Environmental
Geotechnical
Specialists



REPORT

job number J3943/17/E	site address Land off Bismark Street
date June 2017	Worsbrough Common,
written by C. E. Mason	Barnsley,
checked by R. A. Palmer	S70 4NA
	issued by C. E. Mason

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GEOTECHNICAL ENVIRONMENTAL

Environmental Geotechnical Specialists

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Report on a Coal Mining Risk Assessment

Location:	Land off Bismark Street Worsbrough Common, Barnsley, S70 4NA
For:	David Barlow
Report No.	J3943/17/EDS
Report date:	June 2017

For and on behalf of **Rogers Geotechnical Services Ltd**

C. E. Mason BSc FGS
Graduate Geotechnical Engineer

R. A. Palmer MSc FGS
Senior Geotechnical Engineer

1. Introduction

It is understood that as part of the planning application at the site, a Coal Mining Risk Assessment has been requested by the planning authority. Consequently, a desktop study was commissioned in order to assess the risk to the development from coal mining. This report presents the findings of the study.

2. Geological Desk Study

The geological desk study has been undertaken using the following sources of information.

- British Geological Survey map sheet[1].
- British Geological Survey *Geology of Britain Viewer*[2].
- Coal Authority Report[3].
- British Geological Survey *Borehole Records*[4].

[1] Sources: British Geological Survey (NERC) Map Sheet 87 ; Barnsley Solid and Drift Editions
[2] Sources: British Geological Survey (NERC) Geology of Britain Viewer [*online resource from www.bgs.ac.uk*]
[3] Coal Authority Reference: 51001486614001 dated 15th June 2017
[4] Sources: British Geological Survey (NERC) Borehole Records [*online resource from* http://www.bgs.ac.uk//]

2.1 British Geological Survey Maps and Viewer

The appropriate map sheet for the site and the geology viewer has been examined and the following table presents the indicated geology:

Table 1: Geological Data for the Site

Strata Type	Strata Name[5]	Previous Name[6]	Description[6]
Made ground			Artificial/man made deposit.
Superficial Geology	None recorded.		
Solid Geology	Woolley Edge Rock	-	Sandstone, coarse-grained in the north, becoming finer southwards.
	Pennine Middle Coal Measures Formation	-	Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit.

It should be appreciated that topographically the site is situated on the flank of a western sloping hill.

The available geological data suggests that made ground will be present on the northwestern and eastern site boundary. Taking into consideration the available historic maps, it may be assumed that this made ground is worked material related to the Brick Works located off Warren Quarry Lane (1906 1:2,500 map data). Although this feature is not anticipated to ingress far onto the site, the potential for open cast workings to be present should be taking into consideration during the development phase.

There are no dip indicators relevant to the site (i.e. within 500m of the site or within the same fault block) on the geological map. However, taking into account the structure of the regional geology and outcrop patterns, it can be anticipated that the solid geology within the local area dips at shallow angles towards the east.

The available geological data indicates that solid geology changes from northwest to south east across the site. The north western quadrant of the site is underlain by undifferentiated Pennie Middle Coal Measures Formation, whereas the south eastern quadrant of the site is underlain by the Wolley Edge Rock. These units are separated by the Meltonfield Coal.

In addition, the site is situated within a heavily faulted area and is within close proximity to two faults. The Barebones Fault is regionally extensive and is located approximately 195m to the north east, with a general trend of northwest-southeast. There is also a localised fault located approximately 210m northwest of the site, with a trend of northeast-southwest. However, these faults are not anticipated to affect the proposed development.

[5] Sources: British Geological Survey (NERC) Map Sheets 87; Barnsley; Solid and Drift Edition, and Geology of Britain Viewer [*online resource from www.bgs.ac.uk*]
[6] Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [*online resource from www.bgs.ac.uk*]

There are three coal seams that are shown to outcrop within the local area. These seams are summarised as follows:

Table 2: Summary of coal seams within the vicinity of the site.

Seam Name	Seam thickness[5]*	Outcrop distance from site*[5]	Anticipated depth below site
Meltonfield (Woodmoor; Wathwood) coal (MD)	0 – 1.4	On site	Within 5m bgl within the south-eastern quadrant of the site
Two-Foot (Royston; Half yard) coal (TF)	0.1 – 2.1	170m W	Between 8m and 18m bgl
Abdy (winter) coal (A)	0 – 1.9	280m W	Between 15m and 25m bgl

*All distances are given as approximations only. It should be noted that coal seam thicknesses vary over relatively short distances

In light of the above and taking into account the regional structural geology and the topography of the area, there are three seams of coal anticipated to be present at depths of less than 30m below the surface of the site.

2.2 Coal Authority Mines Report

As part of this study a Non-residential Coal Authority Mining Report has been obtained. The report is presented as Appendix 2 and for the purposes of discussion has been summarised below:

Table 3: Summary of the Non-residential Coal Authority Mining Report

Has the search report highlighted evidence or potential of:			
Ref	**Mining Feature**	**Yes/No**	**Comments**
1	Underground Coal Mining: Past	Yes	The property is in a surface area that could be affected by underground mining in 8 seams of coal at shallow to 520m depth, and last worked in 1974.
2	Underground Coal Mining: Present	No	The property is not within a surface area that could be affected by present underground mining.
3	Underground Coal Mining: Future	Yes	The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods. The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining. However, reserves of coal exist in the local area which could be worked at some time in the future. No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.
4	Mine Entries	Yes	Within, or within 20 meters of, the boundary of the property there are 2 mine entries, the approximate position of which are shown on the enquiry boundary plot. There is no record of what steps, if any, have been taken to treat the mine entries. There may however be mine entries/additional mine entries in the local area which the Coal Authority has no known knowledge of.
5	Coal Mining Geology	No	The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.
6	Opencast Coal Mining: Past	No	The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7	Opencast Coal Mining: Present	No	The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.
8	Opencast Coal Mining: Future	No	There are no license requests outstanding to remove coal by opencast methods within 800 metres of the boundary. The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.
9	Coal Mining Subsidence	No	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31 October 1994. There is no current stop notice delaying the start of remedial works or repairs to the property. The Coal Authority is not aware of any request having been made to carry out prevention works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.
10	Mine Gas	No	The Coal Authority has no record of a mine gas emission requiring action.
11	Hazards Related to Coal Mining	No	The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.
12	Withdrawal of Support	No	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.
13	Working facilities orders	No	The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof
14	Payments to owners of former copyhold land	No	The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.
15	Information from the Cheshire Brine Subsidence Compensation Board	No	The property lies outside the Cheshire Brine Compensation District.

2.3 Geological Survey Borehole Records

The British Geological Survey (NERC) keeps borehole records from across Britain which are available for public viewing through their website[7]. As part of this study, the records in the area around the site have been reviewed in order to assist in establishing the geological conditions.

Based upon records provided by the British Geological Survey (NERC) the following table has been produced as a summary for the most applicable features of note in relation to this study, the logs of the boreholes are presented as Appendix 3:

Table 4: Notable Geological Features

Borehole	Approx. Distance from Site	Depth of borehole (m)	Notable features
SE30NW372	146m – 210m E	35	Weak coal – 12.5m depth (0.6m thick) 27.65m depth (0.65m thick) 30.9m depth (0.35m thick)
SE30NW373		35	Weak coal – 12.1m depth (0.55m thick) Weak coal – 28.05m depth (0.45m thick) Weak coal intermixed with shale bands – 31.5m depth (0.3m thick)
SE30NW374		36.5	Weak coal – 14m depth (1.10m thick) 29.25m depth (1.00m thick)

			30.35m depth (0.6m thick) Weak Coal intermixed with shale bands - 34m depth (0.2m thick)
SE30NW375		35	Weak coal – 14m depth (1.35 thick) 29.5m depth (1.15m thick) 32.5m depth (0.95m thick)
SE30NW376		15	Coal/shale – 5m depth (0.05m thick) Coal – 12.1m depth (1.00m thick)
SE30NW377		19	Weak rock possibly coal – 11.5m depth (1.00m thick)
SE30NW378		17	Weak coal – 13.8m depth (1.40m thick)
SE30NW379		15	Weak coal – 12.55m depth (0.65m thick)
SE30NW380		16	Weak coal interspersed with shale – 13.5m depth (0.25m thick)
SE30NW381		17	Weak coal – 14.1m depth (1m thick)
SE30NW382		16	Weak coal – 13.5m depth (1.7m thick)
SE30NW383		16	Weak coal – 13.2m depth (0.5m thick)
SE30NW598	120m – 198m SE	12.2	Coal – 9.75m depth (0.7m thick) interspersed with mudstone before; Coal – 11.15m depth (0.25m thick)
SE30NW599		11.6	Coal – 10.45m depth (0.85m thick)
SE30NW600		15.6	Coal – 14.7m depth (0.8m thick)
SE30NW601		14.65	Coal with thin bands of shale – 13.8m depth (0.85m thick)
SE30NW602		11.15	Shaley coal – 10m depth (0.75m thick)
SE30NW603		10.65	Coal grading into coaly sandstone – 8.95m depth (1.1m thick)
SE30NW604		12.95	Coal – 2.05m depth (0.05m thick) Coal grading into coaly shaley sandstone – 9.6m depth (0.9m thick)
SE30NW605		9.75	Coal grading into coaly sandstone – 8.65m depth (0.4m thick)
SE30NW606		10.45	Coal & mudstone bands – 1.9m depth (0.1m thick) Coal and coaly sandstone – 9.45m depth (0.9m thick)
SE30NW607		10.5	Coal with bands of shale and sand – 8.9m depth (0.8m thick)

It should be appreciated that other borehole scans were available at a greater distance from the site, however, these were felt to be of lesser value to the study as they are not anticipated to present comparable ground conditions to those below the surface of the site.

Nevertheless, the site relevant boreholes have indicated two notable coal seams are present within 30 metres of the ground surface within the local area. The first coal seam appears to be present at depths ranging between 10m and 15m bgl. Taking into consideration the available geological data, this seam is anticipated to represent the Meltonfield Coal seam. In addition, within the deeper borehole scans a second seam of coal was noted at around 30m bgl. This seam is anticipated to represent the Two-foot Coal Seam. Considering the outcrop patterns of these seams topography, the borehole scans suggest that the solid geology within the local area dips around 4°east.

Although in some borehole scans the seams encountered are of a poor quality and/or not of an economic thickness, it should be appreciated that coal seam thicknesses and quality can

vary over relatively short distances. Therefore, there remains the possibility that coal seams of economic value may be present below the site surface.

3. Risk Assessment

The risk to the stability of the residential development has been evaluated from the data obtained and with reference to the following ratings and definitions:

Low - The possibility of instability is unlikely therefore no further action is necessary.

Moderate - The possibility of instability is likely and further investigation or remedial action may be required.

High - The possibility of instability is highly likely and further investigation or remedial action will be necessary.

Table 5: Development specific risk assessment

Item	Risk of Instability	Coal Seam(s) Considered	Risk Rating
1	Shallow coal seams	Meltonfield Coal (MD)	Moderate
		Two-Foot Coal (TF)	Moderate
		Abdy Coal (A)	Moderate
2	Coal workings at depth	The property is in a surface area that could be affected by underground mining in 8 seams of coal at shallow to 520m depth, and last worked in 1974.	Low
3	Mine Entries	Within, or within 20 meters of, the boundary of the property there are 2 mine entries	Moderate/High
4	Open cast workings	The site is situated within an area that may have been affected by open cast stone workings associated with historic brick works	Low/Moderate

Shallow Coal Seams

On the basis of all of the information provided above, three coal seams are anticipated to be present within 30m of the surface at the site. Whilst these seams may be of limited thickness, the possibility of these seams being worked below the site cannot be ruled out. Historic coal mining activity is evident in the nearby area, and therefore it is considered that if coal was known to be close to ground level it could have been removed illicitly via shallow mining methods with relative ease.

It may be noted that guidance available from both the NHBC and the CIRIA publication, SP32 - *construction over abandoned mine workings,* suggests that competent overburden thickness above a coal seam should be greater than 10 times the thickness of a seam plus seam thickness in order that the collapse of workings would pose a low risk to surface structures.

On this basis, assuming a maximum thickness of the coal seams, the table below suggests the thickness of competent overburden required above each seam to mitigate instability at the surface.

Table 6: Required thickness of competent overburden			
Seam Name	**Seam thickness**	**Anticipated depth below site**	**Required thickness of competent overburden.**
Meltonfield Coal (MD)	0m to 1.4m	0m – 5m bgl within the eastern quadrant of the site	15.40m
Two-Foot Coal (TF)	0.1m to 2.1m	10m – 15m bgl	22.0m
Abdy Coal (A)	0m – 1.9m	15m – 25m bgl	20.90

Based on the above information, it is considered that there will not be a sufficient thickness of competent overburden above the seams in order to prevent the risk of instability posed by the presence of any illicit workings. Therefore, a moderate risk rating has been placed on these seams, and further investigation is recommended to prove or disprove the presence of illicit mining activity.

Coal Workings at Depth

In regard to deeper mining which could affect the site, the property is in a surface area that could be affected by underground mining in 8 seams of coal at shallow to 520m depth, and last worked in 1974. Any movement in the ground due to coal mining activity at significant depths should have stopped. Therefore, there is considered to be a low risk of instability at the site due workings at depth.

Mine Entries

It should be appreciated that the Coal Authority report states that within, or within 20 meters of the boundary of the property there are 2 mine entries. The available plans state that these entries are located on the northern site boundary and represent adits. The azimuth of the adits trends approximately southeast, and therefore these features are anticipated be present below the site surface. There is no record of what steps, if any, have been taken to treat the mine entries. Therefore, it is recommended that further investigation takes place in order to assess the quality and reinstatement of these adits and a moderate to high risk rating has been to assigned these features.

Open cast workings

The available geological data suggests that made ground will be present on the north western and eastern site boundary. Taking into consideration the available historic maps, it may be assumed that these deposits may be related to the Brick Works located off Warren Quarry Lane. Although this feature is not anticipated to ingress far onto the site, the potential for open cast workings to be present should be taking into consideration. Given the shallow depth of the Meltonfield Coal below the eastern quadrant of the site, there is a potential for surface workings to be present that have not been identified in this investigation. On this basis, it is recommended that careful inspections take place during the development. Should any evidence for day-holes, bell pits or open-cast workings become apparent, works should be halted and the advice of geotechnical specialists sought.

4. Conclusions

In light of the potential risks of instability at the site from the working of shallow coal at the site, it cannot be recommended that development takes place without further investigation to conclusively determine the presence of such workings. This work should include physical drilling methods to explore the ground conditions.

Investigation for Shallow Coal

General practice is to undertake rotary openhole boreholes in a minimum of three locations across the site to mitigate against the potential for drilling through intact columns associated with pillar and stall workings. As the geology of the site is noted to change from northwest to south east, some cognisance will be required when triangulating these boreholes. It will be necessary to make sure at least one of the boreholes is positioned to the east of the Meltonfield Coal outcrop in order to prove/disprove the presence of workings within this seam. These boreholes should be extended to depths in order to assess the quality and continuity of the three shallow seams.

It is normal to investigate the ground to 30m below ground level; any workings below this depth are unlikely to result in significant instability. However, as opencast workings have been noted to be present within some areas of the site it may be necessary to extend these holes depending on the level of competent cover encountered. In any event, it is considered that approval should be sought with the Local Authority as to the efficacy of this approach.

Investigation of Adits

In the first instance, it would be prudent to request a Mine Entry Interpretive Report from the Coal Authority. Such documents hold information regarding the exact location of the adit, adit azimuth, depth and treatment details, and will aid a ground investigation specialist in providing a suitable intrusive investigation to assess shaft stability.

Based on the advice within these documents an intrusive investigation should be undertaken in order to obtain comprehensive data on ground conditions, to assess whether mining has occurred, the location of the adit and the stability and reinstatement of the adit.

General practice is to excavate a series of trial trenches in the areas of the known adit locations. However this method may not be possible if a substantial depth of fill associated with opencast workings is present on site. If this method of investigation is proven to be unfeasible the site should be probed with drillholes in the position that the adits have been reasonably well established. The most efficient drilling sequence is a spiral or grid pattern. Extreme care is required when undertaken exploratory works as adits may collapse where the fill or supports are disturbed. Safety precautions will be required to protect personnel and equipment.

It is of note that Rogers Geotechnical Services would be happy to assist in any further intrusive investigation that may be required.

Appendix 1

Site Plan

J3943/1.7/EDS


Middlese
Cope St
Cope St
Warren Quarry Ln
Bank St
Worsbrough Common
Community Centre
Bismarck St
Surrey Cl
Warren Quarry Ln
Highstone Mews
Care Home
The Little Boat Chippy
Map
Google
3D

Appendix 2

Coal Authority Report

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report





BISMARK STREET
WORSBROUGH COMMON
BARNSLEY
S70 4NA



Date of enquiry:	15 June 2017
Date enquiry received:	15 June 2017
Issue date:	15 June 2017
Our reference:	51001486614001
Your reference:	J3943/17/EDS

CON29M Non-Residential Mining Report

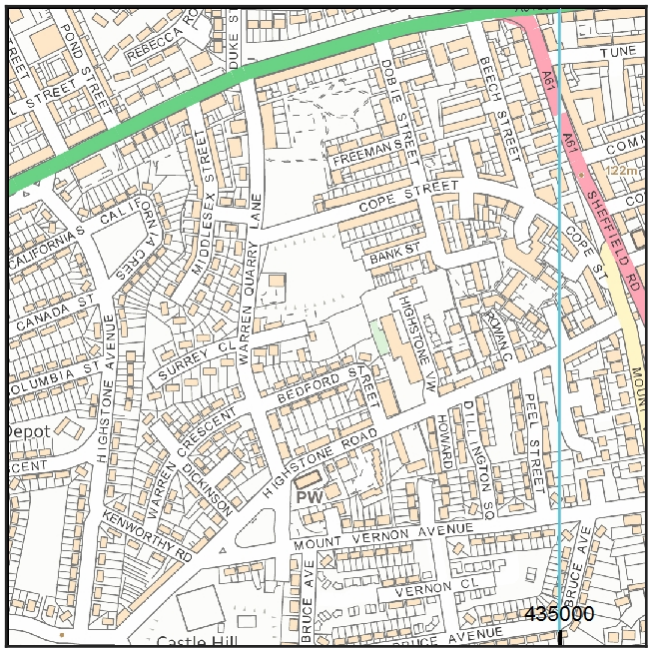
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

ROGERS GEOTECHNICAL SERVICES LTD

Enquiry address

BISMARK STREET, WORSBROUGH COMMON, BARNSLEY, S70 4NA



Approximate position of property

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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 8 seams of coal at shallow to 520m depth, and last worked in 1974.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

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

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

Within, or within 20 metres of, the boundary of the property there are 2 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

There is no record of what steps, if any, have been taken to treat the mine entries.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives 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 please visit www.groundstability.com.

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

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

9. Coal mining subsidence

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

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

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

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

12. Withdrawal of support

The property is 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.

13. Working facilities order

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

14. Payments to owners of former copyhold land

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

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot 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 obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

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 advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, 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 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.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Alternative formats

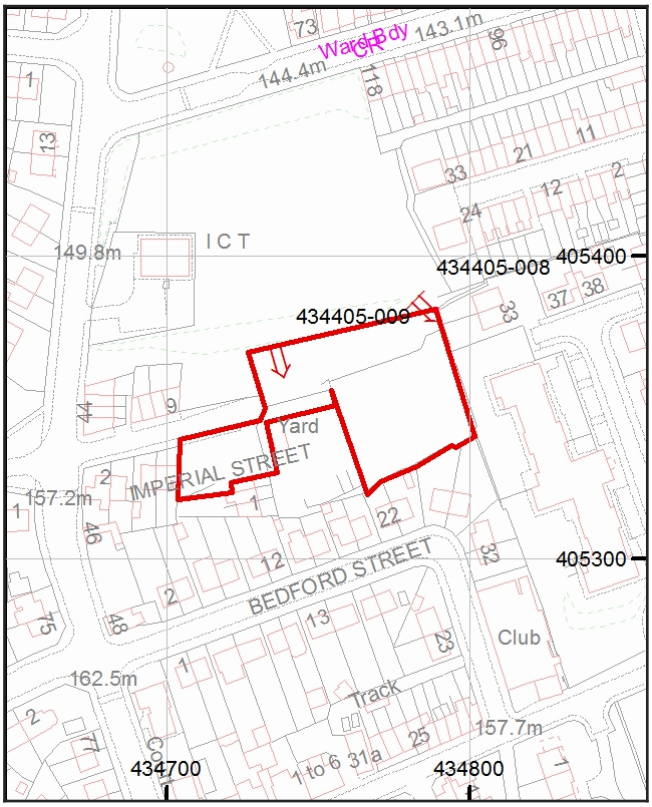
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Enquiry boundary

Key

Approximate position of enquiry boundary shown

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How to contact us

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200 Lichfield Lane
Mansfield
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NG18 4RG

www.groundstability.com

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Map data

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VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	15 June 2017
Issued to	ROGERS GEOTECHNICAL SERVICES LTD BARNCLIFFE MILLS NEAR BANK SHELLEY HUDDERSFIELD KIRKLEES HD8 8LU
Property search for	BISMARK STREET WORSBROUGH COMMON BARNSLEY S70 4NA
Reference number	51001486614001
Date of issue	15 June 2017
Cost	£78.30
VAT @ 20%	£15.66
Total received	£93.96
VAT registration	598 5850 68

Appendix 3

BGS Borehole Records

BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level Location DILLINGTON PARK STADIUM, BARNSLEY 434 811

BOREHOLE No. K Date JULY 1996 405368

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M %	Ø	Density kg/m³	N
	0.300		Sandstone rubble						
0.300									
	4.000		Weak to moderately strong brown sandstone becoming grey towards base						
4.300									
	4.600		Grey mudstone						
8.900									
	0.800		Coal with bands of shale and sand						
9.700									
	0.350		Grey mudstone						
10.050									

Water Struck at Standing Water Level

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

J. T. HYMAS (Site Investigation) LTD.

12 Yarm Road, Stockton-on-Tees,
Cleveland TS18 3NE
Tel. 01642 607083 Fax.01642 612355



BOREHOLE RECORD

Contract No. G (Sheet 2) Client QUALITY CARE DEVELOPMENTS LTD

Ground Level Location DILLINGTON PARK STADIUM, BARNSLEY

BOREHOLE No. G (Sheet 2) Date JULY 1996

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m^2	M %	Ø	Density kg/m^3	N
9.600									
	1.100		Coal grading to coaly shaley sandstone						
10.700									
	0.250		Sandstone with shaley bands						
10.950									
	0.350		Grey mudstone						
11.300									
	1.650		Grey siltstone with bands of sandstone						
12.950									

Water Struck at Standing Water Level

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level _____ Location DILLINGTON PARK STADIUM, BARNSLEY 434838

BOREHOLE No. G (Sheet 1) Date JULY 1996 405345

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M %	Ø	Density kg/m³	N
0.150	0.150		Soil						
2.050	1.900		Moderately strong to weak yellow/ brown sandstone						
2.100	0.050		Coal						
3.200	1.100		Moderately strong yellow/brown sandstone						
9.600	6.400		Grey mudstone						
			*Borehole continued						

Water Struck at _____ Standing Water Level _____

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level Location DILLINGTON PARK STADIUM, BARNSLEY

BOREHOLE No. B (Sheet 2) Date JANUARY 1996

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m^2	M %	Ø	Density kg/m^3	N
9.750									
	0.700		Firm grey mudstone						
10.450									
	0.850		Coal						
11.300									
	0.300		Firm brown to grey mudstone						
11.600									

Water Struck at _____ Standing Water Level _____

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level Location DILLINGTON PARK STADIUM, BARNSLEY 434821

BOREHOLE No. B (Sheet 1) Date JANUARY 1996 405367

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M %	Ø	Density kg/m³	N
	2.300		Made up ground - broken sandstone						
2.300									
	2.900		Moderately strong broken sandstone						
5.200									
	1.500		Firm to stiff mottled silty clay						
6.700									
	2.000		Weathered grey mudstone						
8.700									
	0.150		Grey siltstone						
8.850									
	0.900		Firm grey mudstone						
9.750									
			* Borehole continued..						

Water Struck at Standing Water Level

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level Location DILLINGTON PARK STADIUM, BARNSLEY

BOREHOLE No. A (Sheet 2) Date JANUARY 1996

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m2	M %	Ø	Density kg/m3	N
9.750									
	0.700		Coal						
10.450									
	0.700		Brown to grey mudstone						
11.150									
	0.250		Coal						
11.400									
	0.800		Grey mudstone						
12.200									

Water Struck at Standing Water Level

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level _____ Location DILLINGTON PARK STADIUM, BARNSLEY 434841

BOREHOLE No. A (Sheet 1) Date JANUARY 1996 405314

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M %	Ø	Density kg/m³	N
0.250	0.250		Sandy soil						
1.700	1.450		Weathered to hard sandstone with thin bands of sand						
2.950	1.250		Firm to stiff mottled silty clay						
6.700	3.750		Weathered to fairly hard grey mudstone						
6.850	0.150		Grey siltstone						
9.750	2.900		Fairly hard grey mudstone						
			* Boring continued..						

Water Struck at _____ Standing Water Level _____

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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BOREHOLE RECORD

Contract No. 14110/95 Client QUALITY CARE DEVELOPMENTS LTD

Ground Level _____ Location DILLINGTON PARK STADIUM, BARNSLEY 434841

BOREHOLE No. A (Sheet 1) Date JANUARY 1996 405314

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M %	Ø	Density kg/m³	N
0.250	0.250		Sandy soil						
1.700	1.450		Weathered to hard sandstone with thin bands of sand						
2.950	1.250		Firm to stiff mottled silty clay						
6.700	3.750		Weathered to fairly hard grey mudstone						
6.850	0.150		Grey siltstone						
9.750	2.900		Fairly hard grey mudstone						
			* Boring continued..						

Water Struck at _____ Standing Water Level _____

Undisturbed Sample	U
Disturbed Sample	O
Penetration Test	P
Cohesion	C
Angle of Internal Friction	Ø
Moisture Content %	M
Standard Penetration Value	N

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SE30NW

383

H.J.T. SOLMEK

Sheet 1 of 1 | Borehole No. 12

Boring Method: ROTARY PERCUSSION OPEN HOLE DRILLING TECHNIQUES WITH AIR FLUSH

Site: HIGHSTONE ROAD, WORSBOROUGH COMMON, BARNSLEY

Drilling Commenced: 31.1.89

Ground Level: 7.61m A.A.D.

Scale	Samples / Tests: Sample Type	Samples / Tests: Test	Standing Water Level (m)	Reduced Level (m)	Description of Strata	Depth (m)	Legend
2.0					Overburden	3.00	
4.0					Yellow brown, orange in places, SANDSTONE, weak becoming weak to moderately weak	4.00	
					becoming yellowish white	4.50	
					orange brown	4.70	
					dark grey brown	4.80	
6.0					Yellow SANDSTONE becoming yellow white with occasional darker bands	7.00	
8.0					Wet	7.50	
10.0					Grey brown, MUDSTONE, silty, moderately weak, in places weak		
12.0					moderately weak to moderately strong	11.70	
					dark grey/brown SHALE - Moderately weak	12.60	
14.0					Black, COAL, weak to very weak, Solid	13.20	
					Grey SEATEARTH, moderately weak to moderately strong becoming greyish brown MUDSTONE, moderately weak	13.70	
16.0						16.00	
18.0					Borehole Suspended		
20.0							

Remarks: All comments in "Descriptions of Strata", regarding the strength and consistency of the rock mass, are related to observations of penetration rate during drilling and in the absence of rock 'Core Samples', must be regarded as indicative only. During drilling, at the change of each rod below where water entered the hole, returns were lost, generally for a short period (0.30m to 0.50m maximum), however drilling indicated continuous solid ground at all times during these zones.
Wet from 7.50m.

See sheets A & B for key to symbols

SE30NW

375

H.J.T. SOLMEK

Sheet 2 of 2

Borehole No. 4

Boring Method

ROTARY OPEN HOLE DRILLING TECHNIQUES AT 100mm DIAMETER, USING AIR FLUSH

Site

HIGHSTONE ROAD
WORSBOROUGH COMMON, BARNSLEY

Drilling Commenced 31.1.89

Ground Level 6.13m A.O.D.

Scale	Samples/Tests: Sample Type	Samples/Tests: Test	Standing Water Level (m)	Reduced Level (m)	Description of Strata	Depth (m)	Legend
					becoming greyish brown MUDSTONE, moderately weak		
22.0							
24.0							
						25.00	
26.0					Dark brown, SHALE, weak		
28.0							
						29.50	
30.0					Black, COAL, weak to very weak, solid	30.65	
					Grey SEATEARTH, moderately weak to moderately strong		
32.0					becoming greyish brown MUDSTONE, moderately weak		
						32.50	
					Black, COAL, weak to very weak, solid	33.45	
34.0					Grey SEATEARTH, moderately weak to moderately strong		
					becoming greyish brown MUDSTONE, moderately weak	35.00	
36.0					Boring Suspended		
38.0							
40.0							

Remarks All comments in "Descriptions of Strata", regarding the strength and consistency of the rock mass, are related to observations of penetration rate during drilling and in the absence of rock 'Core Samples', must be regarded as indicative only. During drilling, at the change of each rod below where water entered the hole, returns were lost, generally for a short period (0.3m to 0.5m maximum), however drilling indicated continuous solid ground at all times during these zones.
Wet from approximately 8m.

See sheets A & B for key to symbols

SE30NW

375

H.J.T. SOLMEK

Sheet 1 of 2

Borehole No. 4

Boring Method: ROTARY OPEN HOLE DRILLING TECHNIQUES AT 100mm DIAMETER, USING AIR FLUSH

Site: HIGHSTONE ROAD WORSBOROUGH COMMON, BARNSLEY

Drilling Commenced: 31.1.89

Ground Level: 5.13m A.A.D.

Scale	Samples Tests: Sample Type	Samples Tests: In-situ Test	Standing Water Level (m)	Reduced Level (m)	Description of Strata	Depth (m)	Legend
					Overburden		
2.0						2.50	
					Yellow brown, orange in places, SANDSTONE, weak becoming weak to moderately weak		
4.0							
6.0							
8.0						8.00	
					Very wet, no returns, Solid ▼ wet	8.20	
						9.10	
10.0					few returns probably Sandstone	10.20	
					Grey brown, MUDSTONE, silty, moderately weak in places weak		
12.0						12.50	
14.0					no returns, solid	14.00	
					Black, COAL, weak to very weak, solid	15.35	
16.0					Grey SEATEARTH, moderately weak to moderately strong becoming greyish brown MUDSTONE, moderately weak		
18.0							
20.0							

Remarks

See sheets A & B for key to symbols

British Geological Survey

SE 30 NW/23

FORM P 70
SERIES 680

CONFIDENTIAL

15 DEC 1

6-INCH MAP	B/N REGD. No.
Yorks. 274 SE	
(County, Sheet and Qtr.)	
SE 30 NW.	
(Nat. Grid, Sheet & Qtr.)	

Attach tracing from a map or sketch map if possible

Section of BARTON COLLIERY

No. 4 Underground Borehole

Purpose To prove the Silkstone Seam

Exact Site O.S. N.G.R. SE/34807/05431

Level at which ~~shaft~~ bore ~~drift~~ commenced relative to O.D. 930 ~~metres~~ ft* B.S.D.

Date of sinking or boring May 1971

Sinker or borer National Coal Board

Cores, other than coal, examined by P. Hirst

*Delete as appropriate

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS ~~Metres~~ ft*	~~Centims~~ ins*	DEPTH ~~Metres~~ ft*	~~Centims~~ ins*
	Floor of THORNCLIFFE SEAM				
	OPEN HOLE - NO CORE 46·02	151	0	151	0
	Dark grey shely mudstone	0·05	2	46·0151	2
	Grey mudstone-seatearth	0·08	3	46·0151	5
	Smooth dark grey shely mudstone with occasional mussel fragments	0·05	3	46·0151	0
	COAL	0·06	2½	46·0151	10½
	Fine grey siltstone-seatearth with roots	0·20	8	46·0152	6½
	Grey mudstone	0·02	0½	46·0152	7
	Grey laminated slightly silty mudstone with roots and ironstone nodules 0·146 1		6	46·0154	1
	Grey silty mudstone with roots, silty streaks and occasional lintric surfaces 1·93 2		4	46·0156	5
	Fine dark grey siltstone with ironstone nodules and occasional rootlets 0·53 1		9	48·2158	2
	Grey silty mudstone with siltstone layers at the top, micaceous partings and ironstone patches 0·56 1		10	48·7160	0
	Grey slightly silty mudstone with occasional plant straps and silty partings 1·93 6		4	50·7164	4
	Grey silty mudstone with ironstone patches and comminuted plant debris	0·20	8	50·7167	0
	Grey siltstone with carbonaceous/micaceous partings	0·18	7	51·0167	7
	Pale grey cemented sandstone with carbonaceous/micaceous partings	0·10	4	51·0167	11
	Grey silty mudstone with ironstone bands and a little plant debris	0·25	10	51·4169	9
	Slightly silty mudstone with ironstone nodules and thin bands of cemented ferruginous siltstone at the top 0·68 1		7	51·9170	4
SILKSTONE	COAL 2'-0"·62				
	Inferior COAL 5" 0·13				
	COAL 3" 0·05				
	Inferior COAL 1'5" 0·44 0·93 3		1	52·8173	5
	COAL 1" 0·04				
	Inferior COAL 1" 0·04				
	Grey mudstone with roots and nodular ironstone at the base 0·53 1		9	53·3175	2
	Fine grey siltstone with roots and ironstone nodules 0·86 2		10	54·2178	0
	Coarse grey siltstone with roots, some rippling present 0·41 1		4	54·6179	4
	Grey siltstone with occasional roots and ironstone patches, some rippling towards the base 0·57 1		8	55·1781	0
	Grey rippled silt/sandstone with micaceous partings	0·24	9	55·4181	9
	BOTTOM OF BOREHOLE				

FORM P 70
SERIES 600

SE 30 NU/22

COMMERCIAL IN CONFIDENCE
31 MAY 1972

6-INCH MAP | NEW GRID REF.
Yorks. 274 SE
(County, Sheet and Qtr.)
SE 30 NW
(Nat. Grid, Sheet & Qtr.)

Attach tracing from a map or sketch map if possible

Section of VARVIL (VARY LANE) Borehole

Purpose To prove the Swallow Wood, Haigh Moor and Lidgett seams

Exact Site O.S. N.G.R. TV/34769/05393

Level at which ~~shaft~~ bore ~~drift~~ commenced relative to O.D. 481·29 feet* A.O.D.

Date of sinking or boring Dec. 1971/January 1972

Sinker or borer Boyles Bros.

Cores, other than coal, examined by T. J. Smith.

*Delete as appropriate

GEOLOGICAL CLASSIFICATION	NATURE OF STRATA	THICKNESS feet	THICKNESS inches	DEPTH feet	DEPTH inches
	OPEN HOLE - NO CORE - 0 TO 580	580	0	580	0
	Grey mudstone with ironstone bands	1·01	3	581	3
	Ferruginous mudstone	0·07	3	581	6
	Grey mudstone	0·02	1	581	7
	Dark grey shaly mudstone with cubillelinton, occasional plant fragments, muscle and ~~dirrophis~~ sp.	0·35	10	582	5
	Grey mudstone	0·15	6	582	11
	Smooth dark grey/black shale with ironstone bands, ~~dirrophis~~ sp. and rather				
	large curved shells	0·46	6	583	5
	Grey sandy mudstone with plant remains	0·18	7	583	12
	Dark flaky mudstone	0·03	1	583	13
	Grey mudstone with occasional plant fragments	0·10	4	583	17
	Dark grey slightly silty shaly mudstone with nodules	0·13	5	584	10
	COAL	0·28	11	584	21
	Mudstone-seatearth with ~~lithomarsions~~ and coaly streaks	0·18	7	584	28
	COAL	0·11	4	584	32
	Dark grey mudstone-seatearth with rootlets, ~~siltstone~~ and occasional small ironstone nodules	1·28	4	585	36
	Slightly silty mudstone-seatearth with roots and ~~siltstone~~	0·15	6	585	42
	Dark grey mudstone with abundant plant remains	0·10	4	585	46
DUNSIL	Inferior dull COAL 0·10 4"				
	COAL 0·28 11"				
	Carbonaceous mudstone and inferior COAL 0·11 4"	0·52	8	586	46
	COAL 0·32 1'-0"				
	Grey mudstone-seatearth	0·28	11	586	57
	Strong siltstone-seatearth with rootlets and ironstone nodules	0·41	6	587	3
	Grey slightly silty mudstone with rootlets, plant remains and ironstone nodules	0·11	4	587	7
	Fine grey siltstone with occasional plant remains	0·28	11	587	18
	Grey sandstone with carbonaceous micaceous partings	2·79	2	590	20
	Strong grey siltstone (slightly darker with plant remains around 616 ft 0 in.)	1·30	3	591	23
	KIP: T.C. 607·70m probably COAL 197·70m	0·05	2	591	25
	COAL (fragmented)	0·15	6	591	31
	Weak flaky mudstone-seatearth	0·08	3	591	34