

**Environmental
Geotechnical
Specialists**



COAL INVESTIGATION

job number C1035/20/E/1902	date 28/01/21
site address Land off Ravensthorpe Road, Dewsbury Riverside, Thornhill Lees, Dewsbury, WF12 9EG.	
written by I. Sakoor	checked by C. E. Mason
issued by I. Sakoor	

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GEOTECHNICAL
ENVIRONMENTAL



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Report on a Shaft Investigation

Location: **Land off Ravensthorpe Road,**
Dewsbury Riverside, Thornhill Lees, Dewsbury, WF12 9EG.

For: Kirklees Council

Report No. C1035/20/E/1902

Report date: January 2021

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

Imran Sakoor BEng, FGS
Geo-environmental Engineer

Charlotte Mason BSc FGS
Geo-environmental Engineer

1. Introduction

It is understood that the land off Ravensthorpe Road, Thornhill Lees, Dewsbury is to be re-purposed for use as allotments. As a consequence of the Coal Mining Risk Assessment undertaken for the development (C1035/20/E/1615, October 2020), it became apparent that there are possible risks associated with the presence of two mine entries (shafts) onsite as indicated by Coal Authority records. As such, intrusive investigation has been carried out at the site to establish the risk associated with a shaft anticipated to be present. 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. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, these are for guidance only and no liability can be accepted for their accuracy.

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



3. Preliminary Desk Study

The following information has been considered during the works.

- Appraisal of available on-line British Geological Survey and Coal Authority data.
- Coal Mining Risk Assessment produced by Rogers Geotechnical Services Ltd (C1035/20/E/1615, October 2020).
- Mine Entry Interpretive Report including mine entry data sheets (C1035/20/E/1867, November 2020).

4. Fieldworks

In order to undertake this investigation, it was necessary to obtain permission to enter or disturb Coal Authority interests. This was permission was granted on the 16th December 2020 as permit reference number 21090, which is presented in Appendix 1 to this report. Under the requirements of the licence, a personal gas monitor for CO, CH₄, CO₂, O₂ and H₂S gases was employed throughout the works in order.

The fieldworks were undertaken during the period 18th to 19th January 2021 and included mechanically excavated trialpits/trenches in order to expose the shaft and prove the depth to rockhead.

The investigatory location is shown on the site plan which is presented in Appendix 2 to this report. It should be appreciated that in order to accurately locate the recorded position of the shaft, the coordinates given by the Consultants Coal Mining Report presented within the Phase 1 Desk Study and Mine Entry Interpretive Report were used to set out the shaft investigation area. Using this information, setting out of the investigation area was undertaken with a Leica Total Station.

4.1 Disused Mine Shaft Investigation

The information from the Coal Authority indicated the presence of two mineshafts in close proximity to each other on the site. A search was made for these shafts (mine entry ref: 433419-005 and 423419-006) by excavating shallow trenches in the area where the shafts were anticipated. This work was undertaken using a 13t tracked back-acting excavator and the soils were logged on site in general accordance with BS5930: 2015, and full descriptions are given on the trialpit record which is presented in Appendix 3. Photographic evidence of the features observed are presented in Appendix 4. Dimensions of the trenches and locations of features identified with collected using the above mentioned GPS Staff.

Once excavations were completed, the trialpits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of the pit undertaken in this investigation should be understood by



the current site user, as the mounds or depressions associated with the pit may present a risk to the current site use e.g. trip hazards or agricultural equipment. Furthermore, it must be realised that the infilled pit represents an area of disturbance within the site soils, thus the soils at the pit location may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

5. Geological Appraisal

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

Table 1: Geological Data for the Site

Strata Type	Strata Name ¹	Previous Name ²	Description ²
Superficial Geology (Eastern edge of site only)	River Terrace Deposits	-	Sand and gravel, locally with lenses of silt, clay or peat. [Generic description].
Solid Geology	Pennine Lower Coal Measures Formation	Lower Coal Measures	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the base, and more numerous and thicker coal seams in the upper part.

6. Discussion of Ground Conditions

The trenching in close proximity to the grid reference for shaft 423419-006, revealed generally 0.35m of topsoil, over made ground described as soft greyish brown very gravelly clay. The gravel included mudstone, siltstone, coal and brick fragments. Shaft 413419-006 was revealed 1.45m below ground level and located at 423188.2 E, 419671.65 N. The mine entry was observed to be a 2.2m diameter brick lined feature, which had been infilled with cohesive soils. Furthermore, it could be seen that the shaft had not been treated or capped and is in poor condition as some bricks were missing around the lining. It should be appreciated that sandstone rockhead was encountered within a nearby trial pit at 4m below ground level. Photographs of the feature are presented in Appendix 4.

With reference to shaft 423419-005, an area of approximately 17m x 16m was excavated around the coordinates given by the Coal Authority. It should be appreciated that as the shaft has been located from abandonment plans, a departure of 8m from the given coordinates has been taken (see C1035/20/E/1615 Mine Entry Interpretive Report, November 2020). It should be appreciated that no evidence of a shaft was observed within the departure zone. Moreover, whilst it was noted that the made ground was thickest (up to 1m) close to the expected location, the fill reduced to around 0.5m depth towards the edge of the departure zone. In view of this, it is considered unlikely that shaft 423419-005 is present outside of the excavated area.

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

² Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]



In addition, during the fieldworks, the farmer remarked that a small area of the site could be seen as a distinctly different colour at certain times of the farming season. Thus, the excavation trench was extended to include this as well. However, as before whilst some made ground was encountered, this was found to be limited in thickness and was underlain by natural soils.

Given that shaft 423419-006 was found as a distinct circular brick lined feature, it would not be unreasonable to expect shaft 423419-005 to be have been constructed in a similar fashion. Both of these are considered to have served the same mine as one is denoted as an engine shaft for access/egress and the other as an air shaft for providing ventilation. In view of this, it is apparent that mine shaft 423419-005 is not present in the area indicated by the Coal Authority or the area excavated as part of this investigation.

In the context of the guidance given by CIRIA C758 – *Abandoned mine workings manual* it should be appreciated that the minimum distance for siting structures from open or poorly filled shafts depends primarily on the nature and thickness of the surface deposits. This would presumably be on the basis that a significant ground collapse within intact rock would be improbable, therefore the crater associated with a collapse shaft would be located within the soils above the rock. Figure 5.1 of CIRIA C758 goes on to suggest that a realistic collapse crater within such soils would repose to an angle of $90^\circ - \phi$, where ϕ is the angle of shearing resistance for the soil and the resulting angle is taken from a vertical projection at the outer edge of the shaft. From the shaft wall, the zone of collapse would extend to $z \times \tan \phi$, where z is the depth to competent bedrock.

As a consequence of the above, it may be noted that the near surface soils at the site generally comprise clays. Whilst such soils would possess cohesion in the short-term and thus would be likely to stand at near vertical angles shortly after a collapse, effective stress conditions would ultimately prevail. As such, for a collapse crater within these soils, an effective angle of shearing resistance of say 25° should be employed. Consequently, it is considered that a collapse crater associated with these soils would repose to an angle of 65° from the vertical (i.e. 25° up from horizontal). With this in mind and on the basis that the thickness of the soil above rockhead at the site is likely to be around 4m, the lateral extent of a crater at the site would be $\approx 8.6\text{m}$ ($4 \times \tan 65^\circ$) away from the outer circumference of a collapsed shaft.

Furthermore, whilst the area of shaft 423419-005 indicated to be present to the Coal Authority has been excavated, this mine entry could not be located. It may be the case that this shaft may be present underground and have served as a connection between coal seams. It may also be possible that this shaft has been recorded due to a mapping error at the time when the mine abandonment plans were being drawn up.



7. Risk Assessment

It should be appreciated that at the time of writing of this report development plans have not been finalised, thus the influence of the shaft on any future surface structures cannot be fully assessed. However, there is a credible risk that these features represent a Health and Safety risk to any future site users.

In light of the findings of this investigation, the risks to the proposed development and humans from the shafts recorded by the Coal Authority 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 2: Development specific risk assessment (shaft)

Item	Risk of Instability	Comments	Risk Rating
1	Collapse of shaft (mine entry reference: 423419-006).	Located at grid reference 423188.2 E, 419671.65 N.	High
2	Collapse of shaft (mine entry reference: 423419-005).	Not identified at given grid reference or within specified departure zone.	Moderate

Mine shaft 423419-006 whilst infilled with soil is considered to be present in an unstable condition, thus some remediation will be required. This could comprise a two-way spanning reinforced concrete capping located at or below rockhead, anticipated to be present at around 4m depth. The width of the capping should be at least twice the diameter of the shaft (4.4m in this instance) and a minimum of 0.45m thick. The cap should be designed in accordance to BS EN 1992 -1-1:2004 with a design life of 120 years. The reinforced concrete caps should be designed to carry the weight of the overburden and any other superimposed, loads, including transient loads the engineer deems are likely to be imposed. In addition, any buildings will need to be sited outside the potential zone of collapse of the shaft.

It should be appreciated that with regards to mine shaft 423419-005, no evidence has been observed of its presence both at the given coordinates and within the departure zone of 8m as such, whilst it can be suggested that the shaft is not present, some level of risk of the shaft being at locations outside its given departure zone remains. As such it is strongly recommended that a watching brief is undertaken during the groundworks phase of both the remediation works for shaft 423419-006 and for the final development itself. It would also be prudent to extend excavations for the shaft remedial works to cover the departure zone for shaft 423419-005. Clearly, if any evidence of this shaft is subsequently found, then all work should stop immediately and the advice of a specialist geotechnical engineer should be sought.



8. Recommendations for Further Work

- This report should be forwarded to the relevant authorities as soon as practicable to ensure they have sufficient time to review and discuss any issues.
- The advice of specialist contractors should be sought regarding the design and installation of the shaft remediation works.
- Should the second shaft be revealed during this exercise or during the groundworks phase, then remediation will be required. All work should stop in this case, and the advice of specialists should be sought.

9. References

- British Standards Institution (2015 + A1:2020) BS5930: *Code of practice for ground investigations*, B.S.I., London.
- British Geological Survey (NERC) (2021), 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/>)
- D. N. Parry, C. P. Chiverell (2019): *Abandoned mine workings manual*, C758, CIRIA, London.



Appendix 1

Coal Authority License



The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 21090

Name and Address of Permit Holder:

*AHR Building Consultancy
4th Floor
Norwich Union House
High Street
Huddersfield
HD1 2LR*

Site Location:

*Land at
Dewsbury Riverside
Off Ravensthorpe Road
Dewsbury
WF12 9EG*

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

Investigation by excavation to locate two mine entries

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:

- *No flush medium as trial pit by excavator*
- *Personal Gas Monitoring CO, CH₄, CO₂, O₂, H₂S*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*

Signed: Helen Day Granted Date: 16th December 2020

For and on behalf of The Coal Authority

*Nominated Representative: Helen Day, Permitting Assistant 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: 21090

Permit Boundary:



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Appendix 2

Site Plan



Notes:

Investigation positions approximated from site operative's notes.

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Telephone: 0843 50 66 87
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Client:

City of Bradford Metropolitan District
Council

Job Number:

C1243/20/E/1946

Project Details:

6-24 Darley Street, Bradford, BD1
3LE.

Not to scale - reference only





Appendix 3

Trialpit Records



Trial Pit Log

Trialpit No
SHAFT
423419-006
Sheet 1 of 1

Project Name: Dewsbury Riverside	Project No. C1035/20/E/1902	Co-ords: 423188.20 - 419671.65 Level: 46.51	Date 18/01/2021
Location: Ravensthorpe Road, Dewsbury		Dimensions (m): Depth 3.00	Scale 1:50
Client: Kirkless Council			Logged IMY

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.35	46.16		TOPSOIL (Dark brown silty CLAY with rootlets).
							MADE GROUND (Soft greyish brown very gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to medium of mudstone, siltstone, coal and brick fragments). [Mine shaft infill].
							1.45m: Shaft level. Shaft noted to be 2.2m diameter, circular, brick lined feature. Poor condition.
				3.00	43.51		End of pit at 3 00 m

Remarks:	
Stability:	



Trial Pit Log

Trialpit No

TP1

Sheet 1 of 1

Project Name: Dewsbury Riverside

Project No.
C1035/20/E/1902

Co-ords: 423188.57 - 419685.43

Level:

Date

19/01/2021

Location: Ravensthorpe Road, Dewsbury

Dimensions
(m):

1.2

Depth
4.15

4.3

Scale

1:50

Logged
IMY

Client: Kirkless Council

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.30			TOPSOIL (Dark brown slightly gravelly silty CLAY).	
				0.80			MADE GROUND (Very soft dark brown and black very gravelly silty CLAY with occasional whole brick. gravel is sub-angular to sub-rounded, fine to medium of mudstone, siltstone and coal).	1
							Soft to firm, becoming firm to stiff, brown brown mottled grey slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to medium of mudstone.	2
				3.20			Stiff greyish brown slightly gravelly silty CLAY. Gravel is sub-angular to sub-rounded, fine to medium of mudstone.	3
				4.00			Very weak brown thickly laminated ferruginous SANDSTONE.	4
				4.15			End of pit at 4.15 m	5
								6
								7
								8
								9
								10

Remarks:

Stability:





Appendix 4

Photographs



Photo 1: Mine shaft 423419-006. Shaft level approximately 1.45m bgl.



Photo 2: Mine shaft 423419-006. Circular feature, 2.2m diameter.



Photo 3: Mine shaft 423419-006. Remnant of brick lining can still be seen as impressions in shaft wall.



Photo 4: Mine shaft 423419-006. Shaft infilled with soil. Poor condition. No capping or evidence of treatment.



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield,

Job No:

C1035/20/E/1902

Site:

Land off Ravensthorpe Road,
Dewsbury Riverside,
Thornhill Lees,
Dewsbury,
WF12 9EG.

Client:

Kirklees Council





Photo 5: Mine shaft 423419-006. Much of former brick lining has degraded and is no longer present.



Photo 6: Area excavated as part of search for shaft 433419-005.



Photo 7: Area excavated as part of search for shaft 433419-005.



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