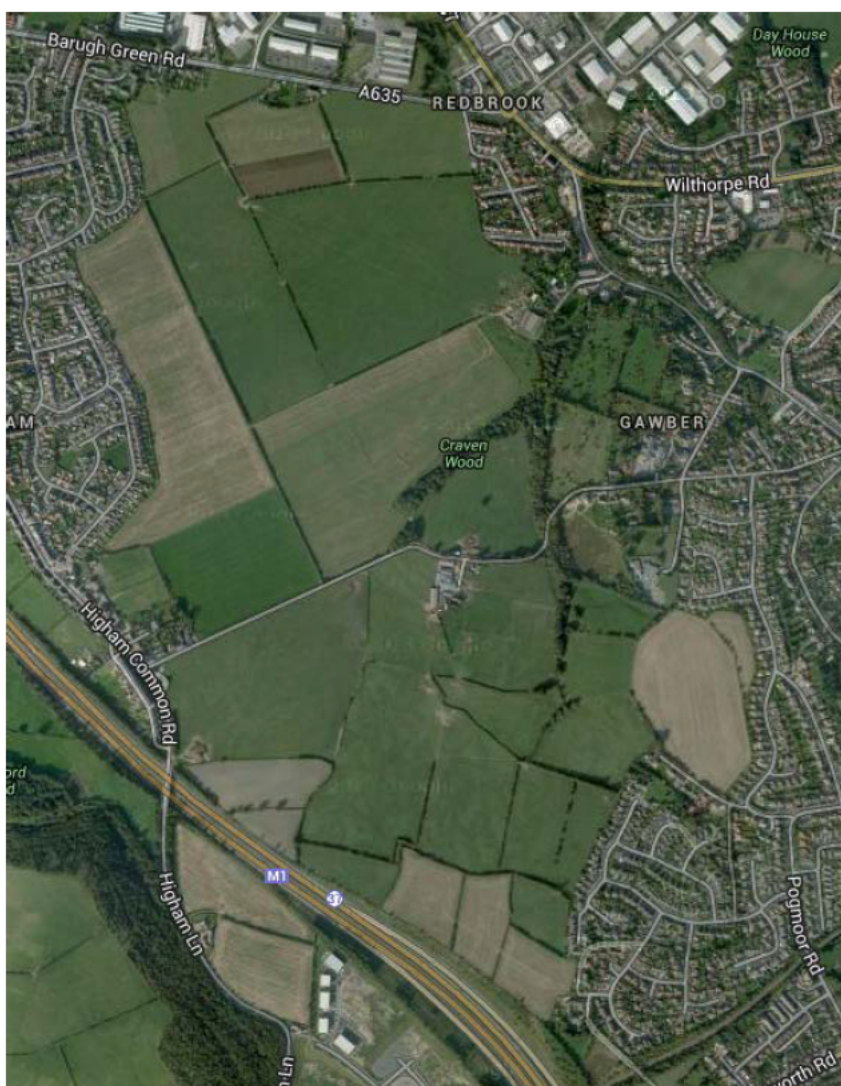


GEOTECHNICAL AND GEO-ENVIRONMENTAL SITE APPRAISAL COMMENTARY

BARNSLEY WEST

FOR

STRATA



36284-001

4 October 2013

GEOTECHNICAL AND GEO-ENVIRONMENTAL SITE APPRAISAL COMMENTARY

BARNSELEY WEST

FOR

STRATA

Job No. : 36284

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Approved :



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Eastwood & Partners (Consulting Engineers) Limited Registered No 1835021

GEOTECHNICAL AND GEO-ENVIRONMENTAL SITE APPRAISAL SUMMARY

Introduction

This appraisal considered the likely significant effects that the ground conditions at the application site could have on the proposed development.

Site Description

The site is located to the West of Barnsley and comprises mainly agricultural land with two farms. Several streams cross the site and there are several areas of woodland as well as field boundaries.

Site History

The following table summarises the pertinent features shown on the historical Ordnance Survey maps.

Date of map	On site	Off site
1855	Agricultural fields with four woodland areas Hermit Lane present	Barugh Green Road and Higham Common Road present with small villages of Barugh Green, Higham and Gawber centred around road crossings.
1891	No changes	
1938	Footpath shown to cross centre of site north of Hermit Lane.	Residential development. Gawber and Barugh Green up to boundaries.
1955	Hermit and Drury Spring Woods not shown – fields instead.	Individual properties built along Barugh Green Road.
1965	North of Hermit Lane opencast. Drains shown crossing the site (Craven Wood shown just along the stream) One field to the east of the site shown as opencast.	No changes
1973	No opencast workings shown. Land in north shown as fields.	M1 constructed Additional residential development to north-west.
1983	No changes	Additional residential development to the east.

In summary, with the exception of opencast workings, the site has remained predominantly agricultural. The surrounding area has also been predominantly agricultural or residential.

Geology

The geological map, Sheet SE30NW (1:10,000), shows the site to overlie Carboniferous Coal Measures. These are expected to comprise bands of mudstone, sandstone and coal seams. A

number of fault lines are present on the site, mostly trending north-west to south-east. The overall dip of the strata is shown to be approximately 5° to the north-east.

Coal seams are shown to outcrop across the site, including the Barnsley Coal (2.29 m to 3.1 m thick), the Dunsil Coal (0.46 m to 0.81 m thick), the Gawber Coal (0.72 m thick) and the Swallow Wood Coal (0.3 to 1.15 m thick). There is also a thin coal recorded between each of these.

The bedrock is shown to be predominantly mudstone, with a thin band of the Haigh Moor Rock in the north and a thin band of sandstone in the east.

Opencast Workings

Four areas of opencast workings are shown. We have obtained copies of the abandonment plans from the Coal Authority and a copy of these is appended, along with our drawings 36284/001 to 005 which extract the pertinent information from these. Eastwood & Partners also arranged for six cable percussion boreholes to be completed to investigate the depth and nature of the backfill within the four areas of opencast workings. A copy of the logs for these is also appended and their approximate positions are shown on drawings 36284/001 to 005.

The following is summarised for each of these areas:

Craven I - Reference should be made to Eastwood & Partners' drawings 001 and 002 and the Coal Authority plan Craven I & II 0E/COMP/03/311 Sheet 1 of 2

These are the northernmost of the workings. The Swallow Wood seam and overlying Thin seam are shown to have been worked and these workings are indicated to have been up to 12.5 m deep, although generally much shallower than this.

Borehole 3 was undertaken within the north-eastern end of this area. At this position the ground level is expected to be around 85 m above Ordnance Datum (AOD) and the base of the Swallow Wood Seam and workings at 75 m AOD. Of the order of 10 m of made ground was therefore expected. Made ground, comprising clay, mudstone/siltstone gravels and coal, was recorded to 2.5 m below ground level (bgl) at which point, a 100 mm thick coal band was recorded before natural ground, of mudstone, was recorded from 2.6 m to the base of the hole at 3.7 m bgl.

The Swallow Wood seam was recorded as being 0.6 m thick, with a 0.3 m thick parting, and the Thin coal 0.34 m thick, with a 0.6 m thick fireclay below.

We would recommend that an allowance for an average of 6 m pile lengths is made for the residential units proposed in this area.

Craven II - Reference should be made to Eastwood & Partners' drawings 001 and 003 and the Coal Authority plans Craven I & II 0E/COMP/03/311 Sheet 1 of 2 and 2 of 2

These are the workings south of Craven I, where the Gawber, Swallow Wood, Top Haigh Moor and Low Haigh Moor are all shown to have been worked. The depth of these workings from original ground level is shown to be up to 44.2 m deep. A pump shaft is also indicated at the north-eastern end of the workings (up to 46.3 m deep). This is shown to be 0.9 m in diameter and the top of the pumping shaft is recorded to be at 87.9 m above Ordnance Datum. The former shaft is also noted to be buried around 1.5 m below the restored ground level at grid reference 432004 407548. This shaft may well need to be located, capped and not built over.

Boreholes 1, 6 and 2 were undertaken within this area. The table below summarises the findings:

Borehole	Current Ground Level (mAOD)	Base of Coal/Excavation Level (mAOD)	Expected Made Ground Depth (m)	Made Ground Depth in Borehole (m)
1	96	51	45	21.8
6	117	74	43	8.7
2	130	85.3	44.7	9.9

The made ground was recorded as similar to that in Craven I. Some boulders were also encountered but the drilling rig managed to progress past these. The natural ground recorded at the base of the boreholes was siltstone. There is clearly an anomaly between the Coal Authority plans and intrusive investigation. It is possible that the lower part of the opencast was backfilled with larger pieces of solid rock and it is these that we encountered at the base of each hole, however it is considered unusual to find this in all three holes. We therefore, consider that it would be prudent to undertake some rotary drilling to confirm whether the recorded natural ground depth is actually large obstructions.

At this stage, we have allowed for an average pile length of 15 m for the residential units proposed in this area. Due to the depth of the made ground and the presence of obstructions, it is considered that driven steel tube piles will probably need to be adopted.

The Gawber is recorded as being 0.5 m thick, the Top Haigh Moor 0.8 m thick and the Low Haigh Moor 0.65 m thick. There is a 0.4 m thick parting within the Gawber (0.9 m total thickness), two partings in the Top Haigh Moor totalling 0.3 m and a fireclay of 0.3 m thickness beneath (1.4 m total thickness) and one parting in the Low Haigh Moor of 0.25 m (0.9 m total thickness). The Swallow Wood seam was the same as for Craven I.

The current ground level appears to be similar to the ground levels from which the depths on the abandonment plans are measured and in the majority of cases the current ground levels are slightly higher than previously.

No old mine workings were recorded in either the Craven I or Craven II areas indicating that these seams have probably not been worked by underground methods beyond the extent of the opencast workings. The ground for these two areas is recorded as having been fully restored by July 1952. The made ground has therefore been in place at least 60 years.

Hunters Cottage & Extension - Reference should be made to Eastwood & Partners' drawings 001 and 004 and the Coal Authority plan Hunters Cottage & Extension 0E/COMP/03/121

These are the southernmost of the workings and extracted the Gawber, Thin, Swallow Wood Top and Swallow Wood Bottom seams. The workings are shown to be up to nearly 20 m deep. Old workings were noted to be present in a few areas, although would be expected to be bell pits or smaller opencast workings as opposed to underground workings from shafts. This area was fully restored by June 1956 and the made ground has therefore been in place for at least 56 years.

The original ground levels appear to generally have been significantly higher than the current ground levels. This could be partly due to the difficulty in accurately locating the former workings on the current site boundaries and the discrepancy between their location and size shown on the Coal Authority abandonment plan and geological map.

Borehole 4 was completed in this area. At this position, according to the drawings, the ground level is expected to be around 133 m AOD, compared to an original ground level of 146.5 m AOD. The Swallow Wood Bottom coal was recorded as being around 15.5 m deep and therefore the base of the made ground would be expected to be around 131 m AOD and consequently 2 m below current ground level. Made ground was recorded to a depth of 13.4 m in BH4. This apparent discrepancy is considered to be due to the difficulties in locating of the former workings on the current site plan. For example, if the opencast workings shown on the Coal Authority plan were lined up with the western edge of the workings shown on the geological map, the levels and depth of made ground would be much closer.

The workings in this area are expected beneath the employment units.

The Swallow Wood Top seam was recorded as being 0.36 m thick and the Swallow Wood Bottom seam as 0.9 m thick. The Gawber seam was recorded as being 0.5 m thick, with a shale parting of 0.25 between the two leaves. The Thin seam is recorded as 0.38 m thick.

Farm House Lane - Reference should be made to Eastwood & Partners' drawings 001 and 005 and the Coal Authority plan Farm House Lane NE415

These are the easternmost of the workings and extracted the Barnsley seam. The workings are shown to be up to 15 m deep. Old workings were noted to be present, with approximately 80% previously worked. This area is recorded as having been abandoned in 1960. The made ground is therefore expected to have been in place for at least 50 years.

Borehole 5 was completed in this area. The current ground level is expected to be around 135 m AOD and the base of the coal at 125 m AOD and therefore around 10 m deep. Made ground was recorded to a depth of 8.3 m bgl in this hole, which is reasonably consistent.

We would recommend that an allowance for an average of 6 m pile lengths is made for the residential units proposed in this area.

Underground Workings

In some areas of the site, where the coal has not been worked by opencast methods, the depth and thickness of the coal seams could be such that any underground workings could influence development at the surface, such as the areas to the north-west, north-east and south-west of the Hunters Cottage & Extension workings. Significant underground workings are considered unlikely for a number of reasons including:

- No shafts are recorded on the geological or historical maps;
- There are a number of faults in the area; and
- Former workings were generally not found in the opencast areas.

Some rotary holes are recommended to give confidence in this regard.

Hydrogeology

The site overlies a Secondary A aquifer and is not within a groundwater Source Protection Zone. Springs are understood to be present, mainly in the southern employment areas (although none were apparent when we walked over the site).

Contamination

Ground Gas

The Environment Agency website indicates that there are several landfills to the north-east of the

site (within 250 m) as well as Land at Nudge Hill Farm on the western site boundary (central). These landfills, and the significant thickness of made ground in the areas of former opencast workings, are potential sources of ground gas, which will require investigation. At this stage, it is recommended that Amber 1 gas protective measures are allowed for. These will require a ventilated void or granular blanket below the ground floor construction and a fully lapped and sealed gas membrane system.

BRE211 '*Radon: Guidance on protective measures for new buildings*' indicates that basic radon protective measures are required for at least some areas of the site.

Soils

The ground would not be expected to be significantly contaminated, although elevated concentrations of metals/metalloids, polycyclic aromatic hydrocarbons and sulphates may be recorded.

Abnormals

The area has been extensively mined by opencast methods. We have reviewed abandonment plans supplied by the Coal Authority and undertaken an initial (but not extensive) borehole investigation to establish the depth of the opencast. The extent has been based on the mining abandonment plans.

Residential Areas

The current layout shows the residential areas set over two areas of opencast (Craven I and Craven II) and the smaller residential area to the south-east over the Farm House Lane workings.

At this stage, we would recommend that foundations for all the residential properties are PILED.

We would suggest an allowance of say 6 m pile lengths in the Craven I zone, 15 m average in Craven II and 10 m in Farm House Lane. Due to the depth of the made ground and the presence of obstructions, it is considered that driven steel tube piles will probably need to be adopted in Craven II. Additional investigation is however, recommended to confirm the made ground depths, particularly in Craven II where they were significantly shallower in the boreholes than expected from the plans.

REINFORCED CONCRETE GROUND BEAMS will be required for the piled foundations. Ground floors will need to be pre-cast beam and block with a void under.

Heave precautions may be required for plots close to existing hedgerows.

The backfill in the workings was found to be fairly compact, so it may be possible to use raft foundations instead of piles. Our recent experience is that NHBC are reluctant to accept rafts on backfilled opencast without extensive testing. It may be that rafts could be explored further and we have taken some samples from the boreholes and also installed groundwater monitoring wells in these to enable us to progress this.

Because of the gradients of the site, there is likely to be significant cut and fill. Allowance should be made for retaining structures to terrace development plateaus and access roads.

At this stage, AMBER 1 Gas protection measures should be allowed for.

Access roads will need to be planned to minimise cut and fill and retaining structures.

Employment Areas

It is assumed that the employment units will be lightweight framed structures. The majority are located over opencast areas.

For lightweight framed units, it is possible that reinforced ring beams will be suitable foundations. If heavier structures are envisaged, piled foundations may be necessary.

For units outside the opencast areas, traditional pad/strip foundations will be suitable.

Again, note should be taken of the cut/fill regarding exercise that will be necessary.

Indicative Costs for Abnormals

It is difficult to give definitive costs at this stage. Much will depend upon the developed layouts. However, below is a “finger in the air”.

Residential Areas

For piled foundations, we would expect the piling costs to range between the following:

- 6 m piles - £5000 per plot.
- 10 m piles - £7000 per plot
- 15 m piles - £8000 per plot

Reinforced concrete ground beams £5000 per plot.

(Note, the cost of standard strip footings will need deducting from the above, say, £2500 per plot)

Gas membranes £2000 per plot.

Obviously these costs will be dependent upon plot sizes and complexity.

Strata may have some more reliable figures from recent tenders.

There is likely to be a significant cut and fill exercise, but it should be possible to engineer a balance to avoid taking material off site.

Retaining structures should be kept to a minimum, but it is very likely that some will be required.

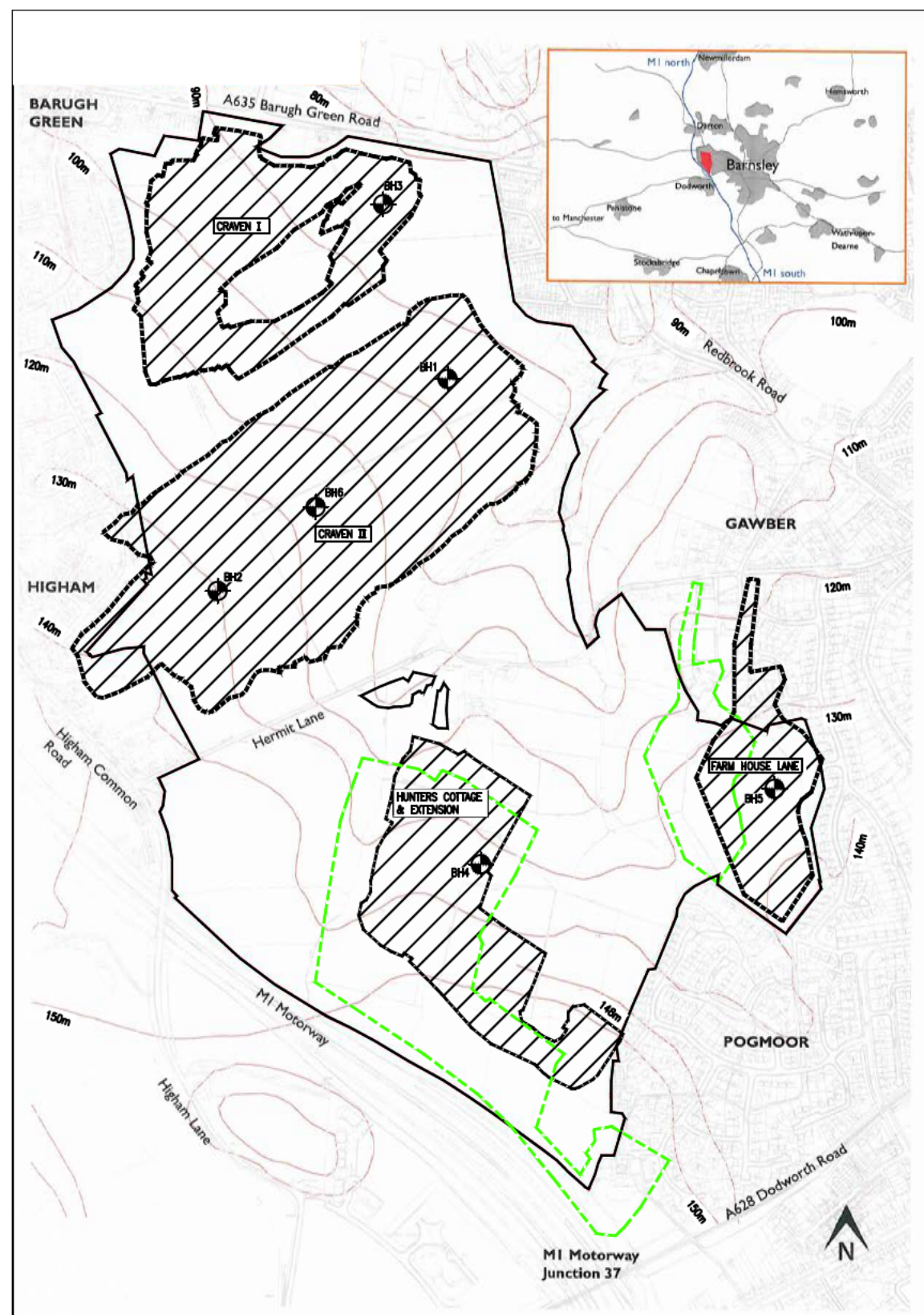
A rough cost would be in the order of, say, £500 per linear metre of wall in the range of 1.5 m to 2 m high.

Employment Units

It is very difficult to put an extra over cost without details of the units. A guess would be in the region of £50/m².

Further Works

Before more definite information regarding the properties of the ground and any contamination present can be given, an intrusive ground investigation would be required. Excavation of trial pits using a mechanical excavator is considered to be the most suitable method as it will enable a thorough investigation of the nature of the ground. Rotary boreholes are also proposed to consider the made ground depths and any other underground coal workings further. Gas and groundwater should also be undertaken. We recommend talking to the NHBC about the foundation options and have samples which could be tested to consider the potential for using raft foundations further.



Information within this drawing is not necessarily produced to scale.
Always use figured dimensions and co-ordinates – if in doubt, ask.

This drawing has been produced using the following record drawings:–

Master Plan from link downloaded 12.08.2013

The Coal Authority

Hunters Cottage & Extension – Drawing No. OE/COMP/03/121

Craven I & II – Drawing No. OE/COMP/03/311 Sheet 1 of 2.

Craven I & II – Drawing No. OE/COMP/03/311 Sheet 2 of 2.

Farm House Lane – Catalogue No NE415 Sheet Info:

KEY

-  Site Boundary
-  Approximate Extent of Opencast Workings taken from the above Coal Authority drawings.
-  Approximate Extent of Opencast Workings taken from Geological Map (SE30NW).
-  Approximate position of Cable Percussion Borehole completed for Eastwood & Partners in September 2013.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

STRATA

BARNSELY WEST

EXTENT OF OPENCAST WORKINGS

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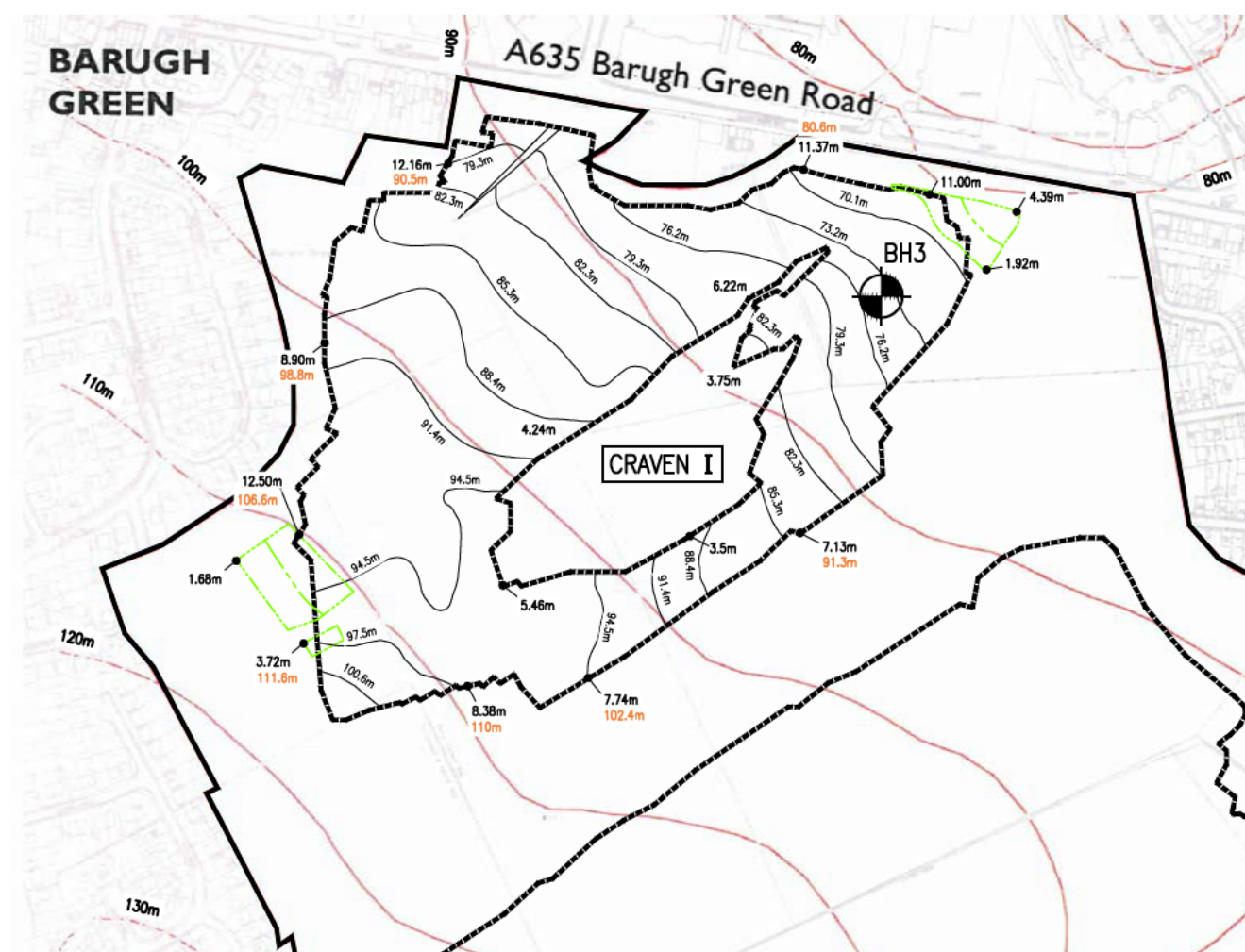
SCALE WHEN PLOTTED AT A3

Approx 1:10000

DRAWING STATUS

INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
JAB	CAT	02.10.13	36284/001	A



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This drawing has been produced using the following record drawings:-
Master Plan from link downloaded 12.08.2013

The Coal Authority

Craven I & II – Drawing No. OE/COMP/03/311 Sheet 1 of 2.

1. This drawing to be read in conjunction with Eastwood & Partners
drawing 36284/001.

KEY

-  Site Boundary
-  Approximate Extent of Previous Opencast Mining
-  Approximate Extent of Thin Seam
-  Approximate Opencast Contours (mAOD)
-  12.5m Depth from Original Ground Level to Base of Coal or Excavation
-  90m Current Ground Level (mAOD)
-  102.5m Original Ground Level (mAOD)
-  Approximate position of Cable Percussion Borehole completed for Eastwood & Partners in September 2013.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

STRATA

BARNSLEY WEST

CRAVEN I OPENCAST WORKINGS

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SCALE WHEN PLOTTED AT A3 Approx 1:5000			DRAWING STATUS INFORMATION	
DRAWN SA/CB	CHECKED CAT	DATE 05-09-13	DRAWING NUMBER 36284/002	REV A

WELLHEAD DRILLING COMPANY		Date 12-9-13	
Wellhead House Hall Lane Chapelthorpe Wakefield WF4 3JE	Telephone: 01924 257003 Fax: 01924 252136	Site Name Redbrook	Job No. 36284
		Borehole No. BH3	

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH	
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm						Water	Casing
							From	To		0 to 75 *	75 to 150 *	150 to 225	225 to 300	300 to 375	375 to 450		
GRASS OVER BROWN SANDY CLAY					0.20	D1	010										
TOP SOIL + ROOTLETS						D2	080										
PALE BEIGE BROWN / BROWN						D3	180										
STIFF CLAY + MUD / SILTSTONE					1.0m	U4	205	250	34							/	2.0
GRAVELS + COAL						D5	250	265	24								
PALE BROWN OCCASIONAL GRY						D6	340										
FIRM MIXED CLAYS + MUD /					2.50	D7	350	358		25/13	50/59				/	345	
SILT STONE / SANDSTONE + SAND						D8	365	370	N/A	25/15	50/37			/	345		
BANDS COAL FINES (LOW SPOIL)																	
COAL BAND					2.60												
PALE GRY BROWN MODERATELY					3.70												
WEAK WEATHERED MUDSTONE																	
BECOMING STRONGER BELOW 3.4																	
END																	
BH COMPLETED																	
YES																	
NO																	
FINAL DEPTH																	

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	GL	3.45

GROUNDWATER DETAILS									
DATE	TIME	DEPTH OF FLOW	RATE OF FLOW	RISING TO MINS				CASING DEPTH	SEALED
				5	10	15	20		
	12-7								

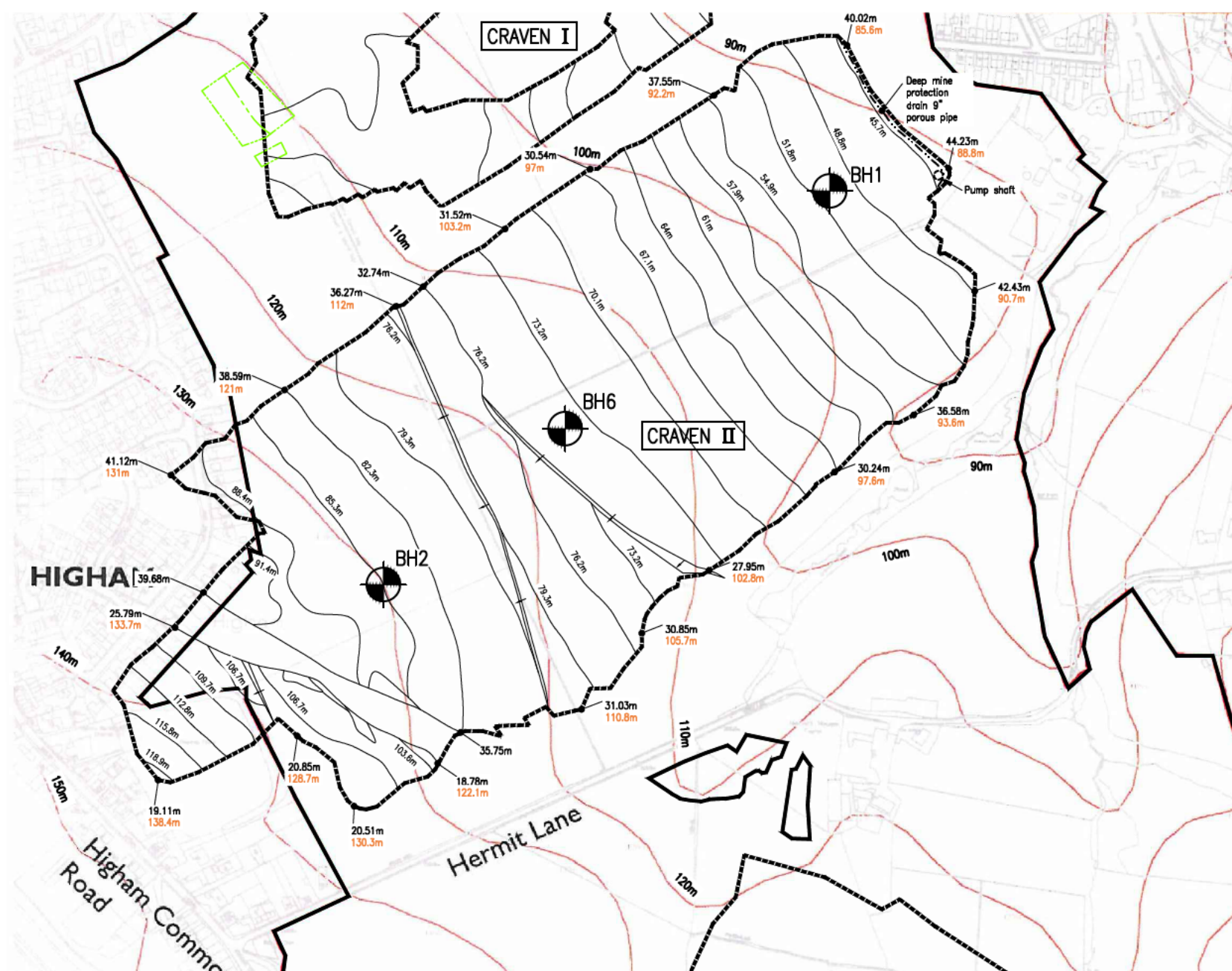
DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHISOL	340	350	1/2HR
CHISOL	355	365	1/2HR

REMARKS	STANDPIPE DETAILS		
30mm PIPE CONSTRUCTION 1HR EXCESS MUDS 1HR		FROM	TO
	PLAIN PIPE	GL	1m
	SLOTTED PIPE	1m	365
	GRAVEL - FILTER	1m	365
	BENTONITE	1m	0.50
	SEALS		
	STOPCOCK COVER		✓
	GAS VALVE & BUNG		✓

SIGNATURES:

Driller.....*CRAIG ROBERTS*.....

Client.....



Information within this drawing is not necessarily produced to scale.
Always use figured dimensions and co-ordinates – if in doubt, ask.

This drawing has been produced using the following record drawings:-
Master Plan from link downloaded 12.08.2013

The Coal Authority

Craven I & II – Drawing No. OE/COMP/03/311 Sheet 1 of 2.

Craven I & II – Drawing No. OE/COMP/03/311 Sheet 2 of 2.

1. This drawing to be read in conjunction with Eastwood & Partners drawing 36284/001.

KEY

	Site Boundary
	Approximate Extent of Previous Opencast Mining
	Approximate Opencast Contours (mAOD)
42.3m	Depth from Original Ground Level to Base of Coal or Excavation
90m	Current Ground Level (mAOD)
102.5m	Original Ground Level (mAOD)
	Approximate position of Cable Percussion Borehole completed for Eastwood & Partners in September 2013.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

STRATA

BARNSLEY WEST

CRAVEN II OPENCAST WORKINGS

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SCALE WHEN PLOTTED AT A3

Approx 1:5000

DRAWING STATUS

INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
SA/CB	CAT	05-09-13	36284/003	A

Date 9-9-13

Telephone:
01924 257003
Fax:
01924 252136

36284

BH 1

REDBROOK

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	9 L	3 m

[illegible]

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHISEL	880	890	1/4 HR
CHISEL	1090	1105	1/2 HR

REMARKS	STANDPIPE DETAILS	
	FROM	TO
	PLAIN PIPE	
	SLOTTED PIPE	
	GRAVEL - FILTER	
	BENTONITE	
	SEALS	
	STOPCOCK COVER	
	GAS VALVE & BUNG	

Driller.....(RAIG LOBERTS)

Client

WELLHEAD DRILLING COMPANY

Date 10-9-13

Wellhead House
Hall Lane
Chapelthorpe
Wakefield
WF4 3JE

Telephone:
01924 257003
Fax:
01924 252136

Site Name

Job No.

36284

Borehole No.

BH1

Redbrook

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH		
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm						Water	Casing	
							From	To		0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450			
COLLIERY SPOIL BECOMING MOIST TO WET BELOW 15.5m. BOULDER FILL IN ON ADVANCING CASING PUSHING BOULDER 1630-1725 V. GRAVELLY BELOW 18m WITH CLAYY ROCKS (MUD/SILTSTONE) END SHIFT - 20m					11m	SD19	9.05	9.50		4	4	6	5	4	4	/	3m	
						D20	9.80											
						U21	10.05	10.50	124								/	3m
						S22	11.05	11.11	25/24	50/35							/	3m
						D23	11.80											
						SD24	12.05	12.50		6	5	6	6	9	9	/	3m	
						D25	12.80											
						SD26	13.10	13.55		4	6	7	7	8	7	/	3m	
						D27	13.80											
						SD29	14.10	14.55		3	4	5	5	5	5	/	3m	
						D30	14.80											
						U31	15.10	15.55	35									
						D32	15.80											
						SD33	17.25	17.70		4	7	6	7	7	6	/	17-20	
						D34	18m											
						SD35	18.20	18.65		3	4	5	7	9	8	12.8	18-10	
						D36	19m											
						C37	19.20	19.65		3	3	4	5	3	6	12.9	19.5	
BH COMPLETED		YES	NO	FINAL DEPTH														

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	GL	

GROUNDWATER DETAILS									
DATE	TIME	DEPTH OF FLOW	RATE OF FLOW	RISING TO MINS				CASING DEPTH	SEALED
				5	10	15	20		
WATER SEAPAGE		16m		NO RISE					
WATER STRIKE		18-1m		ROSE				12.8m	

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHISEL	10.90	11.05	1/2 HR
CHISEL	11.10	11.40	1 HR
CHISEL	16 -	16.30	3/4 HR

REMARKS	STANDPIPE DETAILS	
	FROM	TO
	PLAIN PIPE	
	SLOTTED PIPE	
	GRAVEL - FILTER	
	BENTONITE	
	SEALS	
	STOPCOCK COVER	
	GAS VALVE & BUNG	

SIGNATURES:

Driller.....RAIG ROBERTS

Client.....

WELLHEAD DRILLING COMPANY		Date 11-9-13			
Wellhead House Hall Lane Chapelthorpe Wakefield WF4 3JE	Telephone: 01924 257003 Fax: 01924 252136	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Site Name Redbrook</td> <td style="width: 30%;">Job No. 36284</td> <td style="width: 40%;">Borehole No. BH1</td> </tr> </table>	Site Name Redbrook	Job No. 36284	Borehole No. BH1
Site Name Redbrook	Job No. 36284	Borehole No. BH1			

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH		
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm								
							From	To		0 to 75 *	75 to 150 *	150 to 225	225 to 300	300 to 375	375 to 450	Water	Casing	
AS 18m V GRAVELY WITH CURRY PACKETS MOD STRONG SILTSTONE BED - Rock. END					21-80	D38	20m											
						C39	200	2065		8	11	14	8	8	7	12.8	20.5	
						D40	21											
						S41	2180	2182	MR	25/07	50/13					12.8	21.75	
					21-86	D42	2180											
						S43	2185	- MR	25/0	50/08m						12.8	21.8	
BH COMPLETED ☒ YES ☐ NO					FINAL DEPTH	21.86												

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	GL	21.8

GROUNDWATER DETAILS									
DATE	TIME	DEPTH OF FLOW	RATE OF FLOW	RISING TO MINS				CASING DEPTH	SEALED
				5	10	15	20		
AM	WATER		12.77						

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHISEL	2180	2185	1HR

REMARKS	STANDPIPE DETAILS	
50mm Pipe (constructed) 1. 3/4 HR.	FROM	TO
	PLAIN PIPE	GL 1m
	SLOTTED PIPE	1m 21.85
	GRAVEL - FILTER	1m 21.85
	BENTONITE	1m 0.5m
	SEALS	
	STOPCOCK COVER	☒
GAS VALVE & BUNG	☒	

SIGNATURES

Driller..... CRAIG ROBERTS.....

Client.....

WELLHEAD DRILLING COMPANY		Date 17/18-9-13						
Wellhead House Hall Lane Chapelthorpe Wakefield WF4 3JE	Telephone: 01924 257003 Fax: 01924 252136	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Site Name</td> <td style="width: 30%;">Job No.</td> <td style="width: 40%;">Borehole No.</td> </tr> <tr> <td style="height: 40px; vertical-align: bottom;">Red Brook</td> <td style="vertical-align: bottom;">36284</td> <td style="vertical-align: bottom;">BH 6</td> </tr> </table>	Site Name	Job No.	Borehole No.	Red Brook	36284	BH 6
Site Name	Job No.	Borehole No.						
Red Brook	36284	BH 6						

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH		
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm								
							From	To		0 to 75 *	75 to 150 *	150 to 225	225 to 300	300 to 375	375 to 450	Water	Casing	
BROWN CLAY - TOPSOIL — BROWN FIRM CLAY + MUDSTONE BRICK GRAVELS — GREY OCCASIONAL BROWN CLAYS + MUDSTONE SILTSTONE OCC COAL, BRICK (CONCRETE SPALLS) MUCH SILTSTONE BOULDER COBBLES BETWEEN S30 - 6m. OCC COBBLES BELOW 6m — MODERATELY STRONG SILTSTONE END —					0.20 0.80 8.70 9.04	D1	0.0											
						D2	0.50											
						D3	0.80											
						D4	1.80											
						S05	2.05	2.30		5	5	9	4	5	4	/	2.0	
						D6	2.80											
						D7	3.80											
						S08	4.05	4.50		5	8	6	5	6	7	/	4.0	
						D9	4.80											
						D10	5.30											
						S11	6.05	6.50	N/R	7	6	6	4	4	3	/	6.0	
						D12	6.80											
						D13	7.80											
S014	8.05	8.50		7	6	7	10	11	10	/	7.5							
S015	8.70	8.77		25/31		50/43				/	7.5							
S16	9.09	9.04		25/10		50/15				/	7.5							
BH COMPLETED					YES	NO	FINAL DEPTH											

WELLHEAD DRILLING COMPANY

Date
11-9-13

Wellhead House
Hall Lane
Chapelthorpe
Wakefield
WF4 3JE

Telephone:
01924 257003
Fax:
01924 252136

Site Name

Job No.

36284

Borehole No.

Redbrook

BH2.

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH		
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm							Water	Casing
							From	To		0 to 75	75 to 150	150 to 225	225 to 300	300 to 375	375 to 450			
GRASS OVER BROWN CLAY / SANDY TOP SOIL.					0.25	D1	0.20											
BROWN / YELLOW BROWN FIRM. STIFF SANDY CLAY OCCASIONAL GREY MUD- STONE ROCKETS + GRAVELS OF COAL SAND / MUDSTONE SILTSTONE.					1.80	D2	0.80											
						D3	1.80											
						D4	2.05	2.50		3	2	2	4	5	4	/	2	
						D5	3m											
COLLIERY SPOIL - MIXED MUD / SILTSTONES, GREY BROWN, + CLAYS OCC COAL, FIRM-STIFF MUCH SILTSTONE BOULDERS AROUND 8.5m.					9.90	D6	4.05	4.50	27							/	3	
						D7	4.50	4.65	10									
						D8	5.50											
						D9	6.05	6.50		2	4	3	3	5	16	/	3	
MODERATELY STRONG SILTSTONE BONDRCK.					10.54	D10	7m											
						D11	8.05	8.50	47							/	3	
						D12	8.50	8.65	17									
END						D13	9.50											
						D14	10.10	10.26		10	15/45	50/39				/	3	
						D15	10.50	10.54		25/13		50/27				/	3	

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	90	3m

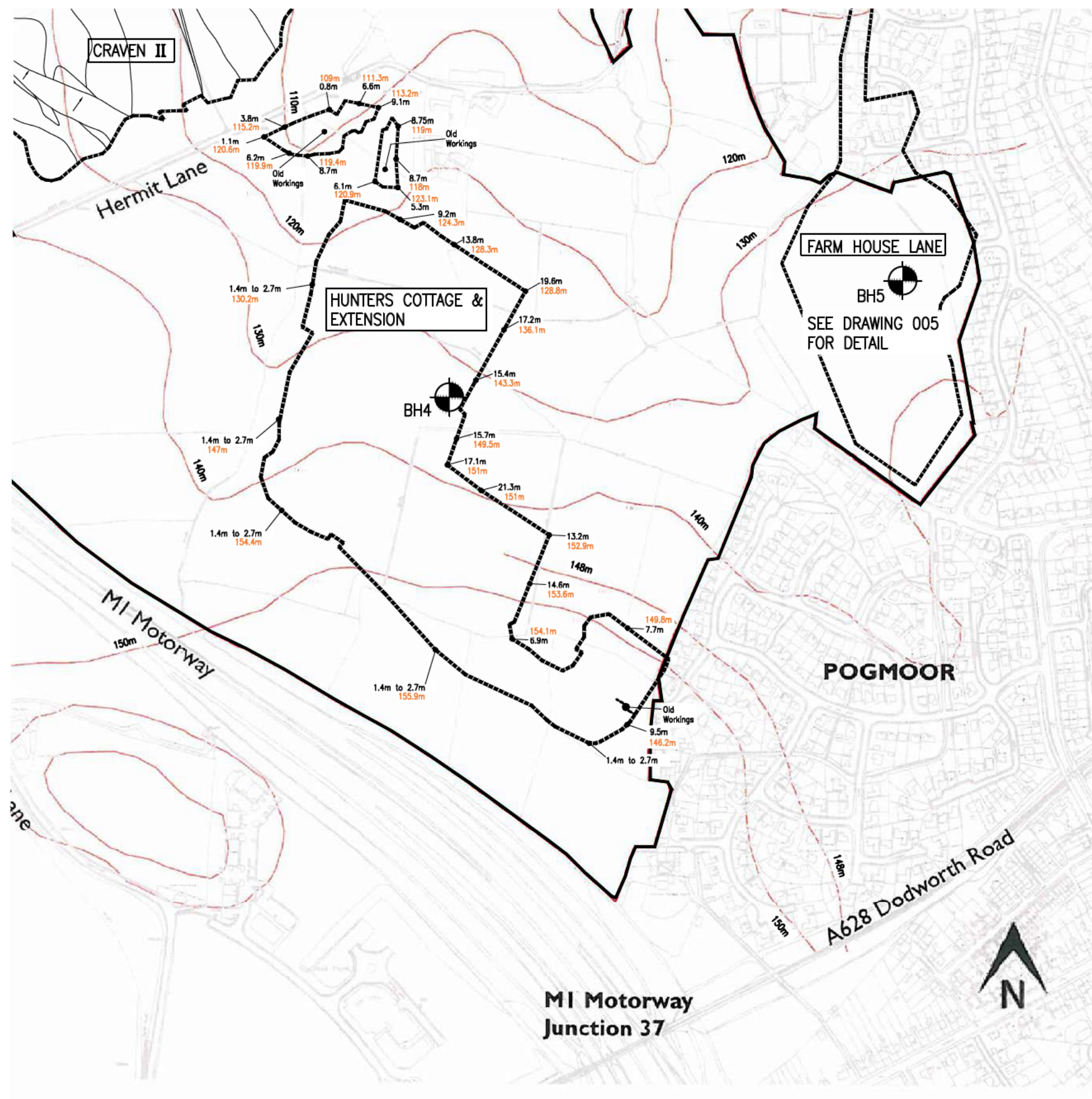
GROUNDWATER DETAILS									
DATE	TIME	DEPTH OF FLOW	RATE OF FLOW	RISING TO MINS				CASING DEPTH	SEALED
				5	10	15	20		
	024								

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHISEL	990	1010	1/2HR
CHISEL	1030	1050	1/2HR

REMARKS		STANDPIPE DETAILS	
50mm PIPES (construction) 1 1/2 HR		FROM	TO
		PLAIN PIPE	90 1m
		SLOTTED PIPE	1m 1050
		GRAVEL - FILTER	1m 1050
		BENTONITE	1m 050
		SEALS	
		STOPCOCK COVER	
		GAS VALVE & BUNG	

SIGNATURES:

Driller..... GRAHAM ROBERTS
Client.....



Information within this drawing is not necessarily produced to scale.
Always use figured dimensions and co-ordinates – if in doubt, ask.

This drawing has been produced using the following record drawings:-
Master Plan from link downloaded 12.08.2013

The Coal Authority

Hunters Cottage & Extension – Drawing No. OE/COMP/03/121

1. This drawing to be read in conjunction with Eastwood & Partners
drawing 36284/001.

KEY

	Site Boundary
	Approximate Extent of Previous Opencast Mining
13.2m	Depth from Original Ground Level to Base of Coal or Excavation
120m	Current Ground Level (mAOD)
102.5m	Original Ground Level (mAOD)
	Approximate position of Cable Percussion Borehole completed for Eastwood & Partners in September 2013.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

STRATA

BARNSELY WEST

HUNTERS COTTAGE & EXTENSION
OPENCAST WORKINGS

Eastwood & Partners **EOP**
CONSULTING ENGINEERS

St. Andrew's House
23 Kingfield Road
Sheffield
S11 9AS

Tel 0114 255 4554
Fax 0114 255 4330

mail@eastwoodandpartners.com
www.eastwoodandpartners.com

SCALE WHEN PLOTTED AT A3

Approx 1:5000

DRAWING STATUS

INFORMATION

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
SA/CB	CAT	05-09-13	36284/004	A

WELLHEAD DRILLING COMPANY

Date 12-13/9-13

Wellhead House
Hall Lane
Chapelthorpe
Wakefield
WF4 3JE

Telephone:
01924 257003
Fax:
01924 252136

Site Name

Job No.

36284

Borehole No.

Redbrook

BH 4

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH			
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm							Water	Casing	
							From	To		0 to 75 *	75 to 150 *	150 to 225	225 to 300	300 to 375	375 to 450				
GRASS OVER BROWN SANDY CLAY TOPSOIL					- 0.13	D1	080												
BROWN BROWN COLLIGY SPILL (MUD, SILT STONES + CLAYS LITTLE COAL FIRM)						D2	180												
SOFTER BELOW 2m						U3	205	250	18									/	2.0
						D4	250	265	8										
						D5	380												
BECOMING U GRAVELY BROWN S-1m WITH CLAY BANDS					- 5-10	S06	405	450		2	2	1	2	3	2		/	4.0	
						D7	480												
						D8	580												
FIRM CLAY COLLIGY SPILL MUD - SILTSTONE - COAL					- 6-20	S09	605	650		2	2	3	3	4	8	4.4	6.0		
						D10	680												
						D11	780												
U GRAVELY AGAIN WITH CLAY BANDS POCKETS						S012	805	850		2	3	2	3	3	4	4.5	8.0		
						D13	880												
END SHIFT					- 10m	D14	980												
						S015	1005	1050		5	5	4	3	4	4	4.4	10.0		

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	GL	10M

GROUNDWATER DETAILS									
DATE	TIME	DEPTH OF FLOW	RATE OF FLOW	RISING TO MINS				CASING DEPTH	SEALED
				5	10	15	20		
WATER STRIKING		S/L	12.05	4.4	2.0	mins			

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)

REMARKS		STANDPIPE DETAILS	
Await Access H/L		FROM	TO
		PLAIN PIPE	
		SLOTTED PIPE	
		GRAVEL - FILTER	
		BENTONITE	
		SEALS	
		STOPCOCK COVER	
		GAS VALVE & BUNG	

SIGNATURES:

Driller CRAIG ROBERTS.

Client

WELLHEAD DRILLING COMPANY

Date

16-9-13

Wellhead House
Hall Lane
Chapelthorpe
Wakefield
WF4 3JE

Telephone:
01924 257003
Fax:
01924 252136

Site Name

Job No.

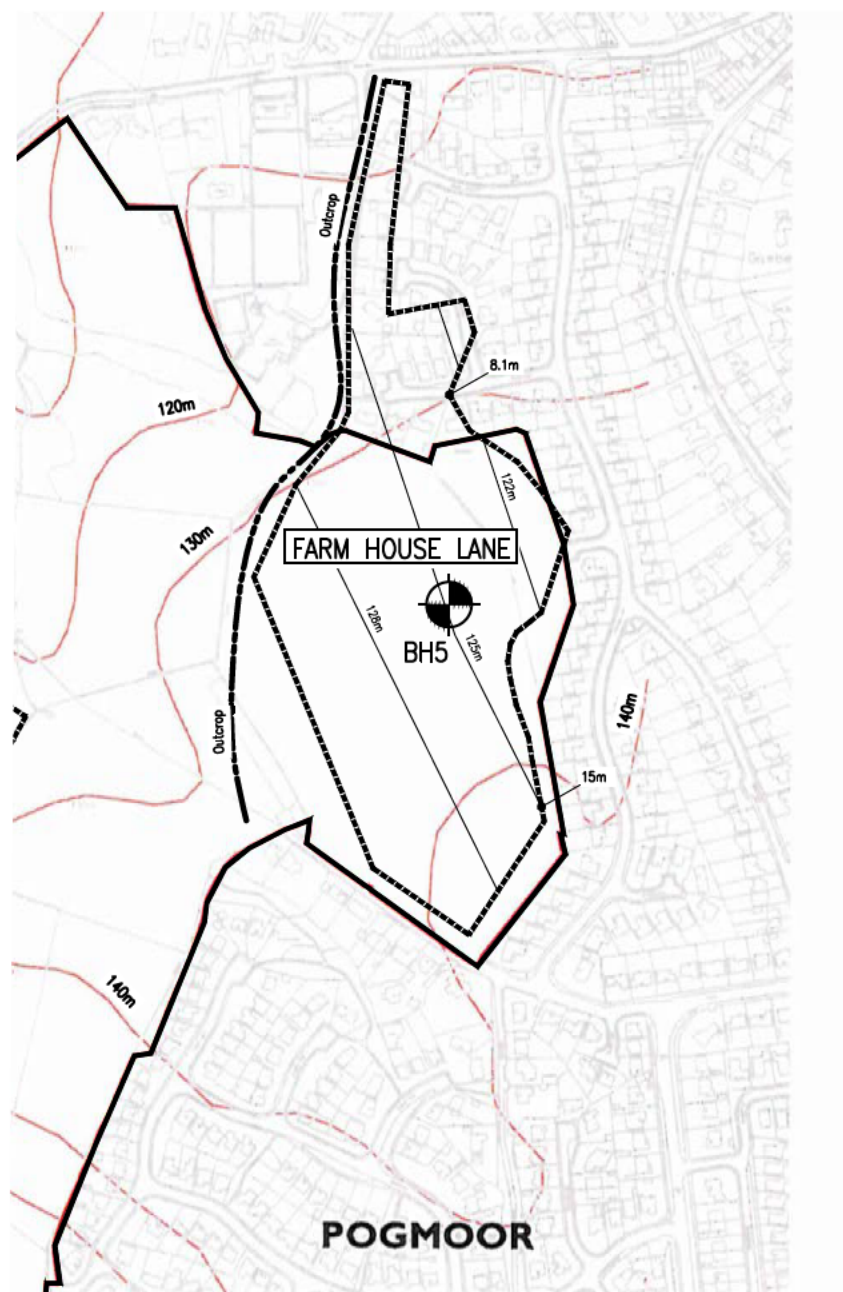
36284

Borehole No.

Red Brook

BH4

DESCRIPTION OF STRATA					DEPTH TO BASE OF STRATA FROM G/L(m)	SAMPLES AND IN SITU TESTING										CASING & WATER DEPTH		
Soft / Firm Stiff Loose / Dense	Colour Fine Coarse Medium	Clayey Silty Sandy etc	SOIL TYPE	Sand Bands Cobbles etc		Type No	Depth (m)		U blows	S.P.T. / C.P.T. mm						Water	Casing	
							From	To		0 to 75 *	75 to 150 *	150 to 225	225 to 300	300 to 375	375 to 450			
GRAVELLY MUD-SILTSTONE COLLIERIE SPOIL + GRAY ROCKERS MUCH SILT MUDSTONE COBBLES BELOW 12m MODERATELY STRONG SILTSTONE BEDROCK END					10m	D16	1080											
					D17	1180												
					S018	1205	1250		8	8	9	6	7	8	4.5	12		
					D19	134												
					S020	1342	1348		25/26		50/29				4.5	13.4		
					13.40	S21	1348	1352	M/R	25/14		50/21				4.5	13.45	
						</												



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Always use figured dimensions and co-ordinates – if in doubt, ask.

This drawing has been produced using the following record drawings:–
Master Plan from link downloaded 12.08.2013

The Coal Authority

Farm House Lane – Catalogue No NE415 Sheet Info:

1. This drawing to be read in conjunction with Eastwood & Partners drawing 36284/001.

KEY

	Site Boundary
	Approximate Extent of Previous Opencast Mining
	Approximate Opencast Contours (mAOD)
	Depth from Original Ground Level to Base of Coal or Excavation
	Current Ground Level (mAOD)
	Approximate position of Cable Percussion Borehole completed for Eastwood & Partners in September 2013.

A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

STRATA

BARNSLEY WEST

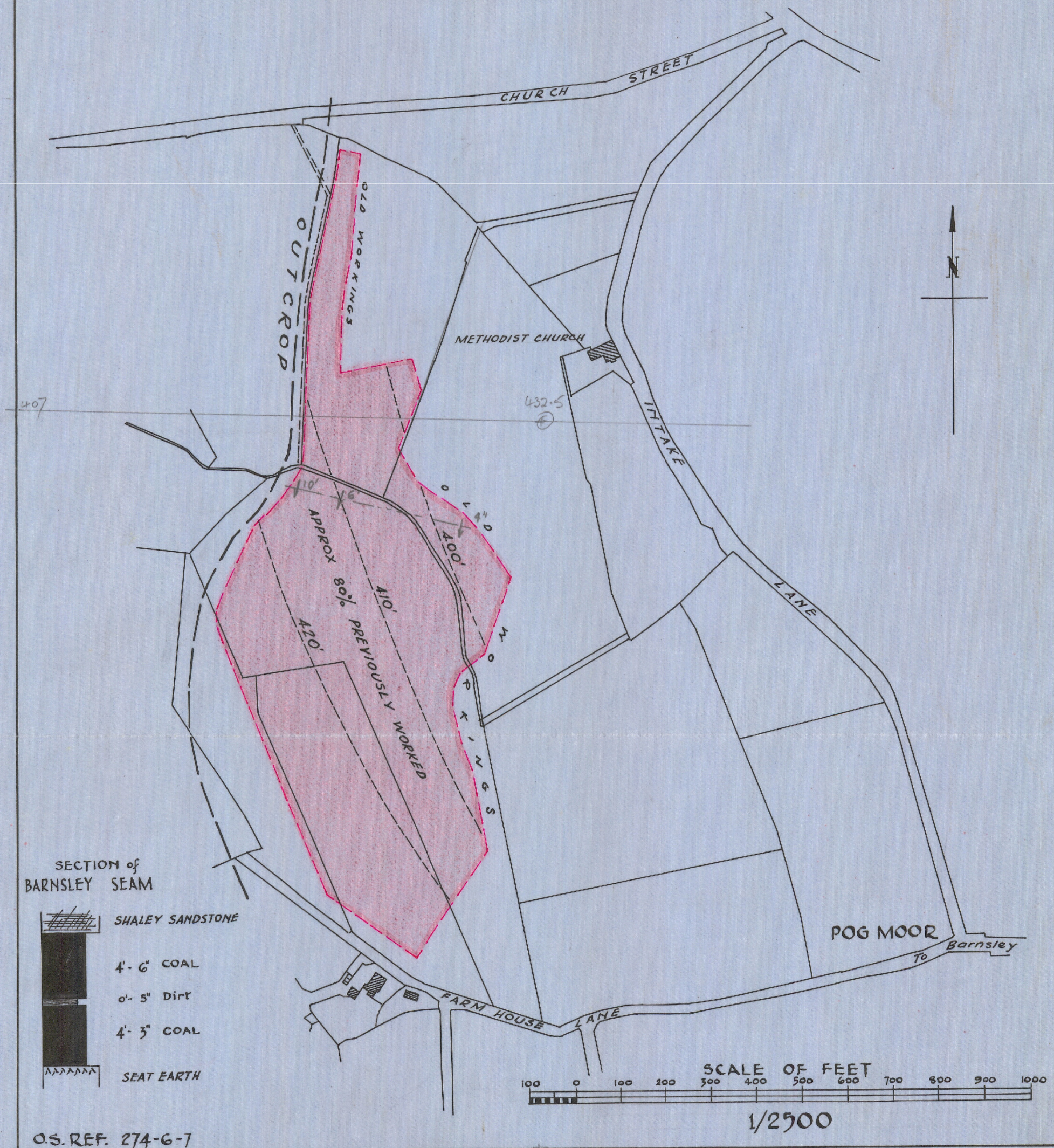
FARM HOUSE LANE OPENCAST
WORKINGS

Eastwood & Partners **EOP**
CONSULTING ENGINEERS
St. Andrew's House
23 Kingfield Road
Sheffield S11 9AS
Tel 0114 255 4554
Fax 0114 255 4330
mail@eastwoodandpartners.com
www.eastwoodandpartners.com

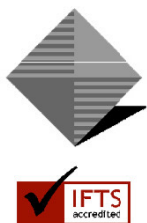
SCALE WHEN PLOTTED AT A3 Approx 1:5000			DRAWING STATUS INFORMATION	
DRAWN SA/CB	CHECKED CAT	DATE 05-09-13	DRAWING NUMBER 36284/005	REV A

FARM HOUSE LANE ~ PRIVATE OPENCAST SITE
WORKED by F.J. SWAIN LTD.,
ABANDONED Nov., 1960.

N.E.415.



The Coal Authority



Catalogue No.: NE415 Sheet Info:

Date: 27/08/2013

Scale: 1 TO 2500

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Kim Godson - The Coal Authority, 200 Lichfield Lane, Mansfield, Nottingham, NA, UK

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Date 16/17-9-13

Telephone:
01924 257003
Fax:
01924 252136

36284

REDBROOK

B+15

CASING		
SIZE (mm)	FROM (mm)	TO (mm)
150	96	750

[illegible]

DELAYS / BAD ACCESS / HARD STRATA etc.			
Cause & Time Encountered	From (m)	To (m)	Time (hr)
CHSBL	840	855	1HR

Driller..... CRAIG ROBERTS.....

Client.....

REMARKS	STANDPIPE DETAILS		
EXCESS MOVE <u>1HR</u> PIPE CONSTRUCTED <u>1 1/2 HR</u>		FROM	TO
	PLAIN PIPE	GL	1m
	SLOTTED PIPE	1m	855
	GRAVEL - FILTER	1m	855
	BENTONITE	1m	0.5
	SEALS		
	STOPCOCK COVER ✓		
GAS VALVE & BUNG ✓			