

**Coal Mining Risk Assessment
at
4 Station Road
Royston, Barnsley
For
Mr Peter Dimberline**

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Executive Summary

Proposal	A detached 2 storey office development.
Current land use	Existing residential property and associated land lying at approximately 70.0m AOD.
Mining related site history	No historic mining features recorded on the site. Several former collieries are present locally. The site lies within an area significantly affected by historic mining activities.
Geology	Directly underlain by the Mexborough Rock sandstone of the Middle Coal Measures. The Royston coal seam underlies the site at shallow depth.
Mining history and context	There are 2 instances of a single seam of worked coal recorded beneath the site at depths of between 333 and 409m, last worked in 1908. The Royston coal seam has been historically worked locally. A former mine entry (shaft) is recorded southeast of the site. Unrecorded mine entries could be present on the site. The site lies within an area of probable past shallow coal mining and is within a Development High Risk Area as defined by the Coal Authority.
Mining related risks	There is a potential for shallow mining beneath the site. However, the presence of sufficient thickness of competent sandstone cover would mitigate any potential for surface instability – Low . Unrecorded former mine entries may be present on site – Low to Moderate . Mine gases may be present on the site – Low to Moderate .
Mitigation of risks	Proof drilling at the site is not warranted and consolidation of any potential mine workings by drill and grouting is not required. Vigilance during site enabling works to check for past unrecorded mine entries. Incorporation of protection measures for mine gases may be required within new development, subject to the advice of regulators.

Introduction

1.1 Design IT were appointed by Mr Peter Dimberline, on behalf of his client, to undertake a Coal Mining Risk Assessment (CMRA) for a site comprising land at 4 Station Road, Royston, Barnsley, which is proposed for commercial development. A planning application is to be submitted to Barnsley Metropolitan Borough Council (BMBC) and the site is identified as lying within a Coal Authority (CA) Coal Mining Development Referral Area, thus there is a requirement for a CMRA in order to provide BMBC with information on historic coal mining and an assessment of its potential impact on land stability.

1.2 The purpose of this CMRA 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

1.3 To this end the study has included an inspection of published historical mapping, published geological data, publicly available planning information and a review of a CA consultants coal mining report, together with other sources as indicated within the report.

1.4 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above.

1.5 The comments and opinions presented in this report are based on the findings of the available desk study assessment carried out by Design IT. Responsibility cannot be accepted for

any conditions not revealed by this desk study and which have not been taken into account by this assessment.

1.6 This report has been prepared for the sole use of Mr Peter Dimberline and his client. No other third party may rely upon or reproduce the contents of this report without written approval of Design IT. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and we do not owe them any Duty of Care or Skill.

1. Site location and description

2.1 The site is centred on National Grid Reference 436145mE 411475mN, immediately southwest of Station Road (B6132) and within the centre of Royston village. A site location plan is included as **Appendix A**.

2.2 The site is irregularly shaped and occupied almost entirely by an existing detached 2 storey residential property with peripheral areas of informal surfacing. An access road to a neighbouring business passes close to the property's northwestern elevation. Across the site levels fall steadily towards the east with the site lying at approximately 70.0m AOD. Existing commercial and, to a lesser extent, residential properties bound the site with Station Road lying immediately east/northeast of the site.

Proposed development

2.3 It is understood that it is proposed to redevelop the site with a detached 2 storey commercial office building with access directly off Station Road. The replacement building is to fully occupy the approximate footprint of the existing residential property. Details of the proposed development layout are included as **Appendix A**.

Site history

2.4 Historical maps for the site and its surroundings, available from internet based sources, have been reviewed and a summary of this information, specifically relating to mining related features, is provided below.

Date	On site features	Off site features (coal mining related)
1854 – 1893	Open land.	None.
1893 – present	Existing residential property.	Sandstone quarry approximately 40 to 50m west. Monckton Main colliery approximately 1.4km northeast (disused post 1989). Carlton Main colliery approximately 2.2km southeast (disused post 1966).

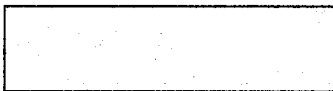
		Wharnccliffe Woodmoor colliery approximately 1.8km south (disused post 1966).
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2. Geological setting and historical mining context

3.1 Information obtained from various sources pertaining to the site's geology and historical mining perspective is summarised in the table below with information sources identified as appropriate.

Information sources	British Geological Survey (BGS) 1:50 000 scale, sheet 87, Barnsley, bedrock and superficial. BGS 1:10 560 scale County Series 2nd Edition 1943, sheet 262SE, Carlton, bedrock and superficial. BGS online Borehole Database. Geological Survey memoir 'Geology of the Country around Barnsley', 1947. Geological Survey memoir 'Geology of the Country around Wakefield', 1940. 'The Geology of the Yorkshire Coalfield', 1878 Green et. al. BGS 'The Pennine Lower and Middle Coal Measures formations of the Barnsley District', Report IR/06/135. BMBC online Planning Applications Search. CA online Interactive Viewer. CA Consultants coal mining report and accompanying plan, Ref. 51002074088001, 3 April 2019 (included as Appendix B). Historic Ordnance Survey (OS) online mapping.
Made ground	None shown.
Drift	None present.
Solid	Mexborough (Royston) Rock sandstone of the Middle Coal Measures.
Dip of strata	Assumed 4 to 5° northwest.
Faults	Fault recorded to the northwest striking southwest to northeast and downthrowing to the southeast. Another fault recorded to the northeast striking northwest to southeast and downthrowing to the northeast.
Coal seams	The Royston coal seam is shown as outcropping approximately 100m southeast. The coal seam is considered to underlie the site at shallow depth. The next coal seam recorded beneath the Royston coal seam within the stratigraphic column is the Sharlston Top coal seam, which does not underlie the site at shallow depth. Locally, BGS stratigraphic section thicknesses for the Royston coal seam are between 0 and 0.8m and likewise for the underlying Sharlston Top

	coal seam are between 0 and 1.9m. The approximate separation of these coal seams is some 40m.
Shafts and collieries	The CA Interactive Viewer indicates a single former mine entry (shaft) approximately 200m to the southeast of the site. Shaft records for the New Monckton colliery No.1 shaft some 3km northeast indicate the Sharlston Top coal seam as approximately 1.2m total thickness, including a single dirt parting, with an overlying unnamed coal seam (labelled as 'Stone and Coal') recorded at 0.75m thick and interpreted as the Royston coal seam. The separation of these seams is approximately 42m.
Nearby intrusive information	Information presented in the Yorkshire geological memoir cites an exposure of the Royston coal seam within a railway cutting approximately 1.25km east of the site where it is recorded as approximately 0.75m thick comprising black shale and stone coal. Archive National Coal Board (NCB) exploratory borehole information located between approximately 550 and 750m northeast of the site recorded the Sharlston Top coal seam to be approximately 1.1m thick and comprising 3 leaves of coal. The Sharlston Top coal seam lies approximately 42m below the base of the Mexborough Rock sandstone, the inferred position of the Royston coal seam, although this coal seam was not recorded as such.
Coal Authority consultants coal mining report	The pertinent points presented in the CA consultants coal mining report are: A single seam of worked coal is recorded twice beneath the site at depths of between 333 and 409m, last worked in 1908. The depth of the seam is such that there is considered to be no adverse effect upon the surface stability of the site. There are probable unrecorded shallow coal workings beneath the site, considered to be associated with the Royston coal seam. No spine roadways are recorded beneath the site at shallow depth. There are no known mine entries within 100m of the site. There are no records of mining related subsidence claims within 50m of the site. There are no records of any mine gas emissions requiring action within 500m of the site.
Shallow mining	The CA Interactive Viewer indicates the site to lie within the northern limit of a Development High Risk Area. Additionally, the site lies within an area of probable past shallow coal mining, interpreted as being associated with the Royston coal seam.
Surface mining and Quarrying	The CA Interactive Viewer does not record any nearby areas of past unlicensed surface coal mining.

	Historic OS mapping shows former sandstone quarrying as present within 40m of the site.
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3. Risk assessment

4.1 The potential risks to the redevelopment of the site associated with the coal mining legacy of the locality are summarised in the following table.

Coal mining issue	Risk		Risk assessment (Risk rating)
	Yes	No	
Underground coal mining (recorded at shallow depths)	-	No	The Royston coal seam is present at shallow depth beneath the site. There is no evidence of recorded shallow mine workings beneath the site – Low
Underground coal mining (probable at shallow depths)	Yes	-	The site lies within a DHRA and is affected by probable shallow mining. Unrecorded historic mining of the Royston coal seam at outcrop may have occurred locally with the potential for shallow mining within this coal seam to be present beneath the site - High
Mine entries (shafts and adits)	Yes	-	No mine entries recorded on site, however unrecorded mine entries are a possibility. A recorded former mine entry (shaft) is recorded to the southeast – Low to Moderate
Coal mining geology (fissures)	-	No	CA information and published geology do not indicate any faults or geological weaknesses recorded at the site as a consequence of mining related activities – Low
Record of past mine gas emissions	Yes	-	CA information states no mine gas related issues in the locality. However, given the presence of potential shallow mining beneath the site, together with recorded deeper past mining, generation of mine gases is possible - Low to Moderate
Recorded coal mining surface hazard	-	No	CA information does not record the presence of any mining surface hazards on or close to the site – Low
Surface mining (opencast workings including sandstone quarries)	-	No	CA information states the site to be unaffected by any past or current opencast workings. Historical mapping records former sandstone quarries at 40m west of the site – Low

4. Discussion

5.1 The risk assessment above highlights several potential risks posed to the site during redevelopment, namely potential for shallow coal mine workings, potential for unrecorded mine entries and associated mine gas emissions, cumulatively assessed as **low to high**. These risks are discussed in turn more fully below.

Shallow mine workings

5.2 The Royston coal seam is recorded as underlying the site at shallow depth and may potentially have been historically exploited through mining. Given the location of the site relative to the recorded outcrop of the Royston coal seam and taking cognisance of the dip of the strata and the local topography (the site lies at an elevation approximately 10m higher than the coal seam outcrop), it is estimated that the coal seam is likely to be present beneath the site within approximately 17m of the surface. The Sharlston Top coal seam is estimated to present at approximately 59m depth beneath the site. Nearby historic records indicate a total exploitable thickness of approximately 0.75m for the Royston coal seam. Assuming competent rock head is present within 2m and that a minimum of 10 times intact coal seam thickness of competent rock strata is required to be present above the seam to maintain surface stability in the event of the coal seam having been exploited, then there is considered to be *sufficient* competent rock cover above the Royston coal seam beneath the site. Furthermore, the presence of competent sandstone strata (Mexborough Rock) above the Royston coal seam would further mitigate any potential surface instability at the site should the coal seam have been historically exploited or be present at shallower depth. There is considered to be *sufficient* competent rock cover above the Sharlston Top coal seam beneath the site should this coal seam have been historically exploited and be present at a maximum locally recorded thickness of 1.9m. Therefore, it is considered that the undertaking of intrusive investigation works to determine the presence and depth of the Royston coal seam are unnecessary in this instance.

Mine entries

5.3 Due to the proximity of the outcrop of the Royston coal seam and the site being within an historic mining area, the presence of on-site unrecorded former mine entries associated with the exploitation of the coal seam, and deeper coal seams, cannot be discounted. Prior to 1872, it was not

a statutory requirement to record mine entries and mining plans. Furthermore, CA information records the site as within an area of probable past shallow coal mining. Such features are considered as presenting a potential risk to development by way of instability and potential collapse.

Mine gas

5.4 The potential for upward migration of mine gases beneath the site cannot be discounted. Such gases are particularly prevalent in former pillar and stall workings that remain open and allow them to build up over time. Mine gases pose a potential significant human health risk to the future occupants of dwellings and existing occupants of adjacent dwellings.

5. Proposed mitigation strategy

6.1 A review of geological and historical mining information at the site has shown that there is now a revised **low** risk to surface stability from shallow mine workings that may be present within the Royston coal seam. Additionally, there is a potential **low to moderate** risk to surface stability by way of unrecorded former mine entries and a **low to moderate** risk exists for the site to be affected by potential mine gas emissions.

Shallow mine workings

6.2 Geological, historical and CA mapping all demonstrate there to be a plausible risk presented by shallow mine workings within the Royston coal seam that may be present beneath the site. However, the risk assessment has demonstrated that there is considered to be sufficient thickness of competent sandstone cover above the Royston coal seam to mitigate against any potential surface instability should historic mining of this coal seam have taken place beneath the site. Therefore, no intrusive investigation using boreholes is considered necessary with no requirement for consolidation of any mine workings using drill and grouting techniques.

Mine entries

6.3 The presence of unrecorded mine entries should be confirmed. During site enabling works and a site strip the exposed sub soils should be checked for the presence of disturbed and potentially unstable ground associated with backfilling of such features. Vigilance should be taken during such works with respect to any anomalous findings. If mine entries are identified on the site, then these will require treatment by either grouting and capping at the surface or spanning by geogrids, as appropriate. The siting of any new development footprint over such features or within influencing distance should be avoided. In such circumstances consultation with the Coal Authority is recommended.

Mine gas

6.4 The incorporation of robust gas protection measures during construction are considered likely within the new development. However, such measures are inherently incorporated within the

construction of new buildings by way of use of a well-constructed suspended floor slab offering a passively vented underfloor void, incorporation of a radon protection membrane (if appropriate) and a damp proof membrane together with the sealing of service entries. The requirement for a gas monitoring programme is not considered warranted. It is recommended that advice and approval is sought from regulators at an early stage with regard to the scope and specification of appropriate gas protection measures within the new development.

6. Conclusions

7.1 There is considered to be a negligible risk posed to the redevelopment of the site (surface instability) from collapse of historic shallow mine workings that may be present in the underlying Royston coal seam. As such, proof drilling and/or consolidation by drill and grouting is not warranted.

7.2 In addition, as there can never be total certainty with regards to unrecorded mine entries, the developer should be made aware of this possibility during site stripping and excavation for foundations. Any evidence of the suspected presence of former mine entries should be investigated further.

7.3 Advice should be sought from regulators as to adoption of appropriate measures to protect against ground (mine) gases within the new development.

Appendix A
Site location plan and development layout

Station Road Royston



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Licence number 100022432. Plotted Scale - 1:1250

Peter Dimberline RIBA

Appendix B
Coal Authority consultants coal mining report



The Coal
Authority

Consultants Coal Mining Report

4 Station Road
Royston
Barnsley
S71 4EW

Date of enquiry:	3 April 2019
Date enquiry received:	3 April 2019
Issue date:	3 April 2019
Our reference:	51002074088001
Your reference:	Coole 18169



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

Ian Thorpe

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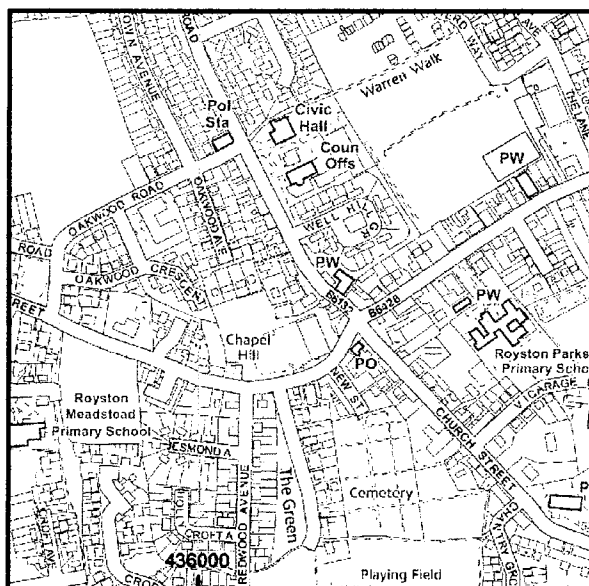
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Approximate position of property



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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	LOW BARNSELEY	Coal	652I	308	South-West	4.7	North-East	161	1909
unnamed	LOW BARNSELEY	Coal	6621	333	Beneath Property	2.9	North-East	161	1908
unnamed	LOW BARNSELEY	Coal	6623	409	Beneath Property	5.8	North	161	1902
unnamed	TOP HAIGH MOOR	Coal	6625	416	North-East	3.9	North	107	1916
unnamed	LIDGETT	Coal	652Z	419	South-West	4.6	North-East	71	1945
unnamed	LOW BARNSELEY	Coal	652J	424	West	4.9	North-East	161	1908
unnamed	LIDGETT	Coal	64U7	438	South-East	5.5	North	70	1947
unnamed	TOP HAIGH MOOR	Coal	6626	498	North-East	5.8	North	107	1934

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:

NE197	NE224	SY72
SY73	SY71	NE190
NE546	NE536	

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

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

None recorded within 50 metres of the enquiry boundary.

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 in an area where notices to withdraw support were given in 1957, 1961 and 1962.

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.

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.