



Redrow Homes Limited

Land at Stakehill, Rochdale

Coal Mining Risk Assessment

Report No. 322974-R02 (00)

RSK GENERAL NOTES

Project No.: Report No. 322974-R02 (00)

Title: Coal Mining Risk Assessment : Land at Stakehill, Rochdale

Client: Redrow Homes Limited

Date: September 2022

Office: RSK Environment Limited, Spring Lodge, 172 Chester Road, Helsby, Chester, WA6 0AR. Tel 01928 726006

Status: Rev 00

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Revision control sheet				
Revision ref.	Date	Reason for revision	Amended by:	Approved by:
Rev Version No		First issue	n/a	see above

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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EXECUTIVE SUMMARY

Commissioning and purpose of assessment	RSK Environment Limited (RSK) was commissioned by Redrow Homes Ltd to carry out a coal mining risk assessment of the land at Stakehill, Rochdale, M24 2SB, grid reference 389096, 409377. The overall aim of the project was to assess any constraints to the proposed residential development associated with underground coal mining activities in the area.
DESK-BASED ASSESSMENT	
Site description and proposed development	The site currently comprises agricultural land, occupies an area of approximately 89 hectares and is being considered for development for residential use.
History of site and surrounding area	The site was formerly used for agricultural and sand and gravel extraction. Potential sources of contamination identified on-site comprise a small known inert landfill and potentially backfilled former ponds and sand and gravel extraction excavations. No significant potentially contaminative current activities have been identified in the immediate surrounding area that could affect the site.
Previous site investigation (SI) reports	There are no previous ground investigation reports available.
Geology and environmental setting	The site is underlain by superficial glacial till and undifferentiated fluvioglacial deposits over Pennine Lower Coal Measures Formation according to published geological data. There is also likely to be made ground associated with former sand and gravel extraction and demolished former agricultural and domestic dwellings. The superficial deposits are expected to be in the order of 80m thick and consequently the likelihood of the site being influenced by underground coal mining is considered to be extremely low.
Recommendations including issues for further assessment	There are no recommendations to be made for further assessment of the site with regards to underground coal mining activities.
<i>The information given in this summary is necessarily incomplete and is provided for initial briefing purposes only. The summary must not be used as a substitute for the full text of the report.</i>	

1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Redrow Housing Limited to carry out a coal mining risk assessment report of the land at Stakehill, Rochdale, M24 2SB, at National Grid reference 389096, 409377. The project was carried out to an agreed brief as set out in RSK's proposal (Ref. 322974L01, dated 24 March 2022).

RSK's service constraints are shown in Appendix A.

The site in question is being considered for development for residential use.

1.2 Background and objectives

The site is located over Coal Measures bedrock and may therefore have been affected by coal mining activities. In these areas the assessment of mining legacy issues should be carried out in accordance with the guidance provided by the Coal Authority, who adopt a risk-based approach for the advice that they offer on proposed development sites. The Coal Authority are a statutory consultee to Local Planning Authorities in respect of building development within the defined Development High Risk Areas on the coalfield areas of England, Wales and Scotland where a planning application is required.

A review of the information provided on the Coal Authority Interactive Viewer of the UK coalfield areas has been carried out and this indicates the site lies within the Coal Authority Coal Mining Reporting Area and includes Development High Risk Areas. It is a requirement within High Risk Areas to assess coal mining legacy risks by preparation of a desk-based Coal Mining Risk Assessment (CMRA) report to support planning applications for new building developments.

A CMRA needs to consider a number of sources of information to determine potential coal mining issues that may be relevant to a site, it then needs to identify and assess the site-specific coal mining risks and propose an appropriate mitigation strategy (if required) relevant for the proposed site end-use.

The present report presents a CMRA for the subject site and the objective of the work is to identify and assess potential coal mining legacy issues which might influence residential development of the site and outline any required mitigation measures. It follows the approach to assessment outlined by the Coal Authority and is compliant with their requirements.

A preliminary risk assessment (PRA) in respect to potential ground contamination issues has been produced by RSK and is reported under separate cover.

1.3 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report and it is also compliant with relevant planning policy and guidance.

The scope of works for the assessment has included the following:

- assessment of local geology, hydrogeology and hydrology
- assessment of the potential risks from past, present and future coal mining activities
- review of any previous site investigation reports made available
- preliminary consideration of geotechnical constraints and hazards
- identification of the need for further action, e.g. intrusive investigations, if any.

1.4 Existing reports

The following reports detailing previous works at the site were made available for review:

- REC Ltd, Phase I Geo-Environmental Site Assessment, Land at Manchester Road, Middleton, Report Referenced 107412p1r0 and dated April 2019.

Pertinent information from this earlier assessment have been used in subsequent sections of the present report.

1.5 Limitations

This report is subject to the RSK service constraints given in Appendix A and limitations that may be described through this document.

2 SITE DETAILS

2.1 Site location

Site location details are presented in Table 1 and a site location plan is provided on Figure 1.

Table 1 Site location details

Site name	Land at Stakehill
Full site address and postcode	Rochdale, M24 2SB
National Grid reference (centre of site)	389096, 409377

2.2 Site description

The site covers an area of approximately 89 hectares. It is currently occupied by several farms and a garden centre.

The site is approximately rectangular in shape with the long axis aligned north-south and comprises almost entirely agricultural land. It is crossed by Thornham Lane in its southern part and by numerous farm tracks and footpaths.

The site generally slopes down from a high point (182m) located just northwest of Thornfields Farm, close to the site eastern boundary, with the lowest point (132m) being the extreme southwest corner of the site.

St John's Church is located in the southwestern corner of the site, with Thornham Primary School also located on Thornham Lane in the south of the site. Newhay and Thornfields Farms are located in the central western and eastern parts of the site, respectively.

2.3 Surrounding land uses

The site is located between Slattocks and Rochdale, immediately east of the village of Trub and southwest of Junction 20 of the M62, within a predominantly rural setting. Immediate surrounding land uses are summarised in Table 2.

Table 2 Surrounding land uses

North	Thornham New Road, with M62, beyond
East	A627 (M) with agricultural land, beyond
South	A627 (M) with agricultural land, beyond
West	Residential and commercial properties

2.4 Development plans

The proposed layout of the site, at the time of preparing this report, is shown in Appendix B.

The site is to be developed for residential housing with associated access roads and private gardens with additional areas of soft landscaping plans planned.

No details of the proposed ground levels have been provided therefore for the purpose of this report it has been assumed that the current levels will remain unchanged.

3 DESK-BASED ASSESSMENT

This CMRA forms part of the desktop study which was designed generally to meet the objectives of a preliminary (phase 1) investigation, as defined by BS 10175:2011 + A2 2017 (BSI, 2017) and this assessment relates to LCRM Stage 1, Tier 1 preliminary risk assessment. The "vicinity" of the site for the purposes of this report is defined as locations situated within an approximate 250 m radius of the site, although certain sources and/ or sensitive targets further than 250 m may also have been considered.

The desk study (of which this CMRA forms a part) aims principally to identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

3.1 Site geology

3.1.1 Anticipated geological sequence

Published records (British Geological Survey, Sheet 85, Manchester, 2010 and 2011) for the area and available historical borehole logs indicate the geology of the site to be characterised by the succession recorded in Table 3. There are 6 publicly available BGS historical boreholes located on or within 250m of the site, the three deepest and most relevant of which are presented in Appendix D.

Table 3 Site geology

Strata	Description	Estimated thickness	Permeability
Made ground	Infill to former sand and gravel pits, ponds, etc. May include 'inert' waste deposits	0 to 10m	Low to high
Glacial till	Clay to sandy clay, unsorted, with common pebbles, cobbles and some boulders	12m to 75m	Generally low to very low
Fluvioglacial deposits, undifferentiated	Sand and gravel with lenses of clay and stony clay	27m to 68m	Medium to high
Pennine Lower Coal Measures Formation	Mudstone and siltstone interbedded with fine to medium sandstone, subordinate seatearths, marine bands, ironstones and coal seams	Greater than 142m proven in BGS borehole 14m to west 307m to base proven in BGS borehole 203m to east	Variable
Relevant information sources: BGS Geoindex ☒ BGS borehole logs ☒ Previous SI report ☐			

The site lies within the north-south orientated Proto-Roch buried fluvioglacial channel, which has resulted in the presence of a significant thickness (estimated from BGS borehole logs to be 75m to 85m) of superficial deposits underlying the site.

A major northwest to southeast orientated fault is indicated to cross the site. Downthrow is indicated to be to the northeast.

The Arley Coal seam is indicated to sub-crop beneath the superficial deposits, aligned approximately northeast to southwest, as indicated on the plan included within the Consultants Coal Mining report, Appendix C. The subcrop position is conjectured (i.e. not accurately known) and the bedrock dips at a shallow angle (little information is available for the site area but from surrounding areas this is expected to be around 10 degrees or so) to the southwest. On the available borehole records, taken to this depth, the Arley coal seam (and others recorded) was intact (i.e. with no evidence of underground working) and was approximately 1.8m in thickness.

3.2 Mining and quarrying

The site is located over Coal Measures bedrock and may have been affected by coal mining activities. As outlined above, in these areas the assessment of mining legacy issues should be carried out in accordance with the guidance provided by the Coal Authority.

A number of sources of information have been reviewed to determine coal mining issues relevant to the site. These include geological records (from BGS) and mining records (from the Coal Authority), in addition a site-specific Consultants Coal Mining report has been obtained by RSK for the Land at Stakehill (a copy of the full report is included as Appendix C). The review and assessment of this information is included in Section 3.2.1 to 3.2.2 below.

Based on this data review an assessment of site-specific mining legacy risks has been completed. This assessment is included in Section 3.2.3 to 3.2.8 below.

3.2.1 Mining geology and records

As detailed within Section 3.1, the development site comprises Pennine Lower Coal Measures Formation bedrock within which coal seams are present. Several coal seams are recorded as being present beneath the site, with the Arley Coal seam indicated as outcropping beneath the site. Known details are summarised in Table 4 below.

Table 4 Coal seams present at the site

Coal Seam	Depth (m)	Extraction thickness (cm)	Beneath site?	Seam dip angle and direction	Year last mined
Arley	120	180 to 190	Yes	10°, southwest	Not worked

The Coal Authority have no records of the Arley seam being worked beneath the site and there are no recorded mine entries either on site or within the immediately surrounding areas. The Coal Authority records indicate there are no actual or probable shallow underground workings beneath the site. The assessment of the site as lying within a

Development High Risk Area is simply as a result of the potential subcrop position of the Arley coal seam, however BGS records confirm that this is at significant depth.

No non-coal mining features are recorded relating to the site.

An appraisal of the historic mapping information contained within the reviewed reports records no evidence of deep mine workings or open cast (surface mining) activities.

3.2.2 Coal Authority mining report

In support of the Coal Mining Risk Assessment a Coal Authority Mining Report was procured and is summarised in Table 5 below.

Table 5 Summary of Coal Authority consultants mining report

Feature	Comment
Underground Coal Mining	The Coal Authority indicate that there has been no past underground mining recorded and that it is unlikely that unrecorded shallow workings exist. No future underground mining proposals have been recorded
Open cast Coal Mining	The Coal Authority report that no opencast mining is recorded within 500m of the site boundary
Mine Entries	There are no recorded mine entries within 100m of the site boundary. It is unlikely that unrecorded mine entries are present
Coal Mining Subsidence	The Coal Authority lists no damage notices or claims for the subject property, or any property within 50m of the site boundary, since 1994
Mine Gas	There are no records of mine gas within 500m of the site boundary

3.2.3 Coal mining risk assessment

This Coal Mining Risk Assessment considers the risk presented by six aspects of mining: deep mining, shallow mining, open cast mining, mine entries, mine gases and spontaneous combustion. These are considered in turn for the subject site in the following sections of this report.

The likelihood of other hazards associated with coal mining, e.g. aggressive or expansive ground, affecting the development site is considered highly unlikely given the lack of historical coal processing industries present on, or within the immediate surrounds of the site, e.g. engineering works.

3.2.4 Underground mining risk assessment

Deep coal mining

Deep coal mining risk relates to mine workings present at depths greater than 30m below rock head. In general, the risk presented by these workings is very low as a result of either the depth at which historic workings (pillar and stall) lie resulting in any collapses self-arresting through bulking of the overburden or, the cessation of modern mining in the UK (longwall) that tends to induce surface subsidence immediately or, at most, around 4 years once support is removed from the cutting face.

There is no recorded deep coal mining beneath the site. Consequently, deep coal mining is not considered a risk on the site.

Shallow coal mining

Shallow coal mining risk relates to underground mine workings present at depths shallower than about 30m below rockhead where collapses within relic workings are more likely to result in propagation of voids to the surface of the site. Collapses within mine workings can occur immediately following abandonment but tend to be delayed for decades and controlled by numerous factors including strength of roof material, groundwater regime, structural geology and surface loading. Most shallow workings tend to be in a state of stasis, be that; partially, fully collapsed or fully open, with changes to surface loading or groundwater regimes the typical stimulus for inducing collapses.

There is one named coal seam, the Arley Coal, that is recorded as being present at a depth of around 120m beneath the site, although geological mapping indicates it may subcrop beneath part of the subject site. Previous investigations in the area refer to the Cannel, Upper Foot and Lower Mountain Main Coals as being present beneath the site at greater depths but these all have a significant cover thickness of bedrock. The BGS borehole records indicate rockhead to be at a depth of between 79m and 81m and in these boreholes the Arley seam (which was approximately 1.8m in thickness) was recorded as intact with no evidence of workings. Given these ground conditions, even if the Arley seam was locally worked at subcrop position (which is considered highly unlikely), there will be approximately 80m thickness of superficial soils (including a mixture of granular soils and competent glacial clays) above the seam. Although the low strength of superficial soils does not offer the same protection as rock cover, some forty times the seam thickness of superficial soils would provide adequate cover.

The information from the BGS geological maps and BGS borehole records indicate that it is evident that there are no shallow coal seams present beneath the site and that there is no significant risk from shallow underground mining.

3.2.5 Opencast mining risk assessment

There are no shallow coal seams present beneath the site and there are no records of any opencast coal mining. Consequently, there is no risk associated with surface mining.

3.2.6 Mine entry risk assessment

Mine entry risk relates to the potential for abandoned and untreated mine shafts to be present on site that are prone to collapse due to various factors including; the passage of time, changes in drainage and increased loading.

The Coal Authority report states there are no mine entries either on or within 100m of the site boundary. The closest shaft is recorded on the Interactive Coal Authority Viewer as being approximately 1,200m from the eastern boundary.

The potential risk from mine entries is therefore considered to be negligible across the development site.

3.2.7 Mine gas risk assessment

Mine gas risk relates to the potential of explosive, toxic and asphyxiant gasses associated with former shallow or deep coal mining to affect the development site or affect neighbouring properties as a result of development works. Made Ground within former opencast sites is another possible source of mine gas, which could be released when disturbed.

The underlying solid strata at the site comprise generally low permeability mudstones and siltstones and the potential for mine gases, if and where present, to escape to the surface of the site is considered very low. No records of mine gas have been recorded within 500m by the Coal Authority.

The potential risk from mine gases is therefore considered to be very low.

3.2.8 Spontaneous combustion risk assessment

Spontaneous combustion risk relates to the potential for fire to be started through the action of self heating without the application of external heat and introduction of oxygen, which might occur during site development.

The depth to any coal seams present below the site is greater than that which will be encountered during any investigation and development works, meaning the likelihood of spontaneous combustion arising from coal seams and any related workings is very low.

Made Ground should also be considered as potentially susceptible to spontaneous combustion as pockets of coal ash within the material may exist. In general, these are considered likely to represent discrete or localised areas of material that may include combustible elements at varying concentrations.

Overall, the potential risk from spontaneous combustion is considered to be very low.

3.2.9 Potential for ground source heating and cooling

Most locations in the UK are suitable for the installation of ground source heating or cooling (GSHC) systems. The most appropriate type of installation is determined by the available space, heating and cooling demands of the proposed development and several geological and hydrogeological factors, and drilling risks. RSK can appraise these site-specific conditions through a desk-based feasibility study to assist in determining the viability of this sustainable source of heating/cooling energy at the site, should this be of interest to you. We also have in-house capability to undertake field assessments, as well as the design and installation of GSHC systems.

4 CONCLUSIONS AND RECOMMENDATIONS

The available information has been reviewed and a site-specific assessment of potential coal mining legacy risks has been presented in this CMRA report. Based on this information no coal mining risks have been identified for the subject site for the proposed residential development. Consequently, no mitigation measures are required.

It is not considered necessary to undertake any specific site investigation work to further assess potential coal mining risks relating to the site. However routine site investigation works will be required to confirm ground conditions and foundation requirements. This should include assessment of the shallow soil gas regime and any potential contamination issues related to the former uses of the site.

Should unforeseen conditions potentially relating to historical coal mining activities be encountered during redevelopment then specialist advice should be sought to determine the appropriate course of action.

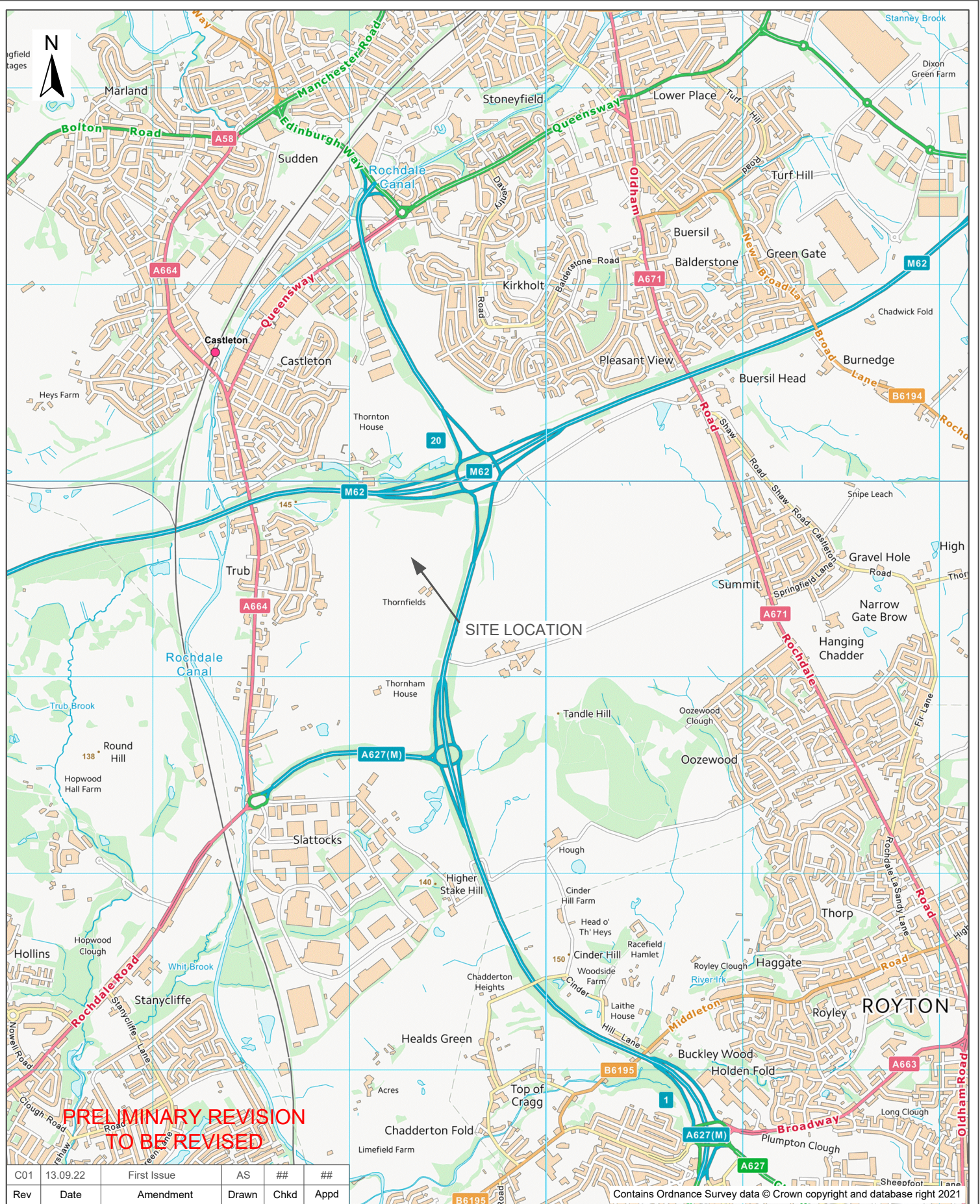
REFERENCES

British Geological Survey, 1:50,000 geological map series, New Series, Sheet No. 85, Manchester, Bedrock Geology, 2010.

British Geological Survey, 1:50,000 geological map series, New Series, Sheet No. 85, Manchester, Bedrock and Superficial Geology, 2011.

FIGURES

FIGURE 1 SITE LOCATION PLAN



C01	13.09.22	First Issue	AS	##	##
Rev	Date	Amendment	Drawn	Chkd	Appd



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Client		Redrow Homes Ltd			
Project Name		Land at Stakehill			
Description		Site Location Plan			
Dimension	Size	Scale	Geolocation	Project ID	Drawing no.
m	A4	1:25,000	389312,409610	322974	11101
Rev		File name		P01	
				322974-HE-111-SS-D-C-11101-P01	

APPENDICES

APPENDIX A SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Redrow Homes Limited (the "Client") in accordance with the terms of a contract between RSK and the Client. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
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4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK 's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, persistent, bioaccumulative or toxic chemicals (including PFAS/PFOS) or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):
 - a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
 - b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.

- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.
11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.
12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.

APPENDIX B PROPOSED LAYOUT OF THE SITE



PRELIMINARY REVISION
TO BE REVISED

ST JOHNS THORNHAM CHURCH

ST JOHN'S CE VA
PRIMARY SCHOOL
THORNHAM

LEGEND

— Site boundary

Notes:

Base plan provided by Redrow Homes No.Ref: 31599-MR-M-Id02A-Masterplan Workshop - Figure 10.



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Dimension	Scale	Size
m	1:5000	A3

Client Redrow Homes Ltd			
Project Name Land at Stakehill			
Description Proposed Development Plan			
Project ID 322974	Drawing no. 32401	Revision P02	File name 322974-HE-324-SS-D-C-32401-P02

C01	15.09.22	First Issue	AS	##	##
Rev	Date	Amendment	Drawn	Chkd	Appd
0 50 100 150 200 250m					

APPENDIX C CONSULTANTS COAL MINING REPORT

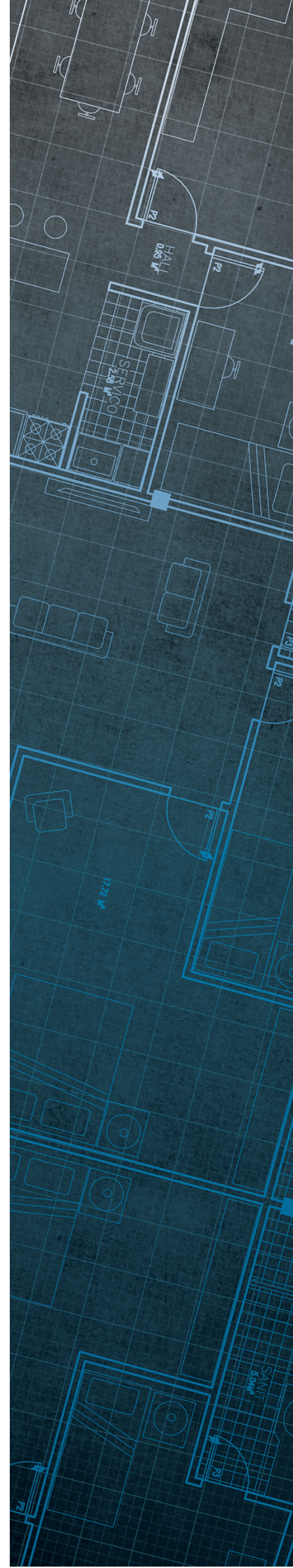


The Coal
Authority

Consultants Coal Mining Report

St Johns C Of E Church
Thornham Lane
Rochdale
M24 2SA

Date of enquiry:	30 August 2022
Date enquiry received:	30 August 2022
Issue date:	30 August 2022
Our reference:	51003308146001
Your reference:	322974



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

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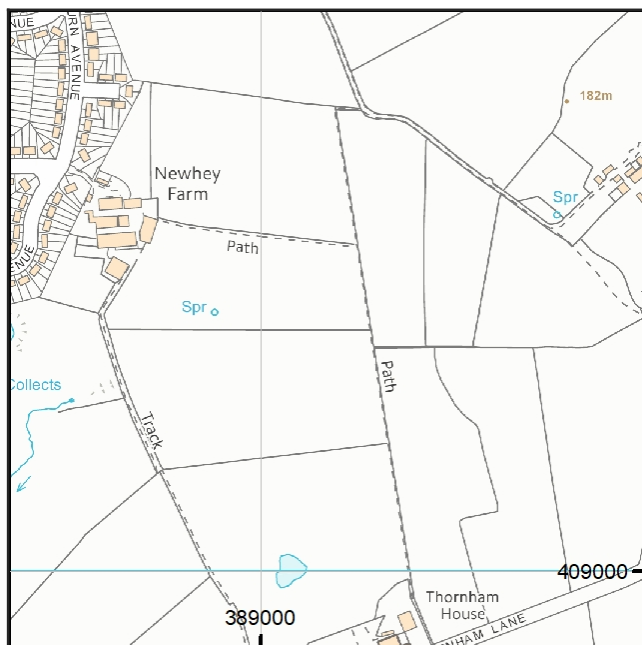
www.groundstability.com

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Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

16820		
-------	--	--

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
ARLEY	Coal	Yes	Within	N/A	298
ARLEY	Coal	Yes	Within	N/A	305
ARLEY	Coal	Yes	Within	N/A	315
ARLEY	Coal	Yes	Within	N/A	338
ARLEY	Coal	Yes	Within	N/A	338
ARLEY	Coal	Yes	Within	N/A	347

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, 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.

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

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.

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.

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

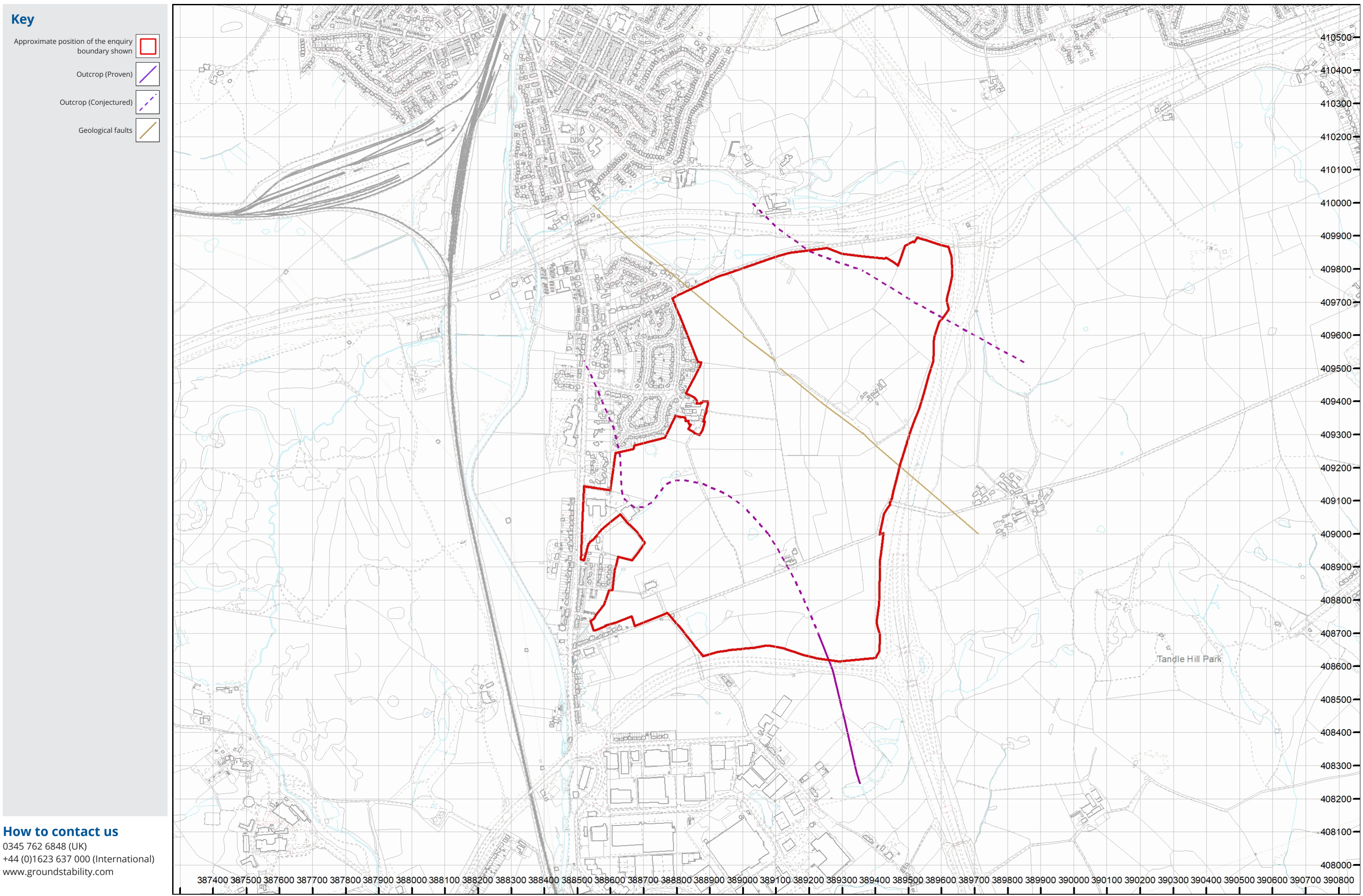
Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.



APPENDIX D BRITISH GEOLOGICAL SURVEY (BGS)
BOREHOLE LOGS

SDZONE/2

ROYTON No. 3.B.H.

Put down by Platt Bros
Oldham. to prove
L.M.M. [7]

[895.W.]

1054d. N.W. 1/4 Sec. 10, T. 12N. R. 10E. 1927-8.

Cores examined by L.H.T
Interpretations in red
by IV.L.

Fluvial
Drift

Wells, Test.

M.C.I.

ARLEY MINE 5'0"

RIDDLE SCOUT ROCK.

OLD LAWRENCE ROCK.

Fault cutting out Helpet
Edge Rock + Accompton Missions

"Bad
faulty
ground"
Hole went crooked + had to be cemented
up + re-bored.

Pyritous Shale Upper Foot Mine + 7' + some Band
absent in No. 2. Bt

Fine to coarse
Current bedded
Sandstone

Upper Foot Mine
Rock

Canally shale + coal 1'

Pyritous
shale

L.M.M.

L.F.M. (M.C.I.)

Early Mine Drilling

Medium grained on whole.
- Coarse in parts
Current bedded.

Woodhead
Hill
Rock

Very coarse at
base with
streaks of coal

UPPER FOOT MINE 10'

Coarse Int

St. Inch Mine

LOWER MOUNTAIN MINE 2'

Coarsest.

Sandrock Mine

Rough
Rock
MILLSTONE
GRT

SECTION OF Boring No. 3

at Roman Estate, Roston
br. Roston

Maps: One-inch 85 Six-inch 89 S.W. County Lancashire

Height above O.D. Latitude Longitude

Communicated by Visited by L. H. Tooke Date of Sinking 1927-8

Made by Messrs. Vivian's, Whitehaven Dip of Strata About 10°

Messrs Platt Bros. Oldham.

T/m D/m

Thickness

Depth from Surface.

Soil and clay	1	6	1	6	0.415
Sandy clay + stones	3	-	4	6	1.37
Brown clay	7	6	12	-	3.65
Sandy clay	22	-	34	-	10.36
Stiff clay	6	-	40	-	12.19
Loamy sand	16	-	56	-	17.06
Sand	12	3	68	3	20.80
Sand and gravel	27	5	95	8	29.16
Sand and soft coal	6	4	102	-	31.08
Sand, gravel and cobbles	29	-	131	-	39.92
Clay and stones	9	-	140	-	42.67
Sand + soft shatterd sandstone	19	-	159	-	48.46
Yellow brown clay	6	-	165	-	50.29
Brown clay with occasional stones	78	-	243	-	74.06
Conglomerate of blue shale, clay stones and ironstone	5	-	248	-	75.59
Brown clay and cobbles	12	-	260	-	79.26
Barland shaly fireclay with ironstone	2	-	262	-	79.85
Grey sandy shale	2	4	264	4	80.56
Hard grey sandstone	-	8	265	-	80.77
Alternating bands of the grey rotten shale with hard jointy sandstone	7	-	272	-	82.90
Hard grey sandstone with beds of shale	4	-	276	-	84.12
Blue sandy shale	3	-	279	-	85.03
Rotten grey fireclay with ironstone nodules	4	-	283	-	86.25
Ironstone band	-	5	283	5	86.38
Fireclay	2	1	285	6	87.02
Grey shale with ironstone	9	-	294	6	89.76
Grey shale with ironstone	21	-	315	6	96.16

Boring No. 3.
 Rhodan Catalt.
 Region.

Folio

County Hancock

6 in. Map 89 S.W.⁴

Description.

THICKNESS.

DEPTH.

Feet. Inches.

Feet. Inches.

71m

01m

Water lost
 here →

Strong jointy sandy shale with ironstone
 Grey sandy shale
 Grey sandstone
 Sandy shale
 Sandstone
 Sandy shale with vertical joints
 Hard jointy sandstone with bone partings.
 Grey shale with ironstone bands
 Grey sandstone
 Hard grey sandstone with black coal streaks
 Very hard jointy sandstone.
 Grey shale with bands of the grey shale with
 ironstone bands
 Blue shale with ironstone bands
 Rotten black shale.
 Coal. ARLEY MINE
 Strong fireclay
 Grey fireclay
 Grey shaly fireclay with ironstone
 Black shale with ironstone
 Blue black shale
 Grey shaly fireclay
 Sandy shale
 Grey shaly sandstone
 Alternating bands of rock and shale
 Ironstone band
 Dark blue shale
 Blue black shale with ironstone
 Carbonaceous in blue black shale
 Blue black shale
 Blue shale
 Blue grey shale
 Alternating bands of rock and shale
 Blue grey shale
 Carbonaceous in blue grey shale.
 Dark blue jointy shale.
 Blue black shale
 Strong sparry sandstone with grey black clay joint
 Blue sandy shale
 Grey jointy shale with two hard bands of rock
 Rotten grey shale
 Grey shale upon
 Rotten grey shale
 Rotten grey shale
 Blue grey shale with pyrites
 Grey shaly sandstone
 Hard grey gritty sandstone
 Blue shale
 Shale, Connally, with light coal.
 Strong fireclay

Bad
 Faulty
 Ground

6 6
 - 10
 2 6
 2 4
 3 4
 9 -
 16 9
 14 -
 3 -
 9 -
 6 6
 39 9
 12 -
 7 10
 5 -
 1 6
 4 6
 14 -
 2 9
 2 5
 4 -
 2 -
 3 6
 4 6
 - 4
 1 2
 14 -
 5 -
 9 -
 5 4
 2 8
 2 6
 7 -
 3 6
 8 -
 2 -
 3 3
 4 3
 4 6
 10 6
 4 -
 65 -
 3 -
 11 6
 21 6
 38 -
 17 -
 1 -
 2 6

322 -
 322 10
 325 4
 327 8
 330 8
 339 -
 355 9
 369 9
 372 9
 381 9
 388 3
 428 -
 440 -
 447 10
 452 10
 454 4
 458 10
 462 10
 465 7
 468 -
 472 -
 474 -
 477 6
 482 -
 482 4
 488 6
 502 6
 507 6
 516 6
 521 10
 524 6
 527 -
 534 -
 537 6
 545 6
 547 6
 550 9
 555 -
 559 6
 570 -
 574 -
 639 -
 642 -
 658 6
 674 -
 712 -
 724 -
 730 -
 732 6

98.14
 98.39
 99.16
 99.87
 100.58
 103.32
 108.43
 112.69
 113.61
 116.35
 118.33
 130.45
 134.11
 136.49
 138.02
 138.47
 139.85
 141.07
 141.90
 142.64
 143.86
 144.47
 145.54
 146.91
 147.01
 147.37
 153.16
 154.68
 157.42
 159.05
 159.84
 160.62
 162.76
 163.83
 166.26
 166.87
 167.86
 169.16
 170.53
 173.73
 174.95
 194.76
 195.68
 199.18
 205.43
 217.01
 222.19
 222.50
 223.26

SD 80 NE 2 3.

Sheet No. 3.

GEOLOGICAL SURVEY AND MINERAL RESOURCES DEPARTMENT

Thornham Estate.
Roxton.

Folio

County Lancashire
6 in. Map 895W.V

Description.

THICKNESS.

DEPTH.

Feet.

Inches.

Feet.

Inches.

7/m

0/m

Dark blue fireclay
 Black shale
 Blue grey shale with pyrites
 Strong grey fireclay
 Dark blue shale
 Blue & grey shale with ironstone bands & pyrites
 Dark blue shale
 Strong grey fireclay
 Dark blue shale
 Strong grey fireclay
 Grey shale fireclay
 Grey shale sandstone with shale beds
 Grey jointy sandstone, open & shale streaks
 Hard grey sandstone wedge pieces of open
 Hard sandstone rock
 Hard jointy sandstone
 Hard sandstone with coal streaks
 Hard jointy sandstone
 Blue shale
 Grey & blue shale with ironstone bands
 Blue shale with massive bed. Pyrites nodules at base
 Coal. Upper part of the series
 Fireclay
 Fine grained sandstone
 Medium to coarse sandstone & grit
 Grey shale (vegetable fossils)
 Hard granular
 Coarse grained sandstone

Lost water
900' to 905'

1 6

2 6

3 6

2 6

11 6

8 -

9 6

4 6

- 8

2 10

10 -

8 6

2 -

20 -

80 -

14 -

16 -

6 -

13 6

1 -

- 10

1 6

1 6

20 2

2 10

2 -

2 2

20 -

750 -

786 6

740 -

742 6

752 -

762 -

771 6

776 -

776 8

779 6

789 6

798 -

800 -

820 -

900 -

914 -

930 -

936 -

992 6

1006 -

1007 -

1007 10

1009 4

1010 10

1031 -

1033 10

1035 10

1038 -

1058 -

223.72

224.48

225.55

226.31

229.81

232.25

235.15

236.52

236.72

237.59

240.63

243.23

243.84

249.93

274.32

278.58

283.46

285.29

302.51

306.62

306.93

307.18

307.64

308.10

314.24

315.11

315.72

316.38

322.47

Ref.

(*11815) W1,29051/O.369 10,000 9/29
A.&E.W.Ltd. Gp.556

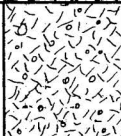
BOREHOLE AT
SLATTOCKS, MIDDLETON.

SIBSONE 13

110

430

T883.R5



Boulder clay

Sand

Brown clay

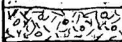
60'

120'

Sand.

180'

240'



Blue clay with pebbles.
Base of drift. 264'6"

300'

360'

Coal 6"
Parting 1"
Coal 1 1/2"
Coal 3 1/2"

ARLEY MINE. 5' 10 1/2"

400ft Blue

26'

26'

26'

26'

26'

26'

26'

26'

26'

26'

26'

26'

26'

26'

Coal 7'

420'

Broken shale & spar.

18' to 1 cut Coal
48' to Top of

468'6"

SLATTOCKS BOREHOLE N^o 1.

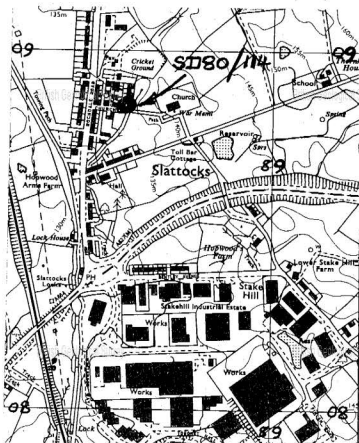
SD80/114

MIDDLETON.

Owner		Licence no. Appln no. Cancelled		Nat. grid ref. SD 8859 - 0886	
Occupier		IGS ref. no. SD80 NE/3.		Status BOREHOLE.	
Ground Level		m OD	ft. OD	Aquifer	
Level of well top		m OD	ft. OD	Code	
Rest water level		m bwt	ft. bwt	Summary of geological section	Thickness
(Date)		m OD	ft. OD	BOREHOLE LOG	Depth
Construction: Method			Date 1913	AVAILABLE.	
Depth bwt	Dia.	Linings (below well top)			
		From	To	Dia.	Type
468'					
Abstraction rates:		Type of pump		British Geological Survey	
gph PWL		Chem./bact. anal.		YES/NO	
gpd		Well driller		JOHN THOM.	

If insufficient space has been allowed, continue in 'Notes' overleaf.

Lockie 162



SD 80/114 Notes SLATTOCKS BH N^o 1

Notes

SLATTOCKS BH N^o 1

This bonehole was originally unsited & registered on SD81/49A.

8.3.2000 - BGS have identified this
bonehole as being in grid square
SD80 at NGR SD8859-0886 & has
therefore been re-registered under the
above WRB N^o - DCP 9.3.2000
see bonehole file for BH log.

Register + V.I. amended accordingly.
Copy of white card + site map DCP.
sent to BGS on 10-3-2000 DCP.

transferred to SD80 24.2.00

SD81/49A

RECORD OF WELL (SHAFT OR BORE)

1" N.S. 85

1" O.S.

Grid

Ref.

10

At Slatooks No.1 Borehole.

SD 8859 0886

Town or Village Middleton

County Lancs.

Six-inch quarter sheet 88 SE.E.

Exact site

in parish of SD80 NE/3

(A rough sketch-map or a tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) ft. If well starts below ground surface, state how far ft.

Shaft ft., diameter ft. Bore ft. Diameter of bore: at top ins.; at bottom ins.

Details of permanent lining tubes (internal diameters preferred)

SD80/114

Water struck at depths of (feet)

Rest-level of water below top of well feet. Suction at feet. Yield on hours' test days'

 gallons per (with pump of capacity g.p.h.); depressing water level to feet

below top. Time of recovery hrs. Amount normally pumped daily g.p.h. for hours.

Quality (attach copy of analysis if available)

Sunk by for Mr. Date of well 1913

Information from Chamber Colliery Co. Ltd.

(For Survey use only).
GEOLOGICAL
CLASSIFICATION.

NATURE OF STRATA
(and any additional remarks).

THICKNESS

DEPTH

Feet.

Inches.

Feet.

Inches.

Soil	1	6	1	6
Foulder Clay	38	6	40	-
Sand	12	-	52	-
Brown clay	11	-	63	-
Sand	192	-	255	-
Blue clay with pebbles (Base of drift)	9	6	264	9
Broken shale with COAL		6	265	-
Blue shale	4	-	269	-
Grey sandstone	23	-	292	-
Blue shale	6	-	298	-
Blue shale with ironstone balls	18	10	316	10
Soft blue shale	6	6	323	4
Grey sandstone	11	-	334	4
Broken blue shale with ironstone balls	9	-	343	4
Dark blue shale	12	4	355	8
Blue shale	12	-	367	8
Blue shale with broken bands	7	-	374	8
Dark blue shale with iron bands	9	-	383	8
Black shale	1	6	385	2
Soft black shale		6	386	8
Black shale	8	9	394	5
COAL		6	394	11
Parting	ARLEY MINE: 5 ft. 10 1/2 ins.		394	11 1/2
COAL		1	396	11
Parting	at 400 ft. 3 1/2 ins.		396	11 1/2
COAL		3	400	3 1/2
Fireclay		2	402	6
Blue and grey shale with iron bands	5	6	408	-
Broken black shale	2	3	411	6
Fireclay	2	3	413	9
COAL Inferior		7	414	4
Fireclay with iron nodules	1	6	415	10
Strong grey bind with iron balls	5	2	421	-
Blue and grey sandstone	3	-	424	-
Strong grey bind	11	6	435	6
Broken shale & spar	5	-	440	6
Blue sandy shale with MUSSELS	17	6	458	-
Blue shale with iron bands	10	6	468	6

Bottom of hole

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

For Survey use only

Date received

G.S.M. Office File No.

Site marked on 1" map (use symbol)

(*11115) W.420051/0.889 10,000 8/89
A. & E.W. Ltd. Op. 444

Slattocks No. 1

SD 81/49A (moved to
SD80/114
see overleaf)

Owner		Licence no. Appn no.		Nat. grid ref. SD 81/49A	
Occupier		IGS ref. no. 88SE10		Status SEE NOTE OVERLEAF	
Ground level		m OD	ft. OD		Aquifer
Level of well top		m OD	ft. OD		Code
Rest water level		m bwt	ft. bwt		Summary of geological section
(Date)		m OD	ft. OD		Thickness
					Depth
Construction: Method		Date			
BH LOG AVAILABLE					
Depth bwt	Dia.	Linings (below well top)			
		From	To	Dia.	Type
Abstraction rates		Type of pump			
gph PWL		Chem./bact. anal.		YES/NO	
gpd		Well driller			

If insufficient space has been allowed, continue in 'Notes' overleaf.

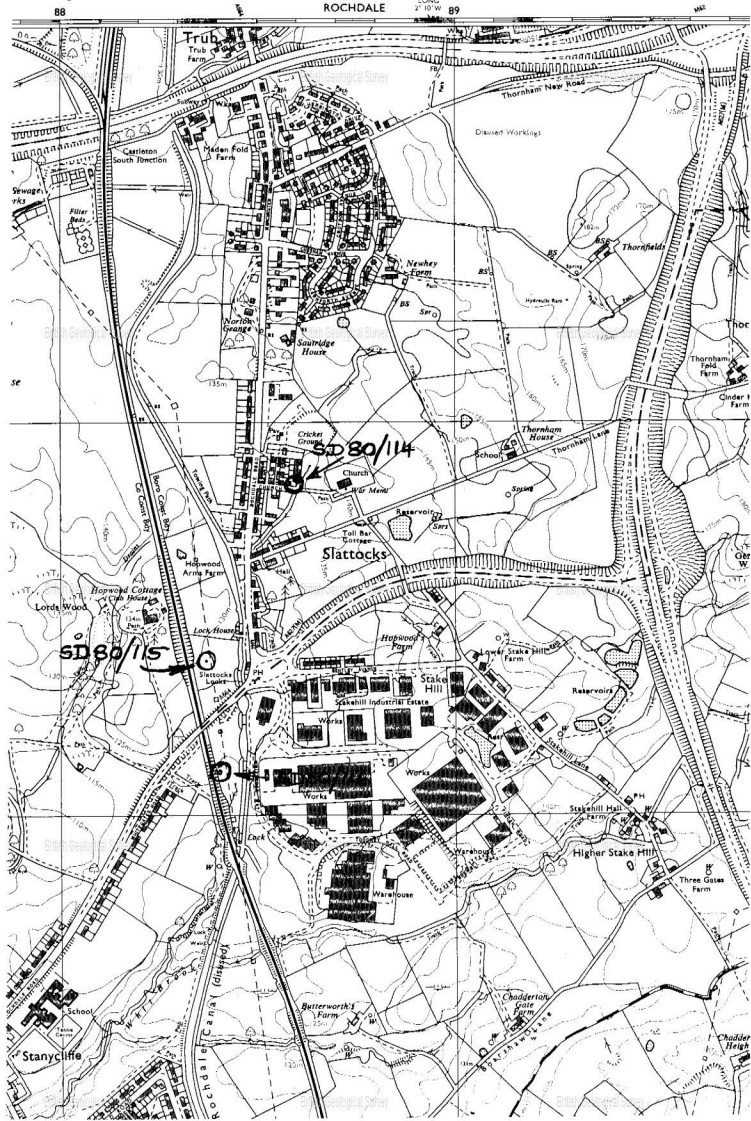
1/5/79/207

Site Plan

SD81/49A

Notes SLATTOCKS No 1.

8-3-2000 - This bh was originally
unsited. The BGS have now
identified ^{this bh} as being in SD80 &
has been ^{given} the WRB No SD80/114.
See bh file SD80/114 for bh
log - DCP 8.3.2000
Register + V.I. amended accordingly.



at Messrs Castleknock Brewery Co. Ltd

SD 81 SE 9

County Lancashire 19

six-inch

Longitude 2°-10'-30"

Date of sinking

Dip of Strata

	Thickness.		Depth from Surface.		T/m	Depth/m
	ft	in	ft	in		
Not given.						8.53
Marl = prot. = clay	4.8	16	28			13.41
Sand & gravel	1.8	6	50			15.24
Marl & pebbles	0.9	3	53			16.15
Marl	1.2	4	57			17.37
Marl & pebbles	0.9	3	60			18.29
Marl	6.4	21	81			24.69
Grey rock (Baker)	0.2	- 6"	81	6		24.84
Marl with sand & pebbles	30.0	98 6	180	-		54.86
Loam	1.2	4	184	-		56.08
Sand	9.7	32	216	-		65.84
Sandy loam & gravel	4.6	15	231	-		70.41
Quicksand	2.4	8	239	-		72.85
Gravel	0.6	2	241	-		73.46
Quicksand	4.3	14	255	-		77.72
Gravel	0.6	2	257	-		78.33
Blue clay with stones	3.0	10	267	-		81.38
Blue shale	19.8	65	332	-		101.19
Blue rock	5.5	18	350	-		106.68
Grit rock	4.5	15	365	-		111.25
Blue shale	1.5	5	370	-		112.78
Black shale	24.3	80	450	-		137.16
Grey shale	3.7	12	462	-		140.82
Grey rock	8.5	28	490	-		149.35
Dark rock	0.9	3	493	-		150.27

Base of drift

Analysis Recd. by Messrs. T. Mitchell & Co. Aug 22nd 1897

Carbonate of lime 4.99 grains per gallon

" " Magnesia 3.75 " "

" " Iron .76 " "

Chloride of Soda 1.49 " "

Sulphate of Soda 1.96 " "

Sulphate of Soda 1.46 " "

Carbonate of Soda 11.74 " "

Total solids 25.33

Temporary hardness 70.46

Permanent hardness 10.46

London: N.B.

RECORD OF WELL (SHAFT OR BORE)

1" N.S. 85
1" O.S. 9
Grid Ref.

At Messrs. Castleton Brewery, Co. Ltd., Castleton

Town or Village Rochdale County Lancs. Six-inch quarter sheet 88 SE.E.

Exact site (A rough sketch-map or a tracing from a map is very desirable)

in parish of

Level of ground surface above sea-level (O.D.) 460 ft. If well starts below ground surface, state how far ft.

Shaft ft., diameter ft. Bore ft. Diameter of bore: at top ins.; at bottom ins.

Details of permanent lining tubes (internal diameters preferred)

Latitude 53°- 35' - 19"

Water struck at depths of (feet)

Rest-level of water below top of well feet. Suction at feet. Yield on hours' test days'

gallons per (with pump of capacity g.p.h.); depressing water level to feet

below top. Time of recovery hrs. Amount normally pumped daily g.p.h. for hours.

Quality (attach copy of analysis if available)

Sunk by Messrs. T. Matthews for Mr. Date of well

Information from Drawing NH 76

(For Survey use only).
GEOLOGICAL
CLASSIFICATION.

NATURE OF STRATA
(and any additional remarks).

THICKNESS

DEPTH

Feet.

Inches.

Feet.

Inches.

Not given

28

-

28

-

Marl

16

-

44

-

Sand & gravel

6

-

50

-

Marl & pebbles

3

-

53

-

Marl

4

-

57

-

Marl & pebbles

3

-

60

-

Marl

21

-

81

-

Grey rock (Boulder)

6

-

81

6

Marl with sand & pebbles

98

6

180

-

Loam

4

-

184

-

Sand

32

-

216

-

Sandy Loam & gravel

15

-

231

-

Quicksand

8

-

239

-

Gravel

2

-

241

-

Quicksand

14

-

255

-

Gravel

2

-

257

-

Blue clay with stones

10

-

267

-

Blue shale

65

-

332

-

Blue rock

18

-

350

-

Grit rock

15

-

365

-

Blue shale

5

-

370

-

Black shale

80

-

450

-

Grey shale

12

-

462

-

Grey rock

28

-

490

-

Dark rock

3

-

493

-

For Survey use only

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

Date
received

G.S.M. Office
File No.

Site marked
on 1" map
(use symbol)

(*11815) Wt.29051/0.369 10,000 9/39
A & E.W.Ltd. Cp.686

SD 8156/9

SD 8842 1042

SD 81/31

RECORD OF WELL (SHAFT OR BORE)

1" N.S. 85

1" O.S.

Grid

Ref.

9

At Messrs. Castleton Brewery, Co. Ltd., CastletonTown or Village RochdaleCounty Lancs.Six-inch quarter sheet 88 SE.E.

Exact site

in parish of

(A rough sketch-map or a tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) 460 ft. If well starts below ground surface, state how far ft.Shaft ft., diameter ft. Bore ft. Diameter of bore: at top ins.; at bottom ins.

Details of permanent lining tubes (internal diameters preferred)

Latitude 53° - 35' - 19"

Water struck at depths of (feet)

Rest-level of water below top of well feet. Suction at feet. Yield on hours' test gallons per (with pump of capacity g.p.h.); depressing water level to feetbelow top. Time of recovery hrs. Amount normally pumped daily g.p.h. for hours.

Quality (attach copy of analysis if available)

Sunk by Messrs. T. Matthews for Mr. Date of well Information from Drawing NH 76(For Survey use only).
GEOLOGICAL
CLASSIFICATION.NATURE OF STRATA
(and any additional remarks).

THICKNESS

DEPTH

Feet.

Inches

Feet.

Inches.

Not given

28

-

28

-

Marl

16

-

44

-

Sand & gravel

6

-

56

-

Marl & pebbles

3

-

53

-

Marl

4

-

57

-

Marl & pebbles

3

-

60

-

Marl

21

-

81

-

Grey rock (Boulder)

8

-

81

8

Marl with sand & pebbles

98

6

180

-

Loam

4

-

184

-

Sand

32

-

216

-

Sandy Loam & gravel

15

-

231

-

Quicksand

8

-

239

-

Gravel

2

-

241

-

Quicksand

14

-

255

-

Gravel

2

-

257

-

Blue clay with stones

10

-

267

-

Blue shale

65

-

332

-

Blue rock

18

-

350

-

Grit rock

15

-

365

-

Blue shale

5

-

370

-

Black shale

80

-

450

-

Grey shale

12

-

462

-

Grey rock

28

-

490

-

Dark rock

3

-

493

-

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

For Survey use only

Data
receivedG.S.M. Office
File No.Site marked
on 1" map
(see symbol)(*11818) W120081/0.869 10,000 9/59
A.C.B.W.Ltd. Op.884

SECTION OF *Borehole*at Messrs *Castleton Brewery Co. Ltd.*
Castleton, N. Rochdale.
County *Lancashire* **19**Maps: One-inch *81*Six-inch *81*Height above O.D. *460 ft.*Latitude *53° 35' 19"*Longitude *2° 10' 30"*Communicated by *Thomas Mutton Ltd. Pendleton.*

Date of sinking

Made by *Dawson NH 76.*

Dip of Strata

	Thickness.		Depth from Surface.	
	ft	in	ft.	in
<i>Not given.</i>	28	-	28	-
<i>Marl = prob. = clay</i>	16	-	44	-
<i>Sand & gravel</i>	6	-	50	-
<i>Marl & pebbles</i>	3	-	53	-
<i>Marl</i>	4	-	57	-
<i>Marl & pebbles</i>	3	-	60	-
<i>Marl</i>	21	-	81	-
<i>Grey rock (Boulder)</i>	-	6"	81	6
<i>Marl with sand & pebbles</i>	98	6	180	-
<i>Loam</i>	4	-	184	-
<i>Sand</i>	32	-	216	-
<i>Sandy loam & gravel</i>	15	-	231	-
<i>Quicksand</i>	8	-	239	-
<i>Gravel</i>	2	-	241	-
<i>Quicksand</i>	14	-	255	-
<i>Gravel</i>	2	-	257	-
<i>Blue clay with stones</i>	10	-	267	-
<i>Blue shale</i>	65	-	332	-
<i>Blue rock</i>	18	-	350	-
<i>Grit rock</i>	15	-	365	-
<i>Blue shale</i>	5	-	370	-
<i>Black shale</i>	80	-	450	-
<i>Grey shale</i>	12	-	462	-
<i>Grey rock</i>	28	-	490	-
<i>Dark rock</i>	3	-	493	-

Base of drift

Analysis Recd. by Messrs. T. Mutton May 22nd 1897

Carbonate of lime 4.99 grains per gallon

" " 3.15 " "

" " .76

Alumina 1.99

Silica 1.64

Carbonate of Soda 11.74

Total solids 25.23

Temporary hardness 79.45

Permanent hardness 24.10

Darkness: Nil