Coal Mining Risk Assessment
For

Land Adj to 68, Wharfedale Road
Pogmoor, Barnsley

Client:-
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Executive Summary

Proposal	Two storey dwelling.
Current land use	Undeveloped land parcel at approximately 122m AOD.
Mining related site history	Former opencasting within close proximity of the site. Numerous old coal pits, former shafts and adits and several collieries present locally.
Geology	Directly underlain by the Barnsley Rock sandstone of the Middle Coal Measures. The Barnsley coal seam underlies the site at shallow depth.
Mining history and context	5 seams of worked coal are recorded as potentially influencing the site at depths of between 170 and 370m, last worked in 1980. The site lies within an area of probable past shallow coal mining, just east of an area of known past shallow coal mining and is within a Development High Risk Area as defined by the Coal Authority. Previous intrusive investigations east of the site have proved mineworkings within the Barnsley seam.
Mining related risks	There is a potential for shallow mining beneath the site potentially leading to surface instability – **Moderate to High**. Unrecorded former mine entries may be present on the site – **Moderate to High**. Mine gases may be present on the site – **Moderate**.
Mitigation of risks	Proof drilling is recommended to confirm the status of the underlying Barnsley coal seam. If shallow mining is confirmed, drill and grout may be required or possibly the incorporation of a raft foundation, subject to local authority building control approval. Vigilance during site enabling works to check for former unrecorded mine entries. Protection from mine gases may require addressing within new development, subject to the advice of regulators.

1. Introduction

1.1 Design IT were appointed by Mr Peter Thompson to undertake a Coal Mining Risk Assessment (CMRA) for a site at 68, Wharfedale Road, Pogmoor, Barnsley which is proposed for development with a 2 storey detached dwelling. A planning application (Ref. 2015/0838) has been 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 necessitating the 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 maps, published geological data, publicly available planning information and a review of a CA 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 Thompson 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.

2. Site location and description

2.1 The site is centred on National Grid Reference 432490mE 407182mN and located on the eastern side of Wharfedale Road immediately south of its junction with Church Street in the northwestern part of Pogmoor, approximately 2km northwest of Barnsley town centre. The site is entirely located within an existing residential area. A site location plan is included as **Appendix A.**

2.2 An inspection of recent aerial imagery indicates the site to be an undeveloped parcel of land under grass. It is relatively level lying at approximately 122m AOD with levels locally falling to the west. A gate allowing access to the site is present along the eastern boundary by way of no. 88 Intake Lane. A low wall forms the western boundary with hedges and fences present along the northern and southern boundaries.

Proposed development

2.3 It is proposed to construct an infill 2 storey residential property with parking provision and gardens. Details of the proposal 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)
1855 – 1970s/80s	Open fields	Sandstone quarries and old shaft approximately 750m southeast. Gawber collieries 1.5 to 2km northeast. Untitled pit/earthworks approximately 175m north. Redbrook colliery approximately 850m northeast. Old shafts and colliery approximately 700m north. Brickworks, clay pit and old shaft

		approximately 1km southeast. Farmhouse colliery (drift) approximately 750m south. Opencast workings approximately 250m southwest.
1970s/80s – present	Undeveloped land within the Wharfedale Road residential development	None.

3. 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) 1:10 000 scale, sheet SE30NW. BGS online Borehole Database. BGS Internal Report IR/06/135 'The Pennine Lower and Middle Coal Measures formations of the Barnsley district', 2006. Geological Survey Memoir, Sheet 87 'Geology of the Country Around Barnsley', 1948. 'Sections of Strata of the Coal Measures of Yorkshire', W H Wilcockson, 1950 3rd Edition. BMBC online Planning Applications Search. CA online Interactive Viewer. CA mining report, Ref. 51001049652001, 1 December 2015 (included as **Appendix B**).
Made ground	None shown on site, however an area of infilled ground (backfilled opencast) is present close to the west/southwest and an area of made ground (colliery spoil) to the north.
Drift	None present.
Solid	The Barnsley Rock sandstone of the Carboniferous Middle Coal Measures.
Dip of strata	5^0 to the northeast.
Faults	A fault is indicated to the south trending northwest to southeast and downthrowing to the southwest, however, none on or within close proximity to the site.
Coal seams	The Barnsley coal seam is shown as outcropping approximately 100m to the west of the site and is considered as potentially underlying the site at shallow depth. The Barnsley Rider coal seam (above the Barnsley coal in the sequence) is conjectured as outcropping just beyond the eastern site boundary, this coal seam is not present beneath the site. Regional thicknesses for the Barnsley seam are between 1.7 to 3.1m with significant dirt partings present. Locally, BGS recorded stratigraphic section thicknesses for the Barnsley seam is between 2.3 to 3.1m.
Shafts and collieries	BGS mapping and the CA Interactive Viewer record numerous abandoned shafts and adits close to the west, northwest and southwest

	along the outcrop of the Barnsley seam and within the same fault block as the site. Shaft records for the former East Gawber and North Gawber collieries located to the southeast and northeast record the Barnsley coal seam to be 2.7m thick (including dirt partings) with the separation between the Barnsley and the overlying Barnsley Rider coal seam as between 23 and 25m. The former Redbrook colliery approximately 850m northeast of the site and reasonably close the outcrop of the Barnsley seam records its thickness, including dirt partings, at 2.8m.
Nearby intrusive information	Former intrusive investigation works for Barnsley Hospital approximately 700m east, proved the Barnsley seam at approximately 55m depth. Its intact thickness was approximately 3.3m (including dirt partings), while evidence of former workings (broken ground and voids) were proved at a total thickness of 2.1m.
Coal Authority mining report	5 seams of worked coal are recorded as potentially influencing the site at depths of between 170 and 370m, last worked in 1980. The CA believes the site lies in an area where there is coal at or close to the surface, which may have been worked in the past. There are no known mine entries at, or within 20m, of the site. There are no records of any mine gas emissions requiring action within the site boundary. Within 50m of the site to the west and north there are 2 former coal mining subsidence claims.
Shallow mining	The CA Interactive Viewer indicates the site to lie within the eastern limit of an area of probable shallow coal mining and just east of an area of recorded past shallow coal mining; considered to be associated with extraction of the Barnsley seam. The site is located on the eastern limit of a CA designated Development High Risk Area.
Surface mining	Historical OS mapping, BGS mapping and the CA Interactive Viewer record former opencast mining approximately 150m to the west and 250m to the southwest of the site.

4. 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)	**Yes**	-	CA information indicates known past shallow coal mining very close to the western site boundary the site and within 50m of the site there are 2 coal mining subsidence claims. In addition, the site is within 100m of the outcrop of the Barnsley seam in which past workings are recorded to the east of the site – **Moderate to High**
Underground coal mining (probable at shallow depths)	**Yes**	-	Shallow depth to the Barnsley seam and the site lies within an area of probable shallow workings and within a Development High Risk Area. Intrusive investigations east of the site have proved evidence of mineworkings within the Barnsley seam. Evidence of widespread historical mining in the locality would suggest potential shallow mining of the Barnsley seam - **High**
Mine entries (shafts and adits)	**Yes**	-	Numerous recorded former mine entries (including adits) within the locality associated with the outcropping of the Barnsley seam nearby to the west. Unrecorded mine entries are a possibility – **Moderate to High**
Coal mining geology (fissures)	-	**No**	CA information and published geology does not indicate any geological weaknesses on 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, potential for mine gas as shallow and deep mining is present beneath the site - **Moderate**
Recorded coal mining surface hazard	-	**No**	CA information does not record the presence of any mining surface hazards on site, but past surface hazards (shafts) are indicated nearby to the west of the site -

			Low
Surface mining (opencast workings)	-	**No**	CA information state the site to be unaffected by any past, current or future open cast workings. However, past opencasting has occurred within 150m to the west of the site closer to the outcrop of the Barnsley seam - **Low**

5. Discussion

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

Shallow mineworkings

5.2 The Barnsley coal seam is recorded as underlying the site at shallow depth and is proved to have been historically worked very close to the west of the site. It is estimated that the Barnsley coal seam is likely to be present beneath the site at between approximately 15 and 20m below the surface with depth to rockhead likely to be shallow due the absence of superficial soils. This depth is further confirmed by the conjectured outcrop of the overlying Barnsley Rider seam just beyond the eastern site boundary and the separation of these seams as being between 23 and 25m, as recorded in nearby collieries. Local intrusive information and former colliery records indicate a thickness of between 2.7 and 3.1m for the Barnsley seam (including dirt partings). There is considered to be *insufficient* competent rock cover above the Barnsley seam to maintain surface stability in the event of this seam having been worked beneath the site. This assumption is based upon having a minimum of 10 times intact coal seam thickness of competent rock strata present above the coal seam. However, the surface stability at the site cannot be guaranteed in the absence of intrusive works. Such intrusive investigations will determine whether mineworkings are present within the Barnsley seam and to what extent and confirm the depth of the coal seam and its thickness beneath the site.

Mine entries

5.3 Due to the proximity of the outcrop of the Barnsley coal seam nearby to the west and numerous recorded abandoned mine entries (shafts and adits) along the outcrop of the coal seam, the presence of on-site unrecorded former mine entries associated with the exploitation of this seam cannot be discounted. Pre 1849, it was not a statutory requirement to record mine entries and mining plans. 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.

6. Proposed mitigation strategy

6.1 A review of geological and historical mining information at the site has shown that there is a potential risk to surface stability from shallow mineworkings that may be present within the Barnsley coal seam and possible unrecorded mine entries, together with a potential risk posed by upward migration of mine gases.

Shallow mineworkings

6.2 CA mapping and evidence from local intrusive investigations demonstrate there to be a definite risk presented by shallow mineworkings within the Barnsley coal seam potentially present beneath the site. It would be prudent, therefore, to undertake proof drilling across the site to confirm the depth to rockhead and depth to/nature of the underlying coal seam. Boreholes should be put down to 30m below existing ground levels with appropriate permission and licences obtained from the Coal Authority prior to commencing any such works. If shallow mining is proved as presenting a risk to the surface stability of the site then drilling and grouting works would be required to consolidate the workings. Alternatively, subject to loadings and the nature of any proved mineworkings, a raft foundation may be feasible to spread imposed loadings of the new building, subject to local authority building control approval.

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. If mine entries are identified on the site, then these will require treatment by grouting and capping at the surface and the siting of new development over these features should be avoided.

Mine gas

6.4 Incorporation of robust gas protection measures during construction should be adopted. However, such measures are inherently incorporated within the construction of new buildings by way of use of a 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.

7. Conclusions

7.1 There is a potential risk posed to the redevelopment of the site from shallow mineworkings that may be present in the underlying Barnsley coal seam. Such risks comprise surface instability from collapse of past workings and former mine entries. Proof drilling is recommended to better understand these risks.

7.2 In addition, as there can never be total certainty with regard 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 proposed development

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PROPOSED 1No DWELLING
ADJ. 68 WHARFEDALE RD
POGMOOR
SITE PLAN Rev A 1:500@A4

Linwood
Barnsley Road
Dodworth
Barnsley S75 3JR



Appendix B

Coal Authority mining report

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848 DX 716176 MANSFIELD 5

DESIGN IT STRUCTURAL SOLUTIONS LTD
37 HALL BANK
BARNSLEY
S75 1EX

Our reference:	**51001049652001**
Your reference:	**Land Adj 68 Wharfedale**
Date of your enquiry:	**01 December 2015**
Date we received your enquiry:	**01 December 2015**
Date of issue:	**01 December 2015**

This report is for the property described in the address below and the attached plan.

Residential Coal Authority Mining Report

68 WHARFEDALE ROAD, BARNSLEY, S75 2LJ

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 5 seams of coal at 170m to 370m depth, and last worked in 1980.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on Coal Authority Information section of the report.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

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The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

There are 2 claim(s) within 50 metres of the property boundary that do not match the property address. These are shown on the attached plan.

The 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.

If further subsidence damage claims information is required in addition to that provided in this report, the Authority need to manually search their records. For further advice on how to order this additional information visit www.groundstability.com or telephone 0345 7626 848.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

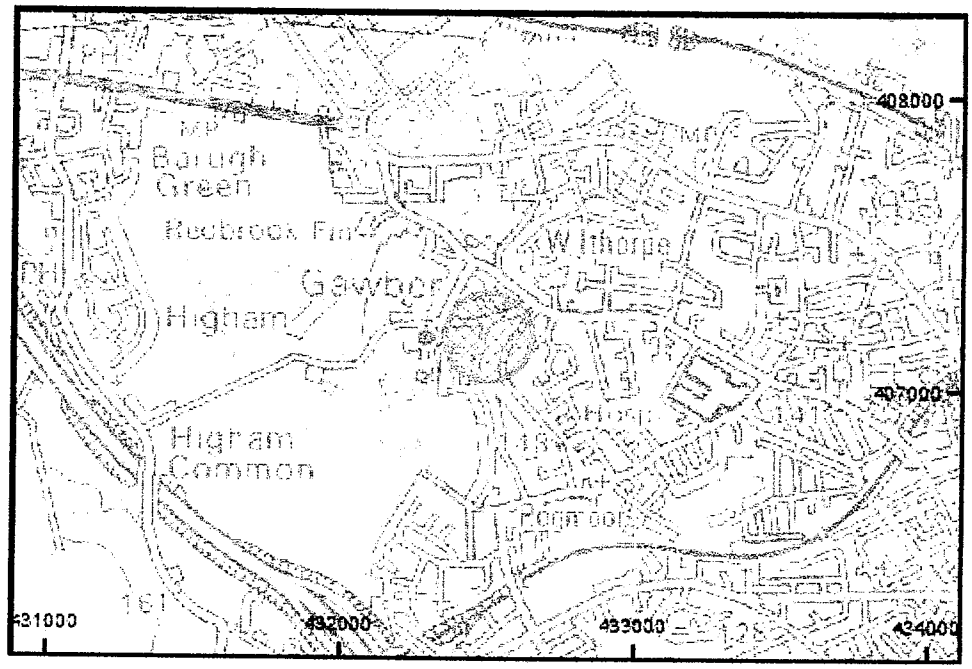
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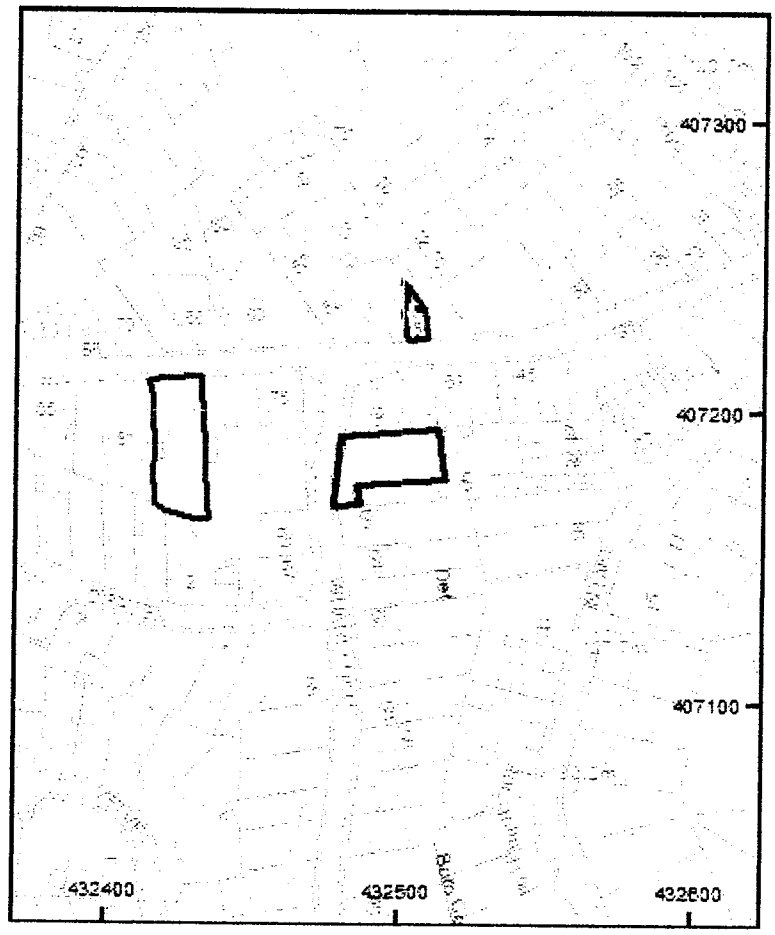
Location map

Approximate position of property



Enquiry boundary

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Key

Approximate position of enquiry boundary shown

Coal Claims

Mapping sourced from Ordnance Survey