

COAL MINING RISK ASSESSMENT

Knowl Park House, Mirfield

March 2021

REV A



CIVIL | STRUCTURAL | GEOTECHNICAL & ENVIRONMENTAL | TRAFFIC AND TRANSPORT

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COAL MINING RISK ASSESSMENT

Knowl Park House, Crowlees Road, Mirfield, WF14 9PP
October 2020 – (C3257) – March 2021 – REV A

1. INTRODUCTION

HSP Consulting Engineers Ltd were commissioned by Frank Shaw Associates to prepare a Coal Mining Risk Assessment for the construction of a new dementia care home on the site. The assessment is to provide the Local Planning Authority with information on coal mining and an assessment of its impact on land stability.

Site Location and Description

The site is located off Crowlees Road, approximately 0.5km north of Mirfield town centre. The approximate National Grid Reference for the centre of the site is (NGR) 420370, 420244. The site currently supports an existing dementia day care centre with associated car parking and areas of soft landscaping.

Description and Layout of Proposed Development

The development proposals show the demolition of the existing care home building and the construction of a single storey dementia care home with associated car parking and areas of soft landscaping.

Scope of the Coal Mining Risk Assessment

The purpose of this Coal Mining Risk Assessment Report is to:

- Present a desk-based review of all available information on the coal mining issues which are relevant to the application site;
- Use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

Geology

The bedrock geology of the site is indicated to comprise the Pennine Lower Coal Measures Formation consisting of Sandstone, Mudstone and Siltstone. Described as '*Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.*' No superficial deposits are expected on the site. An outcrop of coal, the Silkstone seam, is recording on site trending southeast to northwest, on the mapping accompanying ref 2. Published BGS information indicates the seam is between 0.2 and 10.7m in thickness. Limited Made Ground deposits are expected to be encountered across the site.

2. SOURCES OF INFORMATION USED TO INFORM THIS REPORT

The sources of information obtained upon which the risk assessment of coal mining issues have been based are listed below; (The reports / extracts are appended as applicable).

- Ref 1. British Geological Survey (BGS) Geology of Britain Viewer.

- Ref 2. Coal Authority Consultants Coal Mining Report, date 11th September 2020, Ref: 51002299601001.
- Ref 3. BGS 1:50,000 Series Geological Mapping, Sheet 77 Huddersfield, Solid and Drift Edition.
- Ref 4. BGS Borehole Record Viewer.
- Ref 5. Coal Authority Interactive Map Viewer.

3. IDENTIFICATION AND ASSESSMENT OF SITE-SPECIFIC COAL MINING RISKS

The table below summarises the potential risks associated with coal mining legacy for the proposed development site, identified from *list sources of information*.

Coal Mining Issue	Yes	No	Risk Assessment
Underground coal mining (recorded at shallow depths)	Y		The property is in a surface area that could be affected by underground mining in 1 seam of coal at 114m depth, that was last worked in 1906. Any movement in the ground due to coal mining activity should have stopped. An outcrop of Silkstone is recorded on site trending southeast to northwest. This was identified within a single window sample borehole advanced at the site during a separate ground investigation under coal permit license 20763 at a depth of 2.20m begl.
Probable unrecorded shallow workings	Y		Probable unrecorded shallow workings may be present beneath the site (Ref 2).
Mine entries (shafts and adits)		N	No mine entries are recorded within a 100m radius of the site boundary.
Coal mining geology (fissures)		N	The CA is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.
Recorded coal mining surface hazard		N	The CA has not received a damage notice or claim for the subject property or any property within 50 metres of the enquiry boundary since 31 st October 1994.
Surface mining (opencast workings)		N	The site is not within the boundary of an opencast site from which coal has been removed by opencast methods. The site is also not within 200m of the boundary of an opencast site within which coal is being extracted by opencast methods.

For those coal mining issues identified as “yes” a discussion and assessment of the risks, both individually and cumulatively, to the application site and the proposed development are given in the next section.

4. MITIGATION STRATEGY PROPOSED

The Coal Authority Mining Report indicates that the site is in a surface area that could be affected by underground mining in 1 seam of coal at 114m depth, that was last worked in 1906. Any movement in the ground due to coal mining activity should have stopped.

The Coal Authority indicate it is probable that unrecorded shallow workings may also be present beneath the site.

The Coal Authority Mining Report indicates a conjectured outcrop of coal (Silkstone Seam) on site. The mapping indicates the outcrop trends from the southeast to the northwest, dip direction and amount are not given but assume to be to the (north east based on direction of younging). Coal was identified within a single window sample borehole advanced at the site during a separate ground investigation, under coal permit license 20763, at a depth of 2.20m begl. The thickness of the coal is unknown at this stage as it was not fully penetrated, within the windowless sampler borehole, due to SPT refusal.

An application was made to the Coal Authority in September 2020 for any applicable Mining Abandonment Plans that may be available that intersect with the site. The Coal Authority confirmed that they had no abandonment plans shallower than 50m available for the site. Due to the nature of the proposed development (single storey care home) it was not deemed necessary to view any plans for workings deeper than 50m begl (as all movement should have stopped).

Following The Coal Authority granting a permit to investigate (Permit No. 21346), rotary probing was undertaken on the 10th and 11th February 2021. Four exploratory hole locations were advanced to 30m with water flush using rotary drilling techniques. The drilling recorded intact seams of coal within all of the exploratory locations. Shallow coal in the range of 0.70m to 1.00m in thickness was encountered in three of the four exploratory holes at depths of between 3.00m and 4.70m begl. No voids or worked seams were recorded within any of the exploratory locations, therefore HSP consider that ground stabilisation works should not be required prior to the re-development of the site based on the investigation to date.

However, due to the presence of the existing care home building it was not possible to access all the planned exploratory locations within the proposed building footprint. HSP recommend the final rotary borehole is advanced following demolition and site clearance to confirm the recommendations above.

HSP recommend that guidance laid out within 'Coal Seam Outcrop Precautions – HSP Memo' (Appendix II) be followed to ensure that the development is protected should any seams be exposed during groundworks on the site. The risk of exposure and subsequent combustion of a shallow coal seam is considered to be very low based on the likely depth of made ground and overburden.

5. CONCLUSION

An outcrop of Silkstone Coal is recorded on site and The Coal Authority indicate unrecorded shallow workings are probable. Following The Coal Authority granting a permit to investigate (Permit No. 21346), rotary probing was undertaken on the 10th and 11th February 2021. Four exploratory hole locations were advanced to 30m using rotary drilling techniques with water flush. The drilling recorded intact seams of coal within all of the exploratory locations. Shallow coal in the range of 0.70m to 1.00m in thickness was encountered in three of the four exploratory holes at depths of between 3.00m and 4.70m begl. No voids or worked seams were recorded within any of the exploratory locations, therefore HSP consider that ground stabilisation works should not be required prior to the re-development of the site based on the investigation to date.

However, due to the presence of the existing care home building it was not possible to access all the planned exploratory locations within the proposed building footprint. HSP recommend the final rotary borehole is advanced following demolition and site clearance to confirm the recommendations above.

HSP recommend that guidance laid out within 'Coal Seam Outcrop Precautions – HSP Memo' (Appendix II) be followed to ensure that the development is protected should any seams be exposed during earthworks on the site. The risk of exposure and subsequent combustion of a shallow coal seam is considered to be very low.

RELEVANT APPENDICES

Appendix I	Coal Authority Consultants Coal Mining Report, date 11 th September 2020, Ref: 51002299601001.
Appendix II	Coal Seam Outcrop Precautions – HSP Memo.
Appendix III	Window Sample Borehole Logs from October 2020 Ground Investigation.
Appendix IV	Rotary Open Hole Borehole Logs from February 2021

Appendix I



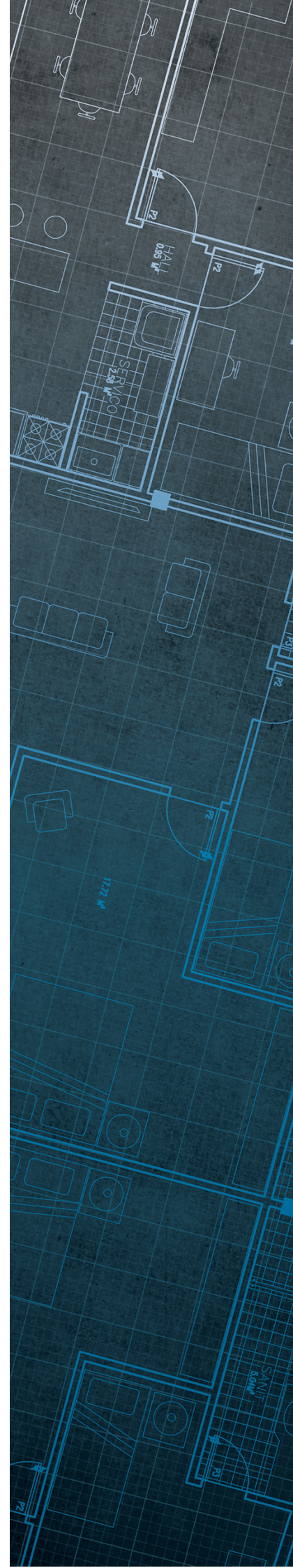
The Coal
Authority

Consultants Coal Mining Report

Staff House
Knowl Park House
Crowlees Road
Mirfield
Kirklees
WF14 9PP

Date of enquiry: 11 September 2020
Date enquiry received: 11 September 2020
Issue date: 11 September 2020

Our reference: 51002299601001
Your reference: C3257



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

HSP CONSULTING

Enquiry address

Staff House
Knowl Park House
Crowlees Road
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Kirklees
WF14 9PP

How to contact us

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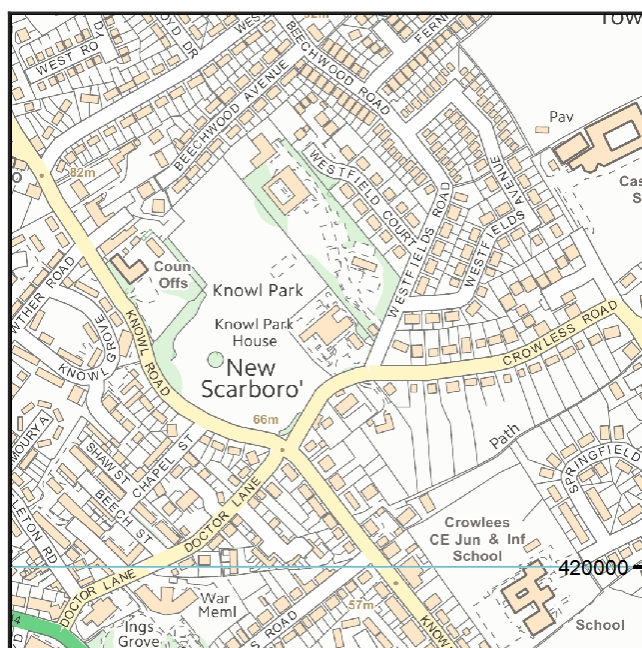
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 /thecoalauthority



Approximate position of property



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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	BLACK BED	Coal	6HBN	114	Beneath Property	2.7	East	76	1906

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.

Abandoned mine plan catalogue numbers

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

10527	GCR57	GCR54
-------	-------	-------

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
SILKSTONE	Coal	Yes	Within	N/A	96

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

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

Distance to site investigation (m)	Direction
0.9	North-East

See Section 4 for further information.

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.

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.

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.

Site investigations

The site is within an area of previous interest. It is close to where the Coal Authority has received information relating to past site investigations.

The site requires further investigation and may influence how you approach your risk assessment.

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.

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.

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.

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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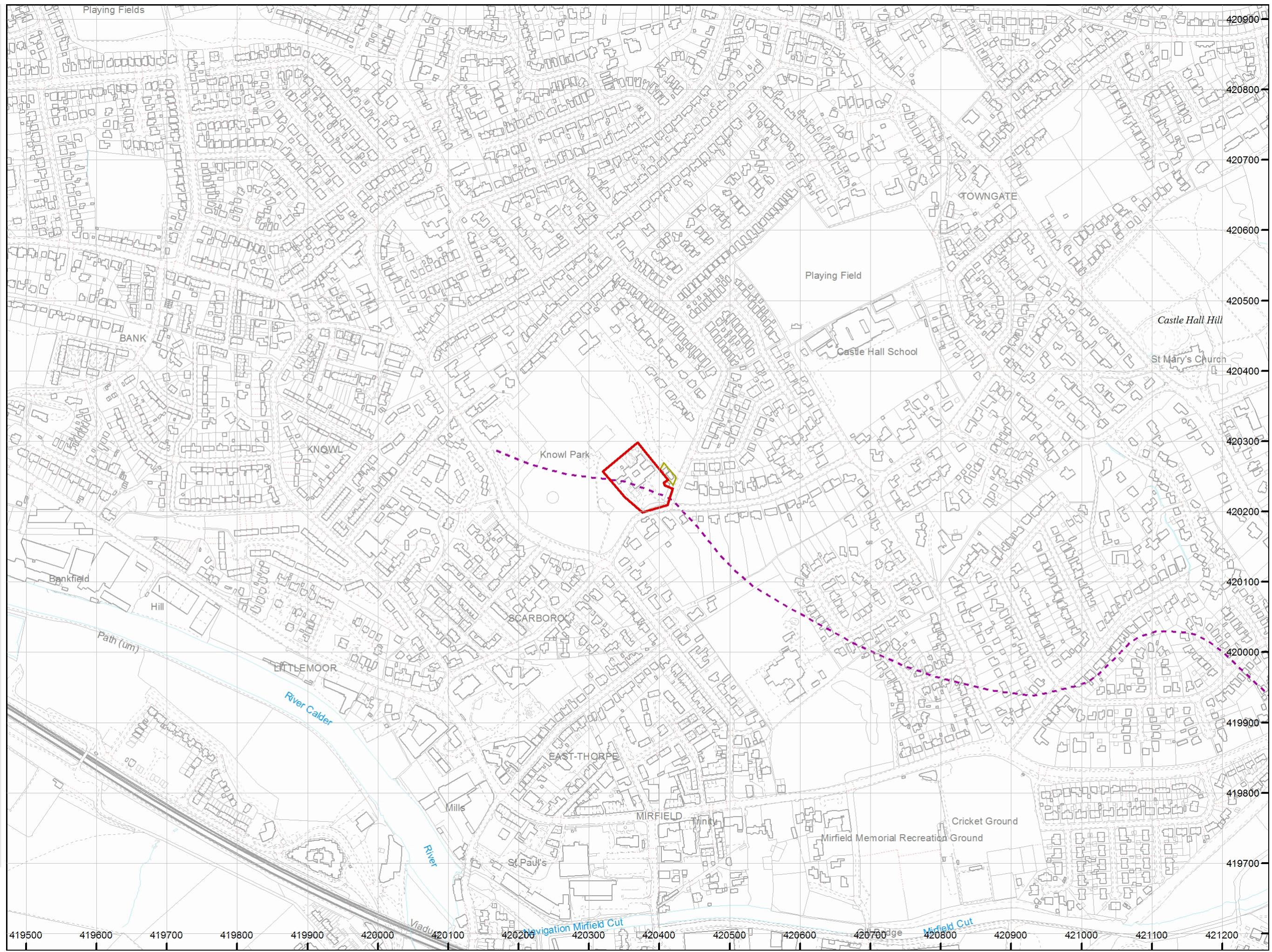
VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	11 September 2020
Issued to	HSP CONSULTING BYRON HOUSE 4 MEADOWBANK WAY EASTWOOD NOTTINGHAMSHIRE NG16 3SB
Property search for	STAFF HOUSE KNOWL PARK HOUSE CROWLEES ROAD MIRFIELD KIRKLEES WF14 9PP
Reference number	51002299601001
Date of issue	11 September 2020
Cost	£112.13
VAT @ 20%	£22.43
Total received	£134.56
VAT registration	598 5850 68

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) 
- Site investigations 



How to contact us
0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com

Appendix II



COAL SEAM OUTCROP PRECAUTIONS – GUIDANCE NOTE 1

There are four potential problems at a coal seam outcrop:

- Shallow opencast workings (day-eyes)
- Combustion (spontaneous or otherwise)
- Sulphates
- 'Hard spot' (differential settlement)

This guidance note addresses the risk of combustion, sulphates and hard-spots.

In general the risk of igniting an unworked seam encountered at outcrop or at shallow depth in footings or drainage excavations is low. The risk is increased where aeration occurs (especially where the seam has been worked).

Dependent upon the calorific value of the seam, where it is less than 450mm thick, the coal is unlikely to be able to sustain prolonged combustion and generate sufficient heat to cause a problem.

Where it is thicker than 450mm the following general guidance applies:-

Where coal is exposed in footing excavations (over 450mm thick) it should be sealed from the air using compacted clay (or concrete used in footing).

Where coal is exposed in services trenches (over 450mm thick), the trench should be back filled above the pipe bedding surrounding the pipe or service with reasonably compacted clayey soil or sub-base. Sealing around manhole chambers should be carried out (as above) where the seam is over 900mm thick.

(*care required in carrying out compaction – no plant used where cover to pipe is less than 450mm).

Where seam is exposed across plot

Table 1

Seam thickness (mm)	Cover/seal thickness outside house footprint (incombustible material)	Cover/seal thickness beneath house (mm) (only applies where there is oversite beneath timber floor or where there is a beam and block floor)	Notes/comments
450-900	500mm for 5m	None	(unless open fire is to be used – 300mm)
900-2000	750mm for 7.5m	300	(if open fire to be used – remove coal for radius of 2m beneath centre of grate)
1000-3000	1000mm for 10m	500	(if open fire to be used – remove coal for radius of 3m beneath centre of grate)
>3000			Removal of coal

Notes for Table 1

1.If there is a layer of natural strata above the seam the thickness of the seal may be reduced accordingly.

Sulphates

Unless testing shows otherwise, sulphate precautions should be taken where foundations are in contact with a coal seam. Minimum class 2 conditions to BRE Digest 363 should be taken.

Geotechnical considerations where coal encountered in footings

Coal usually has a bearing capacity greater than that of natural clay soils surrounding it. The coal is very unlikely to cause a hard-spot problem any more onerous than a sandstone. Where sharp boundaries are encountered in footings between coal and clay, additional thickening and strengthening of the strip footing may be necessary.

Appendix III

Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type WS
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 01/10/2020 -		Logged By L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
Well		0.30	ES	N=50 (6,7/50 for 275mm)	0.20		Legend	<p>Grass over brown slightly sandy clayey TOPSOIL with many rootlets.</p> <p>MADE GROUND comprising yellow weathered Sandstone cobble.</p> <p>Stiff yellow orange slightly sandy CLAY with gravels of sandstone and mudstone. Gravels are fine to coarse angular to subrounded.</p> <p>Stiff yellow grey mottled slightly sandy laminated CLAY with inter-bedded Mudstone fragments and occasional Coal lithorelicts.</p> <p>Very weak grey weathered laminated MUDSTONE.</p> <p style="text-align: right;">End of borehole at 1.00 m</p>
		0.60	D		0.25			
		0.80	ES		0.50			
		1.00			0.80			
					1.00			

Remarks

Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
WS

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 01/10/2020 -

Logged By
L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20		Grass over brown slightly sandy TOPSOIL with many rootlets.	
		0.40	ES		0.45		MADE GROUND comprising reworked brown slightly sandy clay with occasional brick gravels.	
		0.70	ES		0.60		Gravels are fine to coarse angular to subrounded.	
		0.80	D		0.80		Stiff grey brown orange mottled slightly sandy CLAY.	
		1.00		50 (3,4/50 for 240mm)	1.00		Stiff grey brown mottled CLAY with gravels of Mudstone. Gravels are fine to coarse angular to subrounded.	
							Very weak grey weathered MUDSTONE. Recovered as fragments of MUDSTONE in a Clay matrix.	
							End of borehole at 1.00 m	

Remarks



Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
WS

Location: Crowlees Road, Mirfield

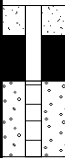
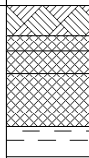
Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 01/10/2020 -

Logged By
L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	ES		0.20 0.30 0.45		<p>Grass over brown slightly sandy TOPSOIL with occasional sandstone gravel and many rootlets. Gravels are fine to coarse angular to subrounded.</p> <p>MADE GROUND comprising Sandstone fragments in a sandy matrix.</p> <p>MADE GROUND comprising reworked slightly sandy laminated Clay with many rootlets.</p> <p>MADE GROUND comprising grey ashy sandy gravelly fill. Gravels are fine to coarse angular to subrounded concrete and brick.</p> <p>Stiff grey brown mottled CLAY.</p> <p style="text-align: right;">End of borehole at 1.00 m</p>	
		0.80	ES		0.80			
		0.90	D		1.00			
		1.00		50 (4,10/50 for 265mm)				

Remarks


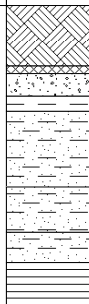
Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type WS
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 01/10/2020 -		Logged By L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES	N=39 (2,2/3,4,10,22)	0.40			<p>Grass over brown slightly sandy clayey TOPSOIL with occasional rootlets and gravels of brick and sandstone. Gravels are fine to coarse angular to subrounded.</p> <p>MADE GROUND comprising crushed red brick, MADE GROUND comprising sandy gravelly fill with cobbles of concrete and sandstone. Gravels are fine to coarse angular to subrounded.</p> <p>Medium dense to dense yellow fine to coarse slightly gravelly SAND with occasional cobbles of Sandstone. Gravels are fine to coarse angular to subrounded sandstone.</p> <p>Stiff grey orange mottled CLAY.</p> <p>Stiff orange grey mottled friable slightly sandy CLAY.</p> <p>Stiff to very stiff grey brown orange mottled slightly sandy CLAY with interbedded Ironstone and Coal lithorelicts.</p> <p>Very stiff grey brown mottled weathered MUDSTONE. Recovered as friable laminated Clay with interbedded Mudstone.</p> <p style="text-align: right;">End of borehole at 2.00 m</p>
		0.80	ES		0.45			
		1.00	ES		0.60			
		1.20	ES		0.70			
		1.40		1.20				
		1.50		1.50				
		1.70		1.70				
2.00		50 (7,9/50 for 230mm)	2.00					

Remarks

Borehole Log

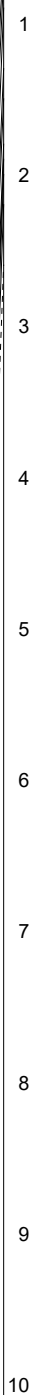
Borehole No.

WS05

Sheet 1 of 1

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type WS
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 01/10/2020 -		Logged By L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
Well		0.45	ES	N=28 (3,5,7,7,9)	0.30			Grass over brown slightly sandy clayey TOPSOIL with many rootlets and occasional sandstone and brock gravels. Gravels are fine to coarse angular to subrounded.
		0.90	ES		0.45			MADE GROUND comprising reworked sandy gravelly clay fill. Gravels are fine to coarse angular to subrounded sandstone, brick and pottery.
		1.00			0.55			
					0.70			
					0.90			
		1.50	D	N=25 (6,6/5,6,6,8)	1.30			MADE GROUND comprising reworked black clay fill with rootlets and gravels of brick, coal and sandstone. Gravels are fine to coarse angular to subrounded.
		1.80	ES		1.50			Firm to stiff grey black mottled CLAY with occasional coal lithorelicts.
		2.00			1.80			Firm to stiff orange grey mottled CLAY with occasional gravels of sandstone. Gravels are fine to coarse angular to subrounded.
					1.90			Stiff orange grey mottled CLAY with occasional Mudstone lithorelicts,
					2.00			Stiff orange grey mottled CLAY.
		2.20	Very weak weathered MUDSTONE recovered as grey friable Clay with volumes of interbedded Mudstone.					
2.60		N=50 (25 for 135mm/50 for 245mm)	2.60	Very weak grey brown weathered IRONSTONE.				
				Very weak grey MUDSTONE.				
				Stiff black grey laminated CLAY with many Coal fragments and lithorelicts.				
				Very weak black weathered COAL recovered as friable laminated COAL fragments.				
				End of borehole at 2.60 m				



Remarks



Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
WS

Location: Crowlees Road, Mirfield

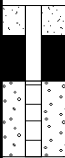
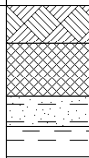
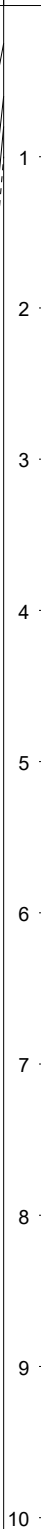
Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 01/10/2020 -

Logged By
L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES	50 (25 for 125mm/50 for 230mm)	0.25		<p>Grass over brown slightly sandy clayey TOPSOIL with many rootlets and occasional gravels of brick and sandstone. Gravels are fine to coarse angular to subrounded.</p> <p>MADE GROUND comprising reworked brown sandy gravelly Clay fill. Gravels are fine to coarse angular to subrounded brick and sandstone.</p> <p>Stiff brown grey orange mottled slightly sandy CLAY.</p> <p>Stiff to very stiff brown orange mottled CLAY with inter bedded Mudstone fragments.</p> <p style="text-align: right;">End of borehole at 1.00 m</p>	
		0.80	ES		0.60			
		0.90	D		0.80			
		1.00			1.00			
								

Remarks

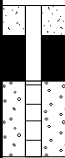
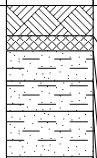
Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type WS
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 01/10/2020 -		Logged By L.Jones

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	ES		0.20 0.30 0.50 0.70 1.00			<p>Grass over brown slightly sandy clayey TOPSOIL with many rootlets.</p> <p>MADE GROUND comprising reworked brown orange grey mottled Clay with gravels of brick, concrete and sandstone. Gravels are fine to coarse angular to subrounded.</p> <p>Stiff grey brown orange mottled slightly sandy CLAY with occasional coal lithorelicts.</p> <p>Stiff grey brown orange mottled slightly sandy friable CLAY with interbedded coal and sandstone fragments.</p> <p>Very stiff grey orange mottled slightly sandy laminated CLAY with interbedded sandstone fragments.</p> <p>End of borehole at 1.00 m</p>
		0.70	D					
		0.70	ES	N=50 (4,5/50 for 295mm)				
		1.00						

Remarks




DO NOT SCALE
NOTES:



 - Site Boundary

 - Borehole Location Plan

 - Borehole + Standpipe



Lawrence House, Meadowbank Way,
Eastwood, Nottingham, NG16 3SB
Tel: 01773 535 555 Fax: 0870 600 6091
www.hspconsulting.com

CLIENT:
Frankshaw Associates

PROJECT:
Knowl Park House

TITLE:
Site Location Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL

DESIGN/DRAWN:	DATE:
LEJ	Sept 2020

PROJECT No:	DRAWING No:
C3257	001

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Appendix IV

Rotary Core Log

Borehole No.

BH01

Sheet 1 of 3

Project Name: Knowl Park House

 Project No.
C3257a

Co-ords: -

 Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

 Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

 Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Fill and Clay.	1
							2.00			Yellow and brown MUDSTONE.	2
							4.00			Light grey MUDSTONE.	4
							6.00			Black MUDSTONE.	6
							6.40			Light grey MUDSTONE.	7
											8
											9
											10

Continued on next sheet

Remarks

Rotary Core Log

Borehole No.

BH01

Sheet 2 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							15.00				11
							15.50				12
											13
											14
											15
											16
											17
											18
											19
											20

COAL.

Light grey MUDSTONE.

Continued on next sheet

Remarks





Rotary Core Log

Borehole No.

BH01

Sheet 3 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield



Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description
				TCR	SCR	RQD				
							24.60			COAL.
							25.60			Light grey MUDSTONE.
							30.00			

21

22

23

24

25

26

27

28

29

30

End of borehole at 30.00 m

Remarks



Borehole Log

Borehole No.

BH01

Sheet 1 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
Well								Fill and Clay.
					2.00			Yellow and brown MUDSTONE.
					4.00			Light grey MUDSTONE.
					6.00			Black MUDSTONE.
					6.40			Light grey MUDSTONE.

Continued on next sheet

Remarks

Borehole Log

Borehole No.

BH01

Sheet 2 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					15.00			COAL.	15
					15.50			Light grey MUDSTONE.	16
									17
									18
									19
									20

Continued on next sheet

Remarks



Borehole Log

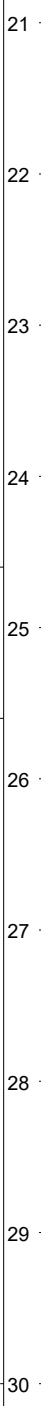
Borehole No.

BH01

Sheet 3 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					24.60		COAL.	
					25.60		Light grey MUDSTONE.	
					30.00			



Remarks

End of borehole at 30.00 m



Rotary Core Log

Borehole No.

BH02

Sheet 1 of 3

Project Name: Knowl Park House

 Project No.
C3257a

Co-ords: -

 Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

 Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

 Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Fill and Clay.	1
							1.80			Yellow and brown MUDSTONE.	2
							3.00			COAL.	3
							4.00			Yellow and brown MUDSTONE.	4
							5.00			Light grey MUDSTONE.	5
											6
											7
											8
											9
											10

Continued on next sheet

Remarks



Rotary Core Log

Borehole No.

BH02

Sheet 2 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield		Level:	Scale 1:50
Client: Frankshaw Associates		Dates: 10/02/2021 -	Logged By DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
											11
							12.40			COAL.	13
							13.50			Light grey MUDSTONE.	14
							14.20			COAL.	15
							14.40			Light grey MUDSTONE.	16
											17
											18
											19
											20

Continued on next sheet

Remarks







Rotary Core Log

Borehole No.

BH02

Sheet 3 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
											21
							22.00			COAL.	22
							23.00			Light grey MUDSTONE.	23
											24
											25
											26
											27
							28.00			COAL.	28
							28.40			Light grey MUDSTONE.	29
							30.00				30

End of borehole at 30.00 m

Remarks

Borehole Log

Borehole No.

BH02

Sheet 1 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
Well								Fill and Clay.	1
					1.80			Yellow and brown MUDSTONE.	2
					3.00			COAL.	3
					4.00			Yellow and brown MUDSTONE.	4
					5.00			Light grey MUDSTONE.	5
								6	
								7	
								8	
								9	
								10	

Continued on next sheet

Remarks

Borehole Log

Borehole No.

BH02

Sheet 2 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					12.40			
					13.50			COAL.
					14.20 14.40			COAL.
								Light grey MUDSTONE.
								Light grey MUDSTONE.

11
12
13
14
15
16
17
18
19
20

Continued on next sheet

Remarks



Borehole Log

Borehole No.

BH02

Sheet 3 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								21
					22.00		COAL.	22
					23.00		Light grey MUDSTONE.	23
								24
								25
					28.00		COAL.	28
					28.40		Light grey MUDSTONE.	29
					30.00		End of borehole at 30.00 m	30

Remarks

Rotary Core Log

Borehole No.

BH03

Sheet 1 of 3

Project Name: Knowl Park House

 Project No.
C3257a

Co-ords: -

 Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

 Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

 Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Fill and Clay.	1
							1.70			Yellow and brown MUDSTONE.	2
							3.00			Light grey MUDSTONE.	3
							4.50			COAL.	5
							5.50			Light grey MUDSTONE.	6
											7
											8
											9
											10

Continued on next sheet

Remarks

Rotary Core Log

Borehole No.

BH03

Sheet 2 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							13.50				11
											12
											13
											14
							14.50				15
											16
											17
											18
											19
											20

Continued on next sheet

Remarks

Rotary Core Log

Borehole No.

BH03

Sheet 3 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description
				TCR	SCR	RQD				
							21.40			
							22.40		COAL.	
									Light grey MUDSTONE.	
							26.80		Coal.	
							27.50		Light grey MUDSTONE.	
							30.00			
										End of borehole at 30.00 m

Remarks

Borehole Log

Borehole No.

BH03

Sheet 1 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Fill and Clay.	1
					1.70			Yellow and brown MUDSTONE.	2
					3.00			Light grey MUDSTONE.	3
					4.50			COAL.	5
					5.50			Light grey MUDSTONE.	6
								7	
								8	
								9	
								10	

Continued on next sheet

Remarks

Borehole Log

Borehole No.

BH03

Sheet 2 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 10/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
Well								
					13.50			
					14.50		COAL.	
							Light grey MUDSTONE.	

11
12
13
14
15
16
17
18
19
20

Continued on next sheet

Remarks



Borehole Log

Borehole No.

BH03

Sheet 3 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 10/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								21
					21.40		COAL.	22
					22.40		Light grey MUDSTONE.	23
								24
								25
					26.80		Coal.	27
					27.50		Light grey MUDSTONE.	28
								29
					30.00		End of borehole at 30.00 m	30

Remarks

Rotary Core Log

Borehole No.

BH04

Sheet 1 of 3

Project Name: Knowl Park House

 Project No.
C3257a

Co-ords: -

 Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

 Scale
1:50

Client: Frankshaw Associates

Dates: 11/02/2021 -

 Logged By
DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
										Fill and Clay.	1
							1.80			Yellow and brown MUDSTONE.	2
							4.00			Light grey MUDSTONE.	4
							4.70			COAL.	5
							5.40			Light grey MUDSTONE.	6
											7
											8
											9
											10

Continued on next sheet

Remarks

Rotary Core Log

Borehole No.

BH04

Sheet 2 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 11/02/2021 -		Logged By DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
											11
											12
											13
											14
							14.70			COAL.	15
							15.20			Light grey MUDSTONE.	16
							16.00			COAL.	17
							16.30			Light grey MUDSTONE.	18
											19
											20

Continued on next sheet

Remarks



Rotary Core Log

Borehole No.

BH04

Sheet 3 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield		Level:	Scale 1:50
Client: Frankshaw Associates		Dates: 11/02/2021 -	Logged By DRILLER

Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							24.50			COAL.	
							25.30			Light grey MUDSTONE.	
							30.00				

21
22
23
24
25
26
27
28
29
30

End of borehole at 30.00 m

Remarks



Borehole Log

Borehole No.

BH04

Sheet 1 of 3

Project Name: Knowl Park House	Project No. C3257a	Co-ords: -	Hole Type RO
Location: Crowlees Road, Mirfield	Level:		Scale 1:50
Client: Frankshaw Associates	Dates: 11/02/2021 -		Logged By DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
Well								Fill and Clay.	1
					1.80			Yellow and brown MUDSTONE.	2
					4.00			Light grey MUDSTONE.	4
					4.70			COAL.	5
					5.40			Light grey MUDSTONE.	6
								7	
								8	
								9	
								10	

Continued on next sheet

Remarks

Borehole Log

Borehole No.

BH04

Sheet 2 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 11/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					14.70			COAL.
					15.20			Light grey MUDSTONE.
				16.00			COAL.	
				16.30			Light grey MUDSTONE.	

11
12
13
14
15
16
17
18
19
20

Continued on next sheet

Remarks



Borehole Log

Borehole No.

BH04

Sheet 3 of 3

Project Name: Knowl Park House

Project No.
C3257a

Co-ords: -

Hole Type
RO

Location: Crowlees Road, Mirfield

Level:

Scale
1:50

Client: Frankshaw Associates

Dates: 11/02/2021 -

Logged By
DRILLER

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					24.50		COAL.	21 22 23 24 25 26 27 28 29 30
					25.30		Light grey MUDSTONE.	
					30.00		End of borehole at 30.00 m	

Remarks






DO NOT SCALE
NOTES:



 - Site Boundary

 - Borehole



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CLIENT:
Frankshaw Associates

PROJECT:
Knowl Park House

TITLE:
Coal Investigation Site
Location Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL

DESIGN/DRAWN:	DATE:
LEJ	Jan 2021

PROJECT No:	DRAWING No:
C3257	001

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