
Scale: 1:10,000
Printed at: 1:10,000

N
W E
S

2010

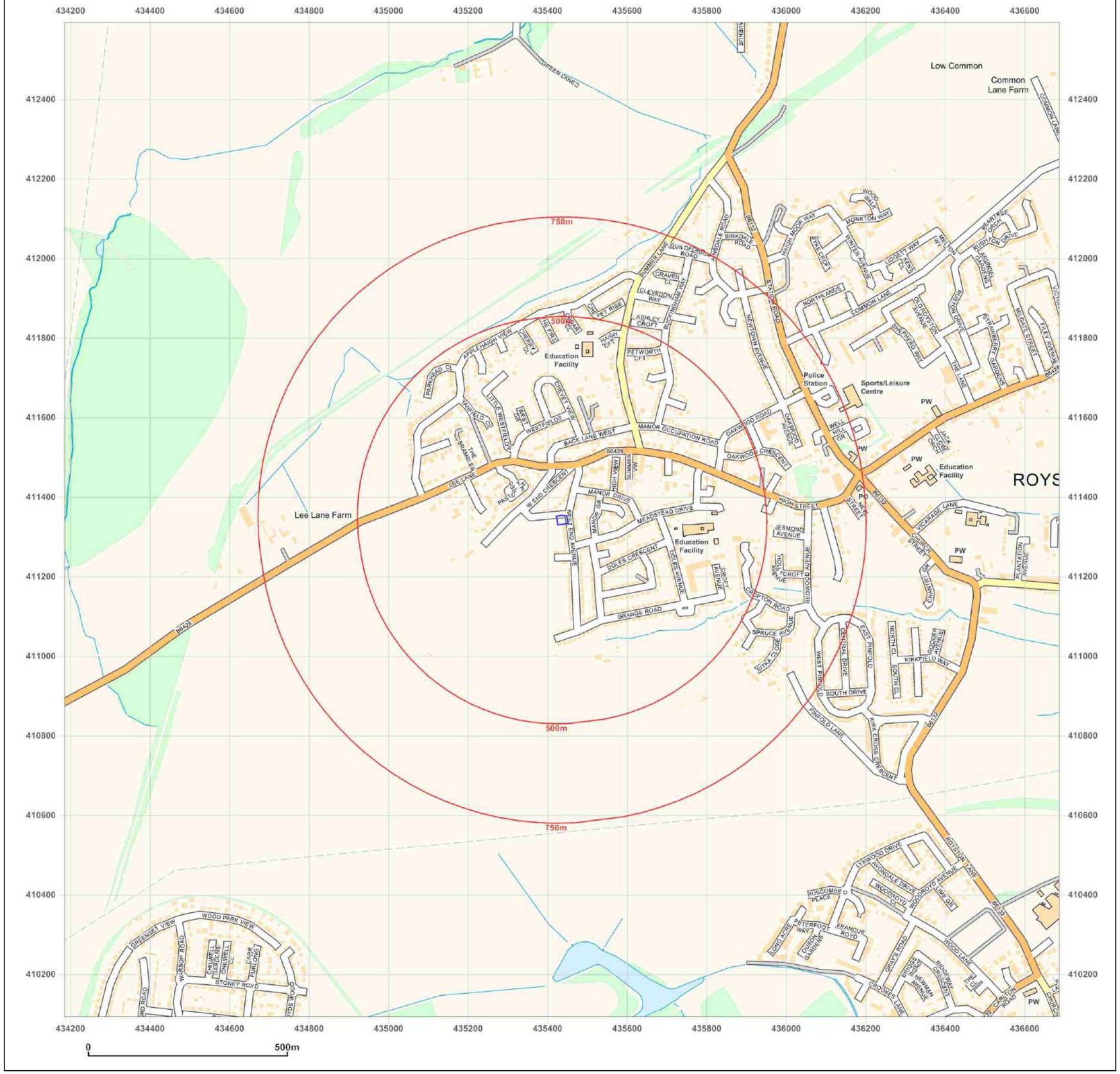
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Report Ref: GS-3977679
Grid Ref: 435436, 411342

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
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2014

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Appendix C

Groundsure EnviroInsight Report

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977677
Your Reference:	18-6003_West_End_Avenue_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

Address: WEST END AVENUE, BARNSLEY, S71 4LN

Dear Sir/ Madam,

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

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

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**WEST END AVENUE, BARNSLEY, S71 4LN**
Date:	**12 Jun 2017**
Reference:	**GS-3977677**
Client:	**Hamson Barron Smith Ltd**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435437,411343
Site Size:	0.06ha

Report Reference: GS-3977677
Client Reference: 18-6003_West_End_Avenue_PO23001793

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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	0	0	0	9
1.2 Additional Information – Historical Tank Database	0	0	0	2
1.3 Additional Information – Historical Energy Features Database	0	0	3	12
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	0
1.6 Potentially Infilled Land	0	0	2	0

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	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	1	1
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	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	2	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?	None
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	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
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)	1	0	0	2	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	0	5	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	No	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/Natural Resources Wales 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?	Limited potential
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	2	1
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	1	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
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	1	0	1	0	0	2
8.14 Records of Green Belt land	0	0	0	1	1	3

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?	Negligible
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 1 and 3% 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?	No 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.

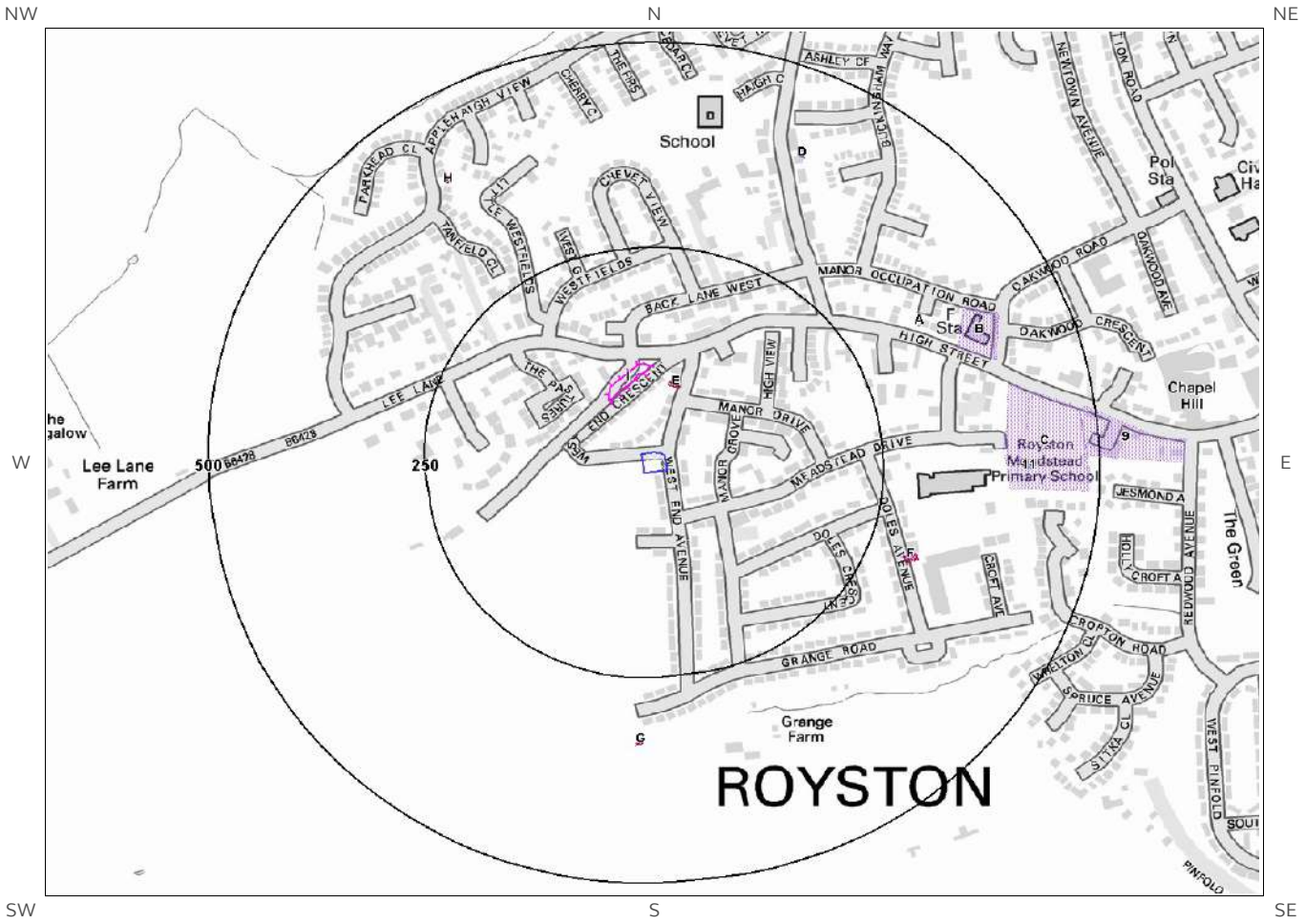
Note: Maps

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



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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: 9

ID	Distance [m]	Direction	Use	Date
1A	332	NE	Unspecified Pump	1854
2A	338	NE	Unspecified Pump	1854
3B	362	E	Fire Station	1978
4B	371	NE	Fire Station	1989
5C	390	E	Unspecified Factory	1989
6C	390	E	Unspecified Factory	1978
7D	393	NE	Unspecified Tank	1904
8C	405	E	Unspecified Works	1966
9	482	E	Unspecified Works	1966

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: 2

ID	Distance (m)	Direction	Use	Date
10D	395	NE	Unspecified Tank	1906
11	416	E	Unspecified Tank	1993

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: 15

ID	Distance (m)	Direction	Use	Date
12E	82	N	Electricity Substation	1970
13E	83	N	Electricity Substation	1976

14E	84	N	Electricity Substation	1993
15F	292	E	Electricity Substation	1983
16F	293	E	Electricity Substation	1970
17F	293	E	Electricity Substation	1976
18F	293	E	Electricity Substation	1993
19G	325	S	Electricity Substation	1970
20G	326	S	Electricity Substation	1976
21G	326	S	Electricity Substation	1993
22G	330	S	Electricity Substation	1985
23G	331	S	Electricity Substation	1993
24H	398	NW	Electricity Substation	1986
25H	399	NW	Electricity Substation	1995
26H	400	NW	Electricity Substation	1981

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: 0

Database searched and no data found.

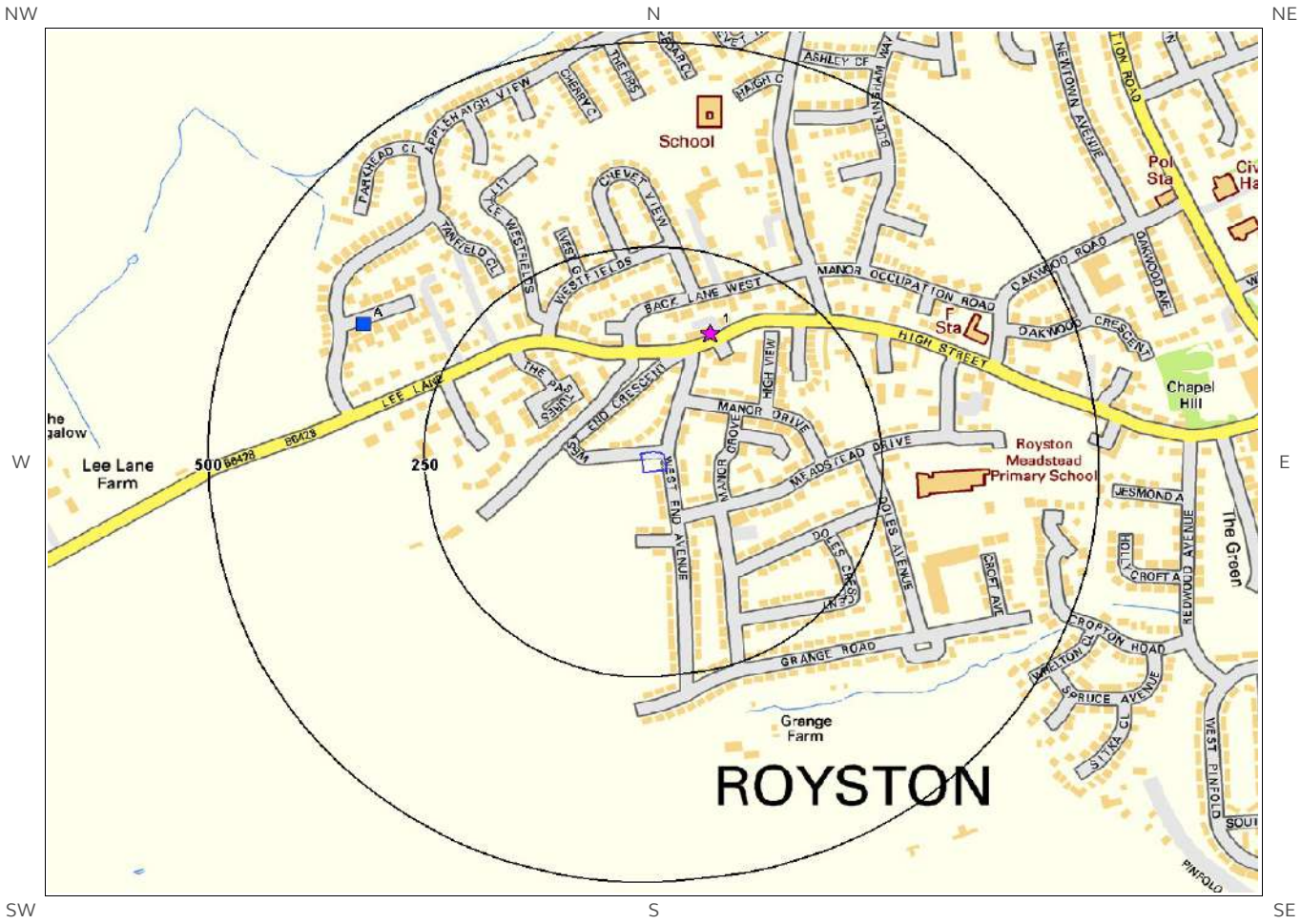
1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 2

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

ID	Distance(m)	Direction	Use	Date
27I	75	NW	Pond	1904
28I	75	NW	Pond	1891

2. Environmental Permits, Incidents and Registers Map



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Site Outline

250
500
Search Buffers (m)

Recorded Pollution Incident

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/Natural Resources Wales 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:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details	
2A	358	NW	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 2	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 14/04/2009 Effective Date: 14-Apr-2009 Revocation Date: -
3A	358	NW	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 1	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 02/11/1989 Effective Date: 02-Nov-1989 Revocation Date: 13/04/2009

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

0

Database searched and no data found.

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

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/Natural Resources Wales Recorded Pollution Incidents

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

1

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	157	N	435500 411500	Incident Date: 03-Dec-2001 Incident Identification: 46273 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

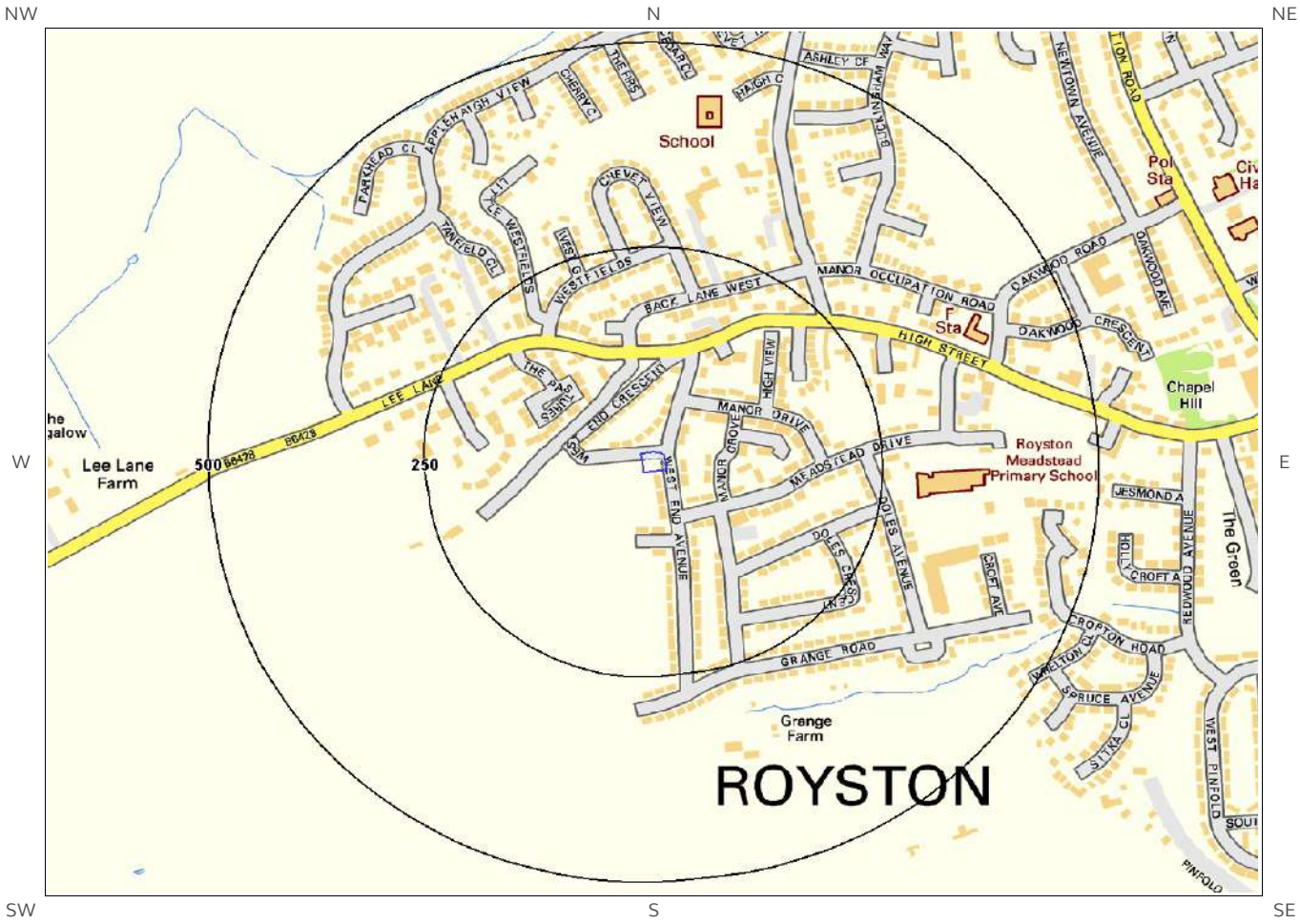
Database searched and no data found.

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



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Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW 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/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

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

2

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	869	NE	436300 411700	Site Address: Warren Walk, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B16 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 21-Jun-1994 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Barnsley Metropolitan Borough Council First Recorded: - Last Recorded: -
Not shown	1166	SE	436600 410800	Site Address: Land between Royston Lane and Cronkhill Lane, Carlton, Barnsley Waste Licence: Yes Site Reference: WD20 B457, 4400/B457, 20B457(95) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 18-Feb-1985 Licence Surrendered: 20-Jan-1993 Licence Holder Address: Stud Farm, Carlton, Barnsley Operator: E Maw and Son Licence Holder: E Maw First Recorded: 18-Feb-1985 Last Recorded: 20-Jan-1993

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:

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

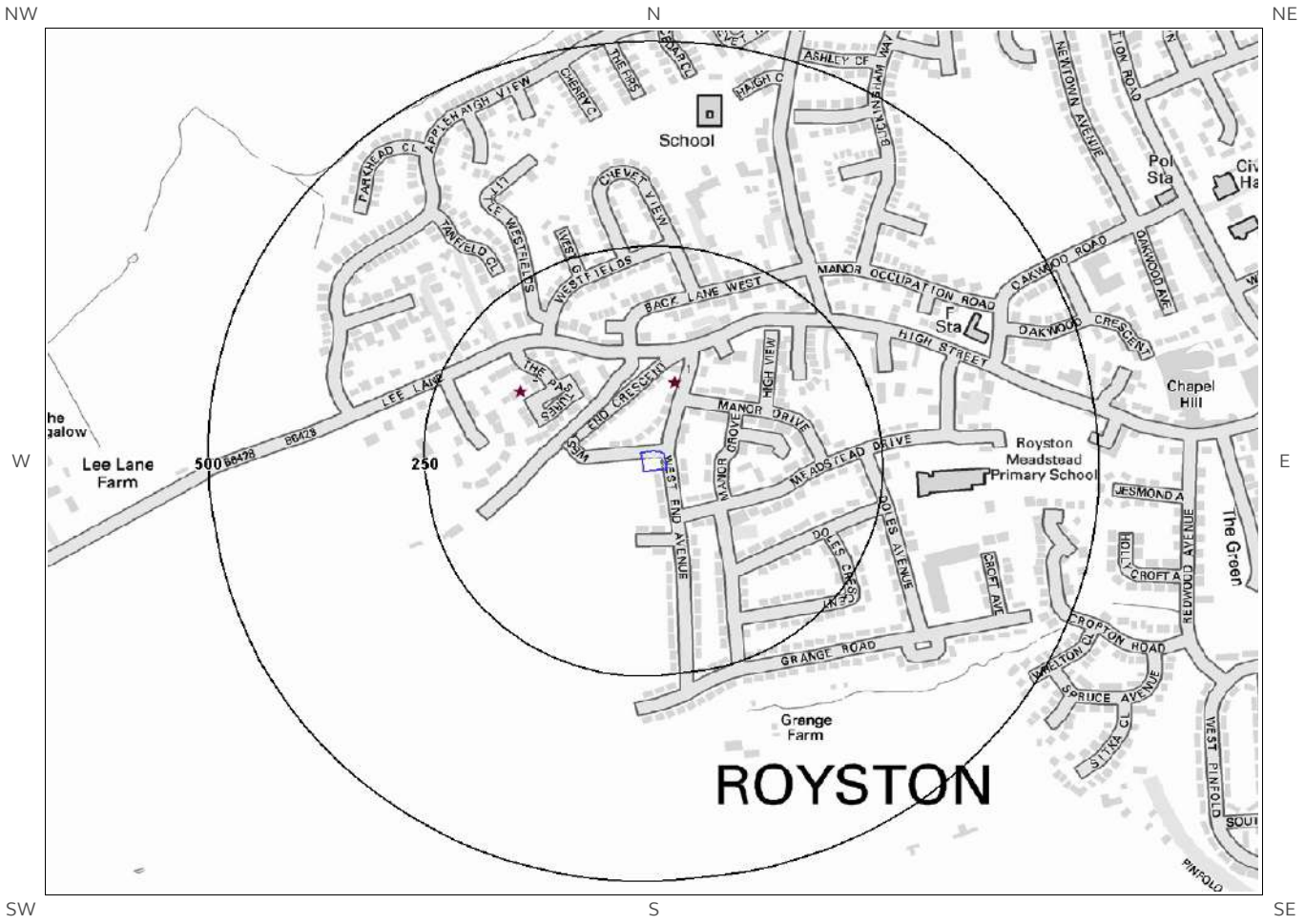
Database searched and no data found.

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

0

Database searched and no data found.

4. Current Land Use Map



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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: 2

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	87	N	Electricity Sub Station	435460 411439	Electricity Sub Station, S71	Electrical Features	Infrastructure and Facilities
2	159	NW	A1 Caravan Care	435281 411428	A1 Caravan Care, 8, The Pastures, Royston, Barnsley, S71 4RQ	Sports and Leisure Equipment Repair	Repair and Servicing

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

Database searched and no data found.

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

5.3 Bedrock and Solid Geology

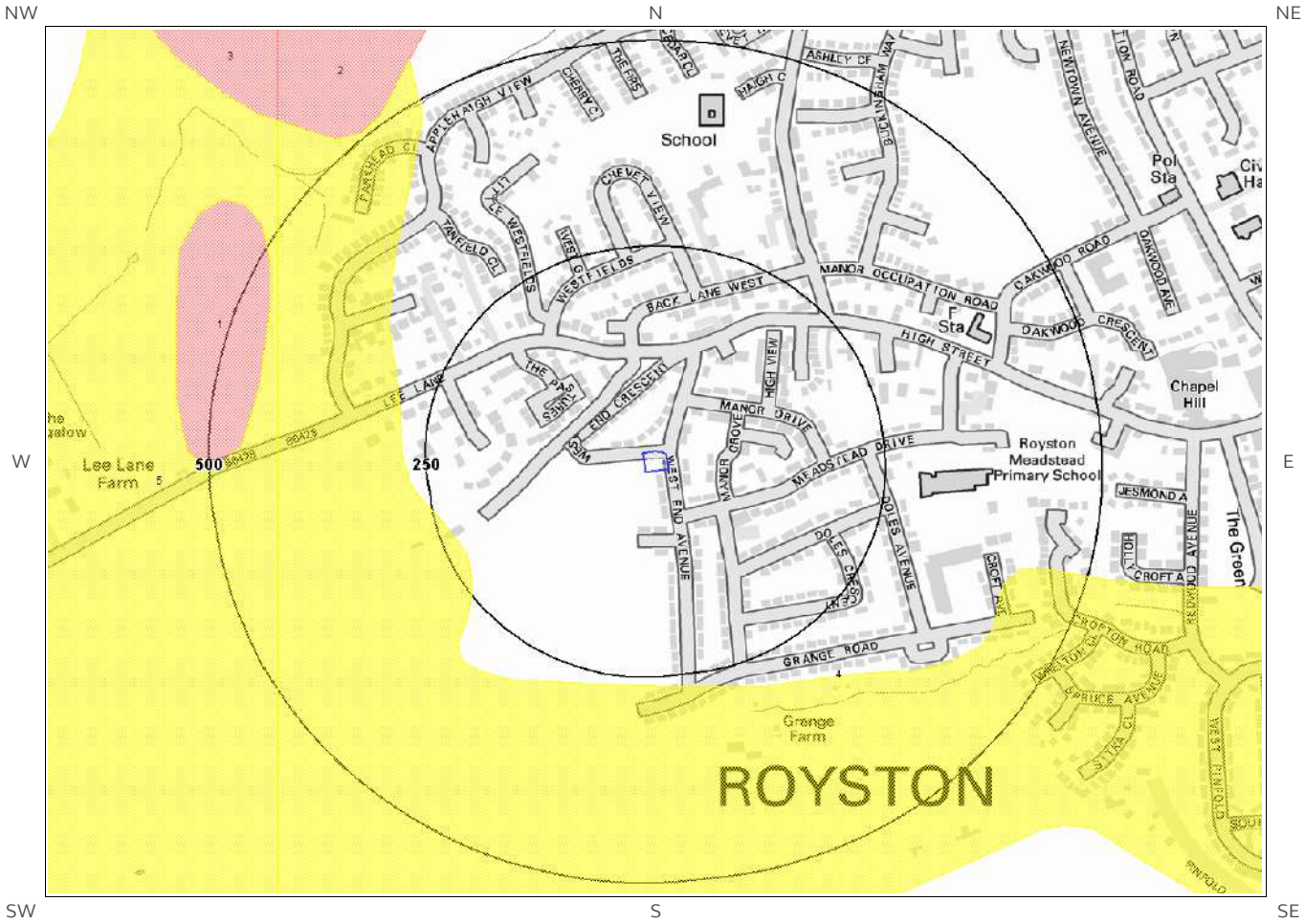
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE
MXR-SDST	MEXBOROUGH ROCK	SANDSTONE

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

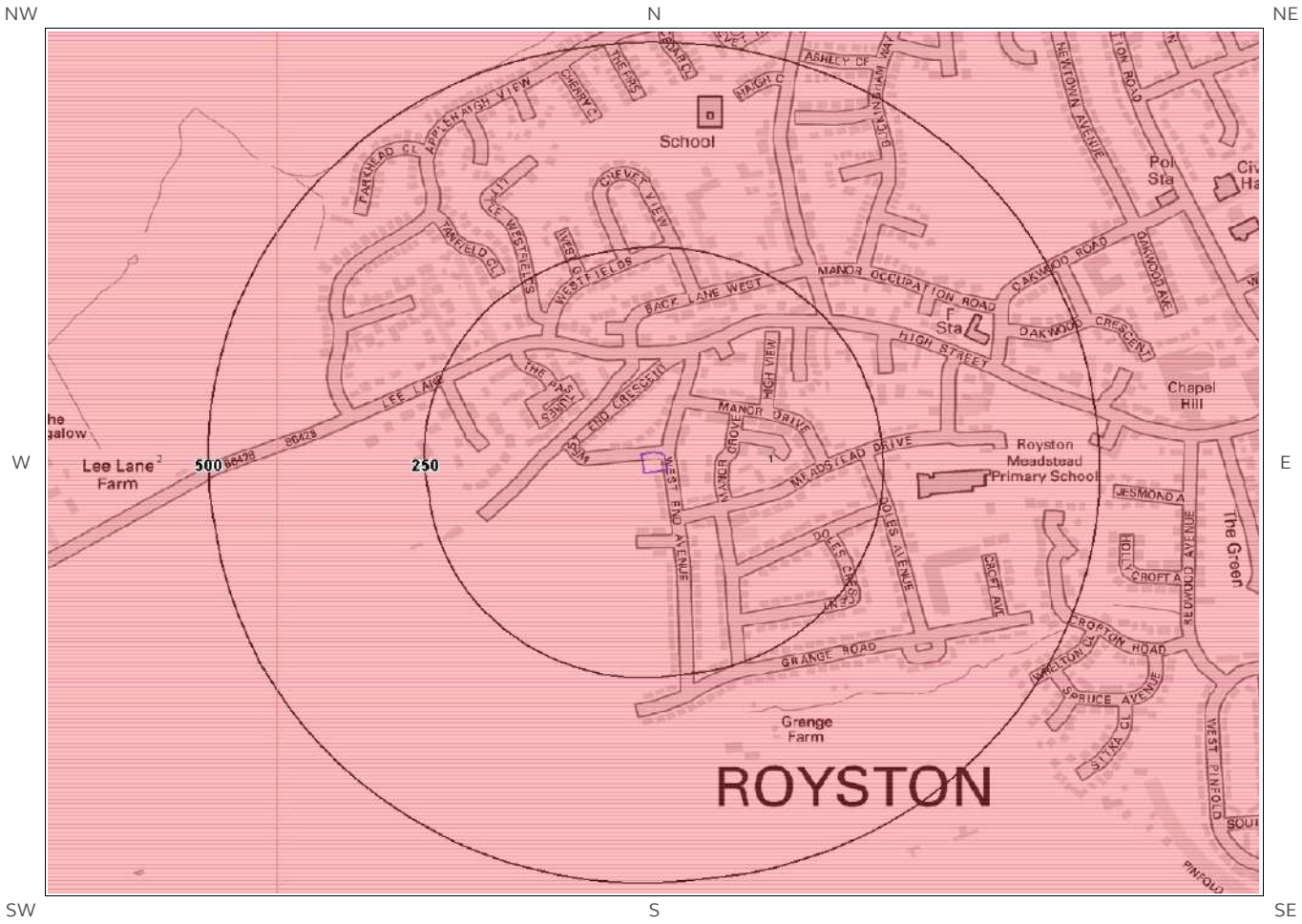
6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



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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

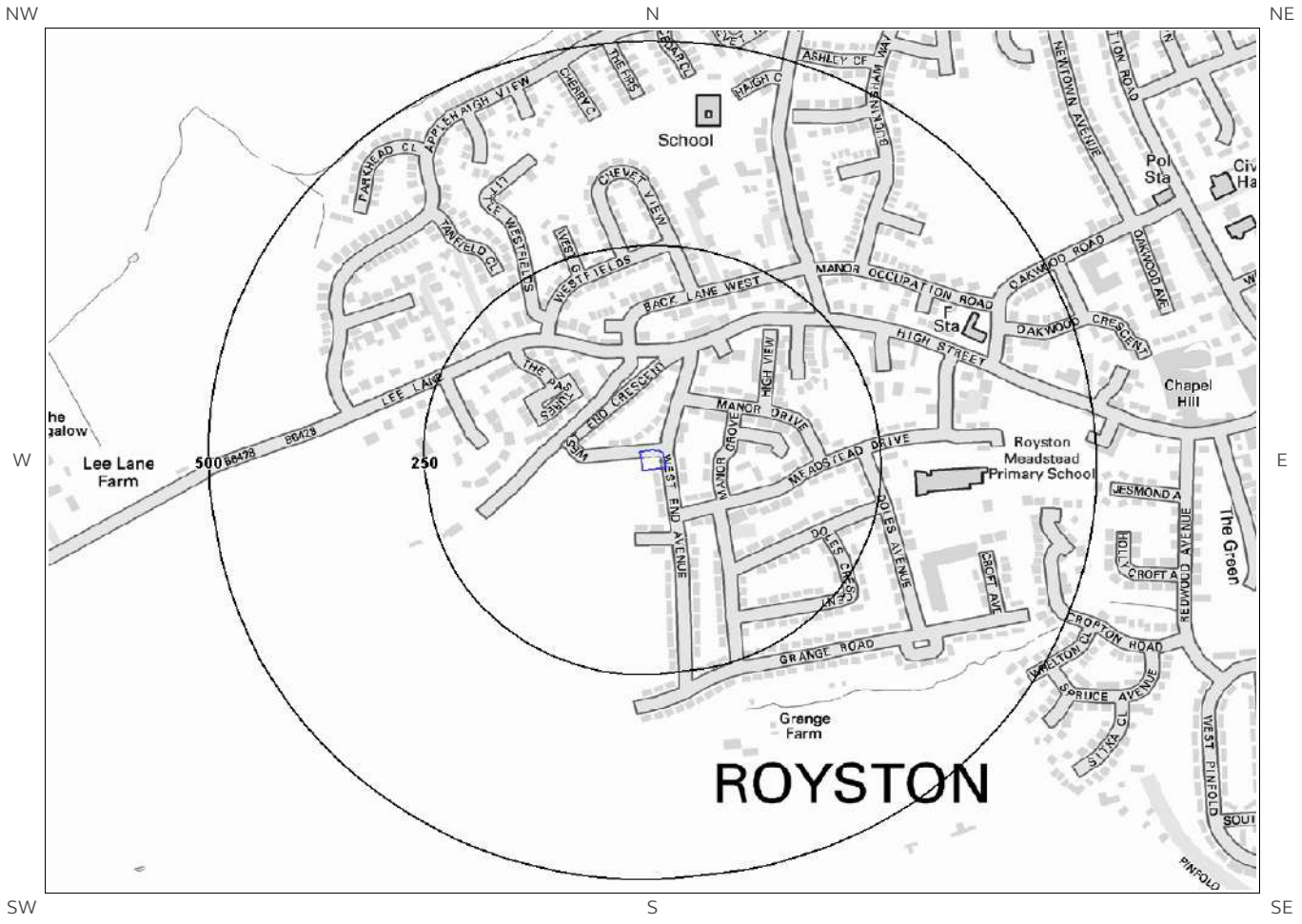
Secondary Aquifer - Undifferentiated Layers

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
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

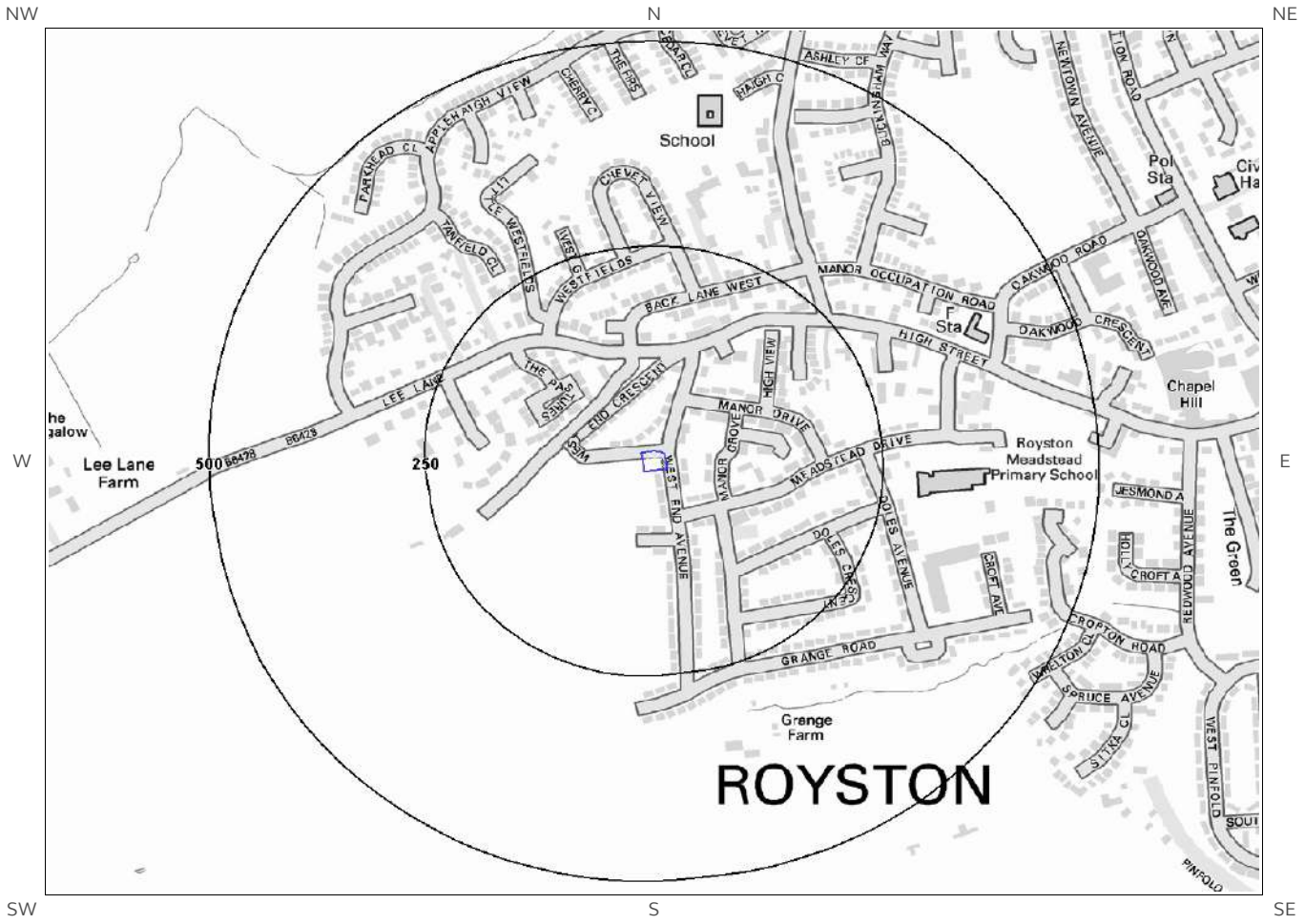
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

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

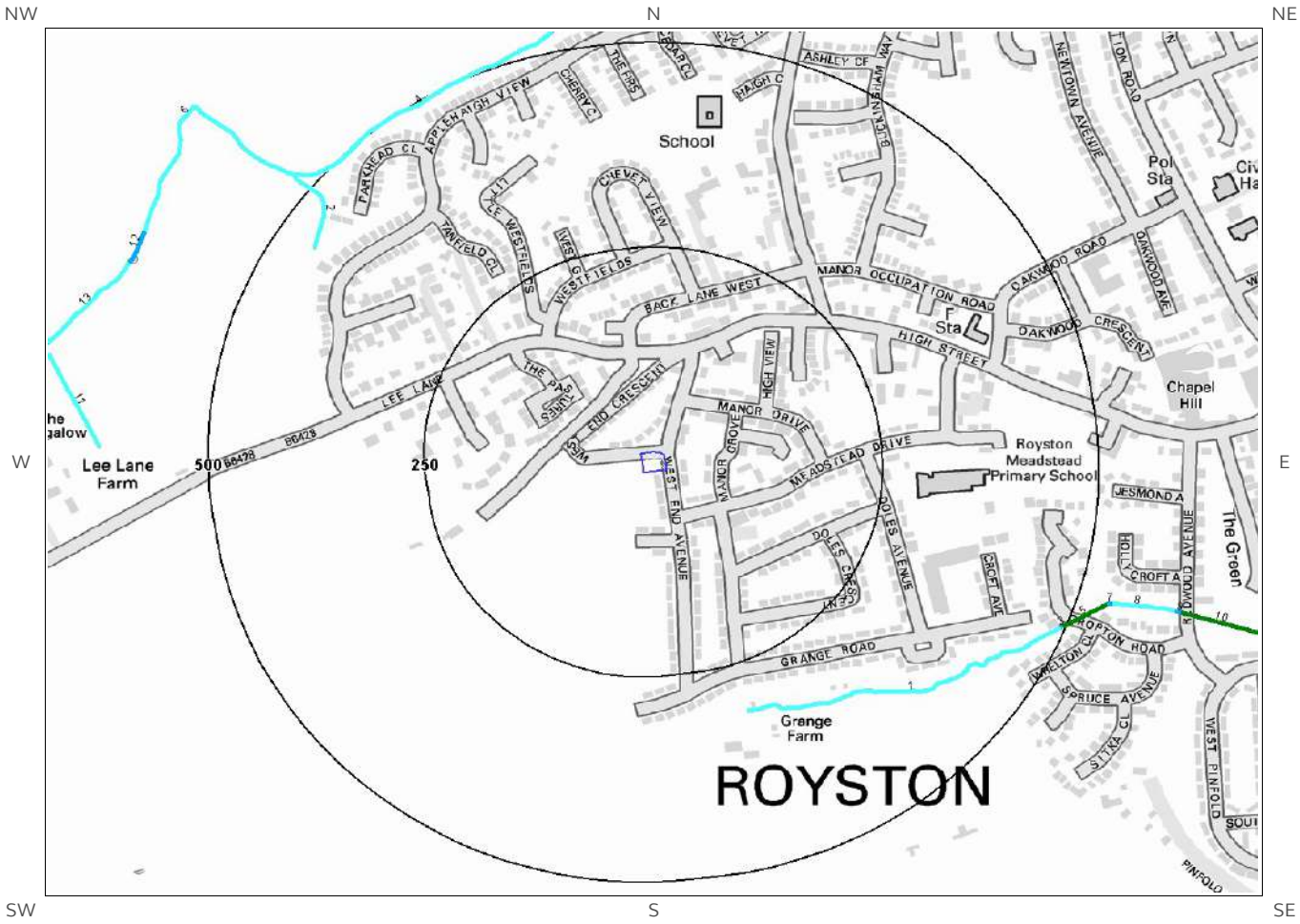
Source Protection Zone 3C - Total Catchment within Confined Aquifer

Site Outline

250
500
Search Buffers (m)

Potable Water Abstraction Licence

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

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

ID	Distance (m)	Direction	Designation	Description
4	228	SW	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
5	421	W	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
1	449	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	421	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

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

Database searched and no data found.

6.4 Surface Water Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1925	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL COMPANY LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1394 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 27/3/1998 Version End Date:
Not shown	1925	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Use Relating To Secondary Category (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL CO LTD	Annual Volume (m^3): 110000 Max Daily Volume (m^3): 2742 Application No: 1394-V860 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 102 Version Start Date: 21/1/2008 Version End Date:

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	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.
265	W	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.
438	NW	Minor Aquifer/High Leaching Potential	H3	Coarse textured or moderately shallow soils which readily transmit non-adsorbed pollutants and liquid discharges but have some ability to attenuate adsorbed pollutants because of their clay or organic matter content.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

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):

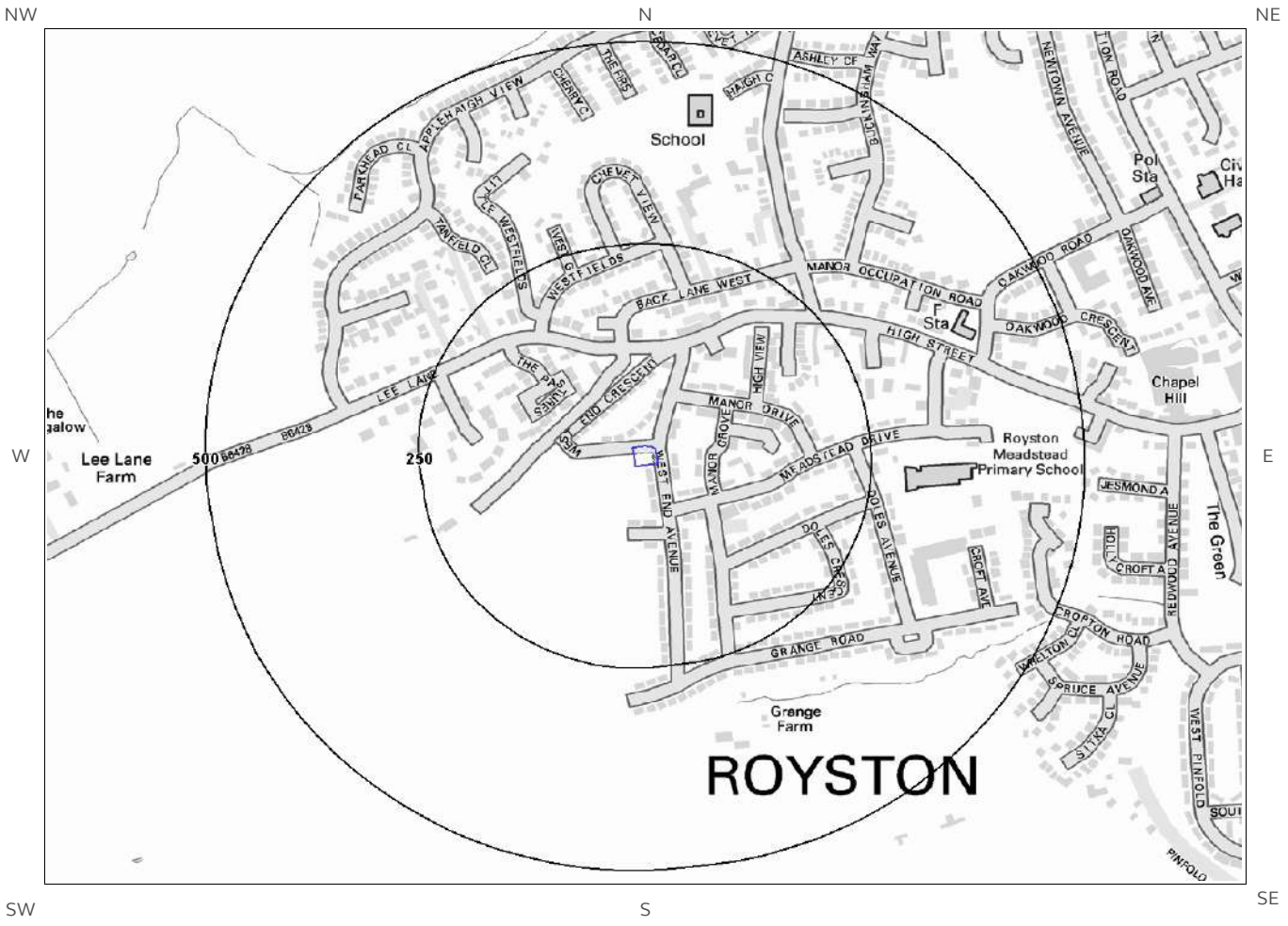
ID	Distance (m)	Direction	Details	
1	308	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	452	NW	River Name: Drain Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
3	494	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
4	497	NW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
5	497	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? No

Database searched and no data found.

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



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Site Outline

Search Buffers (m)
100
250

Zone 2 Floodplain

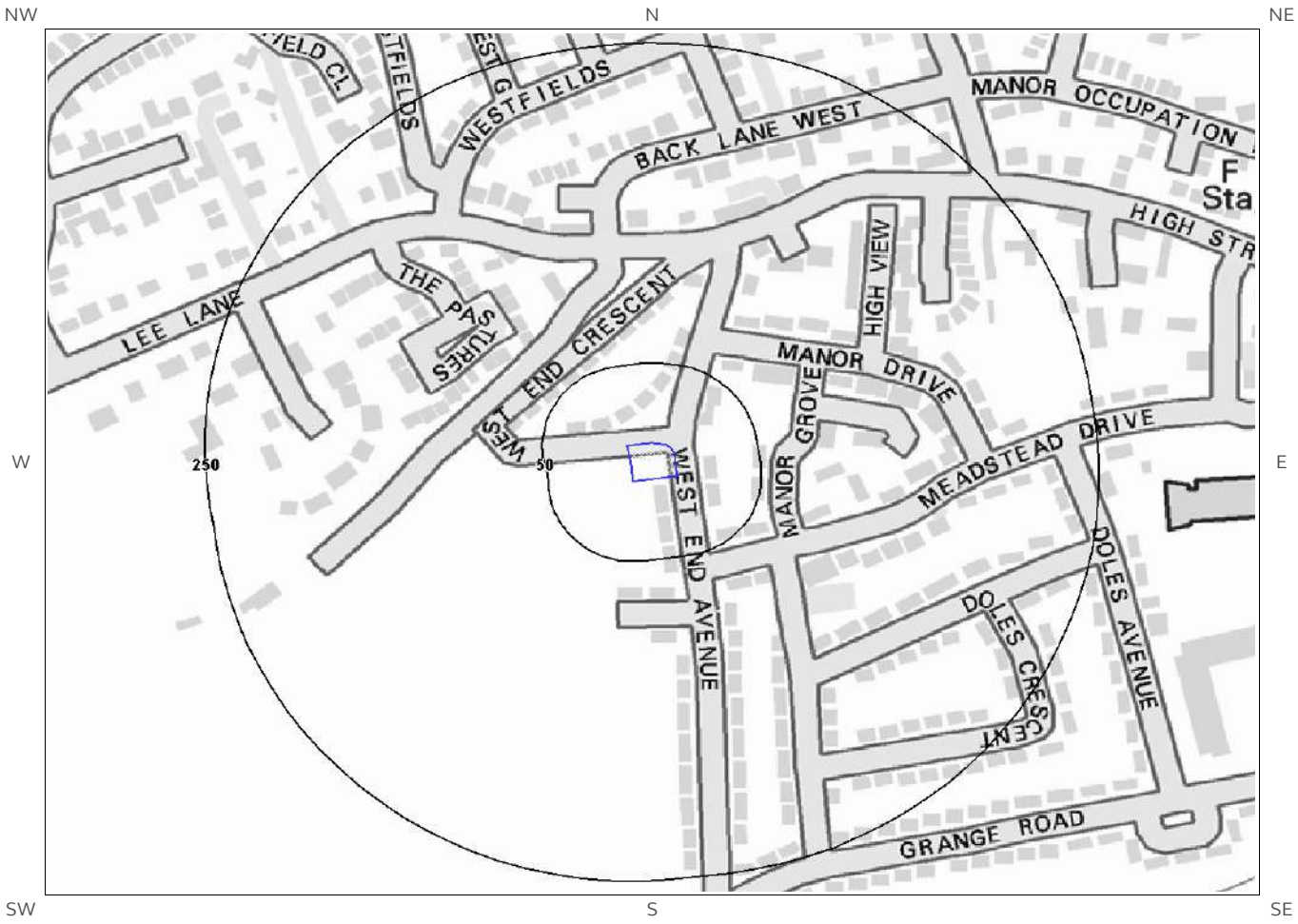
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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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/Natural Resources Wales Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales 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/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

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

7.4 Flood Defences

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

Limited potential

Where limited potential for groundwater flooding to occur is indicated, this means that although given the geological conditions there may be a groundwater flooding hazard, unless other relevant information, e.g. records of previous flooding, suggests groundwater flooding has occurred before in this area, you need take no further action in relation to groundwater flooding hazard.

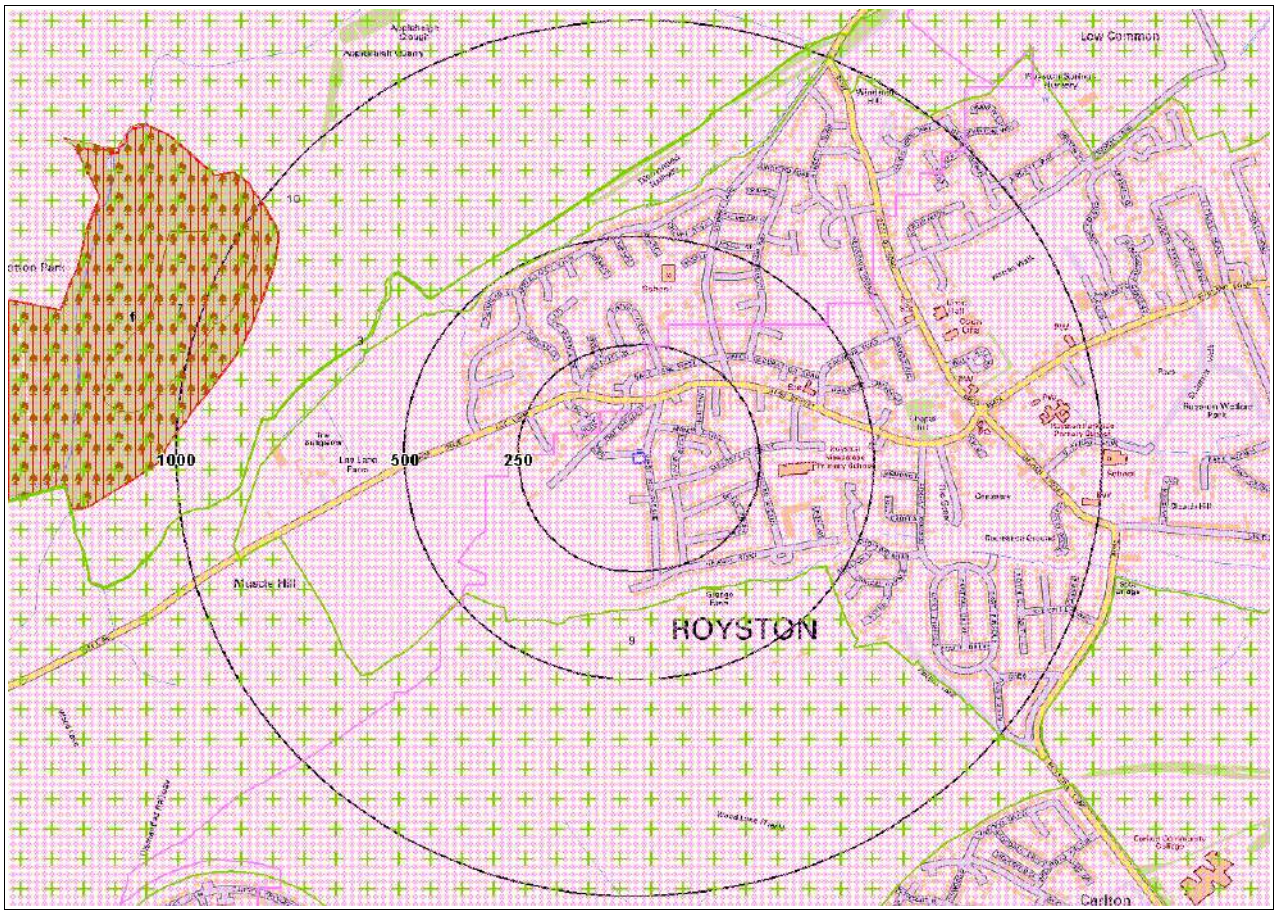
7.8 Groundwater Flooding Confidence Areas

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

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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Site Outline

100
250
Search Buffers (m)

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:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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
6	884	W	UNKNOWN	Ancient and Semi-Natural Woodland
7	937	W	UNKNOWN	Ancient Replanted Woodland
Not shown	1439	W	UNKNOWN	Ancient Replanted Woodland

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

1

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
1	885	W	Notton Wood	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
2	0	On Site	Existing	DEFRA
3	86	NW	Existing	DEFRA
Not shown	1330	S	Existing	DEFRA
Not shown	1833	SW	Existing	DEFRA

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

5

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
9	315	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
10	546	NW	Liverpool, Manchester and West Yorks Greenbelt	Wakefield District (B)
Not shown	1330	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1801	SW	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1978	SE	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

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

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

Hazard
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.

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 1 and 3% 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? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

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

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

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

10.2 Non-Coal Mining

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

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

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

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: 03708 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: Barnsley Metropolitan Borough Council
Phone: 01226 770770
Web: http://www.barnsley.gov.uk/
Address: PO Box 634, Barnsley, South Yorkshir, S70 9GG

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

Standard Terms and Conditions

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

Appendix D

Groundsure GeoInsight Report

Groundsure
LOCATION INTELLIGENCE

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-3977678
Your Reference:	18-6003_West_End_Avenue_PO23001793
Report Date	12 Jun 2017
Report Delivery Method:	Email - pdf

Geo Insight

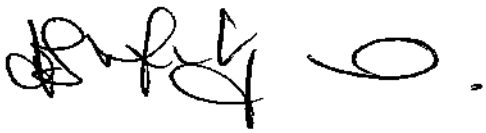
Address: WEST END AVENUE, BARNSLEY, S71 4LN

Dear Sir/ Madam,

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

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

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**WEST END AVENUE, BARNSLEY, S71 4LN**
Date:	**12 Jun 2017**
Reference:	**GS-3977678**
Client:	**Hamson Barron Smith Ltd**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435437,411343
Site Size:	0.06ha

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

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

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

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

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

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	2	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	2	3	3
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Negligible

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	0	3

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	1	2	0

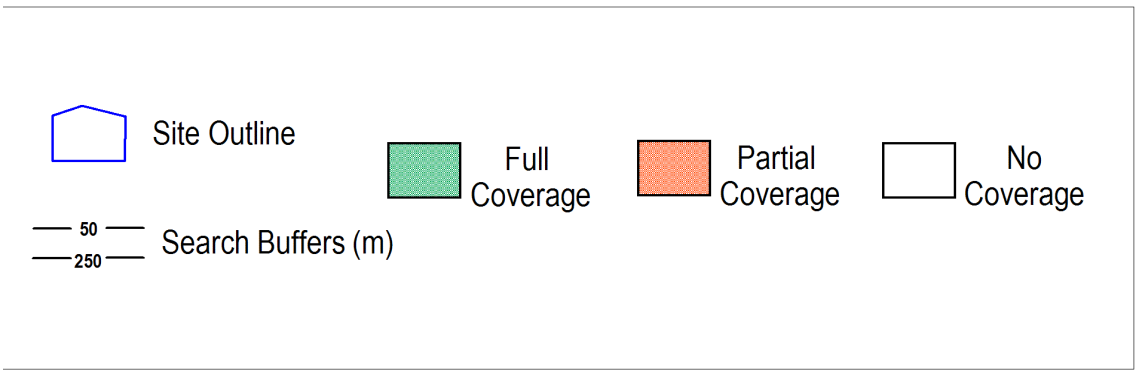
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

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

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	421.0	Some deposits are mapped	Full	Full	No coverage
N3	1330.0	Some deposits are mapped	Full	Full	No coverage
N4	1396.0	Some deposits are mapped	Full	Full	Some deposits are mapped

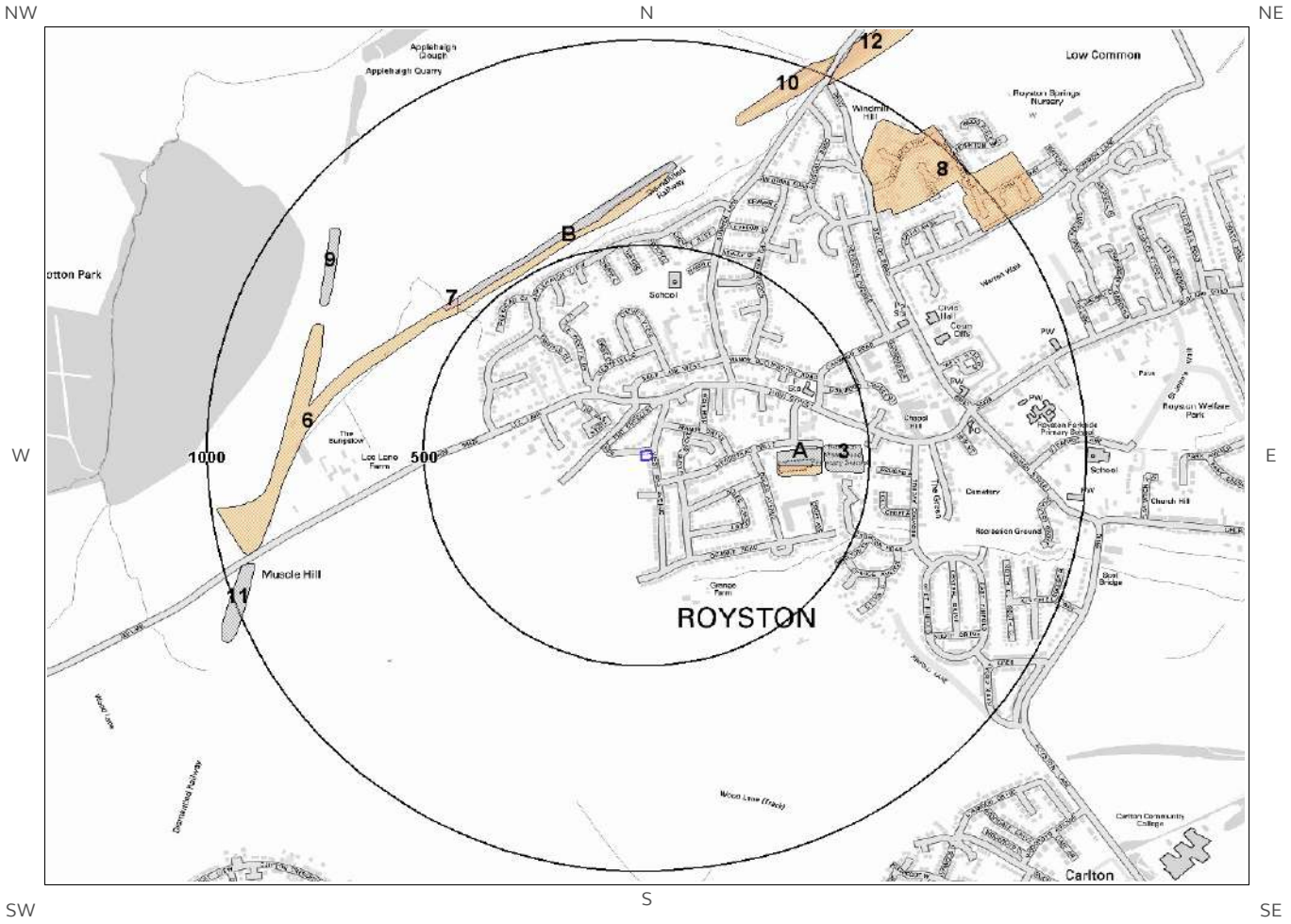
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not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

The definitions of coverage are as follows:

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

1 Geology (1:10,000 scale).

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



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

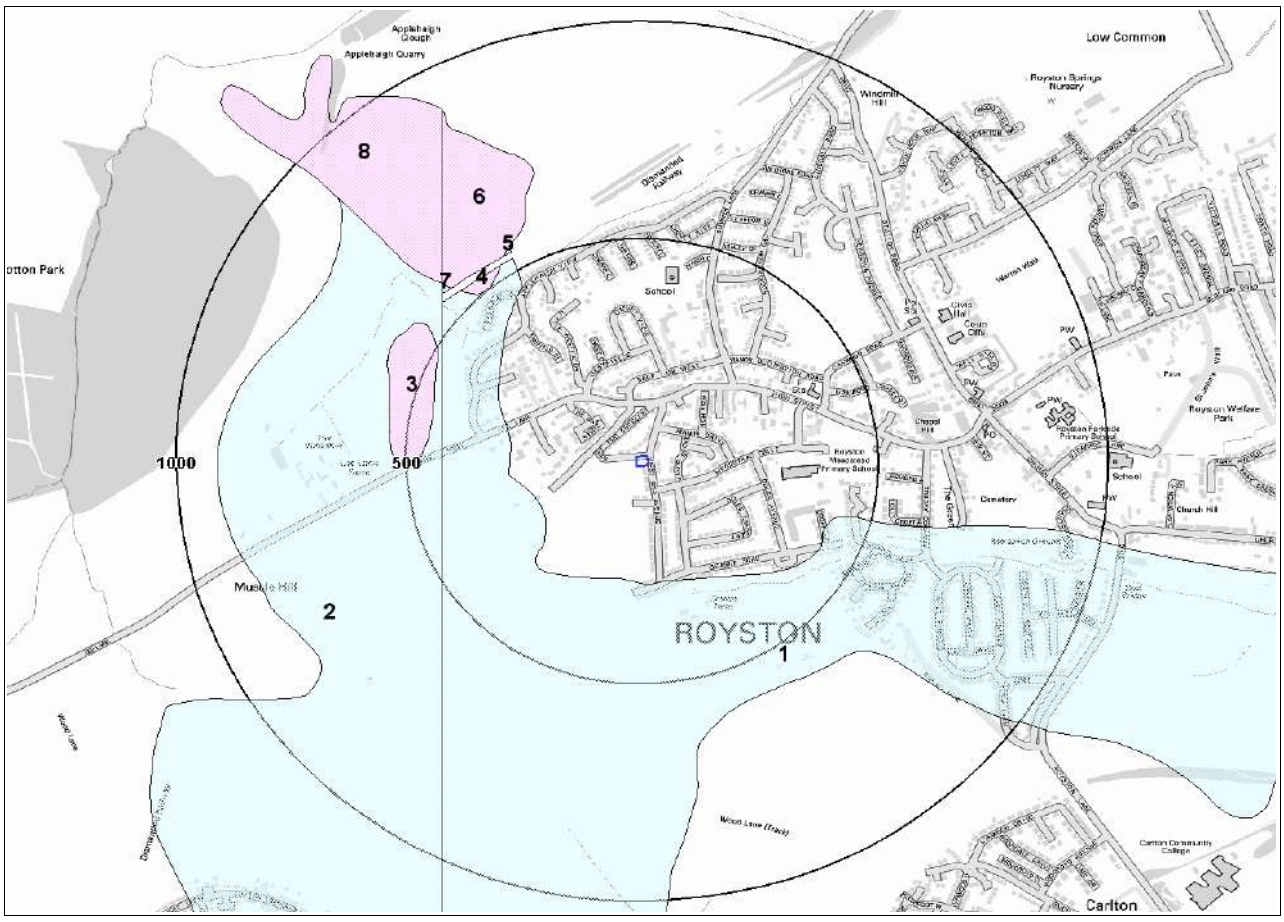
1.1 Artificial Ground

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

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1A	284.0	E	WGR-VOID	Worked Ground (Undivided)	Void
2A	287.0	E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
3	393.0	E	WGR-VOID	Worked Ground (Undivided)	Void

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



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

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

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	228.0	W	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton
2	421.0	W	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton
3	452.0	W	GFDMP-XSV	Glaciofluvial Deposits, Mid Pleistocene - Sand And Gravel	Sand And Gravel

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

No

Database searched and no data found.

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

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

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



Bedrock and Faults Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

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

1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
2	0.0	On Site	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
3	51.0	N	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
4	195.0	NW	ACR-SDST	Ackton Rock - Sandstone	Bolsovian Sub-age
5A	232.0	W	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
6	333.0	S	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
7	369.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
8	421.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
9	474.0	SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

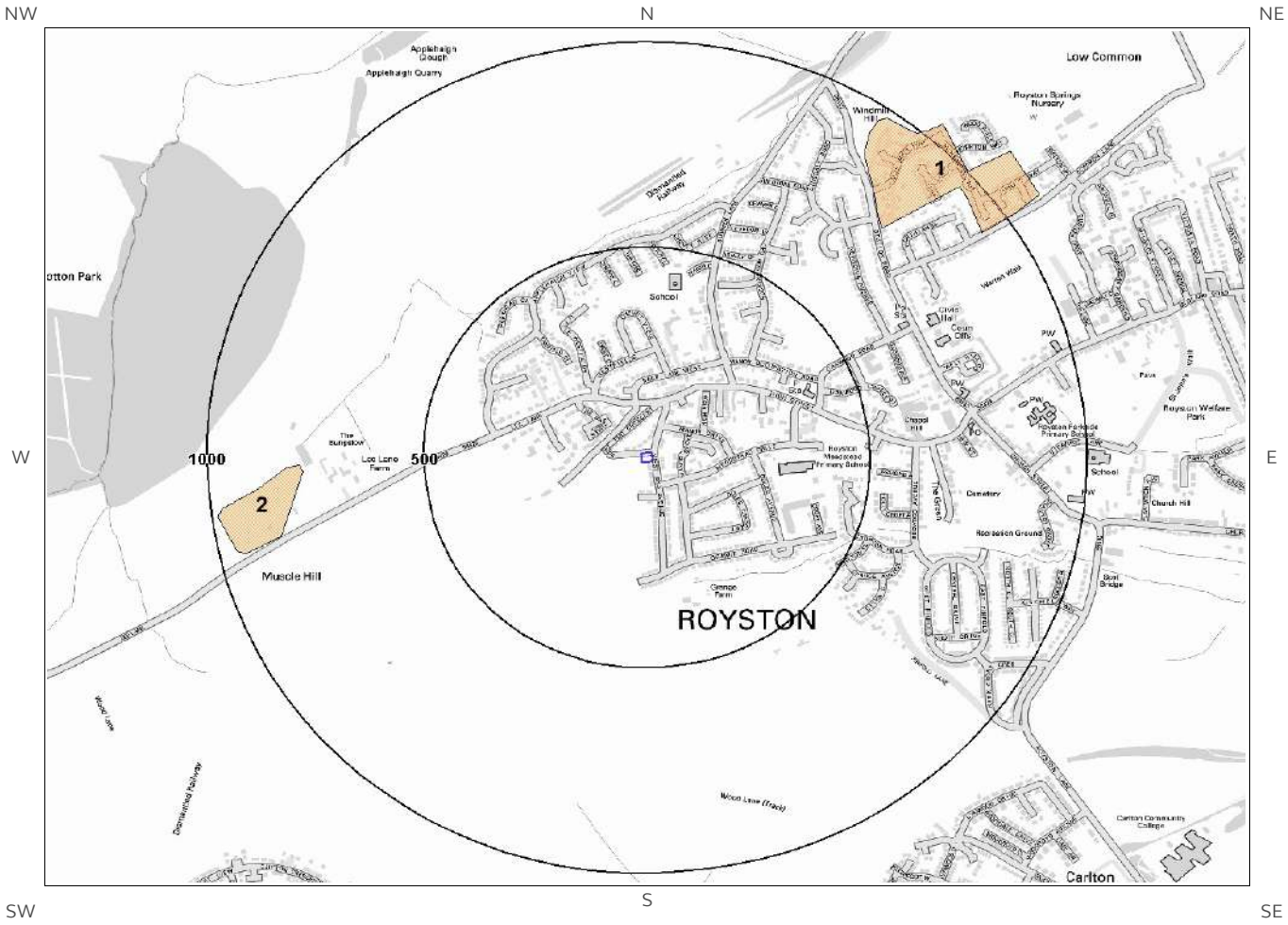
ID	Distance (m)	Direction	Category Description	Feature Description
26	31.0	S	ROCK	Coal seam, inferred
27	46.0	NW	FAULT	Normal fault, inferred
28	51.0	NW	ROCK	Coal seam, inferred
29	195.0	NW	FAULT	Normal fault, inferred
30	280.0	W	FOSSIL_HORIZON	Fossil horizon, marine band
31	474.0	SW	FAULT	Normal fault, inferred

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

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

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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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

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.1.1 Artificial/ Made Ground

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

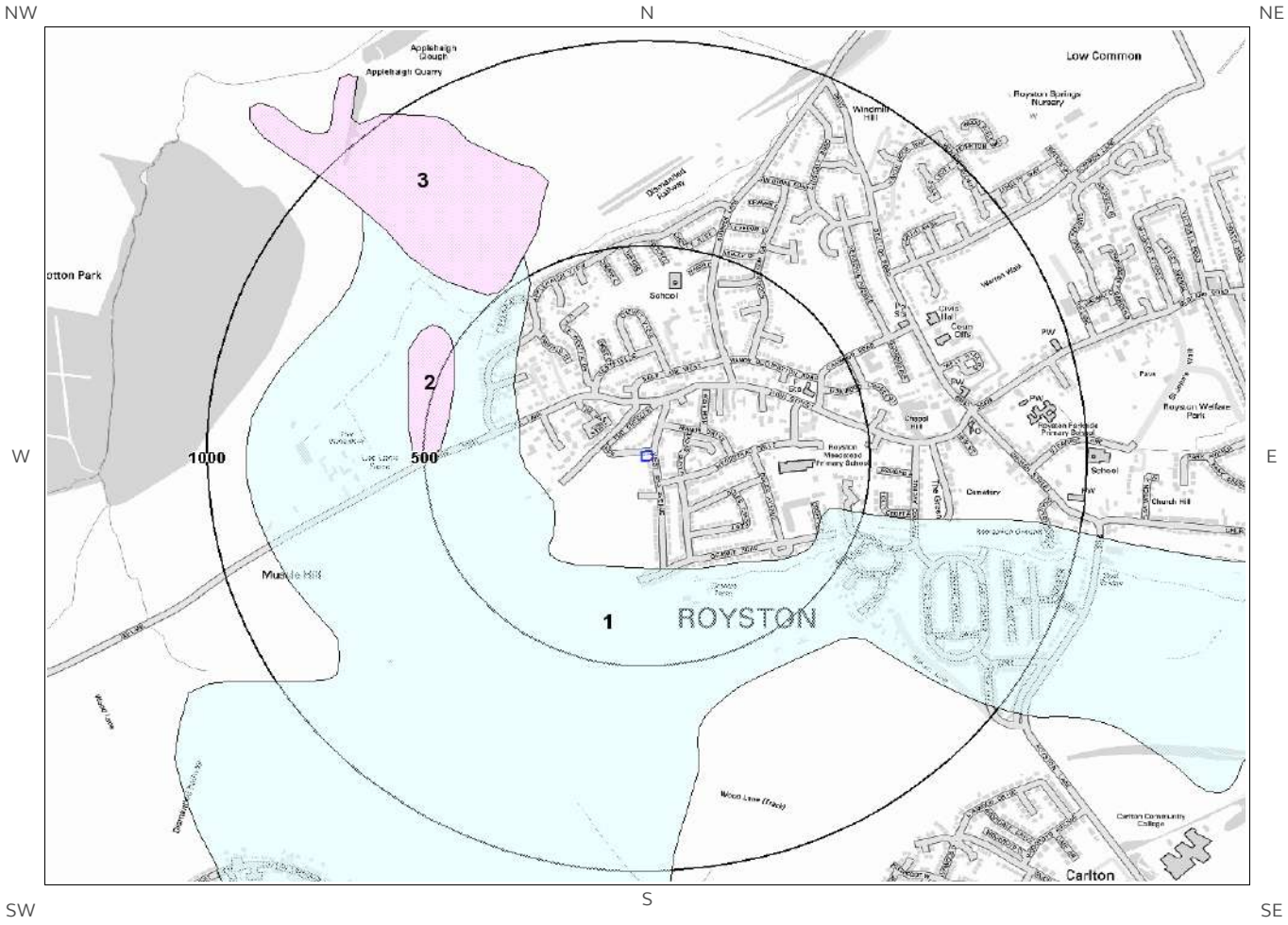
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	228.0	SW	TILMP-DMTN	TILL, MID PLEISTOCENE	DIAMICTON
2	449.0	W	GFDMP-XSV	GLACIOFLUVIAL DEPOSITS, MID PLEISTOCENE	SAND AND GRAVEL

2.2.2 Permeability of Superficial Ground

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

Database searched and no data found.

2.2.3 Landslip

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

Database searched and no data found.

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

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

2.2.4 Landslip Permeability

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
2	0.0	On Site	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
3	51.0	N	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
4	195.0	NW	ACR-SDST	ACKTON ROCK - SANDSTONE	WESTPHALIAN
5A	232.0	W	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
6	335.0	S	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
7	368.0	W	OR-SDST	OAKS ROCK - SANDSTONE	WESTPHALIAN

2.3.2 Permeability of Bedrock Ground

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

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

2.3.3 Faults

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

ID	Distance	Direction	Category Description	Feature Description
20	30.0	S	ROCK	Coal seam, inferred
21	46.0	NW	FAULT	Fault, inferred
22	51.0	N	ROCK	Coal seam, inferred
23	195.0	NW	FAULT	Fault, inferred
24	280.0	W	FOSSIL_HORIZON	Marine band

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

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

3 Radon Data

3.1 Radon Affected Areas

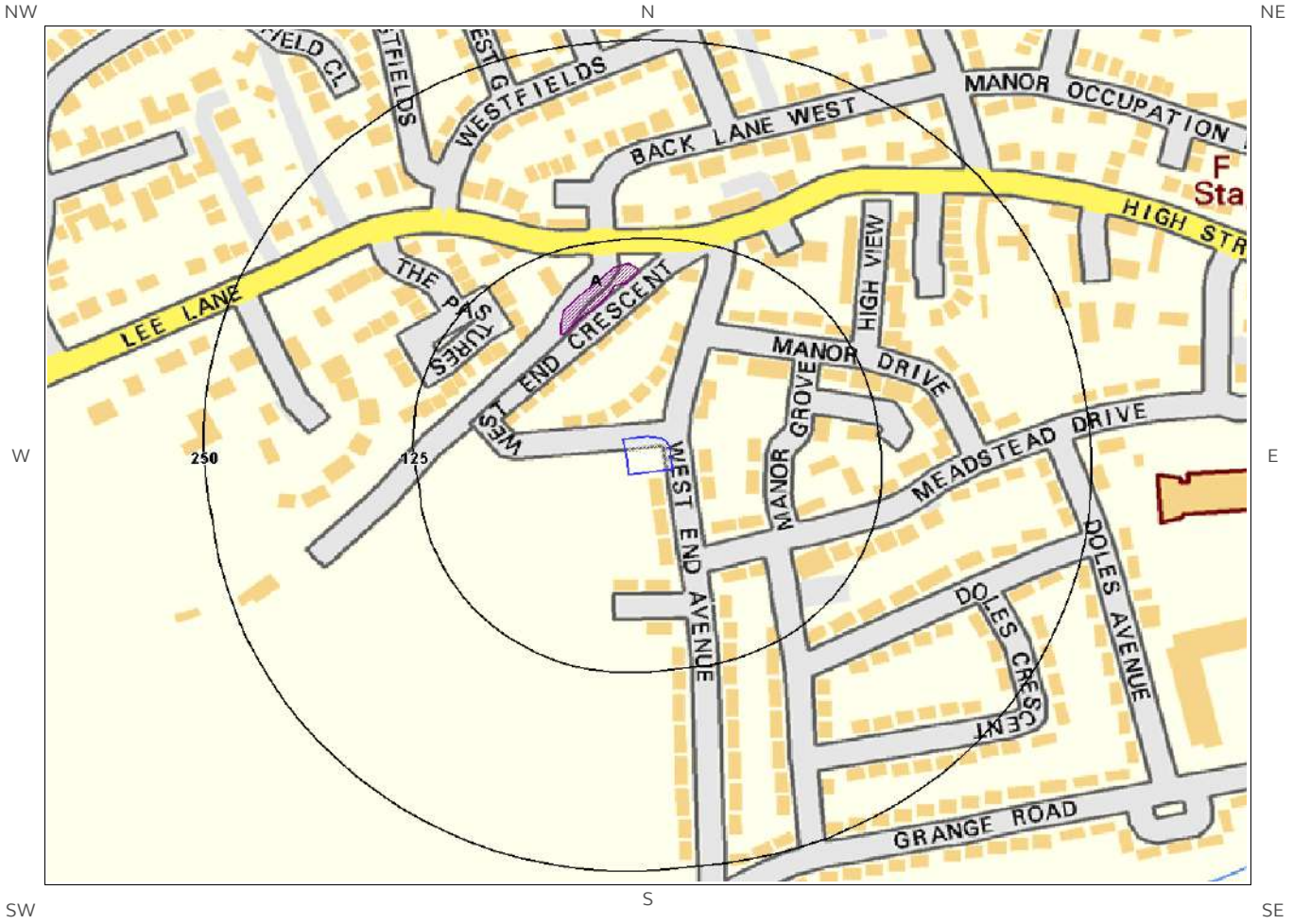
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

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

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4 Ground Workings Map



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

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

ID	Distance (m)	Direction	NGR	Use	Date
1A	75.0	NW	435407 411441	Pond	1891
2A	75.0	NW	435407 411441	Pond	1904

4.2 Historical Underground Working Features derived from Historical Mapping

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

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

Database searched and no data found.

4.3 Current Ground Workings

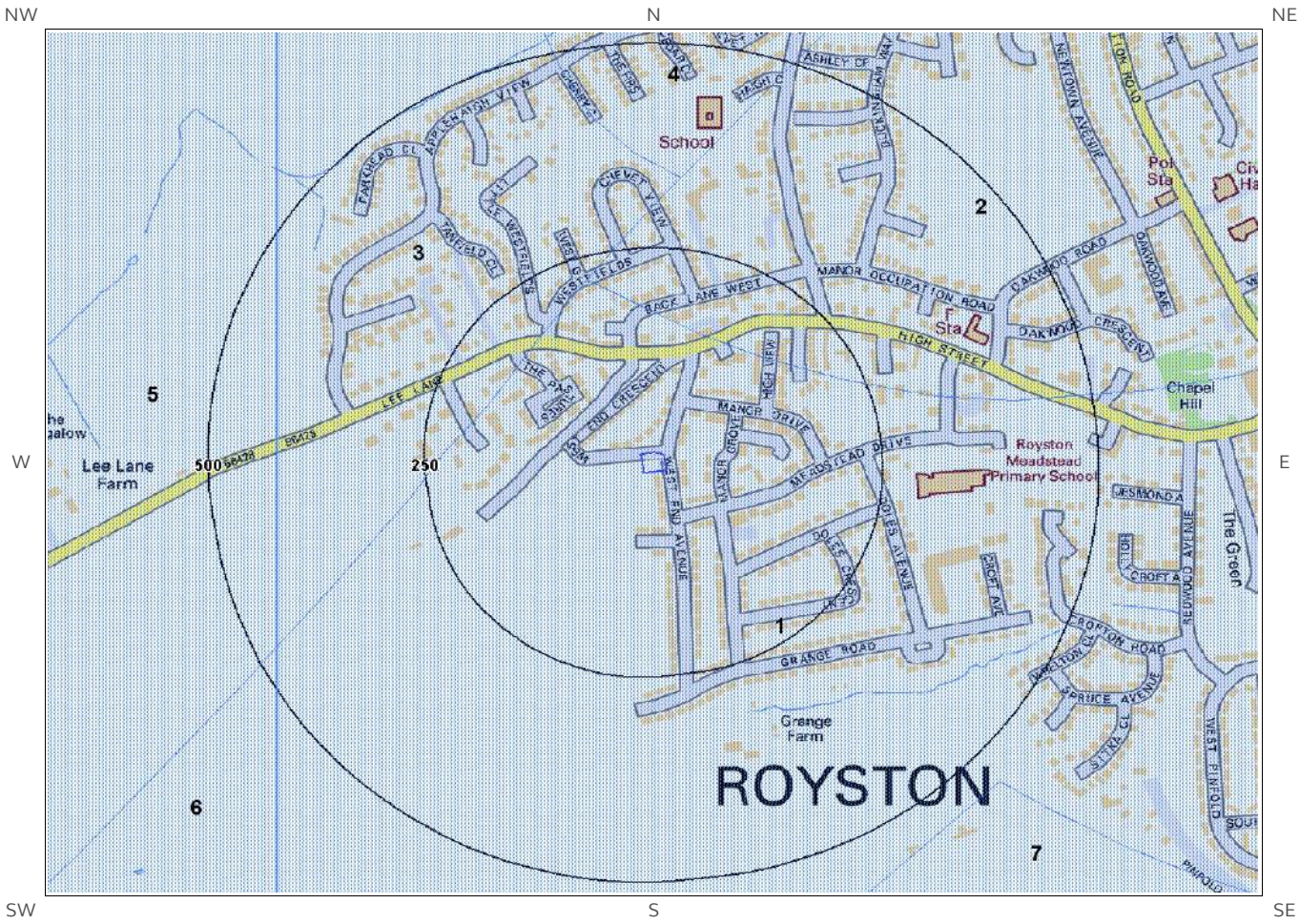
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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

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

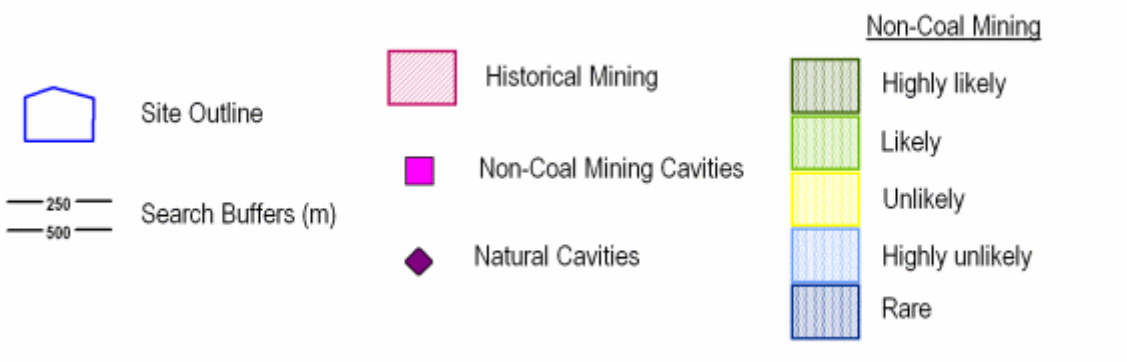
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	826.0	NE	435909 412036	Sandstone	Windmill Hill	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

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

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

Database searched and no data found.

5.2 Coal Mining

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

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

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

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

5.3 Johnson Poole and Bloomer

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

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

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

5.4 Non-Coal Mining

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

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

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	152.0	N	Sheffield Area	Iron Ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
3	178.0	NW	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	337.0	N	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
5	421.0	W	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
6	475.0	SW	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	540.0	SE	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	753.0	S	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	753.0	S	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

5.6 Natural Cavities

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

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

Database searched and no data found.

5.7 Brine Extraction

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

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

Database searched and no data found.

5.8 Gypsum Extraction

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

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

Database searched and no data found.

5.9 Tin Mining

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

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

Database searched and no data found.

5.10 Clay Mining

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

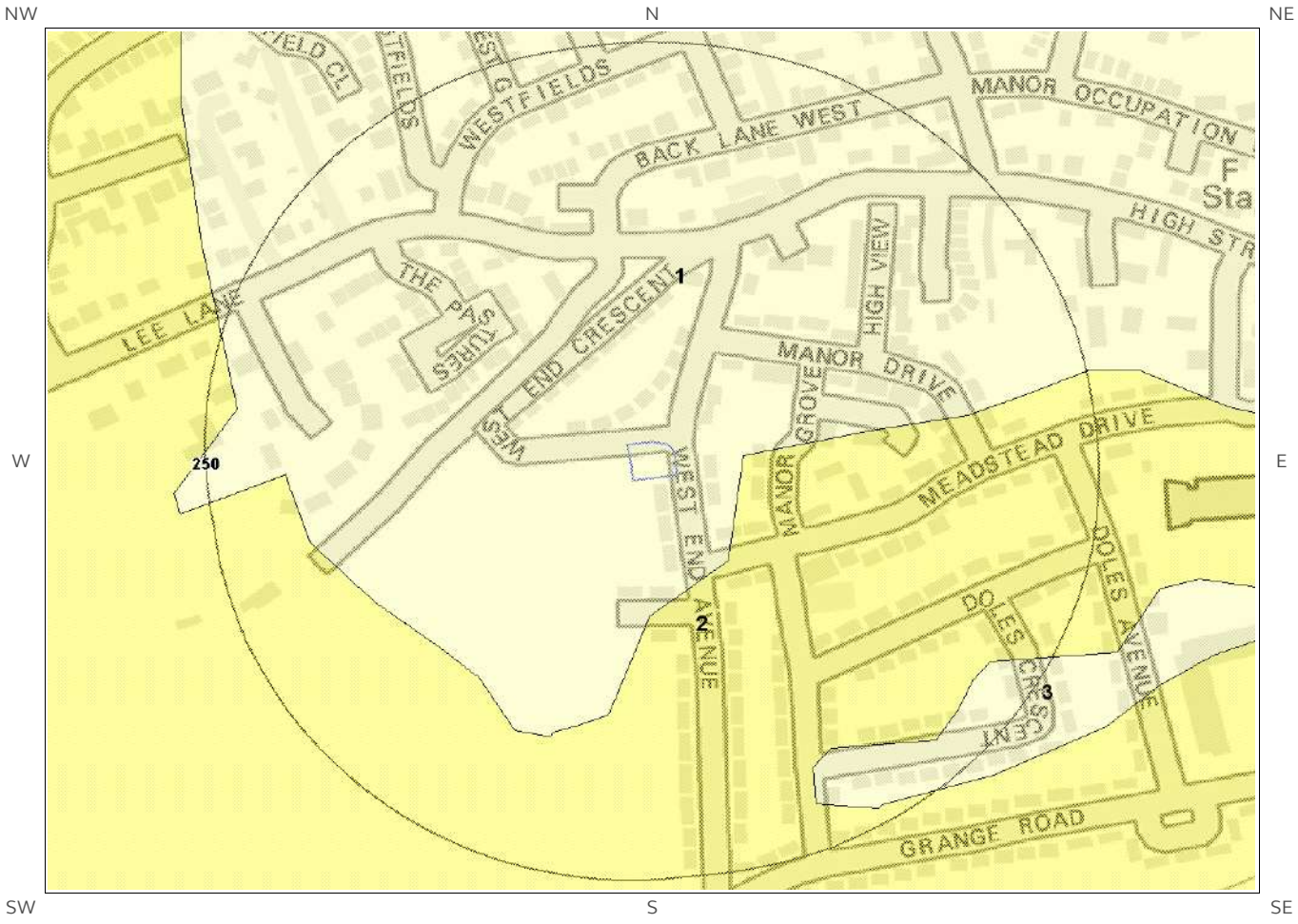
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

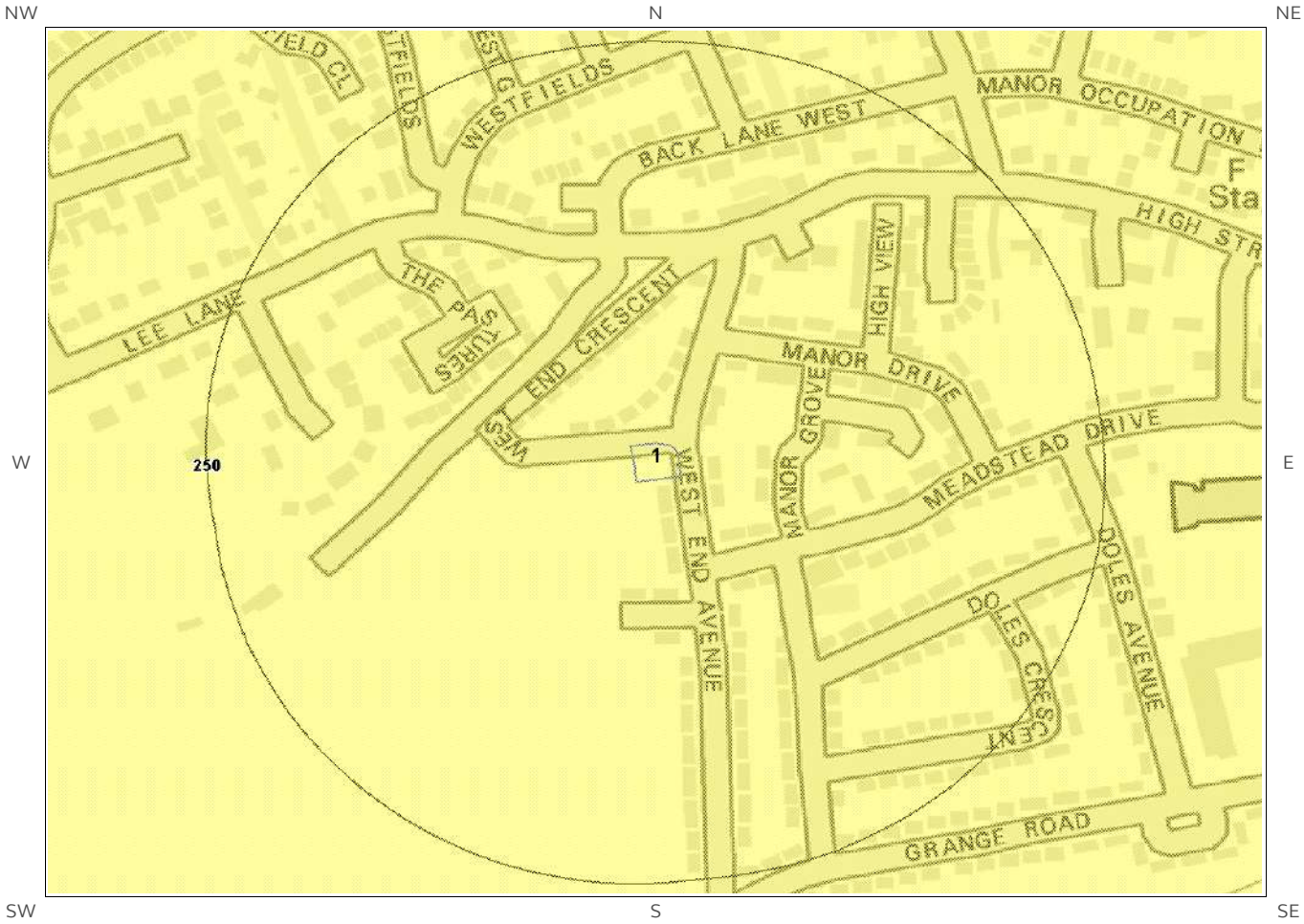


Shrink Swell Clay Legend

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6.2 Landslides Map



Landslides Legend

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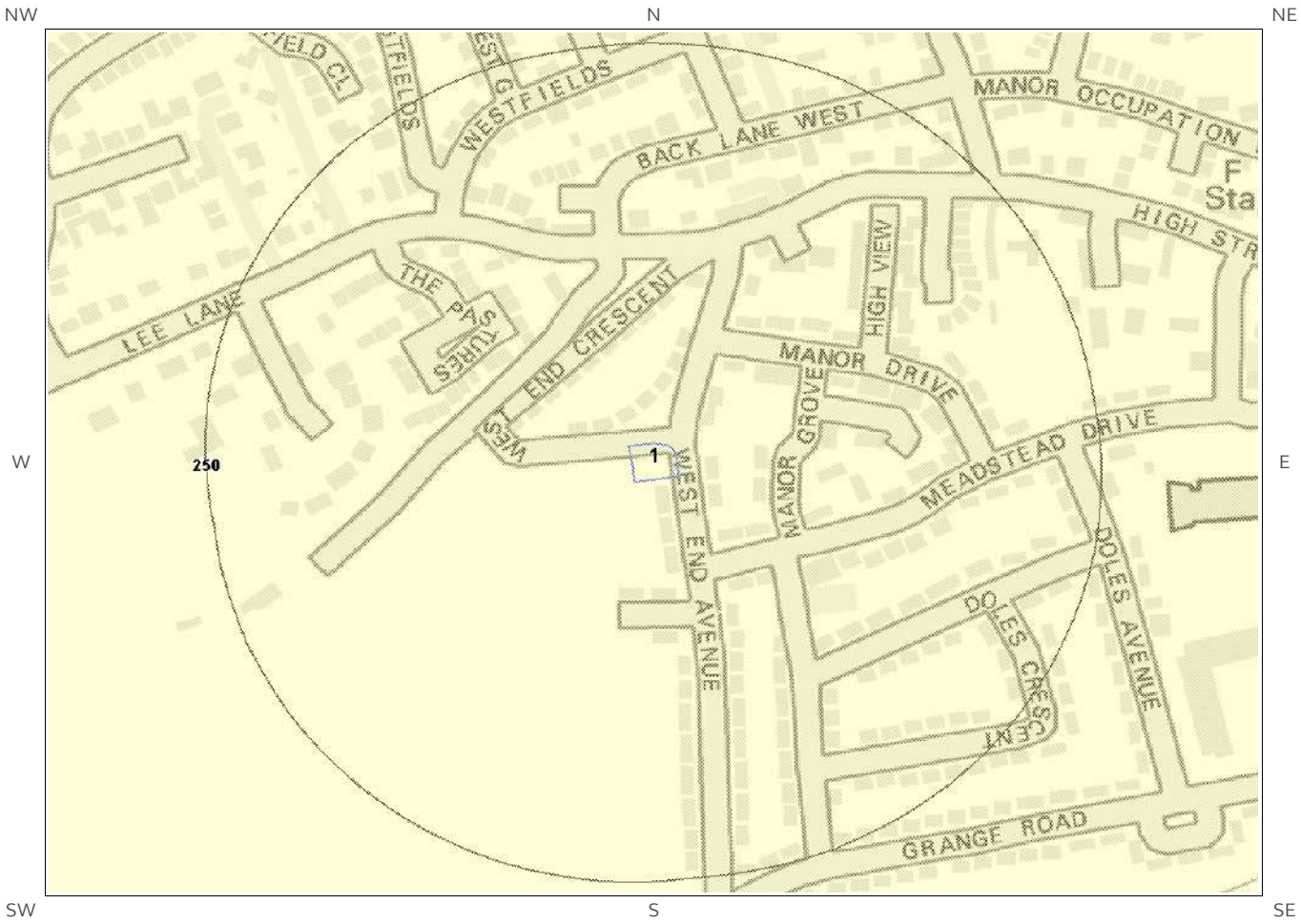
Site Outline

125
250
Search Buffers (m)

No Data / Null
Negligible
Very Low

Low
Moderate
High

6.3 Ground Dissolution of Soluble Rocks Map

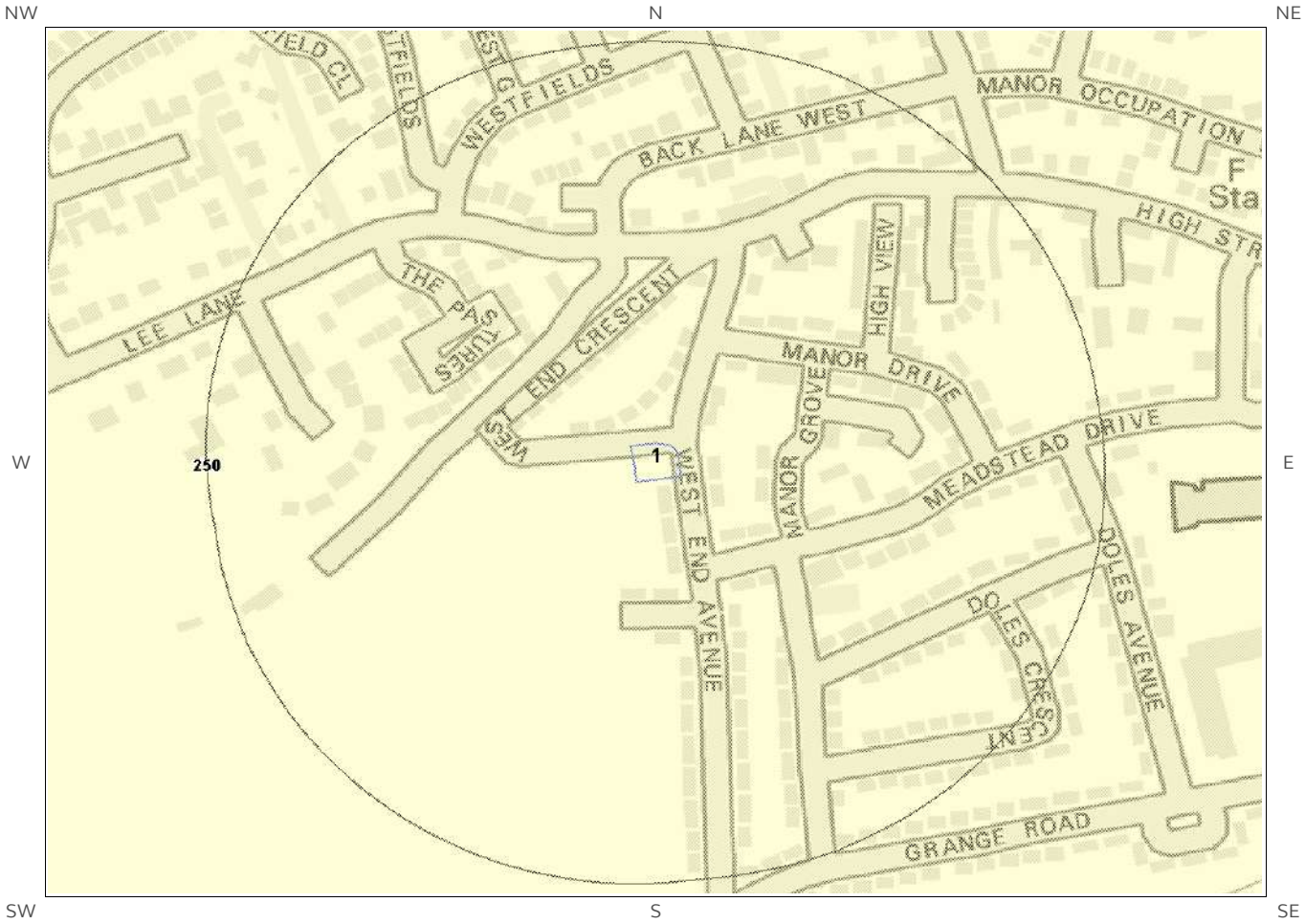


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Ground Dissolution Soluble Rocks Legend



6.4 Compressible Deposits Map

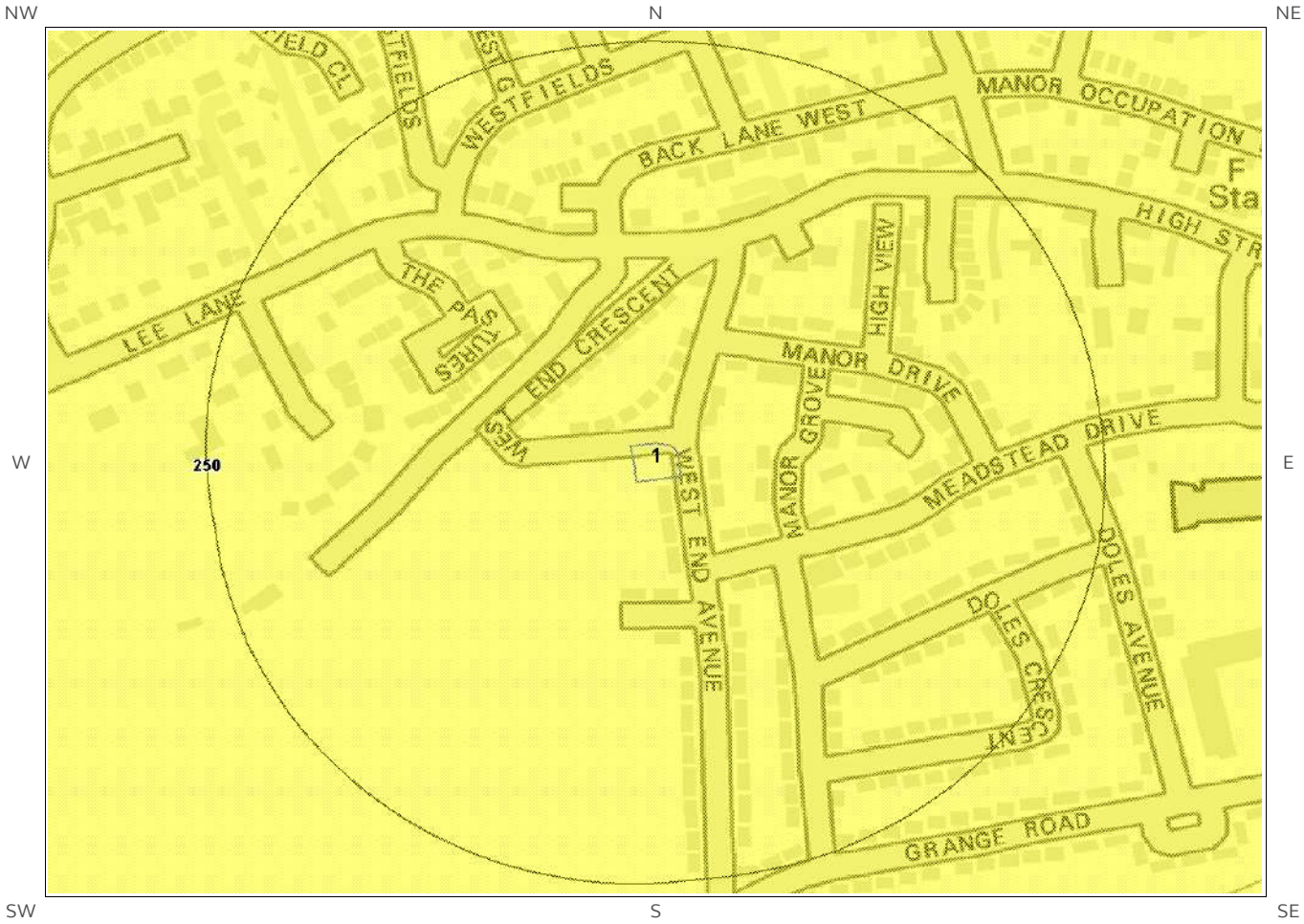


Compressible Deposits Legend

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6.5 Collapsible Deposits Map

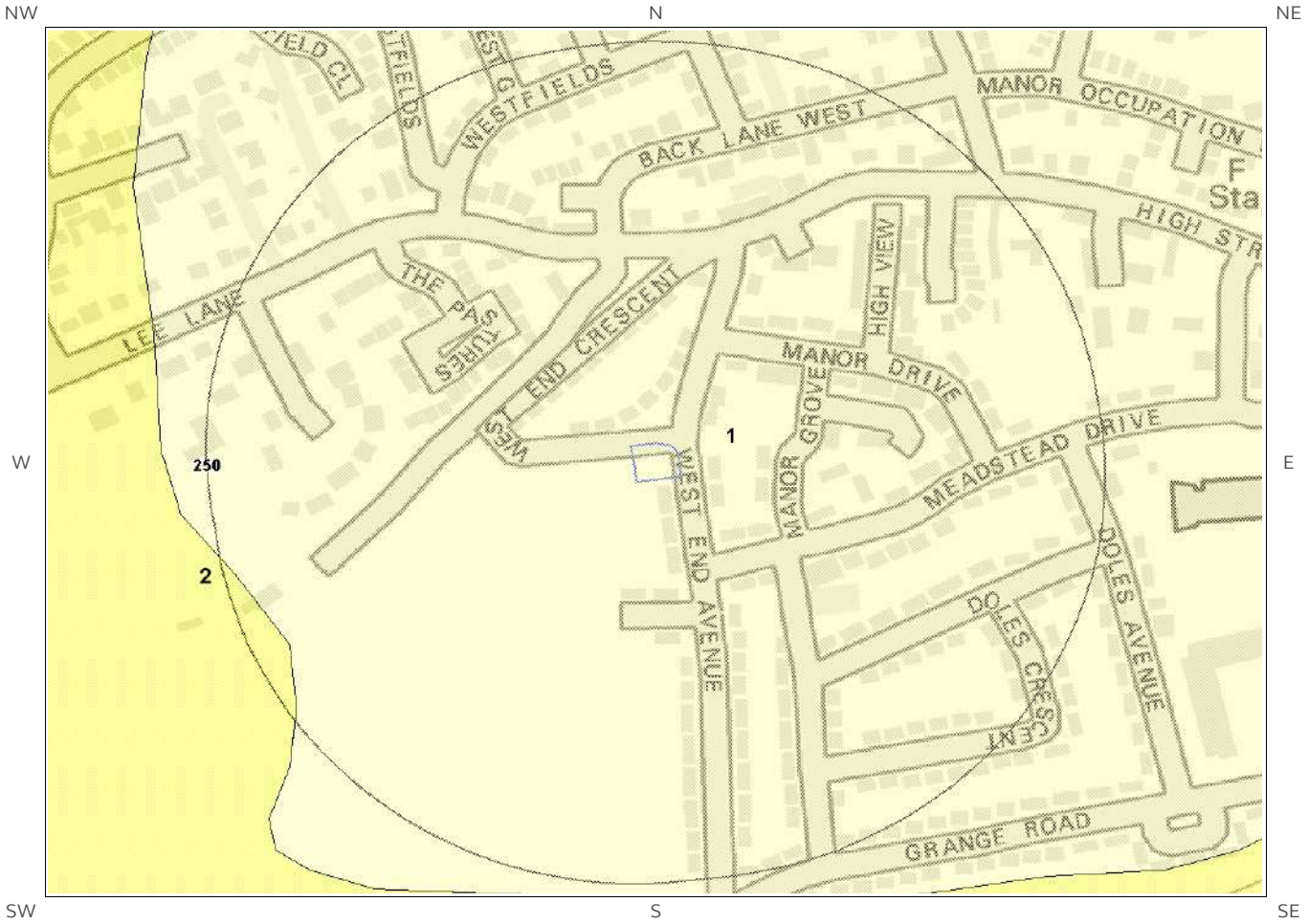


Collapsible Deposits Legend

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6.6 Running Sand Map



Running Sand Legend

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6 Natural Ground Subsidence

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

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

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

6.1 Shrink-Swell Clays

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.
2	37.0	E	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

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

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

6.3 Ground Dissolution of Soluble Rocks

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

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

6.4 Compressible Deposits

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

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

6.5 Collapsible Deposits

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

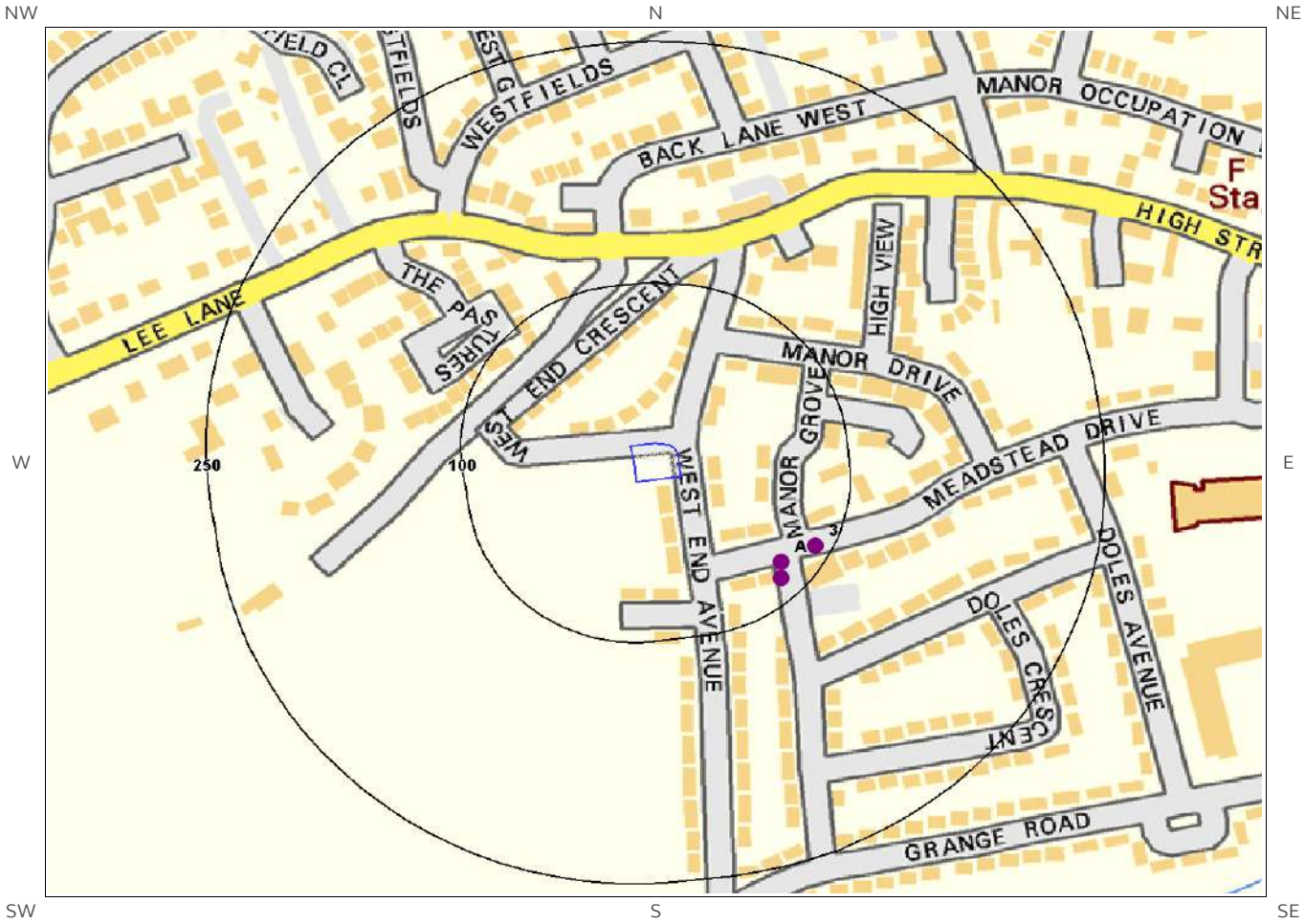
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

6.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	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.

7 Borehole Records Map



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

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

Records of boreholes within 250m of the study site boundary: 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1A	80.0	SE	435510 411280	SE31SE121	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP2
2A	87.0	SE	435510 411270	SE31SE122	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP3
3	90.0	SE	435530 411290	SE31SE120	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP1

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.

8 Estimated Background Soil Chemistry

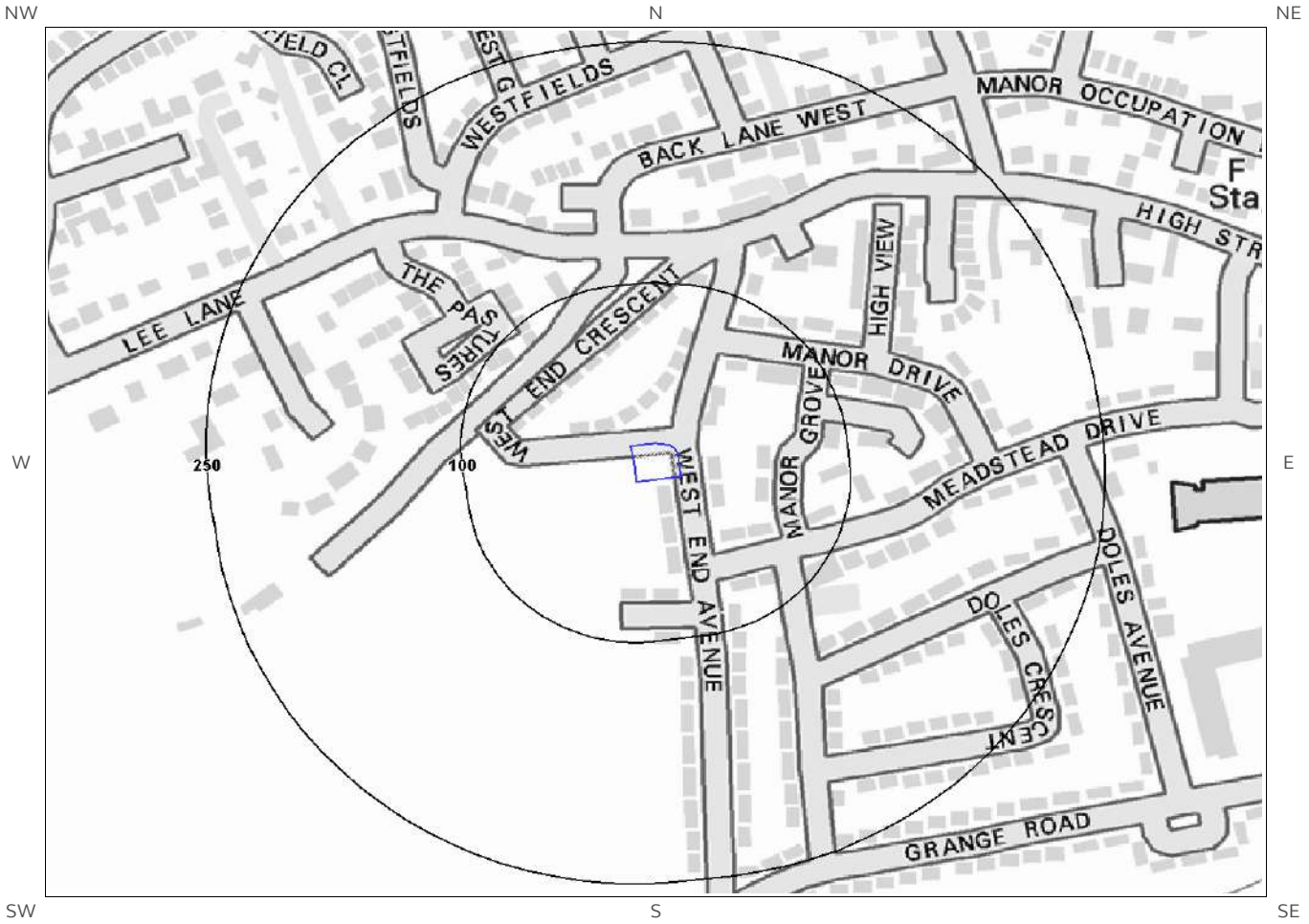
Records of background estimated soil chemistry within 250m of the study site boundary: 3

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
14.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
49.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg

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

9 Railways and Tunnels Map



Railways and Tunnels Legend

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- Site Outline
- 250 / 500 — Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

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

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

Database searched and no data found.

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

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

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

Database searched and no data found.

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

9.2 Historical Railway and Tunnel Features

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

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

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

9.3 Historical Railways

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

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

Database searched and no data found.

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

9.4 Active Railways

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

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

Database searched and no data found.

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

9.5 Railway Projects

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

Is the study site within 5km of the route of the High Speed 2 rail project?	Yes
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

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

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

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

Contact Details

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

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

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

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**

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Standard Terms and Conditions

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

Appendix E

Coal Authority and SYMAS Reports

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report





WEST END AVENUE
WEST END AVENUE
SOUTH YORKSHIRE
S71 4LN



Date of enquiry:	12 June 2017
Date enquiry received:	12 June 2017
Issue date:	12 June 2017
Our reference:	51001479605001
Your reference:	GS-3977680

CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

GROUNDSURE LIMITED

Enquiry address

WEST END AVENUE, WEST END AVENUE, SOUTH YORKSHIRE, S71 4LN



Approximate position of property

Map data

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200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	No
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 6 seams of coal at 270m to 560m depth, and last worked in 1979.

Any movement in the ground due to coal mining activity should have stopped.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

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

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

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

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

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is in an area where a notice to withdraw support was given in 1947.

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

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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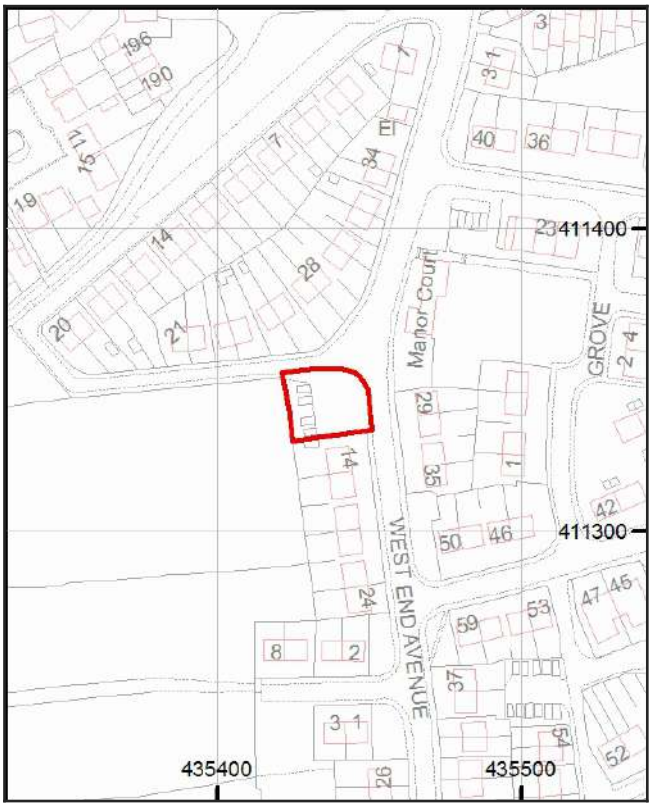
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



Map data

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/thecoalauthority
/coalauthority

DEC DIRECTORATE
South Yorkshire Mining Advisory Service

BARNSLEY
Metropolitan Borough Council

To:	NPS		**FAO:**	Steven Chitty	
My Ref:	M230/8		**Your Ref:**		
Date:	18th November 2014	**Enquiries to:**	Mr. M. Lyons	**Ext:**	2690
Subject:	LAND AT MANOR GROVE, MANOR DRIVE AND MEADSTEAD DRIVE, ROYSTONE, BARNSLEY.				

Further to your consultation request of the 11th November 2014, regarding development opportunity at the three above named locations, I am pleased to provide our report as per below.

SITUATION

The three sites under consideration at Royston are shown edged orange on the attached plan no. M230/8A.

GEOLOGY

Geological records show that the sites are located mainly on the Mexborough Rock Sandstone of the Middle Coal Measures which dips generally in a north-easterly direction in this vicinity. Geological faulting is conjectured to the north-west and the sandstone bedrock may be fissured both naturally and mining induced by the past deep operations as detailed below.

The Royston (or Sharlston Top) coal seam is conjectured to outcrop to the south of the sites as indicated on plan. According to the available information this seam is of around 0.5m thickness in this locality. From Manor Grove eastwards, the actual seam outcrop position has been proved, during past investigations, to deviate further southwards from that conjectured – as illustrated on plan. This would mean that the coal seam would be expected at a greater depth beneath the Meadstead Drive site, possibly in excess of 8m.

MINING

Shallow Mining

The shallow coal seam in this area is rarely known to have been worked historically at shallow depth in the wider vicinity. The likelihood therefore of any historic underground workings being present within this coal is considered as Low.

Deep Mining

The site has been affected by deep coal mining on several occasions, the latest being around 1979. Settlement from these mining operations will now be long complete and as the site is remote from any active coalfield it will not be affected by deep mining subsidence for the foreseeable future.

MINE ENTRIES

None known in this vicinity and the likelihood of any unchartered mine entries being encountered at this location is considered as Low.

FORMER LAND USE

The relevant Ordnance Survey Sheets and National Grid Sheets have been checked and there is no evidence of past industrial use in the vicinity of these sites.

LANDFILL

According to the Borough Landfill Register the site does not lie within 250m of any landfill operation.

CONCLUSIONS

1). The site is stable from the deep mining subsidence aspect and as the scheme is remote from any currently active coalfield it should remain so for the foreseeable future.

2). Although the Royston coal seam may be at shallow depth beneath the site, the likelihood of historic underground workings causing a stability issue at the surface is considered as **LOW** in this instance.

3). Considering the mining and geological details for this location, the likelihood for encountering an old unchartered mine entry within the site is considered as **LOW.**

4). The site is underlain by sandstone that may be fissured both naturally and/or mining induced. Future development may require suitably designed foundations where any weak ground is encountered, and treatment works to stabilise the feature may also be required in sever instances.

5). Historical plan information indicates there has been no evidence of former industrial land use in the vicinity of the site which could cause contamination problems and no landfill sites are recorded with 250m.

THIS REPORT IS BASED ON AND LIMITED TO THE RECORDS IN THE POSSESSION OF SYMAS AT THE TIME THE ENQUIRY IS ANSWERED.

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This report was prepared by Mark Lyons on the 18th November 2014.



P. James
Principal Mining Engineer.

DRAWING TITLE

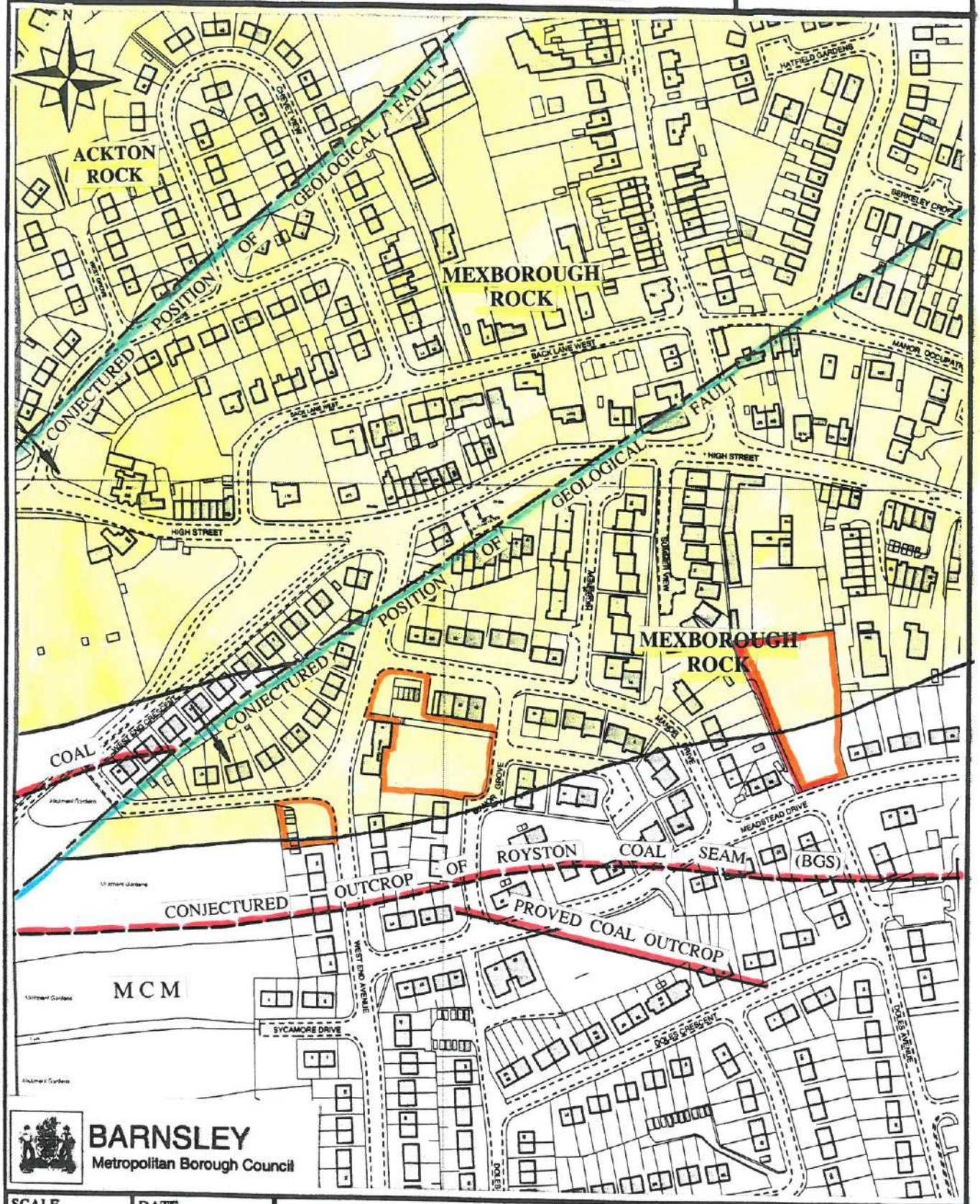
SITES AT MANOR GROVE,

MEADSTEAD DRIVE AND WEST END AVENUE

ROYSTON, BARNSLEY.

DRAWING NO.

M230/8A



BARNSLEY
Metropolitan Borough Council

SCALE	DATE		O.S REFERENCE
1:2500	14 / 11 / 14	SOUTH YORKSHIRE MINING ADVISORY SERVICE	SE 3511
DRAWN BY: AS	CHECKED BY: MAC		P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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APPENDIX D:

HAMSON BARRON SMITH – PRELIMINARY LAND CONTAMINATION AND GEOTECHNICAL RISK ASSESSMENT – DOLES CRESCENT – 23-24-18-1-6007/DSR1 – JULY 2017

Architecture
Surveying
Building Services Engineering
Engineering
Strategic Development & Consultancy



Doles Crescent
Barnsley

Preliminary Land Contamination and Geotechnical Risk Assessment

On behalf of Barnsley Metropolitan Borough Council

Report 23-24-18-1-6007/DSR1
July 2017

Report Issue Record

Project No.:	23-24-18-1-6007
Project Title:	Doles Crescent
Site Location:	Royston, Barnsley
Client:	Barnsley Metropolitan Borough Council
Report Title:	Preliminary Land Contamination and Geotechnical Risk Assessment
Issue Date:	13 July 2017
Report No.:	23-24-18-1-6007/DSR1
Revision:	-

	Written	Reviewed and Approved
Name	**Catherine Riley** BEng, BSc, CEng, CEnv, MCIWEM	**Craig Roberts** BSc, FIEnvSc, CEnv
Signature		
Position	Senior Geo-Environmental Engineer	Technical Director

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A Outline Development Plan
B Historic Maps
C Groundsure EnviroInsight Report
D Groundsure GeoInsight Report
E Coal Authority and SYMAS Reports

Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Doles Crescent
Location	Royston, Barnsley, S71 4LA. NGR 435506,411247.
Approximate area	0.05Ha
Topography	Elevation 65m OD.
Current land use	Private garages.
Proposed development	Low rise residential. Demolish existing garages and replace with one detached bungalow.

SITE SETTING	
Geology	Pennine Middle Coal Measures (mudstone, siltstone and sandstone). No superficial Deposits shown.
Radon	No radon protective measures are required.
Hydrogeology	Secondary A Aquifer. The site does not lies within a source protection zone.
Hydrology	An unnamed tertiary river lies circa 200m south.
Landfill sites	No landfills located within 500m of the site.
History	The site was undeveloped agricultural land until the 1970s, when the existing garages were constructed.
Previous site investigations	Hamson Barron Smith have not been made aware of any previous investigations, which may have been undertaken at this site.
Anticipated ground conditions	Firm or stiff clays derived from weathering of the mudstone bedrock. Coal Measures bedrock at shallow depth.

GEOTECHNICAL	
Foundations	Shallow spread foundations should be suitable. Bearing capacity to be determined from site investigation, but are likely to be sufficient for conventional low rise structures.
Shrinkable soils	Soils may be shrinkable.
Buried concrete	Significant concrete protection measures unlikely to be required.
Floor slabs	Suspended floor slab may be required.
Slope stability	Site and adjacent area are level and therefore no risks.
Pavement	CBR values likely to be adequate for road and car park construction.
Soakaways	Underlying geology may not be suitable for soakaway drainage, subject to full scale testing to confirm and calculate infiltration rates.
Natural cavities	None expected.
Mining	Royston coal seam (circa 0.50m thick locally) is conjectured to outcrop to the north of the site, as dip is generally to the north and east it is unlikely to be present at shallow depth beneath the site. The SYMAS report indicates that the shallow coal seam in this area is historically rarely worked in the wider vicinity. Therefore, the likelihood of historical ground workings being present is considered to be negligible.

CONTAMINATION	
Human health	Potential localised hydrocarbons and solvents associated with car maintenance and potential asbestos containing roofing sheets have been identified. If present, it is considered that these may pose a low to medium risk to identified human receptors.
Controlled waters	Potential localised sources of hydrocarbons and solvents associated with car maintenance pose low to medium risk to the underlying a Secondary A Aquifer. Risks to the surface water, are given the distance from the site considered low.
Gas protection	Risks from ground gases are considered to be low. No radon protection measures required.

1 Introduction

In June 2017, Hamson Barron Smith (HBS) was commissioned by Barnsley Metropolitan Borough Council to undertake a Preliminary Land Contamination and Geotechnical Risk Assessment at Doles Crescent, Royston, Barnsley for the proposed redevelopment of the site.

It is understood that the site is being considered for redevelopment of one detached bungalow. A provisional development sketch has been provided by Barnsley Metropolitan Borough Council and is presented in Appendix A.

The site comprises of four private garages associated with nearby residential properties. The location of the site is shown on Figure 1.

1.1 Project Requirements

The overall objectives of this Phase I assessment are to determine the potential risks from contamination and to identify potential geotechnical risks and constraints.

The objectives of the Phase I report are to:

- Establish the environmental setting, including sensitivity in relation to human health, surface water, groundwater and ecological receptors.
- Review historical and recent land uses to assess the potential for contamination to be present from past and current land-use.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities that may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks, including mining.
- Develop a ground model for the site.

1.2 Information Sources

During the production of this report, the following sources have been reviewed:

- An EnviroInsight Report prepared by Groundsure (Report Number GS4020218 dated 26th June 2017).

- A GeoInsight Report prepared by Groundsure (Report Number GS4020219 dated 26th June 2017).
- A CON29M Non-Residential Mining Report prepared by the Coal Authority (Report Number 51001489753001 dated 27th June 2017).
- A Mineral Report prepared by South Yorkshire Mining Advisory Service (SYMAS) (Report Number M230/8 dated 18th November 2014)
- Historic Ordnance Survey maps.
- British Geological Survey maps.
- British Geological Survey borehole records.
- Environment Agency landfill records.
- Environment Agency groundwater data.

1.3 Previous Investigations

HBS has not been made aware of any previous investigations which may have been undertaken at this site.

2 Site Location

Address: Doles Crescent, Royston, Barnsley.

Post Code: S71 4LA.

National Grid Reference: 435506,411247.

The site location is shown on Figure 1 and a more detailed plan on Figure 2.

Full details of the site's features and land use are presented in Section 3.

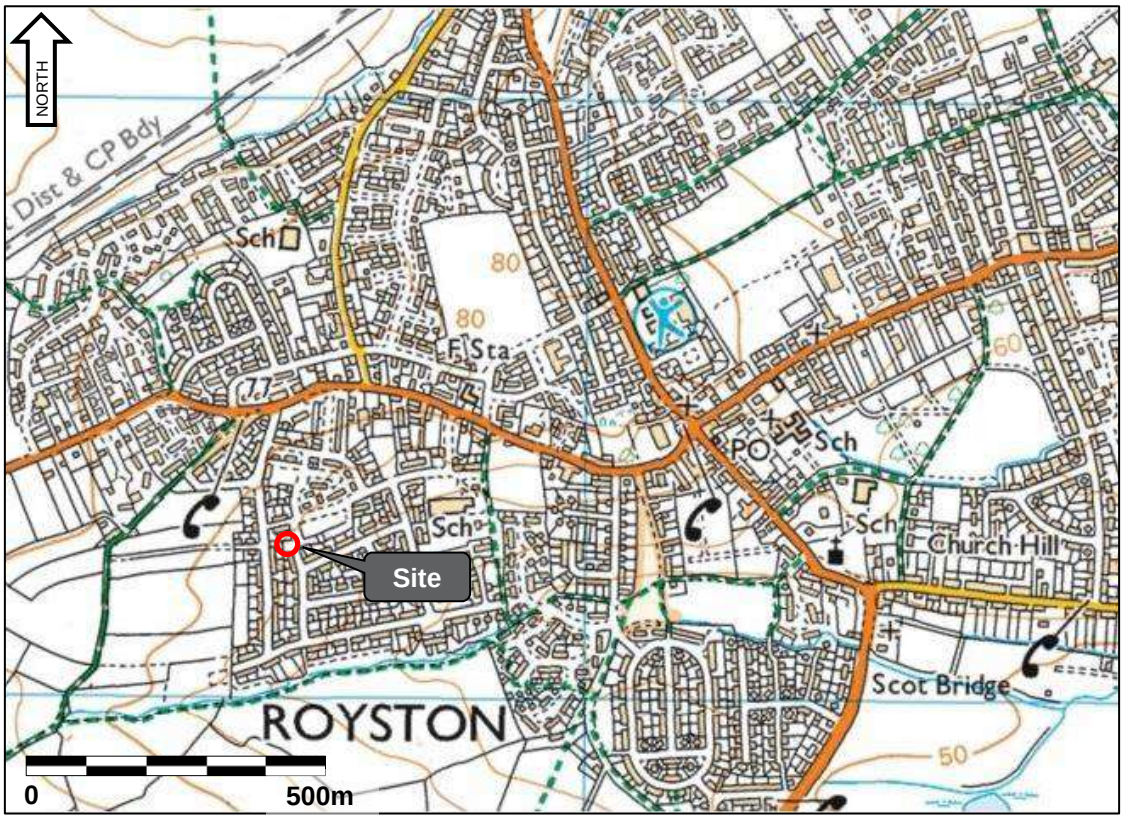


Figure 1 Site location plan

3 Site Description

The site consists of two rows of private garages to the west of Doles Crescent in the village of Royston. The site occupies an area of <0.1Ha and the site is topographically level with an elevation of around 65m OD.

A site walkover survey was undertaken on 13th June 2017 by HBS. There are four private garages left on site; one on the southern edge and three on the northern edge with a tarmacked drive between. Foundation of two former garages are also present on the southern edge either side of the remaining garage.

Two small areas of grassed soft landscaping area present to the east of the site.

An area of open burning was noted in the south west corner of the site.

3.1 Adjacent land Use

The site is bounded on all sides by residential properties.

Figure 2 shows the site setting.

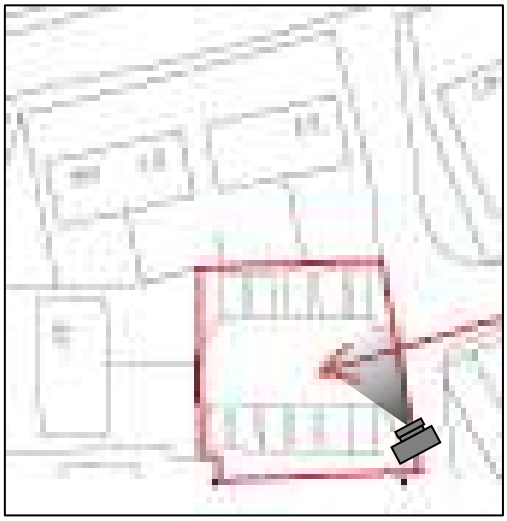


Figure 2 Site layout

3.2 Photographs

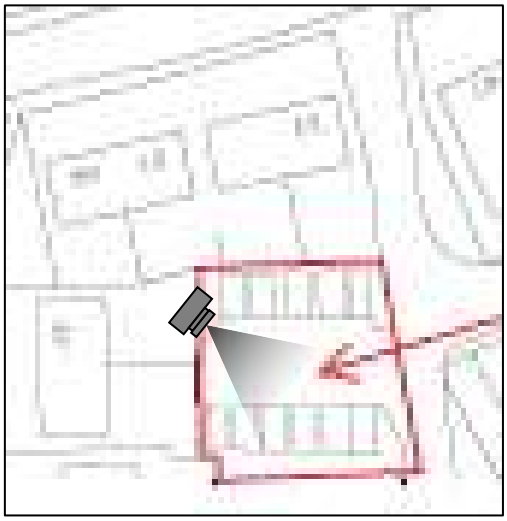


Photograph 1 The garages along the northern boundary, looking north west.





Photograph 2 Single garage left on southern side, looking north east.



4 Environmental Setting

4.1 Geology

The 1:50,000 scale British Geological Survey (BGS) geological mapping indicates the site to be underlain by the Pennine Middle Coal Measures. Superficial deposits are not anticipated to be present beneath the site.

The Pennine Middle Coal Measures are described by the BGS as "*Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit*".

There are no BGS borehole records in the vicinity of the site.

4.2 Soil Geochemistry

BGS estimated soil geochemistry information is included as part of the Groundsure GeoInsight report. The BGS digital estimated soil chemistry data indicates the estimated geometric mean concentrations (mg/kg) of Arsenic, Cadmium, Chromium, Nickel and Lead in topsoil derived by spatial interpolation of the point source soil chemistry data. The original samples were collected and analysed as part of the BGS Geochemical Baseline Survey of the Environment (G-BASE) project.

Table 1 summarises the typical estimated concentrations of each determinant in topsoil in the locality of the site.

Table 1: Summary of BGS Estimated Soil Geochemistry

Determinant	Concentration Range (mg/kg)
Arsenic	<15
Cadmium	<1.8
Chromium	90 – 120
Lead	<100
Nickel	15 – 30

4.3 Hydrogeology

The Environment Agency classifies the Pennine Middle Coal Measures at the site to be Secondary A Aquifer. The site does not lie within a Source Protection Zone and there are no groundwater abstractions within 2km.

This would suggest that groundwater would be of low sensitivity to any potential sources of on-site contamination.

4.4 Hydrology

The nearest surface water is an unnamed tertiary river which lies circa 200m south at its nearest point. The distance of the site from the surface water feature would suggest that surface water is considered to be of low sensitivity to any potential sources of contamination

4.5 Landfill Sites

There are no recorded current or historical landfill sites within 500m.

4.6 Radon

The Groundsure radon report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is between less than 1%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

4.7 Sensitive Land Uses and Designated Areas

The site is in a Nitrate Vulnerable Zone. Notton Wood a Local Nature Reserve and area of Ancient and Semi Natural Woodland lies circa 990m north west.

4.8 Land Use History

The historical land uses of the site and its surrounding area have been established from superseded editions of Ordnance Survey maps and are detailed in Table 2. Copies of the maps are included in Appendix B.

Table 2: Summary of Historical Maps

Date	On Site	Offsite
1854	The site is part of two larger undeveloped agricultural fields.	The general surrounding land use is agricultural with residential properties of the village of Royston present c.230m north. A pond marked “brick pond” lies c.350m north east.
1891-1893	No significant changes are evident.	No significant changes are evident.

Date	On Site	Offsite
1904-1906	No significant changes are evident.	A quarry is present c.550m east and a smithy c.600m south east.
1918	No significant changes are evident.	Limited Mapping: No significant changes are evident.
1930-1938	No significant changes are evident.	The village of Royston has expanded. The smithy is no longer marked. The pond is no longer marked and development of a new housing estate has occurred.
1948	No significant changes are evident.	No significant changes are evident.
1951-1956	No significant changes are evident.	No significant changes are evident.
1960-1966	No significant changes are evident.	The village of Royston has expanded with a residential housing estate constructed to the south east. The quarry is no longer marked.
1970-1978	Eleven buildings (garages) are present on site.	Further residential development has occurred.
1989-1993	No significant changes are evident.	No significant changes are evident.
2002	No significant changes are evident.	No significant changes are evident.
2010	No significant changes are evident.	No significant changes are evident.
2014	No significant changes are evident.	No significant changes are evident.

4.8.1 Summary of Development History

On site

The site was undeveloped agricultural land until the early 1970s, when a series of eleven garages were constructed. The garages are all still present on the newest large scale map i.e. the 1993 but only four are currently present on site. It is not clear on the small scale mapping when the garages were removed.

Off Site

The surrounding land use was typically undeveloped farmland becoming a mixture of agricultural land and residential properties. A pond was located 350m north west of the site. This pond was not shown on maps post dating 1930 and as residential housing / infrastructure has been constructed within its footprint it is assumed that it was backfilled. The nature of material used to backfill the pond is not known. A quarry was present circa 550m from the early 1900s to the later 1950s. The nature of material used to backfill the quarry is not known.

4.9 Statutory Authority Records

A review of public registers contained within the Groundsure EnviroInsight report has been undertaken. These entries relate to trade directories, pollution control registers, hazardous sites, enforcement notices etc. None of the entries are considered to be of relevance to the site, for full details of all entries, reference should be made to the EnviroInsight report in Appendix C.

5 Geotechnical Assessment

The published geological information (Section 4.1) indicates that the site is likely to be underlain by clays of weathered mudstone bedrock of the Pennine Middle Coal Measures.

An assessment of potential geotechnical risks based on the information from the Groundsure GeoInsight Report and available geological information is presented in the following sections. The risks are summarised in Table 4. The Report is reproduced in Appendix D.

5.1 Deep Made Ground

It is likely that some Made Ground would be present, resulting from the development of the site (series of garages). Deep Made Ground resulting from infilling or significant raising of levels is considered unlikely however.

5.2 Buried Structures

Former foundations associated with the current and previous development of the site prior to current layout are likely to be present.

5.3 Compressible Soils

The Groundsure GeoInsight report states that the Compressible Ground risk at the site is “negligible”. Based on the expected geology, compressible soils are not anticipated.

5.4 Shrinking / Swelling Clay

The Groundsure GeoInsight report states that the Shrinking or Swelling Clay risk at the site is “very low”. This is based on the anticipated Pennine Middle Coal Measures. However, the near surface soils may comprise clays derived from weathering of the mudstones in the Coal Measures and therefore may potentially be shrinkable.

5.5 Collapsible soils

The Groundsure GeoInsight report states that the Collapsible Ground risk at the site is “very low”. Based on the anticipated ground conditions, collapsible soils are not expected.

5.6 Aggressive Ground Conditions for Concrete

Based on the published geology, the anticipated soils are not expected to contain significantly elevated concentrations of soluble sulphates or pyritic materials which may oxidise to form soluble sulphates.

5.7 Running Sands / Excavation Instability

The Groundsure GeoInsight report states that the Running Sand risk at the site is "negligible". Based on the anticipated ground conditions, running sands are not expected.

5.8 Groundwater

No evidence of a high water table (such as ponding water, hydrophilic plants, soft ground etc) was noted during the site walkover.

5.9 Slope Stability

The Groundsure GeoInsight report states that the Landslide risk at the site is "Very low".

The site is topographically flat. Provided no significant alterations to the site's topography are made no issues with stability are anticipated. Any proposed slopes or temporary cutting for retaining systems should be carefully assessed however.

5.10 Solution Features / Natural Cavities

The site is expected to be underlain by Pennine Middle Coal Measures which are not prone to dissolution.

The Groundsure GeoInsight report states that the Ground Dissolution risk at the site is "negligible" and no solution features are recorded within 1km.

5.11 Underground Mining

The GeoInsight report states that the site is within an area affected by coal mining. A Coal Authority Mining Report was obtained by HBS, this report confirmed:

- The property is in the likely zone of influence from workings in six seams of coal at 270m to 580m depth, and last worked in 1979. Any movement in the ground due to coal mining activity should have stopped.
- There are no known mine entries on or within 20m of the site.
- 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.
- The property is not within the boundary of an opencast site from which coal has been or is due to be removed by opencast methods.
- The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994.
- The Coal Authority has no record of a mine gas emission requiring action.

The SYMAS Report indicates that the Royston coal seam (circa 0.50m thick locally) is conjectured to outcrop circa 60m to the north east of the site, however the seam outcrop has been proven during past investigation to deviate further southward from the conjectured line on published geology maps, lying circa 445m north eats of the site. Dip of the bedrock strata in the area is typically to the north and east, therefore this seam is not anticipated to be present beneath the site.

The report indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore the likelihood of historical ground workings being present is considered to be negligible.

The report confirms that deep mining has occurred in the area, however it concludes that the site can be regarded as stable from deep mine workings.

The Coal Authority and SYMAS reports are presented in Appendix E.

6 Contamination Risk Assessment

6.1 Legislative Background

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution. Part 2A applies where there is unacceptable risk, assessed on the basis of the current use and the relevant circumstances of the land. It is not directed to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

Part 2A

Part 2A provides a regulatory regime for the identification and remediation of contaminated land and is the primary mechanism in the contaminated land regime. Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

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

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

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

Part 2A is designed to 'enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes'.

In applying the definition of Contaminated Land, Part 2A states that 'the Local Authority must:

- Identify a 'Pollution Linkage'. That is, a linkage between a contaminant and a receptor, by means of a pathway(s).
- Determine if the contaminant is causing significant harm to that receptor, or there is a significant possibility of such harm being caused by that contaminant to that receptor.

If any one element of the pollutant linkage is not present then the land should not be identified as 'contaminated land'.

NPPF

NPPF States that 'to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.'

Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

NPPF also states that after any required remediation, the land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990.

6.2 Preliminary Conceptual Site Model

Following a review of the desk based geo-environmental information on the site and a site reconnaissance, a preliminary CSM has been formulated to identify potential

sources of contamination, likely receptors and potential pathways on and in the immediate vicinity of the site.

It should be noted that some uncertainties exist due to the limited site specific data available. However, potential contaminants and receptors have been identified based on this Phase 1 desk study review. Pathways have been established on reasonable scientific knowledge of the behaviour of the contaminants in the ground.

It should also be noted that because the assessment is based on documentary evidence contaminants may be identified, which in practice are not present and contaminants may be present which have not been identified.

The guidance provided in CLR11 indicates the CSM should identify those contaminants, pathways and receptors which are 'likely' to represent an 'unacceptable' risk either to human health or the surrounding environment.

6.3 Potential Contaminant Sources

6.3.1 Onsite

No significant areas of potential concern were identified from the site walkover. There are a number of minor features that may require specific investigation however:

- Area of open burning in the south west of the site.
- Suspected asbestos corrugated sheets on garage roofs.
- Potential for waste oils and fuels from vehicle repair / leaks to enter drainage system or soils.

One area of open burning was identified to the south west of the site. This area has the potential to act as a source of metals, polycyclic aromatic hydrocarbons and potential residual of hydrocarbons / solvents if accelerants have been used. It is likely that residuals of such would be limited.

The site contains four private garages. These would have been used for storage of motor vehicles as well as allowed the private servicing and repair of vehicles. The latter could have entailed the use of lubricating oils, coolants, hydraulic fluids, paints and solvents.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system.

Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils should be considered to be a potential localised sources of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system. It must be noted that there is no evidence to suggest that this may have occurred.

The quantities of liquids that may have been released are likely to be small (in comparison to prolonged leakage from large storage tanks for example) and any impacted soils are likely to exist as isolated hotspots, rather than widespread gross contamination.

6.3.2 Off site

The surrounding land use was principally farmland becoming residential properties. No significant off site sources of potential contamination have been identified.

6.4 Landfill gas

No current or historical landfills are known to exist within 500m of the site. No organic soils are anticipated to lie beneath the site.

No other sources of ground gas on or in the vicinity of the site. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development. However, as the site lies within an area where coal resources are present, it is recommended that a minimum of one round of gas monitoring is undertaken as part of the site investigation to validate this assumption.

6.4.1 Radon

The Groundsure GeoInsight report states that the site is in an area where the estimated probability of homes being above the action level of 200Bqm^{-3} is bless than 1%. No radon protective measures are required in the construction of new buildings.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

6.5 Receptors

It is understood that the site will be redeveloped with low rise residential properties. Future Residents are assumed therefore to occupy the site full time and may be exposed directly to soils within the site. Construction workers would be directly exposed to soils, however this would only be short term.

- Future Residents
- Construction workers
- Construction materials (including services)
- Groundwater – Secondary A Aquifer.
- Surface Water - unnamed tertiary river 200m to the south
- Flora and fauna.

6.6 Preliminary Risk Assessment

A preliminary risk assessment was undertaken based on a qualitative assessment of the likely presence of a pollutant linkage. A pollutant linkage is the relationship between a source (or contaminant), a pathway and a target (or receptor). Unless all three elements of a pollutant linkage are present, a significant risk is not considered to exist. The approach adopted is to screen each site based on assigning a simple low, medium or high category.

The preliminary risk assessment is shown in Table 3 overleaf.

Table 3 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Localised sources of hydrocarbons, solvents Made Ground e.g. metals, hydrocarbons, polycyclic aromatic hydrocarbons and asbestos.	Human Health – future residents.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Hydrocarbon tainting of potable water supply pipes.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
		Indirect Contact - Vapour inhalation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Possible - if fuels or solvents discharged.	Probability: Possible Consequence: Medium Magnitude: **Low/Medium Risk**
	Controlled Waters – Nearest surface water lies 200m from of the site.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Possible - if fuels or solvents discharged but no surface water lies within 200m of the site.	Probability: Possible Consequence: Medium Magnitude: **Low Risk**

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Underlying geology unlikely to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Ground gases.	Human Health – future residents.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no significant sources identified.	Probability: Unlikely Consequence: High Magnitude: **Low Risk**
	Flora	Displacement of oxygen from root systems	Unlikely – no significant sources identified and no sensitive flora present.	Probability: Unlikely Consequence: Low Magnitude: **Low Risk**
Radon.	Human Health – future residents.	Permeation through ground floor.	Unlikely - No protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: **Low Risk**

7 Conclusions and Recommendations

7.1 Geotechnical Risks

The potential for geotechnical hazards are summarised in Table 4.

Table 4: Summary of Geotechnical Hazards.

Potential Geological Hazard	Impact on proposed development	Likelihood of presence
Deep Made Ground	High	Unlikely
Buried structures	Moderate	Possible
Compressible ground	Moderate	Unlikely
Shrinking / swelling clay	Moderate	Possible
Collapsible ground	High	Unlikely
Aggressive ground conditions for concrete	Low	Unlikely
Running sands / excavation instability	Moderate	Unlikely
High water table / groundwater inflows.	High	Unlikely
Slope stability	Moderate	Unlikely
Underground mining	High	Unlikely
Ground dissolution / natural cavities	High	Unlikely

Based on the anticipated ground conditions, conventional spread foundations should be suitable for the proposed development.

The near surface soils are anticipated to be shrinkable and foundations are therefore likely to require deepening in the vicinity of existing, felled or proposed trees. A suspended ground floor slab may also be required.

The clay soils encountered are likely to possess infiltration rates of less than 1×10^{-6} m/s and therefore efficient soakaway drainage is unlikely to be feasible. The Local Authority may still require full scale testing in accordance with BRE 365 (2016) to demonstrate that infiltration rates are too low for soakaway drainage.

7.2 Land Contamination

The site currently contains four private garages; originally there were eleven garages. These would have been used for storage of motor vehicles as well as allowed servicing and repair of vehicles. The latter would have entailed the use of lubricating oils,

coolants, hydraulic fluids, paints and solvents. These products must therefore be considered to be potential localised sources of contamination.

Storage of oils, fluids etc. and their disposal by private individuals is unlikely to have been well managed or regulated. It is therefore possible that waste oils, hydraulic fluids, paints, solvents etc. may have ingressed into the ground or the drainage system Consequently, hydrocarbons from fuels, solvents and lubricating and hydraulic oils must be considered to be a potential source of historical contamination at the site.

This is based on the worst case assumption that motor vehicle repair associated with the garage block may have caused fuels, oils and solvents to ingress into the underlying soils or drainage system.

The potential risks are based on the worst case assumption that the sources may have caused fuels, oils and solvents to ingress into the underlying soils. It must be noted that there is no evidence to suggest that this may have occurred. The actual risks to the receptors would need to be determined by undertaking an intrusive ground investigation and laboratory analysis.

The scope of such an investigation should be discussed and agreed with the local authority.

7.3 Ground Gas

7.3.1 Landfill gas

No sources of ground gas on or in the vicinity of the site. The site is however located in area which is underlain by Coal Measures, these have the potential to generate ground gases. The presence of ground gases cannot therefore be discounted. Subject to the findings of an intrusive investigation it is currently envisaged that no gas protection measures will be required to be incorporated into the future development.

7.3.2 Radon

No radon protective measures are required in the construction of new developments or extensions.

Confirmation of any protection measures should be agreed with the local authority building control and / or NHBC.

7.4 Coal Mining

The mining assessment has confirmed the site is underlain by deep mining, which was last undertaken in 1979. Any movement in the ground due to coal mining activity should have stopped therefore the site should be stable with respect of deep mine workings. However, the site is in an area where shallow coal is anticipated which may have been worked sometime in the past.

Royston coal seam (thickness circa 0.50m thick locally) is conjectured to outcrop to the south of the site, however strata dip in the area is typically to the north east, therefore the seam is unlikely to be present at shallow depth beneath the site.

The SYMAS report also indicates that the shallow coal seam in this area is rarely worked historically in the wider vicinity. Therefore, the likelihood if historical ground workings being present is considered to be negligible.

7.5 Summary

The aim of this report was to assess the potential geotechnical and geo-environmental issues at the proposed development site. Only limited potential sources of contamination have been identified from the Preliminary Risk Assessment. To enable the knowledge of the contaminating potential and land quality of this site to be developed further a Phase II Site Investigation would be required.

In general, where any new building is proposed an intrusive investigation should be carried out so that geotechnical parameters and sub-surface ground conditions can be determined to assist in the design of the structure. Any potential abnormal geotechnical risks identified in this report should be properly investigated so that the actual level of risk and any remedial measures required can be determined. While the provision of a detailed specification for any Phase II investigation was not part of the Client's brief for this report, it should be noted that any intrusive investigation should address any specific contamination and geotechnical risks highlighted in this report. Where any potential sources of contamination have been identified these should be thoroughly investigated to determine actual risks to any identified receptors. Even where no potential sources of contamination have been identified, it would be prudent to undertake confirmatory testing of soils during any geotechnical investigation.

8 Limitations and Uncertainties

8.1 General

It should be noted that the levels of risk identified in this report are perceived risks based on the information reviewed. No physical investigation or testing has been carried out; actual risks can only be assessed following a physical investigation of the site. Further work, including physical investigation, laboratory testing and ground gas monitoring may be required by the appropriate regulators to confirm actual conditions.

This report has been prepared by Hamson Barron Smith with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client.

The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data with respect to site conditions.

The information reported herein is based on the interpretation of data collected during the site investigation, pertaining specifically to the soil samples retained from the identified locations. Should additional information become available that may influence the opinions expressed in this report, Hamson Barron Smith reserves the right to review such information and, if warranted, to alter the opinions accordingly.

The evaluation and conclusions do not preclude the existence of other site conditions and contamination, which could not reasonably have been revealed by the site investigation works undertaken at the time of writing. This report should be used for information purposes only and should not be construed as a comprehensive characterisation of all site conditions or potential contaminants.

This report has been prepared solely for the use of the client, and may not be relied upon by other parties without written consent from Hamson Barron Smith.

Hamson Barron Smith disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

8.2 Site Specific

No access was available to the garages.

9 General Notes

This report will be prepared for the exclusive use of the client named in the document and copyright will subsist with Hamson Barron Smith Limited. Prior written permission must be obtained to reproduce all or part of the report. It will be prepared on the understanding that you will disclose its contents to parties directly involved in the current investigation, preparation and development of the site. Further copies may be obtained with the client's written permission from Hamson Barron Smith Limited with whom a master copy of the document will be retained.

The report and /or opinion will be prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to us at the time of your enquiry. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Hamson Barron Smith Limited. The assessment of the factual data will be provided to assist the client and his Engineer and/or advisors in the preparation of their designs.

The report will be based on the conditions encountered in the context of the proposed development. There may be special conditions, appertaining to the site, however, which may not be revealed by the assessment, and which may not be taken into account in the report.

Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical data would be required to provide discussion and recommendation appropriate to these methods.

The accuracy of the results reported will depend upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristic of the strata as a whole. Where such measurements are critical, the technique of the investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the company where necessary.

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either

visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of these data by the supervising geotechnical engineers.

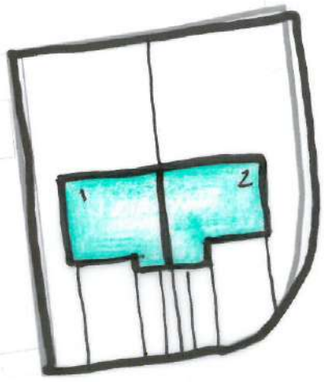
Any comments on groundwater conditions will be based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of the boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

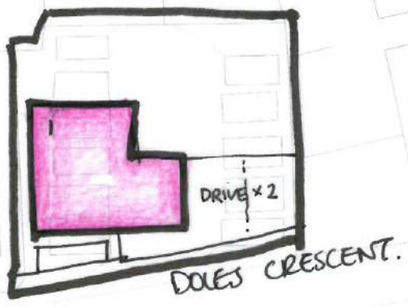
The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical considerations hence its evaluation will be outside the scope of the report.

Appendix A

Outline Development Plan





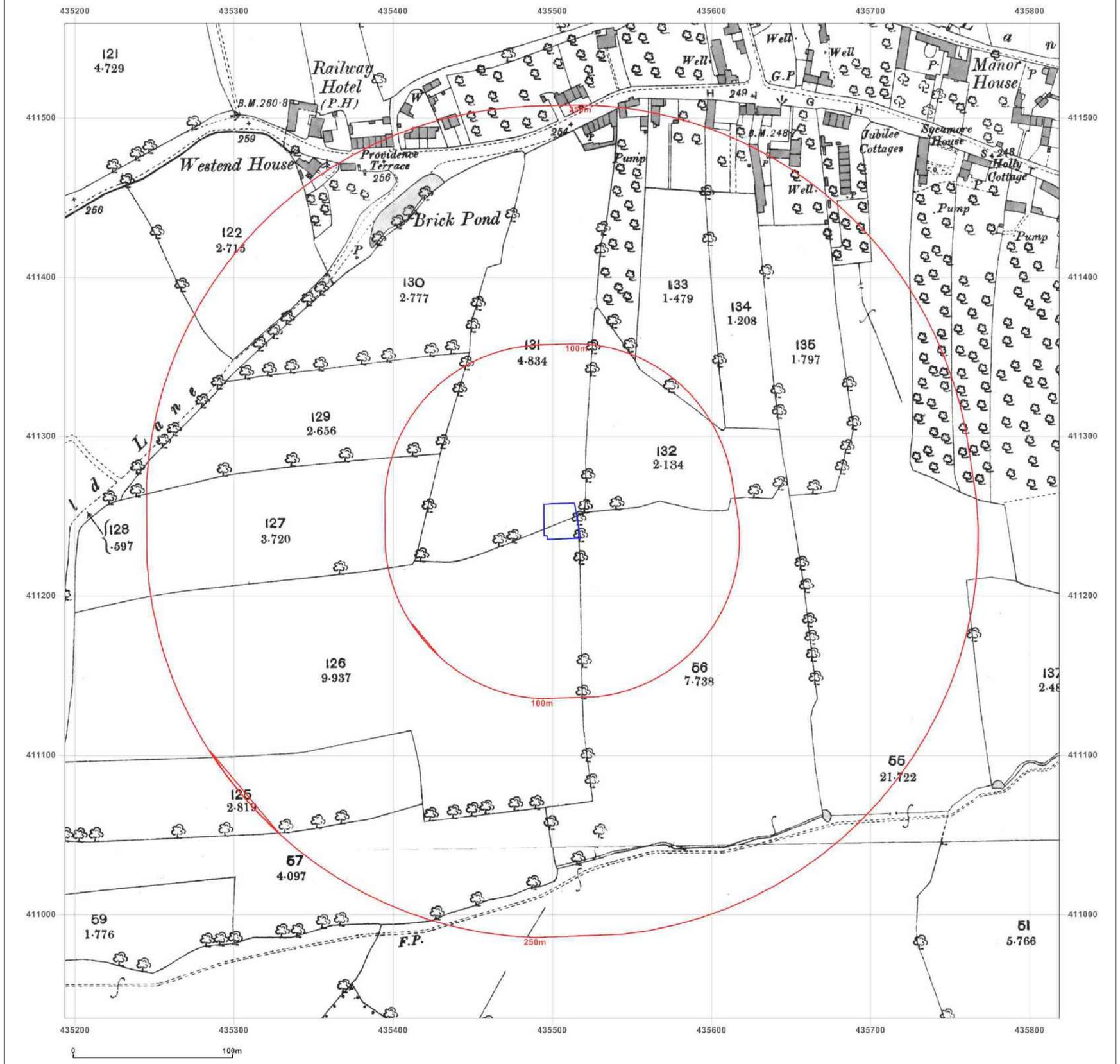


3/4 Bed detached Bungalow

2 Bed/3p Semi detached Bungalows.

Appendix B

Historic Maps



Groundsure INSIGHTS

Site Details:

DOLES CRESCENT, BARNSLEY,
S71 4LA

Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1893**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A



Surveyed 1893
Revised N/A
Edition 1893
Copyright N/A
Levelled N/A

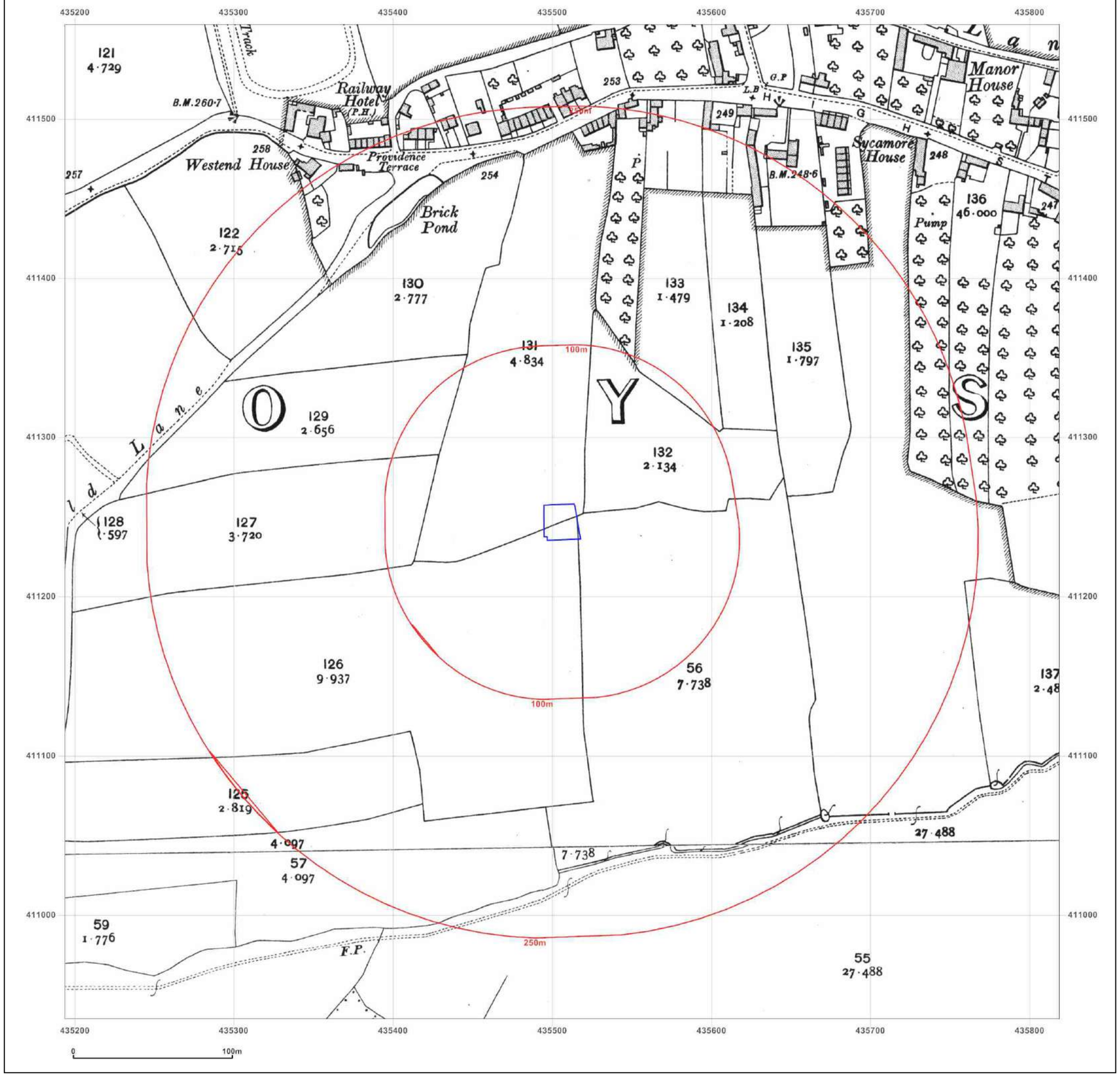
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Site Details:

DOLES CRESCENT, BARNSLEY,
S71 4LA

Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

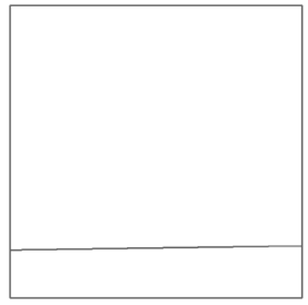
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N
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Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1890
Revised 1904
Edition N/A
Copyright N/A
Levelled N/A

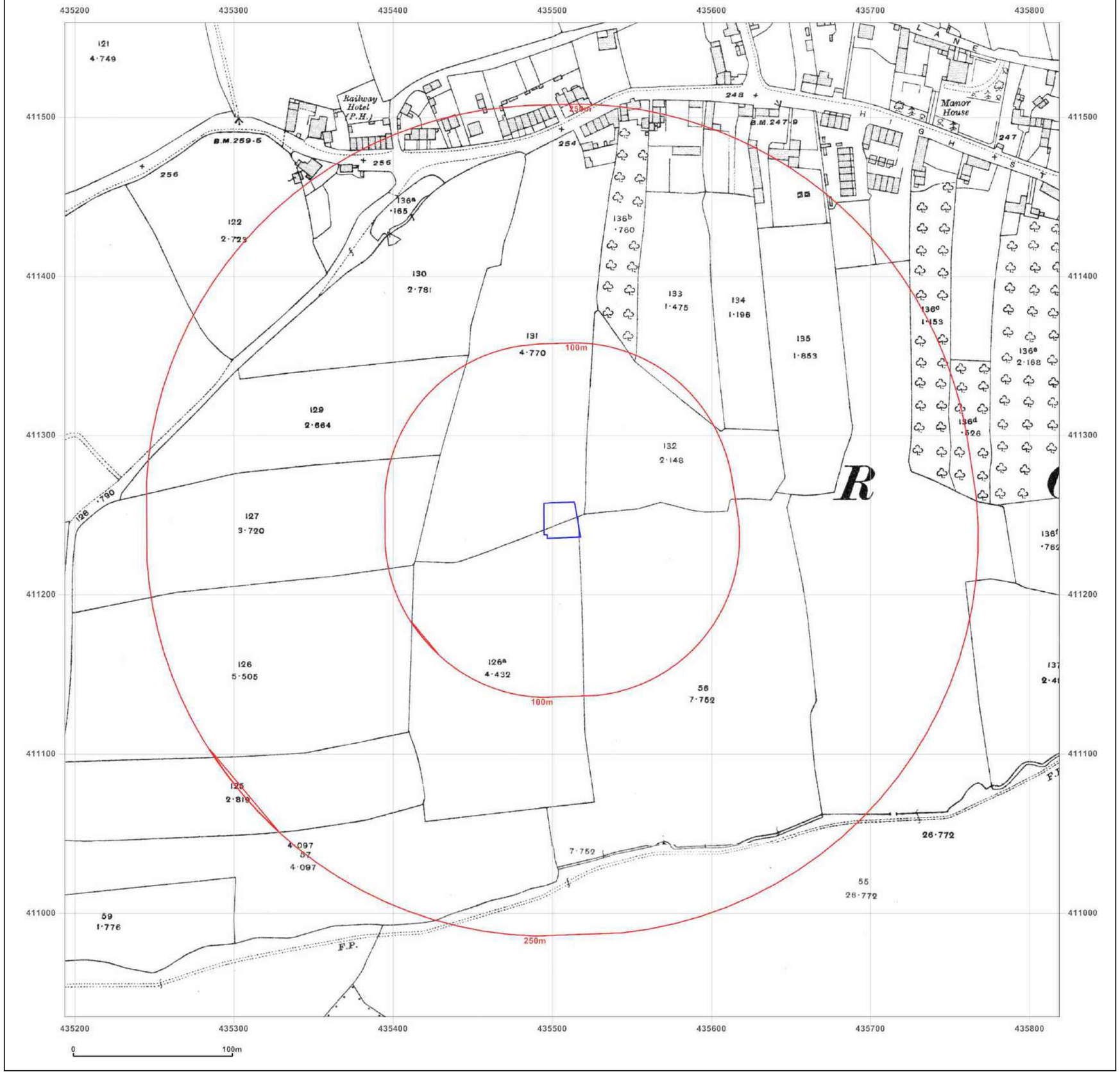
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Site Details:

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S71 4LA

Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

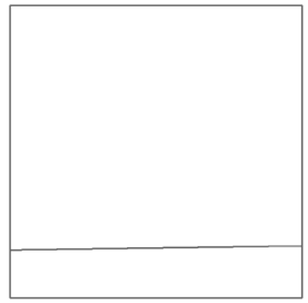
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Revised 1914
Edition 1918
Copyright N/A
Levelled 1915



Surveyed 1891
Revised 1914
Edition 1918
Copyright N/A
Levelled 1915

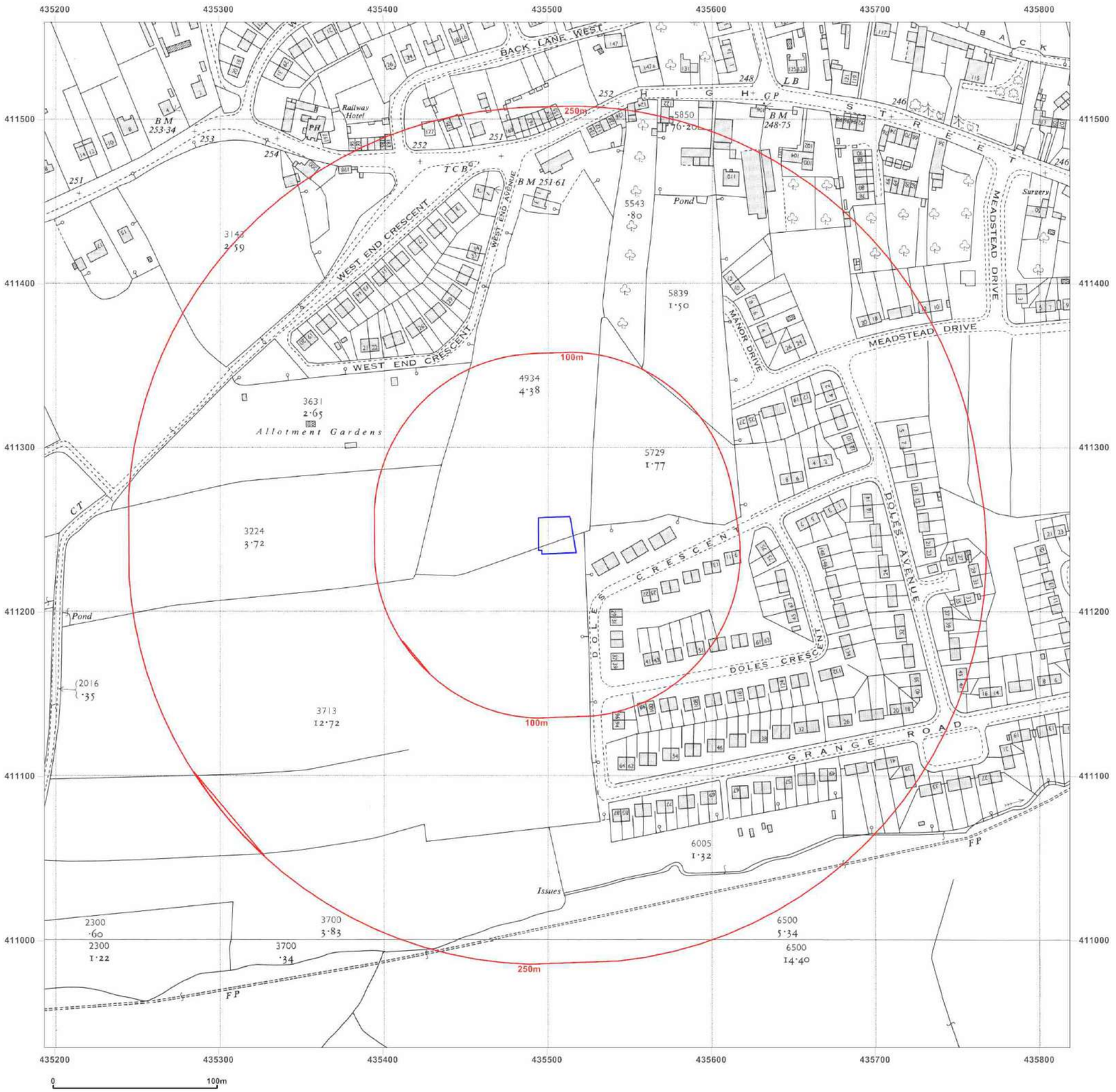
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Report Ref: GS-4020220
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Map Name: National Grid

Map date: **1960**

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Surveyed 1960
Revised 1960
Edition N/A
Copyright 1962
Levelled 1959

Surveyed 1960
Revised 1960
Edition 1962
Copyright 1962
Levelled 1959

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Report Ref: GS-4020220
Grid Ref: 435506, 411247

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Map date: **1970**

Scale: 1:2,500

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

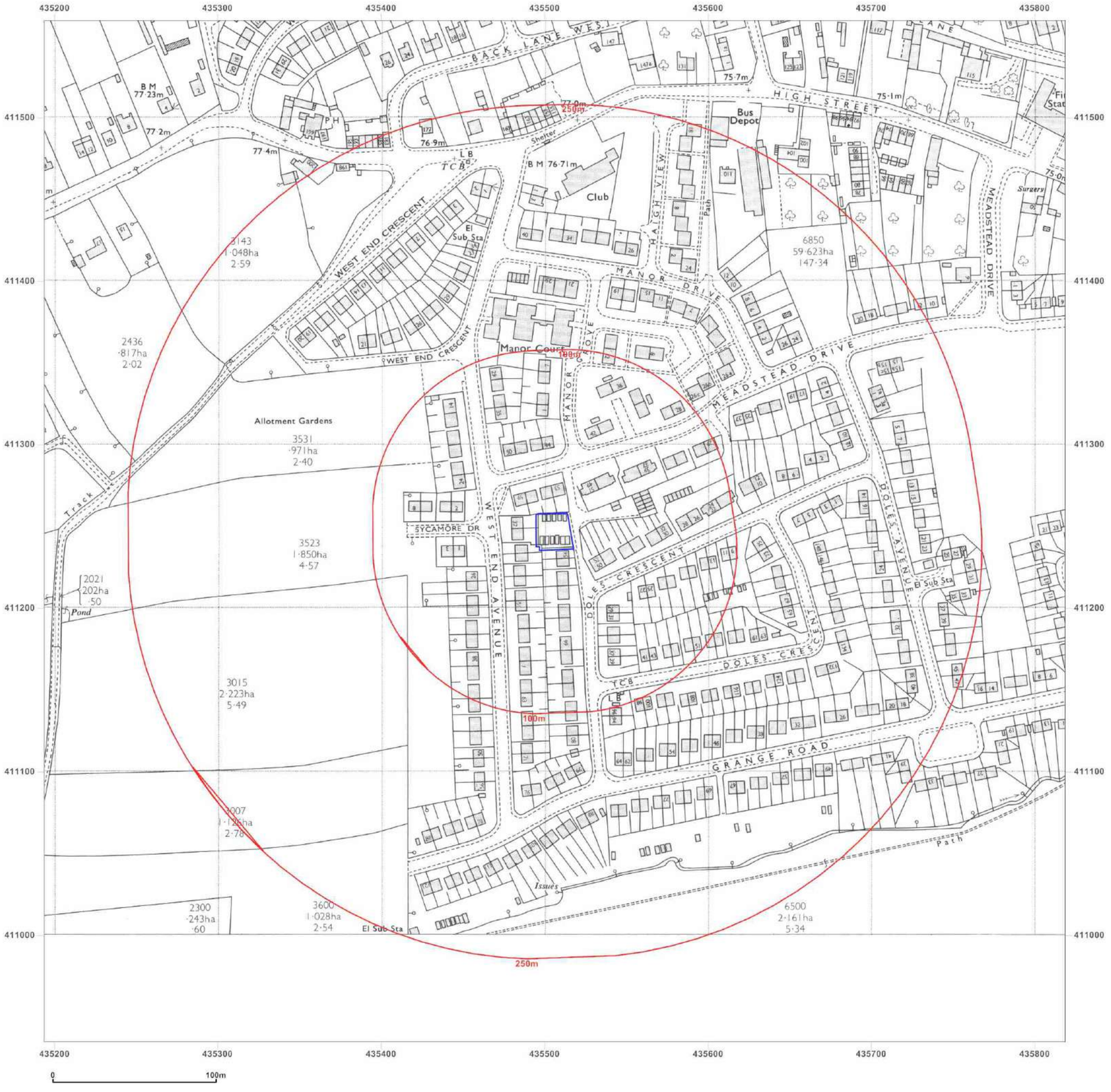
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Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
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Map Name: National Grid

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Report Ref: GS-4020220
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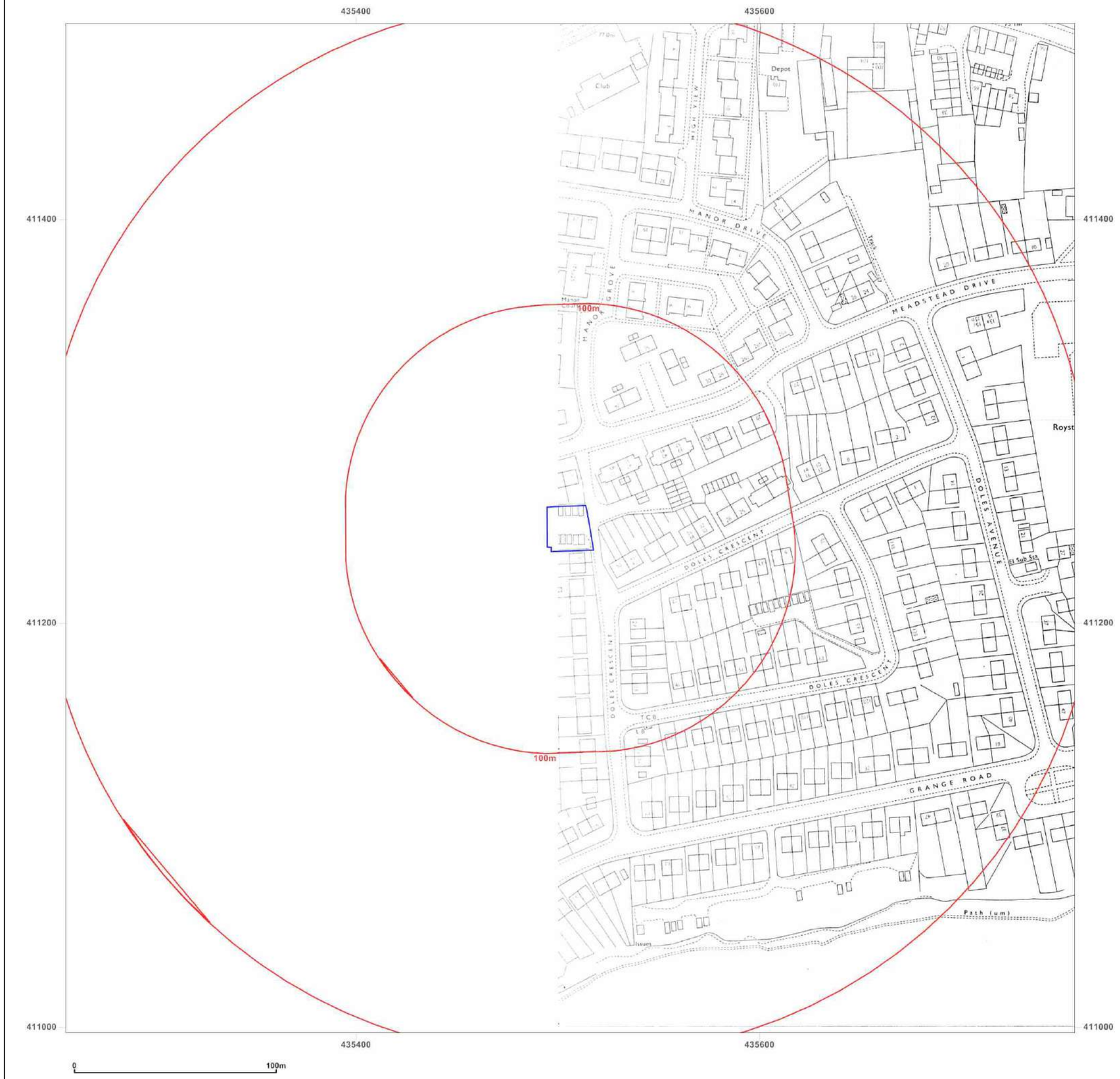
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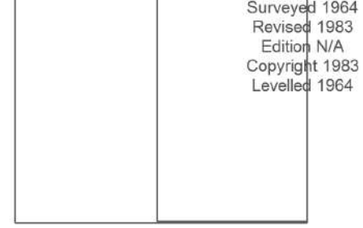
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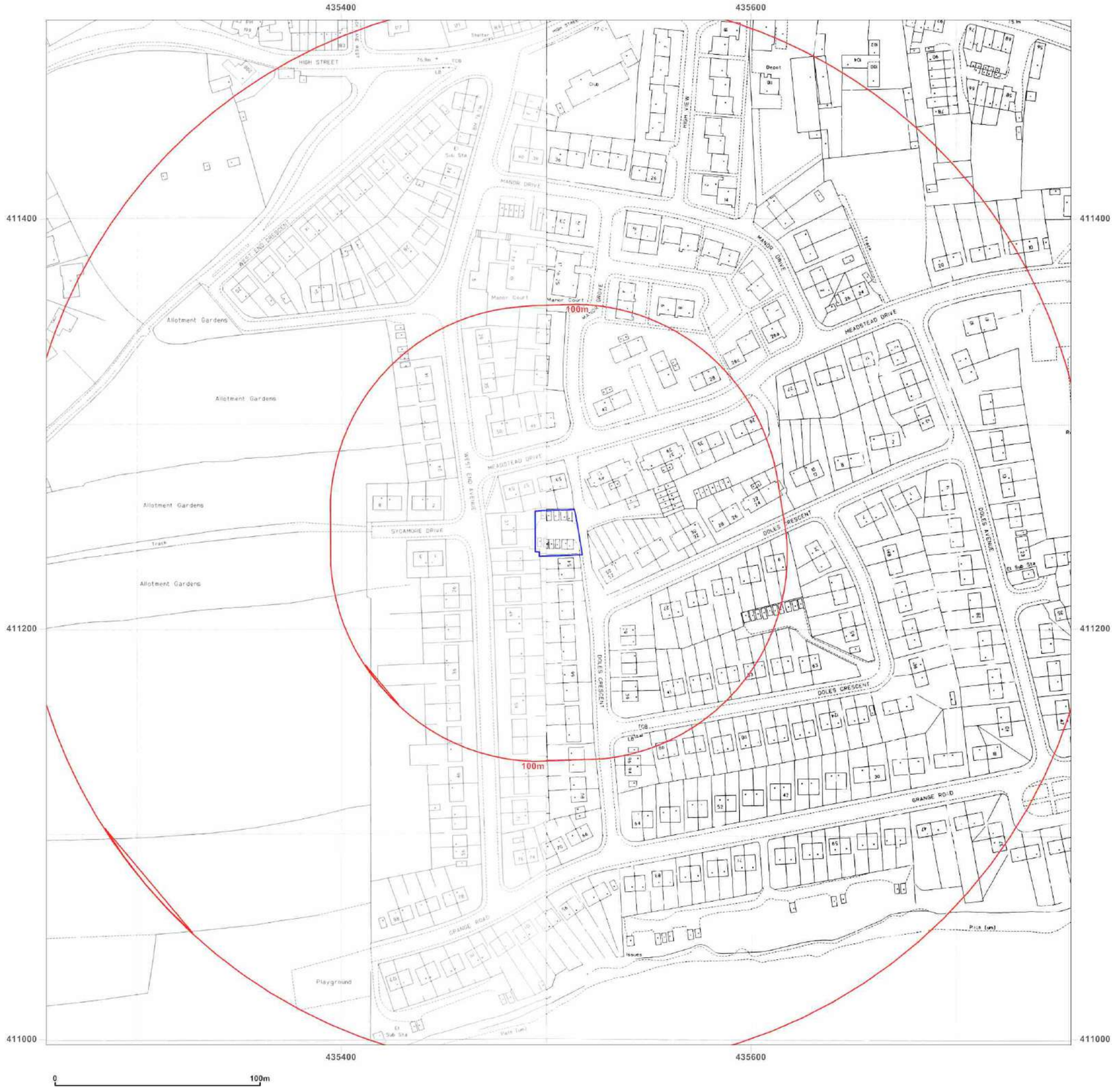
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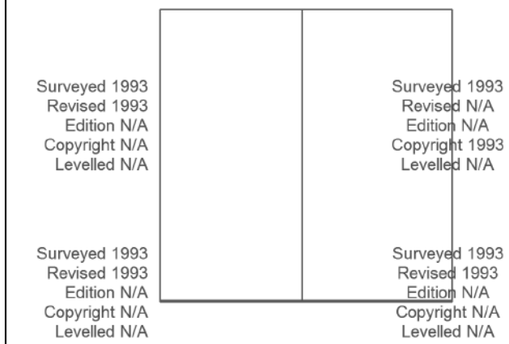
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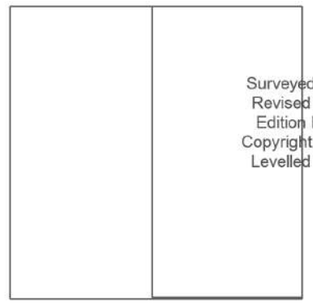
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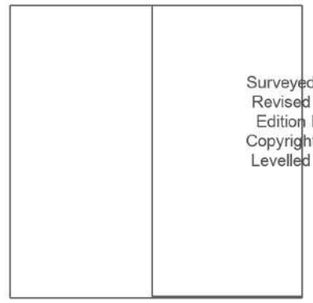
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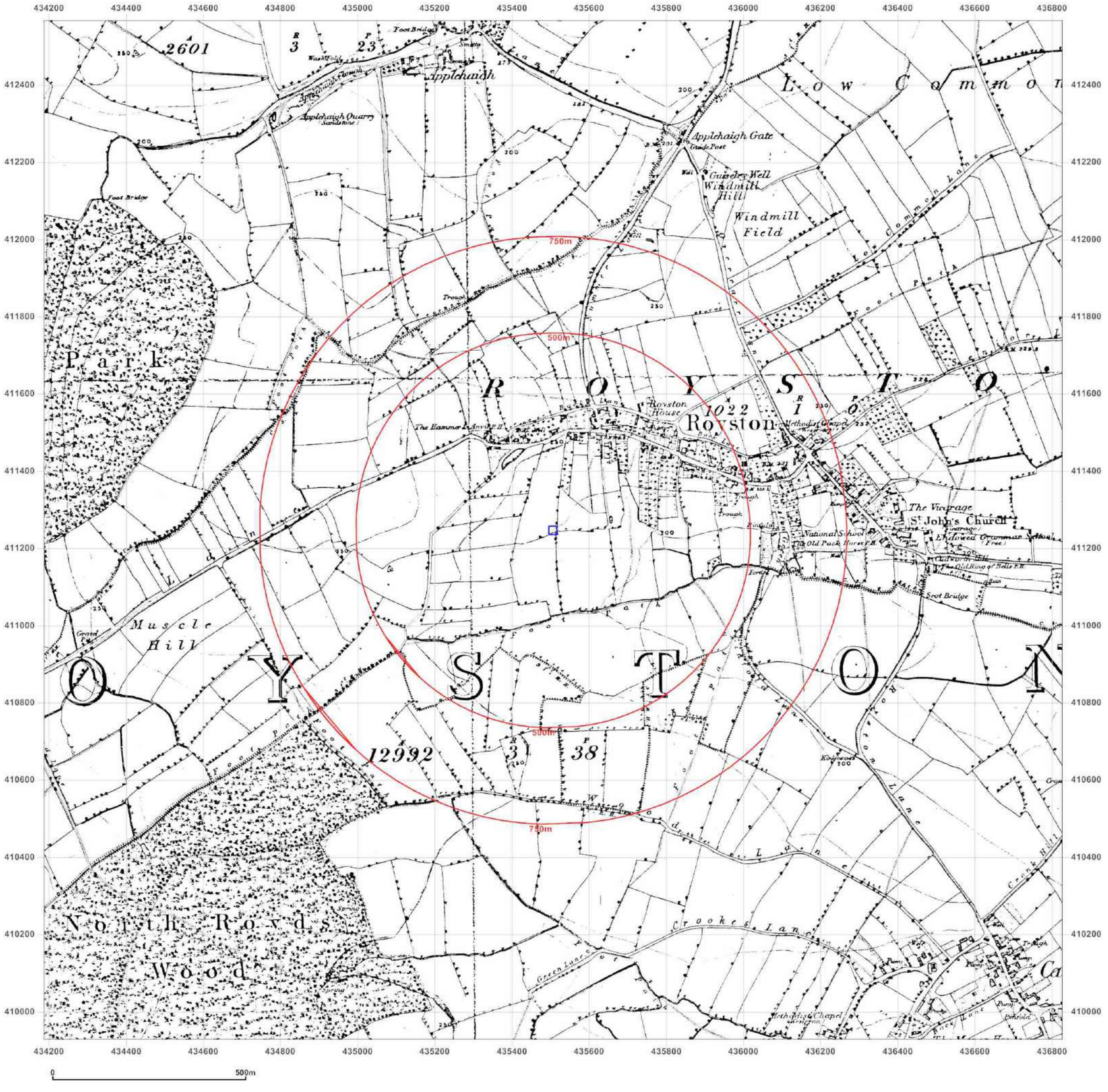
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Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1854**

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Surveyed 1851
Revised N/A
Edition 1854
Copyright N/A
Levelled N/A

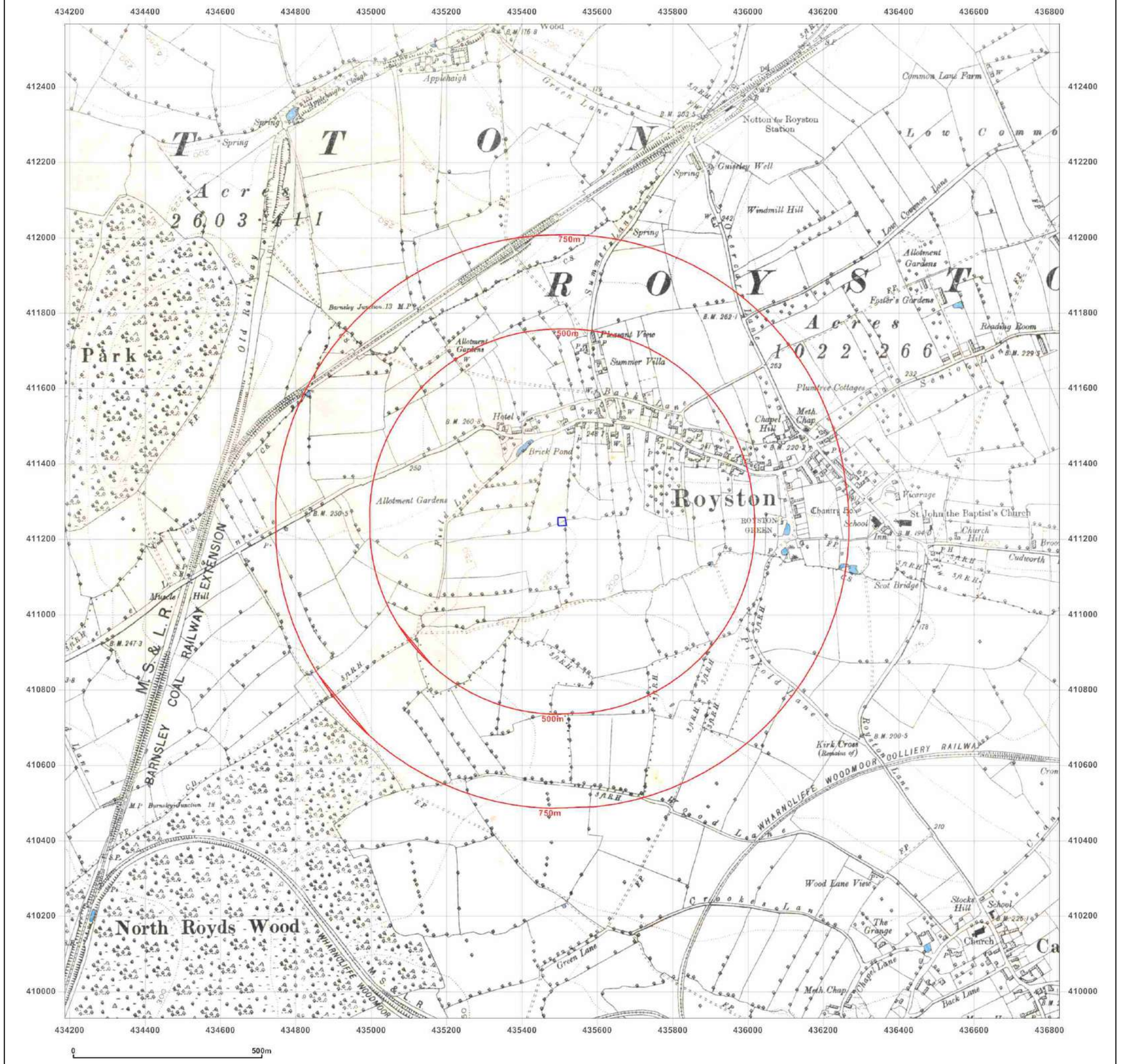
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S71 4LA

Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1891**

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Surveyed 1891
Revised 1891
Edition 1891
Copyright N/A
Levelled N/A

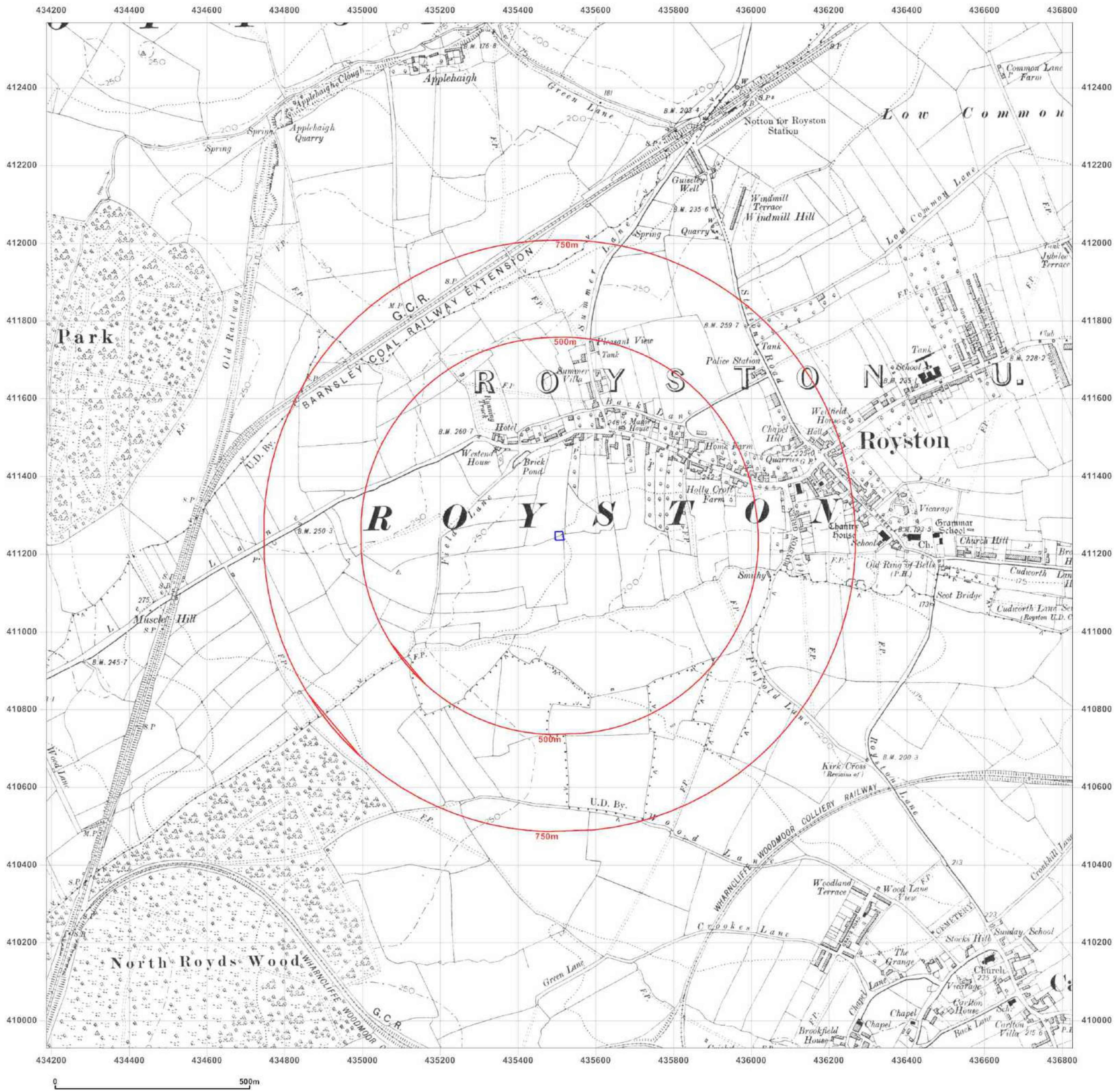
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Site Details:

DOLES CRESCENT, BARNSLEY,
S71 4LA

Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
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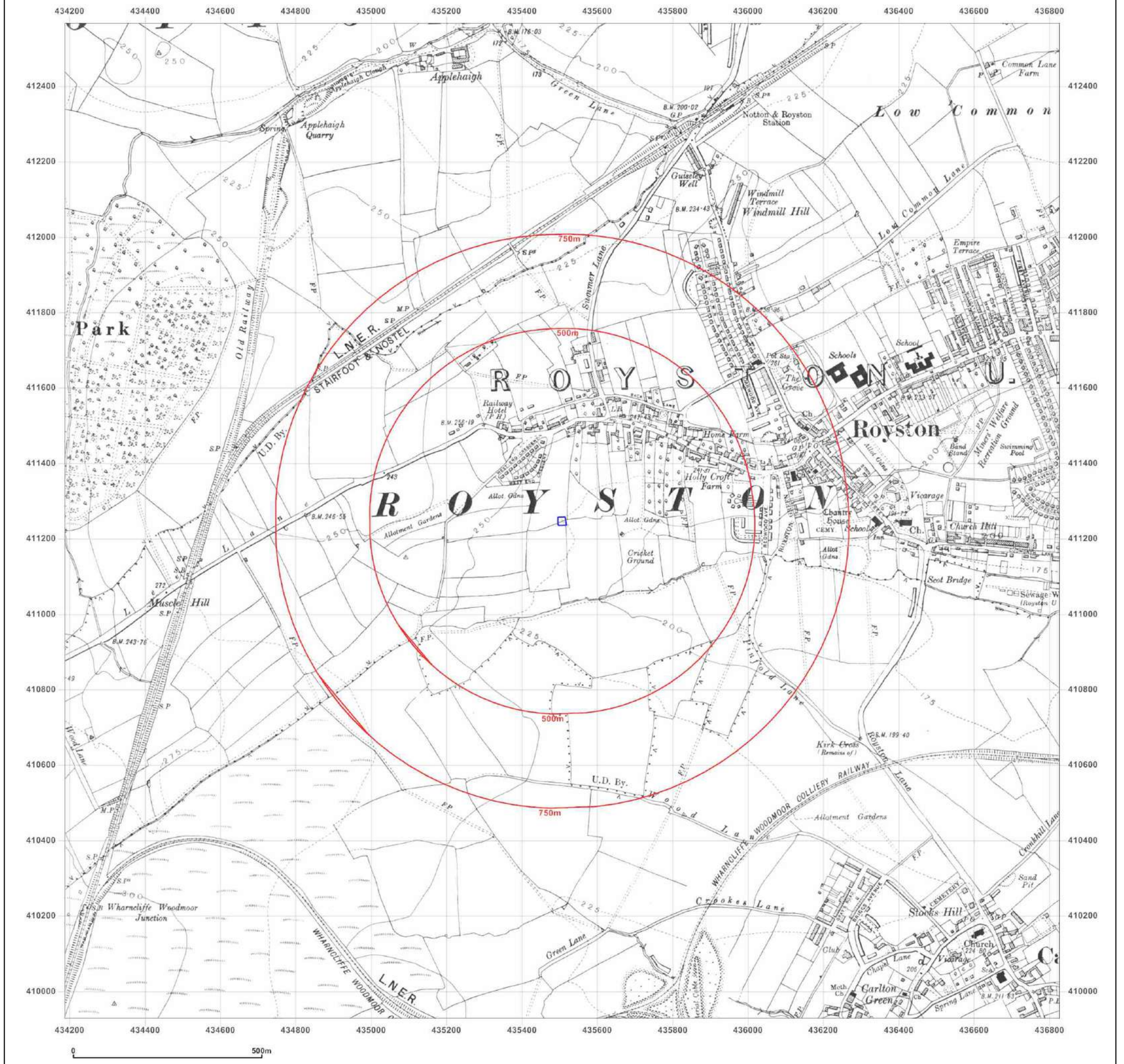
Surveyed 1891
Revised 1904
Edition 1904
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Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1930**

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Printed at: 1:10,560

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Surveyed 1851
Revised 1930
Edition 1930
Copyright N/A
Levelled 1929

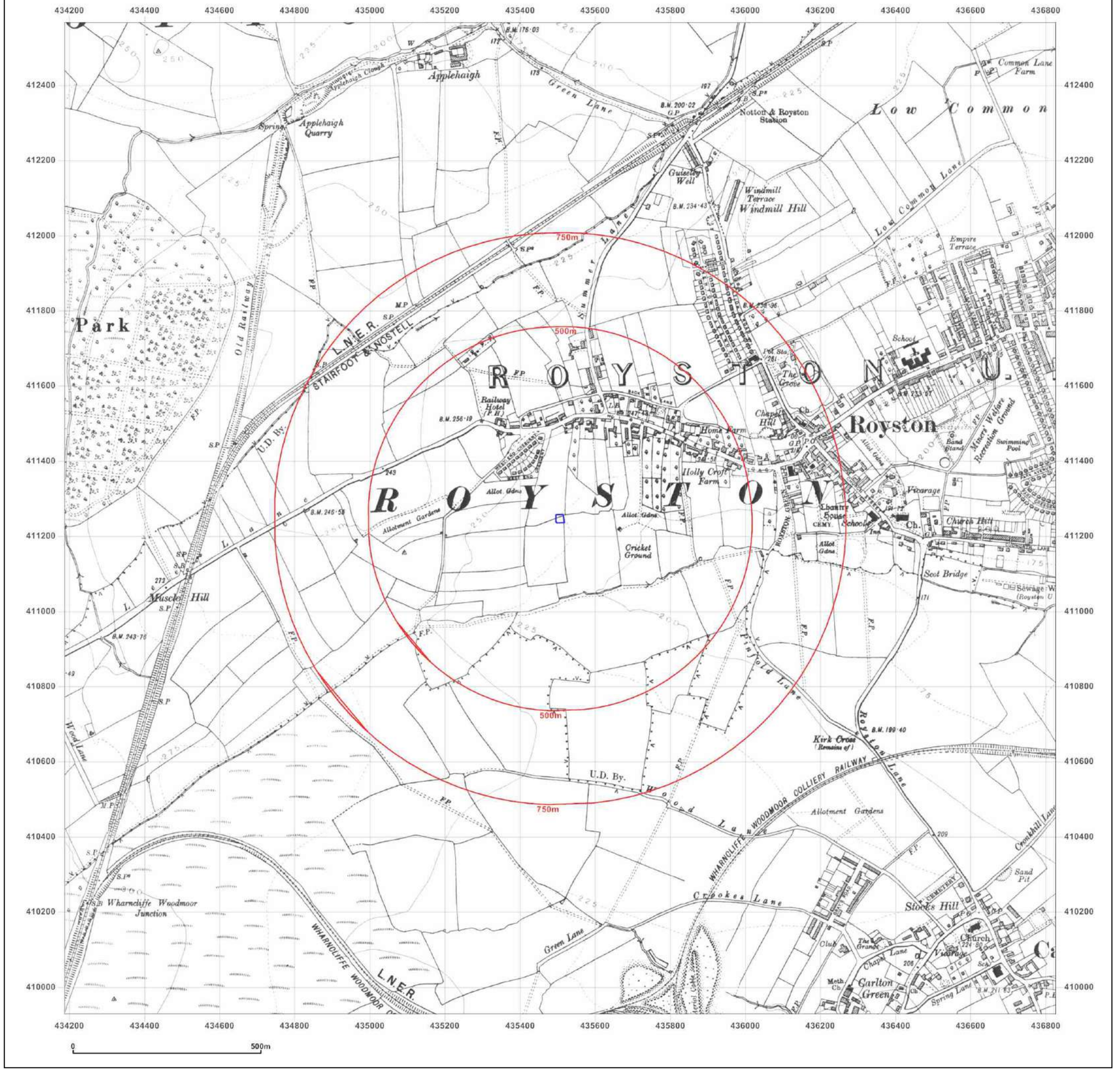
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Client Ref: 18-6007_Doles_Cresc_PO23001937
Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1930**

Scale: 1:10,560

Printed at: 1:10,560

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Revised 1930
Edition 1930
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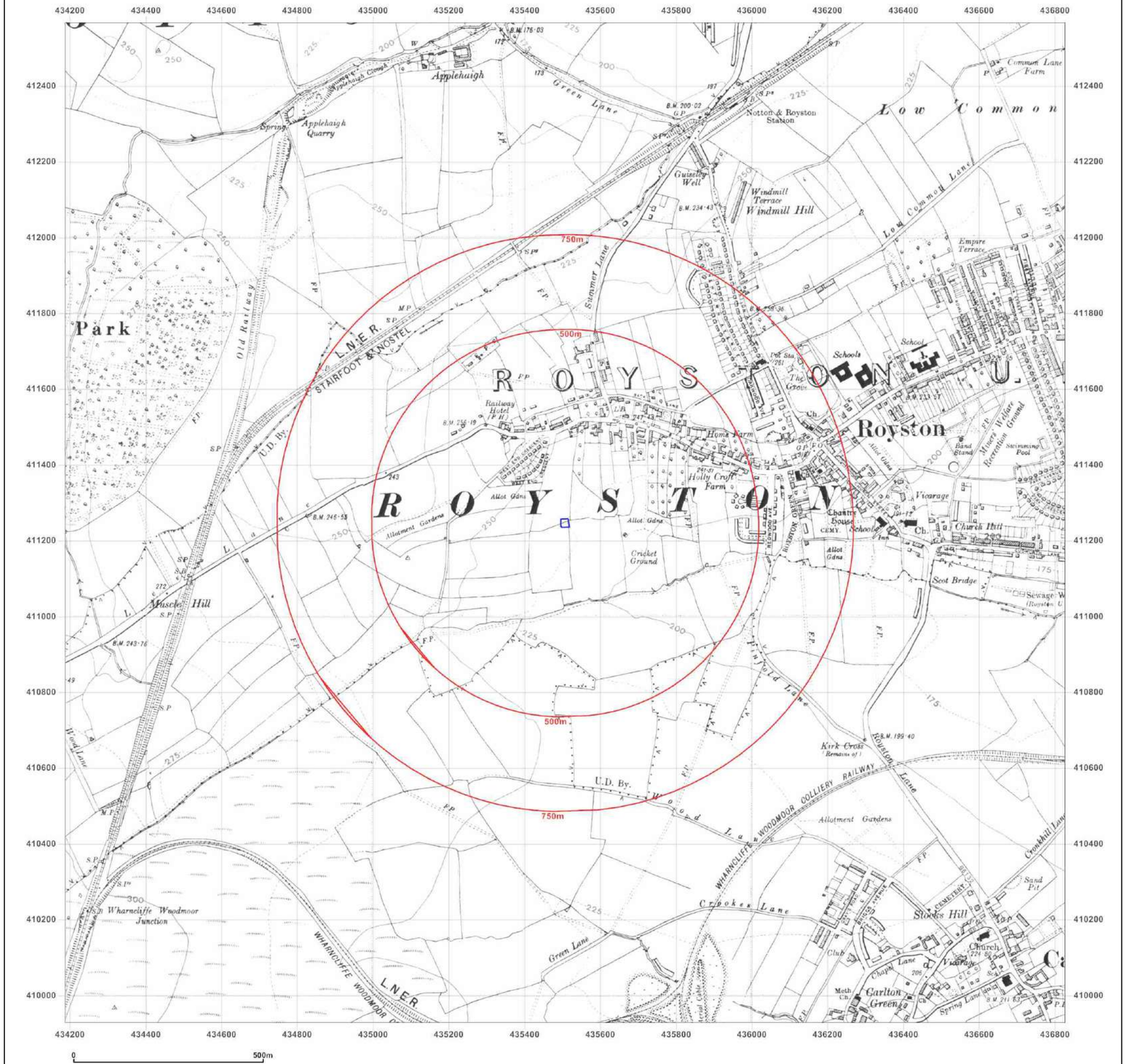
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Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: County Series

Map date: **1938**

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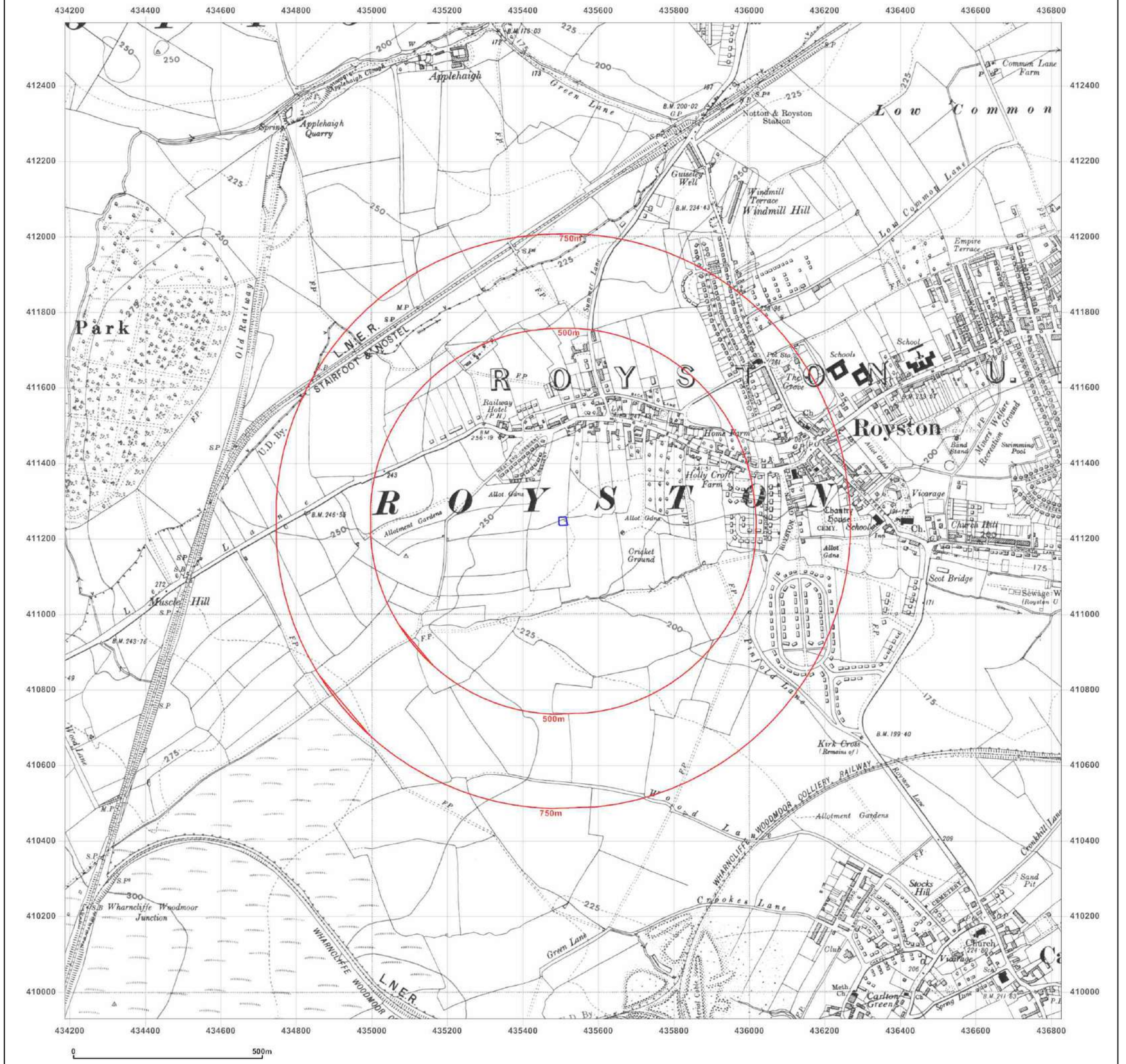
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Map Name: County Series

Map date: **1948**

Scale: 1:10,560

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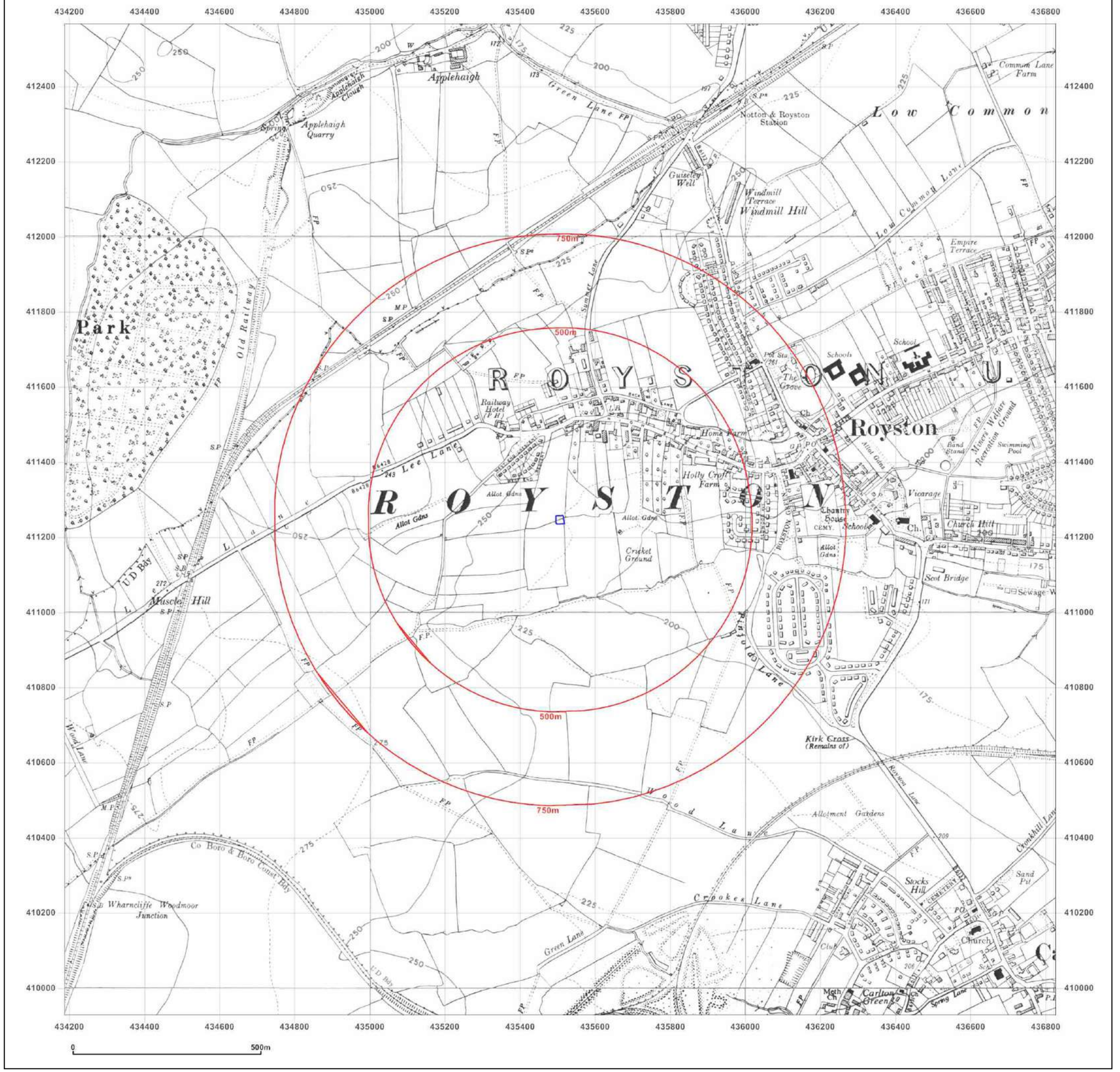
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Grid Ref: 435506, 411247

Map Name: Provisional
Map date: **1951-1956**
Scale: 1:10,560
Printed at: 1:10,560

N
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Surveyed 1951
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Edition N/A
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Surveyed 1951
Revised 1951
Edition N/A
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Surveyed N/A
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Edition N/A
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Revised 1955
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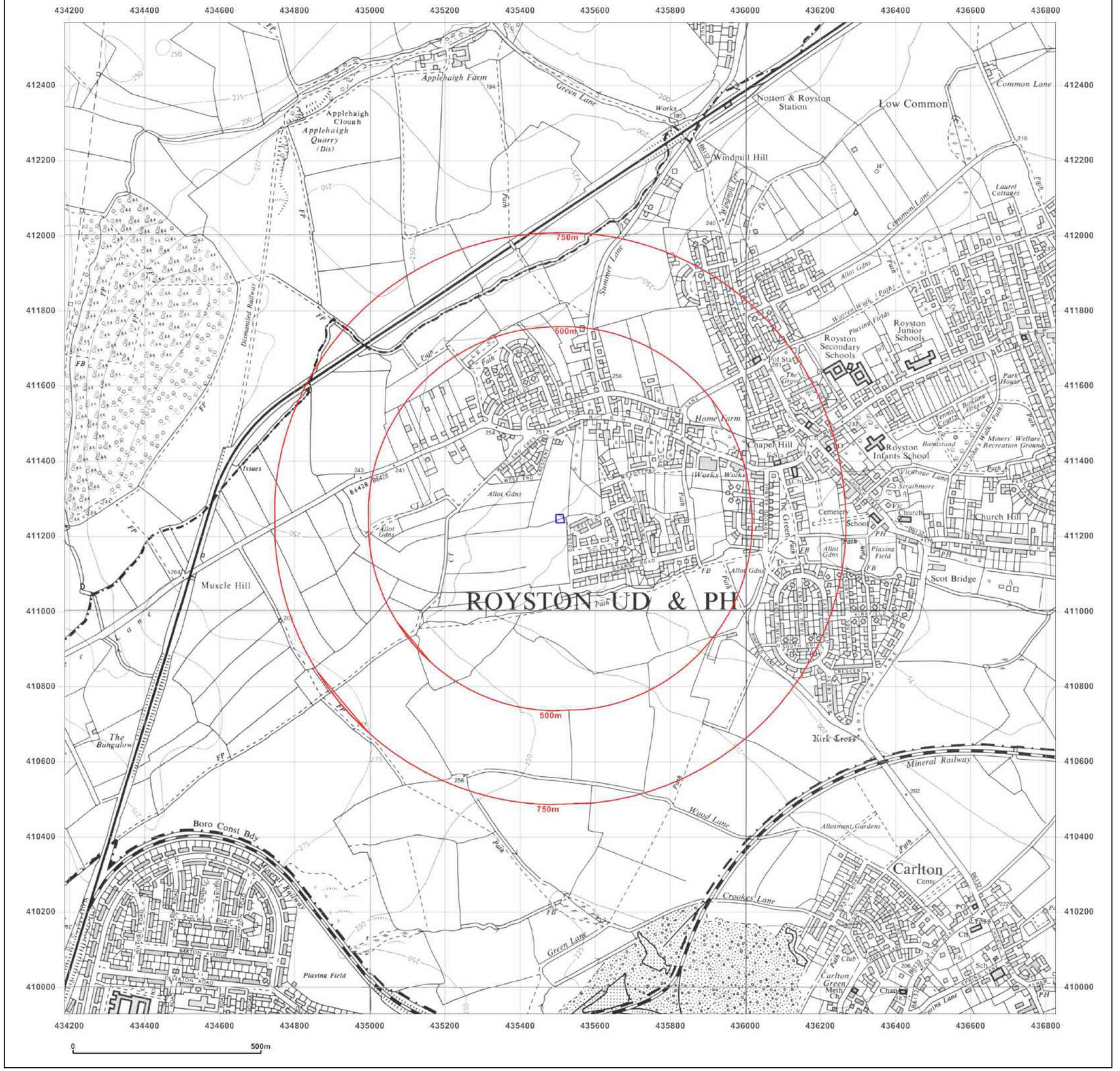
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Grid Ref: 435506, 411247

Map Name: Provisional

Map date: **1965-1966**

Scale: 1:10,560

Printed at: 1:10,560

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

Surveyed 1966
Revised 1966
Edition N/A
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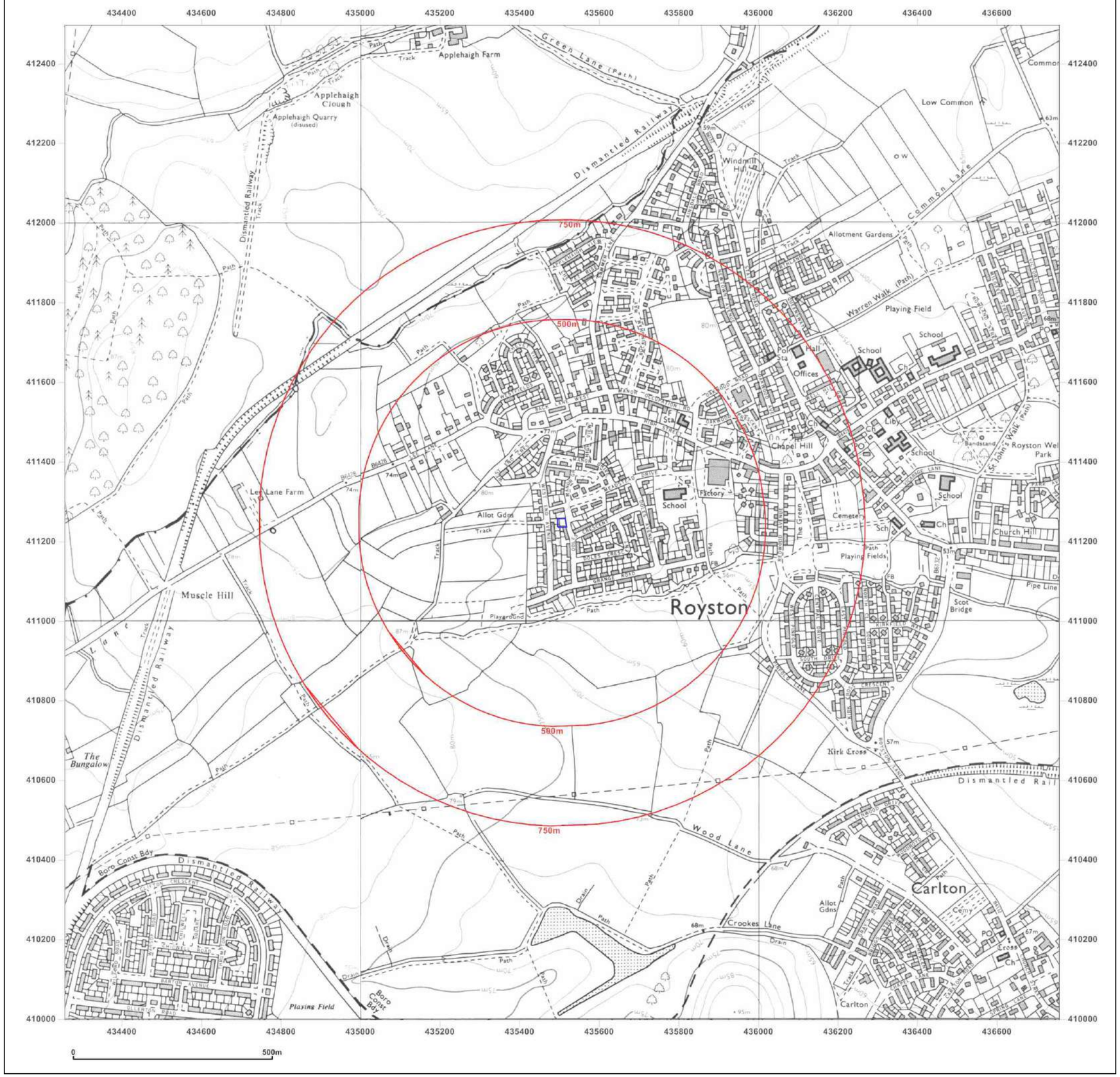
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Grid Ref: 435506, 411247

Map Name: National Grid

Map date: **1973-1978**

Scale: 1:10,000

Printed at: 1:10,000

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Surveyed 1977
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Edition N/A
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Levelled N/A

Surveyed 1976
Revised 1978
Edition N/A
Copyright 1979
Levelled 1978

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Report Ref: GS-4020220
Grid Ref: 435506, 411247

Map Name: National Grid

Map date: **1989-1993**

Scale: 1:10,000

Printed at: 1:10,000

N
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Levelled N/A

Surveyed 1984
Revised 1989
Edition N/A
Copyright 1990
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Grid Ref: 435506, 411247

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

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2002

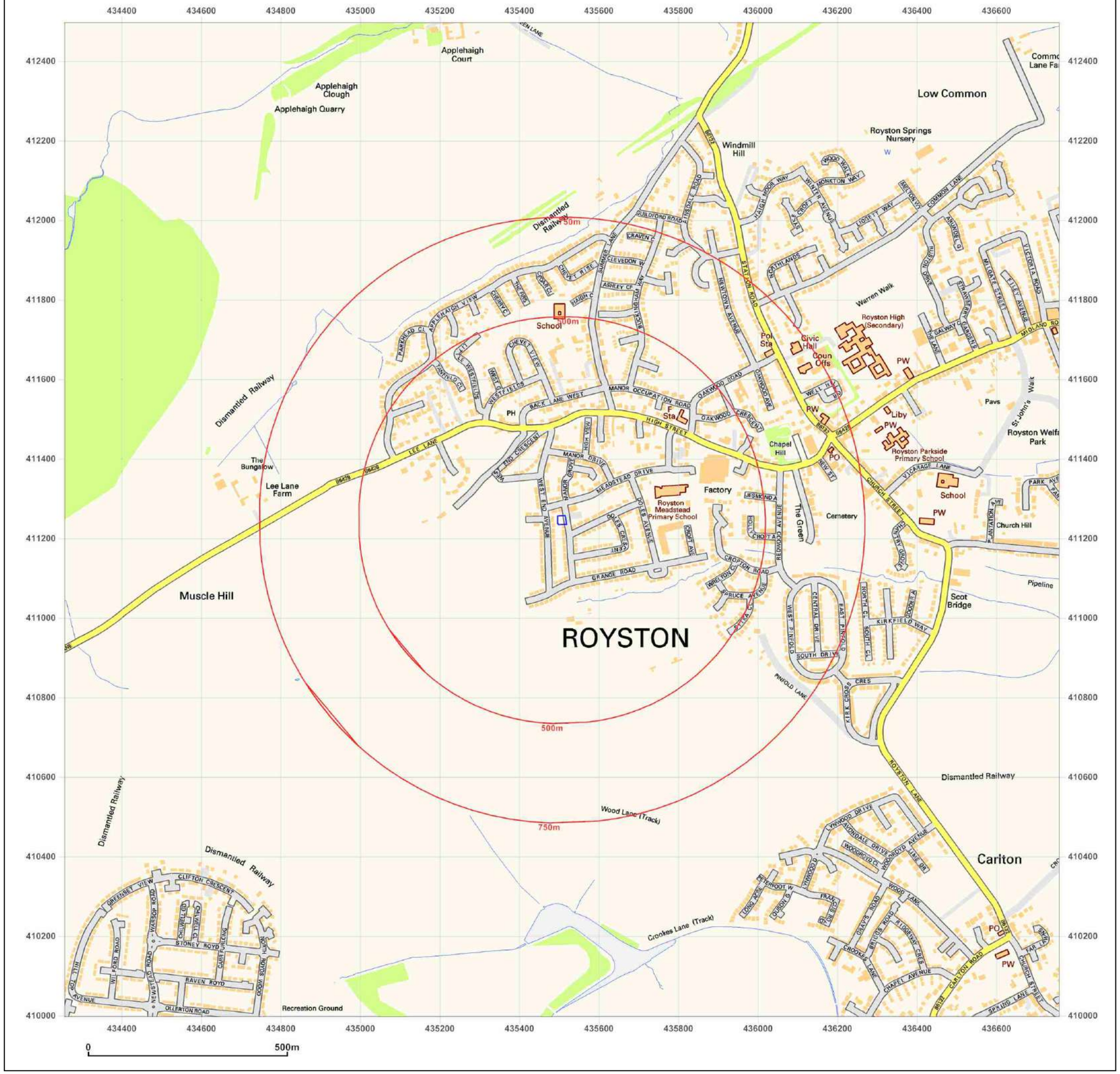
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Grid Ref: 435506, 411247

Map Name: National Grid
Map date: **2010**
Scale: 1:10,000
Printed at: 1:10,000

N W E S

2010

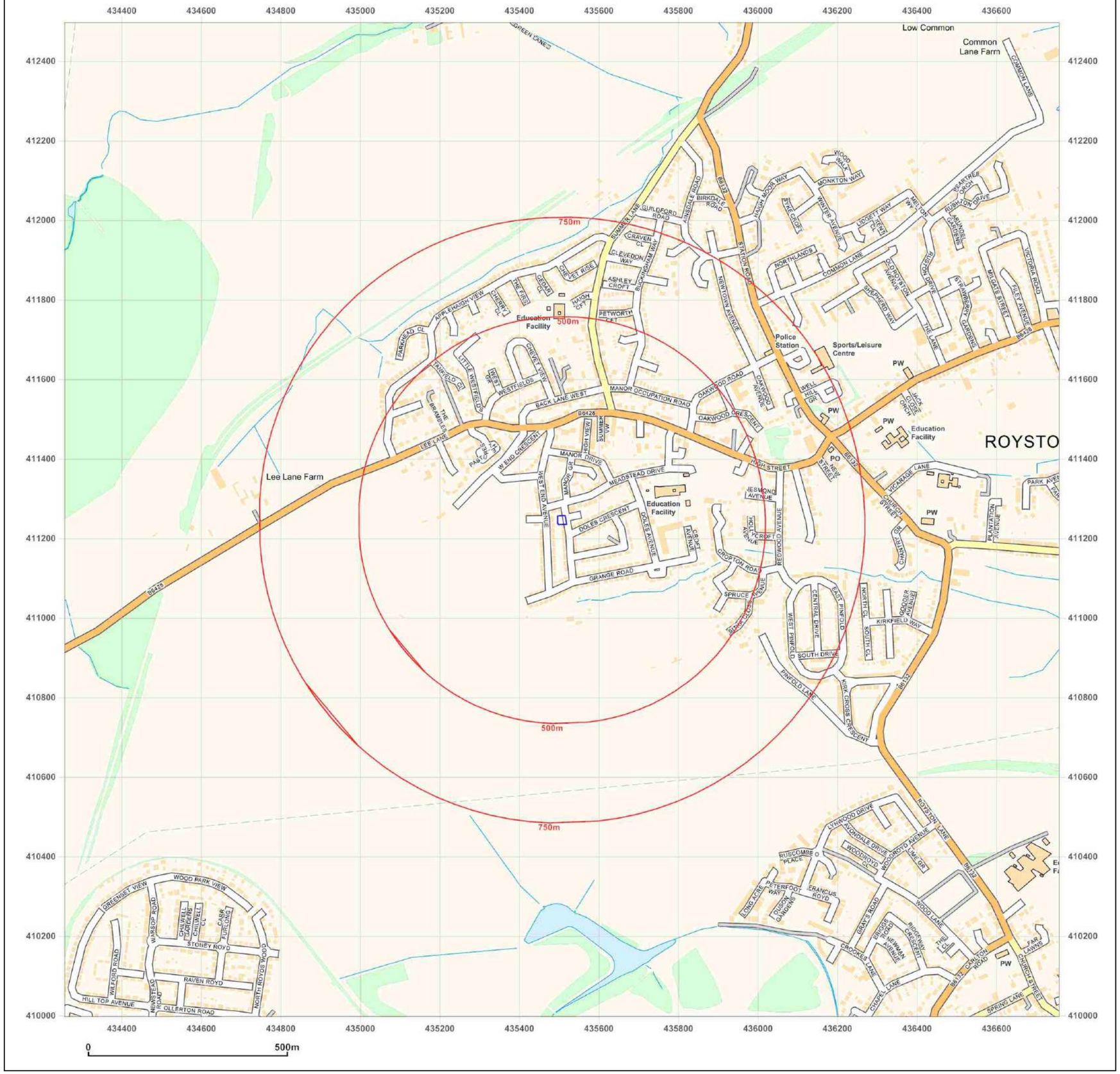
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Report Ref: GS-4020220
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Map Name: National Grid
Map date: **2014**
Scale: 1:10,000
Printed at: 1:10,000

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2014

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Appendix C

Groundsure EnviroInsight Report

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-4020218
Your Reference:	18-6007_Doles_Cresc_PO23001937
Report Date	26 Jun 2017
Report Delivery Method:	Email - pdf

Enviro Insight

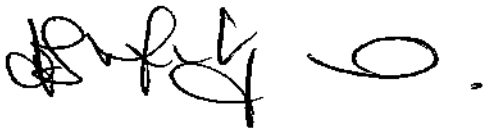
Address: DOLES CRESCENT, BARNSLEY, S71 4LA

Dear Sir/ Madam,

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

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

Yours faithfully,



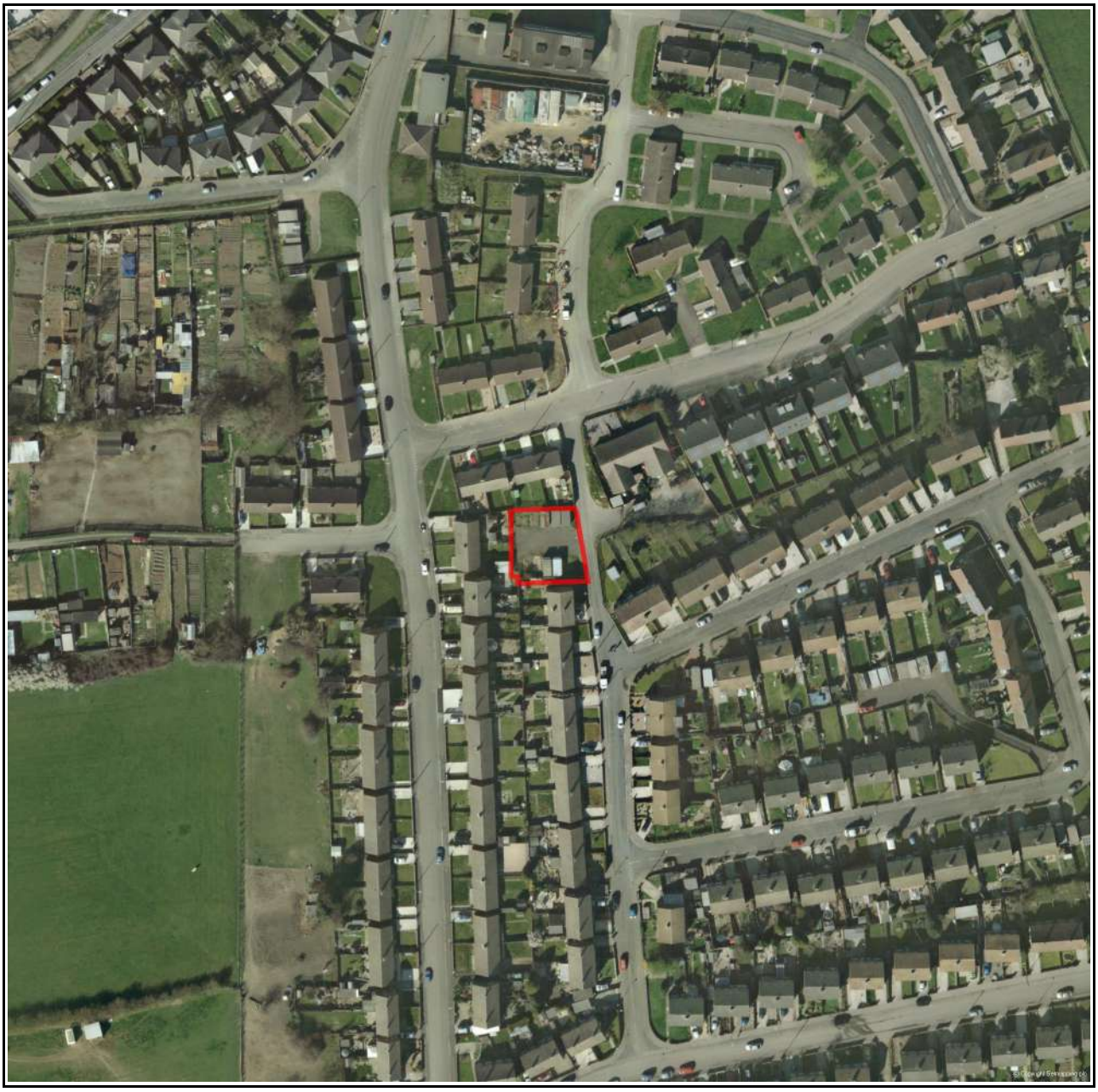
Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**DOLES CRESCENT, BARNSLEY, S71 4LA**
Date:	**26 Jun 2017**
Reference:	**GS-4020218**
Client:	**Hamson Barron Smith Ltd**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435506,411247
Site Size:	0.05ha

Report Reference: GS-4020218
Client Reference: 18-6007_Doles_Cresc_PO23001937

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Overview of Findings

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Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	0	0	0	9
1.2 Additional Information – Historical Tank Database	0	0	0	2
1.3 Additional Information – Historical Energy Features Database	0	0	12	4
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	0
1.6 Potentially Infilled Land	0	0	2	0

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	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	0	2
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	1	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	0	0	1	1
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	0	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	3	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?	None
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	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	2
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)	1	0	1	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	No	No
6.10 Detailed River Network entries within 500m of the site	0	0	1	4	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	No	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/Natural Resources Wales 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?	Not Prone
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Not Applicable

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	1	2
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	1	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
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	1	0	1	0	0	2
8.14 Records of Green Belt land	0	0	1	0	1	3

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?	Negligible
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 1 and 3% 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?	No 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.

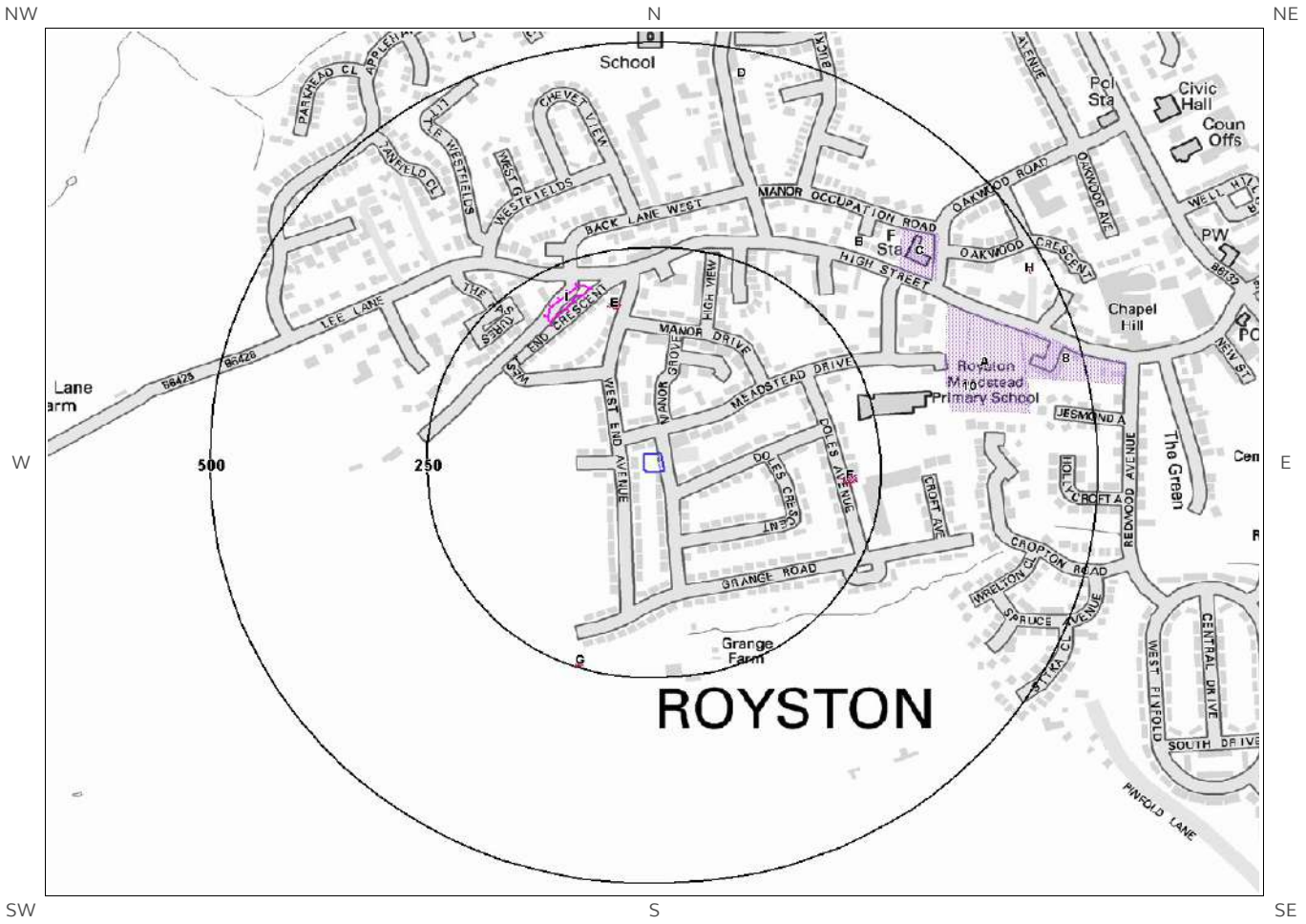
Note: Maps

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



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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: 9

ID	Distance [m]	Direction	Use	Date
1B	338	NE	Unspecified Pump	1854
2A	338	E	Unspecified Factory	1989
3A	338	E	Unspecified Factory	1978
4B	346	NE	Unspecified Pump	1854
5A	349	E	Unspecified Works	1966
6C	352	NE	Fire Station	1978
7C	365	NE	Fire Station	1989
8	432	E	Unspecified Works	1966
9D	463	N	Unspecified Tank	1904

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: 2

ID	Distance (m)	Direction	Use	Date
10	362	E	Unspecified Tank	1993
11D	465	N	Unspecified Tank	1906

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: 16

ID	Distance (m)	Direction	Use	Date
12E	177	N	Electricity Substation	1970
13E	179	N	Electricity Substation	1976

14E	180	N	Electricity Substation	1993
15F	206	E	Electricity Substation	1983
16F	207	E	Electricity Substation	1970
17F	207	E	Electricity Substation	1976
18F	207	E	Electricity Substation	1993
19G	243	S	Electricity Substation	1970
20G	244	S	Electricity Substation	1976
21G	244	S	Electricity Substation	1993
22G	248	S	Electricity Substation	1993
23G	248	S	Electricity Substation	1985
24H	476	NE	Electricity Substation	1993
25H	477	NE	Electricity Substation	1983
26H	477	NE	Electricity Substation	1976
27H	477	NE	Electricity Substation	1970

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: 0

Database searched and no data found.

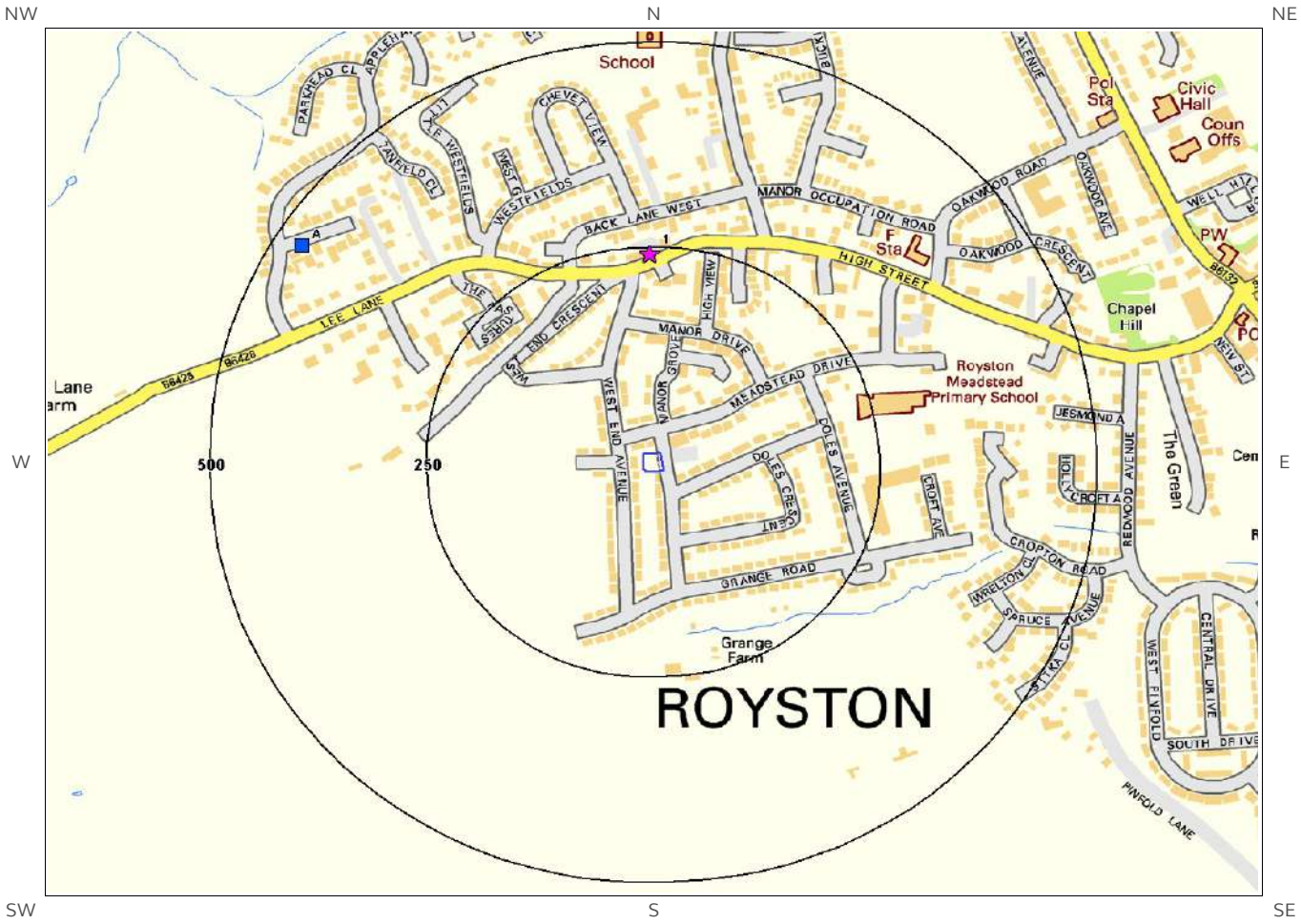
1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 2

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

ID	Distance(m)	Direction	Use	Date
28I	194	NW	Pond	1904
29I	194	NW	Pond	1891

2. Environmental Permits, Incidents and Registers Map



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- Site Outline
- Search Buffers (m) (250, 500)
- Recorded Pollution Incident
- 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/Natural Resources Wales 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:

0

Database searched and no data found.

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

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

2

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

ID	Distance (m)	Direction	NGR	Details	
2A	468	NW	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 2	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 14/04/2009 Effective Date: 14-Apr-2009 Revocation Date: -
3A	468	NW	435100 411510	Address: APPLEHAIGH VIEW SPS, ROYSTON, BARNSLEY, ., SOUTH YORKSHIRE, S71 4JG Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: WADC12 Permit Version: 1	Receiving Water: BLEAKLEY DYKE Status: TRANSFERRED FROM WATER ACT 1989 Issue date: 02/11/1989 Effective Date: 02-Nov-1989 Revocation Date: 13/04/2009

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

0

Database searched and no data found.

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

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/Natural Resources Wales Recorded Pollution Incidents

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

1

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	242	N	435500 411500	Incident Date: 03-Dec-2001 Incident Identification: 46273 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 4 (No Impact) Air Impact: Category 3 (Minor)

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

0

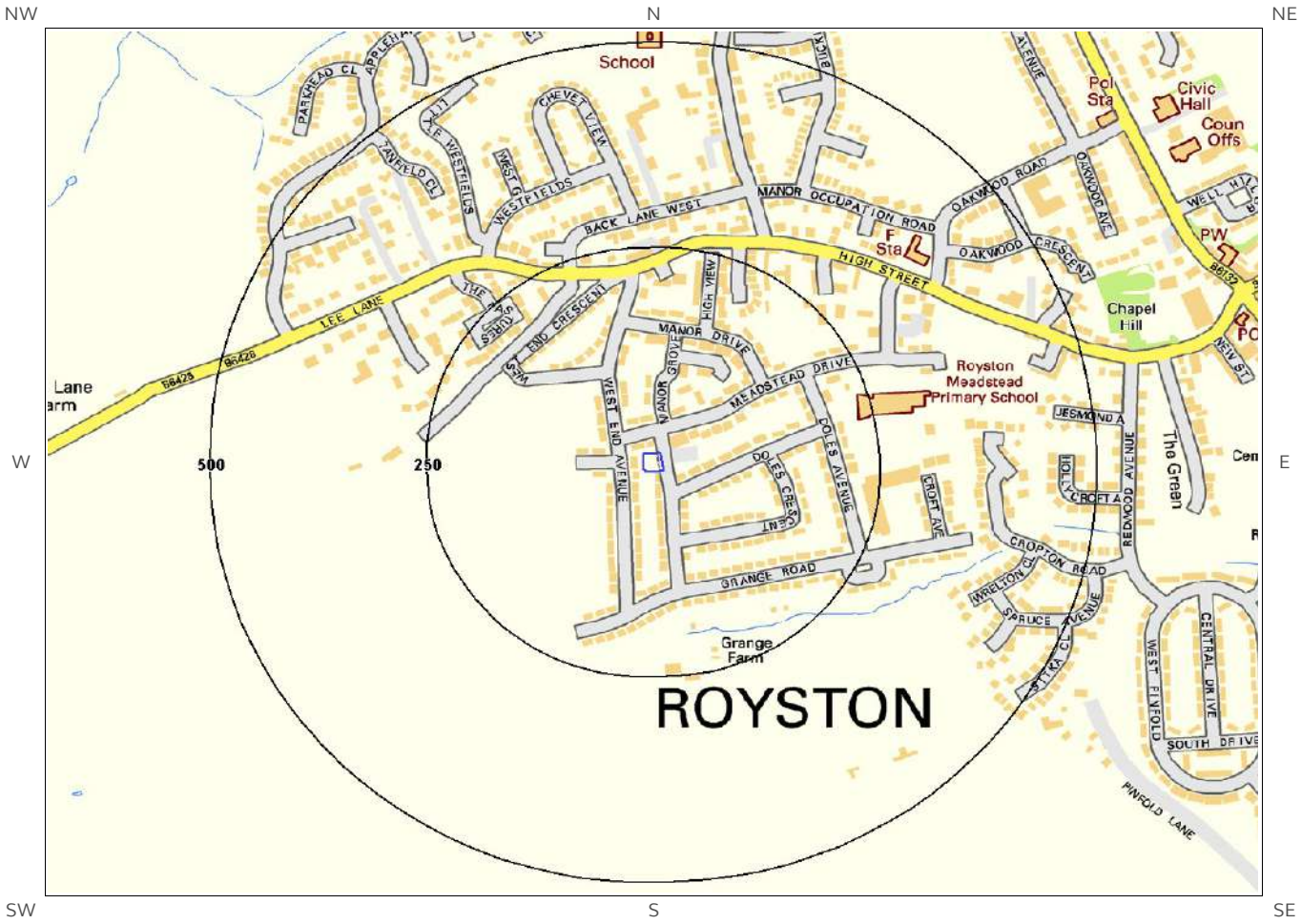
Database searched and no data found.

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



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Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW 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/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

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

2

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	860	NE	436300 411700	Site Address: Warren Walk, Royston, Barnsley Waste Licence: Yes Site Reference: 4400/B16 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 21-Jun-1994 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Barnsley Metropolitan Borough Council First Recorded: - Last Recorded: -
Not shown	1068	E	436600 410800	Site Address: Land between Royston Lane and Cronkhill Lane, Carlton, Barnsley Waste Licence: Yes Site Reference: WD20 B457, 4400/B457, 20B457(95) Waste Type: Inert, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 18-Feb-1985 Licence Surrendered: 20-Jan-1993 Licence Holder Address: Stud Farm, Carlton, Barnsley Operator: E Maw and Son Licence Holder: E Maw First Recorded: 18-Feb-1985 Last Recorded: 20-Jan-1993

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:

0

Database searched and no data found.

3.2 Other Waste Sites

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

0

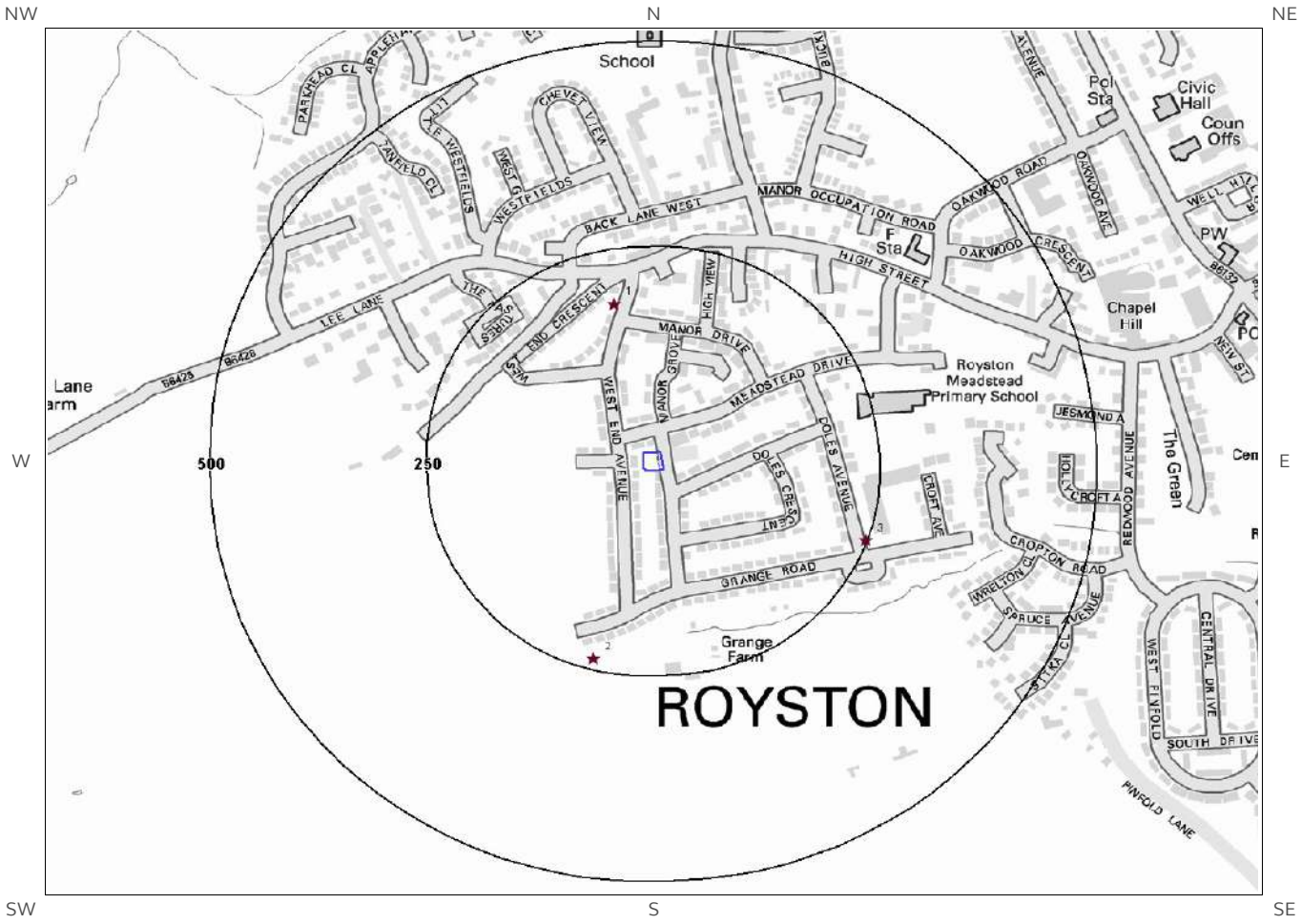
Database searched and no data found.

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

0

Database searched and no data found.

4. Current Land Use Map



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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: 3

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	185	N	Electricity Sub Station	435460 411439	Electricity Sub Station, S71	Electrical Features	Infrastructure and Facilities
2	236	S	Electricity Sub Station	435436 411007	Electricity Sub Station, S71	Electrical Features	Infrastructure and Facilities
3	248	E	Electricity Sub Station	435750 411151	Electricity Sub Station, S71	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

Database searched and no data found.

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

5.3 Bedrock and Solid Geology

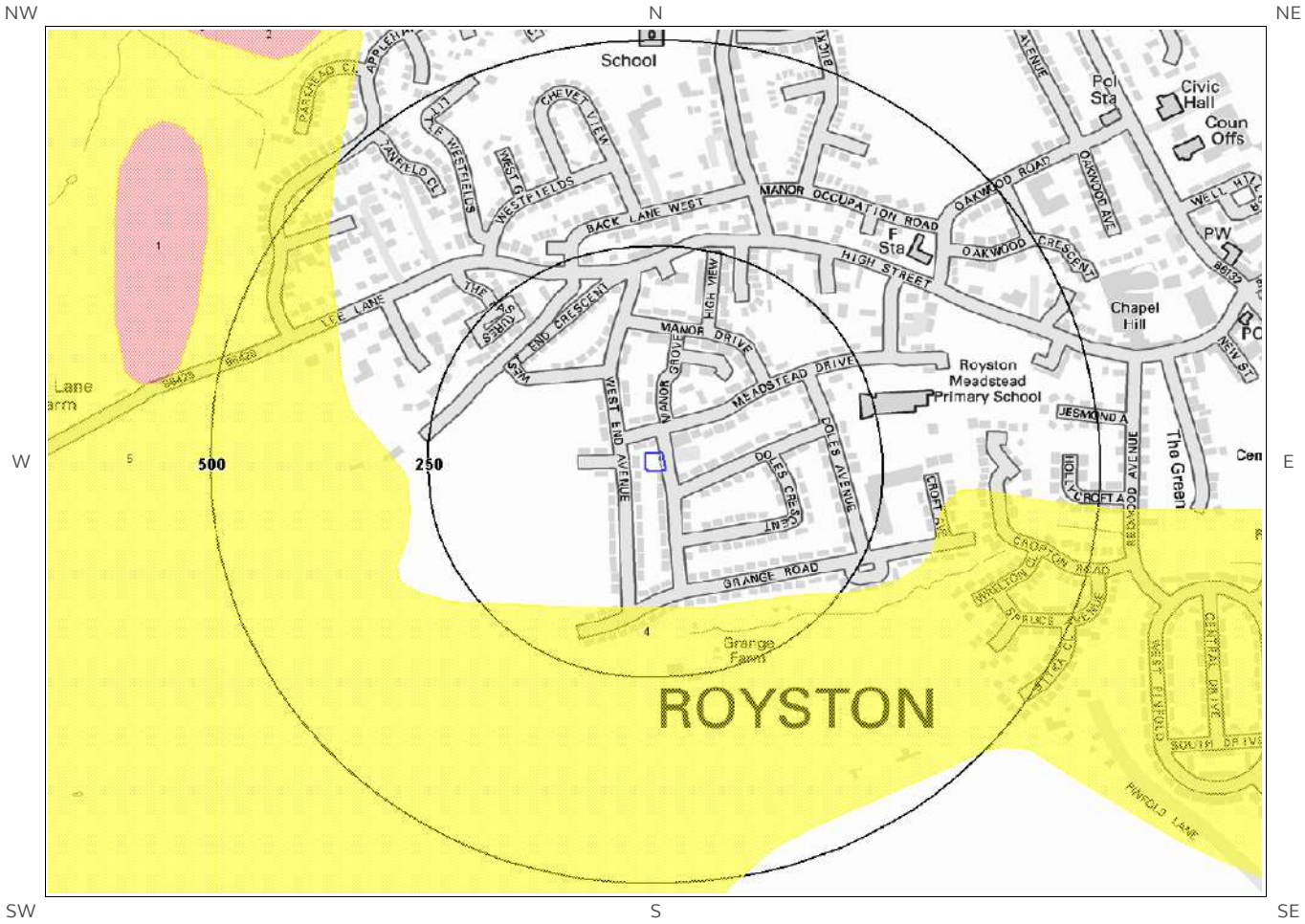
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION	MUDSTONE, SILTSTONE AND SANDSTONE

(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
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

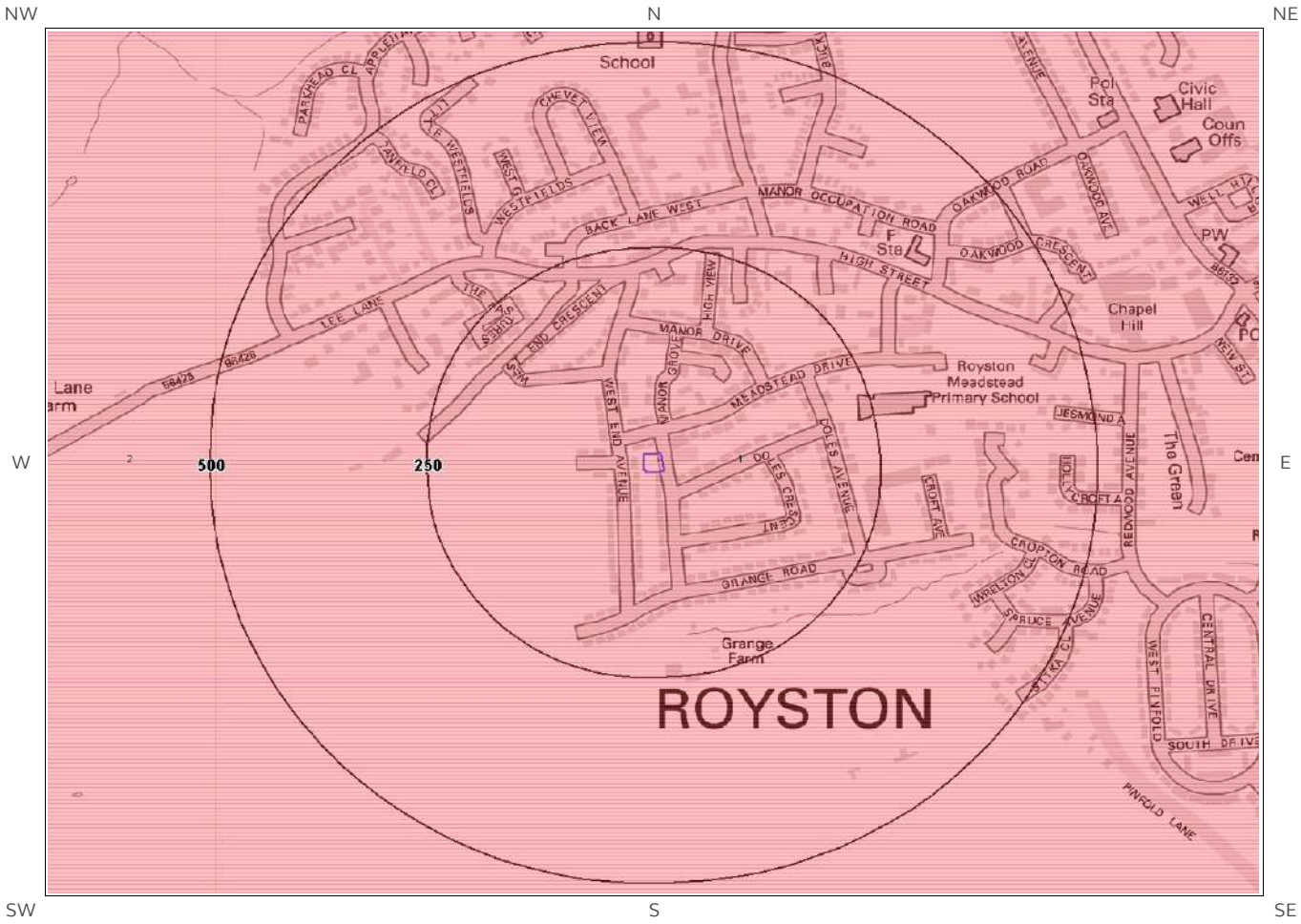
Secondary (B) Aquifer - Lower Permeability Layers

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

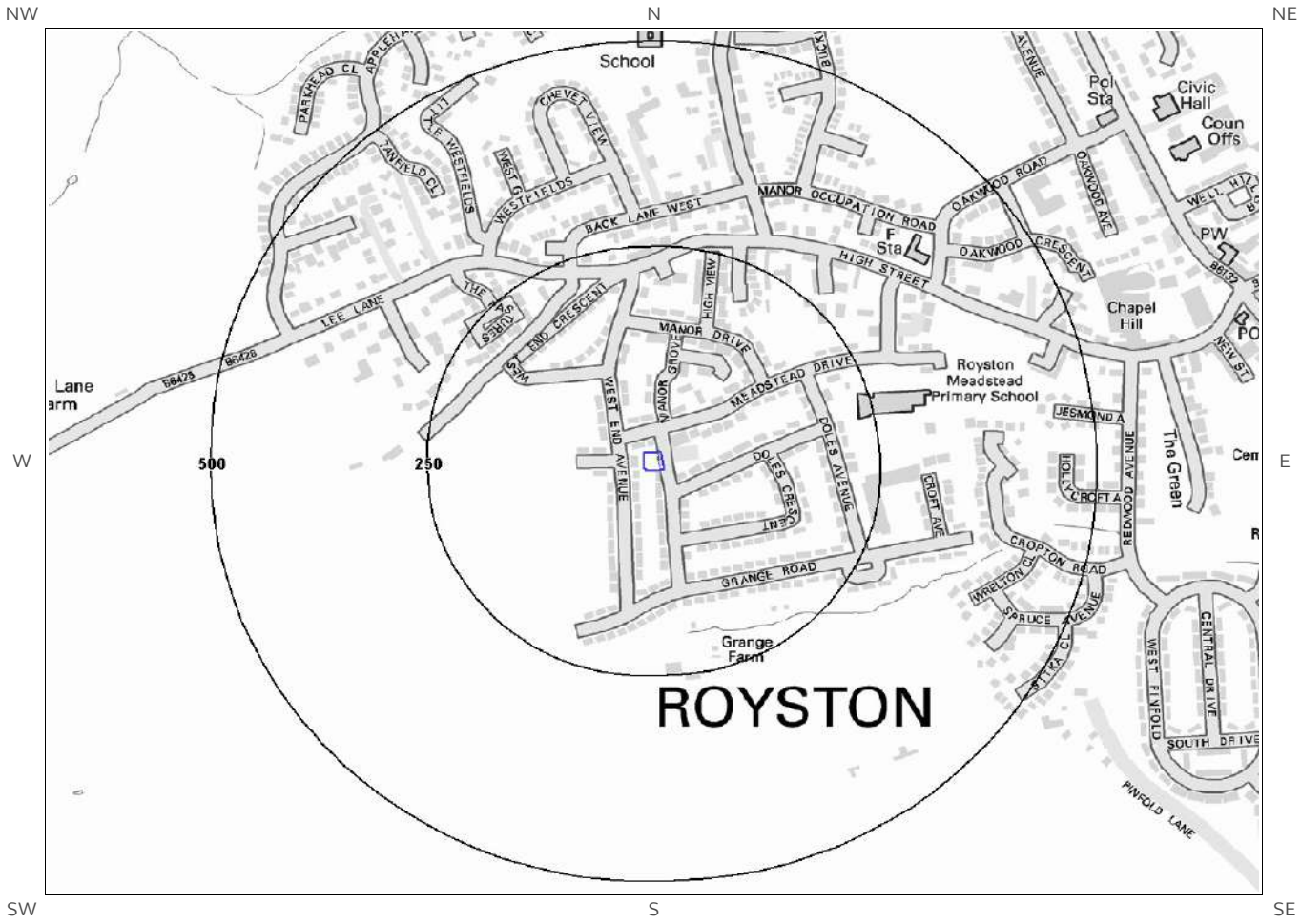
Secondary Aquifer - Undifferentiated Layers

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
Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

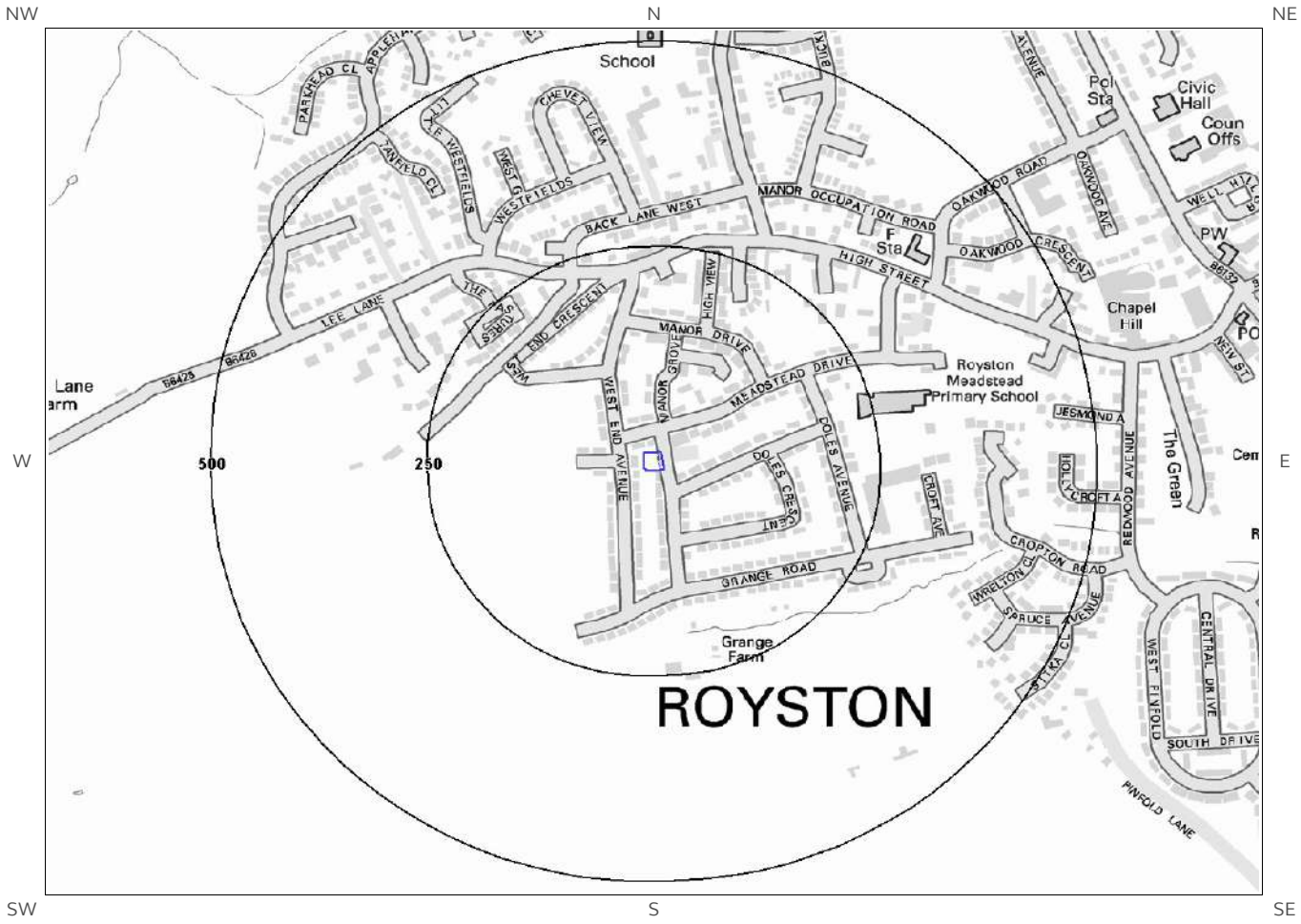
Source Protection Zone 2 - Outer Catchment

Source Protection Zone 3 - Total Catchment

Source Protection Zone 4 - Zone of Special Interest

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

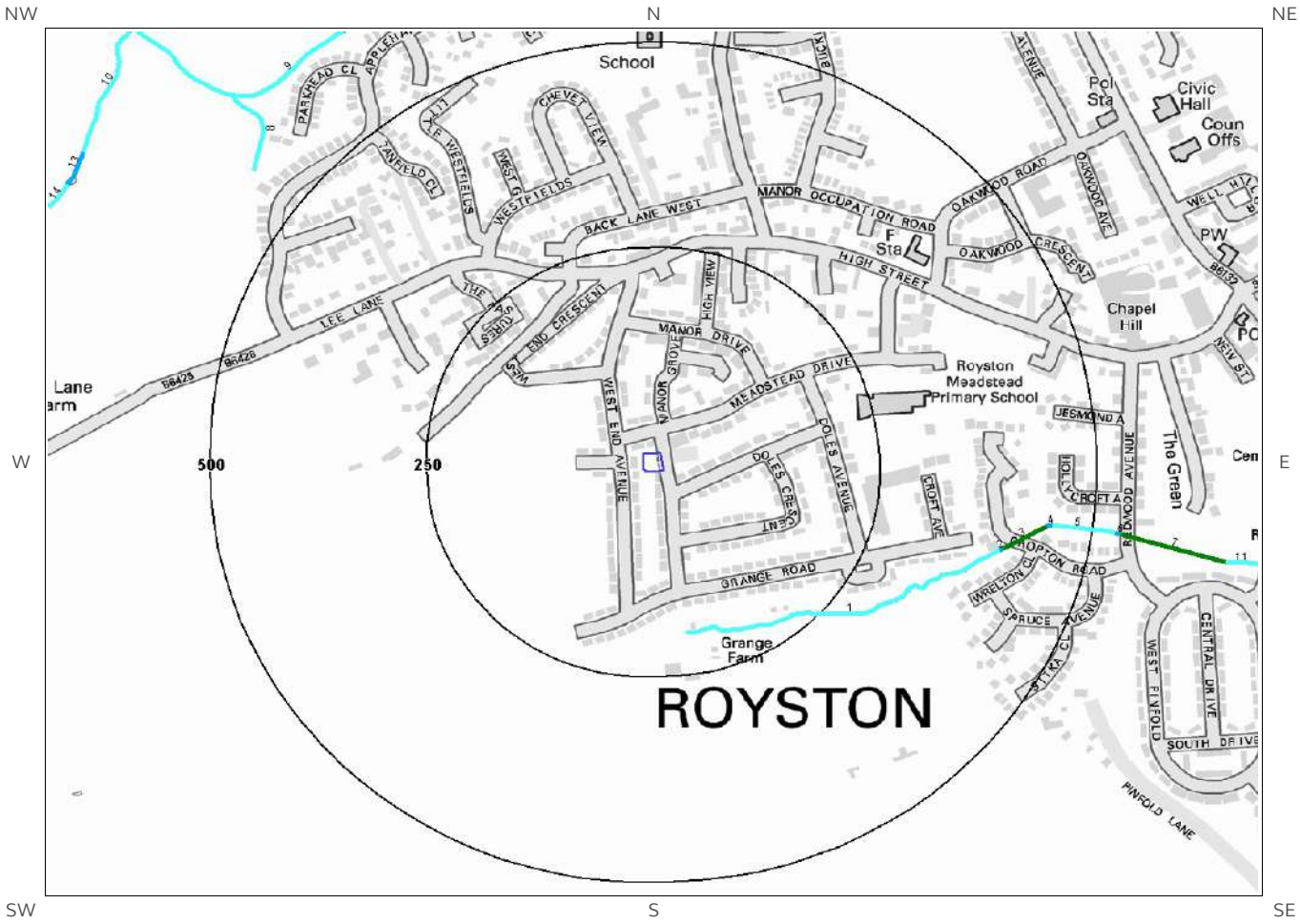
Source Protection Zone 3C - Total Catchment within Confined Aquifer

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

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

ID	Distance (m)	Direction	Designation	Description
4	167	S	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
5	495	W	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.2 Aquifer within Bedrock Deposits

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

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

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

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	495	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

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

Database searched and no data found.

6.4 Surface Water Abstraction Licences

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

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

ID	Distance (m)	Direction	NGR	Details	
Not shown	1921	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Use Relating To Secondary Category (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL CO LTD	Annual Volume (m^3): 110000 Max Daily Volume (m^3): 2742 Application No: 1394-V860 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 102 Version Start Date: 21/1/2008 Version End Date:
Not shown	1921	NE	437080 412370	Status: Historical Licence No: 2/27/08/068 Details: General Cooling (Existing Licences Only) (High Loss) Direct Source: Surface Water Point: Aire And Calder Navigation (old) - Barnsley Data Type: Point Name: MONCKTON COKE & CHEMICAL COMPANY LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Application No: 1394 Original Start Date: 28/4/1966 Expiry Date: - Issue No: 100 Version Start Date: 27/3/1998 Version End Date:

6.5 Potable Water Abstraction Licences

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

Database searched and no data found.

6.6 Source Protection Zones

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

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

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

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

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

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

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	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.
249	S	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? No

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

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	198	S	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
2	400	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
3	403	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
4	448	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
5	454	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

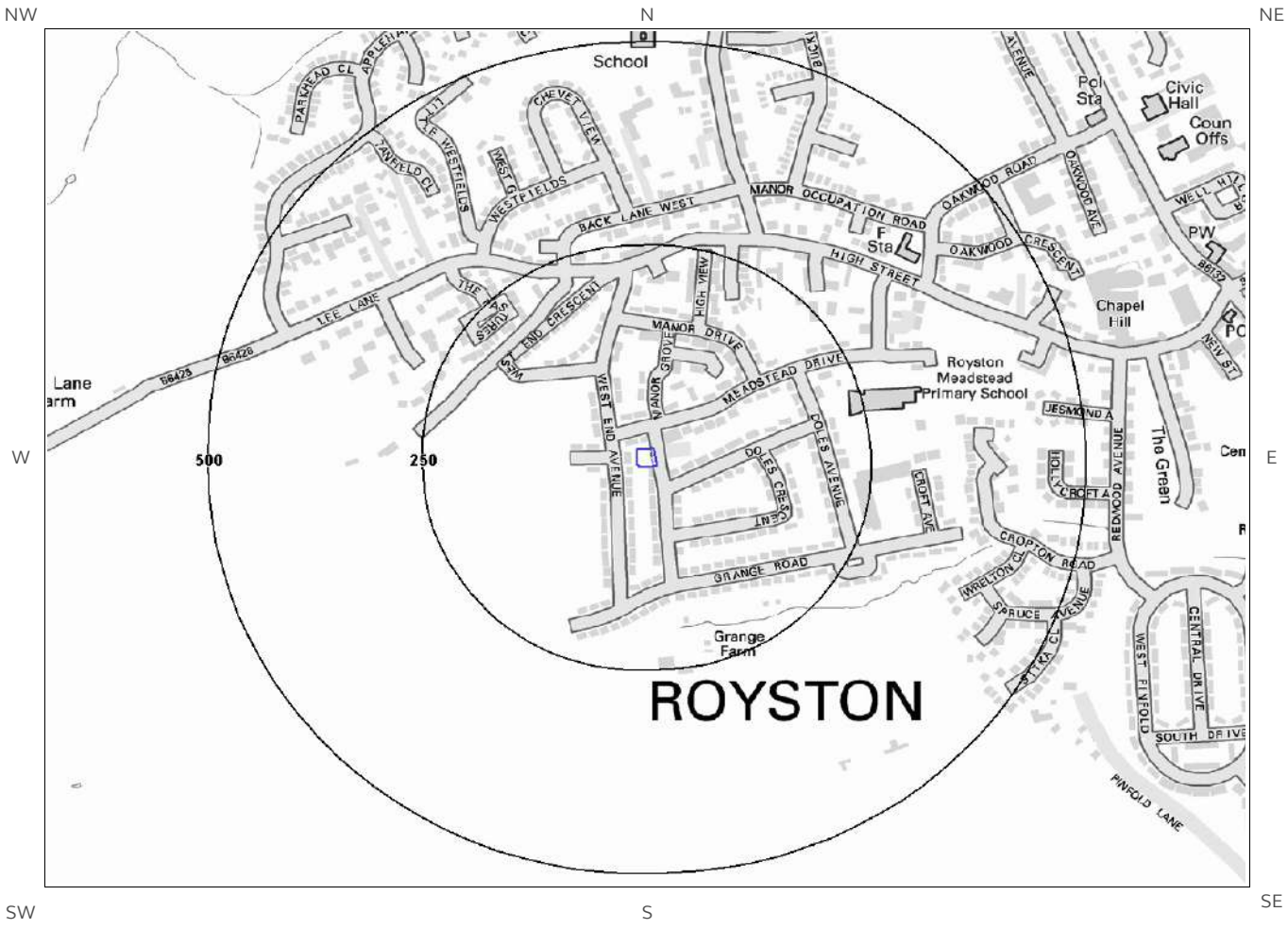
6.11 Surface Water Features

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
198	S
202	S
228	SE

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



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

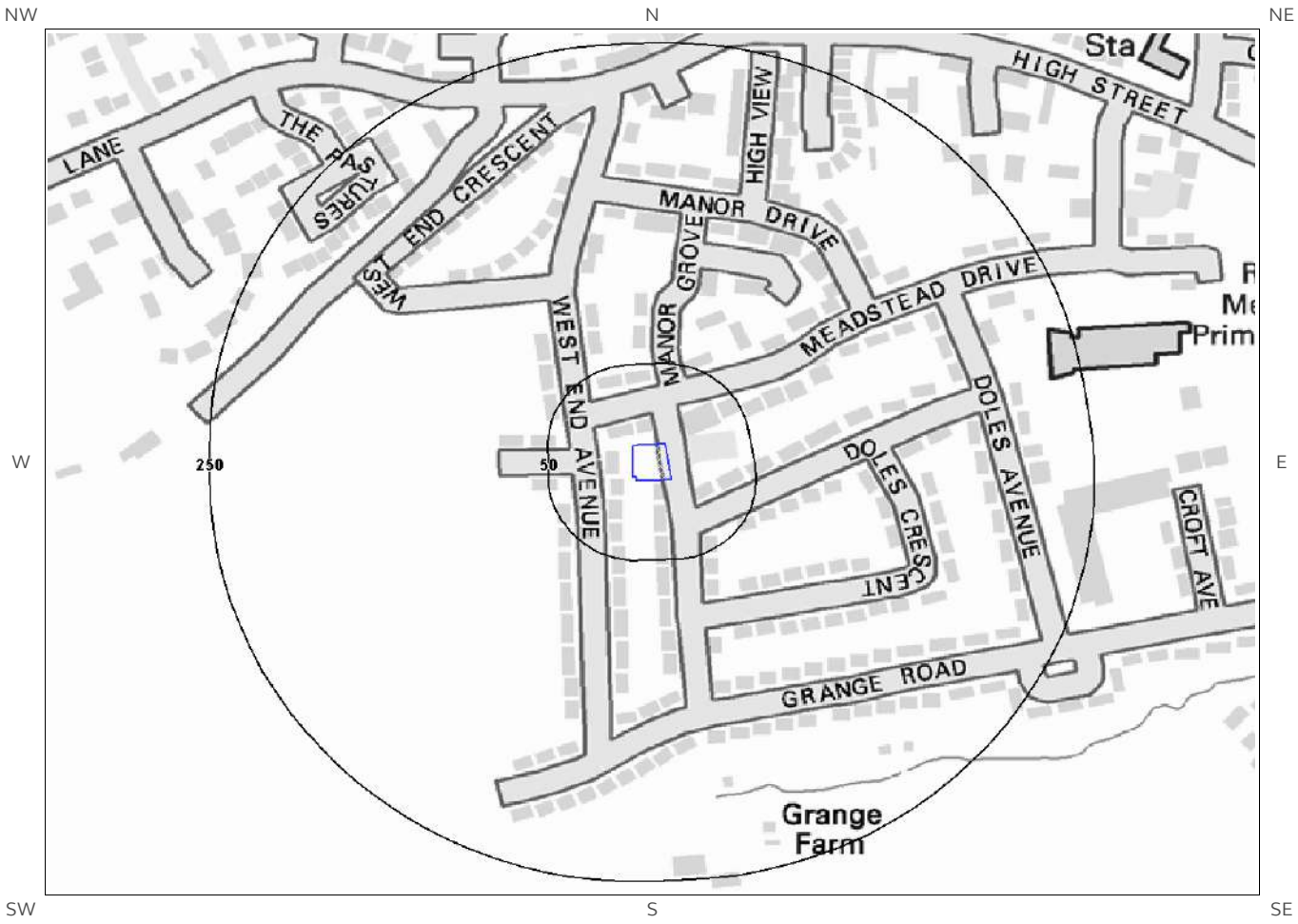
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

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



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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/Natural Resources Wales Zone 2 floodplain? No

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

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales 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/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

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

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? 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? No

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?

Not Prone

The area is not considered to be prone to groundwater flooding based on rock type.

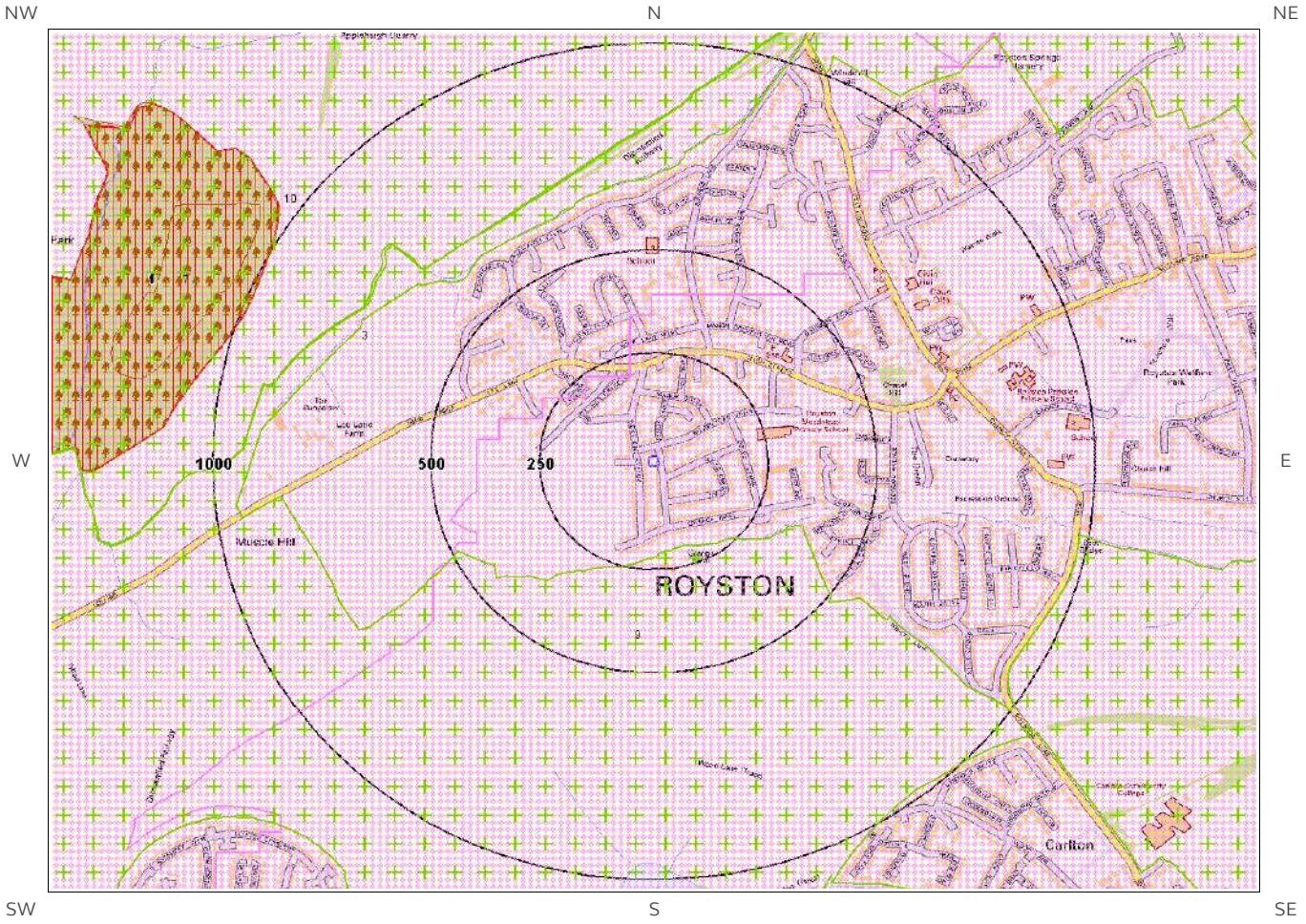
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result? Not Applicable

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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Site Outline

100
250
Search Buffers (m)

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:

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

3

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
6	988	NW	UNKNOWN	Ancient and Semi-Natural Woodland
7	1043	NW	UNKNOWN	Ancient Replanted Woodland
Not shown	1507	W	UNKNOWN	Ancient Replanted Woodland

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

1

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
1	989	NW	Notton Wood	Natural England

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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

0

Database searched and no data found.

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:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
2	0	On Site	Existing	DEFRA
3	198	N	Existing	DEFRA
Not shown	1236	S	Existing	DEFRA
Not shown	1818	SW	Existing	DEFRA

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

5

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
9	202	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
10	666	NW	Liverpool, Manchester and West Yorks Greenbelt	Wakefield District (B)
Not shown	1236	S	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1784	SW	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)
Not shown	1864	SE	Liverpool, Manchester and West Yorks Greenbelt	Barnsley District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

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

9.1.1 Shrink Swell

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

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

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

9.1.2 Landslides

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

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

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

9.1.3 Soluble Rocks

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

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

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

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

9.1.4 Compressible Ground

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

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

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

9.1.5 Collapsible Rocks

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

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

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

9.1.6 Running Sand

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

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

Hazard
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.

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 1 and 3% 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? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

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

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

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

10.2 Non-Coal Mining

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

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

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

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: 03708 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: Barnsley Metropolitan Borough Council
Phone: 01226 770770
Web: http://www.barnsley.gov.uk/
Address: PO Box 634, Barnsley, South Yorkshir, S70 9GG

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

Standard Terms and Conditions

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

Appendix D

Groundsure GeoInsight Report

Groundsure
LOCATION INTELLIGENCE

Hamson Barron Smith Ltd

16 CENTRAL AVENUE, ST. ANDREWS BUSINESS PARK,
NORWICH, NR7 0HR

Groundsure Reference:	GS-4020219
Your Reference:	18-6007_Doles_Cresc_PO23001937
Report Date	26 Jun 2017
Report Delivery Method:	Email - pdf

Geo Insight

Address: DOLES CRESCENT, BARNSLEY, S71 4LA

Dear Sir/ Madam,

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

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

Yours faithfully,



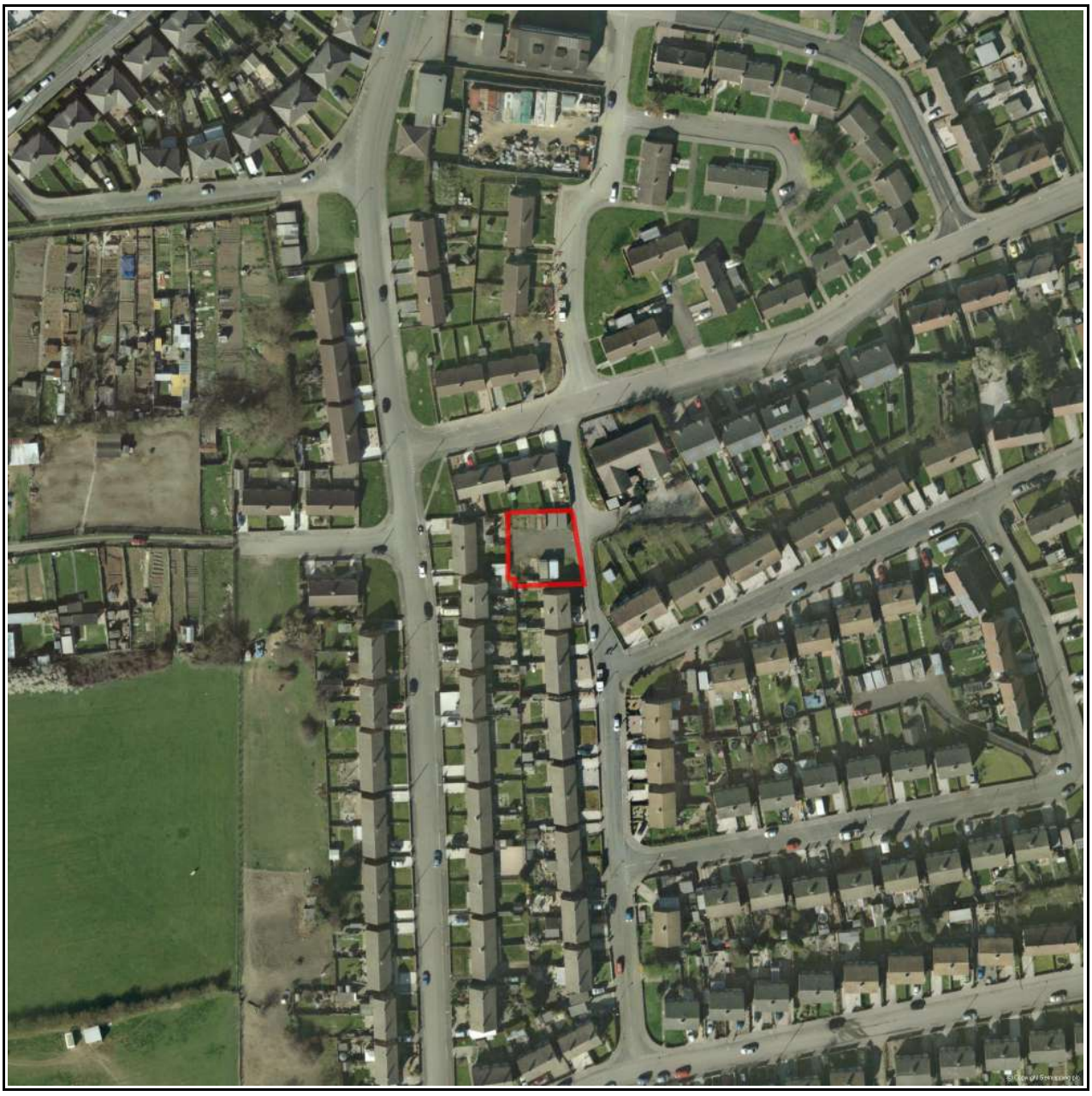
Managing Director
Groundsure Limited

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**DOLES CRESCENT, BARNSLEY, S71 4LA**
Date:	**26 Jun 2017**
Reference:	**GS-4020219**
Client:	**Hamson Barron Smith Ltd**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	26-Mar-2012
Grid Reference:	435506,411247
Site Size:	0.05ha

Groundsure
LOCATION INTELLIGENCE

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Overview of Findings

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

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

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

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

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	No
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	No
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and Faults	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of faults within 500m of the study site boundary?	Yes

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	0	0	2	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	1	0	0	0	0
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	1	0	1	4	3
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

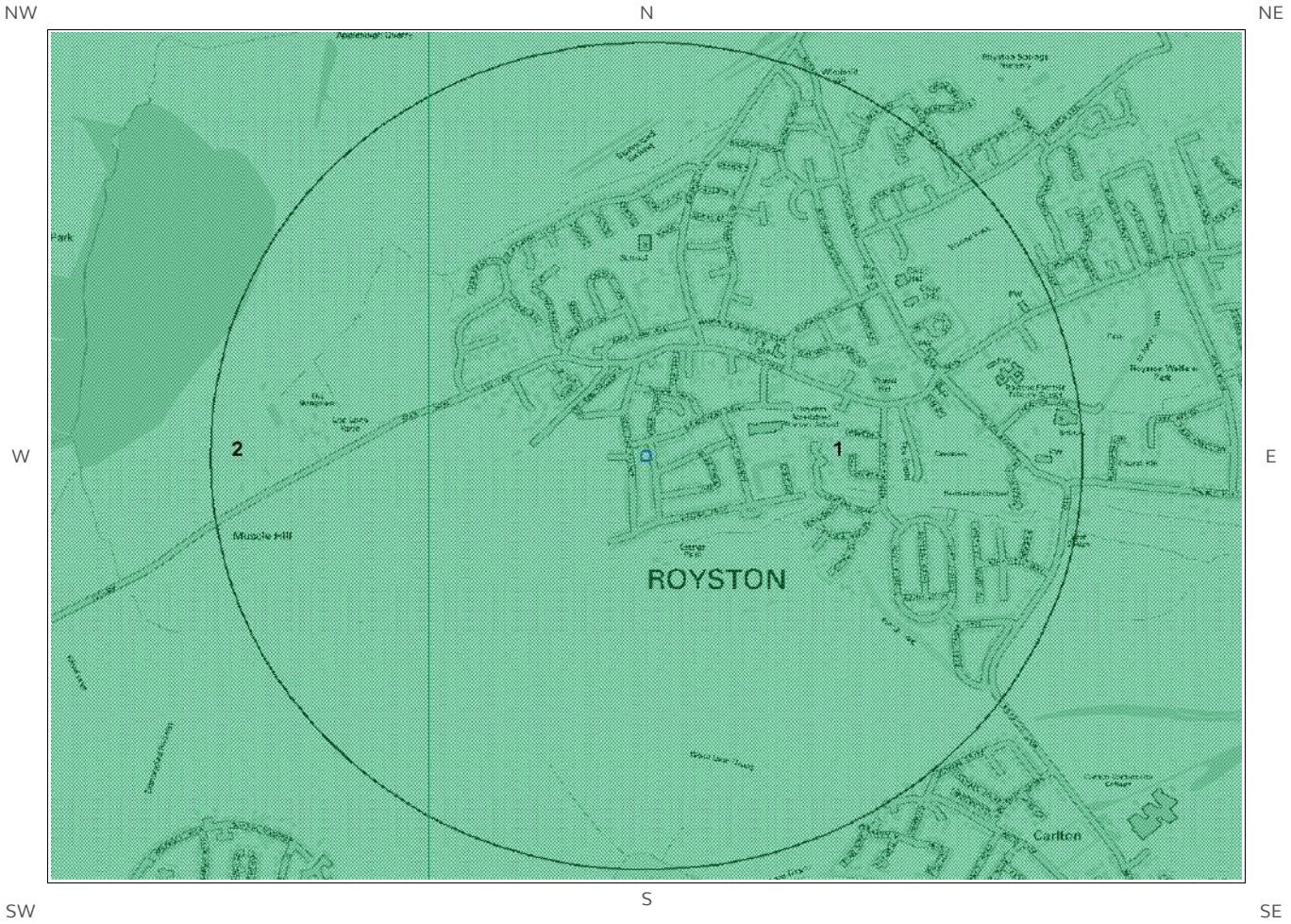
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Very Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Negligible

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	0	3	0

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	2	1	0

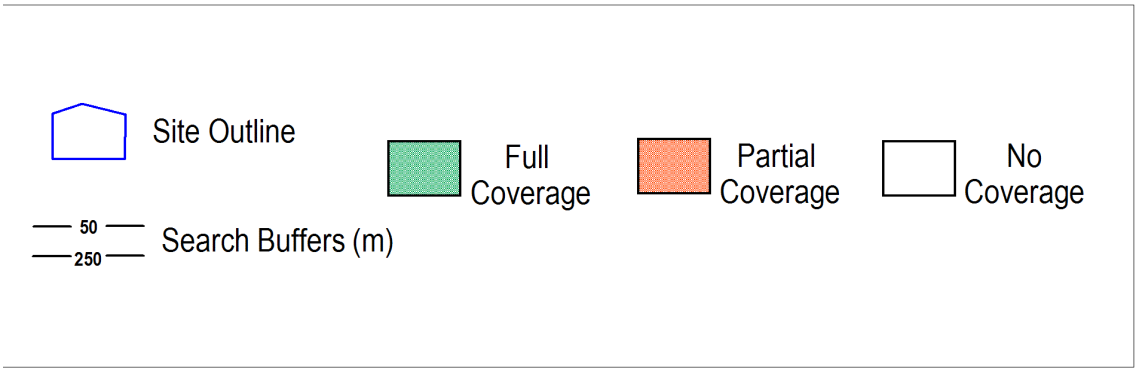
Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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Availability of 1:10,000 Scale Geology Mapping

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

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	Some deposits are mapped	Full	Full	No coverage
2	495.0	Some deposits are mapped	Full	Full	No coverage
N3	1236.0	Some deposits are mapped	Full	Full	No coverage
N4	1332.0	Some deposits are mapped	Full	Full	Some deposits are mapped

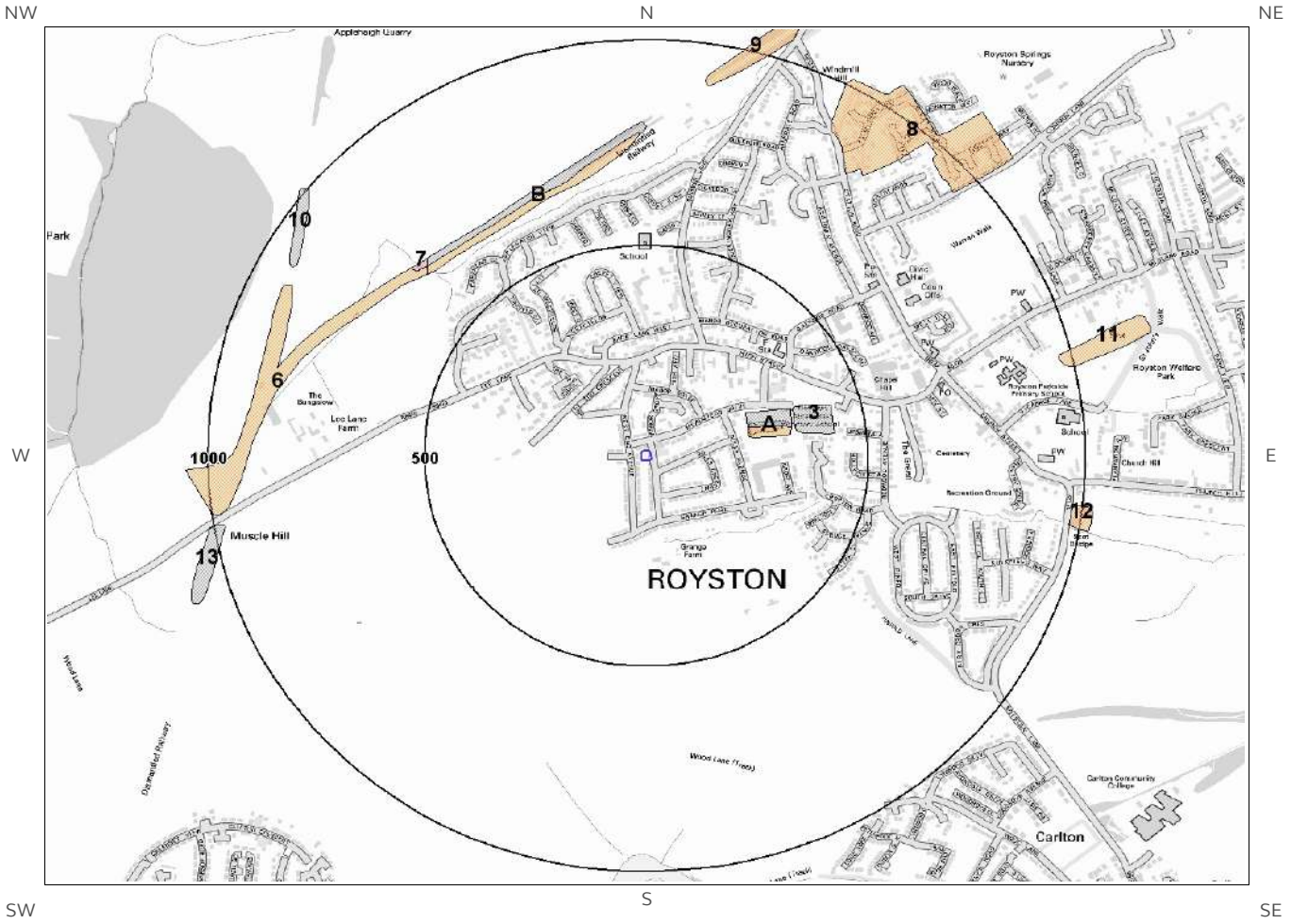
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not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

The definitions of coverage are as follows:

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

1 Geology (1:10,000 scale).

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



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Artificial Ground Legend

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 1:10,000 scale

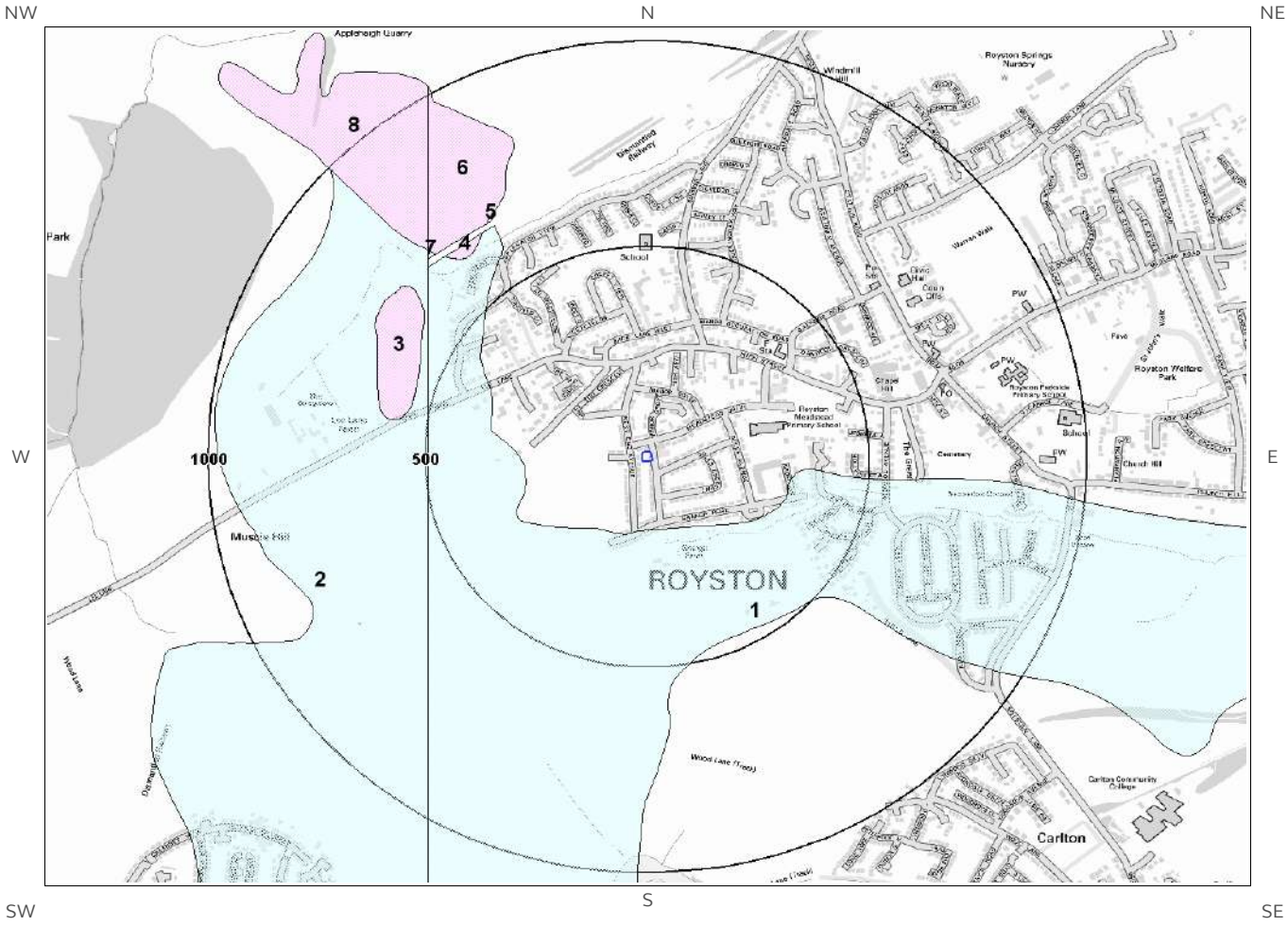
1.1 Artificial Ground

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

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1A	229.0	E	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2A	231.0	E	WGR-VOID	Worked Ground (Undivided)	Void
3	339.0	E	WGR-VOID	Worked Ground (Undivided)	Void

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



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

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

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	166.0	S	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton
2	495.0	W	TILMP-DMTN	Till, Mid Pleistocene - Diamicton	Diamicton

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

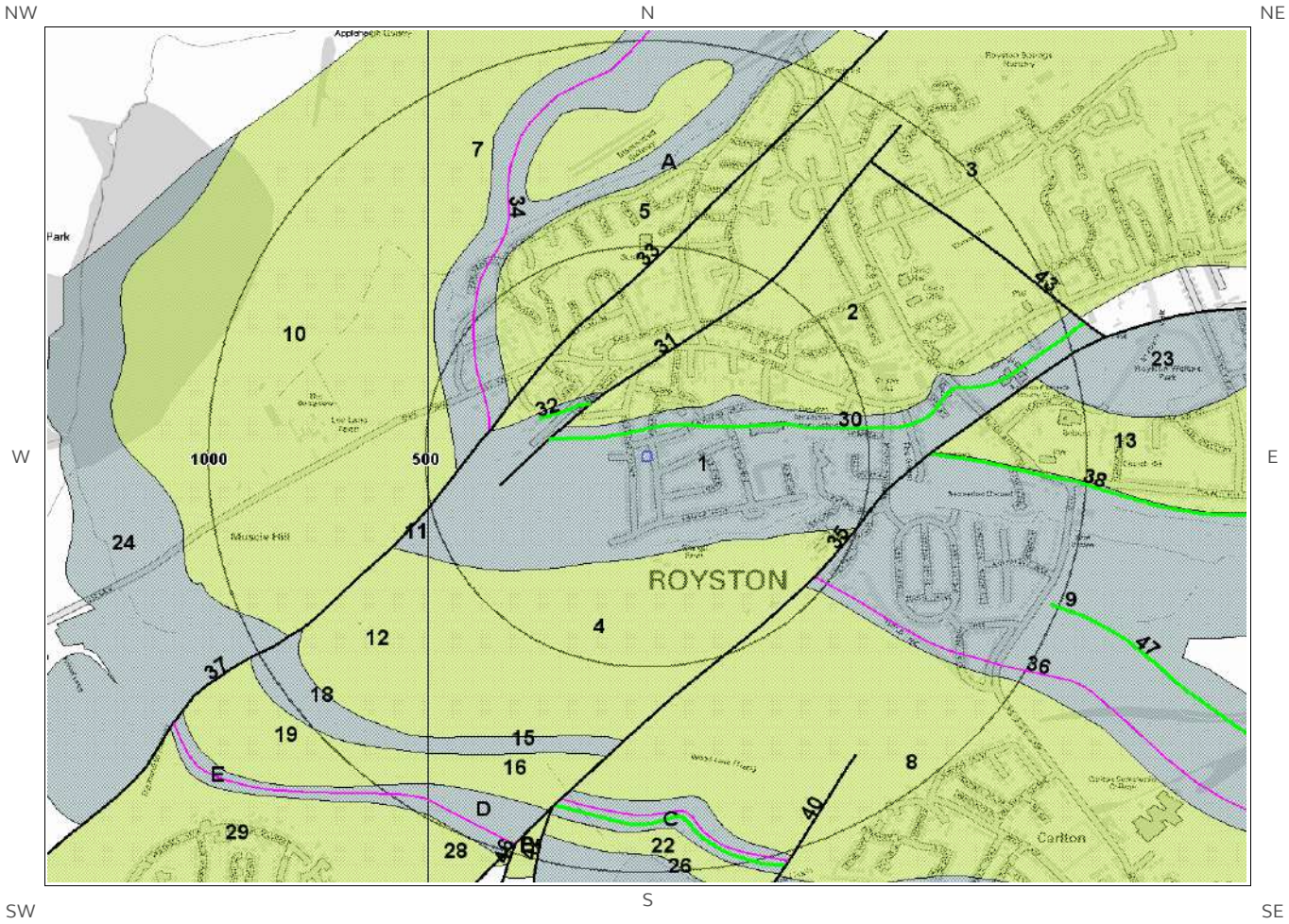
No

Database searched and no data found.

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

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

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



Bedrock and Faults Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and Faults

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

1.3.1 Bedrock/ Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
2	83.0	N	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
3	168.0	NW	MXR-SDST	Mexborough Rock - Sandstone	Bolsovian Sub-age
4	225.0	S	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
5	312.0	NW	ACR-SDST	Ackton Rock - Sandstone	Bolsovian Sub-age
6A	327.0	W	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
7	429.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
8	463.0	SE	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age
9	465.0	SE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian Sub-age - Duckmantian Sub-age
10	495.0	W	OR-SDST	Oaks Rock - Sandstone	Duckmantian Sub-age

1.3.2 Faults

Are there any records of Faults within 500m of the study site boundary at 1:10,000 scale? Yes

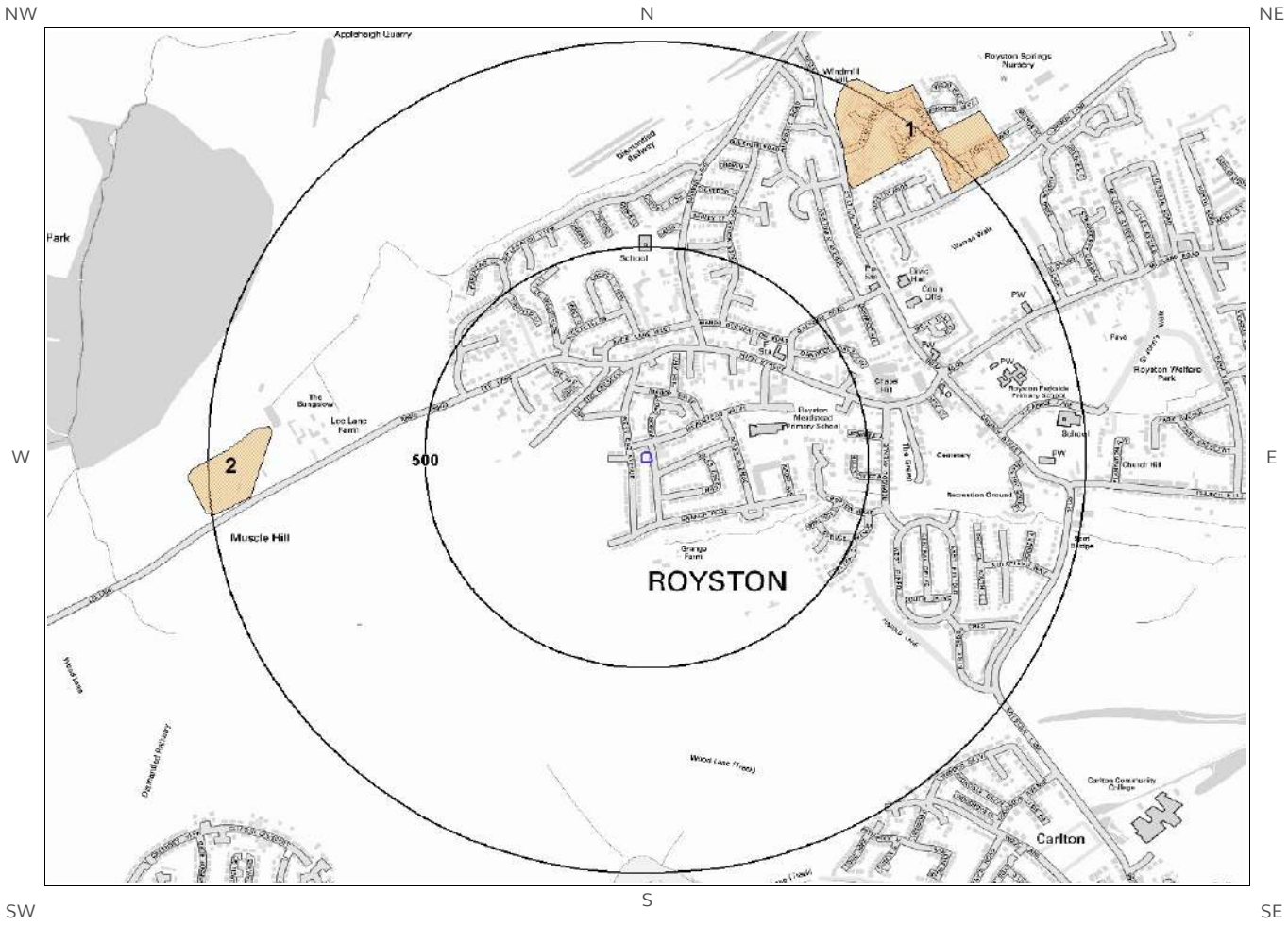
ID	Distance (m)	Direction	Category Description	Feature Description
30	53.0	N	ROCK	Coal seam, inferred
31	166.0	NW	FAULT	Normal fault, inferred
32	167.0	NW	ROCK	Coal seam, inferred
33	312.0	NW	FAULT	Normal fault, inferred
34	356.0	W	FOSSIL_HORIZON	Fossil horizon, marine band
35	463.0	SE	FAULT	Normal fault, inferred
36	467.0	SE	FOSSIL_HORIZON	Fossil horizon, marine band

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

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

2 Geology 1:50,000 Scale

2.1 Artificial Ground Map



Ground Workings Legend

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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

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.1.1 Artificial/ Made Ground

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

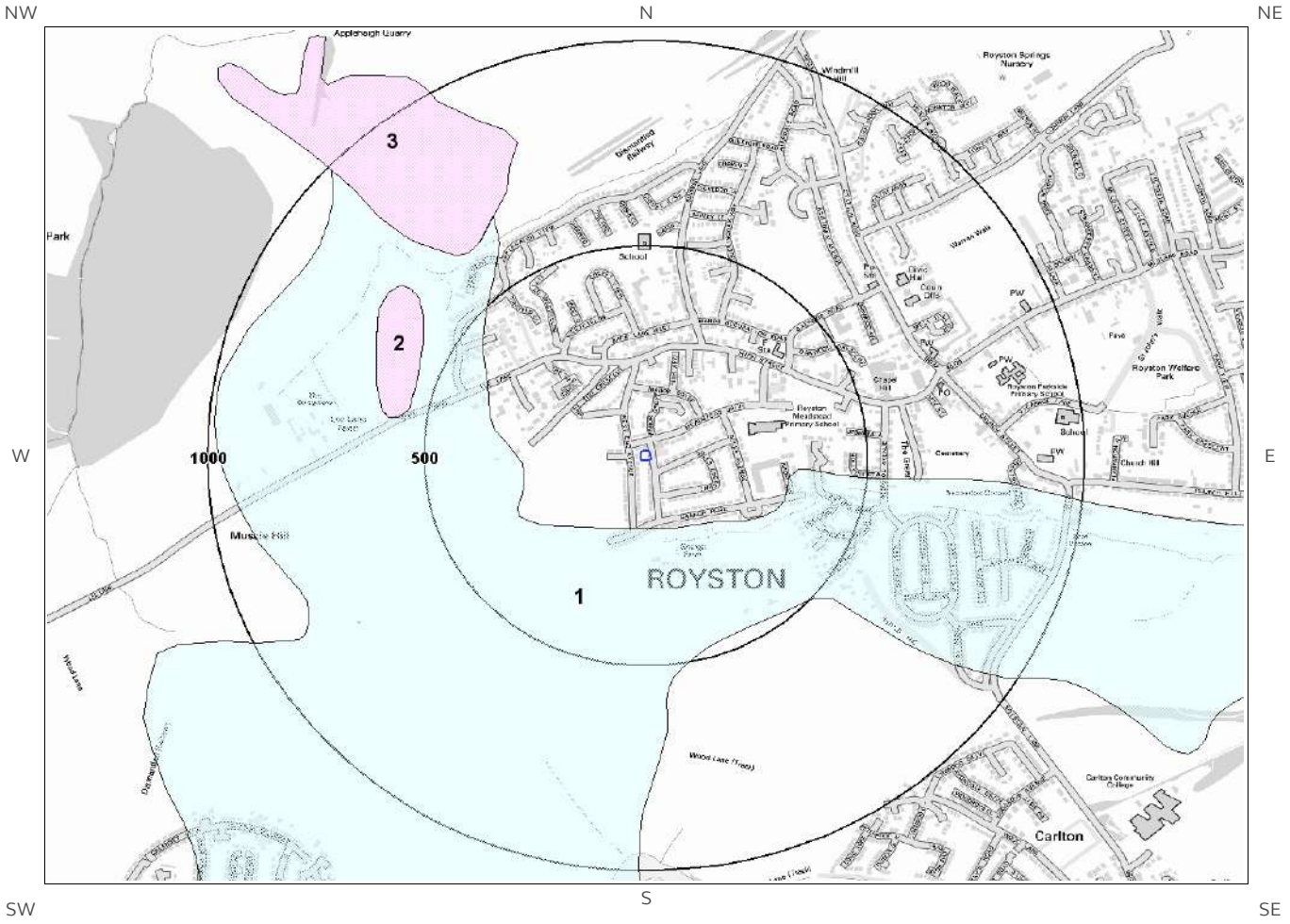
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

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

ID	Distance	Direction	LEX Code	Description	Rock Description
1	167.0	S	TILMP-DMTN	TILL, MID PLEISTOCENE	DIAMICTON

2.2.2 Permeability of Superficial Ground

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

Database searched and no data found.

2.2.3 Landslip

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

Database searched and no data found.

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

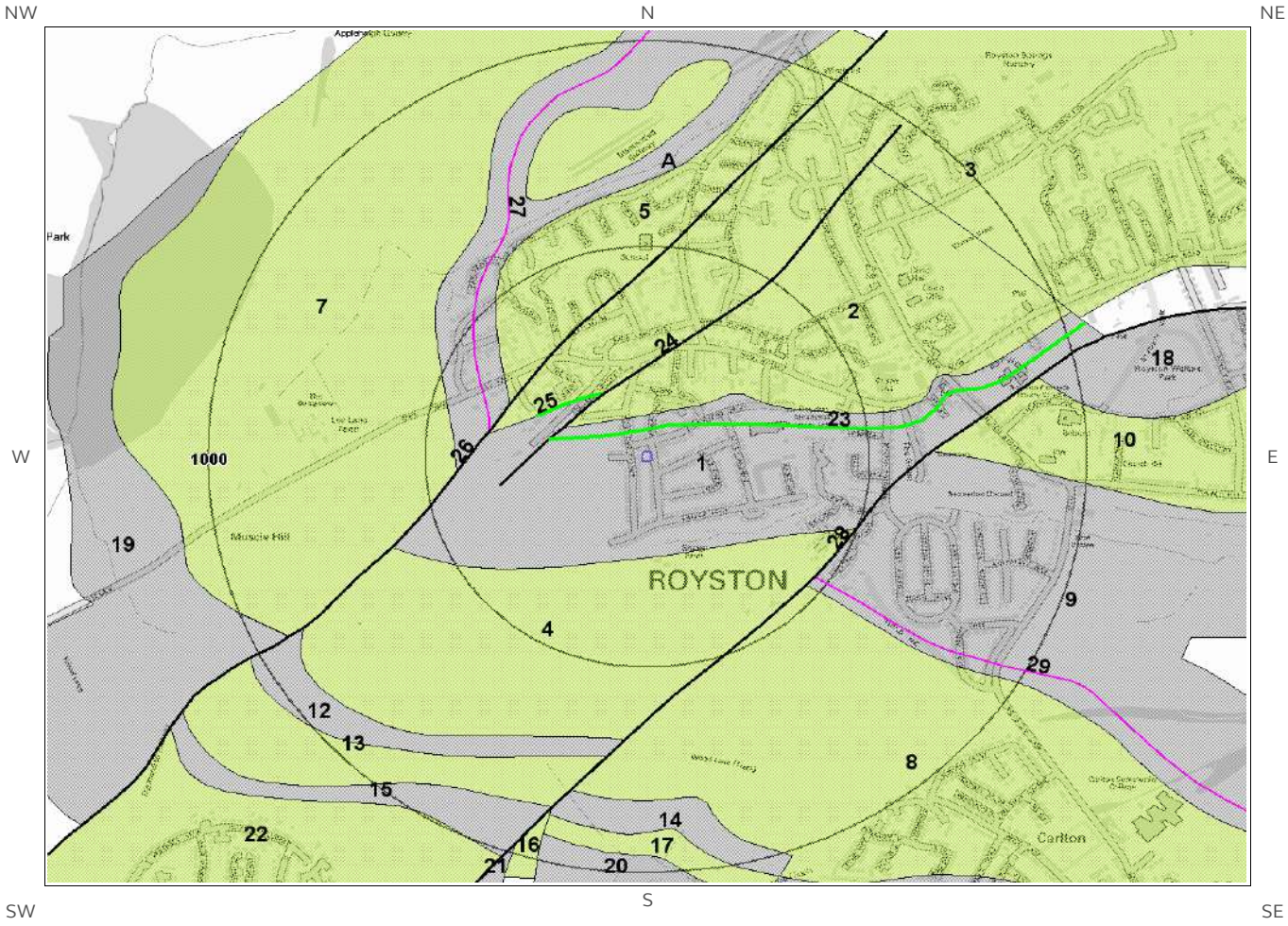
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

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

Database searched and no data found.

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



Ground Workings Legend

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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 087

2.3.1 Bedrock/Solid Geology

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

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
2	88.0	N	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
3	168.0	NW	MXR-SDST	MEXBOROUGH ROCK - SANDSTONE	WESTPHALIAN
4	232.0	S	PMCM-SDST	PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE	WESTPHALIAN
5	312.0	NW	ACR-SDST	ACKTON ROCK - SANDSTONE	WESTPHALIAN
6A	326.0	W	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN
7	429.0	W	OR-SDST	OAKS ROCK - SANDSTONE	WESTPHALIAN
8	463.0	SE	OR-SDST	OAKS ROCK - SANDSTONE	WESTPHALIAN
9	465.0	SE	PMCM-MDSS	PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE	WESTPHALIAN

2.3.2 Permeability of Bedrock Ground

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

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

2.3.3 Faults

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

ID	Distance	Direction	Category Description	Feature Description
23	52.0	N	ROCK	Coal seam, inferred
24	166.0	NW	FAULT	Fault, inferred
25	168.0	NW	ROCK	Coal seam, inferred
26	312.0	NW	FAULT	Fault, inferred
27	356.0	W	FOSSIL_HORIZON	Marine band
28	462.0	SE	FAULT	Fault, inferred
29	468.0	SE	FOSSIL_HORIZON	Marine band

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

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

3 Radon Data

3.1 Radon Affected Areas

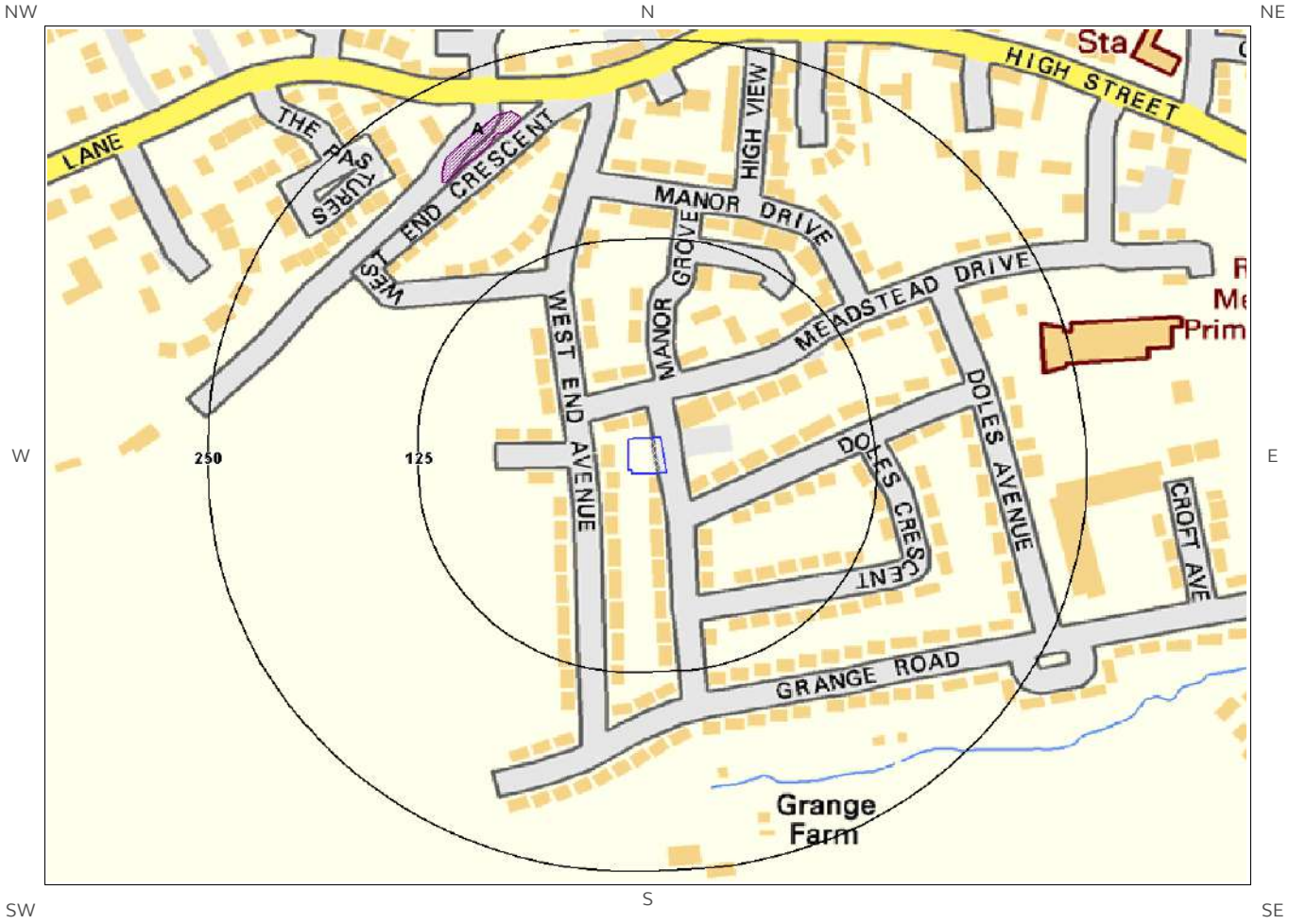
Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

3.2 Radon Protection

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

---

4 Ground Workings Map



Ground Workings Legend

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Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

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

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

ID	Distance (m)	Direction	NGR	Use	Date
1A	194.0	NW	435407 411441	Pond	1891
2A	194.0	NW	435407 411441	Pond	1904

4.2 Historical Underground Working Features derived from Historical Mapping

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

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

Database searched and no data found.

4.3 Current Ground Workings

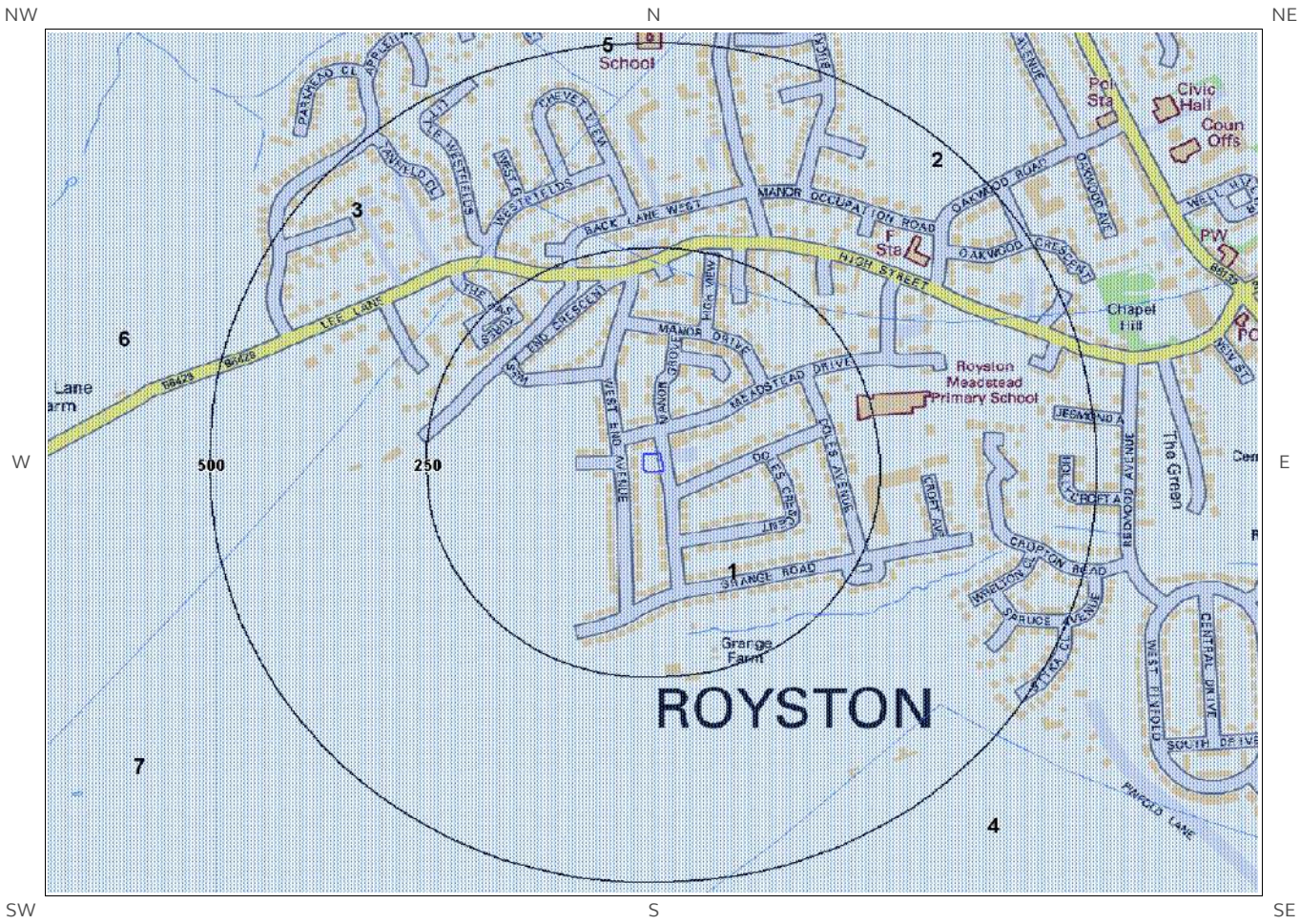
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

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

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

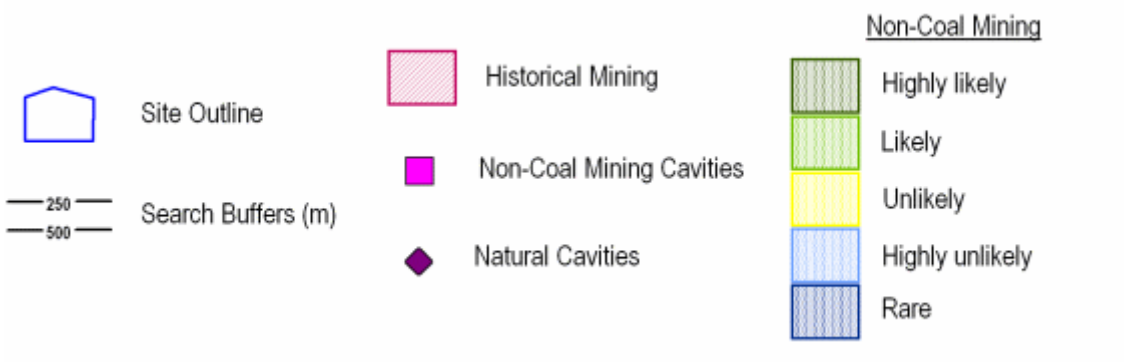
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	872.0	NE	435909 412036	Sandstone	Windmill Hill	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

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5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

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

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

Database searched and no data found.

5.2 Coal Mining

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

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

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

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

5.3 Johnson Poole and Bloomer

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

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

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

5.4 Non-Coal Mining

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

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

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

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	217.0	N	Sheffield Area	Iron Ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
3	293.0	NW	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
4	424.0	SE	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
5	433.0	N	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
6	494.0	W	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
7	509.0	W	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	666.0	S	Not available	Iron Ore (Bedded)	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	666.0	S	Sheffield Area	Vein Mineral/Iron ore	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

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

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

Database searched and no data found.

5.6 Natural Cavities

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

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

Database searched and no data found.

5.7 Brine Extraction

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

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

Database searched and no data found.

5.8 Gypsum Extraction

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

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

Database searched and no data found.

5.9 Tin Mining

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

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

Database searched and no data found.

5.10 Clay Mining

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

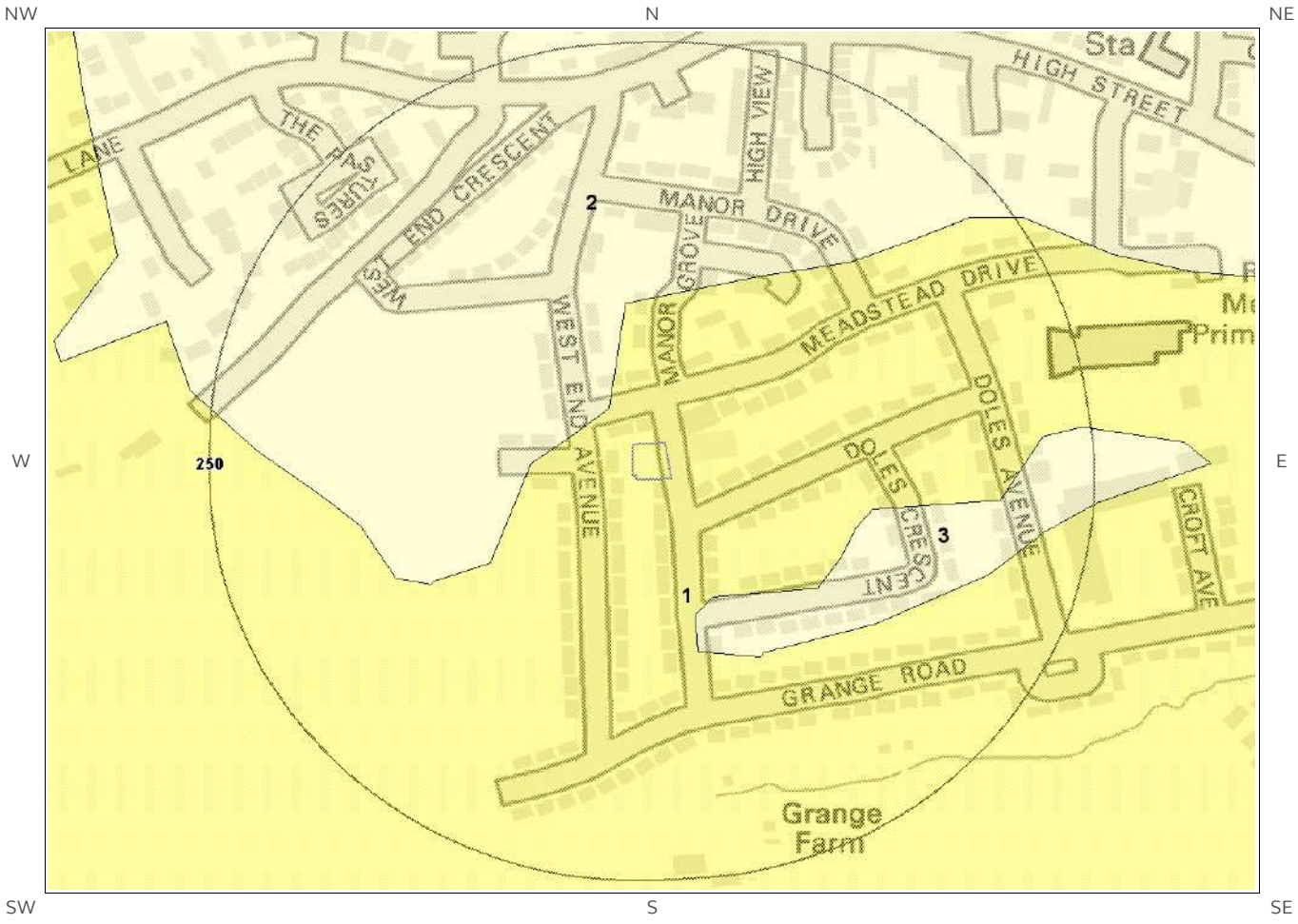
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay Map

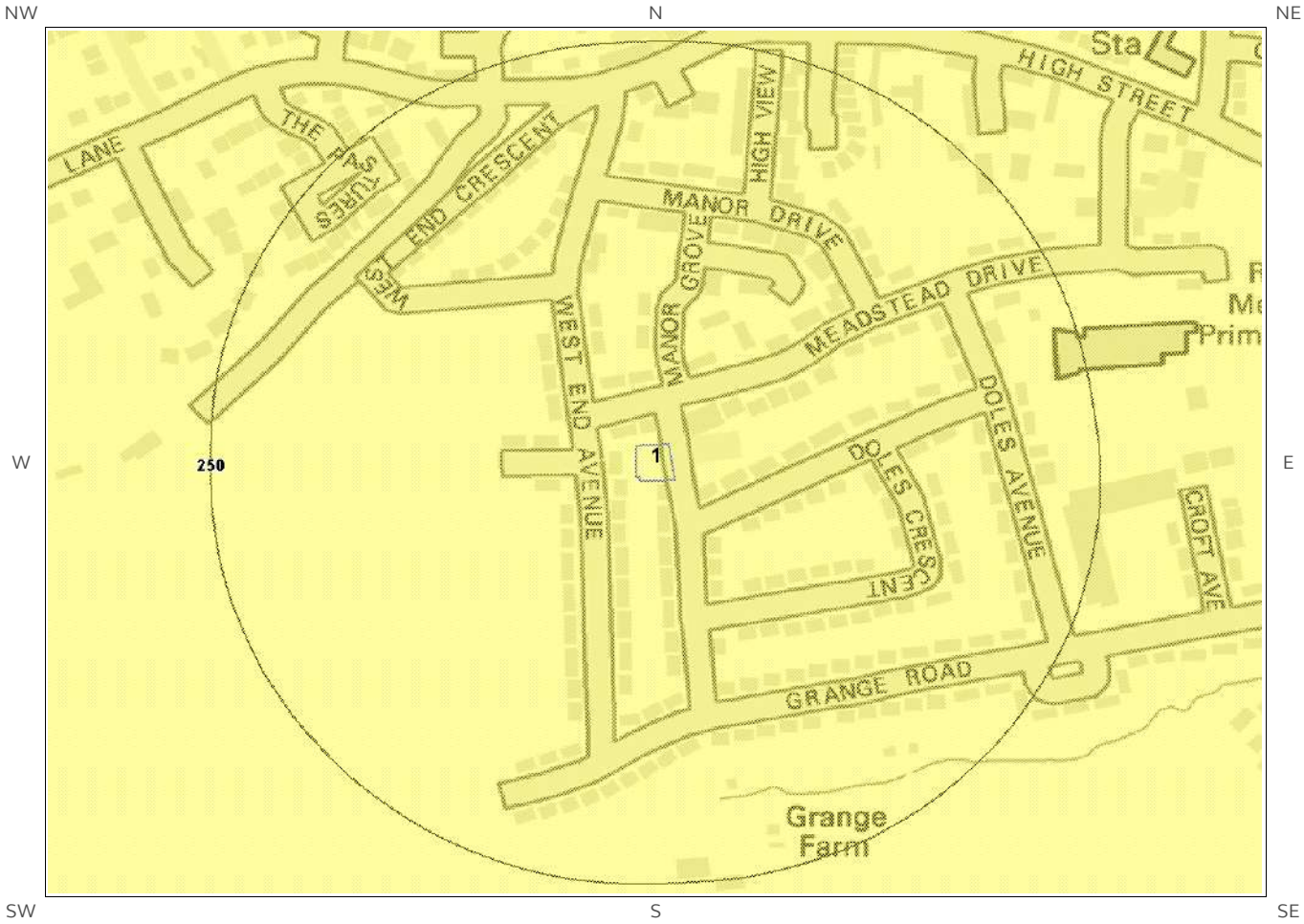


Shrink Swell Clay Legend

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6.2 Landslides Map

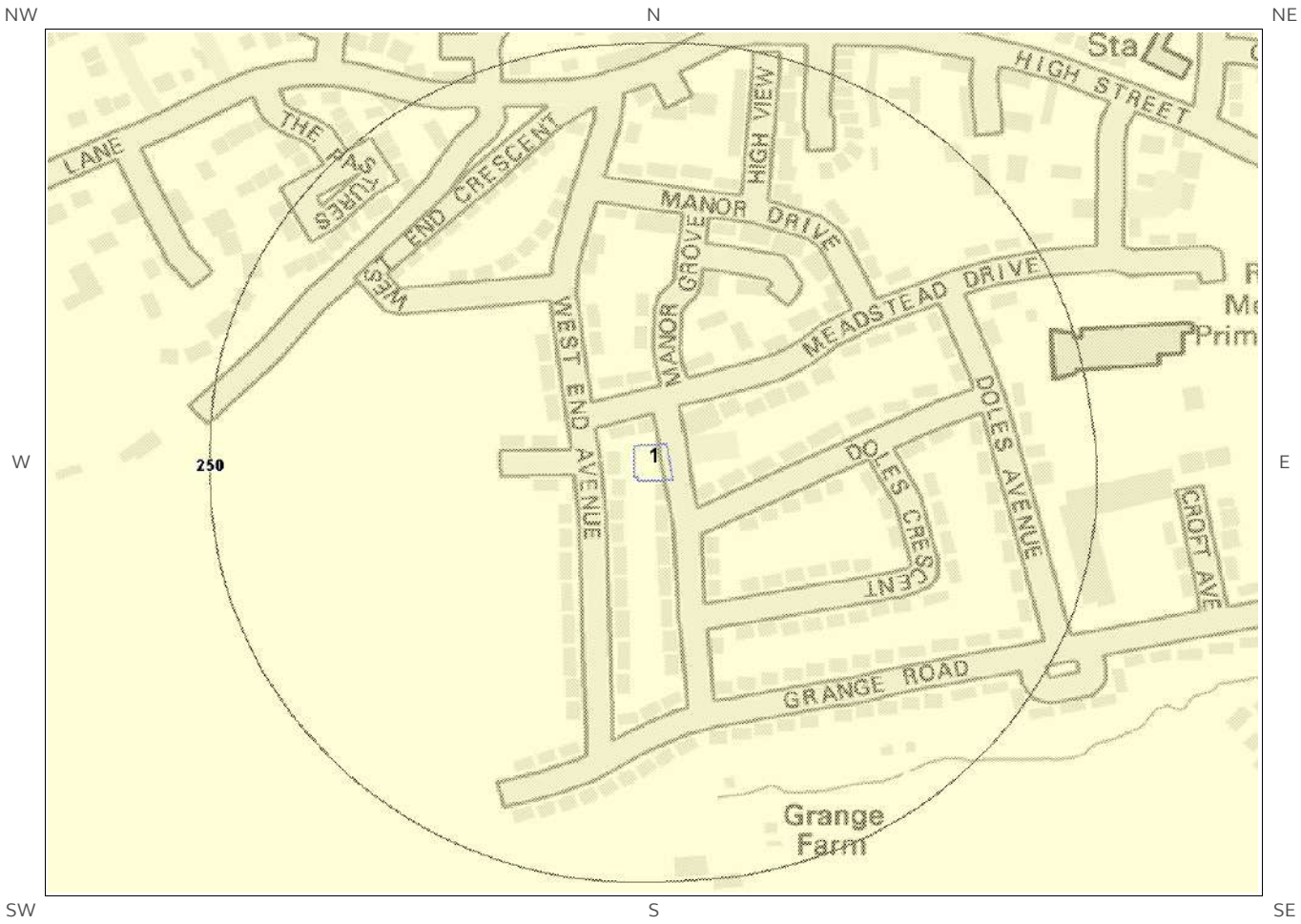


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Landslides Legend



6.3 Ground Dissolution of Soluble Rocks Map

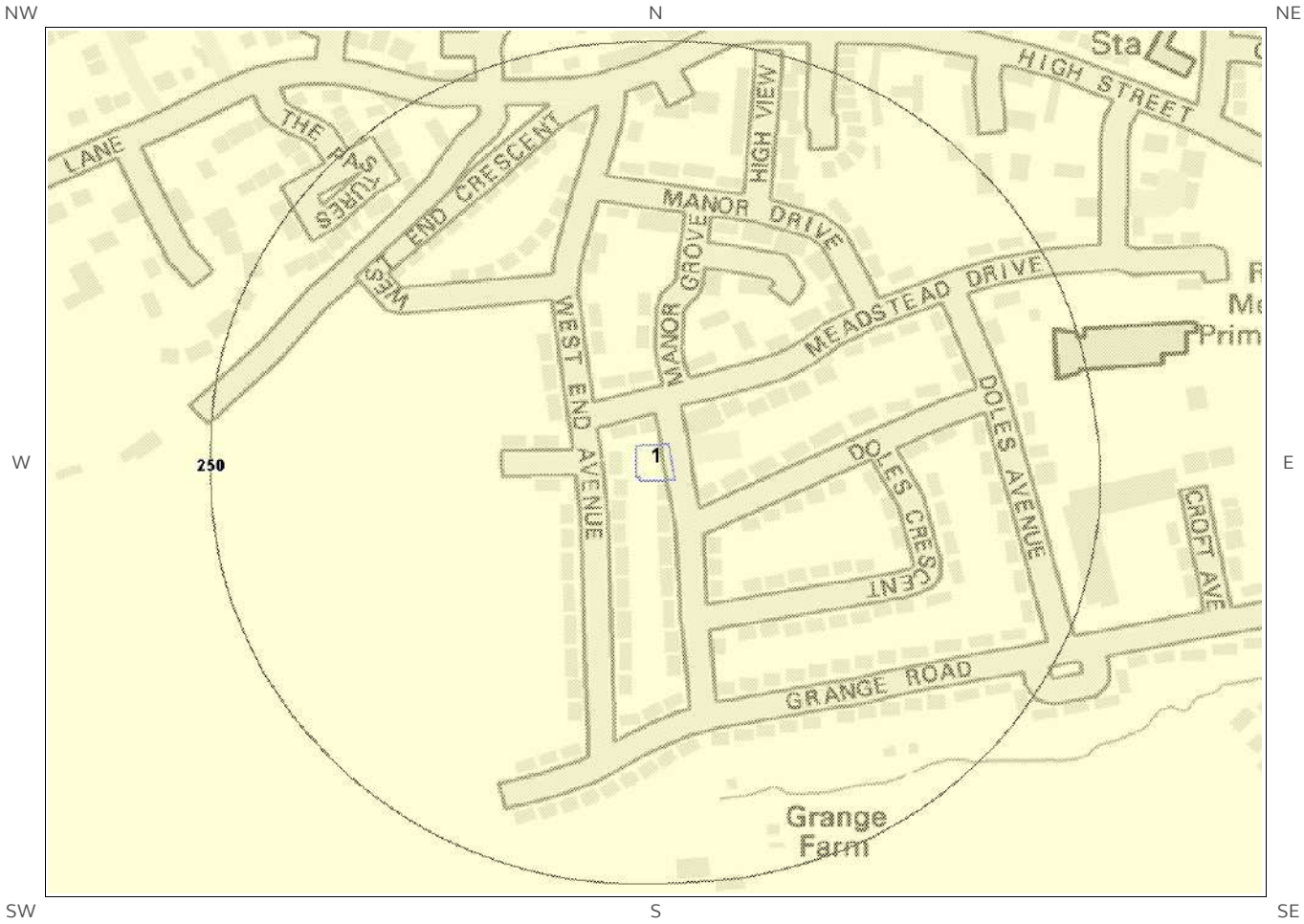


Ground Dissolution Soluble Rocks Legend

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6.4 Compressible Deposits Map

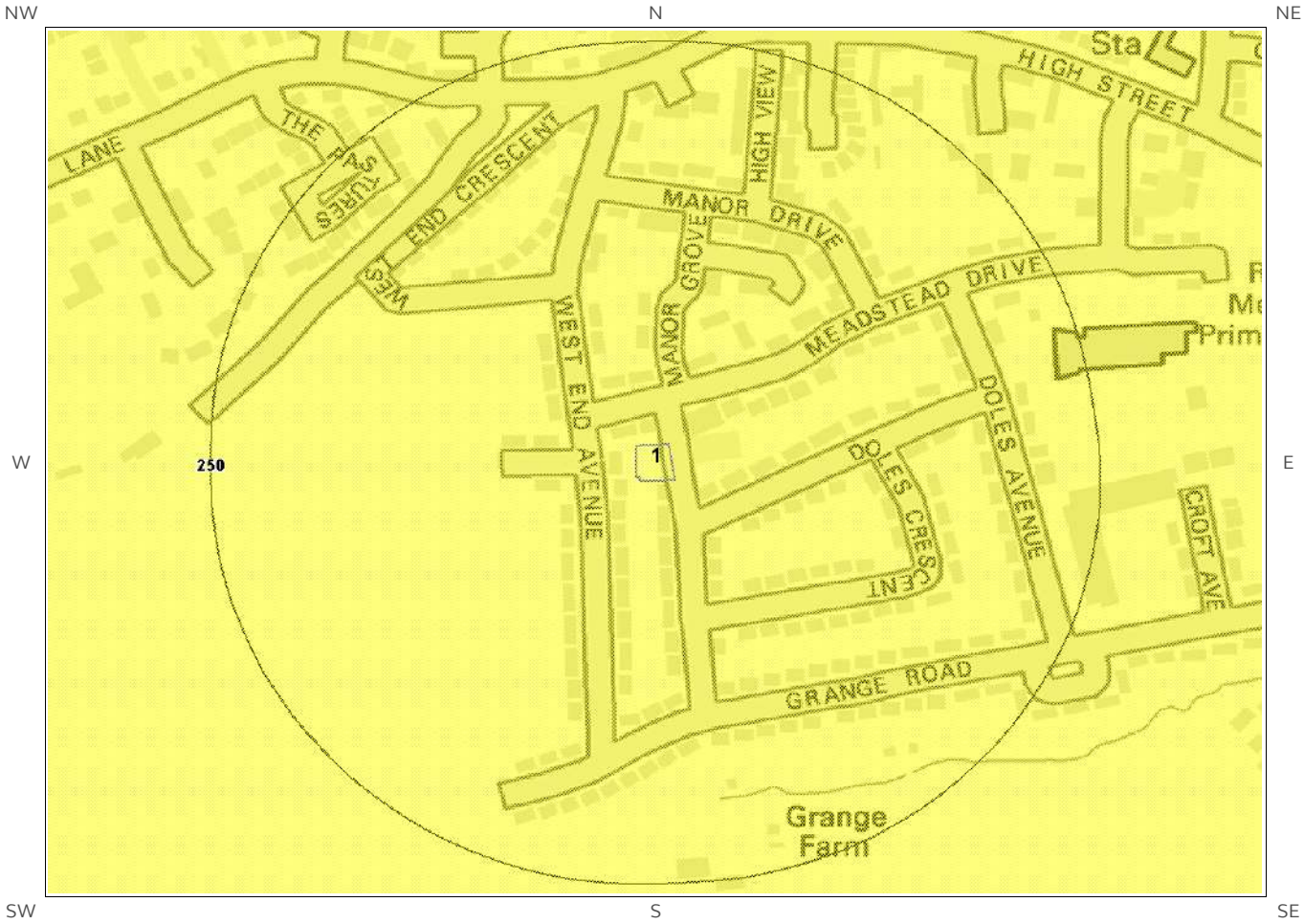


Compressible Deposits Legend

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6.5 Collapsible Deposits Map

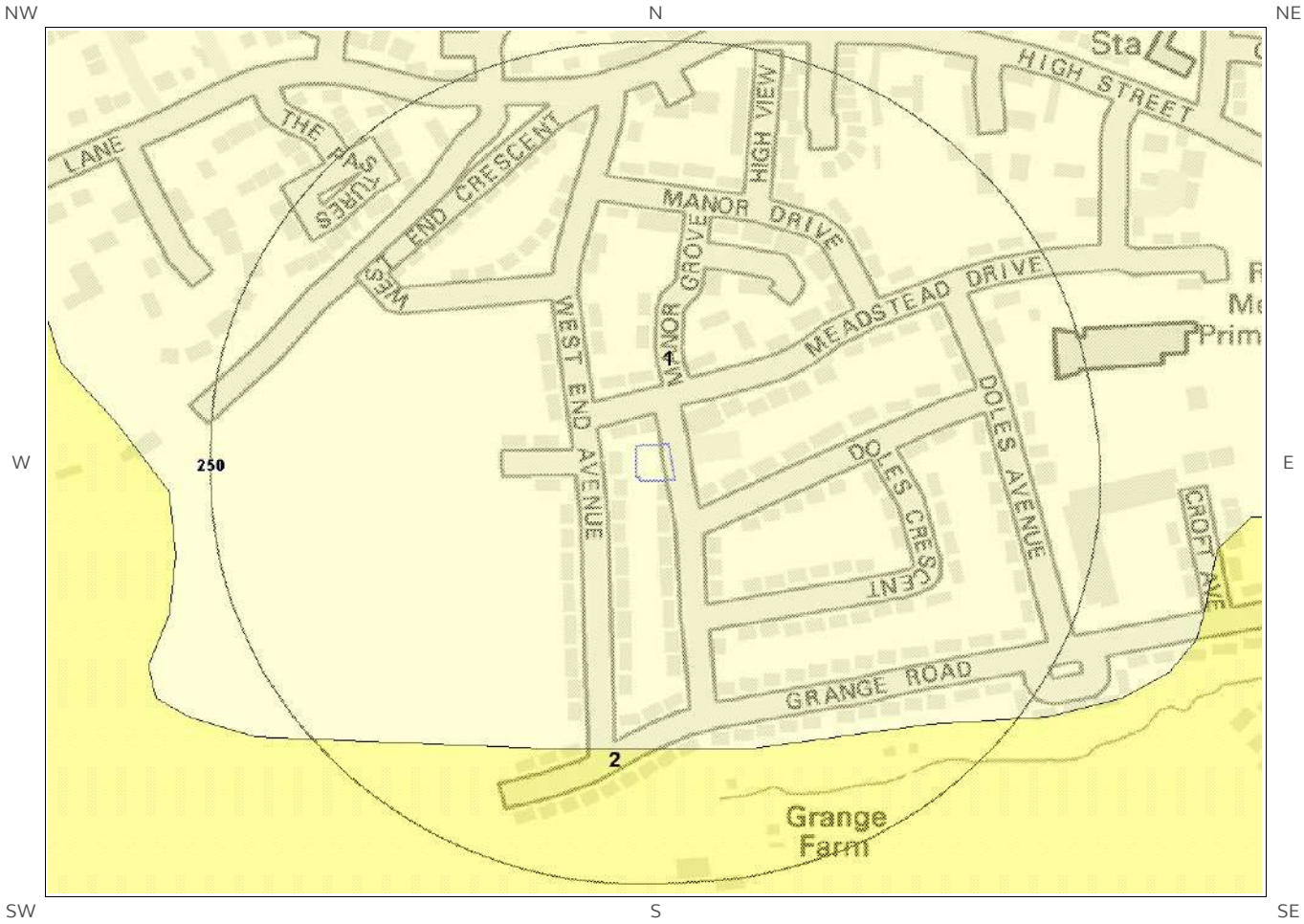


Collapsible Deposits Legend

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6.6 Running Sand Map



Running Sand Legend

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6 Natural Ground Subsidence

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

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

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

6.1 Shrink-Swell Clays

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	26.0	NW	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely likely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

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

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

6.3 Ground Dissolution of Soluble Rocks

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

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

6.4 Compressible Deposits

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

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

6.5 Collapsible Deposits

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

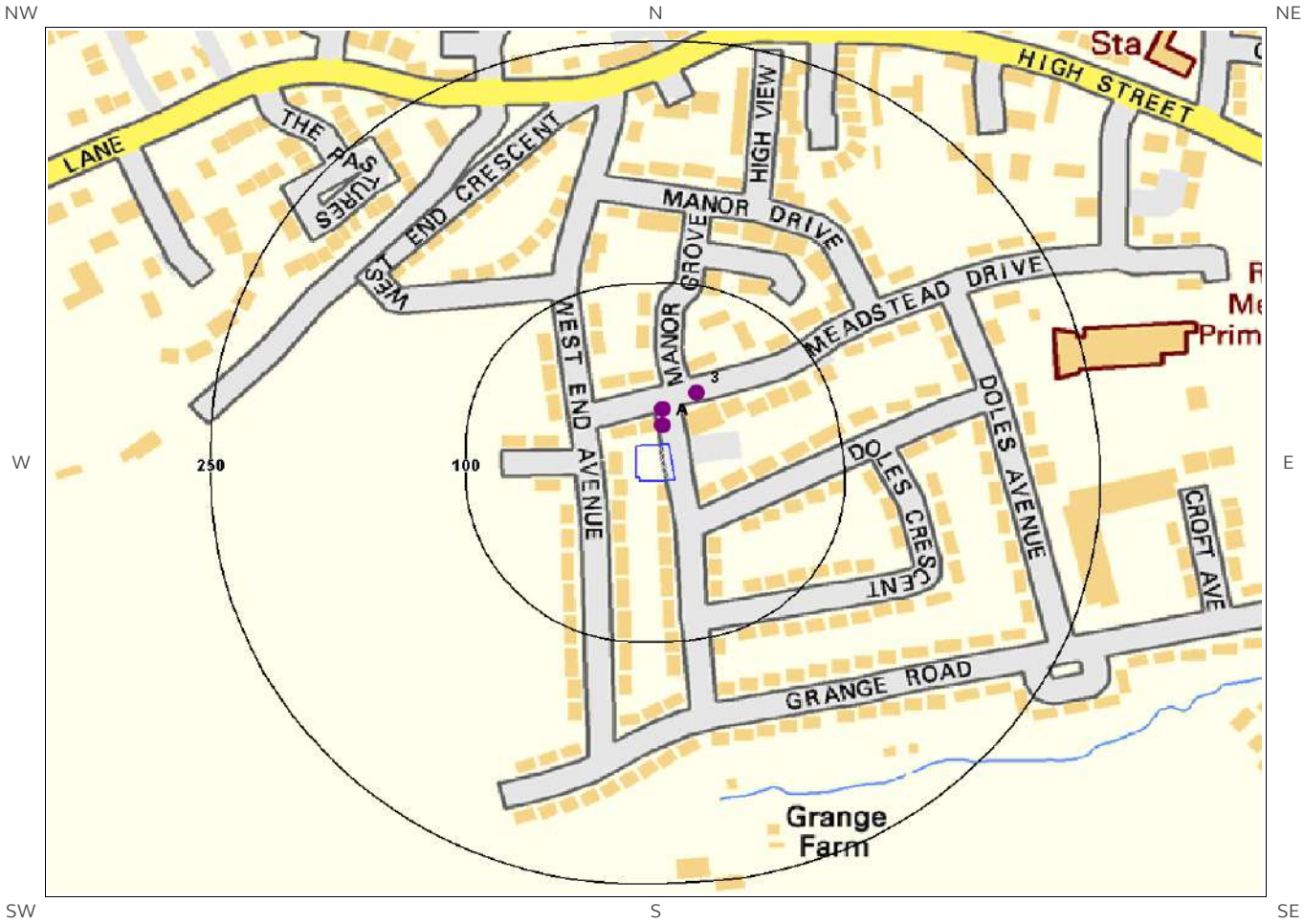
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible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

6.6 Running Sands

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

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	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.

7 Borehole Records Map



Borehole Records Legend

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Site Outline

Borehole Locations

125
250
Search Buffers (m)

7 Borehole Records

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

Records of boreholes within 250m of the study site boundary: 3

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1A	12.0	N	435510 411270	SE31SE122	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP3
2A	22.0	N	435510 411280	SE31SE121	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP2
3	36.0	NE	435530 411290	SE31SE120	-1.0	MEADSTEAD DRIVE ROYSTON BARNSLEY TP1

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.

8 Estimated Background Soil Chemistry

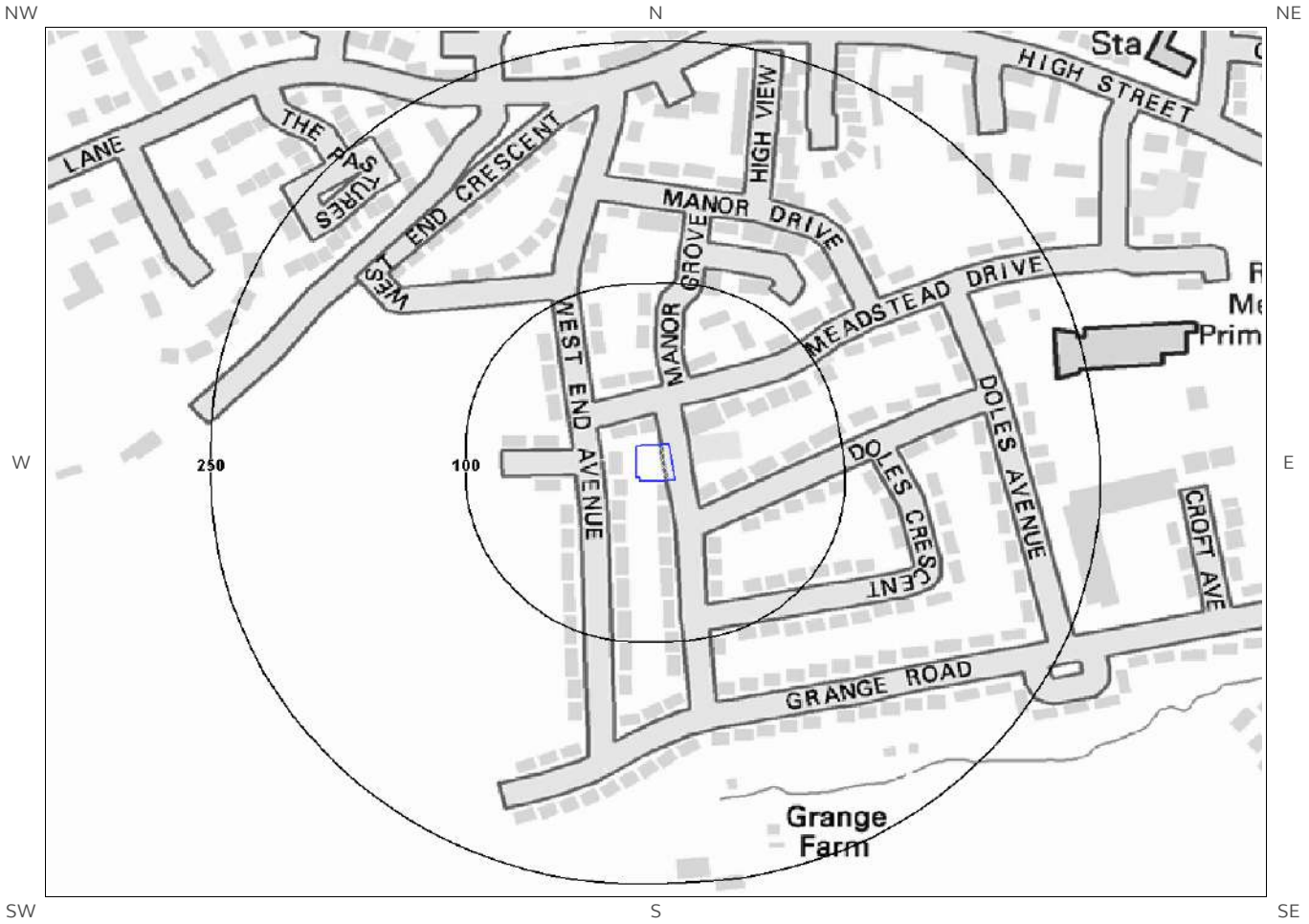
Records of background estimated soil chemistry within 250m of the study site boundary: 3

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

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	90 - 120 mg/kg	15 - 30 mg/kg	<100 mg/kg
46.0	W	RuralSoil	15 - 25 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

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

9 Railways and Tunnels Map



Railways and Tunnels Legend

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© OpenStreetMapContributors

- Site Outline
- 250 / 500 — Search Buffers (m)
- Underground or Partially Underground Railway / Subway System
- Railway Tunnel (OS Mapping)
- Abandoned or Dismantled Railway (OpenStreetMap)
- Railway Track (OS Mapping)
- Railway Track (OpenStreetMap)
- High Speed 2
- High Speed 2 Revised Proposed Route
- Crossrail 1
- Railway and/or Tunnel Feature from Historical Mapping

9 Railways and Tunnels

9.1 Tunnels

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

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

Database searched and no data found.

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

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

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

Database searched and no data found.

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

9.2 Historical Railway and Tunnel Features

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

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

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

9.3 Historical Railways

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

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

Database searched and no data found.

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

9.4 Active Railways

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

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

Database searched and no data found.

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

9.5 Railway Projects

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

Is the study site within 5km of the route of the High Speed 2 rail project?	Yes
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

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

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

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

Contact Details

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

British Gypsum

British Gypsum Ltd
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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
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https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
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https://www.groundsure.com/terms-and-conditions-sept-2016/

Appendix E

Coal Authority and SYMAS Reports

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report







DOLES CRESCENT
BARNSLEY
SOUTH YORKSHIRE
S71 4LA

Date of enquiry:	27 June 2017
Date enquiry received:	27 June 2017
Issue date:	27 June 2017
Our reference:	51001489753001
Your reference:	GS-4020221

CON29M Non-Residential Mining Report

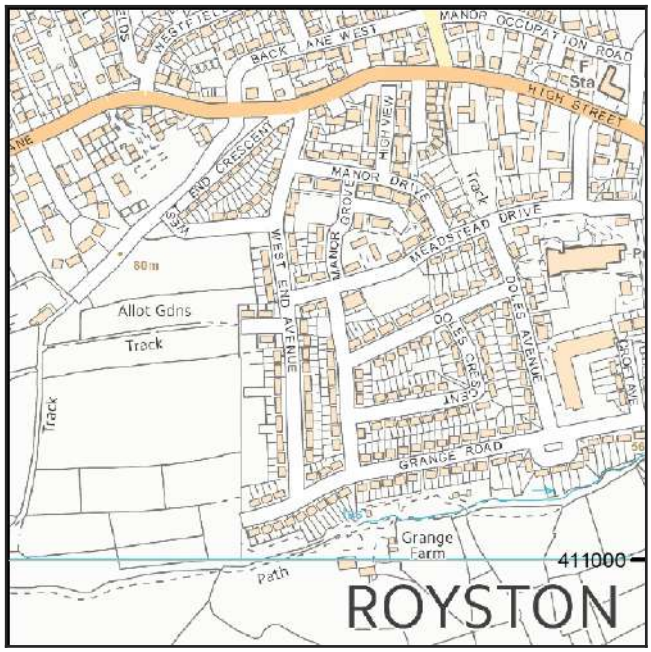
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

GROUNDSURE LIMITED

Enquiry address

DOLES CRESCENT, BARNSLEY, SOUTH YORKSHIRE, S71 4LA



Approximate position of property

Map data

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NG18 4RG

www.groundstability.com

/company/the-coal-authority
/thecoalauthority
/coalauthority

Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	No
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 6 seams of coal at 270m to 530m depth, and last worked in 1979.

Any movement in the ground due to coal mining activity should have stopped.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

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

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9. Coal mining subsidence

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

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

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is in an area where a notice to withdraw support was given in 1977.

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

13. Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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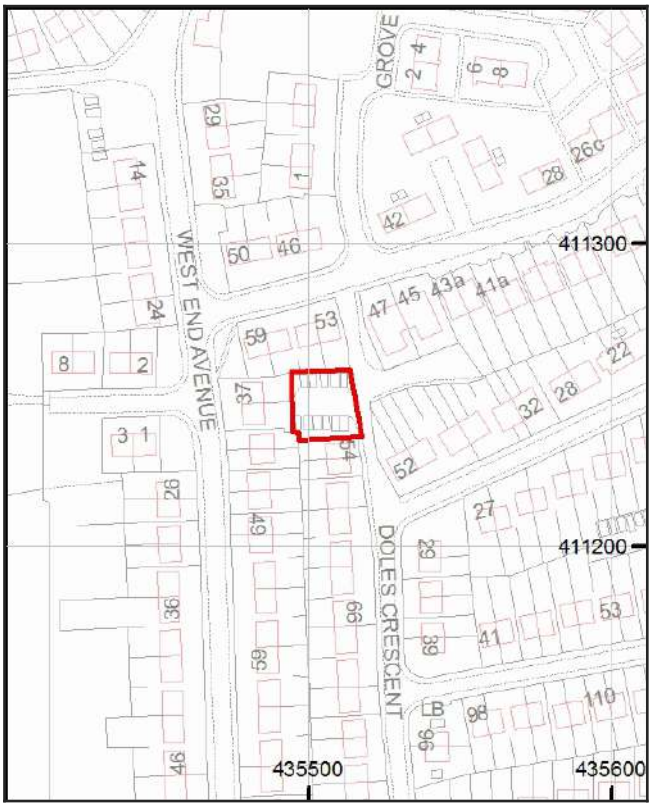
Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



Map data

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/coalauthority

DEC DIRECTORATE
South Yorkshire Mining Advisory Service

BARNSLEY
Metropolitan Borough Council

To:	NPS		**FAO:**	Steven Chitty	
My Ref:	M230/8		**Your Ref:**		
Date:	18th November 2014	**Enquiries to:**	Mr. M. Lyons	**Ext:**	2690
Subject:	LAND AT MANOR GROVE, MANOR DRIVE AND MEADSTEAD DRIVE, ROYSTONE, BARNSLEY.				

Further to your consultation request of the 11th November 2014, regarding development opportunity at the three above named locations, I am pleased to provide our report as per below.

SITUATION

The three sites under consideration at Royston are shown edged orange on the attached plan no. M230/8A.

GEOLOGY

Geological records show that the sites are located mainly on the Mexborough Rock Sandstone of the Middle Coal Measures which dips generally in a north-easterly direction in this vicinity. Geological faulting is conjectured to the north-west and the sandstone bedrock may be fissured both naturally and mining induced by the past deep operations as detailed below.

The Royston (or Sharlston Top) coal seam is conjectured to outcrop to the south of the sites as indicated on plan. According to the available information this seam is of around 0.5m thickness in this locality. From Manor Grove eastwards, the actual seam outcrop position has been proved, during past investigations, to deviate further southwards from that conjectured – as illustrated on plan. This would mean that the coal seam would be expected at a greater depth beneath the Meadstead Drive site, possibly in excess of 8m.

MINING

Shallow Mining

The shallow coal seam in this area is rarely known to have been worked historically at shallow depth in the wider vicinity. The likelihood therefore of any historic underground workings being present within this coal is considered as Low.

Deep Mining

The site has been affected by deep coal mining on several occasions, the latest being around 1979. Settlement from these mining operations will now be long complete and as the site is remote from any active coalfield it will not be affected by deep mining subsidence for the foreseeable future.

MINE ENTRIES

None known in this vicinity and the likelihood of any unchartered mine entries being encountered at this location is considered as Low.

FORMER LAND USE

The relevant Ordnance Survey Sheets and National Grid Sheets have been checked and there is no evidence of past industrial use in the vicinity of these sites.

LANDFILL

According to the Borough Landfill Register the site does not lie within 250m of any landfill operation.

CONCLUSIONS

1). The site is stable from the deep mining subsidence aspect and as the scheme is remote from any currently active coalfield it should remain so for the foreseeable future.

2). Although the Royston coal seam may be at shallow depth beneath the site, the likelihood of historic underground workings causing a stability issue at the surface is considered as **LOW** in this instance.

3). Considering the mining and geological details for this location, the likelihood for encountering an old unchartered mine entry within the site is considered as **LOW.**

4). The site is underlain by sandstone that may be fissured both naturally and/or mining induced. Future development may require suitably designed foundations where any weak ground is encountered, and treatment works to stabilise the feature may also be required in sever instances.

5). Historical plan information indicates there has been no evidence of former industrial land use in the vicinity of the site which could cause contamination problems and no landfill sites are recorded with 250m.

THIS REPORT IS BASED ON AND LIMITED TO THE RECORDS IN THE POSSESSION OF SYMAS AT THE TIME THE ENQUIRY IS ANSWERED.

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This report was prepared by Mark Lyons on the 18th November 2014.



P. James
Principal Mining Engineer.

DRAWING TITLE

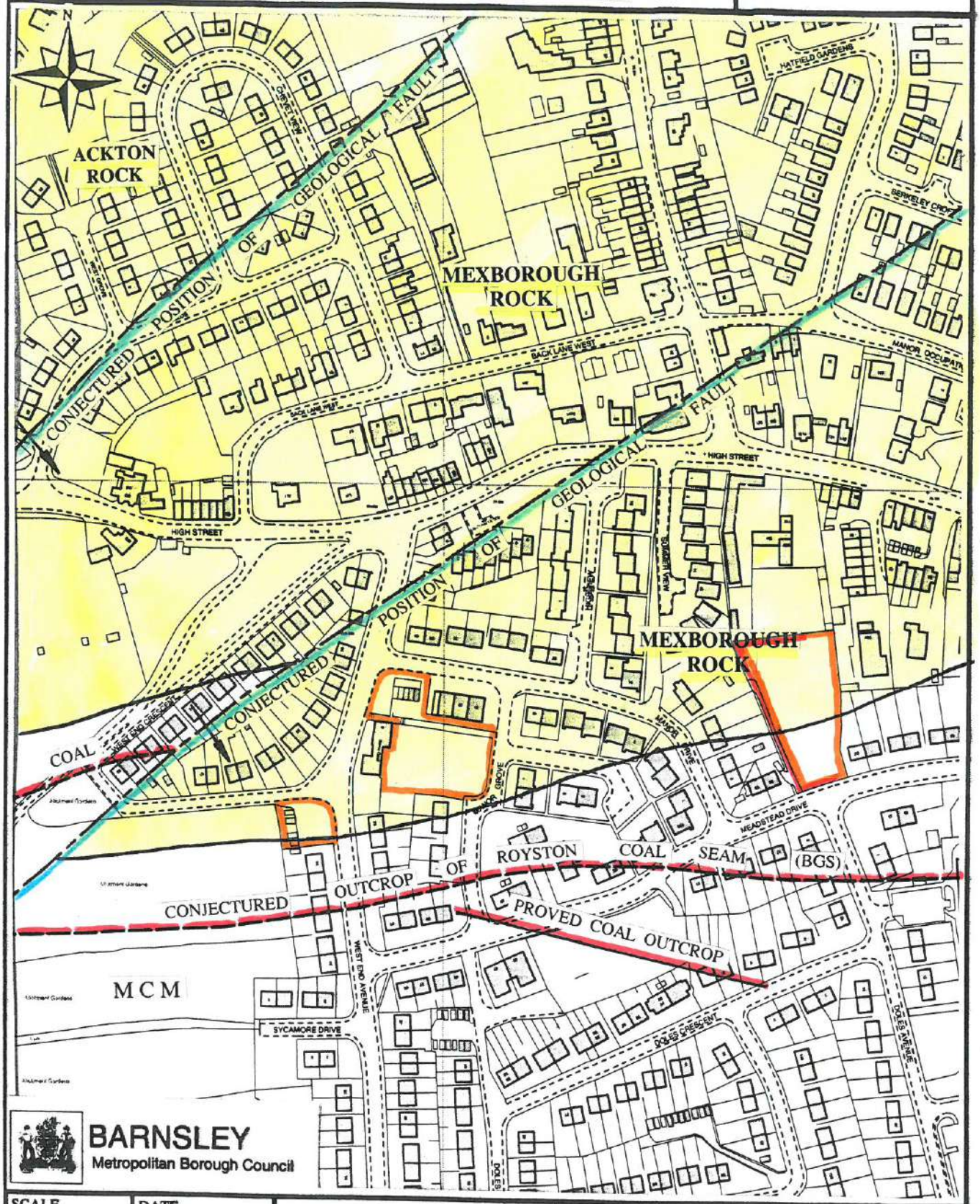
SITES AT MANOR GROVE,

MEADSTEAD DRIVE AND WEST END AVENUE

ROYSTON, BARNSLEY.

DRAWING NO.

M230/8A



BARNSLEY
Metropolitan Borough Council

SCALE	DATE		O.S REFERENCE
1:2500	14 / 11 / 14	SOUTH YORKSHIRE MINING ADVISORY SERVICE	SE 3511
DRAWN BY: AS	CHECKED BY: MAC		P. JAMES BSc (Hons) PRINCIPAL MINING ENGINEER

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APPENDIX E:

GROUNDINVESTIGATION LOGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH101
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 15/01/2018 - 15/01/2018	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES		0.20			TOPSOIL: Brown, very clayey, SAND.
		0.40 - 0.60	ES		0.30			Firm, orange, mottled light grey, sandy CLAY.
					0.40			Brown, very clayey SAND with frequent rootlets. (relic topsoil).
					0.90			Firm, orange mottled light grey, sandy CLAY.
		1.00		N=26 (3,3/3,3,7,13)				Firm, black, gravelly CLAY.
					1.30			Loose, light grey, very clayey, slightly gravelly, SAND. Gravel is fine and medium, angular and sub-angular, calcarious mudstone.
					1.50			Extremely weathered calcarious MUDSTONE.
		1.80		N=50 (10,11/50 for 255mm)	1.80			End of borehole at 1.80 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH102
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 15/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.30	ES		0.30			TOPSOIL: Brown, very clayey, SAND.
		0.50 - 0.60	ES					Firm, orange mottled light grey, sandy CLAY.
		1.00		N=14 (2,2/3,3,3,5)	1.10			Dense, brown, very clayey, SAND. [Weathered Pennine Middle Coal Measures]
		2.00		50 (25 for 145mm/50 for 255mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH103
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 15/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES		0.30			TOPSOIL: Brown, very clayey, SAND.
		0.50 - 0.60	ES					*Frequent fine, angular brick gravel between 0.25m - 0.30m bgl.* Firm, orange mottled light grey, sandy CLAY.
		1.00		N=13 (3,3/3,3,3,4)	1.00			Medium dense, brown slightly clayey, SAND.
					1.10			Stiff, brown, sandy, gravelly CLAY. Gravel is fine and medium, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		50 (9,11/50 for 295mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH104
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 15/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.40	ES		0.20			TOPSOIL: Brown, very clayey, SAND.
					0.60			Medium dense, brown, clayey, SAND.
		0.80 - 0.95	ES					Medium dense, light grey, gravelly SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
		1.00		N=31 (13,11/10,8,7,6)				
					1.50			Stiff, brown, sandy, gravelly, CLAY. Gravel is fine and medium, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=50 (3,4/50 for 285mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH201
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES		0.20			TOPSOIL: Dark brown, very clayey, slightly gravelly, SAND. Gravel is fine, angular and sub-angular brick.
		0.40 - 0.60	ES		0.60			MADE GROUND: Brown, very clayey, gravelly, SAND. Gravel is fine to coarse, angular to sub-rounded, brick, concrete and sandstone.
		1.00		N=7 (2,2/1,2,2,2)	1.10			MADE GROUND: Brown mottled dark brown, very sandy, CLAY. (Fabric appears disturbed).
								Medium dense, orange mottled light grey, clayey, very gravelly SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. *Becoming dense from 1.50m bgl.*
		2.00		N=50 (4,6/50 for 295mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH202
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.30	ES		0.10			TOPSOIL: Brown, very clayey, slightly gravelly, SAND. Gravel is fine, angular and sub-angular, brick.
		0.50 - 0.70	ES					MADE GROUND: Grey, sandy, gravelly, CLAY. Gravel is fine and medium, angular to sub-rounded, brick, sandstone and coal.
		1.00		N=9 (2,2/2,2,2,3)	0.75			Dense, orange mottled light grey, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=50 (8,8/50 for 245mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH203
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES		0.20			TOPSOIL: Dark brown, very clayey, slightly gravelly SAND. Gravel is fine, angular and sub-angular, brick and sandstone.
		0.50 - 0.70	ES					MADE GROUND: Dark brown, sandy, gravelly CLAY. Gravel is fine and medium, angular to sub-rounded, brick, concrete, clinker and sandstone.
		1.00		N=9 (2,2/2,2,2,3)	1.00			Dense, orange mottled light grey, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=10 (3,2/2,2,3,3)				
		2.60		50 (25 for 125mm/50 for 245mm)	2.60			End of borehole at 2.60 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH204
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.30	ES		0.10			TOPSOIL: Dark brown, very clayey, slightly gravelly SAND. Gravel is fine, angular and sub-angular, brick and sandstone.
		0.60 - 0.80	ES		0.80			MADE GROUND: Dark brown, sandy, gravelly, CLAY. Gravel is fine and medium, angular and sub-rounded, brick, concrete, coal, sandstone and quartzite.
		1.00		N=19 (2,2/2,3,6,8)				Dense, orange mottled light grey, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=23 (4,3/3,4,7,9)				
					2.40			Black, SAND. [Weathered Pennine Middle Coal Measures]
					2.50			Dense, brown, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		3.00		50 (9,14/16,16,18,)	3.00			End of borehole at 3.00 m

Remarks
No Groundwater Encountered

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH301
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 - 0.30	ES		0.10			TOPSOIL: Dark brown, very clayey, gravelly, SAND. Gravel is fine, angular brick.
		0.60 - 0.70	ES					Dense, orange mottled light grey, clayey, SAND.
		1.00		N=10 (2,2/2,2,2,4)				*Becoming gravelly from 0.90m bg. Gravel is fine and medium, angular and sub-angular sandstone.*
		2.00		N=50 (3,3/50 for 275mm)	2.00			End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH302
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 16/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00 - 0.20	ES		0.20			TOPSOIL: Brown, very clayey, slightly gravelly, SAND. Gravel is fine, angular brick.
		0.50 - 0.70	ES		0.50			Medium dense, brown, clayey, SAND.
		1.00		N=18 (4,4/4,4,5,5)				Dense, grey mottled orange, slightly clayey, very gravelly SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=50 (3,6/10,12,14,14)	1.95 2.00			COAL, fine, angular gravel. End of borehole at 2.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH401
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 17/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15 - 0.25	ES		0.15			TOPSOIL: Dark brown, very clayey, SAND.
		0.40 - 0.50	ES		0.25			MADE GROUND: Red brick, SAND and GRAVEL.
					0.50			MADE GROUND: Dark grey very clayey, gravelly SAND. Gravel is fine, angular and sub-angular sandstone and coal.
		1.00		N=8 (1,1/2,2,2,2)				Dense, orange mottled light grey, very clayey, SAND.
					1.50			Dense, light grey, clayey, gravelly SAND. Gravel is fine to coarse, angular and sub-angular, sandstone. [Weathered Pennine Middle Coal Measures]
		2.00		N=20 (2,3/4,4,6,6)				
		3.00		50 (25 for 135mm/50 for 265mm)	3.00			End of borehole at 3.00 m

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
BH402
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type WLS
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 17/01/2018 -	Logged By DA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.08			TARMAC
		0.35 - 0.50	ES		0.35			MADE GROUND: Light grey, fine and medium, angular LIMESTONE GRAVEL.
		0.70 - 0.80	ES					Firm/stiff, green, very sandy, CLAY.
								Becoming brown from 0.70m bgl.
		1.00		N=12 (1,2/2,3,3,4)	1.00			Dense, orange mottled light grey, clayey, SAND.
		2.00		N=18 (2,2/3,4,5,6)				
					2.40			*Traces of coal between 2.30 -2.40m bgl.*
								Weathered Pennine Middle Coal Measures - Recovered as fine to coarse, angular and sub-angular sandstone gravel.
		3.00		50 (7,11/50 for 275mm)	2.90 3.00			*Can be crumbled between fingers. Extremely weak 2.40-2.90m bgl.*
								Intact low quality, COAL.
								End of borehole at 3.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO101
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Topsoil - (Drillers Description)
					0.40			Orange brown sandy clay. (Drillers Description)
					0.70			Orange brown weathered SANDSTONE. (Drillers Description)
					1.30			Moderately strong dark grey/black MUDSTONE. (Drillers Description)
					1.60			Strong light grey MUDSTONE. (Drillers Description)
					2.00			Strong orange SILTSTONE. (Drillers Description)
					2.20			COAL. (Drillers Description)
					2.30			Strong light grey/brown MUDSTONE. (Drillers Description)
					4.00			Strong orange SILTSTONE/SANDSTONE. (Drillers Description)
					7.40			Strong light grey to grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO101
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO102
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Topsoil - (Drillers Description)
					0.40			Stiff yellow/brown sandy clay. (Drillers Description)
					0.90			Orange brown weathered SANDSTONE/ SILTSTONE. (Drillers Description)
					1.80			Moderately strong light grey to grey MUDSTONE. (Drillers Description)
					4.00			Grey MUDSTONE. (Drillers Description)
					9.10			Strong dark grey/brown MUDSTONE. (Drillers Description)
					9.60			Strong light grey to grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO102
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO103
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Topsoil - (Drillers Description)
					0.40			Stiff yellow/brown silty clay. (Drillers Description)
					0.80			Moderately strong orange fine SANDSTONE. (Drillers Description)
					1.40			COAL. (Drillers Description)
					1.45			Strong light grey MUDSTONE. (Drillers Description)
					3.60			COAL. (Drillers Description)
					3.80			Strong light grey MUDSTONE. (Drillers Description)
					6.00			Strong light grey/brown MUDSTONE. (Drillers Description)
					8.90			Dark brown/black MUDSTONE.
					9.40			Strong light grey to grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO103
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 08/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO201
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Made Ground - Soil with brick and stone. (Drillers Description)
					1.20			Dark brown sandy CLAY. (Drillers Description)
					2.10			Moderately strong light grey/brown SILTSTONE/ SANDSTONE. (Drillers Description)
					4.70			Strong light grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
Slow ingress of Groundwater encountered at 2.80m bgl.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO201
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
Slow ingress of Groundwater encountered at 2.80m bgl.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO202
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Made Ground - Soil with brick and stone rubble. (Drillers Description)
					0.80			Made Ground - Loose brick rubble. (Drillers Description)
					1.60			Moderately strong orange/brown fine SANDSTONE. (Drillers Description)
					5.40			Strong light grey to grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO202
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO203
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Topsoil - (Drillers Description)
					0.40			Made Ground - Loose soil, ash and brick fill. (Drillers Description)
					2.30			Moderately strong light orange/brown SILTSTONE/SANDSTONE. (Drillers Description)
					5.60			Strong grey/brown MUDSTONE. (Drillers Description)
					8.90			Strong light grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO203
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO301
Sheet 1 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Made Ground - Ash, soil, brick and stone rubble. (Drillers Description)
					0.90			Moderately strong yellow/orange SILTSTONE/ SANDSTONE.
					3.00			Strong light brown SILTSTONE. (Drillers Description)
					3.40			COAL. (Drillers Description)
					3.50			Strong light grey/brown SILTSTONE/ MUDSTONE. (Drillers Description)
					4.80			Strong light grey to grey MUDSTONE. (Drillers Description)
								Continued on next sheet

1 2 3 4 5 6 7 8 9 10

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Borehole Log

Borehole No.
RO301
Sheet 2 of 2

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: -	Hole Type RO
Location: Royston, Barnsley		Level:	Scale 1:50
Client: NPS Barnsley Limited		Dates: 07/02/2018 -	Logged By Drillers

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					15.00			End of borehole at 15.00 m

11 12 13 14 15 16 17 18 19 20

Remarks
No Groundwater Encountered.

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP101
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 16/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.10	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.40			TOPSOIL: Dark brown, very clayey SAND, with rare pottery fragments and coal gravels.
				0.80			Firm, orange mottled light grey, sandy CLAY.
			HVR=140 HVR=140 HVR=140				Very stiff, light grey, very sandy, CLAY.
				2.10			End of pit at 2.10 m

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Remarks: No Groundwater Encountered.

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP102
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 16/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.70	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.30			TOPSOIL: Brown, very clayey, SAND.
			HVR=140				Firm/stiff, orange mottled light grey, sandy, very gravelly, CLAY. Gravel is fine to coarse, angular and sub-angular, sandstone.
				1.80			Weathered sandstone bedrock. Recovered as fine to coarse, angular and sub-angular, sandy GRAVEL.
				2.70			End of pit at 2.70 m

Remarks: No Groundwater Encountered

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP103
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 16/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.40	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							TOPSOIL: Brown, very clayey, SAND.
				0.35			Firm/stiff, orange mottled light grey, very sandy, gravelly, CLAY. Gravel is fine to coarse, angular and sub-angular, sandstone.
▼				2.10			Weathered sandstone bedrock. Recovered as very sandy, GRAVEL. Gravel is fine to coarse, angular to sub-angular sandstone.
				2.40			End of pit at 2.40 m

1 2 3 4 5

Remarks: Slow ingress of Groundwater at 2.20m bgl

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP104
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 16/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.20	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			TOPSOIL: Dark brown, very clayey, gravelly SAND. Gravel is fine, angular to rounded, sandstone and quartzite.
				0.65			Medium dense, light brown, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, sandstone.
▼				2.00			Weathered sandstone bedrock. Recovered as very sandy, GRAVEL.
				2.20			COAL. Recovered as a clayey, very sandy GRAVEL.
							End of pit at 2.20 m

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Remarks: Slow ingress of Groundwater at 1.90m bgl.

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP201
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 17/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.80	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			TOPSOIL: Dark brown, very clayey, gravelly SAND. Gravel is fine and medium, angular to rounded, brick, sandstone and quartzite.
							MADE GROUND: Dark brown, clayey, very gravelly SAND. Gravel is fine to coarse, angular to sub-rounded, brick and sandstone.
				0.70			Dense, orange mottled light grey, clayey, gravelly, SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
▼				2.50			Weathered sandstone bedrock. Recovered as very gravelly, slightly cobbly SAND. Gravel is fine to coarse, angular and sub-angular sandstone. Cobbles are fine, angular and sub-angular, sandstone.
				2.80			End of pit at 2.80 m

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Remarks: Slow ingress of Groundwater at 2.70m bgl.

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP202
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 17/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.60	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			TOPSOIL: Brown, very clayey, gravelly SAND. Gravel is fine and medium, angular to rounded, brick, sandstone and quartzite with rare plastic and pottery.
							MADE GROUND: Brown, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, brick (whole and fragments) and sandstone, with rare glass
							Old telegraph pole between 0.30 and 0.50m bgl.
				0.80			CONCRETE slab.
				1.00			Dense, orange mottled light grey, clayey, gravelly SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
▼							
				2.60			End of pit at 2.60 m

1
2
3
4
5

Remarks: Fast ingress of Groundwater at 1.40m bgl.

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP203
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 17/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 2.30	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			TOPSOIL: Brown, very clayey, gravelly, SAND. Gravel is fine and medium, angular to rounded, brick, sandstone and quartzite.
							MADE GROUND: Brown, clayey, very gravelly, SAND. Gravel is fine to coarse, angular and sub-angular, brick and sandstone.
▼				1.00			Dense, orange mottled light grey, clayey, gravelly, SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
				2.30			End of pit at 2.30 m

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Remarks: Slow ingress of Groundwater at 1.00m bgl.

Stability: Stable

AGS

Alan Wood & Partners

Trial Pit Log

Trialpit No
TP401
Sheet 1 of 1

Project Name: Royston, Barnsley - Various Sites	Project No. 40400	Co-ords: - Level:	Date 17/01/2018
Location: Royston, Barnsley		Dimensions (m): Depth 3.10	Scale 1:25
Client: NPS Barnsley Limited			Logged DA

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Reddish brown, slightly clayey, SAND and GRAVEL. Gravel is fine and medium, angular and sub-angular, brick.
				0.40			Dense, orange mottled light grey, clayey, gravelly, SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
							Can be broken between fingers 0.40 - 1.90m bgl.
▼				1.90			COAL
				2.05			*Poor quality*
							Dense, orange mottled light grey, clayey, gravelly, SAND. Gravel is fine and medium, angular and sub-angular, sandstone.
				3.10			End of pit at 3.10 m

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Remarks: Slow ingress of Groundwater at 1.90m bgl.

Stability: Stable

AGS

APPENDIX F:

LABORATORY TEST RESULTS: GEOTECHNICAL

LABORATORY REPORT

4043

Contract Number: PSL18/0559

Report Date: 07 February 2018

Client's Reference:

Client Name: Alan Wood & Partners
Hallamshire House
Hayland Street
Sheffield
S9 1BY

For the attention of: David Ashton

Contract Title: Royston, Various Sites

Date Received: 5/2/2018
Date Commenced: 5/2/2018
Date Completed: 7/2/2018

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH101	E2	D	0.40	0.60	Brown mottled grey slightly gravelly very silty CLAY.
BH103	E2	D	0.50	0.60	Brown mottled grey slightly gravelly sandy very silty CLAY.
BH203	E2	D	0.50	0.70	MADE GROUND brown gravelly sandy clay.
BH204	E1	D	0.10	0.30	MADE GROUND dark brown gravelly sandy clay.
BH402	E1	D	0.35	0.50	MADE GROUND brown gravelly sandy clay.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Royston, ~Various Sites

Contract No:
PSL18/0559
Client Ref:

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH101	E2	D	0.40	0.60	39			76	33	43	98	Very high plasticity CV.
BH103	E2	D	0.50	0.60	21			49	25	24	86	Intermediate plasticity CI.
BH203	E2	D	0.50	0.70	39			49	27	22	81	Intermediate plasticity CI.
BH204	E1	D	0.10	0.30	22			45	25	20	80	Intermediate plasticity CI.
BH402	E1	D	0.35	0.50	27			48	27	21	84	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

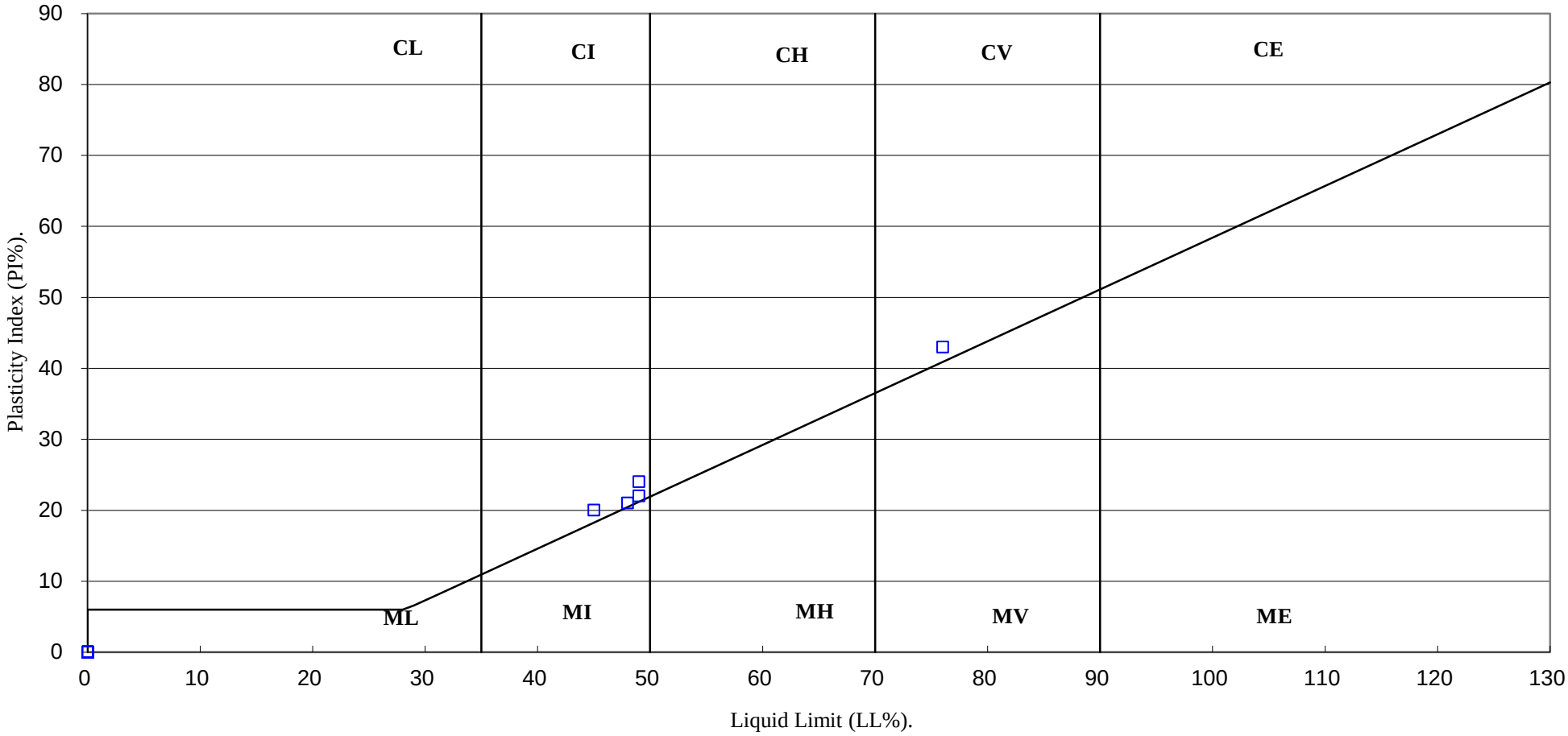
Royston, Various Sites

Contract No:

PSL18/0559

Client Ref:

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Royston, Various Sites**	**Contract No:**
			PSL18/0559
			Client Ref:
			0

APPENDIX G:

LABORATORY TEST RESULTS: CHEMICAL

2531

ANALYTICAL TEST REPORT

Contract no:	69649
Contract name:	Royston - Various Sites
Client reference:	40400
Clients name:	Alan Wood & Partners
Clients address:	Hallamshire House Hayland Street Sheffield S9 1BY
Samples received:	24 January 2018
Analysis started:	24 January 2018
Analysis completed	31 January 2018
Report issued:	31 January 2018

Notes:

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:

U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
69649-1	BH101 E1	0.00-0.20	Loam with Roots	-	-	39.8
69649-2	BH102 E2	0.10-0.30	Clay	-	-	19.0
69649-3	BH103 E1	0.00-0.20	Clayey Loam with Roots and Brick	-	-	22.8
69649-4	BH104 E2	0.80-0.95	Loamy Clay	-	-	18.3
69649-5	BH201 E1	0.00-0.20	Clayey loam with Gravel	-	-	17.0
69649-6	BH202 E2	0.50-0.70	Loamy Clay	-	-	18.1
69649-7	BH203 E1	0.00-0.20	Sandy Loamy Clay with Gravel	-	-	14.8
69649-8	BH204 E2	0.60-0.80	Sandy Clay with Gravel	-	-	16.7
69649-9	BH301 E2	0.60-0.70	Sandy Clay with Gravel	-	-	12.5
69649-10	BH302 E1	0.00-0.20	Clayey Loam with Roots	-	-	32.1
69649-11	BH401 E1	0.15-0.25	Sand with Gravel and Brick	-	-	11.0
69649-12	BH402 E2	0.70-0.80	Clay	-	-	18.3

Chemtech Environmental Limited

SOILS

Lab number			69649-1	69649-2	69649-3	69649-4	69649-5	69649-6
Sample id			BH101 E1	BH102 E2	BH103 E1	BH104 E2	BH201 E1	BH202 E2
Depth (m)			0.00-0.20	0.10-0.30	0.00-0.20	0.80-0.95	0.00-0.20	0.50-0.70
Date sampled			15/01/2018	15/01/2018	15/01/2018	15/01/2018	16/01/2018	16/01/2018
Test	Method	Units						
Arsenic (total)	CE127 M	mg/kg As	12	7.4	12	10	18	19
Boron (water soluble)	CE063 M	mg/kg B	1.9	0.9	1.0	1.4	1.3	1.1
Cadmium (total)	CE127 M	mg/kg Cd	0.3	<0.2	0.2	0.3	0.6	0.3
Chromium (total)	CE127 M	mg/kg Cr	44	41	42	39	112	66
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	28	13	23	18	69	26
Lead (total)	CE127 M	mg/kg Pb	58	13	60	33	339	70
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	17	22	20	29	27	24
Selenium (total)	CE127 M	mg/kg Se	0.9	0.6	0.9	0.9	1.0	1.0
Zinc (total)	CE127 M	mg/kg Zn	105	61	89	90	179	92
pH	CE004 M	units	7.1	7.0	6.2	7.0	7.6	7.6
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	34	13	36	23	73	67
Sulphate (total)	CE062 M	mg/kg SO_4	1167	169	1005	544	1153	595
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Cyanide (total)	CE077 M	mg/kg CN	<1	<1	<1	<1	<1	<1
Thiocyanate	CE145 M	mg/kg SCN	<1	<1	1.6	<1	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	5.70	0.24	3.72	1.26	6.65	2.74
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	9.83	0.41	6.41	2.17	11.47	4.72
PAH								
Naphthalene	CE087 M	mg/kg	0.05	<0.01	<0.01	<0.01	0.06	<0.01
Acenaphthylene	CE087 M	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthene	CE087 M	mg/kg	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
Fluorene	CE087 U	mg/kg	<0.01	<0.01	<0.01	<0.01	0.03	<0.01
Phenanthrene	CE087 M	mg/kg	0.28	<0.02	<0.02	<0.02	0.45	<0.02
Anthracene	CE087 U	mg/kg	0.09	<0.02	<0.02	<0.02	0.18	<0.02
Fluoranthene	CE087 M	mg/kg	0.55	<0.02	<0.02	<0.02	1.18	0.03
Pyrene	CE087 M	mg/kg	0.47	<0.02	<0.02	<0.02	1.08	<0.02
Benzo(a)anthracene	CE087 U	mg/kg	0.28	<0.02	<0.02	<0.02	0.66	0.03
Chrysene	CE087 M	mg/kg	0.25	<0.01	<0.01	<0.01	0.57	<0.01
Benzo(b)fluoranthene	CE087 M	mg/kg	0.29	<0.02	<0.02	<0.02	0.76	<0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	0.14	<0.02	<0.02	<0.02	0.26	<0.02
Benzo(a)pyrene	CE087 U	mg/kg	0.25	<0.02	<0.02	<0.02	0.63	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	0.16	<0.02	<0.02	<0.02	0.40	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	0.12	<0.02	<0.02	<0.02	0.34	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	2.92	<0.27	<0.27	<0.27	6.63	<0.27

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SOILS

Lab number			69649-1	69649-2	69649-3	69649-4	69649-5	69649-6
Sample id			BH101 E1	BH102 E2	BH103 E1	BH104 E2	BH201 E1	BH202 E2
Depth (m)			0.00-0.20	0.10-0.30	0.00-0.20	0.80-0.95	0.00-0.20	0.50-0.70
Date sampled			15/01/2018	15/01/2018	15/01/2018	15/01/2018	16/01/2018	16/01/2018
Test	Method	Units						
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1	1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	1	1	<1	<1	3	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	2	1	1	1	6	2
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	<1	2	1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	0.7	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	4	<4	<4	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	4	<4	<4	8	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	44	20	14	19	223	41
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	<10	<10	<10	116	17
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			69649-7	69649-8	69649-9	69649-10	69649-11	69649-12
Sample id			BH203 E1	BH204 E2	BH301 E2	BH302 E1	BH401 E1	BH402 E2
Depth (m)			0.00-0.20	0.60-0.80	0.60-0.70	0.00-0.20	0.15-0.25	0.70-0.80
Date sampled			16/01/2018	16/01/2018	16/01/2018	16/01/2018	17/01/2018	17/01/2018
Test	Method	Units						
Arsenic (total)	CE127 M	mg/kg As	12	16	13	12	8.6	12
Boron (water soluble)	CE063 M	mg/kg B	1.5	1.2	0.5	1.3	1.4	0.6
Cadmium (total)	CE127 M	mg/kg Cd	0.6	0.3	<0.2	<0.2	0.2	<0.2
Chromium (total)	CE127 M	mg/kg Cr	69	51	41	42	51	38
Chromium (VI)	CE146	mg/kg CrVI	<1	<1	<1	<1	<1	<1
Copper (total)	CE127 M	mg/kg Cu	34	21	9.9	18	20	17
Lead (total)	CE127 M	mg/kg Pb	112	44	12	50	16	24
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	20	22	24	14	24	22
Selenium (total)	CE127 M	mg/kg Se	0.8	0.9	0.7	0.6	1.5	0.9
Zinc (total)	CE127 M	mg/kg Zn	160	81	46	70	644	79
pH	CE004 M	units	8.2	7.9	7.5	7.2	7.9	7.1
Sulphate (2:1 water soluble)	CE061 M	mg/l SO_4	181	40	17	41	180	17
Sulphate (total)	CE062 M	mg/kg SO_4	1313	512	145	1265	1067	285
Sulphide	CE079	mg/kg S^{2-}	<10	<10	<10	<10	<10	<10
Cyanide (free)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Cyanide (total)	CE077 M	mg/kg CN	<1	<1	<1	<1	<1	<1
Thiocyanate	CE145 M	mg/kg SCN	<1	<1	<1	1.0	<1	<1
Phenols (total)	CE078	mg/kg PhOH	<0.5	<0.5	<0.5	<0.5	0.9	<0.5
Total Organic Carbon (TOC)	CE072 M	% w/w C	2.83	1.79	0.19	2.33	1.27	0.82
Estimate of OMC (calculated from TOC)	CE072 M	% w/w	4.88	3.09	0.33	4.02	2.19	1.41
PAH								
Naphthalene	CE087 M	mg/kg	0.14	0.05	<0.01	0.04	0.05	<0.01
Acenaphthylene	CE087 M	mg/kg	0.10	<0.01	<0.01	<0.01	0.09	<0.01
Acenaphthene	CE087 M	mg/kg	0.29	<0.01	<0.01	<0.01	0.43	<0.01
Fluorene	CE087 U	mg/kg	0.35	<0.01	<0.01	<0.01	0.43	<0.01
Phenanthrene	CE087 M	mg/kg	4.84	0.10	<0.02	0.17	10.21	0.02
Anthracene	CE087 U	mg/kg	1.48	0.03	<0.02	0.06	4.58	<0.02
Fluoranthene	CE087 M	mg/kg	9.50	0.16	<0.02	0.44	42.78	0.05
Pyrene	CE087 M	mg/kg	7.78	0.14	<0.02	0.39	36.03	0.04
Benzo(a)anthracene	CE087 U	mg/kg	3.81	0.09	<0.02	0.27	19.06	0.05
Chrysene	CE087 M	mg/kg	3.49	0.08	<0.01	0.21	17.23	0.03
Benzo(b)fluoranthene	CE087 M	mg/kg	4.05	0.10	<0.02	0.25	20.20	0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	1.77	0.05	<0.02	0.11	8.79	<0.02
Benzo(a)pyrene	CE087 U	mg/kg	3.47	0.08	<0.02	0.22	17.26	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	2.28	0.05	<0.02	0.10	9.89	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	0.48	<0.02	<0.02	<0.02	2.33	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	1.94	0.05	<0.02	0.09	8.38	0.04
PAH (total of USEPA 16)	CE087	mg/kg	45.8	0.98	<0.27	2.36	198	<0.27

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SOILS

Lab number			69649-7	69649-8	69649-9	69649-10	69649-11	69649-12
Sample id			BH203 E1	BH204 E2	BH301 E2	BH302 E1	BH401 E1	BH402 E2
Depth (m)			0.00-0.20	0.60-0.80	0.60-0.70	0.00-0.20	0.15-0.25	0.70-0.80
Date sampled			16/01/2018	16/01/2018	16/01/2018	16/01/2018	17/01/2018	17/01/2018
Test	Method	Units						
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	1	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	24	<1	<1	1	94	1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	20	2	<1	4	95	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	4	1	<1	1	8	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	<4	<4	5
EPH Aliphatic (>C12-C16)	CE068	mg/kg	7	<4	<4	5	5	5
EPH Aliphatic (>C16-C35)	CE068	mg/kg	223	30	<10	79	159	16
EPH Aliphatic (>C35-C44)	CE068	mg/kg	109	16	<10	19	24	<10
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	Wet	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO_4
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO_4
CE079	Sulphide	Extraction, Continuous Flow Colorimetry	Wet		10	mg/kg S^{2-}
CE077	Cyanide (free)	Extraction, Continuous Flow Colorimetry	Wet		1	mg/kg CN
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	Wet	M	1	mg/kg CN
CE145	Thiocyanate	Weak acid extraction, Colorimetry	Dry	M	1	mg/kg SCN
CE078	Phenols (total)	Extraction, Continuous Flow Colorimetry	Wet		0.5	mg/kg PhOH
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	Wet	U	0.01	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	Wet	M	0.01	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	Wet	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	Wet	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	Wet		0.27	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
69649-1	BH101 E1	0.00-0.20	N	
69649-2	BH102 E2	0.10-0.30	N	
69649-3	BH103 E1	0.00-0.20	N	
69649-4	BH104 E2	0.80-0.95	N	
69649-5	BH201 E1	0.00-0.20	N	
69649-6	BH202 E2	0.50-0.70	N	
69649-7	BH203 E1	0.00-0.20	N	
69649-8	BH204 E2	0.60-0.80	N	
69649-9	BH301 E2	0.60-0.70	N	
69649-10	BH302 E1	0.00-0.20	N	
69649-11	BH401 E1	0.15-0.25	N	
69649-12	BH402 E2	0.70-0.80	N	

APPENDIX H:

AWP GENERIC ASSESSMENT CRITERIA

Alan Wood & Partners
Generic Assessment Criteria for Soils

Revision Version: V.7 - September 2015

Parameter	Residential		Commercial	Allotment	Public Open Space near Residential land (POS_{resi})	Public Park Land (POS_{park})	Source
	With Plant Uptake	Without Plant Uptake					
	1-6% SOM	1-6% SOM	1-6% SOM	1-6% SOM	1-6% SOM	1-6% SOM	
Metals/Metalloids [a]							
Arsenic (inorganic)	37	40	640	49	79	170	DEFRA C4SL [b]
Beryllium	1.7	1.7	12	35	2.2	63	LQM/CIEH [c]
Boron	290	11,000	240,000	45	21,000	46,000	LQM/CIEH [c]
Cadmium [d]	22	150	410	3.9	220	880	DEFRA C4SL [b]
Chromium (III)	910	910	8,600	18,000	1,500	33,000	LQM/CIEH [c]
Chromium (VI) [e]	21	21	49	170	21	250	DEFRA C4SL [b]
Copper	2,400	7,100	68,000	520	12,000	44,000	LQM/CIEH [c]
Lead [f]	200	310	2,300	80	630	1,300	DEFRA C4SL [b]
Mercury (inorganic)	40	56	1,100	19	120	240	LQM/CIEH [c]
Nickel	130	180	980	53	230	800	LQM/CIEH [c]
Selenium	250	430	12,000	88	1,100	1,800	LQM/CIEH [c]
Vanadium	410	1,200	9,000	91	2,000	5,000	LQM/CIEH [c]
Zinc	3,700	40,000	730,000	620	81,000	170,000	LQM/CIEH [c]
Other Inorganics							
pH	<5	<5	<5	<5	<5	<5	-
Total Sulphate	2400	2400	2400	2400	2400	2400	BRE (2005) [g]
Water-Soluble Sulphate	0.5g/l	0.5g/l	0.5g/l	0.5g/l	0.5g/l	0.5g/l	BRE (2005)

Parameter	Residential						Commercial [i]			Allotment			Public Open Space near Residential land (POS_{resi})			Public Park Land (POS_{park})			Source
	With Plant Uptake			Without Plant Uptake															
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	
Organics [h]																			
Acenaphthene	200	490	1,080	2,000	3,600	5,200	75,000	92,000	100,000	34	85	202	Subject to site specific assessment where required			Subject to site specific assessment where required			CLEA/LQM/CIEH
Acenaphthylene	170	400	900	2,000	3,600	5,200	76,000	92,000	100,000	28	68	163							CLEA/LQM/CIEH
Anthracene	2,300	5,400	10,700	30,000	34,000	36,000	520,000	530,000	540,000	380	947	2,230							CLEA/LQM/CIEH
Benzo(a)anthracene	7.5	11	13	12	14	15	170	170	180	2.9	6.5	13							CLEA/LQM/CIEH
Benzo(a)pyrene	2.2	2.7	3	3.2	3.2	3.2	35	35	36	3.6	3.7	3.7							CLEA/LQM/CIEH
Benzo(b)fluoranthene	2.6	3.3	3.7	3.9	4	4	44	45	45	1	2.2	3.9							CLEA/LQM/CIEH
Benzo(g,h,i)perylene	315	340	350	360	360	360	3,900	4,000	4,000	290	480	646							CLEA/LQM/CIEH
Benzo(k)fluoranthene	77	93	100	110	110	110	1,200	1,200	1,200	37	76	129							CLEA/LQM/CIEH
Chrysene	15	22	27	30	31	32	350	350	350	4.1	9.5	19							CLEA/LQM/CIEH
Dibenz(a,h)anthracene	0.24	0.28	0.30	0.31	0.32	0.32	3.5	3.6	3.6	0.14	0.27	0.44							CLEA/LQM/CIEH
Fluoranthene	280	560	890	1,500	1,600	1,600	23,000	23,000	23,000	52	127	288							CLEA/LQM/CIEH
Fluorene	165	390	850	2,200	3,400	4,200	60,000	67,000	70,000	27	67	158							CLEA/LQM/CIEH
Indeno(1,2,3-cd)pyrene	27	36	41	45	46	46	500	510	510	9.5	21	40							CLEA/LQM/CIEH
Naphthalene	1	2.3	5.5	1	2.4	6	100	260	600	4	9.8	23							CLEA/LQM/CIEH
Phenanthrene	95.0	220	440	1,300	1,400	1,500	22,000	22,000	23,000	15	38	90							CLEA/LQM/CIEH
Pyrene	620	1,200	2,000	3,700	3,800	3,800	54,000	54,000	55,000	111	271	620							CLEA/LQM/CIEH
Aliphatic EC 5-6 (benzene)	24	40	80	24	40	80	2,400	4,000	8,000	752	1,730	3,900	Subject to site specific assessment where required			Subject to site specific assessment where required			CLEA/LQM/CIEH
Aliphatic EC >6-8 (toluene)	52	110	250	52	110	250	5,200	11,000	25,000	2,304	5,580	13,000							CLEA/LQM/CIEH
Aliphatic EC >8-10	13	30	70	13	30	70	1,300	3,000	7,000	321	770	1,700							CLEA/LQM/CIEH
Aliphatic EC >10-12	60	150	360	60	150	360	6,000	15,000	32,000	2,153	4,300	7,150							CLEA/LQM/CIEH
Aliphatic EC >12-16	500	1,200	2,600	500	1,200	2,600	42,000	72,000	90,000	10,800	12,400	13,200							CLEA/LQM/CIEH
Aliphatic EC >16-35	41,000	69,000	94,000	41,000	69,000	94,000	140,000	160,000	180,000	240,000	260,000	260,000							CLEA/LQM/CIEH
Aliphatic EC >35-44	41,000	69,000	94,000	41,000	69,000	94,000	140,000	160,000	180,000	240,000	260,000	260,000							CLEA/LQM/CIEH

Alan Wood & Partners
Generic Assessment Criteria for Soils

Revision Version: V.6 - April 2015

Alan Wood & Partners

Parameter	Residential						Commercial [i]			Allotment			Public Open Space near Residential land (POS_{resi})			Public Park Land (POS_{park})			
	With Plant Uptake			Without Plant Uptake															
	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	1% SOM	2.5% SOM	6% SOM	
Organics contd./ [h]																			
Aromatic EC >5-7	50	110	240	155	300	630	15,000	28,000	55,000	12	25	57	Subject to site specific assessment where required			Subject to site specific assessment where required			CLEA/LQM/CIEH
Aromatic EC >7-8	100	240	550	370	800	1,800	33,000	68,000	130,000	21	50	117							CLEA/LQM/CIEH
Aromatic EC >8-10	20	50	110	20	53	125	2,000	5,000	120,000	8.6	21	50							CLEA/LQM/CIEH
Aromatic EC >10-12	63	150	340	120	280	650	11,000	22,000	31,000	12.5	31	74							CLEA/LQM/CIEH
Aromatic EC >12-16	140	320	660	1,100	1,900	2,300	35,000	37,000	38,000	23	57	134							CLEA/LQM/CIEH
Aromatic EC >16-21	260	540	930	1,800	1,900	1,900	28,000	28,000	28,000	47	112	260							CLEA/LQM/CIEH
Aromatic EC >21-35	1,100	1,400	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,500							CLEA/LQM/CIEH
Aromatic EC >35-44	1,100	1,400	1,700	1,900	1,900	1,900	28,000	28,000	28,000	370	820	1,500							CLEA/LQM/CIEH
Benzene	0.06	0.13	0.30	0.16	0.30	0.64	15	28	57	0.016	0.033	0.073	Subject to site specific assessment where required			Subject to site specific assessment where required			CLEA/LQM/CIEH
Toluene	104	240	550	370	830	1800	33,000	68,000	130,000	22	50	117							CLEA/LQM/CIEH
Ethylbenzene	30	62	150	34	81	190	3,200	7,000	16,000	16	38	91							CLEA/LQM/CIEH
o-xylene	30	70	170	40	90	200	3,700	8,000	19,000	28	67	160							CLEA/LQM/CIEH
m-xylene	30	70	160	34	80	190	3,400	8,000	18,000	30	74	170							CLEA/LQM/CIEH
p-xylene	30	70	160	33	80	180	3,200	8,000	17,000	28	69	160							CLEA/LQM/CIEH

NOTES

- All values are rounded to 1 or 2 significant figures. All values mg/kg unless otherwise stated.

(a) Generic Assessment Criteria presented by DEFRA (2014) and LQM/CIEH (2015) for metals are not sensitive to Soil Organic Matter content and may be applied directly across the SOM range 1-6% for the land uses given.

(b) Final Category 4 Screening Levels given in DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination - Policy Companion Document, December 2014. Calculated for sandy loam soils with 6% SOM.

(c) Nathanial, C.P., McCaffrey, C., Gillett, A.C., Ogden, R.C. And Nathanial, J.F. (2015). The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. Publication Number **S4UL3286**.

(d) GAC for cadmium are calculated for soils with pH values between 6 and 8. Care should be applied when using the GAC values outside this range and particularly below 5.

(e) Additional site specific risk assessment may be required where elevated concentrations of Chromium (VI) are measured on site.

(f) DEFRA (2014) indicate that the BGS have derived 'normal' background lead concentrations for England & Wales. In England normal background concentrations are 180mg/kg for the principal domain, 2400mg/kg for the mineralisation domain and 820mg/kg for the urban domain (DEFRA, 2012). Calculated C4SL values to be adopted for residential, allotment and POS_{resi} are lower therefore than the 'normal' background concentration of lead in urban areas.

(g) BRE (2005) Special Digest 1, 3rd Edition 'Concrete in Aggressive Ground'. GAC is the upper limit for DS-1 sulphate class concrete.

(h) Organic contaminant GAC values calculated using CLEA v1.06 for sandy soil with SOM of 1%, 2.5% and 6%. Sandy soil type is considered to be conservative for the majority of soils, including brownfield soils on (potentially contaminated) sites. Changes made to default CLEA exposure parameters as per updated information given in DEFRA (2014) (C4SL Tables 3.2 and 3.5) and LQM/CIEH (2015).

(i) GAC derived for pre-1970 office buildings using default commercial CLEA model with adjustment to CLEA exposure parameters as per DEFRA (2014) (C4SL Tables 3.2 and 3.5).

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