Environmental
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GEOTECHNICAL ENVIRONMENTAL

COAL RISK ASSESSMENT

job number	date
C377/19/E/565	10/12/2019

site address
Land at Genn Lane,
Ward Green,
Barnsley,
S70 6TF

written by	checked by
M.Cook	R.Palmer

issued by
M.Cook

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Environmental Geotechnical Specialists

Report on a Coal Mining Risk Assessment

Location:	Land at Genn Lane, Ward Green, Barnsley, S70 6TF		
For:	Garry Greetham Associates		
Report No.	C377/19/E/565	Report date:	December 2019

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

Dr. Mike Cook BSc PhD
Environmental Engineer

Steve Rogers CEng CGeol MICE MCIHT FGS ACIEH
Technical Director

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 Consultants Coal Mining Report[3].
- British Geological Survey *Borehole Records*[4].

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:

[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: 51002197352001 dated 2nd December 2019.
[4] Sources: British Geological Survey (NERC) Borehole Records [*online resource from* http://www.bgs.ac.uk//]

Table 1: Geological Data for the Site			
Strata Type	**Strata Name**[5]	**Previous Name**[6]	**Description**[3]
Made Ground/Fill	Made Ground (Undivided)	-	Made ground is an area where the pre-existing (natural or artificial) land surface is raised by artificial deposits. The purpose of the made ground is unspecified by the BGS viewer, however based upon aerial photography this may be associated with the releveling of ground for the adjoining sports pitch. Variable composition.
Superficial Geology	-	-	Not indicated to be present on site.
Solid Geology	Pennine Middle Coal Measures Formation	Middle Coal Measures	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.

The site is situated upon undifferentiated strata of the Pennine Middle Coal Measures Formation. 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 (around 6°) towards the northeast.

There are seven local 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**
Low Beamshaw Coal (LBE) (also known as the Beamshaw Low Coal)	0.0 – 1.2m	On Site	At or near to surface.
Kents Thin Coal (KN)	0.0 – 1.9m	200m SW	Approximately 20m.
Kents Thick Coal (KK)	0.3 – 2.6m	550m SW	Approximately 37.5m.
Top Beamshaw Coal (TBE)	0.0 – 2.9m	170m NE	Not anticipated to be present below the site.
Abdy Coal (A)	0.0 – 1.9m	300m NE	Not anticipated to be present below the site.
Two-foot Coal (TF)	0.1 – 2.1m	380m NE	Not anticipated to be present below the site.
Meltonfield (MD)	0.0 – 1.4m	510m NE	Not anticipated to be present below the site.

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

The Low Beamshaw Coal (LBE), is indicated to outcrop on the site. Considering the generalised vertical section on the geological map, the Kents Thin Coal (KN) is anticipated to be present

[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*]

approximately 20m below the Low Beamshaw Coal. Moreover, the Kents Thick Coal (KK) anticipated to be present approximately 17.5m below the Kents Thin Coal. Thus, these two seams could be expected to be present below the site at depths of approximately 20m and 37.5m, respectively.

However, again considering the generalised vertical section on the geological map, the site is stratigraphically below the coal seams northeast of the site, the Top Beamshaw Coal (TBE), Abdy Coal (A), Two-foot Coal (TF) and the Meltonfield Coal (MD). Thus, these seams are not anticipated to be present below the site surface.

2.2 Coal Authority Mines Report

As part of this study a Coal Authority Consultants Coal 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 Consultant's Coal Mining Report

Has the report highlighted evidence or potential of:			
Ref	**Mining Feature**	**Yes/No**	**Comments**
1	Underground Coal Mining	Yes	The property is in a surface area that could be affected by underground mining in 5 seams of coal between 105m and 436m depth and worked between 1867 and 1970.
2	Probable Unrecorded Shallow Workings	Yes	Probable unrecorded shallow workings are indicated to be present below the site.
3	Spine Roadways at Shallow Depth	No	No spine roadway recorded at shallow depth.
4	Mine Entries	No	None recorded within 100m of the enquiry boundary.
5	Abandoned mine plans	Yes	Plans of abandoned mine workings below the site are suggested to be available by the Coal Authority.
6	Outcrops	Yes	The Low Beamshaw Coal is indicated to be present on site.
7	Geological Faults	No	No faults, fissures or breaklines recorded.
8	Opencast Mines	No	None recorded within 500 metres of the enquiry boundary.
9	Coal Authority Managed Tips	No	None recorded within 500 metres of the enquiry boundary.
10	Site Investigations	No	None recorded within 50 metres of the enquiry boundary.
11	Remediated Sites	No	None recorded within 50 metres of the enquiry boundary.
12	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 of the enquiry boundary, since 31st 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.
13	Mine Gas	No	None recorded within 500 metres of the enquiry boundary.
14	Mine Water Treatment Schemes	No	None recorded within 500 metres of the enquiry boundary.
15	Future underground mining	No	For further information please see section 3 of the Consultant's Coal Mining Report (ref 51002197352001).
16	Coal mining licensing	No	
17	Court orders	No	
18	Section 46 notices	No	
19	Withdrawal of support notices	No	
20	Payments to owners of former copyhold land	No	

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
SE30SW142	220m NE	15.0	Coal (Intact) – 11.1m (0.40m thickness).
SE30SW143	220m NE	20.0	Coal – 20m (thickness not indicated).
SE30SW144	220m NE	20.0	Coal (Intact) – 17.1m (0.40m thickness).
SE30SW145	220m NE	20.0	Coal (Intact) – 19.5m (thickness not indicated).

It should be appreciated that there was limited borehole data within the immediate vicinity of the site that was available for public viewing. Other borehole scans were available at a greater distance from the site (within other fault blocks), however, these were felt to be of limited value to the study as they are not anticipated to present comparable ground conditions to those below the surface of the site.

Nevertheless, the boreholes have indicated notable coal seams present at approximately 11m below ground level (bgl) and 17-20m bgl of the ground surface within the local area. Based on the available geological data, and considering that the borehole records are approximately 220m NE of the site, it is anticipated that these seams may represent the Abdy Coal and Top Beamshaw Coal. These coal seams are not anticipated to be present underneath the site.

However, it should be appreciated that whilst the The Low Beamshaw Coal, Kents Thin Coal and Kents Thick Coal seam were not observed within these boreholes, 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 proposed 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	Low Beamshaw Coal (LBE)	Moderate
		Kents Thin Coal (KN)	Moderate
2	Coal workings at depth	Kents Thick Coal (KK) and below	Low

On the basis of all of the information provided above, two 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.**
Low Beamshaw Coal (LBE)	0.0 – 1.2m	At or near to surface.	13.2m
Kents Thin Coal (KN)	0.0 – 1.9m	Approximately 20m.	20.9m
Kents Thick Coal (KK)	0.3 – 2.6m	Approximately 37.5m.	28.6m

Based on the above information, it is considered that there will not be a sufficient thickness of competent overburden above the Low Beamshaw Coal and Kents Thin Coal 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.

However, based on its anticipated depth below ground level, it is likely that there should be a sufficient thickness of competent overburden above the Kents Thick Coal, such that the risk from the collapse of workings is low. Therefore, a low risk rating has been assigned to this seam.

4. Conclusions

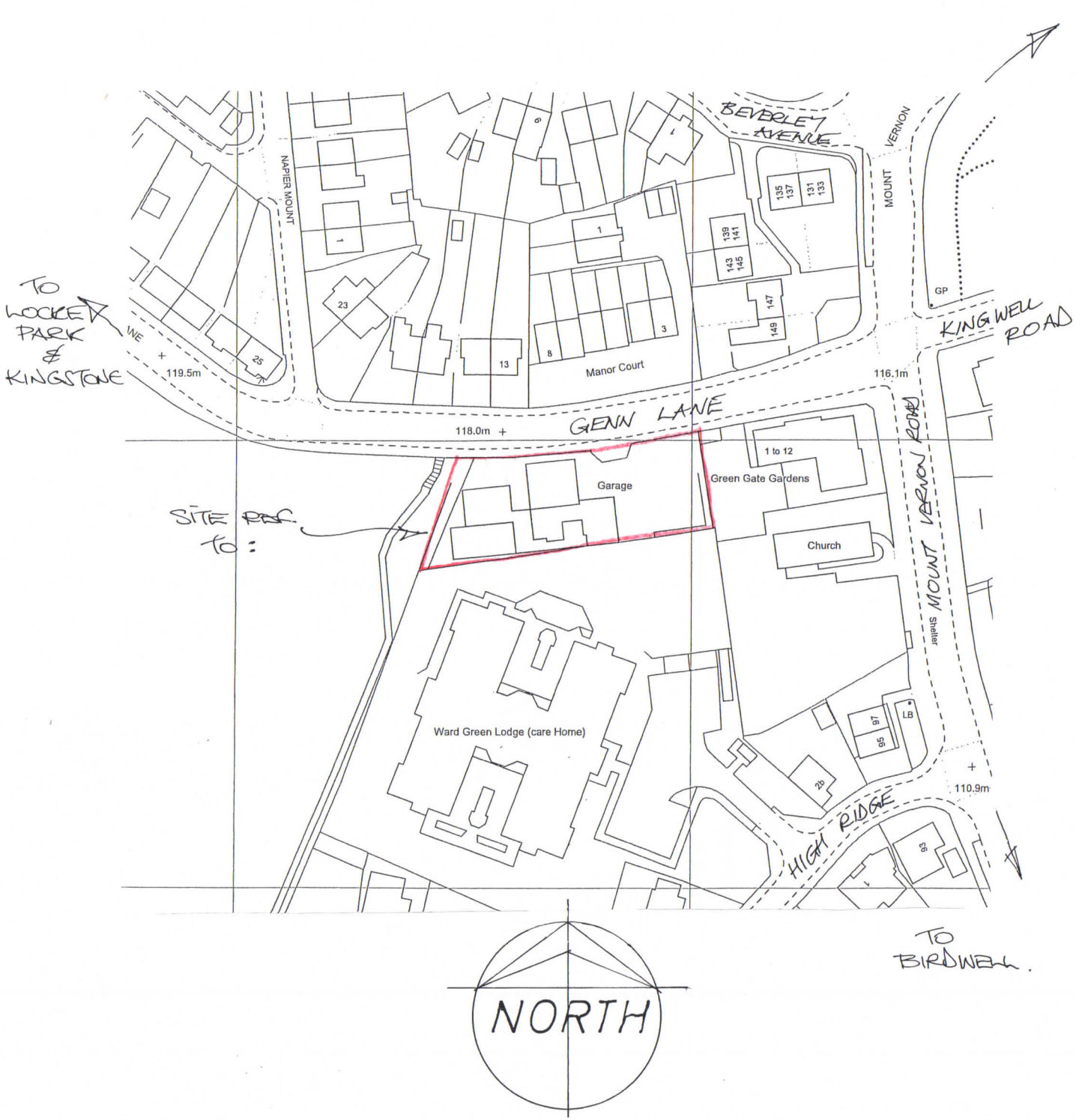
In light of the potential risks of instability at the site from the working of shallow coal, it cannot be recommended that development takes place without further investigation to conclusively determine the presence of such workings. This work should include physical drilling methods to explore the ground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

General practice is to undertake rotary openhole boreholes at three locations across the site to mitigate against the potential for drilling through intact columns associated with pillar and stall workings. Furthermore, 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, in this case, the risk of instability is due to shallow workings, therefore, drilling to these depths may not be necessary and the objective should be to ensure that the shallow seams are un-worked or have sufficient competent cover. It may therefore be possible, in the first instance, to undertake one borehole to 30m below the top of the rockhead, with the remaining boreholes proving the depth and continuity of the coal seam(s). In any event, it is considered that approval should be sought with the Local Authority as to the efficacy of this approach.

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



Rev	Notes	Date

Garry Greetham Associates
Residential Design Consultant
Westwood House
18 Carr Lane
Tankersley
Barnsley S75 3BE
Tel(01226)746573

PROJECT	Residential Development
CLIENT	Mr. J. Hoyland
TITLE	Location Layout
ADDRESS	Furniture Interiors Ltd Genn Lane, Ward Green, Barnsley. S70 6TF
DRAWN BY	ggg
SCALE	1:1250
DATE	Oct 19
DRAWING No	910-01
REV	

Member of the Chartered Institute of Architectural Technologists

Appendix 2

Coal Authority Report

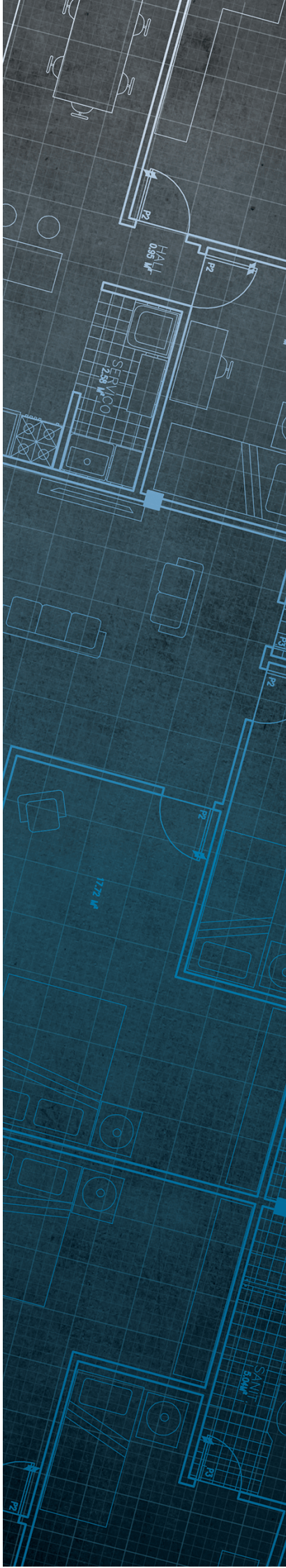
The Coal Authority

Consultants

Coal Mining Report

Land At Genn Lane
Ward Green
Barnsley
S70 6TF

Date of enquiry:	**2 December 2019**
Date enquiry received:	**2 December 2019**
Issue date:	**2 December 2019**
Our reference:	**51002197352001**
Your reference:	**C377/19/E/565**



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

ROGERS GEOTECHNICAL SERVICES LTD

Enquiry address

Land At Genn Lane
Ward Green
Barnsley
S70 6TF



Approximate position of property

Map data

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Mansfield
Nottinghamshire
NG18 4RG

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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BARNSLEY	Coal	6Z88	105	Beneath Property	6.1	North-East	252	1867
unnamed	BARNSLEY	Coal	6Z86	109	Beneath Property	6.1	East	252	1883
BARROW	TOP FENTON	Coal	6Z8F	323	Beneath Property	6.0	East	96	1949
BARROW	TOP FENTON	Coal	6Z8G	331	North	6.1	East	107	1955
BARNSLEY	PARKGATE	Coal	6Z8K	345	Beneath Property	5.5	East	109	1960
BARNSLEY	PARKGATE	Coal	6Z8L	354	North	5.7	East	128	1960
BARROW	MIDDLETON MAIN	Coal	6Z8P	366	Beneath Property	6.2	East	132	1938
BARROW	MIDDLETON MAIN	Coal	6Z8Q	376	North	5.7	East	140	1938
BARROW	SILKSTONE	Coal	6Z8V	430	Beneath Property	5.0	East	200	1922
BARNSLEY	SILKSTONE	Coal	6Z8W	436	North	5.3	East	200	1970

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

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Abandoned mine plan catalogue numbers

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

7911	FGB582	SY210
SY140	1676	SY206
NE1075	FGB160	SY177

Our records show we have more plans than those shown above which could affect the enquiry boundary.

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
BEAMSHAW LOW	Coal	Yes	Within	N/A	133

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

Please refer to the “Summary of findings” map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

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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.

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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.

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Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

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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.

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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.

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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.

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The Coal Authority

Summary of findings

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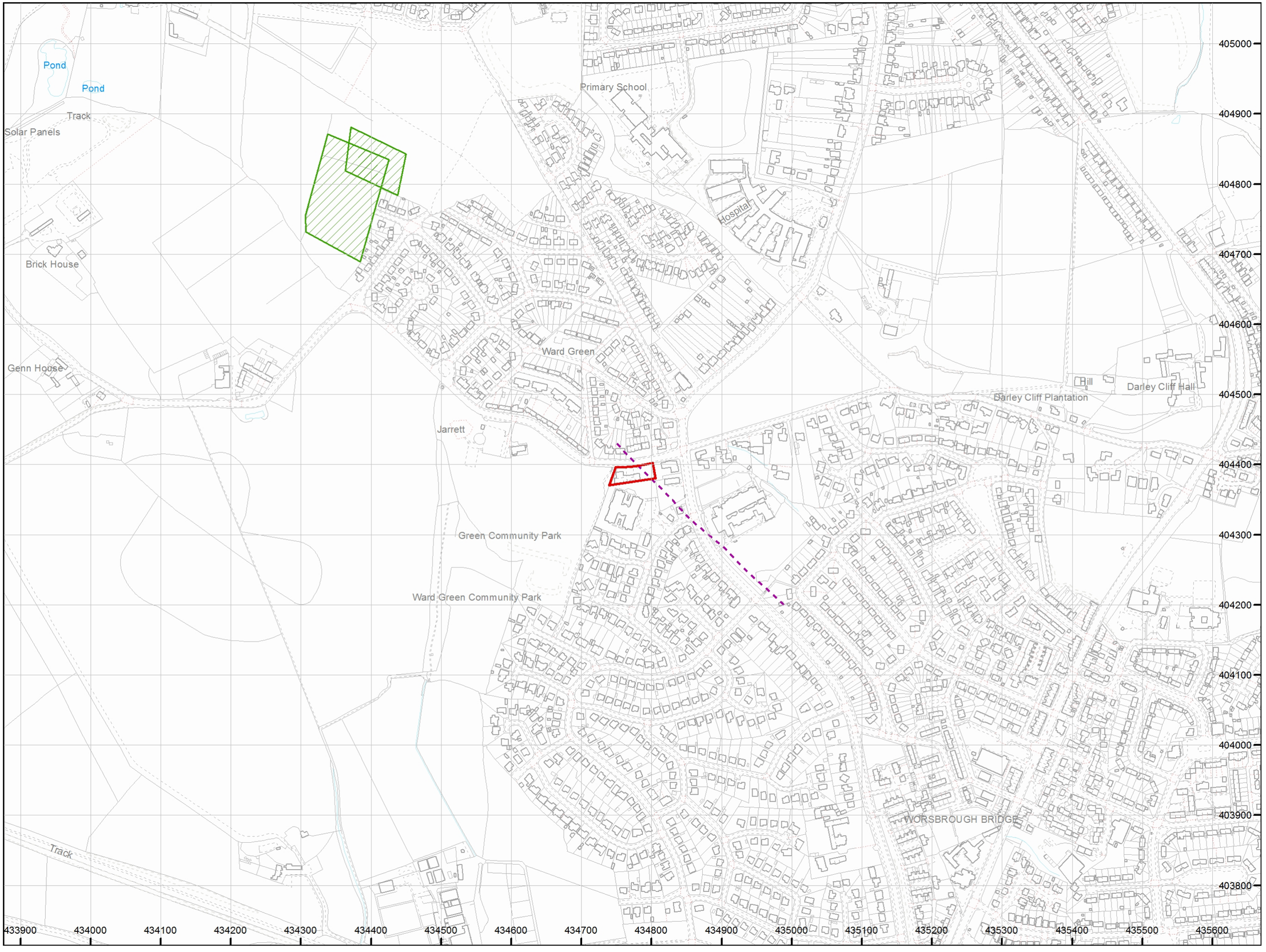
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

Approximate position of the enquiry boundary shown

Outcrop (Conjectured)

Unlicensed opencast site



How to contact us
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www.groundstability.com

Appendix 3

BGS Borehole Records

Norwest Holst Soil Engineering Ltd.

Borehole No. **A**

BOREHOLE LOG

Contract No. F6031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Openhole
Diameter of Borehole 85 mm

Sheet 1 of 2
Chainage
Ground Level m.A.O.D.
Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Firm, brown, grey mottled silty CLAY.							4/6
		2.40					
Dark grey, slightly silty highly weathered MUDSTONE.							

Type of Sample

- Is. S.P.T.
- Ic. C.P.T.
- O Jar
- ● Bulk
- ▮ Undisturbed
- × Vane
- Δ Water
- Piezometer

Remarks (Observations of Ground Water etc.)

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **A**

F6031

BOREHOLE LOG

Contract No. F6031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Openhole 85 mm
Diameter of Borehole

Sheet 2 of 2
Chainage
Ground Level m.A.O.D.
Date 4/8/84

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Dark grey, slightly silty highly weathered MUDSTONE.		11.10					
COAL.		11.50					
Dark grey, slightly silty, moderately to highly weathered MUDSTONE.		15.00					4/6
BOREHOLE COMPLETE.							

Type of Sample

Is S.P.T. ■ Undisturbed
Ic. C.P.T. × Vane
O Jar △ Water
● Bulk ⊗ Piezometer

Remarks (Observations of Ground Water etc.)

Water struck at 8.00 m.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **B**

F6031

BOREHOLE LOG

Contract No.....

Location Hornby Street, Barnsley

Client Hutter Jennings & Titchmarsh

Method of Boring Rotary Openhole

Diameter of Borehole 85 mm

Sheet 1 of 2

Chainage.....

Ground Level..... m.A.O.D.

Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N" R.Q.D.%	Daily Progress
Clayey TOPSOIL.		0.40					4/6
Light brown slightly silty fine and medium grained highly weathered SANDSTONE, becoming less weathered with depth.							

Type of Sample

- S.P.T. — Undisturbed
- C.P.T. — Vane
- Jar — Water
- Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **B**

BOREHOLE LOG

Contract No. F6031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Openhole
Diameter of Borehole 85 mm

Sheet 2 of 2
Chainage
Ground Level m.A.O.D.
Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Light brown slightly silty fine and medium grained highly weathered SANDSTONE, becoming less weathered with depth.		13.00					
Dark grey slightly silty highly weathered MUDSTONE.							
COAL.							
BOREHOLE COMPLETE.		20.00					

Type of Sample

- S.P.T. — Undisturbed
- C.P.T. — Vane
- Jar — Water
- Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Water struck at 6.30 m.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **C**

BOREHOLE LOG

Contract No. F6031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Openhole
Diameter of Borehole 85 mm

Sheet 1 of 2
Chainage
Ground Level m.A.O.D.
Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Firm light brown CLAY with occasional SANDSTONE fragments.		2.00					4/6
Light brown slightly silty fine and medium grained highly to completely weathered SANDSTONE, becoming less weathered with depth.							

Type of Sample

S.P.T. Undisturbed
C.P.T. Vane
Jar Water
Bulk Piezometer

Remarks (Observations of Ground Water etc.)

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **C**

BOREHOLE LOG

Contract No. F6031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Daenhole
Diameter of Borehole 85 mm

Sheet 2 of 2
Chainage
Ground Level m.A.O.D.
Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
Light brown slightly silty fine and medium grained highly to completely weathered SANDSTONE, becoming less weathered with depth.		12.50					
Dark grey slightly silty moderately to highly weathered MUDSTONE.		17.10					
COAL.		17.50					
Dark grey, slightly silty moderately weathered MUDSTONE.							
BOREHOLE COMPLETE.		20.00					

Type of Sample

- D S.P.T. — Undisturbed
- Ic. C.P.T. — Vane
- O Jar — Water
- Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Water struck at 9.50 m.

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **D**

BOREHOLE LOG

Contract No. F8031
Location Hornby Street, Barnsley
Client Hutter Jennings & Titchmarsh
Method of Boring Rotary Borehole
Diameter of Borehole 85 mm

Sheet 1 of 3
Chainage
Ground Level m.A.O.D.
Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.Q.D.%	Daily Progress
MADE GROUND: Sand and sandstone gravel fill.		1.40					4/6
Light brown, slightly silty fine and medium grained moderately weathered SANDSTONE.		10.00					

Type of Sample

- Is S.P.T. — Undisturbed
- Ic. C.P.T. — Vane
- O Jar — Water
- Bulk — Piezometer

Remarks (Observations of Ground Water etc.)

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey

Norwest Holst Soil Engineering Ltd.

Borehole No. **D**

Contract No. F8031

BOREHOLE LOG

Location Hornby Street, Barnsley

Sheet 2 of 3

Client Hutter Jennings & Titchmarsh

Chainage

Method of Boring Rotary Openhole

Ground Level m.A.O.D.

Diameter of Borehole 85 mm

Date 4/6/84

Description of Strata	Legend	Depth Below G.L.(m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N" / R.Q.D.%	Daily Progress
Grey slightly silty moderately to highly weathered MUDSTONE.		10.00					
COAL.		19.60					
		20.00					

Type of Sample

Is S.P.T. ■ Undisturbed

Ic. C.P.T. × Vane

O Jar Δ Water

● Bulk Piezometer

Remarks (Observations of Ground Water etc.)

Water levels are subject to seasonal or tidal variations and should not be taken as constant

British Geological Survey