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BY EMAIL

Our Ref: PRN/01/L17/WW

13th December 2024

Dear Pam

Proposed New Residential Dwellings
Jill Lane, Mirfield
Intrusive Coal Mining Investigation

A Coal Mining Risk Assessment was undertaken by ARP Geotechnical Ltd (reference PWS/01/JRjcl1, dated 4th September 2024). The report concluded that potential workings within the Middleton 11 Yard and Blocking Coal beneath the site pose a possible risk to ground stability, and a rotary borehole investigation was recommended to be carried out. In accordance with our commission, the recommended investigation was carried out between the 28th November and 3rd of December 2024. The findings of the investigation are reported below.

Background

The geological maps show the site to be underlain by undifferentiated strata (mudstones, siltstones and minor sandstones) of the Pennine Lower Coal Measures of the Carboniferous Period. No superficial deposits are indicated on or near the site, and no faults are shown on or near the site.

The nearest indicated coal seam outcrops are 75m to the north (the Wheatley Lime Coal) and 144m to the southwest (also the Wheatley Lime Coal). The seam is indicated to have younger strata on the sides of the outcrop away from the site and, therefore, this seam will not underlie the site.

The general dip of strata in the area is indicated to be at around 3 degrees to the east. The Generalised Vertical Section (GVS) on the geological map indicates the Middleton Eleven Yard Coal to be approximately 6m below the Wheatley Lime coal seam. As a result, the seam may be present at very shallow depth (estimates around 4m). The seam is indicated to be between 0.3m and 1.1m thick. Therefore, based on the maps and elevations, the Blocking Rider and the Blocking Coal seams were likely to underlie the site.

It was recommended that a rotary drilling investigation be carried out to check for any evidence of shallow workings beneath the site. Details of the investigation subsequently carried out are provided below.

Site Works

Three boreholes were drilled, using rotary openhole water flush techniques, by Demolition & Geotechnical Ltd between the 28th November to the 3rd of December 2024. The boreholes were numbered BH1, BH2, and BH3 and were drilled to depths of between 12m and 28m, at the locations shown on the attached plan. The investigation was designed, organised, and supervised (on a full-time basis) by ARP Geotechnical Ltd, and boreholes were logged by both the Engineer and the lead driller. The logs are attached.

As part of an earlier Geo-Environmental investigation on 1st September 2024, three trial pits were excavated to between 2.1m and 3.5m depth and a shaft search for the Mining Remediation Authority (formerly the Coal Authority) mine entry, referenced: 421421-021, conducted on the days of 29th May, 3rd of June and 6th of June.

Ground Conditions and Stability Assessment

The rotary boreholes revealed rock head to be present at depths of between 1.0m (BH1 and BH2) and 2.0m (BH3) overlying mudstone. Trial pits undertaken by ARP in close proximity to BH1 and BH2, encountered bedrock at 1.5m and 1.7m respectively and therefore these depths have been used as depth to bedrock for these locations.

Broken ground, believed to be at the level of the Middleton 11 Yard Coal, was encountered in BH1 and BH2, at depths of 5.5m-6.0m and 5.8m-6.7m respectively. Soft ground was encountered between 6.0m-6.5m in BH3, again believed to be at the level of the Middleton 11 Yard Coal. No intact coal was encountered at the level of the shallower seam. BH1 and BH2, lost flush from the level of the broken ground. Strata below the workings were recorded as hard strata to the base of each borehole at 12.0m depth. BH3 retained flush through the soft ground and was drilled to a depth of 28m from the surface. A small band of intact coal 0.1m thick, thought to be the Blocking Coal was recorded at 22.5m. With mudstone being recorded throughout the remainder of the borehole.

It is a generally accepted rule of thumb that workings in a seam will require some form of treatment (usually drilling and grouting), unless there is at least 10 times the seam thickness of rock cover above the original seam roof (not above the top of any migrated workings). Assuming the maximum extraction of the up to 1.1m thick Middleton 11 Yard seam then 11m of rock cover would be required above the original seam roof. In all three boreholes there is insufficient cover present.

A summary table, showing the rotary borehole investigation detailing an assessment of cover thickness is presented below.

Rock Cover Thickness Assessment

BH	Depth to Rock (m)	Depth (m) to base of coal or workings	Depth to Original Roof (m)	Rock Cover to Original Seam Roof (m)	Comment on Rock Cover Thickness
BH1	1.5	6.0(BR)	5.2	3.7	Insufficient
BH2	1.7	6.7(BR)	5.9	4.2	Insufficient
BH3	2.0	6.5(S)	5.7	3.7	Insufficient
BH3	2.0	22.6 (IC)	22.5	16*	sufficient

S = Soft BR = Broken IC = Intact Coal

*Rock cover to base of overlying workings.

From the above, it can be seen that there is insufficient cover in BH1, BH2 and BH3 borehole locations for the recorded shallow workings of the Middleton 11 Yard Coal workings.

Rotary borehole locations were back filled with bentonite to surface upon completion to prevent any pathway for mine gases to reach the surface.

Gas Monitoring

Shallow coal seams, made ground and old mine workings can contain harmful gases. Depending on the fracture state of the strata on the site, gases have the potential to migrate from underlying mine workings towards the surface. Therefore, gas monitoring is required to determine the level of risk from mine gases. During the site investigation (see attached site plan), three monitoring wells were installed to 3.0m depth 1m from the position of each rotary borehole location. The gas monitoring is ongoing.

Conclusion

In conclusion, the rotary borehole investigation found broken ground in BH1 and BH2 at depths of 5.5m-6.0m and 5.8-6.7m respectively and BH3 recorded soft strata at depths of 6.0m -6.5m.

The drilling confirms that the coal has been worked at a shallow depth across the site with rock cover ranging between 3.7m to 4.2m. This is much less than the 11m rock cover that would be required for stability.

Intact coal, believed to be the Blocking Coal, was encountered in BH3, on the southeast corner of the site, at a depth of 22.5m. The proven thickness at that location was 0.1m, with sufficient cover of 16m to the base of the shallower workings being proven and no treatment of this seam is required.

In the light of the above, coal mine workings identified from the rotary investigation do not have sufficient rock cover, across the whole site, and stabilisation treatment by injection of grout into a grid of boreholes (known as drilling and grouting) will be required. A 3m grid is recommended, continuing 3m beyond the proposed building footprint.

The drilling and grouting works will need to be designed and carried out generally in accordance with CIRIA 32 "Construction Over Abandoned Mine Workings". The works will need to be monitored by a Geotechnical Engineer, and a Validation Report on the works issued following completion, to interested Stakeholders.

Once the workings have been treated, foundations in general (in addition to any measures identified to be necessary for the BH3 anomaly) will need to be reinforced. For a strip foundation, this will comprise two layers of B503 mesh within a 300mm thick footing - one near the bottom of the footing and one near the top.

Regulatory agreement will be required for any proposed ground stabilisation programme and engineering designs which interact with mining features.

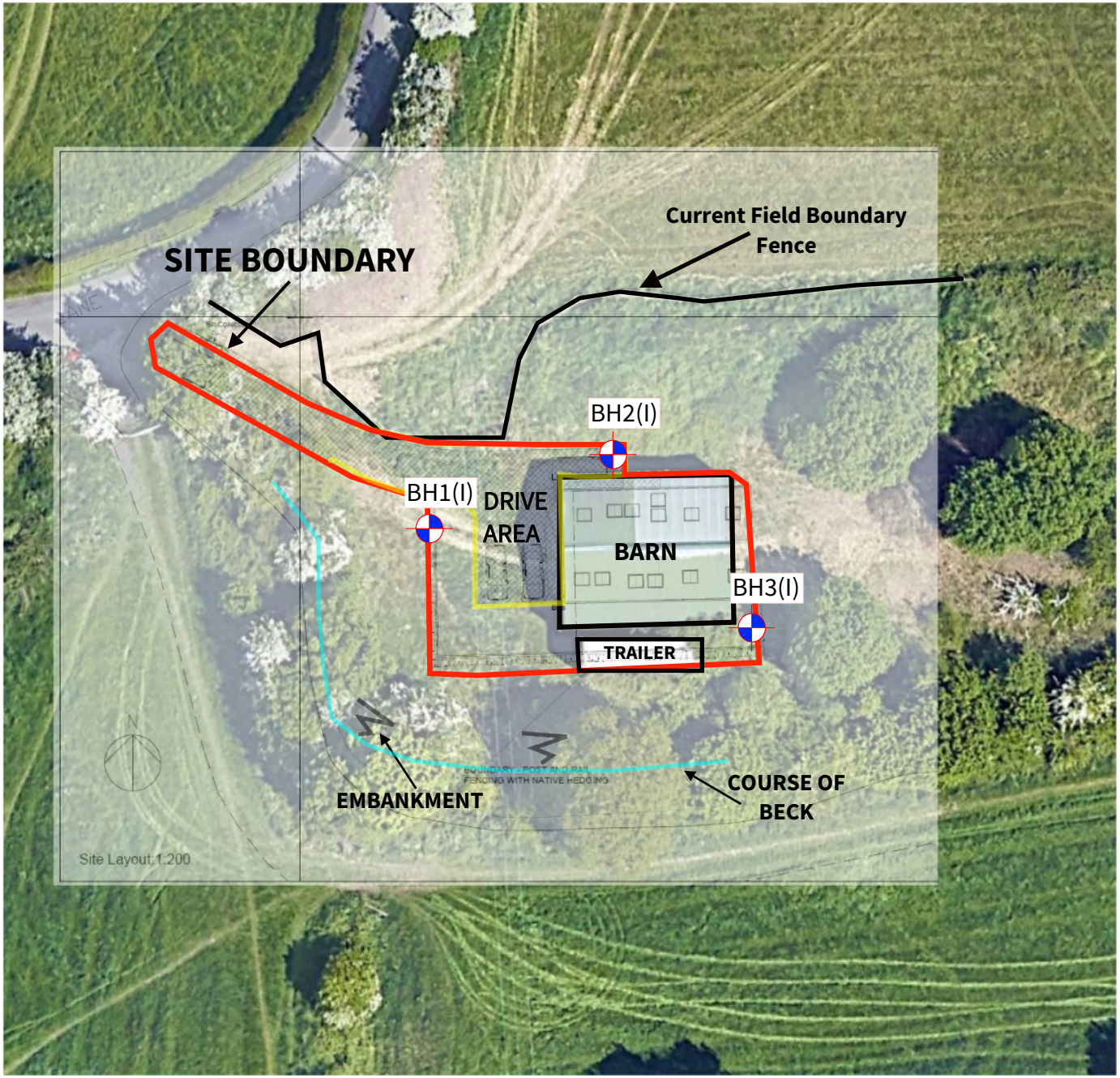
There is the possibility of unrecorded mine entries. A watching brief should be maintained by the contractors during the site strip and development works, and if any suspect features are identified, then a geotechnical engineer should be contacted for advice.

We trust the above information and enclosures meet your requirement. However, if you have any queries, please do not hesitate to contact us at your convenience.

Yours sincerely
for ARP GEOTECHNICAL LTD

William Watkins

Encs



0m 15m

KEY

ARP ROTARY BOREHOLE LOCATION.

(I) - MONITORING INSTALL.

Error Radius

ARP GEOTECHNICAL LTD
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Project	JILL LANE, MIRFIELD
Client	PAMELA DEWS
Title	COAL MINING INVESTIGATION PLAN
Date	DECEMBER 2024
Drawn: WW	Scale: AS SHOWN
Job No.	PWS/01

D & G UK

DRILLING LOG SHEET

SITE: 3:11 Lane, Mirfield

CREW/RIG: WW | RIG: Geo300

DATE: 2-4/12/24 | SHEET: 1 OF 1

LEAD DRILLER INITIALS: DS | LEAD DRILLER SIGNED:

EQUIPMENT USED:

BH	DEPTH	STRATA DESCRIPTION
BH1	0.00-1.00	clay
	1.00-5.00	mudstone
	5.00-5.50	soft
	5.50-6.00	broken
	6.00-13.00	hard strata
BH2	0.00-1.00	clay
	1.00-5.80	mudstone
	5.80-6.70	broken
	6.70-12.00	hard strata
BH3	0.00-1.00	made ground
	1.00-2.00	clay
	2.00-6.00	mudstone
	6.00-6.50	soft
	6.50-22.50	mudstone sandstone bands
	22.50-22.60	coal
	22.60-28.00	mudstone

BH	DEPTH	STRATA DESCRIPTION

BH	CASING DIA	CASING DEPTH

GAS READING	

TOTALS	BHS	DRILL	CASE	CORE
TODAY	3	53		
PREVIOUS	/	/		
TO DATE	3	53		