Haigh Huddleston & Associates
Civil Structural Engineering Consultants

Firth Buildings, 99-101 Leeds Road, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

Phase 1
Geo-environmental Report

FOR

PROPOSED RESIDENTIAL DEVELOPMENT

AT

WEST STREET, WORSBOROUGH
BARNSLEY, SOUTH YORKSHIRE

FOR

THE EBOR SIPP re RGM ODDIE,
c/o WALKER CIPPS

AUGUST 2013

E13/5820/R001

Prepared by

M.Huddleston MEng

Haigh Huddleston Associates is the trading name of Haigh Huddleston Associates Limited
Registered Office: Firth Buildings, 99-101 Leeds Road, Dewsbury, WF12 7BU
Registered in England Number 6458196

1.0 INTRODUCTION

1.1 This report is commissioned to examine the risk of contamination for the above site in line with the recommendations of Part II of the Environmental Protection Act 1990 PPS 23. It is based on information provided by both the client and statutory bodies in both written and verbal format. It is assumed that all information given is correct and factual at the time of writing this report. No liabilities can be accepted for information provided by third parties and subsequently found to be in error.

2.0 THE SITE

2.1 The site is located at West Street, Worsbrough, Barnsley South Yorkshire and is situated around Ordnance Survey grid reference SE 35846 03689. A site location plan is included in Appendix A

2.2 The site is approximately triangular, with the long northern edge formed by West Street. A dismantled railway runs along the southern boundary. There are residential developments to the north east, north and west. To the east there is further industrial development and to the south is open field and the River Dove. The site area is approximately 2ha.

2.3 Access to the site is directly from West Street in the north west and north east of the site. The accesses lead directly onto concrete highway that runs throughout the site connecting the various industrial units and parking areas which make up the majority of the site. The remainder of the site is made up of compacted made ground and overgrown areas, with dense vegetation noted adjacent the northern, western and southern boundaries.

2.4 The site generally falls from north to south, with a high point of approximately 60m AOD in the north east corner of the site and a low point of approximately 53m AOD in the south east of the site.

2.5 The site is bounded to the west, east and south by a post and wire fence. The northern boundary is formed by a stone wall which has openings for vehicular access to West Street in the north west and north east.

3.0 SITE HISTORY

A number of historical Ordnance Survey plans from 1850-2012 have been consulted. These are contained for reference within Appendix C to the rear of the report. Below is a brief description outlining the significant developments that may effect future construction of the site.

Date	Historical uses on site	Historical findings within 100m perimeter of the site	Historical findings further than 100m perimeter of the site
1850	i). Coal pit labelled in western third of the site. ii). Dearne and Dove canal shown on site running alongside southern boundary with two docks extending northwards.	i) Chemical works immediately to the east of the site. ii).Wells located immediately to the east of the site and 100m to the east. iii). Railway line running east-west immediately to the south of the site. iv). River Dove located to the south of the railway. v). Northern boundary formed by Caulker Lane.	i). Glass works 150m to the west. ii). Foundry 200m to the west. iii). Darley Main Colliery 200m to the north of the site. iv). Sandstone Quarry 200m to the north east of the site.
1890-1892	i). Buildings for Dearne and Dove saw mills shown in south eastern quarter of the site. ii). Coal pit no longer labelled in west of site. iii). Terraced buildings shown along eastern half of northern boundary.	i). Wells no longer shown to the east. ii). Reservoir immediately to the east of the site. iii). Residential development 100m to the north east of the site.	i). Darley Main Colliery no longer labelled to the north. ii) Sandstone quarry no longer labelled to the north east.
1903-1906	i). Western half of site labelled as Timber Yard.	i). Residential development immediately to the north west.	i). Glass Works 150m to the west now labelled as Steel Works. ii). Air shaft shown 200m to the north west of the site.
1929	i). Saw Mills extended into western half of site.	i). Two schools constructed immediately to the north of the site.	i). Works no longer labelled to the west of the site.
1938	i). The on-site features are similar to the previous sheet.	i). The features within 100m of the site are similar to the previous sheet.	i). No significant developments further than 100m from the site.
1948-1951	i). The on-site features are similar to the previous sheet.	i). Residential development to the north west of the site.	i). Residential development extends over air shaft 200m to the north west.
1960-1966	i). Dearne and Dove Canal now shown as area of marsh in southern quarter of site.	i). Chemical works and reservoir no longer shown to the east of the site.	i). Works labelled 200m to the south east. ii). Colliery works extending to within 450m south of site.

Date	Historical uses on site	Historical findings within 100m perimeter of the site	Historical findings further than 100m perimeter of the site
1967-1971	i). Saw Mills now labelled as Engineering Works. ii). Depot shown to west of Engineering Works. iii). Marsh no longer shown in south of site.	i). Battery Works shown immediately to the east of the site.	i). No significant developments further than 100m from the site
1977	i). The on-site features are similar to the previous sheet.	i). The features within 100m of the site are similar to the previous sheet.	i). Colliery works extended to within 250m of the south east of the site. ii). Sewage Works 400m to the south east.
1987-1993	i). Engineering works reconfigured on site.	i). Railway line to south of site dismantled.	i). Colliery works 250m to south east of site now labelled as disused tip.
2002	i). The on-site features are similar to the previous sheet.	i). Factory shown immediately to the south east of the site.	i). No significant developments further than 100m from the site.
2012	i). The on-site features are similar to the previous sheet.	i). The features within 100m of the site are similar to the previous sheet.	i). The features further than 100m from the site are similar to the previous sheet.

4.0 SITE GEOLOGY & MINING

4.1 The BGS Digital Geological Map of Great Britain at 1:50,000 scale has been consulted and we would report as follows:-

4.2 The southern half of the site is shown as being undivided made ground, this is believed to be from the infilling of the former Dearne and Dove Canal and docks.

4.3 The majority of the site is shown to be underlain by Kent's Rock consisting of sandstone. The north east and south west corners of the site are underlain by the Pennine Middle Coal Measures Formation consisting of mudstone, siltstone and sandstone.

4.4 An inferred coal seam is shown crossing the site from the north west to the south east.

4.5 A fault line is shown crossing the south eastern corner of the site, running from south west to north east.

4.6 A Coal Authority report has been obtained and is included in Appendix B. The reports states that the property is in the likely zone of influence from workings in 12 seams of coal at 50m to 470m depth, and last worked in 1969. Any ground movement from these coal workings should have stopped by now.

4.7 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.

4.8 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.

4.8 There is a mine shaft shown in the western third of the site. It is recorded as being unfilled but covered. The approximate location of the mine shaft has been shown on the survey in Appendix A.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 Radon

The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level.

No Radon Protective Measures are necessary.

5.2 Landfill Sites

There is a single recorded historical landfill site within 250m of the site. This is located 65m to the north of the site, and the type of waste accepted is not recorded.

However, there are four recorded pollution incidents to land 90m south of the site. All four of them are category 3 (minor) incidents. The materials involved are described as asbestos, construction and demolition materials and other.

Finally, the canals and dry docks in the southern half of the site have been historically infilled with unknown material.

5.3 Flood Risk

The site does not lie within a currently designated Environment Agency flood zone.

The Flood Risk Assessment states that the site is not at risk of flooding from river or tidal water up to a 1% return period nor is it at risk for storms in excess of the 0.1% risk level.

Soakaways are thought to be an unlikely method of surface water dispersal due to likely infiltration capacity of the underlying strata. A discharge rate is to be agreed with the relevant authorities and storm water attenuation provided on site to ensure there is no increased flood risk to properties downstream of the development.

5.4 Groundwater

The bedrock underlying the site is classified as a Secondary (A) Aquifer. These are 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.

There are no groundwater abstraction licences recorded within 250m of the site.

There are seven recorded licensed discharge consents within 250m of the site. They are located 93m, 100m, 108m, 185m and 185m to the south east, 105m to the south and 157m to the north east. All but the discharge 100m to the south east are recorded as discharging into the River Dove.

There are no recorded surface water abstractions within 250m of the site.

There are no recorded pollution incidents in controlled waters within 250m of the site.

The site is not in a source protection zone.

The nearest open surface water feature is the River Dove located 82m to the south of the site. This is classified as a primary river.

A watercourse/drain serving Worsbrough Dale crosses the site from north to south, before discharging into the River Dove to the south. This has been shown on the site survey in Appendix A.

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

6.1 The initial stage in assessing the risks posed from contaminated land during the redevelopment of a site is to prepare a conceptual model. A generalised conceptual model can be developed highlighting the main pollutant linkages through a contaminant ► pathway ►receptor model for a residential development. In order to prepare the conceptual model for a particular site the following parameters need to be reviewed as discussed below.

6.2 Contamination of existing land can be caused by a number of factors, including:-

i) Possible historical/current industrial activities.
ii) Disposal of waste materials.
iii) Storage of materials.
iv) A number of natural processes can also lead to hazardous gases and elevated heavy metals.

6.3 Potential pathways can include ground and surface water, permeable strata, existing services providing a conduit and voided ground. Potential receptors can include human health, ecosystems, controlled waters and building structures. There are a number of ways that a receptor can be exposed to the contaminant these include, inhalation, direct contact, ingestion, dermal contact and uptake.

6.4 Sources of potential contamination, that could affect the proposed development, from either on of off site activities would include the following:-

i) Possible ground contamination from industrial usage of site.
ii) Possible ground gas migration from historical mine workings and histocial landfill recorded 65m to the north east.
iii) Possible ground gases from made ground in southern half of the site.
iv) Possible contaminants in the backfill material to the former canal and docks within the southern half of the site.
v) Possibility of PCBs from the electric substations on site.

Based on the above activities the potential for some contamination to exist on site is considered to be moderate.

6.5 Considering the proposed residential end use, there will be two possible human receptor groups exposed to the existing onsite contamination:-

a) Site operatives during development.
b) End users, future site residents (the critical receptor is 0-6year-old child).

6.6 Human receptors may be exposed to site contamination by a number of possible pathways. These pathways are summarised in Table 1 below.

Table 1- Potential Human Exposure Pathways

Human Exposure Pathway	Site Residents	Construction Workers
Soil Ingestion	YES	YES
Consumption of Home Grown Vegetables	YES	NO
Dermal Contact	YES	YES
Dust Inhalation	YES	YES
Gases/Vapours	YES	NO

6.7 The construction workers will come into contact with any contaminated soil to a far greater extent than future residents. The exposure pathways are generally through dermal contact and indirect ingestion. However their exposure will be for a limited time and the provision and correct use of personnel protective equipment and adequate welfare facilities during construction should restrict their risks to acceptable levels

6.8 The risk of pollution to controlled waters by existing contamination is considered low. The site is underlain by strata that are classified as a Secondary (A) aquifers. There have been no recorded historical incidents of pollution to controlled waters by the current industrial usage of the site. There are no licensed ground water abstractions within 250m of the development.

6.9 No specific areas of ecological importance have been identified in the initial desk top study. Therefore the site is considered to be in a low risk environmental setting. The potential for phototoxic materials to exist at shallow depth should be considered, these could pose a potential risk to new planting and soft landscaping areas within the proposed development.

6.10 The proposed planning drawings indicate residential properties to be constructed. The presence of elevated sulphates and hydrocarbons could affect the long term integrity of buried concrete structures, including foundations and drainage pipes. Plastic water supply pipes can also be damaged by the presence of hydrocarbon contamination.

7.0 CONCLUSIONS

7.1 There has been historical and current industrial development both on and adjacent the site. The surrounding land is a mixture of residential, industrial and open land. There is a mineshaft recorded beneath the existing industrial unit in the west of the site, and a former canal and docks backfilled in the south of the site. We therefore believe the site has a moderate risk of ground contamination being present.

7.2 We would recommend that a detailed Phase II Ground Investigation is undertaken. This will enable the underlying strata to be confirmed and foundations for the new development to be specified. In addition to this, the exact location and treatment to the mineshaft recorded on site and depth and extents of backfill to the former canal and dry docks should be determined.

7.3 Trial pits and soil sampling should be undertaken across the site to confirm the presence of any contaminants within any made ground on site. Care should be taken to avoid known features such as existing live services and the culvert crossing the site.

7.4 In addition to this, we would propose that a minimum of two days of initial bore hole investigation should be undertaken on site to confirm the depth and presence of any shallow mine workings. However, it is possible that there will be a requirement to proof drill on a plot by plot basis. For investigative works disturbing Coal Authority mining interests, permission will be required from the Coal Authority.

7.5 There is also a risk of ground gas migration from backfill material to the former canal and docks located in the south of the site, the historical landfill 65m to the north east and the former shallow mine workings. We would propose that in this instance gas monitoring is undertaken.

7.6 Soil samples from any made ground present or areas showing visual/olfactory signs of contamination should be taken for contamination testing for the normal ICRCL, BTEX, asbestos and total TPH in the parking areas. In the vicinity of the existing electric substations, samples should also be submitted for PCB analysis. If any contamination is found, a site remediation report should outline the most effective method of dealing with the contamination and any validation requirements.

7.7 To summarise, we would recommend the following is required as part of the detailed Phase 2 site investigation:

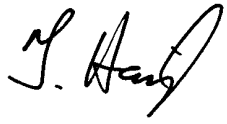
- Permission sought from Coal Authority to enter or disturb Coal Authority Mining Interests.
- Demolition of existing buildings to enable existing mineshaft on site to be located.
- Rotary borehole investigation to confirm presence of shallow mine workings beneath the site.
- Gas monitoring stations to be installed within rotary boreholes to monitor for ground gases.
- Trial pitting to determine underlying soil strata and extents of infilled canal and dry docks on site.
- Samples of made ground and natural strata to be tested for ICRCL, asbestos, BTEX. Underneath parking areas samples should also be tested for TPH (Total). In the vicinity of the electric substations, samples should be tested for PCBs.
- Clay samples to be submitted for geotechnical analysis to determine the volume change potential.
- Possible water level management required during investigations.

Prepared by



M. Huddleston. MEng

Checked by



T. Haigh. BSc.,C.Eng.M.I.C.E.

August 2013

This report is subject to the provisions of the Copyright Acts and is for the sole benefit of The Ebor Sipp in respect of the proposals described.

APPENDIX A

LOCATION PLAN

SITE SURVEY



OS GRID REFERENCE 435900, 403650

Haigh Huddleston & Associates

Civil Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662

e trevor.haigh@haighhuddleston.co.uk

Client	J R Paley Associates
Project	West Street, Worsborough
Detail	Site Location Plan

Scale	Dwn	Chkd	Date	Dwg No.
1:1250	MD		May '13	E13/5820/01

N403700

N403680

N403660

N403640

N403620

West Street

APPROXIMATE LOCATION OF EXISTING WATERCOURSE DRAINING TO THE RIVER DOVE

APPROXIMATE LOCATION OF MINE SHAFT

APPROXIMATE EXTENTS OF FORMER DRY DOCK

APPROXIMATE EXTENTS OF FORMER CANAL

TO RIVER DOVE

CHEMICAL WORKS

Haigh Huddleston & Associates

Civil Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Rd, Dewsbury. WF12 7BU t 01924 464342 f 01924 450662

e trevor.haigh@haighhuddleston.co.uk

Client	J R Paley Associates
Project	West Street, Worsborough
Detail	Site Features Plan

Scale	Dwn	Chkd	Date	Dwg No.
1:500	MD		Aug '13	E13/5820/02

APPENDIX B

MINING REPORT

GEOLOGICAL REPORT

The COAL AUTHORITY

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

HAIGH HUDDLESTON & ASSOCIATES
99-101 LEEDS ROAD
DEWSBURY
WEST YORKSHIRE
WF12 7BU

Our reference:	**51000285477001**
Your reference:	**PALEYS 5820**
Date of your enquiry:	**01 May 2013**
Date we received your enquiry:	**01 May 2013**
Date of issue:	**01 May 2013**

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

Non-Residential Coal Authority Mining Report

WEST STREET, WORSBROUGH, BARNSLEY, SOUTH YORKSHIRE, S70

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 12 seams of coal at 50m to 470m depth, and last worked in 1969.

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

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.

Present

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

Future

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

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

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

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

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

Mine entries

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Within, or within 20 metres of, the boundary of the property there is 1 mine entry, the approximate position of which is shown on the attached plan.

Our records disclose the following information:

435403-004. is unfilled but covered.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie. for development sites and new build).

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

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

Opencast coal mining

Past

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

Present

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

Future

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

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.

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

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

Mine gas

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

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

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

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

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Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

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

Comments on Coal Authority information

The attached plan shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and the obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by telephoning 0845 762 6848 or online at www.coal.decc.gov.uk/en/coal/cms/services/claims.

If you wish to discuss the relevance of any of the information contained in this report you should seek the advice of a qualified mining engineer or surveyor. If you or your adviser wish to examine the source plans from which the information has been taken these are normally available at our Mansfield office, free of charge, by prior appointment, telephone 01623 637235. Should you or your adviser wish to carry out any physical investigations that may enter, disturb or interfere with any disused mine entry the prior permission of the owner must be sought. For coal mine entries the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

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.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

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Additional Remarks

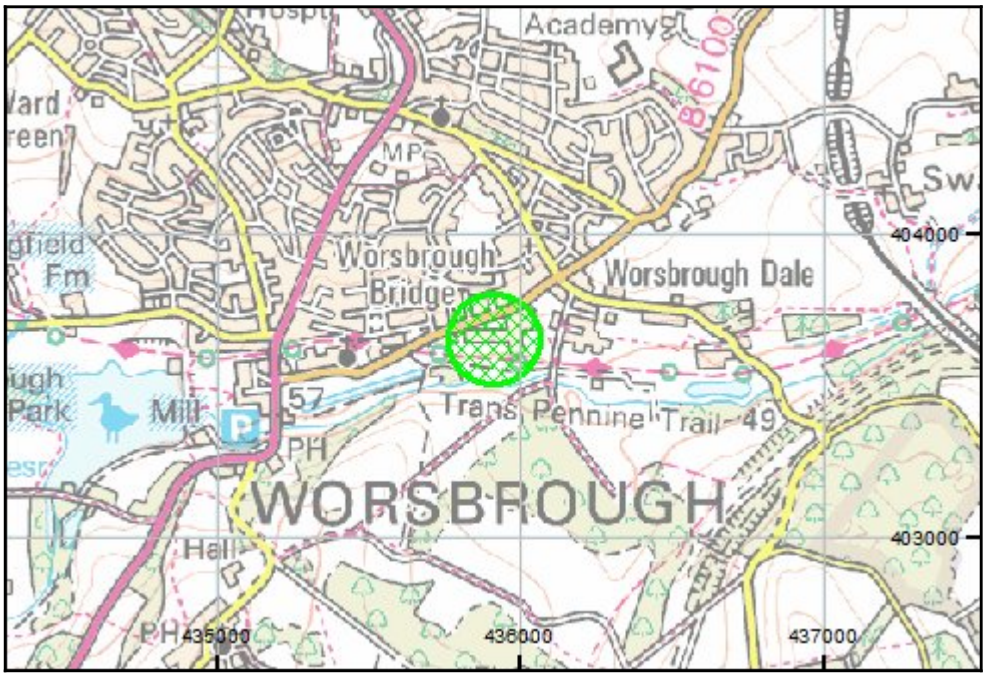
This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006.

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Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	01 May 2013
Issued to:	HAIGH HUDDLESTON & ASSOCIATES 99-101 LEEDS ROAD DEWSBURY WEST YORKSHIRE WF12 7BU
Property Search for:	WEST STREET, WORSBROUGH, BARNSLEY, SOUTH YORKSHIRE, S70
Reference Number:	51000285477001
Date of Issue:	01 May 2013
Cost:	£59.00
VAT @ 20%:	£11.80
Total Received:	£70.80
VAT Registration	598 5850 68

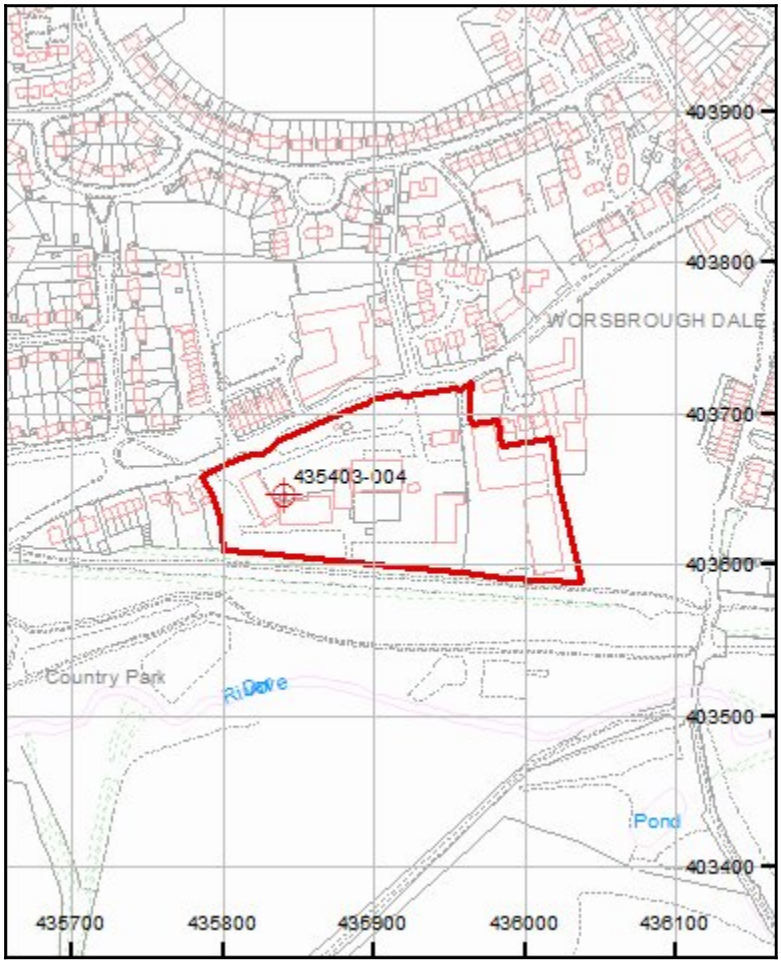
Location map

Approximate position of property



Enquiry boundary

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Key

Approximate position of enquiry boundary shown

Disused Adit or Mineshaft

Mapping sourced from Ordnance Survey

Haigh Huddleston & Associates
99-101, Leeds Road,
Dewsbury, WF12 7BU

GroundSure Reference:	GS-772220
Your Reference:	5820
Report Date	1 May 2013
Report Delivery Method:	Email - pdf

GroundSure GeoInsight

Address: LAND ADJACENT TO 7-9 WEST STREET,WORSBROUGH,BARNSLEY, S70 5PF

Dear Sir/Madam,

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

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

Yours faithfully,

Managing Director
Groundsure Limited

Enc.
GroundSure GeoInsight

GroundSure GeoInsight

Address: LAND ADJACENT TO 7-9 WEST STREET,WORSBROUGH,BARNSLEY, S70 5PF

Date: 1 May 2013

GroundSure Reference: GS-772220

Your Reference: 5820



Brought to you by GroundSure

Aerial Photograph of Study Site

NW N NE



W E

SW S SE

Aerial photography supplied by Getmapping PLC.
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Site Name: LAND ADJACENT TO 7-9 WEST STREET,WORSBROUGH,BARNSLEY, S70 5PF
Grid Reference: 435874,403647
Size of Site: 2.17 ha

Overview of Findings

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

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

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

Report Section	Number of records found within (X) m of the study site boundary
1. Geology	**Description**
1.1 Artificial Ground,	
1.1.1 Is there any Artificial Ground /Made Ground present beneath the study site?*	Yes
1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	Yes
1.2 Superficial Geology & Landslips	
1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
1.2.2 Are there any records relating to permeability of superficial geology within the study site* boundary?	Yes
1.2.3 Are there any records of landslip within 500m of the study site boundary?	Yes
1.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No
1.3 Bedrock, Solid Geology & Faults	
1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
1.3.2 Are there any records relating to permeability of bedrock within the study site* boundary?	Yes
1.3.3 Are there any records of faults within 500m of the study site boundary?	Yes
1.3.4 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level
1.3.5 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

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

Source:Scale 1:50,000 BGS Sheet No:087

2. Ground Workings	on-site	0-50	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	5	8	39	-	-
2.2 Historical Underground Workings Features from Small Scale Mapping	0	0	1	2	15
2.3 Current Ground Workings	0	0	0	4	9

3. Mining, Extraction & Natural Cavities	on-site	0-50	51-250	251-500	501-1000
3.1 Historical Mining	0	0	1	2	15
3.2 Coal Mining	1	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
3.4 Non-Coal Mining*	1	0	2	1	3
3.5 Non–Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

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

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

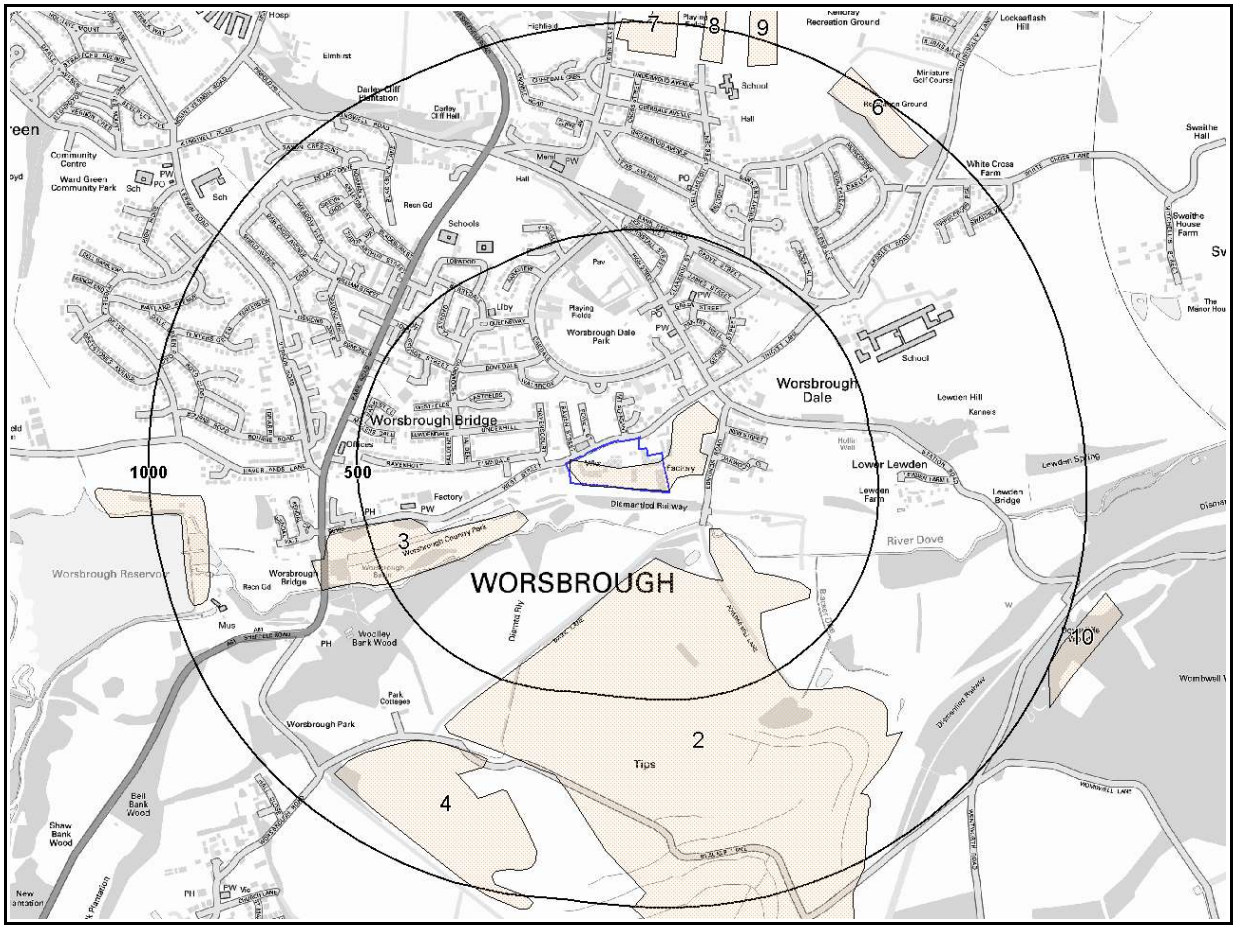
* This includes an automatically generated 50m buffer zone around the site

5. Borehole Records	on-site	0-50	51-250	251-500	501-1000
5.1 BGS Recorded Boreholes	0	0	18	-	-

6. Estimated Background Soil Chemistry	on-site	0-50	51-250	251-500	501-1000
6.1 Records of Background Soil Chemistry	4	4	0	-	-

1.1 Artificial Ground Map

NW N NE



W E

SW S SE

Artificial Ground Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Disturbed Ground (undivided)

Worked Ground (undivided)

Landscaped Ground (undivided)

Infilled Ground

Reclaimed Ground

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

1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:087

1.1.1 Artificial/Made Ground

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

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
2	128.0	SE	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	136.0	SW	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

1.1.2 Permeability of Artificial Ground

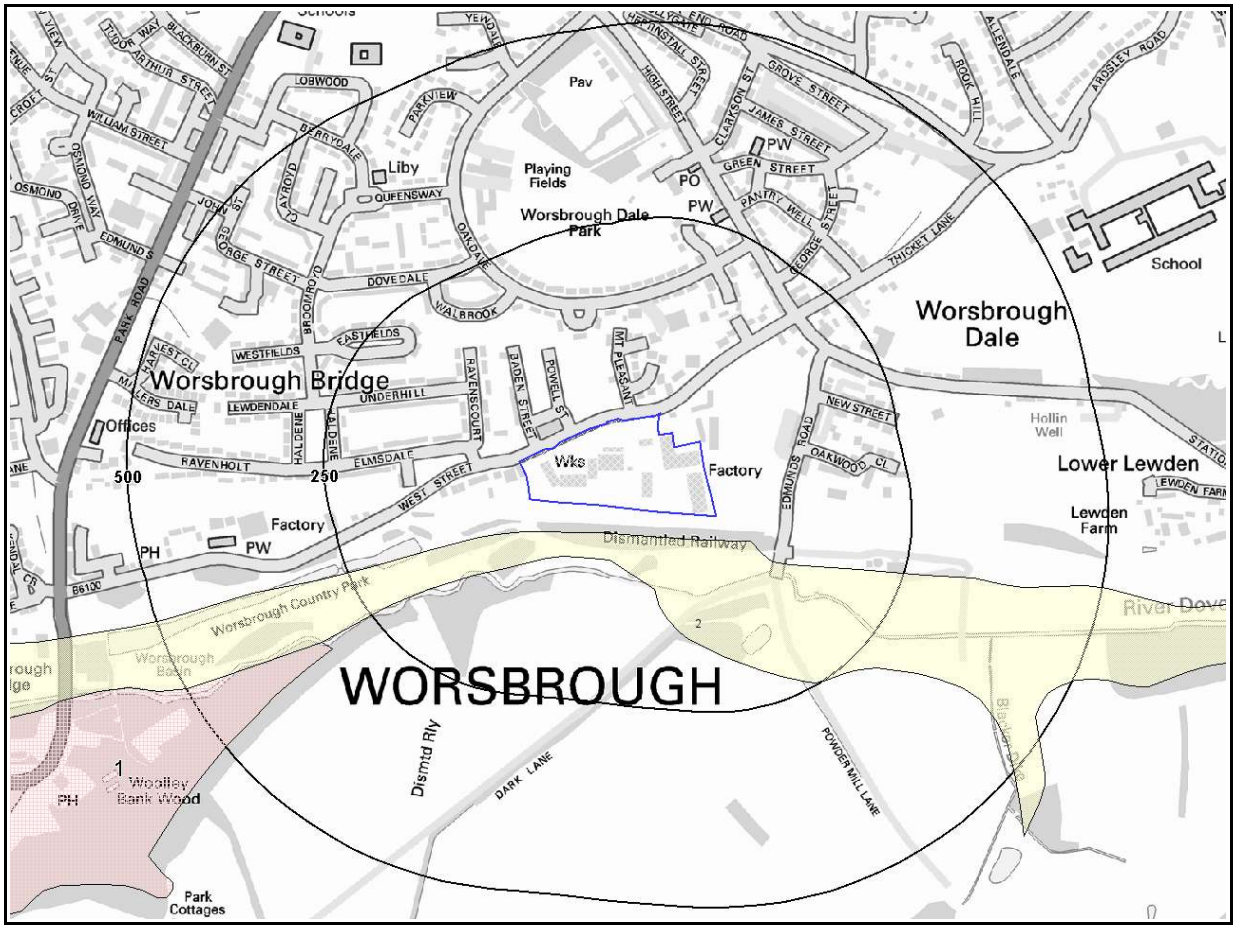
Are there any records relating to permeability of artificial ground within the study site* boundary? Yes

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

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

1.2 Superficial Deposits and Landslips Map

NW N NE



W E

SW S SE

Superficial and Landslips Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000

Search Buffers (m)

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

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/Drift Geology

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

ID	Distance (m)	Direction	Lex Code	Description	Rock Description
2	30.0	S	ALV-CLSI	ALLUVIUM	CLAY AND SILT

1.2.2 Permeability of Superficial Ground

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

Distance (m)	Direction	Flow type	Maximum Permeability	Minimum Permeability
30.0	S	Intergranular	Low	Very Low

1.2.3 Landslip

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

ID	Distance (m)	Direction	Lex Code	Description	Rock Description
1	316.0	SW	SLIP-UNKN	LANDSLIDE DEPOSITS	UNKNOWN/UNCLASSIFIED ENTRY

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

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

1.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

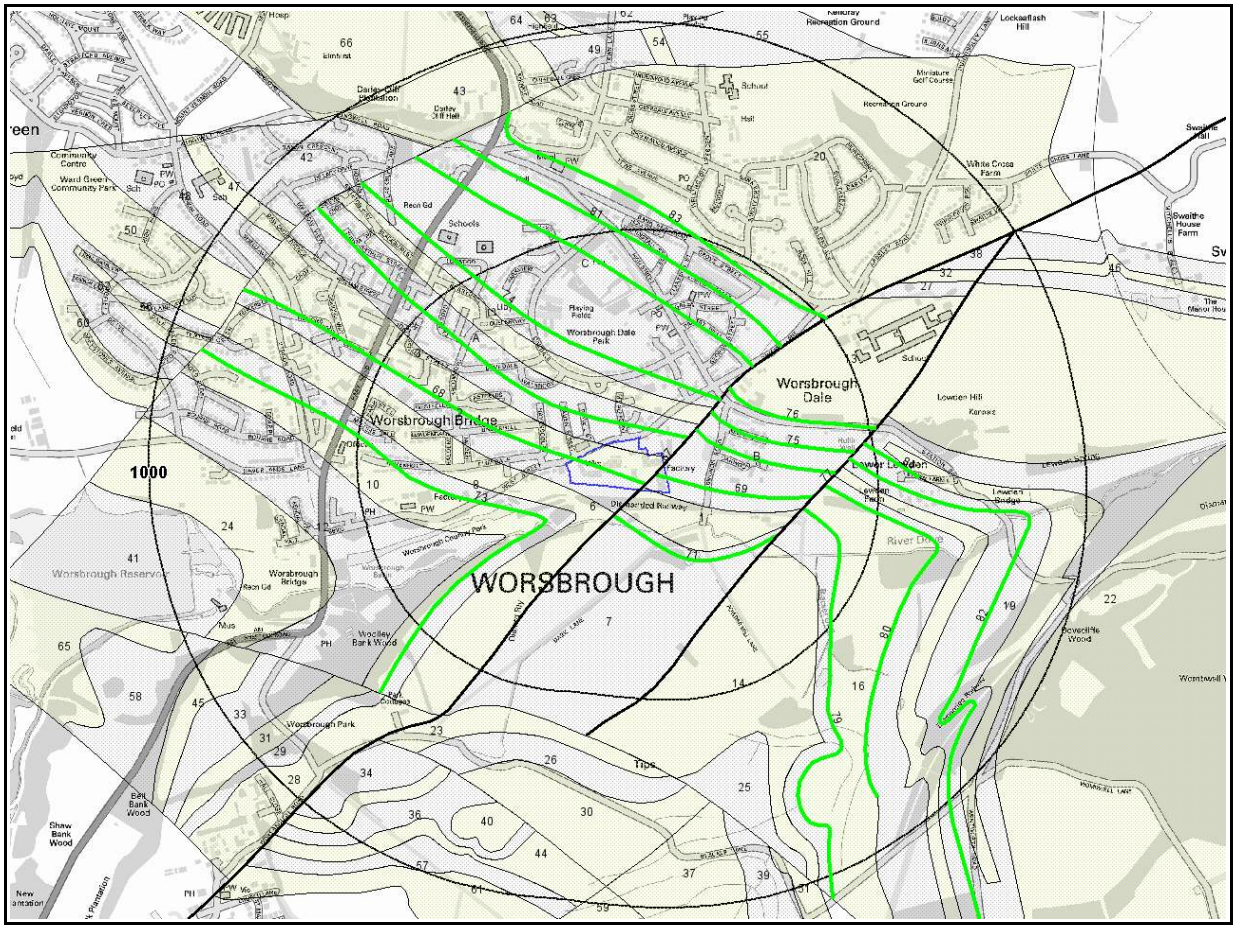
*This includes an automatically generated 50m buffer zone around the site.

1.3 Bedrock and Faults Map

NW N NE

W E

SW S SE



Bedrock & Faults Deposits Legend

Mapping sourced from Ordnance Survey

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Site Outline

500
1000
Search Buffers (m)

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

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:087

1.3.1 Bedrock/Solid Geology

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

ID	Distance (m)	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
2	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
3	0.0	On Site	KNR-SDST	Kent's Rock - Sandstone	Duckmantian (westphalian B)
4B	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
5A	0.0	On Site	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
6	13.0	SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
7	51.0	S	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
8	64.0	S	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
9	65.0	N	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
10	107.0	SW	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
11 C	108.0	N	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
12	203.0	SW	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
13	223.0	NE	WE-SDST	Woolley Edge Rock - Sandstone	Duckmantian (westphalian B)
14	262.0	SE	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
15	271.0	SE	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
16	320.0	E	KNR-SDST	Kent's Rock - Sandstone	Duckmantian (westphalian B)
17	370.0	E	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
18	394.0	E	PMCM-SDST	Pennine Middle Coal Measures Formation - Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
19	417.0	E	PMCM-MDSS	Pennine Middle Coal Measures Formation - Mudstone, Siltstone And Sandstone	Bolsovian (westphalian C) / Duckmantian (westphalian B)
20	472.0	NE	WE-SDST	Woolley Edge Rock - Sandstone	Duckmantian (westphalian B)

1.3.2 Permeability of Bedrock Ground

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

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

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

1.3.3 Faults

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

ID	Distance (m)	Direction	Category Description	Feature Description
67	0.0	On Site	FAULT	Normal fault, inferred
68	0.0	On Site	ROCK	Coal seam, inferred
69	0.0	On Site	ROCK	Coal seam, inferred
70 A	22.0	N	ROCK	Coal seam, inferred
71	67.0	S	ROCK	Coal seam, inferred
72 B	100.0	NE	ROCK	Coal seam, inferred
73	107.0	SW	ROCK	Coal seam, inferred
74	151.0	N	ROCK	Coal seam, inferred
75	156.0	NE	ROCK	Coal seam, inferred
76	223.0	NE	ROCK	Coal seam, inferred
77	262.0	SE	FAULT	Normal fault, inferred
78 C	302.0	NE	ROCK	Coal seam, inferred
79	320.0	E	ROCK	Coal seam, inferred
80	370.0	E	ROCK	Coal seam, inferred
81	384.0	NE	ROCK	Coal seam, inferred
82	438.0	E	ROCK	Coal seam, inferred
83	472.0	NE	ROCK	Coal seam, inferred
84	478.0	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 nationwide coverage.

1.3.4 Radon Affected Areas

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

The property is in a Radon Affected Area, as between 1 and 3% of properties are above the Action Level

1.3.5 Radon Protection

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

No radon protective measures are necessary