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Date: 11th May 2017
Your ref:
My Ref: SI 0257

FOR THE ATTENTION OF MR & MRS J CLAPHAM

Dear Sir,

COAL MINING RISK INTERPRETATION REPORT – FOLLOWING THE INTRUSIVE SITE INVESTIGATION AT 7 DARK LANE, BARNSELY, SOUTH YORKSHIRE S70 6RE.

I am pleased to supply the following report for the above named project and trust that this satisfies your requirements. Please do not hesitate to contact myself at any time for further clarification or advice.

Yours Sincerely,

M Lyons

M. Lyons
Consultant Mining Engineer
BSc CSci MIMMM

THIS REPORT IS BASED ON AND LIMITED TO THE INFORMATION IN MY RECORD AT THE TIME THE ENQUIRY IS ANSWERED. It is based on my professional opinion in line with the guidelines set out in CIRIA Special Publication 32 - "Construction Over Abandoned Mine Workings. Copyright in this report belongs to M.A.Lyons. All rights are reserved and unauthorised use is prohibited. Copyright is not transferred to external parties by possession of this report, however, those for whom the report is compiled have the right to use it. If any unauthorised third party comes into possession of this report, they rely upon it entirely at their own risk and the author does not owe them any Duty of Care or Skill.

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1. Introduction

Planning permission has been conditionally secured for residential development at the above location subject to the mining legacy risks been fully realised and mitigated from on site. Lyons CMC has now undertaken this work via an intrusive site investigation of 3 boreholes, the location of which is outlined on plan no. 00257/B – as attached and illustrated in appendix 5.2.

2. Scope of the Report

The mining legacy risks for this land are as follows:

- Potential historic shallow coal workings in the Swallow Wood coal seam
- Shallow coal at formation level (thin coal seam conjectured to outcrop through site)
- Geological Fault movement – considering conjectured fault just to the south
- Uncharted mine entries
- Fugitive gas emissions

As such, these risks need to be properly determined to ensure sound stability for the development. A borehole investigation consisting of 3 holes was deemed a reasonable level of investigation in the outset regarding potential void migration given the scale and nature of development combined with the available geological and mining information. A watching brief would also be implemented for any signs of mine entries. Considering that predicted depths to the seam are around critical depth (estimated at 10m) together with the relatively steep falling land westwards, the holes were to be focused on the western side of the proposed dwelling where the seam would be at its shallowest. Should the seam be encountered within a depth that may affect the stability of the proposed development then further investigations/boreholes would be considered.

It should be noted that this investigation is focused mainly on determining stability from potential shallow historic coal workings and will only provide limited information regarding the risks of uncharted mine entries, geological faulting and coal at formation level.

Considering a thickness of the Swallow Wood coal seam of around 900mm (*according to the former Horse Wood Opencast in the late 1940's just to the north of the site which proved this coal as 3ft in thickness*), along with the fact that no other workable seam is anticipated at shallow depth, boreholes were decided to be taken to either the base of the coal or to 10m if not encountered (*providing competent strata is proved and depth to rockhead/firm ground is no more than 1m*).

The Horse Wood opencast also indicates the 'Thin' coal seam as 1 ft 3in thick (380mm), which is conjectured to be at the surface in the vicinity of the property – as shown on the attached plan.

3. Site Investigation

3.1 Methodology

Prior to the intrusive site investigation a search for utilities was undertaken both via online data providers and physically on site using a Cable Avoidance Tool (CAT). Boreholes were marked out as illustrated on the attached plan no. 00257/B which is also detailed in appendix 5.2. As part of the mine entry watching brief, a pre survey was undertaken with no visible evidence of any uncharted mine entries. The process for the intrusive investigation is outlined in the system chart in appendix 5.5.

An investigation utilising a handheld Pneumatic Turmag Drill equipped with 40mm diameter drill rods was deemed appropriate in this instance along with water flush technique to analyse returns and minimise any risks associated with mine gas emissions. Gas monitoring equipment would be employed during works for risks associated with Methane and Carbon Monoxide (and Carbon Dioxide if any confined spaces became apparent in the working environment).

The works were to be supervised by the Site Engineer Mr. P. Potter, and overseen by the Principal Engineer Mr. M. Lyons.

3.2 Interpretation of Findings

Bedrock/firm ground was determined at between 0.4m and 0.6m and all three boreholes provided well recovered cuttings with no loss of flush. A small thickness (100mm) of poor quality coal or black/dark shale (*not anticipated as the 'Thin Coal Seam' as conjectured to outcrop close to east*) was observed at a depth of 2.4m in the north-west, 4.8 centrally and 5.3m to the south-east. Considering this line to be approximately along strike of the strata, this infers a possibility of spanning a fault plane, consistent with that conjectured nearby on BGS records (a north-east to south-westerly trending fault conjectured just to the south-east of the property – as indicated on the attached plan).

Firm drilling was then encountered within mudstones containing bands of sandstone to the base of the holes. As the strata was proved to be very competent it was considered adequate to terminate the holes at or around the required 10 times the seam thickness ratio (9 to 10m) as per the guidelines of CIRIA Special Publication No. 32. With the seam dipping to the north east and the land rising in the same direction it was considered unnecessary for any further boreholes on the opposite side of the dwelling to the east where the seam will be at an even greater depth.

4. CONCLUSIONS AND RECOMMENDATIONS

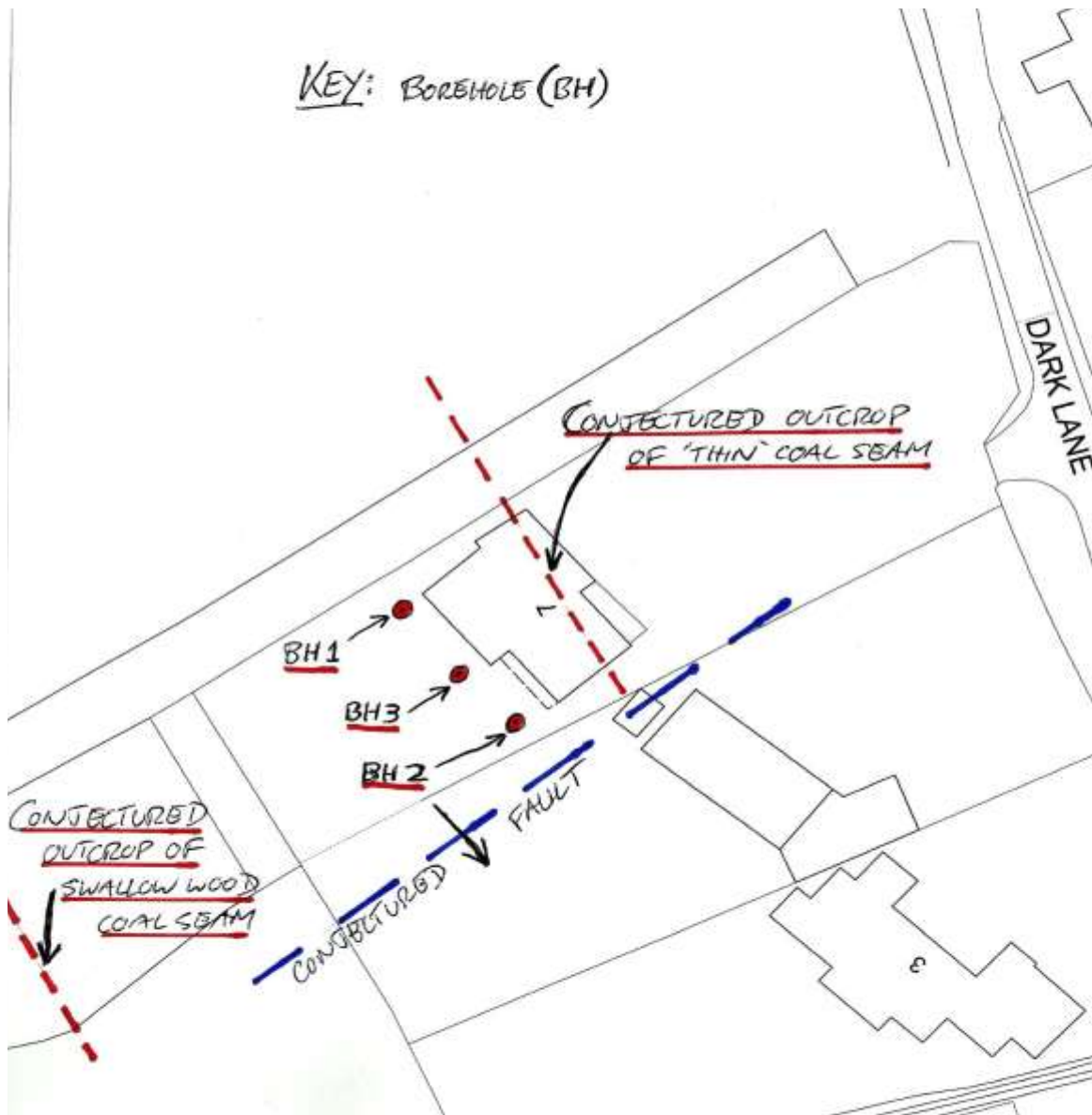
- 1) The risk of any instability to the proposed development regarding potential shallow coal workings has been reduced from MODERATE/LOW to now VERY LOW. Therefore no further investigations and/or stabilisation works would be deemed necessary for the development regarding historic coal workings.
- 2) The borehole information infers a possibility that the property may span a geological fault plane, which implies a slight risk of future lateral displacement. A suitably strengthened foundation design would therefore be recommended such as strengthened strip.
- 3) No signs of any mine entries were observed during the investigations; the risk of any uncharted mine entries has been reduced somewhat; never the less a watching brief should still be undertaken during future ground works. The Coal Authority should be notified should any such feature be suspected.
- 4) There will remain some risk for the development encountering the thin coal seam within foundation excavations which this investigation would not discover. If encountered the coal should be removed, for foundations to be sited on firm strata beneath, and the coal sides blinded off using a suitable inert material to help prevent spontaneous combustion from occurring.
- 5) Although no fugitive mine gases were encountered, methane membrane protection may need to be considered should any shallow coal be encountered that requires removal etc.

5 Appendix

5.1 References

- 5.1.1 CIRIA Special Publication No 32 'Construction Over Abandoned Mine Workings'.
- 5.1.2 British Standards Institution: BS 5930:2015 'Code of practice for ground investigations' BSI 2015.
- 5.1.3 British Standards Institution: BS EN ISO 14688-1: 2002 + A1 2013 'Geotechnical Investigation and Testing - Identification and Classification of Soil - Part 1 - Identification and Description. BSI 2013.
- 5.1.4 British Standards Institution: BS EN ISO 14689-1: 2003 'Geotechnical Investigation and Testing – Identification and Classification of Rock – Part 1 – Identification and Description. BSI 2003. Incorporating Corrigendum No. 1 February 2007.
- 5.1.5 British Standards Institution: BS 10175 'The Investigation of Potentially Contaminated Sites. Codes of Practice'. BSI 2011+A1 2013.
- 5.1.6 British Standards Institution: BS EN ISO 22476-3: 2005 + A1 2011 'Geological Investigating and Testing. Field Testing. Standard Penetration Test'.
- 5.1.7 British Standard 1377:1990 Parts 1-9 'Methods of Test for Soils for Civil Engineering Purposes'.

5.2 Borehole Location Plan



Not To Scale (please refer to attached file for scale plan).

5.3 Drilling log sheets

LYONS CMC
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CONSULTANCY

Daily Return (Drilling)

Sheet No.	1
Date	Thursday 04/05/2017
Contract Name	Mr. J. Early
Contract No.	257
Working Day No.	1

Hole No.	Depth (m)	Casing	Dia	Angle	From (m)	To (m)	Description
BH1	10.50	n/r	40mm	Vertical	0	0.40	Soil/Made ground
	Full returns; no gas detected				0.40	1.80	Clayey sandstone
					1.80	2.40	Sandstone
					2.40	2.50	Coal/Black shale
					2.50	10.50	Firm mudstones with sandstone bands
BH2	10.50	n/r	40mm	Vertical	0	0.60	Soil/Made ground
	Full returns; no gas detected				0.60	2.30	Clayey sandstone
					2.30	5.30	Sandstone
					5.30	5.40	Coal/Black shale
					5.40	10.50	Firm mudstones with sandstone bands
BH3	6.50	n/r	40mm	Vertical	0	0.60	Soil/Made ground
	Full returns; no gas detected				0.60	2.00	Clayey sandstone
					2.00	4.80	Sandstone
					4.80	4.90	Coal/Black shale
					4.90	6.50	Firm mudstone with sandstone bands
							End Of Shift
3	27.50	0.00	Sheet Total		Crew		Plant
3	27.50	0.00	Previous Sheet Total		PJO		Turmag
3	27.50	0.00	Cumulative Total		P.Potter A.Oxley		

Signed: *M Lyons*

Date: 04/05/2017

5.4 Site Investigation Process

Borehole Site Investigation (SI) Process Guide (Shallow Underground Coal Workings)

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