

!
PHASE I DESK STUDY
AT
LAND TO REAR OF 73 SANDY LANE,
PRESTWICH, BURY
FOR
PCI Ltd
REPORT REF: PCI 3277

Engineering Geologists and Environmental Scientists



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CONTENTS

EXECUTIVE SUMMARY

1	INTRODUCTION
2	THE SITE
3	REPORT OBJECTIVE AND REPORT SCOPE
3.1	Report Objective
3.2	Report Scope
4	SITE HISTORY
5	POTENTIAL CONTAMINATION
6	SITE GEOLOGY
6.1	Geology
6.2	Geological Faults
6.3	Engineering Geology
6.4	Geological Hazards
7	SITE HYDROLOGY AND HYDROGEOLOGY
7.1	Hydrology
7.2	Hydrogeology
8	QUARRYING AND MINING
8.1	Quarrying
8.2	Coal Mining Risk Assessment
8.2.1	Coal Authority Report
8.2.2	Shallow Coal Mining
8.3	Stone Mining
9	ENVIRONMENTALLY SENSITIVE SITES
10	REGULATED INDUSTRIES
10.1	Authorisations, Incidents and Registers
10.2	Landfill
11	ENVIRONMENTAL RISK ASSESSMENT
11.1	Introduction
11.2	Potential Sources of Contamination
11.3	Potential Pathways for Migration
11.4	Potential Sensitive Receptors
11.5	Summary Environmental Risk
12	CONCLUSIONS
12.1	Environmental
12.2	Mining
12.3	Geotechnical
13	RECOMMENDATIONS

APPENDICES

APPENDIX A	Historic OS Maps
APPENDIX B	Photographs
APPENDIX C	Conceptual Model
APPENDIX D	The Coal Authority Report

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EXECUTIVE SUMMARY

Risk	
• OS maps indicate the site has been occupied by open land and hard cover with single storey domestic garages	
• Based on the past uses of the site and its surroundings there is a generally low to medium risk to site ownership and a low risk for residential development which should be confirmed by a ground investigation.	
• There is a low risk that the site under its present use is detrimentally affecting site users.	
• The site is unlikely to be classed under Part IIA of the EPA 1990 and is unlikely to be on the local authority potentially contaminated land register	
Details	
• The site is underlain by Quaternary Glacial Sand and Gravel, possibly overlying Glacial Till, overlying mudstone, siltstone, sub-ordinate sandstone and coal of the Carboniferous Westphalian C Coal Measures.	
• Made ground may to be present on site	
• Any made ground is likely to be an unsuitable founding strata. The sands and gravels generally provide good bearing strata when in a dense state of compaction for low rise development.	
• The site lies on a secondary (A) or minor aquifer within the superficial deposits and a secondary (A) or minor aquifer within the bedrock.	
• There are no potable water abstractions within 2000m of the site.	
• The site according to the Environment Agency does not lie in a Flood Zone.	
• There are not areas of historic landfill within 250m of the site which may have a potential to emit methane	
• The site is unlikely to be detrimentally affected by any regulated industries.	
• Radon protection is required for a new development.	
• There is a very low risk of shallow or deep recorded mining detrimentally affecting the site.	
• There are no recorded mine shafts within or within 20m of the site	
• There is a low risk of contamination being present on the site	
• The communal garden area and any import topsoil for gardens should be tested as uncontaminated before use in the gardens	
Recommendations	
• The report has been compiled with the development of the site as the driver. Quantification of the risks can be undertaken with an intrusive ground investigation.	
• Intrusive investigation should be undertaken to assess suitable founding strata and any requirement for mitigating measures for contamination or elevated groundwater levels before any new build construction is undertaken.	
• Mining – Further investigation of mining claims by adjacent properties	

Recommended Investigation	Nature of Investigation	Details of investigation for quantification of risk or for new build on the site
Intrusive Geotechnical	Window Sampler Drilling	Assessment of strata, collection of samples for lab testing and foundation design and to install standpipes for groundwater monitoring
Laboratory Testing	Contamination Tests Geotechnical Testing	Undertake tests for contamination on soil Undertake geotechnical testing for foundation design
Install standpipes	Monitoring	Monitoring for groundwater levels
Concrete Design	Testing for sulphates	BRE sulphate tests for underground concrete design



1. INTRODUCTION

This report describes the results of a Phase 1 Desk Study undertaken on land to the rear of 73 Sandy Lane in Prestwich, Bury. The work was commissioned by Mr Steve Costello on behalf of PCI Ltd and was carried out by this Consultancy, the Ashton Bennett Consultancy.

The purpose of this Phase I Study was to collate and assess information on the site including geological, hydrogeological and mining information, archival maps and historical review to determine past use, a database review, environmental data on water and soil, and to undertake a site reconnaissance to enable a desk top assessment to determine the likely presence and areas of environmental concerns on the site and the presence of pathways of migration and potentially sensitive receptors, and to determine solutions to any geotechnical, environmental and mining concerns to the development of the land for residential use.

This report describes the research work carried out, presents the results of the desk study and from the conceptual model of the site makes recommendations for solutions to any environmental, geotechnical and mining risks to site development.

2. THE SITE

The site is located off Sandy Lane in Prestwich, north of Manchester City Centre. The area of the site is almost entirely hard covered by tarmac with the exception of a small section in the east of the site with bushes and shrubs located. A row of single car domestic garages occupy the west boundary of the site.

The site is bounded to the north by tarmac and single car garages with fencing and residential gardens beyond. The site is bounded to the west by the rear of the single car garages with 2m wooden fencing and residential gardens beyond. The site is bounded to the south by tarmac with overgrowing shrubs, grass and moss then 2m high wooden fencing and residential gardens and houses beyond. The site is bounded to the east by tarmac and 2m corrugated sheet fencing and residential gardens beyond.

The site lies around National Grid Reference 373350^E, 409162^N at a height of 90m above Ordnance Datum. A Site Location Plan is presented as Figure 1, a Site Plan is presented as Figure 2 and a Superficial Geology Plan is presented as Figure 3A, a Bedrock Geology Plan as Figure 3B. A Designated Environmentally Sensitive Sites Map is presented as Figure 4. Archival maps are presented in Appendix A. Photographs are presented as Appendix B. A Conceptual Model is presented in Appendix C and a Coal Authority Report is presented as Appendix D.

A site walk over was undertaken on Friday October 28th 2016.

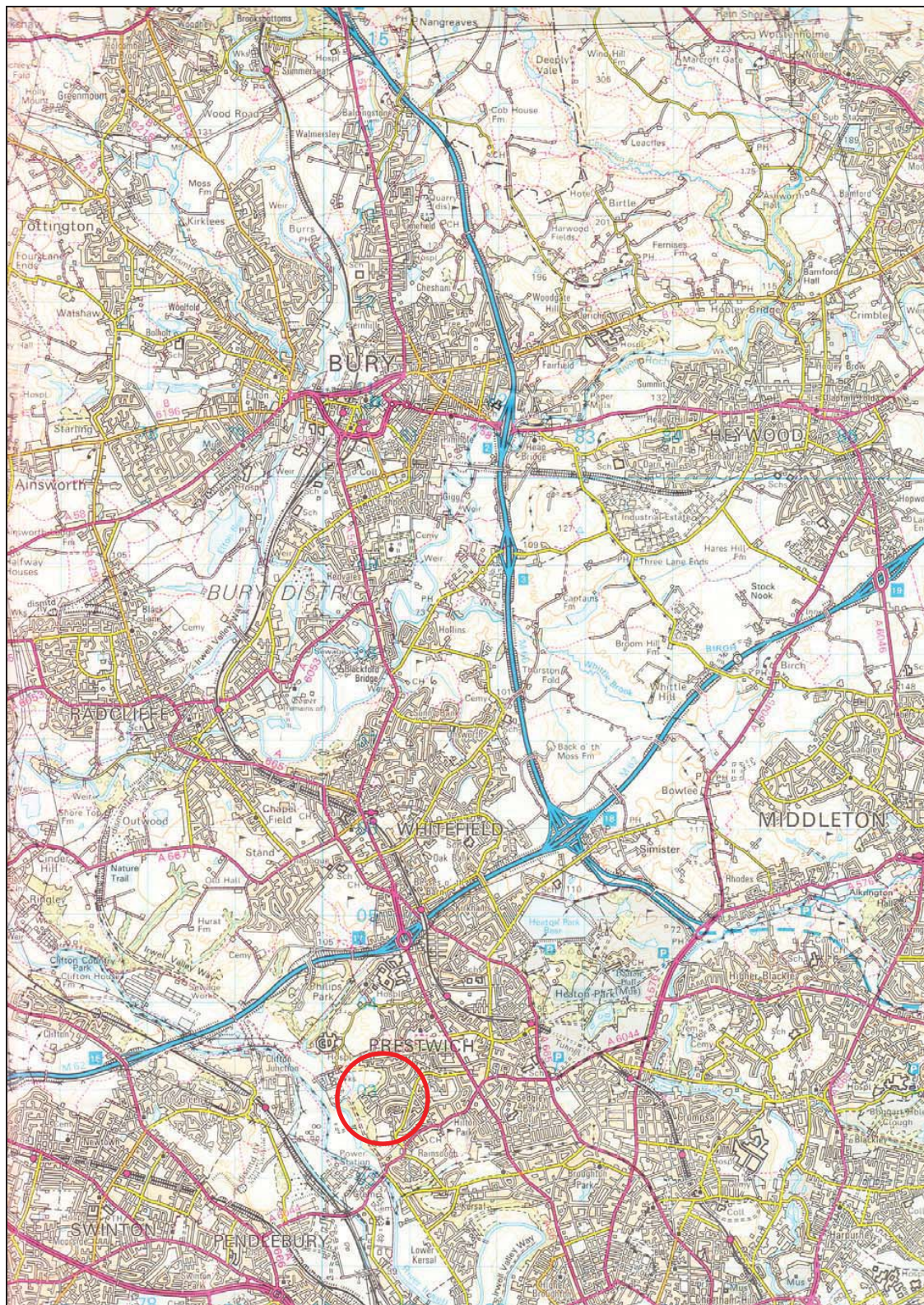


Figure 1

Site Location Plan

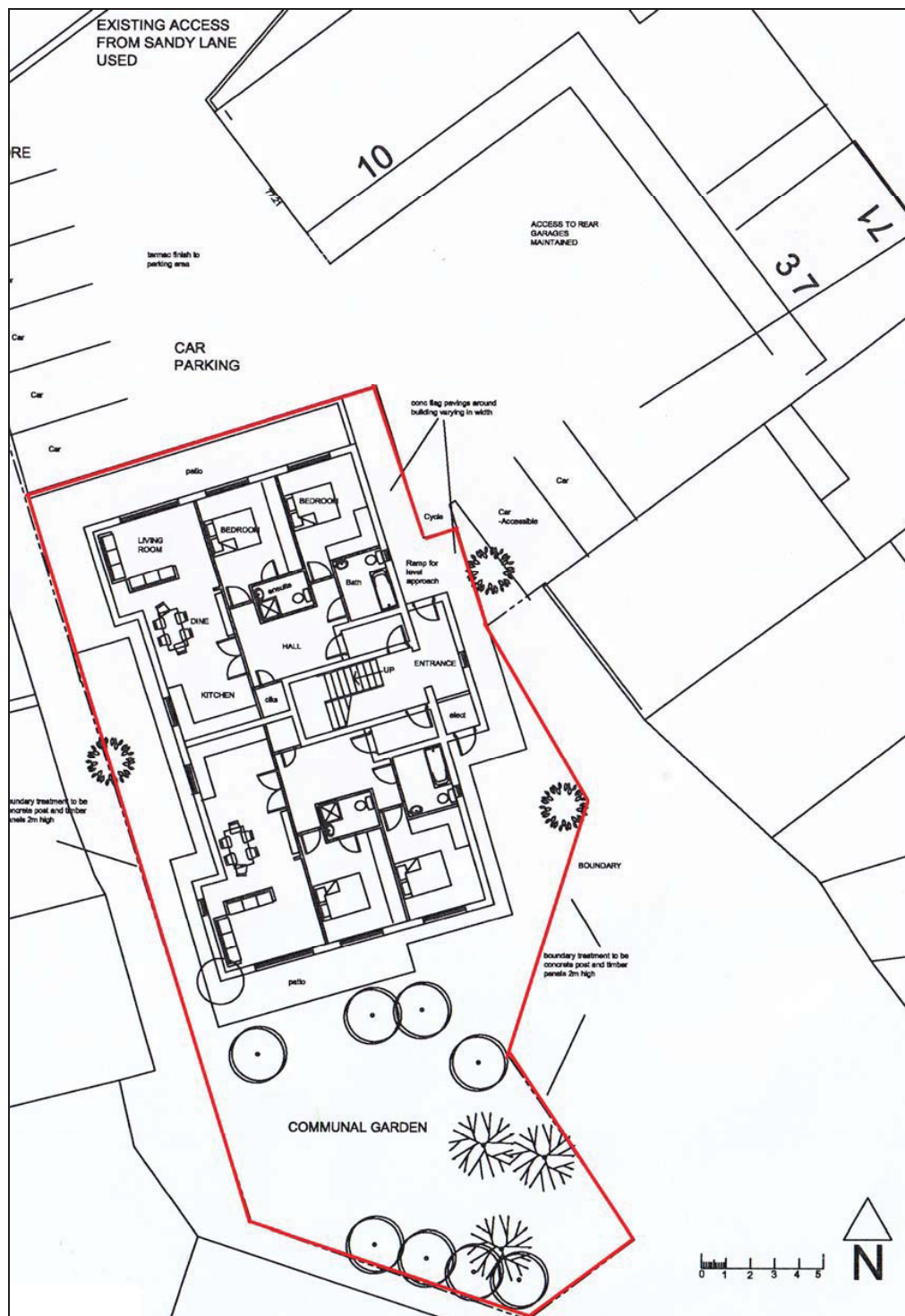


Figure 2 Site Plan

3. REPORT OBJECTIVE AND REPORT SCOPE

3.1 Report Objective

The objective of the desk study is to determine the environmental nature of the site and to establish any environmental concerns and liabilities with particular reference to past contaminative uses of the site as far as is possible from historical and database review. Contaminative use is defined as “any use of land which may cause it to be contaminated by toxic substances” (Section 143 of the Environmental Protection Act 1990). The report undertaken is a Phase I Desk Study and Risk Assessment taking into account the possible contamination, the migration pathways and the presence of potentially sensitive receptors and the engineering properties of the strata and the mining history of the site, including a coal mining and mine shaft risk assessment.

3.2 Report Scope

The information for this report is from sources recommended by the Institute of Civil Engineers (ICE), the Association of Geotechnical and Geoenvironmental Specialists (AGS), Construction Industry Research and Information Association (CIRIA) and the Department of the Environment Transport and the Regions (DETR). The report has been compiled in accordance with the latest ICE, DETR, Department of Environment, Food and Rural Affairs (DEFRA), British Standard Draft Documents and British Standards, CIRIA, CLR 11 & other CLEA Reports and Eurocode 7.

In addition the scope of the investigation has used the extensive knowledge and experience of the staff of Ashton Bennett Consultancy to assess the data and to interpret the findings.

4. SITE HISTORY

The following maps and plans were inspected to assess the history of the site and its past environments. The maps are presented in Appendix A.

TABLE 1
Historical Maps Inspected

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1848-50	1:10,560	The site lies as open ground during this time.	The surrounding area is largely open land or agricultural land. Sand Pits are annotated to the north east and south west of site. Prestwich is evident to the far north east of site. Sandy lane is shown on the maps, though not annotated as such.
1891 & 1893	1:10,560 & 1:2,500	The site area remains unchanged during this time.	The surrounding area indicates the newly constructed Prestwich Hills Reservoir and water works to the east of site. Local surrounding sand pits are no longer annotated. Industrial premises evident to the far west of site, including sewage and bleach works. Newly residential properties shown to the north, east, south and north east of site. Local wells annotated on the 1893 map. Diggle Fold Farm is shown to occupy the buildings local to site while potentially using the site land for agricultural activities.
1907 & 1909 & 1915	1:10,560 & 1:2,500	The site area remains unchanged during this time.	Development is evident in the far surrounding areas of site.
1922 & 1923	1:2,500 & 1:10,560	The site area remains unchanged during this time.	No significant change in the surroundings, surrounding development is evident.

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1927-32 & 1932 & 1937-8	1:10,560 & 1:2,500	The site area remains unchanged during this time.	Surrounding development is evident and by 1937-8 residential buildings are annotated to the immediate east, south and west of site while Sandy Lane is also now annotated on the map.
1951-2 & 1956	1:1,250 & 1:10,560	The site area remains unchanged during this time.	The site area is now surrounded by residential and possibly commercial premises. Electricity sub station annotated to the north of site
1967-8	1:10,560	The site area remains unchanged during this time.	The site area is now shown to be completely surrounded by buildings, both immediately and throughout the far surrounding area.
1973-7 & 1976-8	1:10,000 & 1:1,250	Single storey garages have been constructed along the north west boundary, likely for the surrounding residential properties and including hard cover over the rest of the site area.	The surrounding area remains largely unchanged
1985-8 & 1988-92	1:10,000 & 1:1,250	Further construction of garages on site, specifically along the south west boundary.	The surrounding area remains largely unchanged during this time.
2002	1: 10,000	The site area remains unchanged during this time.	No significant change to the surrounding area.
2010-2014	1:10,000	The site area remains unchanged during this time.	No significant change to the surrounding area.

In summary, the site was open land, possibly with agricultural use until around 1937 when immediately surrounding residential properties were constructed along Sandy Lane and surrounding the site area. By 1970 domestic garages existed on the west of site which remain today.

5. POTENTIAL CONTAMINATION

Potential sources of contamination on the site have been identified from the past and present usage of the site and from neighbouring land-uses.

The use of the site as car parking and garages means that the site could have been contaminated from vehicles leaks or spills etc.

Based on the previous usage of the site and surroundings, the following contamination could be present on the site:

- Ground gas – methane, carbon dioxide, VOCs from infilled land
- Organic substances (PAHs, TPHs, SVOCs, VOCs from oil and waste fuel)
- Metals and arsenic from waste fuel
- Asbestos from garages roofs and brakes

This list does not imply that this contamination is present on site and it is possible that other contamination may be present that is not listed.

6. SITE GEOLOGY

6.1 Geology

The following published BGS geological maps for the site have been examined: 1:63,360 scale (Drift) Sheet 85 “Manchester” and 1:50,000 scale (Solid) Sheet 85 “Manchester”. The maps show the site to be underlain by Quaternary Glacial Sand and Gravel, possibly overlying Glacial Till, overlying mudstone, siltstone, sub-ordinate sandstone and coal of the Carboniferous Westphalian C Coal Measures. Undifferentiated mudstone, siltstone and sandstone are shown to directly underlie the superficial deposits at the site, overlying the Newton Heath Sandstone. The Worsley Four Foot Mine (coal seam) is likely to be present at around 140m.bgl.

The bedrock is shown on the BGS maps to be dipping around 22° from the horizontal towards the southwest.

It is possible that made ground may be present on the site. The glacial deposits may contain soft silt layers, clays and sands and gravels, some of which may be water bearing.

6.2 Geological Faults

A major NW-SE fault with downthrow to the northeast is shown to be present approximately 100m to the northeast of the site. Additionally, other faults that have not been mapped may be present on or close to the site. As tectonic activity is not active at the present time it is unlikely that any faults will detrimentally affect the stability of the site. However where ground is undermined movement in the mine workings can be transferred to the ground surface through the fractured faulted ground.

6.3 Engineering Geology

Any made ground on the site is unlikely to provide a suitable founding stratum for the proposed development. The Glacial Sand and Gravel and Glacial Till often provides a good founding stratum for shallow foundations although the unit may be water bearing. The mudstones and sandstones of the Coal Measures generally provide good founding material for low-rise construction. There is a risk of shrinkage and swelling of shallow clay soils within the Glacial Till and weathered mudstone which must be investigated and addressed during design.

Issues associated with possible mined ground are discussed in Section 8 of this report.

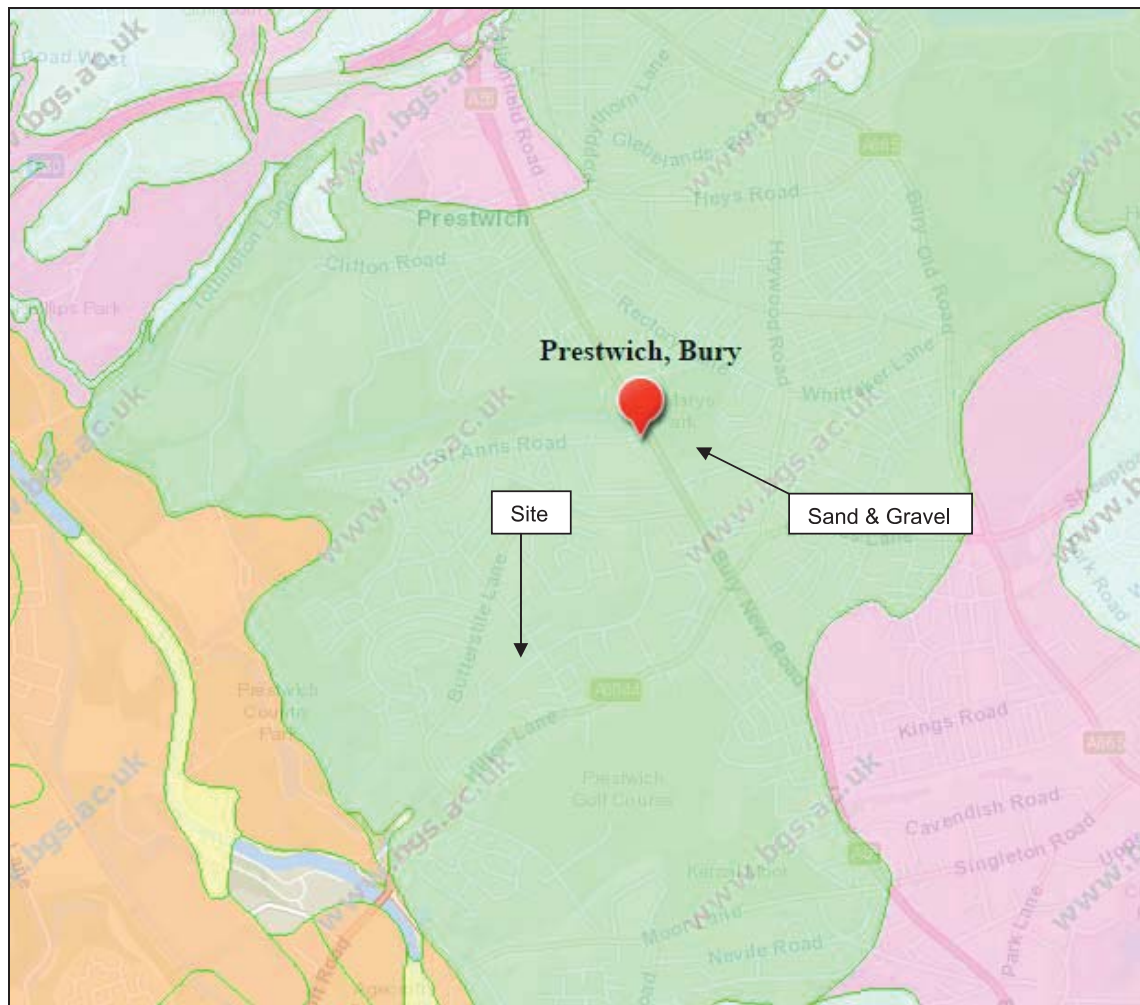


Figure 3A Superficial Geology Plan

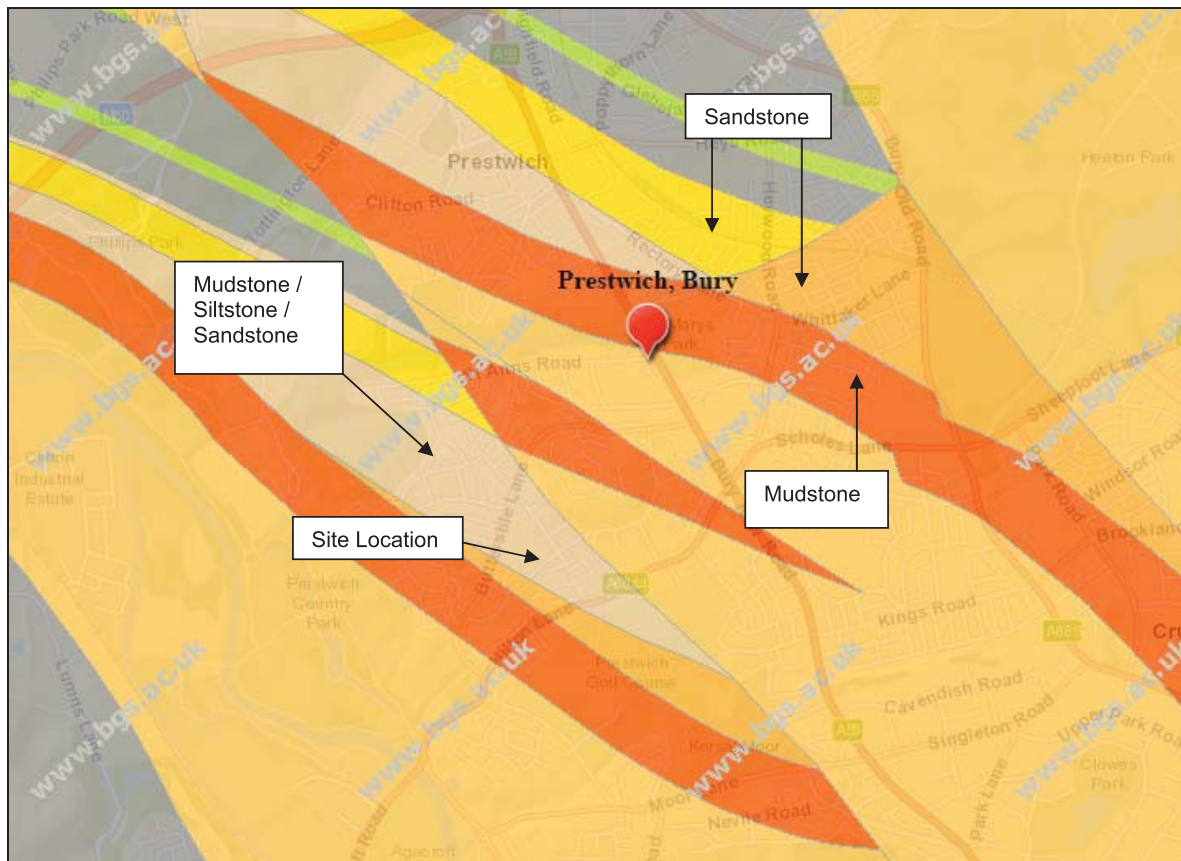


Figure 3B Bedrock Geology Plan

6.4 Geological Hazards

According to the British Geological Survey there is a negligible risk of a shrink and swell hazard from clays, and collapsible rocks, and compressible ground and very low risk running sand, a very low risk of landslides and a negligible risk of soluble rocks.

7. SITE HYDROLOGY AND HYDROGEOLOGY

7.1 Hydrology

The rainfall over the area of the site will naturally drain into town drains and any open ground on the site. The closest surface water is a tertiary river located 433m to the south west of site. There are no biological water quality assessments within 1000m of the site.

The site is shown by the Environment Agency to not lie within a fluvial flood plain. The site is not shown to lie within a pluvial or surface water flood area.

It is important that any contamination found on site is not allowed to detrimentally affect any watercourses. There are no surface water abstraction licences within 1500m of the site.

There are no records of authorisation issued by the Environment Agency to discharge to watercourses in accordance with the Water Resources Act 1991, within 250m of the site.

7.2 Hydrogeology

The abovementioned geological maps produced by the BGS indicate the site to be underlain by permeable Glacial Sand and Gravel overlying low permeability Glacial Till and Coal Measures mudstone with more permeable sandstone below. Groundwater may be present at shallow depth in the Glacial Sand and Gravel. Additionally, perched groundwater may be present within the Glacial Till. A deeper groundwater table would be expected in the Coal Measures sandstone.

The Environment Agency Groundwater Vulnerability maps indicate the Glacial Sand and Gravel at the site as being a 'Secondary (A) Aquifer' and the Coal Measures comprising of a 'Secondary (A) Aquifer'. Secondary (A) aquifers (formerly referred to as minor aquifers) are formations with permeable layers capable of supporting water supplies at local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The permeable layers are the sand and gravels of the superficial deposits.

The site is shown not to lie within or within 500m of a Source Protection Zone. There are no recorded groundwater abstractions within 1000m of the site. There are no potable water abstractions within 2000m of the site.

Other unrecorded or unlicensed wells may be present close to the site. Historic wells may exist within 500m of the site. As the local groundwater may be utilised for abstraction from old unlicensed wells, it is important that it is protected from pollution. It is an offence to pollute the groundwater, whether or not it is used for abstraction.

The BGS indicate that the site is at low risk of groundwater flooding which 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.

Groundwater vulnerability ie areas where groundwater is vulnerable to pollution due to lack of natural strata protection, is high on the land proposed for the houses.

8. QUARRYING AND MINING

8.1 Quarrying

There is no known quarrying of rock on or within the vicinity of the site that is likely to have impacted on the site.

8.2 Coal Mining Risk Assessment

8.2.1 Coal Authority Report

The Mining Report states that the property is in a surface area that could be affected by underground mining in 4 seams of coal at 320m to 930m depth, and last worked in 1989. Any movement in the ground due to coal mining activity should have stopped.

The property is not in the likely zone of influence of any present underground coal workings. The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods. The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area that is likely to be affected at the surface from any planned future workings. However reserves of coal exist in the local area which could be worked at some time in the future. Within or within 20m of the boundary of the property there are no mine entries.

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

The Coal Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that may 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 property does not lie within 200m of the boundary of an opencast site from which coal is being removed by opencast methods. The property is not within 800m of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods. The property is not within 800m of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

The Coal Authority has received 14 claims within 50m of the property boundary that do not match the property address. These are shown on the enquiry boundary plot of the Coal Authority Report in Appendix D. There is no current stop notice delaying the start of remedial works or repairs to the property. The Authority is not aware of any request having been made to carry out preventative works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.

There is no record of any mine gas emissions requiring action by the Coal Authority, under its Emergency Surface Hazard Call Out procedures. The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures. The property is in an area where notices to withdraw support were given in 1959 and 1976. The property is not in an area where a notice have been given under section 41 of the Coal Industry Act 1991, cancelling the entitlement to withdraw support.

The Coal Authority Report is presented in Appendix D and should be read in full.

8.2.2 Shallow Coal Mining

The Coal Authority Report details mining based on their records, which date from 1872. Shallow coal mining often predated the requirement for abandonment records and is often not therefore recorded by the Coal Authority. The Coal Measures do not lie at shallow depth beneath the site.

8.3 Stone Mining

There are no records of stone mining beneath the site.

9. ENVIRONMENTALLY SENSITIVE SITES

The site does lie within or within 1000m of a Site of Special Scientific Interest. It does not lie within 2000m of a National Nature Reserve, a Special Area of Conservation, a Special Protection Area, a RAMSAR site, a World Heritage Site, an Environmentally Sensitive Area, an Area of Outstanding Natural Beauty or a Nitrate Sensitive Area. The site does however lie within 442m of ancient woodland located to the north of site and within 1008m of a local nature reserve, located to the south east of site.

The site does lie within a Nitrate Vulnerable Zone. The site is unlikely to detrimentally affect these environmentally sensitive areas.

10. REGULATED INDUSTRIES

10.1 Authorisations, Incidents and Registers

Results of searches for regulated industries are presented in Table 3.

TABLE 3
Authorisations, Incidents and Registers

Regulated Industry	On SITE	Within 250m	DETAILS
Historic IPC Authorisations	None	None	-
Part A(1) and IPPC Authorised Activities	None	None	-
Water Industry Referrals	None	None	-
Records of Red List Discharge Consents	None	None	-
Records of List 1 Dangerous Substances Inventory Sites	None	None	-
Records of List 2 Dangerous Substances Inventory Sites	None	None	-
Records of Part A(2) and Part B activities and enforcements	None	1	30m SE of site. Butterstile Cleaning, 150 Butterstile Lane. Current Permit-Part B. No Enforcements Notified
Records of Category 3 or 4 Radioactive Consents	None	None	-
Records of Licensed Discharge Consents	None	None	-
Records of Planning Hazardous Substance Consents and Enforcements	None	None	-
Records of COMAH and NIHHS sites	None	None	-
Records of National Incidents Recording System List 2	None	None	-
Records of National Incidents Recording System List 1	None	None	-
Records of sites determined as contaminated land under Section 78R of EPA 1990	None	None	-
Records of Worked Ground	None	None	-
Records from EA landfill Data	None	None	-
Records of Operational Landfill Sites	None	None	-
Records of EA historic landfill sites	None	None	-
Records of non operational landfill sites	None	None	-
Records of local authority landfill sites	None	None	-
Records of operational and non operational waste treatment, transfer or disposal sites	None	None	-
Records of EA licensed waste sites	None	None	-
Current Industrial Land Use	None	4	16m NE of site, Mobile P C Doctor. 83m NE, 129m N and 211m W of site. Electricity Sub Station
Petrol and Fuel Sites	None	None	-
Underground High Pressure Oil and Gas Pipelines	None	None	-
Residential Property (within 250m)	No	Yes	Residential properties to the immediate west, south and east of site
Radon Protection Required	No	No	The property is in a Radon Affected Areas as between 1% and 3% of properties are above action level. Radon protection is required according to BR211 by the Building Research Establishment.
Registered as Contaminated Land under Part IIA EPA 1990	No	No	

Results of searches for regulated industries, pollution incidents and registered authorisations are presented in Table 3 above and indicate that the site is unlikely to be affected by current off-site activity. Radon protection is required for new development.



Figure 4 Designated Environmentally Sensitive Sites Maps

10.2 Landfill

The site does not lie within 500m of any landfill sites and the site is not thought to be underlain by made ground which would cause a potential for the presence of methane and carbon dioxide gases to detrimentally affect the site.

11. ENVIRONMENTAL RISK ASSESSMENT

11.1 Introduction

The environmental liabilities of the site and risk assessments have been undertaken for the continued proposed residential use with gardens. If the site use changes then a further risk assessment may be required.

Environmental risk considerations on the site have been assessed by adopting a site specific qualitative approach to identify the risk, if any, of environmental harm. In accordance with the DETR Draft Statutory Guidance on Contaminated Land the approach is by identifying a hazardous source and establishing possible links between the source via exposure pathways to a potential receptor.

The hazard is a contaminant or potentially polluting substance that is in, on or under the land and which has the potential to cause harm or to cause pollution to controlled waters. The receptor is a living organism or organisms, an ecological system or piece of property, which is being harmed, interfered with or polluted by the contaminant. The pollutant linkage is by means of the pathway which is one or more routes by or through which that receptor is being, or could be, exposed to, or affected by, that contaminant. Thus the presence of a hazard on a site does not necessarily mean that there are risks unless pathways and receptors are present and are receptive to being affected by that specific hazard or contaminant.

- SOURCE - release of pollutant - eg. oil spills
- PATHWAY - route to receptor - eg. permeable strata
- RECEPTOR eg. - river

The likelihood of contamination affecting the environment depends on the migration and persistence of contaminants which varies with the nature of the contaminant and the ground and groundwater conditions, and the presence of sensitive receptors.

The following tables (Table 4, 5, 6 and 7) which are extracted from CIRIA C552 'Contaminated Land Risk Assessment – A Guide to Good Practice' have been used to assess the risk to sensitive receptors from site contamination.

Any category which shows as medium risk or above may require investigation and if high risk is proven, remediation may be required following investigation.

TABLE 4
Risk Matrix – Comparison of Consequence and Probability

Risk = Probability x Consequences		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	Very Low Risk

TABLE 5
Classification of Probability

Probability Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

TABLE 6
Classification of Consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem or organisation forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem or organism forming part of such ecosystem, (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects of carbon dioxide
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc). Easily repairable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

TABLE 7
Classification of Risks and Likely Action Required

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

Any category which shows as moderate risk or above may require investigation and possibly subsequent remediation.

11.2 Potential Sources of Contamination

Potential sources of contamination were investigated through archival maps and the Desk Study. The site has been occupied by hard cover and domestic garages.

Based on the past and current usage of the site and its surroundings, possible contamination that may be present on the site could include:

- Organic substances (PAHs, TPHs) and heavy metals from oil and waste fuel from cars
- Asbestos from garage building materials

Due to the hard cover and past use of the site the level of contamination is expected to be low.

11.3 Potential Pathways for Migration

The potential pathways for carrying any contamination present on the site to reach sensitive receptors may include:

a) Ingestion of and/or skin contact with contamination in the soil

Low Likelihood to Likely – Due to the low level of contamination expected and due to the large area of hard cover, there is a restricted potential for ingestion/skin contact with contamination in soil. Where the communal gardens are proposed there is a higher potential and the ground should be checked for contamination and mitigation measures undertaken where necessary. There may be a risk to workmen which may be mitigated by appropriate use of Personal Protective Equipment.

b) Ingestion of contamination and uptake of contamination in plants/vegetables/animals/pets

Low likelihood to Likely – Vegetables and plants may be grown on the site and ingestion of contamination through uptake in plants/vegetables is unlikely to occur due to the low level of contamination expected and the communal use. Soil tests are required to confirm the potential for harm. It is considered that animals in the food chain are unlikely to be present on site.

c) Ingestion of contaminated drinking water through leaching of contamination into groundwater flowing to underlying aquifers/water abstractions

Low Likelihood – Leaching of any contamination could detrimentally affect groundwater present in the sands and gravels and Coal Measures sandstone beneath the site. The site lies on a Secondary (A) Aquifer(superficial deposits). The site is not within a Source Protection Zone and there are no local potable groundwater abstractions within 2000m of site.

d) Inhalation of vapours produced by landfill/radon/hydrocarbons/old mines

Low Likelihood – A thickness of made ground may be present beneath the site. There are no recorded landfill sites within 250m. Low levels of hydrocarbons may be present in the ground from previous land use. The site lies within a radon protection area. There are no recorded shallow mines in the vicinity.

e) Inhalation of contaminated airborne dust

Low Likelihood – The appropriate safety measures must be exercised to protect both the workers and the local residents from dust during any future construction. Provided this work is carried out diligently, the ongoing risk is low. It is particularly important to protect the staff/workmen from any asbestos detected.

f) Contamination of controlled waters

Unlikely – Leaching of contamination from the site into the closest surface water is unlikely due to distance of >400m.

11.4 Potential Sensitive Receptors

Potential Sensitive Receptors to any contamination on the site could include workmen, occupants of house, perched water and the air. Groundwater and surface water and neighbouring land users are unlikely to be detrimentally affected by the site.

11.5 Summary Environmental Risk

By considering where a viable pathway exists which connects a source to a receptor, this assessment will identify where pollutant linkages may exist. If there is no pollutant linkage, then theoretically there is no risk. Therefore only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. On this site there is a low to medium potential for contamination to be present due to its past use as hard cover and domestic garages and the site will be used for the high sensitivity land use scenario of residential houses.

The risk is assessed by the combination of the probability of the risk and the severity of the risk in line with CIRIA recommendations and the risks are presented in Table 8. The risks cannot be fully determined without intrusive ground investigation, monitoring groundwater and testing the soils and groundwater for contamination. If any material is likely to be removed from site for development then Waste Acceptance Criteria Tests will be required to categorise the soils.

TABLE 8
Risk Assessment for a Residential Site Use

Pathways	Receptors	Perceived Risk	Probability of Risk	Consequence of Risk	RISK
Environmental					
Inhalation of vapours such as methane from landfill and hydrocarbons from ground contamination	Existing/future occupants of the houses and workmen.	Methane & Carbon Dioxide from possible infilled land, past site use.	Low Likelihood of methane, high risk of radon	Severe-Methane can be explosive in air. Carbon dioxide can be fatal. Hydrocarbon can have long term health effects. Radon has long term effects on health	Low to Moderate – Landfill not within 250m of site. - monitoring not required. Radon Protection is required
Ingestion of and/or skin contact from contaminated soil	Existing/future occupants of the houses and workmen	Metals, hydrocarbons from car oil/fuel	Low Likelihood to Likely	Mild	Low to Moderate-Risk can be quantified by testing of soil during Phase II
Ingestion of contaminated drinking water	Local abstraction wells	Contamination of potable water	Low likelihood	Medium- prosecution can occur if site is affecting controlled waters	Low - No potable boreholes with 2000m. Low level of contamination anticipated
Transportation by surface and/or groundwater	Groundwater	Contamination of groundwater in the Superficial Deposits	Low Likelihood	Medium- prosecution can occur if site is affecting controlled waters.	Low to Moderate - to groundwater and surface water due to the low level of contamination anticipated, can be quantified by testing of soils and if necessary of groundwater
	Groundwater	Contamination of groundwater in Coal Measures Sandstone	Low Likelihood		
	Surface Water	Contamination of surface water	Unlikely		
Ingestion and uptake of contamination in plants/animals/vegetables.	Future occupants of houses	Ingestion of contamination via home grown produce in communal gardens	Low likelihood to likely	Medium	Low to Moderate– due to low level of contamination anticipated. Garden areas should be tested for contamination
Inhalation of airborne dust	Workmen, occupants of houses, neighbouring users	Dust during any future construction.	Low likelihood	Medium	Low - provided good construction practice on site to limit dust levels during any future construction
Irradiation	Humans	Radon gas	Unlikely	Mild	Low-Radon protection not required in buildings
Geotechnical					
Fire and Explosion	Buildings and humans	Methane gas from made ground	Low likelihood	Severe	Low – No infilled land within 250m,
Settlement or Heave	Buildings	Made ground can be highly compressible.	Low likelihood	Medium	Low. Factors need addressing in foundation design
Landslip	Buildings	Steeply slopped land	Low Likelihood	Severe	Low risk – Level site
Chemical attack	Buildings	Sulphate can, under certain ground and groundwater conditions, attack concrete.	Low likelihood	Medium	Low soil tests can reduce risk to low by appropriate underground concrete design

Groundwater	Buildings	Rising groundwater	Low likelihood	Medium	Low
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The potential sensitive receptors on the site which could be detrimentally affected by any contamination, geotechnical risks are assessed in Table 8.

12. CONCLUSIONS

12.1 Environmental

The site has been occupied by open ground, hard cover and domestic garages 1850 and the risk of contamination existing on the site is low to medium.

Provided the site is hard covered with houses/driveways with no garden/landscaped ground the risk of the contamination detrimentally affecting people using the site is low. Where the communal gardens are proposed the risk is higher and this area should be tested for contamination and any topsoil imported should be tested before placement for heavy metals, PAH, TPH, pH, SO₄ and asbestos. Workmen undertaking any groundworks/ excavation should wear the appropriate PPE for protection from any contamination.

The site may be suitable for soakaways for sustainable storm water drainage due to the permeable sand and gravel superficial deposits and underlying permeable sandstone, provided contamination is not present. Tests to BRE Design should be undertaken to confirm the size and design of the soakaways

12.2. Mining

There is a low risk of shallow or deep mining detrimentally affecting the site.

12.3 Geotechnical

Sand and gravels are suitable foundation strata where they are in a dense state of compaction. The bearing capacity of the strata should be determined by insitu shear strength tests to ensure suitable bearing capacity for the proposed new build. It is likely that strip footings or pad foundations will be suitable for the development or reinforced raft foundations.

Excavations within any made ground or sand and gravels are likely to require temporary support for construction. Depending on the measured groundwater levels, sump pumping may be required to reduce groundwater levels for construction.

Geotechnical tests should be undertaken for pH and sulphate content of the soils to enable design of underground concrete.

13. RECOMMENDATIONS

The report and recommendations have been compiled with the development of the site for residential purposes. There is a low to medium potential for contamination from past site uses.

The site is unlikely to fall within Part 11A determined as contaminated land and is unlikely to be on the local authority 'potentially contaminated land' register.

A ground investigation is recommended in order to quantify the risks of contamination, groundwater levels and to enable geotechnical testing for foundation design for the proposed development.

Such investigation may comprise:

- Window sampler boreholes to assess ground conditions, collect soil samples and install standpipes.
- Water level monitoring of borehole installations – minimum of 3No. return visits.
- Geotechnical testing of made ground and sands and gravels strata for pH and soluble sulphate.
- Chemical testing to determine the presence/extent/depth and severity of any soil and contamination.

Following intrusive ground investigation, soil testing and monitoring, the risks to the proposed development can be better assessed and a remediation strategy put in place where necessary to mitigate any geotechnical or environmental risks and foundations can be designed for the proposed houses. Radon protection is required for the development.

14. GENERAL REMARKS

This report truly reflects the conditions found during the desk study. Whilst the desk study was undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained, and the ground and gas conditions, mining conditions and contamination expected and it is possible that other undetected information and undetected ground and gas conditions, undetected mining conditions and undetected contamination may exist. The desk study was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

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Frances A Bennett
BSc, CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AIEMA, MEnvSci

Appendix **A**





FOR A BETTER POINT OF VIEW

Site Details:

rear of 73 Sandy Lane,
Prestwich, M25 9PS

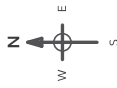
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Report Ref: CMAPS-CM-570498-4873-241016HIS
Grid Ref: 380967, 403001

Map Name: County Series

Map date: 1893

Scale: 1:2,500

Printed at: 1:2,500



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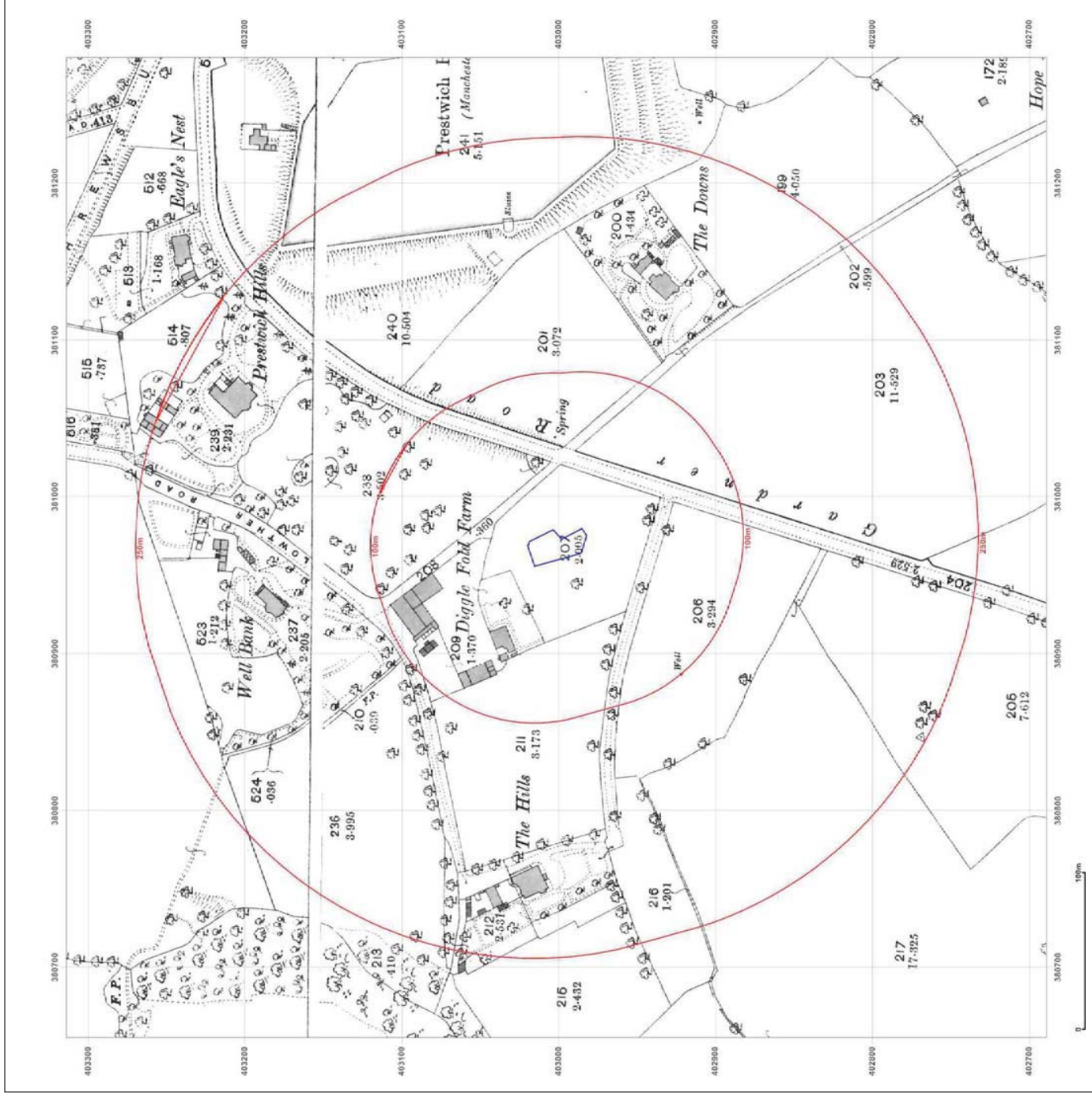


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FOR A BETTER POINT OF VIEW

Site Details:

rear of 73 Sandy Lane,
Prestwich, M25 9PS

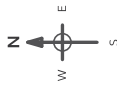
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Grid Ref: 380967, 403001

Map Name: County Series

Map date: 1909

Scale: 1:2,500

Printed at: 1:2,500



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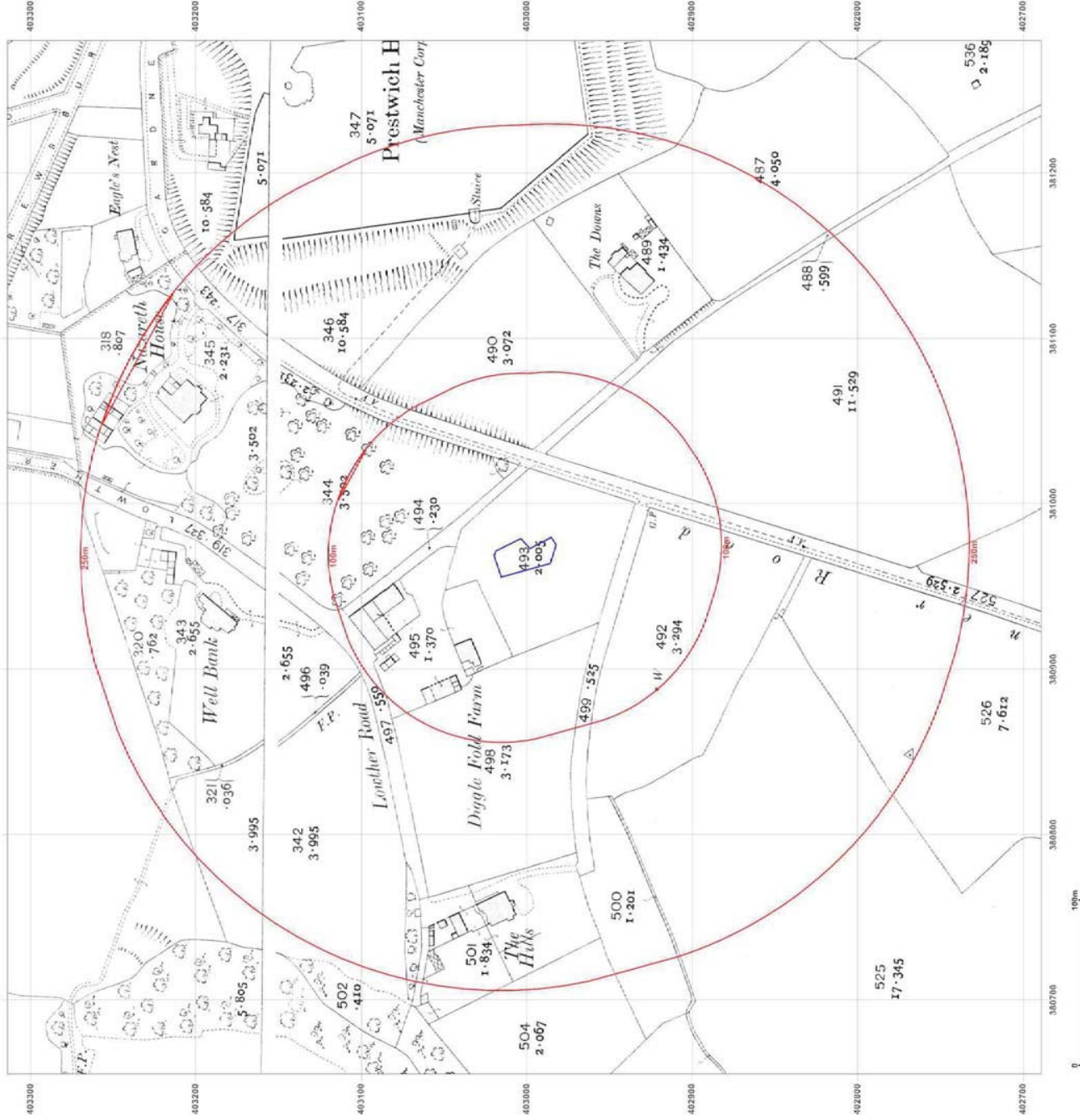


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Site Details:

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Client Ref: 4873
Report Ref: CMAPS-CM-570498-4873-241016HIS
Grid Ref: 380967, 403001

Map Name: County Series

Map date: 1922

Scale: 1:2,500

Printed at: 1:2,500



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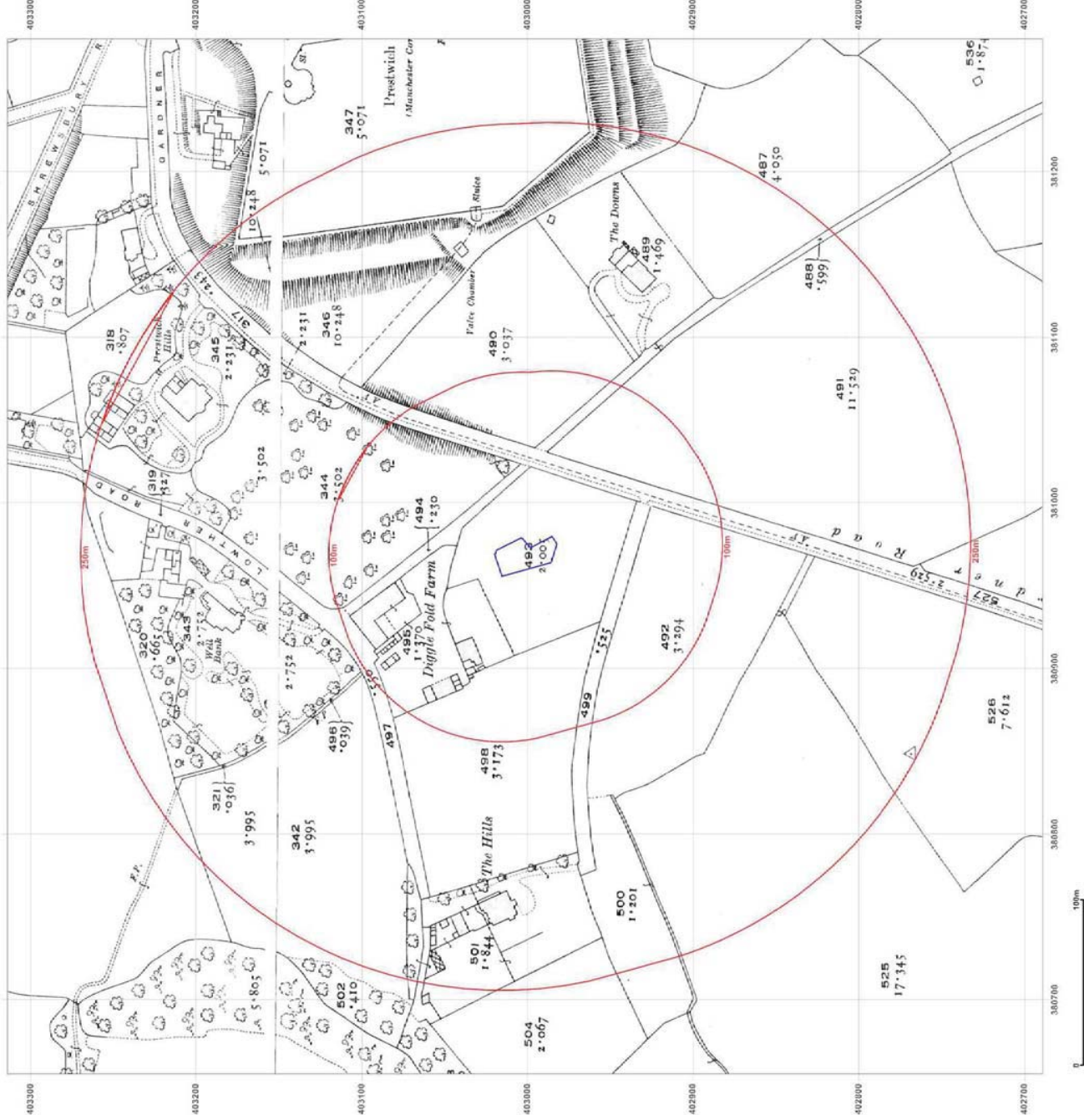


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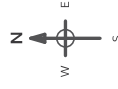
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Map Name: County Series

Map date: 1932

Scale: 1:2,500

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