

**Environmental
Geotechnical
Specialists**



COAL INVESTIGATION

job number J4755/19/E/C	date July 2019
site address 2 Silkstone Lane Silkstone, Barnsley, S75 4DX	
written by C. Mason	checked by R. A. Palmer
issued by C. Mason	

Rogers Geotechnical Services Ltd

Telephone 0843 50 666 87 **Fax** 0843 51 599 30

Email enquiries@rogersgeotech.co.uk

www.rogersgeotech.co.uk

Offices 1 & 2, Barncliffe Business Park, Near Bank, Shelley,
Huddersfield, West Yorkshire HD8 8LU.

GEOTECHNICAL
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Report on Rotary Probing

Location: 2 Silkstone Lane
Silkstone, Barnsley, S75 4DX

For: Mr David Gill

Report No. J4755/19/E/C

Report date: July 2019

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

Charlotte Mason BSc FGS
Geo-environmental Engineer

Rob Palmer MSc FGS ACIEH
Senior Geo-environmental Engineer

1. Introduction

In accordance with planning application number 2018/1082, the site is to be developed by the demolition of the existing dwellings and the construction of a new dwelling and detached garage. The application site falls within the defined Development High Risk Area; therefore within the application site and surrounding area, there are coal mining features and hazards which need to be considered in relation to the determination of this planning application.

As a consequence a site investigation has been undertaken to establish if coal workings are present beneath the area of the proposed works. This report presents the data obtained and discusses the ground conditions in relation to the proposed development.

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of the laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between borehole positions, these are for guidance only and no liability can be accepted for their accuracy.



This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Preliminary Desk Study

The following information has been considered during the works.

- Appraisal of available on-line British Geological Survey and Coal Authority data.
- Acquisition of The Coal Authority licence.

4. Fieldworks

4.1 Acquisition of Licence

In order to undertake this investigation it was necessary to obtain permission to enter or disturb Coal Authority interests. This was permission was granted in July 2019 as permit reference number 18346, which is presented in Appendix 1 to this report. In accordance with the joint Coal Authority and Health and Safety Executive positioning statement, and under the requirements of the licence, the works were undertaken employing water flush drilling techniques with gas monitoring of the boreholes during the fieldworks.

4.2 Rotary Open-hole Boreholes

The fieldworks were undertaken during the period 9th - 11th July 2019 in accordance with the instruction to proceed issued by the client. These works were required in order to prove that workings were not present to a depth of 30m beneath this site.

The boreholes were sunk using a Comacchio 205 rotary drilling rig using rotary open-hole drilling techniques and employing 130mm diameter drag and tricone roller bits. Where necessary, 140mm diameter casing was temporarily installed through the overburden to support the bore. The investigation was undertaken using water flush drilling techniques in accordance with the Coal Authority and Health and Safety Executive positioning statement. Drill chippings brought to surface in the flush returns were inspected by the driller on a screen, which forms part of the re-circulation tanks. The borehole positions are shown on the site plan, which is presented in Appendix 2 and the strata conditions are presented on the borehole records in Appendix 3.

Whilst it was necessary to ensure at least one borehole position was drilled to 30m depth, the required termination depth of the other position was reviewed during the course of the fieldworks. In this case, borehole BH1 was sunk to 30m; borehole BH2 and BH3 were curtailed at 18m as sufficient data had been obtained.



5. Geological Appraisal

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site

Strata Type	Strata Name ¹	Previous Name	Description ²
Superficial Geology	-	-	None identified
Solid Geology	Parkgate Rock	-	A named sandstone member of the Pennine Lower Coal Measures Formation

It should be appreciated that the site is underlain by a named sandstone member of the Pennine Lower Coal Measures Formation. There are no geological dip indicators relevant to the site (ie within the same faulted block) shown on the available geological map data. However, taking into account the outcrop pattern of the strata and the topography of the area, it may be assumed that the solid geology is sub horizontal.

It should be noted that a north-west south-east trending fault is located within close proximity to the site. However, this feature is not anticipated to alter the ground condition across the site or affect the proposed development.

There are two notable coal seams that outcrop within the vicinity of the site as summarised below:

Table 2: Summary of Coal Seams Within The Vicinity Of The Site.

Seam Name	Seam Thickness*	Outcrop Distance From Site*
Middleton Little (Parkgate) Coal Seam	0 – 3.9m	430m NW
Middleton Main (Thorncliffe Thin, Walkers Thin, New Hard, Swilley)	0 – 3.1m	530m NW

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

The geological data suggests that Middleton Little Coal Seam is discontinuous in nature and is stratigraphically located within the centre of the Parkgate Rock. Whilst the true thickness of the Parkgate Rock cannot be accurately gauged (between 0m and 13m), assuming that the seam will be present within the stratum profile, it is likely to be encountered within the top 10m of the site surface.

The Middleton Main Coal Seam is also discontinuous in nature, however, if present within the stratum profile, is anticipated at the base of the Parkgate Rock. There are no further named coal seams anticipated to be present at shallow depths (within 30m) beneath the site.

¹ Sources: British Geological Survey (NERC) Map Sheets 86; Glossop; Solid and Drift Edition, and the Geology of Britain Viewer [online resource from www.bgs.ac.uk]



6. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 3: Generalised Strata Profile

Depth to base (m)	Strata type	Positions strata was revealed	Groundwater strikes (m)
0.3 – 0.4	TOPSOIL	All	None
0.6 – 1.2	CLAY/Weathered Sandstone	All	None
15.5 – 16.5	SANDSTONE (Parkgate Rock)	All	None
16 – 16.8	Coal (Middleton Main)	All	None
+18 - +30	MUDSTONE (Pennine Lower Coal Measures)	All	None

'+' Denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

Within the stratum profile the following notable horizons were recorded.

Table 4: Notable Horizons

Feature	Depth (m)		Thickness (m)	Positions encountered
	Top	Bottom		
Coal (Intact)	15.5	16.0	0.5	BH1
Coal (Intact)	16.2	16.45	0.25	BH2
Coal (Intact)	16.5	16.8	0.3	BH3

During this investigation, after initially encountering a capping of topsoil, orangish brown and brown clay was revealed to a maximum depth of 1.2m. This stratum is anticipated to represent the upper weathered fraction of the Parkgate Rock (Sandstone), as indicated by the geological data for the site. Casing was installed within all boreholes to 1.5m depth prior to progressing the drilling.

Below this stratum, brown and yellowish brown sandstone was encountered within all boreholes to depths ranging between 15.5m and 16.5m. It should be appreciated that the desk study data suggests that the Middleton Little Coal Seam could be present within the sandstone horizon. However, no evidence of a coal seam, broken or voided ground was observed throughout this profile.

Nonetheless, one seam of coal was observed within all boreholes, located at the base of the Parkgate Rock Sandstone (15.5m – 16.5m). This seam ranged in thickness between 0.25m and 0.5m and was noted to be intact in all investigation positions. Due to its depth below ground level, the available geological data suggest that this coal seam is consistent with the Middleton Main Coal.



The coal seam was proven to be underlain by Mudstone in all locations to a maximum depth of 30m bgl. No further evidence of coal seams, broken or voided ground was observed throughout the remainder of the stratum profile.

No groundwater strikes were observed during the site investigation. However, it is possible that the use of water flushing techniques may have masked the presence of any water strikes within the other borehole locations. In any event, it should be appreciated that groundwater levels are subject to seasonal variation or changes in local drainage conditions.

In addition, no methane was detected, with levels of between 0% and 0.1% carbon dioxide and between 20.8% and 20.9 oxygen being recorded during the drilling phase.

7. Discussion of Ground Conditions

On the basis of all of the information provided above it is noted that there is one coal seam present within the stratum profile at depths ranging between 15.5m and 16.5m. This seam is anticipated to represent the Middleton Main Coal Seam. Due to its thickness (0.25m – 0.5m), it is unlikely that this seam would prove commercially viable for extraction. Furthermore, this horizon of coal was proven to be intact at all borehole positions. On the basis of the information provided above, it is considered that it is highly unlikely that shallow coal workings are present beneath or in close proximity to the area of the proposed development. Nonetheless, in the unlikely event that workings were present within areas of the site un-investigated, given the indicated thickness of the seam, it is considered that there will be a sufficient thickness of competent overburden above the seams such that any instability caused by such workings would be unlikely.

In addition, the results of the gas monitoring conducted during the drilling phase suggest that there is a negligible risk of gasses associated with mine workings being present below the proposed development.

8. Risk Assessment

In light of the findings of this investigation, the risk to the proposed development is considered 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 workings	Middleton Little Coal Seam	Low
2		Middleton Main Coal Seam	Low

In view of all the information obtained in this investigation, it is considered that there is a low risk of ground movement as a consequence of coal workings beneath the site.

9. References

- British Standards Institution (2015) BS5930: *Code of practice for site investigations*, B.S.I., London.
- P.R.HEALY, J.M.HEAD: Construction over abandoned mine workings, SP 32, 1984, CIRIA
- British Geological Survey (NERC) (2019), BGS, Keyworth.
 - Geology of Britain Viewer:
(http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)
 - Borehole Scans:
(<http://www.bgs.ac.uk/data/boreholescans/>)
 - Lexicon of Named Rock Units:
(<http://www.bgs.ac.uk/lexicon/>)



Appendix 1

Coal Authority Licence



The Coal
Authority

Permit to Enter or Disturb Coal Authority Mining Interests

Permit Reference Number 18346

Name and Address of Permit Holder:

*Dave Gill
Woodley Lane
Head Road
Cawthorne
Barnsley
S75 4AA*

Site Location:

*Land at
2 Silkstone Road
Silkstone
S75 4DX*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Investigation of shallow mine workings by three boreholes to 30m bgl

within the Authority's mining interests at the identified site location for the period of 12 months from the granted date shown below. The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Applicant's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.

Signed: *Paul Heap* Granted Date: *03/07/2019*

For and on behalf of The Coal Authority

Nominated Representative: Paul Heap, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637154; E-Mail: permissions@coal.gov.uk



Appendix 2

Site Plan



Plan not to scale and investigation positions approximated from site operative's notes.

Title: **Investigation Location Plan**



Rogers **Geotechnical Services** Ltd

Site Name:

2 Silkstone Lane, Silkstone, Barnsley, S75 4DX

Job No:

J4755/19/E



Appendix 3

Rotary Borehole Records



Borehole Log

Borehole No.

BH1

Sheet 1 of 3

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

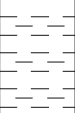
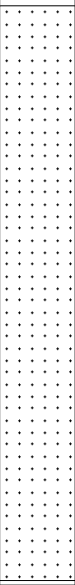
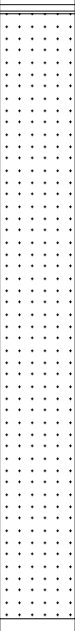
Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 09/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			TOPSOIL	
					1.20			CLAY/Weathered sandstone (Driller's notes)	1
								Yellow SANDSTONE (Driller's notes) (Parkgate Rock)	2
					5.00			Grey MUDSTONE (Driller's notes)	5
					6.00			Yellowish brown SANDSTONE (Driller's notes) (Parkgate Rock)	6
								Continued on Next Sheet	10

Remarks

Starter pit excavated until natural soils encountered. Dayworks: 1.5hrs fetching water and creating access ramp. Casing installed to 5m bgl.





Borehole Log

Borehole No.

BH1

Sheet 2 of 3

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 09/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									11
									12
									13
									14
									15
					15.50			COAL (Intact) (Driller's notes)	
					16.00			Light grey MUDSTONE (Driller's notes)	16
					16.50			Very dark grey MUDSTONE (Driller's notes)	17
					17.50			Medium grey MUDSTONE (Driller's notes)	18
									19
									20
								Continued on Next Sheet	

Remarks

Starter pit excavated until natural soils encountered. Dayworks: 1.5hrs fetching water and creating access ramp. Casing installed to 5m bgl.





Borehole Log

Borehole No.

BH2

Sheet 1 of 2

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 09/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL	
					0.60			CLAY	
								Brown SANDSTONE (Driller's notes) (Parkgate Rock)	1
									2
									3
									4
									5
									6
									7
									8
									9
									10

Continued on Next Sheet

Remarks

Starter pit excavated until natural soils encountered. Casing installed to 1.5m.





Borehole Log

Borehole No.

BH2

Sheet 2 of 2

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 09/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									11
									12
									13
									14
									15
					16.00				16
					16.20			Very dark grey MUDSTONE (Driller's notes)	
					16.45			COAL (Intact) (Driller's notes)	
								Grey MUDSTONE (Driller's notes)	
									17
					18.00			End of Borehole at 18.00m	18
									19
									20

Remarks

Starter pit excavated until natural soils encountered. Casing installed to 1.5m.





Borehole Log

Borehole No.

BH3

Sheet 1 of 2

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

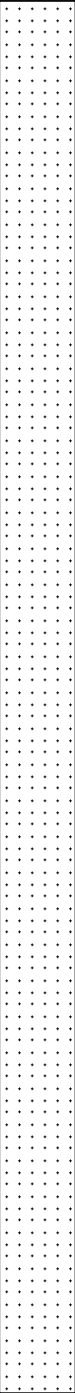
Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 10/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			TOPSOIL	
					0.80			Weathered SANDSTONE (Driller's notes) (Parkgate Rock)	1
								Brown SANDSTONE (Driller's notes) (Parkgate Rock)	2 3 4 5 6 7 8 9 10
Continued on Next Sheet									

Remarks

Starter pit excavated until natural soils encountered. Casing installed to 1.5m.





Borehole Log

Borehole No.

BH3

Sheet 2 of 2

Project Name: 2 Silkstone Road

Project No.
J4755/19/E

Co-ords:

Hole Type
RO

Location: Cawthorne, Silkstone S75 4DX

Level:

Scale
1:50

Client: Mr Dave Gill

Dates: 10/07/2019

Logged By
DG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
									11
									12
									13
									14
									15
									16
					16.50				
					16.80			COAL (Intact) (Driller's notes)	
								Grey MUDSTONE (Driller's notes)	17
					18.00			End of Borehole at 18.00m	18
									19
									20

Remarks

Starter pit excavated until natural soils encountered. Casing installed to 1.5m.

