LYONS CMC
COAL MINING & GEOTECHNICAL CONSULTANCY
[redacted]

Lanneth Developments Ltd
16 Green Lane
Wharncliffe Side
Sheffield
S35 0DL

Date: 12th July 2024
Your ref: (S70 4SP)
My Ref: SI 00357

[redacted]

Dear Mark,

COAL MINING RISK INTERPRETATION REPORT – FOLLOWING THE SITE INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT AT LAND AT DARLEY HOUSE, PANTRY HILL, WORSBROUGH DALE, BARNSLEY S70 4SP

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,

[redacted]

M. Lyons
Consultant Mining Engineer
BSci CSci MIMMM

Contents

1. Introduction

Planning permission is being considered for the development of four detached dwellings at the above location subject to the mining legacy risks been fully realised and mitigated from on site, if necessary. Cape Site Services has now undertaken this work via an intrusive site investigation of 6 boreholes, the location of which is outlined on plan no. 00357/B – as attached and illustrated in appendix 5.2.

2. Scope of the Report

The mining legacy risks to the development are as follows:

- Instability from shallow underground coal workings
- 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 6 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.

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.

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 with tape measure from boundary lines as illustrated on plan no. 00357/B outlined in appendix 5.2. The process for the intrusive coal seam investigation is outlined via the system chart in appendix 5.4.

An investigation utilising a tracked Beretta Rotary Drill Rig equipped with 2m long 75mm diameter drill rods was deemed appropriate in this instance along with water flush techniques to analyse returns and minimise any risks associated with mine gas emissions and spontaneous combustion. Gas monitoring equipment would be employed during works for risks associated with Methane, Carbon Monoxide, Oxygen, Carbon Dioxide and Hydrogen Sulphide. Prior agreement had been secured for these works from the Coal Authority -permit ref: 28430 – as attached for reference in appendix 5.5.

Considering the geological/mining details and CMRA report (ref: P17-00360-Met-RP-GE-001 from Met Consultancy) boreholes were decided to be taken to the base of the second seam (Low Haigh Moor seam) or to a maximum of 30m if no coal is encountered.

The works were to be supervised by the Drilling Engineers Mr. S. Fish and Mr I. Wiles, and overseen by the Principal Engineer Mr. M. Lyons.

3.2 Interpretation of Findings

All boreholes (with exception to BH4) proved two leaves of coal at relatively shallow depth; the top of the shallowest leaf ranging from 2.0m to 3.5m deep. This leaf was recorded as between 0.5m to 0.8m in thickness. An interval of grey/brown mudstone was then experienced to the second leaf ranging from 0.9m to 1.5m. The second leaf ranged in thickness from 0.4m to 0.6m. BH4 proved made ground (local reports suggest this may be associated with an old road/transport route) to 2.5m deep, a single 0.9m thick seam of coal was encountered at 4.6m to 5.5m deep – it is not clear whether this is one of the leaves, as afore mentioned, or indeed both that have come together at this specific location. It was noted that this/these seams close to the surface were relatively poor quality, particularly in the eastern holes where a nearby land drain/culvert exists – which may indicate increased weathering of the strata in that part (hence the 'clay' parting between the leaves in BH3).

Grey mudstone with sandstone bands was encountered below the surface coal seams to between 15.5m to 16.8m where a zone of fractured sandstone was encountered that led to some loss of flush in most holes and totally in BH's 1&5. Firm drilling through this zone however, indicates that this is not related to old mine-workings and more likely to be associated with historic mining subsidence.

A further in-tact seam of coal in the region of 0.5m thickness was encountered at between 20.1m to 21.3m deep across the site.

Given the findings holes were terminated in firm strata at 25m deep; drilling to greater depths was considered unnecessary in this instance.

No signs of underground shallow workings or unstable ground were noted at any of the six boreholes. It seems likely that the Two Foot coal seam (anticipated as the coal closest to the surface) will have been left unexploited in this specific area with it being too shallow/weathered. No fugitive gases were detected at any point during the drilling operations.

The logs appear to match well considering the slight variations in height across the area investigated which would infer no signs of any geological faulting between the borehole locations.

4. CONCLUSIONS AND RECOMMENDATIONS

1) Although what appears to be the 'Two Foot' coal seam within an influencing depth of the proposed development, the six boreholes undertaken have proved stable ground conditions in the areas investigated across the proposed footprint areas – given current deigns/layouts. At such a relatively shallow depth and given the findings/maintenance of flush (through the surface seams), it is unlikely that historic underground mining has taken place. No similar risks are apparent in any deeper coal seams at this location. As such the risk of shallow mining instability is considered low, therefore any associated stabilisation works (such as drilling and grouting) are considered unnecessary. However, it would be prudent to offer an element of strengthened foundations (such as thickened & strengthened strip footings with two layers of mesh for example), in order to accommodate any residual slight risks within areas not covered by this investigation. It should also be noted that other foundation design considerations are likely to be necessary in consideration of the slope across the site and the made ground as discovered in borehole number 5. A structural engineer should be consulted for an appropriate foundation design and regulators should be consulted for their agreement of any such proposals prior to development taking place.

2) The above will of course depend on the formation levels of the development and considering the nature of the land (which slopes quite significantly to the south/south-west) an element of 'cutting' is likely to be required. As such, should any coal be exposed in future foundation work then an appropriate sulphur resistant concrete grade should be utilised and the coal should be totally blinded off to minimise spontaneous combustion risks; with foundations sited on firm strata beneath any coal for sound stability. All usual health & safety precautions should be employed regarding ground gases in any deep trenching work taking place

3) No signs of any mine entries were observed during the investigation, however slight risks are always present within the exposed coalfield for discovering such features. Watching briefs would be prudent during future ground works for any associated signs of either an old mine shaft or adit. The Coal Authority should be notified where any such feature is suspected.

4) No fugitive gases were encountered during this investigation; however, gas monitoring stand pipes have been installed for a future monitoring programme to better determine any associated requirements.

This report and future development proposals should be submitted to the regulators for their approval prior to any works taking place.

I trust that this satisfies your requirements, however please do not hesitate to contact myself at any time for further clarification or advice.

Yours Sincerely,

[redacted]

M. Lyons
Consultant Mining Engineer
BSc Csci MIMMM

Enc.

5 Appendix

5.1 References

5.1.1 CIRIA C758D ‘Abandoned mine workings manual’.

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.

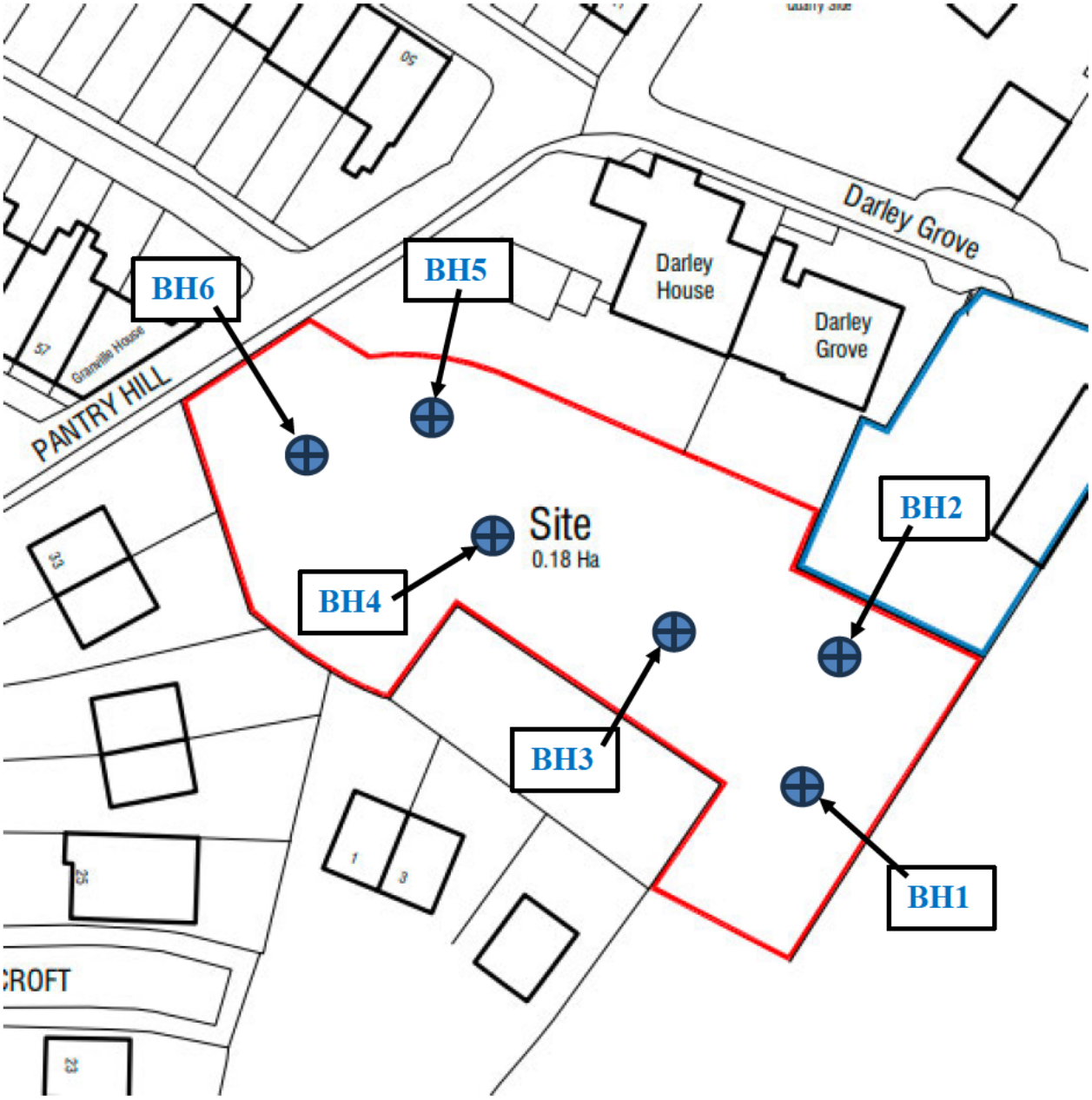
5.1.5 British Standards Institution: BS 10175 ‘The Investigation of Potentially Contaminated Sites. Codes of Practice’. BSI 2011+A1 2013.

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 Stardard 1377:1990 Parts 1-9 ‘Methods of Test for Soils for Civil Engineering Purposes’.

5.2 Borehole Location Plan No. 00357/B

LAND AT DARLEY HOUSE, PANTRY HILL, WORSBROUGH DALE, BARNSLEY S70 4SP
Site Investigation
Borehole Location Plan
(NTS)



5.3 Drilling log sheets

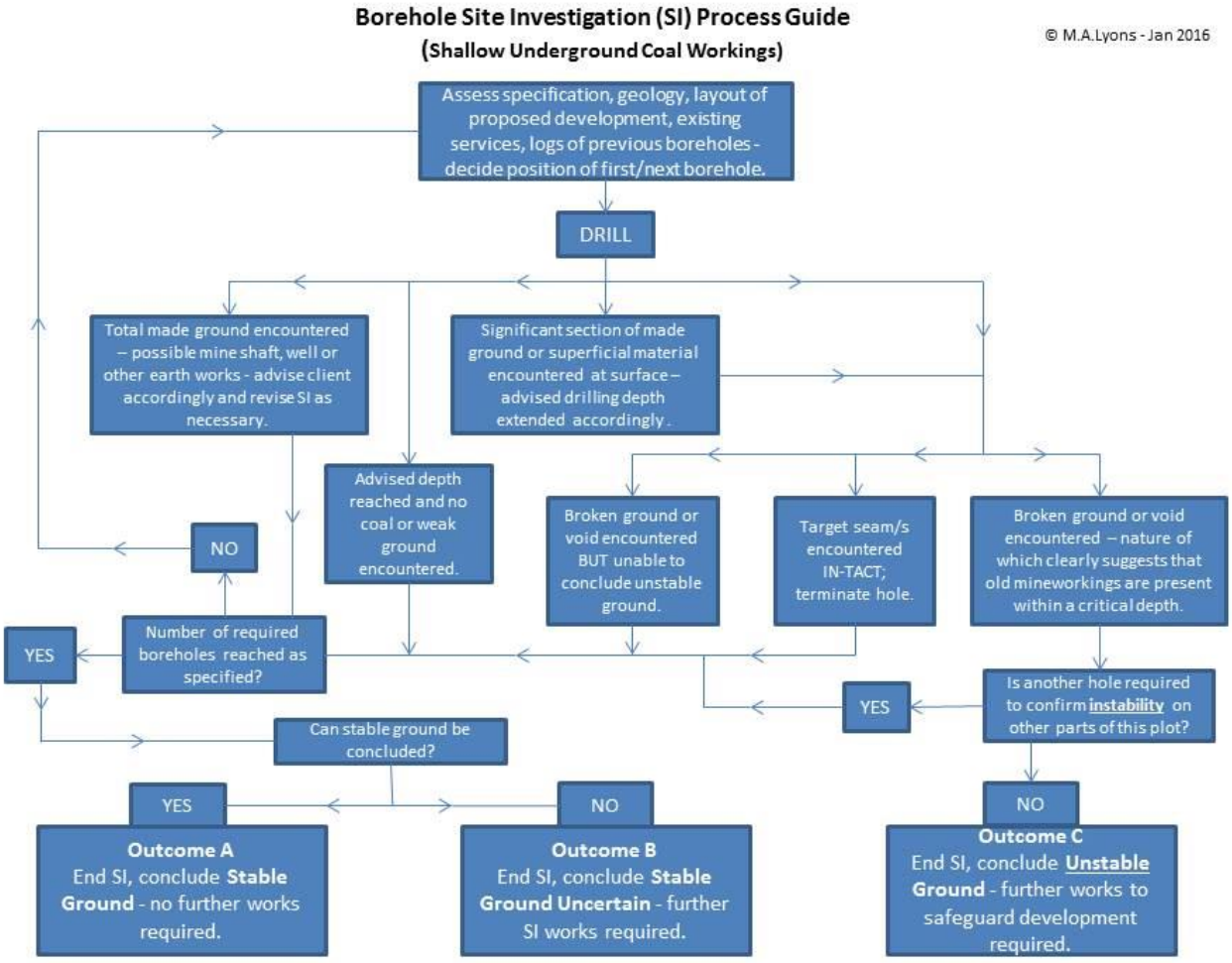
Client:LLaneth Developments	**Site:Pantry Lane Worsborough Dale Barnsley**		**Cape Site Services unit 2, rear of Castle Buildings Carlton Road, Barnsley, S71 3HX**
Date: 25-27/6/24	**Method:** water flush	**Permit No:**	
DrillerSimon Fish		**Driller Assistant: Richard HawkinsJohnathan Doughty**	
Drillers Signature:		**Page No: 1**	

Measurements In Meters

BH No:	FROM	TO	THICKNESS	DESCRIPTION
1				
	0	1.2	1.2	Made Ground
	1.2	3.5	2.3	Clay light brown soft
	3.5	4.3	0.8	coal with black mudstone bands
	4.3	5.2	0.9	Mudstone light brown/grey
	5.2	5.6	0.4	coal
	5.6	16.2	10.6	mudstone grey with sandstone bands
	16.2	17.4	1.2	fractured ground lost flush no returns
	17.4	25	7.6	firm/hard ground no returns
2				
	0	0.5	0.5	made ground
	0.5	2.9	2.4	clay yellow/brown soft bands
	2.9	3.6	0.7	coal stiff with black mudstone bands
	3.6	4.9	1.3	mudstone light brown soft
	4.9	5.5	0.6	coal
	5.5	15.9	10.4	mudstone grey with sandstone bands
	15.9	16.8	0.9	sandstone light brown some fracturing
	16.8	21	4.2	mudstone grey with sandstone bands
	21	21.4	0.4	coal
	21.4	25	3.6	mudstone grey silty

3				
	0	0.7	0.7	made ground
	0.7	1.5	0.8	clay yellow brown soft
	1.5	2.4	0.9	clay brown/grey
	2.4	3	0.6	coal soft black mudstone bands
	3	4	1	clay yellow/brown soft bands
	4	4.5	0.5	coal
	4.5	16.8	12.3	mudstone grey sandstone bands
	16.8	18	1.2	sandstone some fracturing
	18	21.3	3.3	mudstone grey
	21.3	21.7	0.4	coal
	21.7	25	3.3	mudstone grey
4				
	0	2.5	2.5	made ground rubble/ soil/ reworked clay
	2.5	4.6	2.1	mudstone light brown
	4.6	5.5	0.9	coal
	5.5	15.5	10	mudstone grey silty
	15.5	16.5	1	fractured ground /solid lost flush
	16.5	20.1	3.6	firm ground poor returns
	20.1	20.5	0.4	coal poor returns
	20.5	25	4.5	firm ground poor returns
5				
	0	1.3	1.3	made ground
	1.3	2	0.7	clay yellow/grey
	2	2.5	0.5	coal with mudstone bands
	2.5	4	1.5	mudstone grey/brown
	4	4.4	0.4	coal
	4.4	16.5	12.1	mudstone grey sandstone bands
	16.5	25	8.5	lost flush/no returns firm ground
6				
	0	1	1	made ground
	1	2.2	1.2	clay yellow grey
	2.2	2.7	0.5	coal
	2.7	4.2	1.5	mudstone grey brown bands
	4.2	4.6	0.4	coal
	4.6	16.5	11.9	mudstone grey sandstone bands
	16.5	17.2	0.7	sandstone light brown some fracturing
	17.2	20.8	3.6	mudstone grey
	20.8	21.3	0.5	coal
	21.3	25	3.7	mudstone grey

5.4 Site Investigation Process



5.5 Coal Authority Permit

The Coal Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 28430

Name and Address of Permit Holder:

Lanneth Developments Ltd
16 Green lane
Wharncliffe Side
Sheffield
S35 0DL

Site Location:

Land At
Darley House
Pantry Hill
Worsbrough Dale
Barnsley
S70 4SP

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by six boreholes to 30m

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH_4, CO_2, O_2, H_2S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: [redacted] Granted Date: ***11th June 2024***

For and on behalf of The Coal Authority

[redacted]

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

[redacted]