Coal Mining Risk Assessment
For
Mr I Hyde

Bank End Road/High Street,
Worsbrough Dale

Client:-
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Executive Summary

Proposal	Residential development
Current land use	Open land. Levels fall by about 3 to 4 metres to the southwest and southeast
Site history	A school and unidentified buildings occupied the site
Geology	Directly underlain by undifferentiated Middle Coal Measures strata. The Two Foot and Abdy or Winter coal seams underlie the site at shallow depth.
Mining history and context	Seven seams of worked coal are recorded as potentially influencing the site at depths of between 140 and 530 metres, last worked in 1970, with any associated ground movement likely to have ceased Two collieries were located within 500 metres to the south Numerous former adits are recorded southeast of the site exploiting the Two Foot and Abdy or Winter coal seams at crop
Mining related risks	There is a potential for shallow mining beneath the site potentially leading to surface instability Mine gases may be present Both these risks are assessed as medium to high and medium, respectively
Mitigation of risks	Proof drilling is recommended to confirm depth to rockhead and depth and thickness of underlying coal seams Monitoring of wells for mine gases and/or provision of robust gas protection measures during construction, subject to local authority approval

1. Introduction

1.1 Design IT were appointed by Mr Peter Thompson on behalf of his client, Mr I Hyde, to undertake a Coal Mining Risk Assessment (CMRA) for a site at Bank End Road and High Street, Worsbrough Dale proposed for residential development. A planning application has been submitted to Barnsley MBC and the site is identified as lying within a Coal Authority Development Referral Area, thus necessitating the requirement for a CMRA in order to provide Barnsley MBC with information on coal mining and an assessment of its 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 and a review of a Coal Authority 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, Mr I Hyde. 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 435840 404295, occupying an area of approximately 0.05 hectare and located at the junction of Bank End Road and High Street, Worsbrough Dale, Barnsley and southeast of Sheffield Road (A61).

2.2 The site is triangular in shape, roughly grassed and is overgrown with coarse vegetation and trees. Two relic concrete floor slabs occupy the southeastern part of the site. Site levels fall towards the southeast and the southwest to about 100 metres AOD from about 104 metres AOD in the northwest and about 103 metres AOD in the northeast. The land is above that of the adjacent High Street and retained along its southwestern boundary by a low stone retaining wall.

Proposed development

2.3 It is proposed to redevelop the site with five bungalows as two blocks with associated areas of car parking and landscaping. The proposed layout is 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 - 1892	Open fields	Two collieries within 500 metres to the south
1892 – 1966	School with buildings in southeastern part	1892: Two coal shafts approximately 300 metres southeast
1966 - present	Unidentified buildings in southeastern part	-

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	BGS 1:10 000 scale sheet SE30SE BGS Report IR/6/135 'The Pennine Lower and Middle Coal Measures formations of the Barnsley district' Geological Survey memoir 'Geology of the Yorkshire Coalfield', A H Green Coal Authority mining report, Ref. 51000227994001, February 2013 (included as **Appendix B**)
Made ground	None shown, however, likely to be present given previous development
Drift	None present
Solid	Directly underlain by undifferentiated strata (mudstones, siltstones, sandstones and coal seams) of the Middle Coal Measures
Dip of strata	At 5^0 to the northeast
Faults	Faults indicated to the northwest (West Level Fault) downthrowing to the northwest and to the southeast (Worsbrough Fault) downthrowing to the southeast, however, none within close proximity to the site
Coal seams	The Two Foot coal seam is conjectured as outcropping immediately southwest of the site together with the Abdy or Winter coal and the Top Beamshaw coal further to the southwest. All these coal seams are considered to potentially underlie the site at shallow depth. The Meltonfield coal seam is conjectured as outcropping immediately northeast of the site, but does not underlie the site. Thicknesses of these seams are; Two Foot (0.91 to 1.45 metres), Abdy or Winter (0.79 to 0.86 metre) and Top Beamshaw (0.3 metre) and all recorded as having significant dirt partings
Shafts and collieries	Several former shafts are identified within 500 metres of the site
Colliery records and strata exposures	Records for the Swaithe Main colliery and a railway cutting at Dove Cliff, approximately 1.5 kilometres east and southeast respectively, detail the following sequence: Two Foot coal (including dirt partings) – 1.0m Measures – 12.0m Abdy or Winter coal - 0.86m Measures – 19.0m

	Top Beamshaw coal – 0.30m
Coal Authority mining report	Seven seams of worked coal are recorded as potentially influencing the site at depths of between 140 and 530 metres, last worked in 1970, with any associated ground movement likely to have ceased Coal is recorded at or close to the surface that may have been worked in the past There are no known mine entries at, or within 20 metres, of the site, however, records may be incomplete There are no records of any mine gas emissions requiring action within the site boundary The site is within an area for which a notice of entitlement to withdraw support was published in 1947
Shallow mining	BGS report IR/6/135 identifies the site as being present in an area potentially affected by shallow mining where the Two Foot and Abdy or Winter coal seams are assessed as being present within 30 metres of the surface The BGS map indicates numerous historical adits southeast of the site where both the Two Foot and the Abdy or Winter coal seams have been exploited at outcrop The Coal Authority mining report identifies the site as potentially affected by shallow mining

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
	Yes	No	
Underground coal mining (recorded at shallow depths)	√		However, no intrusive information at site or in locality to confirm presence of shallow coal workings, hence, unable to qualify
Underground coal mining (probable at shallow depths)	**Medium to high**		Depth of Two Foot and Abdy or Winter coal seams and evidence of historical exploitation at crop in locality would suggest potential shallow mining
Mine entries (shafts and adits)		√	No mine entries recorded on site. Unrecorded mine entries unlikely to be present
Coal mining geology (fissures)		√	None known, but considered unlikely
Record of past mine gas emissions	**Medium**		None recorded, but potential for mine gas emissions
Recorded coal mining surface hazard		√	None recorded, but possible
Surface mining (opencast workings)		√	Site does not lie within an historical opencast site

5. Discussion

5.1 The risk assessment above highlights two potential risks posed to the site during redevelopment, namely potential for shallow coal workings and associated mine gas emissions, both assessed as medium to high and medium respectively. These risks are discussed in turn more fully below.

Shallow mineworkings

5.2 The Two Foot and Abdy or Winter coal seams underlie the site at shallow depth. The BGS map records reduced level contours beneath the site for the significantly deeper Fenton coal seam and using the known separation of the Fenton and the Two Foot coal seam it is possible to calculate the approximate reduced level of the Two Foot coal and successive coal seams beneath the site. These estimated reduced levels, together with their approximate depths beneath the site and local seam thicknesses, are summarised below.

Seam	Local thickness (m)	Reduced level (m AOD)	Depth below northwestern part of site (m) BGL	Depth below southeastern part of site (m) BGL
Two Foot	1.0	99.0	5.0	1.0
Abdy or Winter	0.86	86.0	18.0	14.0
Top Beamshaw	0.3	66.0	38.0	34.0

5.3 Generally, it is regarded that a thickness of competent rock cover of ten times the seam thickness is required to guarantee stability at the surface above any potentially worked coal seam. With regards to the Two Foot coal and assuming a local seam thickness of a metre, there is insufficient cover. The estimated cover above the Abdy or Winter coal is assessed as sufficient, albeit marginal, while the Top Beamshaw coal is considered to have adequate competent cover to ensure surface stability, assuming local seam thicknesses of 0.86 and 0.3 metre respectively. However, the above seam thicknesses and depths to the coal seams underlying the site are only estimates, and as the depth to rockhead is not known at this stage, the surface stability at the site cannot be guaranteed in the absence of intrusive works.

Mine gas

5.4 The presence of mine gases beneath the site cannot be discounted. Deep mining is recorded as having been undertaken beneath the site and, potentially, shallow mining. Historical mapping identifies numerous local collieries, which would have exploited the deeper coal seams by way of room and pillar methods during the mid and late 19th century, hence, leaving the potential for workings to still remain open and provide a pathway for the upward migration of gases. Likewise, any shallow workings may potentially generate mine gases, which could potentially migrate to the surface.

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 Two Foot, and possibly, the Abdy or Winter coal seams. The deeper Top Beamshaw coal seam is not considered as potentially presenting a risk to the site from collapse of past mineworkings.

6.2 In the absence of site specific data on the depth to rockhead beneath the site, seam thicknesses and thickness of competent rock cover above the Two Foot and Abdy or Winter coal seams, there is uncertainty on the magnitude of risk presented by potential shallow mineworkings within these coal seams beneath the site. It would be prudent, therefore, to undertake proof drilling across the site to confirm the depth to rockhead and depth to the underlying Two Foot and Abdy or Winter coal seams. Boreholes should be put down to 30 metres below existing ground levels with appropriate permission and licences obtained from the Coal Authority prior to commencing any such works.

6.3 In conjunction with the proof drilling works, it is recommended that gas monitoring wells are installed across the site to check for the presence of potential mine gases by way of a monitoring programme in accordance with current guidelines. Alternatively, incorporation of comprehensive and robust gas protection measures during construction in line with current guidelines may negate the need for gas monitoring, subject to approval by the local authority.

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 Two Foot and Abdy or Winter coal seams. Such risks comprise surface instability from collapse of workings and migration of mine gases, the latter potentially from deeper worked seams also. Both of these potential risks are assessed as medium to high and medium, respectively, with proof drilling and gas monitoring 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 is made aware of this possibility during site stripping and excavation for foundations. Any evidence of the presence of mine entries should be investigated further.

Appendix A

Proposed site layout

Appendix B

Coal Authority mining report