

Environmental
Geotechnical
Specialists



COAL MINING INVESTIGATION REPORT

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Report on Rotary Probing

Location: **Crows Nest Farm**
Crawshaw Lane, Flockton, Huddersfield, WF4 4BY

For: Mr & Mrs Ellis

Consultants: Highstone Housing Services Ltd

Report No. C3875/23/E/5884

Report date: December 2023

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

James Finch BSc FGS
Graduate Engineer

Rob Palmer MSc FGS ACIEH
Senior Geo-environmental Engineer

1. Introduction

It is understood that the site is to be developed by the construction of a new detached residential dwelling with associated parking and garden areas. As part of the planning process 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

A Coal Mining Risk Assessment has previously been carried out by ARP Geotechnical Ltd. This report, referenced ELS/01/JED and issued 24th April 2020, considers that there is a possibility that any workings that may have been undertaken within the Second Brown Metal Coal seam could pose a risk to ground stability on the site. It was therefore recommended that intrusive works be carried out in order to investigate the possibility of such workings.

4. Fieldworks

4.1 Acquisition of Coal Authority Permit

In order to undertake this investigation, it was necessary to obtain permission to enter or disturb Coal Authority interests. This permission was granted on the 22nd November 2023 as permit reference number 27575, 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 permit, the works were undertaken employing water flush drilling techniques. Furthermore, the drillers wore gas detectors on their person throughout the works.

4.2 Rotary Open-hole Boreholes

The fieldworks were completed between the 11th and 12th of December 2023, in accordance with the instruction to proceed issued by the client. These works were required in order to prove that workings were not present at shallow depths beneath the site, as identified within the coal mining risk assessment.

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. In addition, representative disturbed samples of the arisings were taken at regular depth intervals and sealed in plastic containers. The borehole positions are shown on the site plan 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 positions was reviewed during the course of the fieldworks, in accordance with the findings of the geological review and CMRA. A summary of the works completed is presented below:

Table 1: Summary of Completed Works

Location	Dates Drilled	Depth (m)	Comments
BH01	12/12/23	10	Terminated as sufficient data was obtained.
BH02	12/12/23	10	Terminated as sufficient data was obtained.
BH03	11/12/23	30	Target depth reached.

5. Geological Appraisal

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

Strata Type	Strata Name ¹	Previous Name	Description ²
Superficial Geology	N/A	N/A	Not indicated to underlie the site.
Solid Geology	Birstall Rock	Cropper Gate Rock Park Gate Rock	The Birstall Rock is a fine-grained, thickly bedded, cross bedded sandstone with common pebbles of ironstone, coal sandstone and mudstone, and common streaks of shaly coal.

A dip marker located within the same faulted block 1.1km to the northwest of the site indicates that the dip of the solid geology in the general area is 1° or 2° to the east.

There is one notable coal seam that outcrops within the vicinity of the site, as summarised below:

Seam Name	Seam Thickness*	Outcrop Distance from Site*
Second Brown Metal Coal (SMBC)	0.4m to 0.7m	30m

*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 the Second Brown Metal Coal seam could be observed at shallow depths; within the top 10m of the site surface. However, considering the generalised vertical section as shown on the BGS 1:10000 and 1:50000 maps, the Third Brown Metal Coal is also anticipated to be present at depths in within 30m below ground level (bgl). Taking the above information into consideration, the geological review suggests that an intrusive investigation may encounter two coal seams (anticipated to represent the Second and Third Brown Metal Coal seams) at relatively shallow depth.

6. Strata Conditions

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

Depth to Base (m)	Strata Type	Positions Strata was Recorded	Groundwater (m)
0.20	MACADAM	BH03	None
0.5	Made ground (CLAY fill)	BH02	None
1 – 1.2	Brown and black CLAY	All	None

¹ Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and the Geology of Britain Viewer [online resource from www.bgs.ac.uk]

2 – 7	Light yellow SANDSTONE	BH01, BH03	None
7.5	Loss of flush	BH01	None
8 – +10	Light orange SANDSTONE	BH01, BH02	None
+10	Light orange MUDSTONE	BH01	None
16	Dark yellow SANDSTONE	BH03	None
+30	Dark yellow MUDSTONE	BH03	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.

During this investigation, after initially encountering a macadam surface in BH03 and 0.50m of clay fill in BH02, a brown and black clay was revealed to a maximum depth of 1.20m. This stratum is anticipated to represent the upper most weathered fraction of the Birstall Rock, as indicated by the geological data for the site. Below this stratum, layers of the Birstall Rock were revealed to a depth of 30m, comprising layers of mudstone and sandstone.

Casing was installed to 8.00m within BH01, to 2.00m within BH02 and 6m in BH03.

No coal seam was encountered during drilling. Flush was lost or waning within the sandstone in each borehole, from 1.2m to 8m in BH01, from 1.2m to 10m in BH02 and from 6m to 9m in BH03, however, as no loss of drilling resistance was recorded in any of these cases, it is reasoned that these losses of flush represent localised zones of naturally fractured rock, and not zones of illicit mining activity.

No groundwater strikes were recorded in any of the boreholes.

7. Discussion of Ground Conditions

On the basis of all of the information provided above it is noted that there are no coal seams present within 30m of the site ground level. Indeed, the boreholes indicate that there is a significant thickness of sandstone from surface, likely representing the Birstall Rock. Beneath this sandstone member, undifferentiated strata of the Pennine Lower Coal Measures Formation was recorded to depth.

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	Second Brown Metal Coal	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 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- Healy, P. and Head, J., 1984. *Construction over abandoned mine workings*. London: Construction Industry Research and Information Association [for] Directorate of Civil Engineering Services, Property Services Agency, Dept. of the Environment.
- Parry, D. and Chiverrell, C., 2019. *Abandoned mine workings manual*. London: CIRIA.
- British Geological Survey (NERC) (2023), 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 Permit



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 27575

Name and Address of Permit Holder:

*Glenys Ellis
Crows Nest Farm
Crawshaw Lane
Huddersfield
WF4 4BY*

Site Location:

*Crows Nest Farm
Crawshaw Lane
Huddersfield
WF4 4BY*

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

Ground investigation by three boreholes to 30m

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) 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 Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e. into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: *Paul Hobson* Granted Date: **22 November 2023**

For and on behalf of The Coal Authority

Nominated Representative: Paul Hobson, Permitting Manager;

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

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk

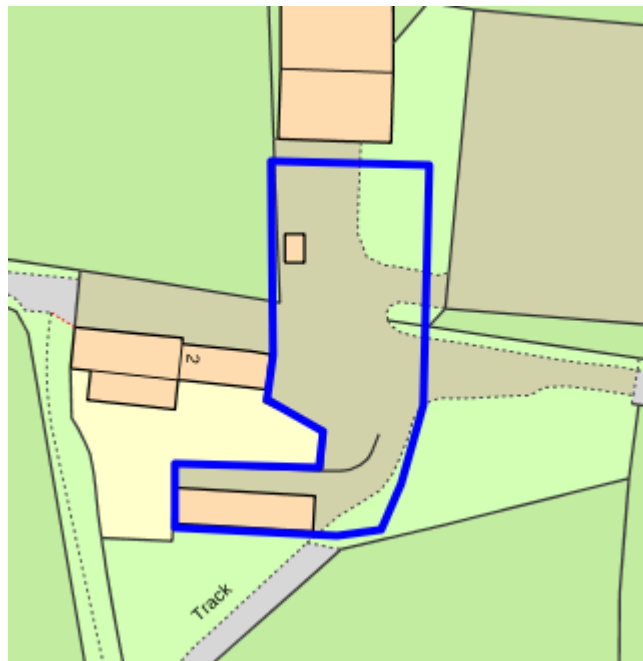


The Coal
Authority

Granted Permit Boundary

Permit Ref: 27575

Permit Boundary:



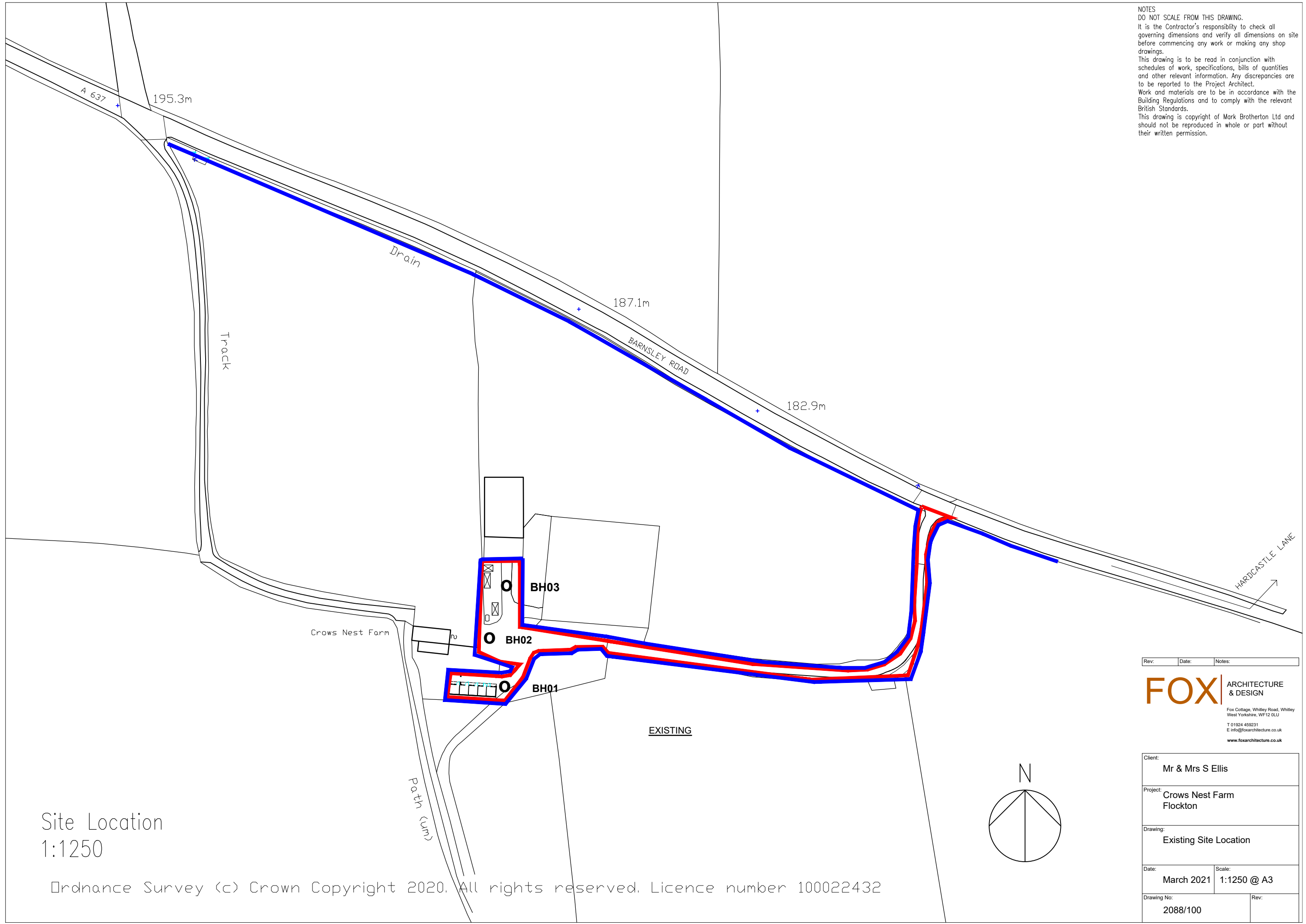
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Appendix 2

Site Plan

NOTES
 DO NOT SCALE FROM THIS DRAWING.
 It is the Contractor's responsibility to check all governing dimensions and verify all dimensions on site before commencing any work or making any shop drawings.
 This drawing is to be read in conjunction with schedules of work, specifications, bills of quantities and other relevant information. Any discrepancies are to be reported to the Project Architect.
 Work and materials are to be in accordance with the Building Regulations and to comply with the relevant British Standards.
 This drawing is copyright of Mark Brotherton Ltd and should not be reproduced in whole or part without their written permission.



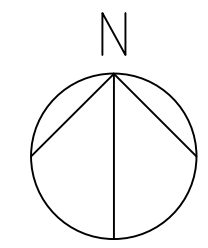
Site Location
 1:1250

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Rev:	Date:	Notes:

FOX ARCHITECTURE & DESIGN
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Client: Mr & Mrs S Ellis	
Project: Crows Nest Farm Flockton	
Drawing: Existing Site Location	
Date: March 2021	Scale: 1:1250 @ A3
Drawing No: 2088/100	Rev:



Appendix 3

Borehole Records



Borehole Log

Borehole No.

BH01

Sheet 1 of 1

Project Name:	Crows Nest Farm, Crawshaw Lane, Flockton	Project No.	C3875/23/E/5884	Co-ords:		Hole Type	RO
Location:	Crow Nest Farm, Crawshaw Lane, Flockton, Huddersfield, West Yorkshire, WF4 4BY			Level:		Scale	1:50
Client:	Mr & Mrs Ellis			Dates:	12/12/2023	Logged By	AB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Dark brown and black CLAY. (Drillers Notes)	1	
					1.20		Light brown yellow SANDSTONE. Very fractured, losing water. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	2	
								3	
								4	
								5	
								6	
					7.00		NO RECOVERY. Fractured, flush Lost. No loss of drilling resistance. BIRSTALL ROCK	7	
					7.50		(Drillers Notes)		
					8.00		Light orange SANDSTONE. BIRSTALL ROCK	8	
							(Drillers Notes)		
							Light grey MUDSTONE. PENNINE LOWER COAL MEASURES FORMATION	9	
							(Drillers Notes)		
					10.00		End of Borehole at 10.00m	10	

Remarks
 No groundwater encountered.
 Casing to 1m.
 Filling Bowser - 1 hour.





Borehole Log

Borehole No.

BH02

Sheet 1 of 1

Project Name:	Crows Nest Farm, Crawshaw Lane, Flockton	Project No.	C3875/23/E/5884	Co-ords:		Hole Type	RO
Location:	Crow Nest Farm, Crawshaw Lane, Flockton, Huddersfield, West Yorkshire, WF4 4BY			Level:		Scale	1:50
Client:	Mr & Mrs Ellis			Dates:	12/12/2023	Logged By	

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							MADE GROUND (Fill CLAY) (Drillers Notes)		
				0.50			Dark brown CLAY. (Drillers Notes)	1	
				1.20			Light orange SANDSTONE. Losing water, very fractured. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	2	
								3	
								4	
								5	
								6	
								7	
								8	
								9	
				10.00			End of Borehole at 10.00m	10	

Remarks
 No groundwater encountered.
 Casing to 2m.
 Filling bowser - 1 hour.





Borehole Log

Borehole No.

BH03

Sheet 1 of 3

Project Name:	Crows Nest Farm, Crawshaw Lane, Flockton	Project No.	C3875/23/E/5884	Co-ords:		Hole Type	RO
Location:	Crow Nest Farm, Crawshaw Lane, Flockton, Huddersfield, West Yorkshire, WF4 4BY			Level:		Scale	1:50
Client:	Mr & Mrs Ellis			Dates:	11/12/2023	Logged By	

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20		MACADAM SURFACE (Drillers Notes) Dark yellowish brown sandy CLAY.		
					1.00		Light yellow SANDSTONE. BIRSTALL ROCK (Drillers Notes)	1	
					2.00		Dark yellow orange SANDSTONE. BIRSTALL ROCK (Drillers Notes)	2	
					6.00		Dark yellowish orange SANDSTONE. Losing water. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	6	
					9.00		Dark orangish yellow SANDSTONE. Lost seal on casing. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	9	
								10	

Remarks
 No groundwater encountered.
 Casing to 6m.
 Filling bowser - 1 hour.





Borehole Log

Borehole No.

BH03

Sheet 2 of 3

Project Name:	Crows Nest Farm, Crawshaw Lane, Flockton	Project No.	C3875/23/E/5884	Co-ords:		Hole Type	RO
Location:	Crow Nest Farm, Crawshaw Lane, Flockton, Huddersfield, West Yorkshire, WF4 4BY			Level:		Scale	1:50
Client:	Mr & Mrs Ellis			Dates:	11/12/2023	Logged By	

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Dark orangish yellow SANDSTONE. Lost seal on casing. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	11	
					12.00		Dark yellow SANDSTONE. Losing water. No loss of drilling resistance. BIRSTALL ROCK (Drillers Notes)	12	
								13	
								14	
								15	
					16.00		Dark grey MUDSTONE. LOWER PENNINE COAL MEASURES FORMATION (Drillers Notes)	16	
								17	
								18	
								19	
								20	

Remarks
 No groundwater encountered.
 Casing to 6m.
 Filling bowser - 1 hour.





Borehole Log

Borehole No.

BH03

Sheet 3 of 3

Project Name:	Crows Nest Farm, Crawshaw Lane, Flockton	Project No.	C3875/23/E/5884	Co-ords:		Hole Type	RO
Location:	Crow Nest Farm, Crawshaw Lane, Flockton, Huddersfield, West Yorkshire, WF4 4BY			Level:		Scale	1:50
Client:	Mr & Mrs Ellis			Dates:	11/12/2023	Logged By	

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
							Dark grey MUDSTONE. LOWER PENNINE COAL MEASURES FORMATION (Drillers Notes)		
								21	
								22	
								23	
								24	
								25	
								26	
								27	
								28	
								29	
					30.00		End of Borehole at 30.00m	30	

Remarks
 No groundwater encountered.
 Casing to 6m.
 Filling bowser - 1 hour.

