Coal Mining Risk Assessment

For

The Old Vicarage, 76 Doncaster Road, Barnsley

Client:-
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Contents

Executive summary 3

1. **Introduction** 4

2. **Site location and description** 6

   Proposed development

   Site history

3. **Geological setting and historical mining context** 7

4. **Risk assessment** 9

5. **Discussion** 10

   Shallow mineworkings

   Mine gas

6. **Proposed mitigation strategy** 12

7. **Conclusions** 13

Appendices

Appendix A Proposed site layout

Appendix B BGS archive shaft record

Appendix C Coal Authority mining report

Executive Summary

Proposal	Residential conversion and new build
Current land use	A former office building occupies the site. Levels fall by about 6 metres from north to south
Site history	A residential property, later a vicarage, occupied the site
Geology	Directly underlain by the Woolley Edge Rock sandstone of the Middle Coal Measures. The Meltonfield coal seam underlies the site at shallow depth
Mining history and context	Three seams of worked coal are recorded as potentially influencing the site at depths of between 160 and 490 metres, last worked in 1979, with any associated ground movement likely to have ceased A colliery was located some 100 metres northeast Numerous former adits are recorded north and northeast of the site exploiting the Meltonfield and Two Foot 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
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 Nuttall Yarwood & Partners Ltd, on behalf of Mr K Sykes, to undertake a Coal Mining Risk Assessment (CMRA) for a site at Doncaster Road, Barnsley 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 Nuttall Yarwood & Partners Ltd and their client Mr K Sykes. 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 434965 406035, occupying an area of approximately 0.25 hectare and located adjacent to and immediately northeast of Doncaster Road (A635) southeast of Barnsley town centre.

2.2 The site is approximately rectangular in shape and currently occupied by a former office building located in the southwestern part, associated car parking and soft landscaping. Levels are about 101 metres AOD at the southwestern site frontage with Doncaster Road and fall northwards to about 95 metres OAD in the northern corner. The land is above that of the adjacent railway line to the northeast and retained by an off site stone retaining wall.

Proposed development

2.3 It is proposed to convert the existing building into apartments and construct a block of five apartments in the northeastern part of the site with associated areas of car parking and landscaping. The proposed layout together with the existing topography 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)
1852 - 1931	Residential property with gardens including a fish pond in the northern corner	1892: Mount Osborne colliery (disused) approximately 100 metres northeast 1894: Colliery approximately 250 metres southwest
1931 - present	Vicarage, later becoming offices	-

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 sheets SE30NW and SE30NE 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 BGS archive record, Mount Osborne Colliery Ref. SE30NE/78 (included as **Appendix B**) Coal Authority mining report, Ref. 51000165713001, October 2012 (included as **Appendix C**)
Made ground	None shown, however, likely to be present given previous development
Drift	None present
Solid	Directly underlain by the Woolley Edge Rock sandstone of the Middle Coal Measures and recorded as in excess of 20 metres thick in the locality
Dip of strata	Between 5^0 and 7^0 to the southeast
Faults	Faults indicated to the southwest downthrowing to the northeast and to the southeast downthrowing to the northwest, however, none within close proximity to the site
Coal seams	The Meltonfield coal seam is conjectured as outcropping immediately northwest of the site and is considered to underlie the site at shallow depth. Beneath the Melton Field, the Two Foot and Abdy or Winter coal seams dip beneath the site and are possibly present beneath the site at shallow depth. Thicknesses of these seams are; Meltonfield (0.89 to 1.32 metres), Two Foot (0.6 to 1.01 metres) and Abdy or Winter (0.76 to 1.7 metres), the latter two with significant dirt partings
Shafts and collieries	Several former shafts are identified within 500 metres of the site
Colliery records	The Mount Osborne colliery (approximate surface level of 84.0 metres AOD) located some 100 metres northeast records the following sequence: Depth to Meltonfield coal – 5.5m (0.91m thick) Measures – 15.3m Depth to Two Foot coal - 21.7m (0.84m thick)

	Measures – 15.5m Depth to Abdy or Winter coal – 38.0m (1.83m thick with 2 dirt partings)
Coal Authority mining report	Three seams of worked coal are recorded as potentially influencing the site at depths of between 160 and 490 metres, last worked in 1979, 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 1976
Shallow mining	BGS report IR/6/135 identifies the site as being present in an area potentially affected by shallow mining where the Meltonfield, 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 north and northeast of the site where both the Meltonfield and Two Foot 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 risk
Underground coal mining (probable at shallow depths)	**Medium**		Depth of Meltonfield coal seam 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. These risks are discussed in turn more fully below.

Shallow mineworkings

5.2 The Meltonfield, Two Foot and possibly Abdy or Winter coal seams underlie the site at shallow depth. The nearby Mount Osborne colliery (approximate surface level of 84.0 metres AOD) lies along the strike of the strata, ie. just down dip of the Meltonfield coal at the base of the Woolley Edge Rock and using the information for the seam separation provided from the colliery records, reduced levels for the Meltonfield, Two Foot and Abdy or Winter coal seams can estimated. These, together with their approximate depths beneath the site, are summarised below.

Seam	Local thickness (m)	Depth (m) BGL at colliery	Reduced level (m AOD)	Depth below northern site corner (m) BGL	Depth below southwestern edge of site (m) BGL
Meltonfield	0.91 – 1.32	5.50	78.5	16.5	22.5
Two Foot	0.84	21.7	62.3	32.7	38.7
Abdy or Winter	1.83	38.0	46.0	49.0	55.0

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 Meltonfield coal and assuming a maximum potential seam thickness of 1.32 metres, there is sufficient, albeit marginal, estimated cover. Both the Two Foot and Abdy or Winter coal seams are considered to have adequate competent cover to ensure surface stability, assuming seam thicknesses of 0.84 and 1.8 metres 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. It is known that the neighbouring Mount Osborne colliery exploited the deep Barnsley coal seam and it is likely that given the date of sinking being prior to 1871 this was done by way of room and pillar methods, 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 Meltonfield coal seam. The deeper Two Foot and Abdy or Winter coal seams are 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 Meltonfield coal seam, there is uncertainty on the magnitude of risk presented by potential shallow mineworkings within this coal seam 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 Meltonfield coal seam. 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 Meltonfield coal seam. 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 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

BGS archive shaft record

Appendix C

Coal Authority mining report