Geo-Environmental Ltd

Consulting Geo-Environmental Engineers

Phase 2 Coal Mining Risk Assessment

Tower Street, Barnsley

Report Ref:
23095-PWAG-00-XX-RP-G-7000-P01

Prepared for:
Mr & Mrs Barton

Date:
July 2023

Summit House
Riparian Way
The Crossing
Cross Hills
BD20 7BW

Tel: 01535 633350
E-mail: info@pwaite.co.uk

www.pwaite.co.uk

DOCUMENT CONTROL SHEET

Issued by: PWA Geo-Environmental Ltd
Summit House
Riparian Way
The Crossings
Cross Hills
Keighley
West Yorkshire
BD20 7BW

Tel: 01535 633350
E-mail: info@pwaite.co.uk

Client: Mr & Mrs Barton

Report Ref: 23095-PWAG-00-XX-RP-G-7000-P01

Project: Tower Street, Barnsley

Report: Phase 2 Coal Mining Risk Assessment

Status: Preliminary

Date: July 2023

Document Production Record

Issue Details	Name	Signature
Prepared By:	Charlie Kelly	
Checked By:	Theo Wood	
Approved By:	Ian Parkinson	

Document Revision Record

Issue No	Date	Revision Details
P01	31/07/2023	Original Issue

Executive Summary

PWA Geo-Environmental Ltd (PWAG) was commissioned by Mr & Mrs Barton to undertake a Phase 2 Coal Mining Risk Assessment for a proposed commercial development located off Tower Street, Barnsley.

Key Findings	
Site	The site comprises a raised, overgrown area of undulating ground with areas of fly tipping of household waste and construction material. The northern boundary of the site is a fenced retaining wall, down into the next-door residential garden. The eastern boundary is comprised of a stone wall. The southern boundary is a near-vertical, approximately 1 – 2 m bank into a stone wall. The western boundary is a near vertical approximately 1-2 m bank next to the road. Neighbouring land predominantly consists of residential properties.
Geology	Underlying superficial geology comprises clays and sands over mudstone, siltstone and sandstone bedrock at shallow depth. The Abdy/Winter Coal is indicated to underlay much of the site at shallow depth which is underlain by the Top Beamshaw Coal.
Mining and Quarrying	The desk study identified a moderate risk to the proposed development from potential unrecorded shallow coal mine workings. Further investigation was recommended.
Site Investigation	Fieldwork undertaken in June and July 2023 comprised three rotary holes drilled to a maximum depth of 21 m bgl. RH01 was drilled on 01/06/2023, RH02 and RH03 were drilled on 03/07/2023 when access to these positions was cleared. These works identified no shallow mine workings.
Ground Conditions Encountered	Topsoil varied between 0.2 m to 0.3 m thick and was replaced with made ground in places. Underlying superficial deposits were encountered at all investigation locations. Two locations were comprised of soft clay, the other being comprised of sand. The depth across the site but was typically around 3.0 m. Bedrock was encountered in all boreholes at around 3.00 m and comprised sandstone, siltstone and mudstone. Two shallow coal seams were also encountered at varying depths.
Coal Seams Encountered	Two coal seams identified to be dipping southeast have been encountered during the investigation. Across the eastern side of site, two thin seams of coal are present at shallow depth. The first seam is between 7.90 and 10.50 m bgl, with a seam thickness of between 0.20 and 0.30 m. This could be related to the Abdy Coal. The second seam is between 12.20 and 20.4 m bgl, with a seam thickness of 0.20 m. This could be related to be the Top Beamshaw coal. Neither possible seams appear in RH02 on the western side of site. This is illustrated in the Ground Model presented as Drawing No. 23095-PWAG-00-XX-DR-G-7002-P02 in **Appendix A**. In addition, a Phase 2 Coal Mining Risk Assessment for the neighbouring residential development immediately to the south also identified the Abdy Coal and Top Beamshaw to be intact.

Conclusions and Recommendations

Based on the information within this report we consider that the risk to the proposed development from unrecorded shallow mine workings is low and mitigation measures are not required. The depth of competent cover across the site was greater than 10 times seam thickness. Therefore, no remediation is considered necessary.

Given the history of mine workings in this area, the prospect of encountering unrecorded mine entries cannot be ruled out. During preparatory works for the proposed new buildings, we recommend that made ground is removed and the undisturbed natural ground inspected for evidence of worked ground that could be indicative of infilled mine entries. If there is any evidence, advice regarding treatment/ foundation precautions should be sought immediately from a suitably qualified engineer.

Contents

Appendices

Appendix A – Drawings

Drawing No.	Title
SK004	Proposed Development
23095-PWAG-00-XX-DR-G-7000-P01	Exploratory Hole Plan
23095-PWAG-00-XX-DR-G-7002-P01	Ground Model

Appendix B – Coal Authority Report

Appendix C – Exploratory Hole Records

1 FOREWORD

This report has been prepared for the sole use and reliance of Mr & Mrs Barton (the Client) and cannot be relied upon by any other parties without the express written authorisation of PWA Geo-Environmental Ltd. Any unauthorised third party relies on this report at their own risk and the authors owe them no duty of care.

The report presents observations and factual data obtained during our site walkover, along with information reviewed during the desk study and intrusive works and provides an assessment of geo-environmental issues with respect to information provided by the Client regarding the site. There may be other conditions on site not encountered during this investigation and which have not been examined. We cannot accept responsibility for any conditions not revealed by this investigation and confirmation of ground conditions between exploratory locations should be undertaken if considered necessary. Any spatial inference of ground conditions between investigation locations are for guidance only and no liability can be accepted for their accuracy.

The groundwater conditions encountered on site and recorded on exploratory records are those observed at the time of investigation. The normal rate of investigation does not enable the recording of an equilibrium water level. Furthermore, groundwater levels are subject to seasonal variation, changes in weather and changes in local drainage conditions. Therefore, this information is provided for guidance only and no liability can be accepted for their accuracy.

The report should be read in its entirety, including all associated drawings and appendices. PWA Geo-Environmental Ltd cannot be held responsible for any misinterpretations arising from the use of extracts that are taken out of context.

The findings and opinions conveyed in this report (including review of any third-party reports) are based on information obtained from the sources listed, which PWA Geo-Environmental Ltd understands are reliable. All reasonable skill, care and diligence has been applied in examining the information obtained. However, PWA Geo-Environmental Ltd accepts no responsibility for inaccuracies in the data supplied or for opinions based on any such inaccurate data.

PWA Geo-Environmental Ltd reserves the right to amend their conclusions and recommendations in the light of further information that may become available.

2 INTRODUCTION

2.1 The Commission and Brief

PWA Geo-Environmental Ltd (PWAG) was commissioned by Mr & Mrs Barton to undertake a Phase 2 Coal Mining Risk Assessment (CMRA) at their site located off Tower Street, Barnsley. The overall objectives were to:

- Carry out rotary probe drilling across the site to ascertain the thickness of competent cover above potential shallow coal mine workings, and if present, determine the risks associated with unrecorded shallow coal mining features.
- Investigate the potential ground gas risk associated with the shallow coal seams.
- Outline recommendations for further works where necessary.

2.2 The Proposed Development

It is understood that the development proposal for the site comprises the construction of a residential building with driveway and lawn.

A copy of the proposed development is presented, SK004 in **Appendix A**. Any changes to the proposed layout, site levels and/ or end use may require amendments to this report.

2.3 Scope of the Coal Mining Risk Assessment

Key tasks of this CMRA are summarised as follows:

- Review an existing report that identified a possible risk to the proposed development from unrecorded shallow mineworkings (Argyll Environmental – Site Solution Combined (July 2022) - Land adjacent 52 Tower Street, S70 1QS – (Ref: 298336709)) and plan a suitable investigation strategy.

- Drilling of 3 rotary open hole boreholes (RH01-RH03) to evaluate the potential presence of shallow unrecorded mine workings.
- Use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of such 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.
- 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.

This report relied on published information and information provided by the client and other parties during the given time period.

2.4 Terms of Reference

The information sources used in the preparation of this report include:

- Argyll Environmental – Site Solution Combined (July 2022) - Land adjacent 52 Tower Street, S70 1QS – (Ref: 298336709.
- Lyons CMC (November 2017) – Coal Mining Risk Assessment (CMRA) for proposed detached dwelling at land off Tower Street, Barnsley (Ref: CMRA 00191).
- ARC Environmental Ltd (April 2018) - Proposed Development at Tower Street, Barnsley S70 1QS. (Note this phase 2 coal mining risk assessment was conducted on the neighbouring residential development to the south).
- Geological information including the British Geological Survey (BGS) 1:10,000 scale geological map (Sheet SE30NW).
- The Coal Authority – Non-Residential Mining Report (Nov 2022) – CON29M - land of the southwest side of Tower Street Barnsley S70 1QS – (Ref: 81007638448001).
- The Coal Authority online interactive map viewer.
- BGS historic borehole records.
- CIRIA C758D. Abandoned mine workings manual. 2019.
- Coal Authority Policy for Building Over or Within the Influencing Distance of a Mine Entry, January 2012.
- Coal Authority Technical Guidance Note TGN01/2019. Findings from a large subsidence event on a residential estate.

PWAG cannot accept responsibility for the reliability and authenticity of published information or reports prepared by third parties.

3 SITE LOCATION AND DETAILS

Table 1. Site Location and Details.	
Site Address	Land off Tower Street, Barnsley S70 1QS
National Grid Reference	Easting: 434356 Northing: 405295
Area	Approximately 0.06 hectares.
Site Location	**Figure 1** (reproduced from Google Maps) is included as a site location plan.

Table 1. Site Location and Details.		
		
Ground Cover	**Ground Cover**	**Estimated percentage**
	Undeveloped grassland.	100%
Description	The site comprises a raised, overgrown area of undulating ground with areas of fly tipping of household waste and construction material. The northern boundary of the site is a fenced retaining wall, down into the next-door residential garden. The eastern boundary is comprised of a stone wall. The southern boundary is a near-vertical, approximately 1 – 2 m bank into a stone wall. The western boundary is a near vertical approximately 1-2 m bank next to the road. Neighbouring land predominantly consists of residential properties.	
Known services	The positions of services are currently unknown. It is recommended that a full utilities survey is undertaken.	
Current Use	Disused land.	
Proposed Use[1]	Residential.	

4 PREVIOUS REPORT

The following reports were reviewed:

- Lyons CMC (November 2017) – Coal Mining Risk Assessment (CMRA) for proposed detached dwelling at land off Tower Street, Barnsley (Ref: CMRA 00191).
- ARC Environmental Ltd (April 2018) - Proposed Development at Tower Street, Barnsley S70 1QS. (Note this phase 2 coal mining risk assessment was conducted on the neighbouring residential development to the south).
- Argyll Environmental – Site Solution Combined (July 2022) - Land adjacent 52 Tower Street, S70 1QS – (Ref: 298336709).

Table 2. Summary of Previous Report – Lyons CMC – November 2017	
Scope	• 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 further works that may be necessary; 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.

Table 2. Summary of Previous Report – Lyons CMC – November 2017	
Coal Seam Outcrops	The Winter (also known as 'Abdy') Coal Seam is conjectured to outcrop some 40m to the west of the site, roughly from north-east to south-west. However, as this position is only 'conjecture' the actual outcrop (surface) position may vary. Dipping beneath the land to the east this coal is expected to be at around 5m deep beneath the site itself. The former Mount Osbourne Colliery shaft section (around 1km away to the north-east) indicates a section of this coal as around 1.8m which includes 2 dirt bands. The Top Beamshaw Coal Seam is the next coal seam to lie beneath the Winter seam by around 4m or so. In these parts this coal is known to consist of two relatively thin leaves separated by a large dirt band.
Fault Planes or Fissures	A geological fault is conjectured to pass the site just to the south-east, trending in a SW to NE direction. There are no records of any fissuring of the sandstone bedrock in these parts, however such rock may have natural fissures that may have been opened out by the past deep mining as detailed below.
Underground Coal Workings - Deep	Deep coal mining has taken place in various coal seams beneath this location, the latest being in the Silkstone Seam from Barrow Colliery in 1975 at around 460m deep. All settlement will be long complete and as no coalfields now exist, the site should remain stable from the deep coal mining perspective for the foreseeable future.
Underground Coal Workings - Shallow	Although workings in the Winter coal seam are not known beneath the site itself, Coal Authority records indicate that relatively shallow workings took place in close proximity to the south-east from the former Vernon Colliery in 1923. Some potential will therefore exist for further unrecorded workings of the coal beneath the site now under review. No underground workings are known in the Top Beamshaw seam in this vicinity and the likelihood of unrecorded workings being present in this coal is considered low.
Mine Entries	No mine entry is known within the site or within 20m of its boundary. However various old shafts are known in wider vicinity and considering the shallow workable coal some potential will exist for unrecorded mine entries being present.
Mine Gases	No evidence of coal mining related fugitive gas emissions are known within 250m of the site. However, considering the presence of shallow workable coal along with possibly faulted bedrock the likelihood of such gases being present should not be ruled out.

Table 3. Summary of Previous Report – Arc Environmental – April 2018	
Scope	Three rotary open boreholes to assess the nature of underlying coal seams present beneath the site and to ascertain if there are any unrecorded workings.
Ground Conditions Encountered	Initial ground conditions comprised grass over topsoil comprising a dark brown sandy gravelly clayey soil with occasional anthropogenic debris, to depths of between 0.30m and 0.60m. The underlying natural strata comprised an orangish brown sandy slightly gravelly clay to between 1.60m and 1.80m. Below, the solid geology comprised sandstones, mudstone and siltstone with interbedded coal seams of the Pennine Middle Coal Measures.
Fault	A fault was indicated to bisect the southeastern portion of the site, trending in a north-east south-west direction. As a result, the geology encountered in the three boreholes differed, with correlations between RBH01 and RBH02 which typically encountered mudstones and siltstone with interbedded coal seams whilst RBH03, which was on the other side of the fault encountered predominantly sandstones with interbedded coal seams.
Coal Seams	Three coal seams were identified on site in RBH01 and RBH02: • The Abdy Coal Seam was encountered between depths of 5.10 and 8.40 m bgl with a thickness of 0.70 m. • The Top Beamshaw Coal was encountered between 9.80 and 12.50 m bgl with a thickness of between 0.25 and 0.30 m. • The Low Beamshaw Coal was encountered at 21.90 m bgl with a thickness of 0.60 m. All three coal seams were also identified in RBH03 but were not labelled. All three coal seams encountered were found to be intact with no evidence of historic mineworkings.
Conclusions	The site is underlain by solid geology comprising the Pennine Middle Coal Measures, noted as a coal bearing formation. The rotary boreholes have identified several coal seams underlying the site, of varying thicknesses. All the seams encountered were noted to be intact with no evidence of unrecorded workings and/or voids. Therefore, based on the ground investigation carried out, it is concluded that there is no risk to the site posed by the shallow underlying coal seams.

Table 4. Summary of Previous Report - Argyll Environmental – July 2022	
Site History	No development on site. The site was used as allotments until 2022, when the site was cleared and disused.
Published Geology	No superficial deposits are identified. Bedrock is expected to be comprised of the Pennine Middle Coal Measures (sandstone, siltstone and mudstone) and the Abdy Rock (sandstone).
Mining and Quarrying	The desk study identified a moderate risk to the proposed development from potential unrecorded shallow coal mine workings. Further investigation was recommended.
Hydrogeology	Bedrock is classed as a Secondary (A) Aquifer.
Radon	The property is not within a Radon Affected Area, as less than 1% of properties are above the action level. No radon protection measures are required for developments undertaken in these areas.
Potential Sources of Contamination	No contaminated ground was identified during the site investigation.
Contaminated Land Risk Assessment	With due regard to the proposed residential development, the site represents a low risk with respect to contaminated land liability issues in its current condition and no remediation is considered necessary.

5 MAPPED GEOLOGY

Online British Geological Survey (BGS) published geological data, the 1:10,000 geological map (Sheet SE30NW (Barnsley)) shows the following geological sequence.

<table>
<tr><th colspan="4">Table 5. Mapped Geology.</th></tr>
<tr><td colspan="4">Summary
Underlying superficial geology comprises clays and sands over mudstone, siltstone and sandstone bedrock at shallow depth. The Abdy/Winter Coal is indicated to underlay much of the site at shallow depth which is underlain by the Top Beamshaw Coal.</td></tr>
<tr><th>Item</th><th colspan="3">Description</th></tr>
<tr><td>Topsoil</td><td colspan="3">None identified on mapping but observed to be present.</td></tr>
<tr><td>Made Ground</td><td colspan="3">None identified on mapping but observed to be present.</td></tr>
<tr><td>Superficial</td><td colspan="3">None identified on mapping but approximately 3.0 m of clay and sand was encountered during the site investigation.</td></tr>
<tr><td>Bedrock</td><td colspan="3">Bedrock is primarily comprised of the Abdy Rock, a thinly bedded yellowish brown sandstone which is underlain by the undifferentiated Pennine Lower Coal Measures Formation, comprised of mudstone, siltstone, and sandstone.
Most of the site is underlain by the Abdy Rock that is reported to be 0.00 m to 42.00 m thick. The conjectured subcrop of the Abdy/Winter coal, henceforth referred to as the Abdy Coal (reported to be 1.22 to 1.42 m thick), is identified to outcrop 20 m northwest of the site. Given that the strata dip to the southeast, the mapping suggests the site is likely to be underlain by the Abdy Coal.
The generalized vertical section on the geological map indicates that the Top Beamshaw Coal (Reported to be 1.21 to 1.84 m thick) is approximately 11.6 m below the Abdy Coal. Therefore, as the Abdy Coal is indicated to be underlaying the site, the Top Beamshaw Coal is also expected to be present at a depth of at least 11.6 m beneath the Abdy Coal.
The next coal seam in sequence beneath the site is the Low Beamshaw Coal reported to be 0.52 m to 0.64 m thick and is approximately 7.7 m below the Top Beamshaw Coal.
It is commonly accepted that 10 times seam thickness of competent rock cover is sufficient to discount stability risks with mine workings. On this basis, the Low Beamshaw is not considered to represent a risk to ground stability at this site and is not considered further. However, any workings in the Abdy Coal or the Top Beamshaw Coal could represent a risk where there is insufficient competent cover.
<table>
<tr><th>Coal seam name</th><th>Seam thickness (m)</th><th>Depth (m bgl)</th></tr>
<tr><td>Abdy Coal</td><td>1.22 to 1.42</td><td>5</td></tr>
<tr><td>Top Beamshaw</td><td>1.21 to 1.84</td><td>16</td></tr>
</table></td></tr>
<tr><td>Faulting</td><td colspan="3">One fault runs northeast to southwest approximately 20 m southeast to the site.</td></tr>
<tr><td>BGS Borehole Records</td><td colspan="3">The nearest borehole records (SE30NW/96 and SE30NW/97) are 290 m northeast at No 8 Park Road, Barnsley. Between 1.60 and 2.80 m of made ground was encountered, followed by 0.90 to 1.00 m of stiff</td></tr>
</table>

Table 5. Mapped Geology.	
	clay over shaley mudstone bedrock. The boreholes were drilled to depths of 3.40 and 4.40 m. No coal was encountered.

6 IDENTIFICATION AND ASSESSMENT OF SITE-SPECIFIC COAL MINING

The potential issues identified by the Coal Authority Interactive Map viewer are summarised by **Table 6.**

Table 6. Coal Authority Interactive Map Information.		
Information	**Site Affected**	**Comment**
Coal Mining Reporting Area	Yes	A CON29M Non-Residential report is presented in **Appendix B**.
Mine Entry	No	No mine entry on site, closest is 220 m southeast of site.
Development High Risk Area	Yes	The site is identified as a development high risk area associated with the nearby coal outcrop northwest of site.
Past Shallow Coal Mine Workings	No	No past shallow coal mine workings are shown on or within the vicinity of the site.
Probable Shallow Coal Mine Workings	Yes	Probable shallow coal mine workings identified.
Coal Outcrops	No	No coal outcrops are identified on site.

7 FIELDWORK and GROUND CONDITIONS ENCOUNTERED

7.1 Scope of Fieldwork

Rotary open hole drilling is an efficient way of investigating underlying geology for evidence of unrecorded mine workings. However, this technique is not suitable for sampling the geology because the drill bit breaks down the strata into small rock chips that are flushed out of the borehole using recirculated water. Rather recovered rock chips are inspected to gain a general indication of geology as the fabric of the strata is destroyed.

Table 7. Scope of Fieldworks.			
Start date:	1/06/2023	**End date:**	3/07/2023
Site Works Summary Fieldwork undertaken in June and July 2023 comprised three rotary holes drilled to a maximum depth of 21 m bgl. RH01 was drilled on 01/06/2023, RH02 and RH03 were drilled on 03/07/2023 when access to these positions was cleared. These works identified no shallow mine workings.			
Technique	**Exploratory Holes**	**Depths**	**Comments**
June 2023			
Rotary Open Holing	RH01	20 m bgl	Investigate the risks associated with unrecorded shallow coal mining features.
July 2023			
Rotary Open Holing	RH02 – RH03	20-21 m bgl	Investigate the risks associated with unrecorded shallow coal mining features.

Descriptions of strata and ground conditions encountered during investigation works are presented on the exploratory hole logs presented in **Appendix C.**

An Exploratory Hole Plan, Drawing No 23095-PWA-00-XX-DR-G-7000 P01 is presented in **Appendix A**.

7.2 Summary of Ground Conditions

Natural ground conditions encountered across the site mainly reflects the published geology. Topsoil comprised of dark brown SAND with common anthropogenic material and varied between 0.2 m to 0.3 m in thickness. Made ground was encountered at RH03 to a thickness of 0.6 m. Underlying superficial deposits were encountered at all investigation locations. Two locations (RH02 and RH03) found soft clay, with RH01 encountering sand. Bedrock was encountered in all boreholes at between 2.90 and 3.10 m bgl as sandstone, siltstone and mudstone. Two shallow coal seams were also encountered in RH01 and RH03. In RH01 0.30 m of coal was encountered at 7.90 m bgl and 0.20 m of coal was encountered at 12.20 m bgl. In RH03 0.20 m of coal was encountered at 10.50 and 20.40 m bgl.

It is possible that these seams are the Abdy Coal and the Beamshaw Coal seams, but due to discrepancies with the expected thicknesses, it cannot be ascertained.

A ground model showing coal depth is included as 23095-PWA-00-XX-DR-G-7002 P01 in **Appendix A.**

A summary of the ground conditions encountered is presented in **Table 8**.

Table 8. Summary of Ground Conditions Encountered.

Strata	Depth Encountered (Thickness)	Description
Topsoil	Ground level (0.20 to 0.30 m)	Generally described as grass over dark brown SAND with common anthropogenic material.
Made Ground	Ground level (0.60 m)	Described as dark brown slightly clayey gravelly fine to coarse SAND with common anthropogenic material and cobbles. Gravel is angular to subangular fine to coarse brick concrete and sandstone.
Clay deposits	0.20 – 0.60 m bgl (2.50 to 2.80 m)	Generally described as soft orangish brown CLAY that becomes sandier with depth.
Sand deposits	Ground level (0.30 m)	Described as a light brown clayey SAND.
Pennine Lower Coal Measures (Coal)	7.90 – 20.40 m bgl (0.20 to 0.30 m)	Intact coal encountered in RH01 and RH03.
Pennine Lower Coal Measures (Bedrock)	2.90 m – 3.10 m bgl (unproven)	Identified as sandstone, siltstone and mudstone. Siltstone encountered as weak to moderately weak grey. Sandstone encountered as weak fine grey sandstone/siltstone. Mudstone generally encountered as weak to moderately weak light to dark grey mudstone.

7.3 Summary of Coal Seams Encountered

Two coal seams identified to be dipping southeast have been encountered during the investigation. Across the eastern side of site, two thin seams of coal are present at shallow depth. The first seam is between 7.90 and 10.50 m bgl, with a seam thickness of between 0.20 and 0.30 m. This could be related to the Abdy Coal. The second seam is between 12.20 and 20.4 m bgl, with a seam thickness of 0.20 m. This could be related to be the Top Beamshaw coal. Neither possible seams appear in RH02 on the western side of site. This is illustrated in the Ground Model presented as Drawing No. 23095-PWAG-00-XX-DR-G-7002-P02 in **Appendix A**.

Table 9. Summary of Coal Seams Encountered.

Location	Depth to rockhead (m bgl)	Depth of borehole (m)	Depth to base of coal seam (m bgl)	Thickness of coal seam (m)	Ratio of Competent (Rock) Cover	Possible seam name
RH01	2.90	20.00	7.90	0.30	26 x seam thickness	Abdy Coal
			12.20	0.20	61 x seam thickness	Top Beamshaw Coal
RH02	3.10	20.00	Not present	Not present	Not applicable	No coal encountered
RH03	3.00	21.00	10.50	0.30	35 x seam thickness	Abdy Coal
			20.40	0.20	102 x seam thickness	Top Beamshaw Coal

All coal seams encountered during drilling were found to be intact. There was no evidence of unrecorded workings such as voids or broken ground that would be identified by a rapid drop in the drill string or loss of water flush. In addition, the workplace was monitored during drilling by the engineer for possible mining related gases (carbon dioxide and methane) and nothing was recorded.

8 ASSESSMENT OF SITE-SPECIFIC COAL MINING RISKS

The potential risks associated with coal mining for the proposed development are summarised in **Table 10** these have been reviewed in light of the information within the report.

Table 10. Coal Mining Risk Assessment.

Coal Mining Issue	Risk Assessment	Risk
Shallow coal workings	The Abdy Coal and Top Beamshaw Coal have been identified at shallow depth on site as intact coal seams. Investigation in the west of the site did not encounter coal (RH02). This suggests the coal subcrop is washed out or missing due to other structural controls. This does not rule out the possibility of encountering coal further to the west. According to the vertical succession on the geological map, the Low Beamshaw Coal is reported to be 0.52 m to 0.64 m thick and is approximately 7.3 m below the Top Beamshaw Coal. Given the depth to the Top Beamshaw Coal this is not considered to represent a risk to ground stability at this site.	Low
Mine entries	The Closest mine entry to site is 220 m southwest of site and represents no risk to this site.	Low
Geological features	The conjectured subcrop of a fault is present on mapping to the southeast of the site. No clear evidence of this fault was observed (such as displacement in depth to coal) and it is likely to be located off site to the southeast. However, we recommend that the presence of potential faults should be considered by the structural engineer when designing foundations.	Low
Recorded coal mining related hazards	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 m of the enquiry boundary.	Low

9 MITIGATION STRATEGY PROPOSED

Two coal seams, considered to possibly be the Abdy Coal and Top Beamshaw Coal, have been identified during the investigation. Both coal seams are shallow, dip southeast and underly the site. Intact coal was identified across the site with no signs of mineworkings in any boreholes. The Abdy Coal, the upper most seam identified, has a maximum seam thickness of 1.42 m recorded on the geological map. During the ground investigation this seam's thickness was observed to range between 0.20 m to 0.30 m and would not be considered of workable thickness. The underlying Top Beamshaw Coal has a maximum seam thickness of 1.84 m recorded on the geological map. During the ground investigation this seam's thickness was observed to range between 0.2 m to 0.3 m and would also not be considered of workable thickness.

It is generally accepted as a rule of thumb for crown hole collapse, ten times the seam thickness of competent rock cover is assumed to provide adequate protection for new developments from workings in underground coal. This is based on guidance given in CIRIA Special Publication 32, reprinted 2002. However, this publication has been superseded and the Coal Authority recently released Technical Guidance Note TGN01/2019 produced findings from a large subsidence event on a residential estate. In this note they advised that 'other subsidence mechanisms can occur, such as pillar failure, for which the 10 times rock cover rule of thumb is not an appropriate guide'.

Based on the information within this report and proven workings of the underlying coal seam, we consider that the risk to the proposed development from unrecorded shallow mine workings is low and mitigation measures are not required. The depth of competent cover across the site was greater than 10 times seam thickness. Therefore, no remediation is necessary.

10 CONCLUSIONS AND RECOMMENDATIONS

This Phase 2 Supplementary Coal Mining Risk Assessment has been performed for Tower Street, Barnsley. It is understood that the proposed development comprises the construction of a residential property, with a garden and hardstanding for parking and driveway. For the purpose of this report, we have assumed that proposed levels will not be significantly different to those existing. If any of these assumptions are incorrect then the conclusions in this report may require reassessment.

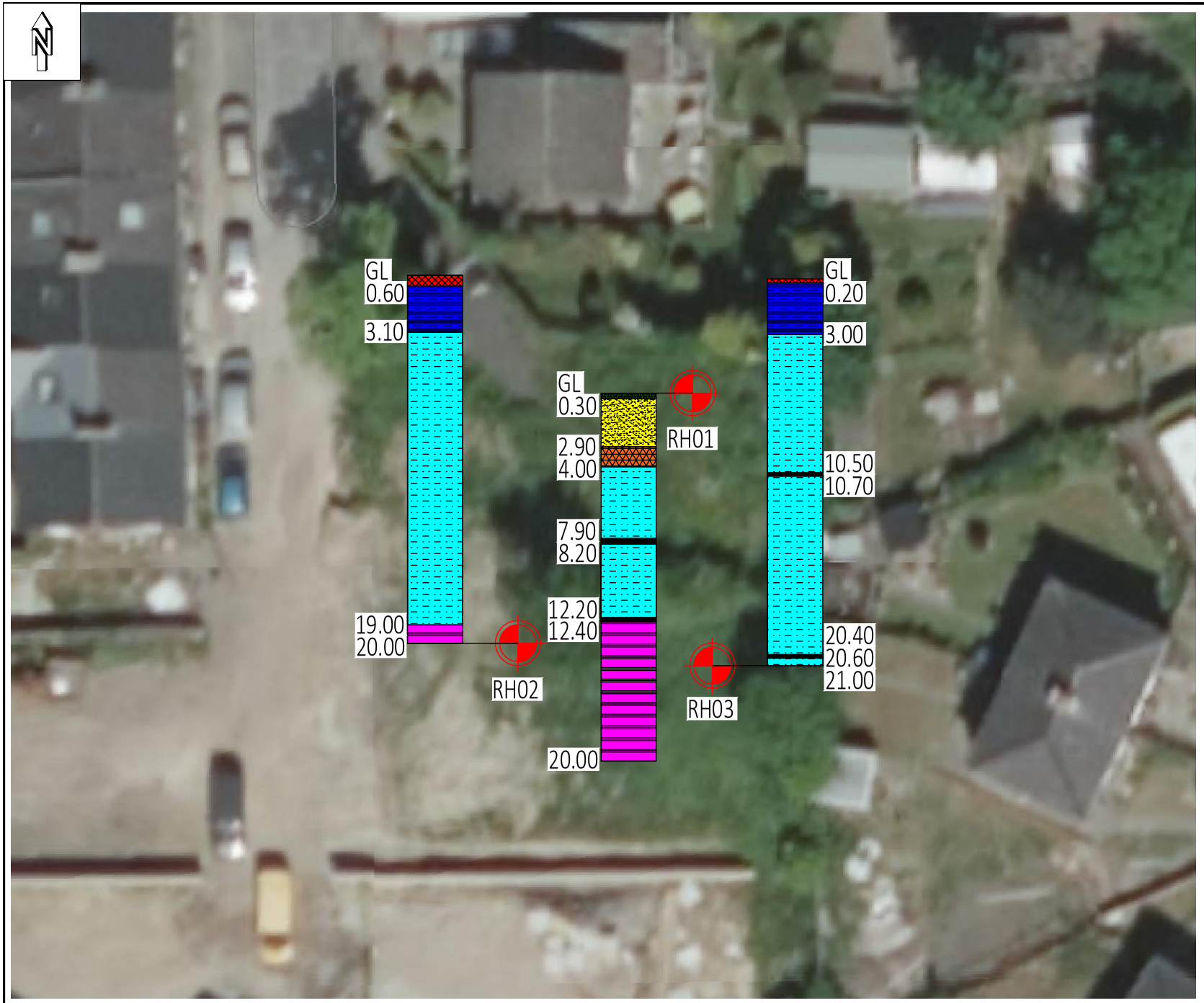
Based on the information within this report, we consider that the risk to the proposed development from unrecorded shallow mine workings is considered low and mitigation measures are not required.

11 REGULATORY APPROVALS

The conclusions and recommendations presented in this report are considered reasonable based on the information that was available. However, these are not guaranteed to gain approval from regulatory authorities. Therefore, we recommend that copies of this report are passed to the appropriate regulator for review and comment before undertaking any additional work.

Appendix A

Drawings



NOTES:

1. COPYRIGHT IN THIS DOCUMENT BELONGS TO PAUL WAITE ASSOCIATES LIMITED & ALL RIGHTS IN IT ARE RESERVED BY THE OWNER.
2. NO PART OF THIS DRAWING MAY BE COPIED, TRANSFERRED, OR MADE AVAILABLE TO USERS OTHER THAN THE ORIGINAL RECIPIENT, INCLUDING ELECTRONICALLY, WITHOUT PRIOR PERMISSION FROM PAUL WAITE ASSOCIATES LIMITED.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
4. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES.
5. NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.

KEY

- BOREHOLE LOCATION
- MADEGROUND
- TOP SOIL
- CLAY
- SAND
- MUDSTONE
- SILTSTONE
- SANDSTONE/SILTSTONE
- COAL (INTACT)

Rev	Date	Remarks	Drawn	Ch'k'd

Paul Waite Associates
pwa Geo Environmental
Consulting Civil , Structural & Geo-Environmental Engineers Summit House, Riparian Way, The Crossings, Crosshills, Keighley, BD20 7BW
T - 01535 633350 E-Mail: info@pwaite.co.uk www.pwaite.co.uk

Client: PHI ARCHITECTURE

Project: TOWER STREET, BARNSLEY

Title: GROUND MODEL

Size	Scale	Designed	Checked	Date
A3	NTS	CK	TW	JUL 23

Drawing Status: PRELIMINARY

Job Number	Originator	Zone	Level	Type	Role	Drawing No.	Rev
23095	PWA	00	XX	DR	G	7002	P01


SOUTH EAST VISTA
GROUND FLOOR 161.900
FIRST FLOOR 164.600
SECOND FLOOR 167.300
ROOF PITCHES 25° & 45°.
161
EXISTING WALL
160
161.5
159
158
157
156
FRONT DOOR
DOUBLE GARAGE
SOUTH WEST VISTA
LONG DISTANCE BARNSLEY & BEYOND VISTAS
TOWER STREET
ADJACENT TERRACE
GARAGE
SOUTHERLY ACCESS ROAD CONCEPT LAYOUT
TOWER STREET BARNSLEY
MR & MRS BARTON
SK004

NOTES:

1. COPYRIGHT IN THIS DOCUMENT BELONGS TO PAUL WAITE ASSOCIATES LIMITED & ALL RIGHTS IN IT ARE RESERVED BY THE OWNER.
2. NO PART OF THIS DRAWING MAY BE COPIED, TRANSFERRED, OR MADE AVAILABLE TO USERS OTHER THAN THE ORIGINAL RECIPIENT, INCLUDING ELECTRONICALLY, WITHOUT PRIOR PERMISSION FROM PAUL WAITE ASSOCIATES LIMITED.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
4. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES.
5. NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
6. ONLY PDF/HARD COPIES OF DRAWINGS SHOULD BE REFERRED TO FOR CONSTRUCTION USE, THE USE OF AUTOCAD DRAWINGS/DWG'S IS UNDERTAKEN ENTIRELY AT THE DEVELOPERS RISK AND ALL DIMENSIONS AND SETTING OUT MUST BE CHECKED IN CONJUNCTION WITH THE ARCHITECT AND ENGINEERS CONSTRUCTION DRAWINGS. ALL DRAWINGS SHOULD BE CONFIRMED AS LATEST ISSUE ON THE DOCUMENT ISSUE SHEET PRIOR TO COMMENCEMENT OF WORKS AND SHOULD BE USED ONLY FOR THEIR DEFINED DRAWING STATUS. ANY DISCREPANCIES BETWEEN THE ARCHITECT AND ENGINEERS DRAWINGS ARE TO BE IMMEDIATELY NOTIFIED TO ALL PARTIES.

Rev	Date	Remarks	Drawn	Ch'k'd

Paul Waite Associates
pwa Geo Environmental
Consulting Civil , Structural & Geo-Environmental Engineers Summit House, Riparian Way, The Crossings, Crosshills, Keighley, BD20 7BW
T - 01535 633350 E-Mail: info@pwaite.co.uk www.pwaite.co.uk

Client: PHI ARCHITECTURE

Project: TOWER STREET, BARNSLEY

Title: PROPOSED EXPLORATORY HOLE PLAN

Size	Scale	Designed	Checked	Date
A3	NTS	TW	IP	MAY 23

Drawing Status: PRELIMINARY

Job Number	Originator	Zone	Level	Type	Role	Drawing No.	Rev
23095	PWA	00	XX	DR	G	7000	P01

Appendix B

Coal Authority Report

The Coal Authority

CON29M
coal mining report

52, S70 1QS

Known or potential coal mining risks

Further action

No further reports from the Coal Authority are required. Further information on any next steps can be found in our Professional opinion.

For more information on our reports please visit www.groundstability.com

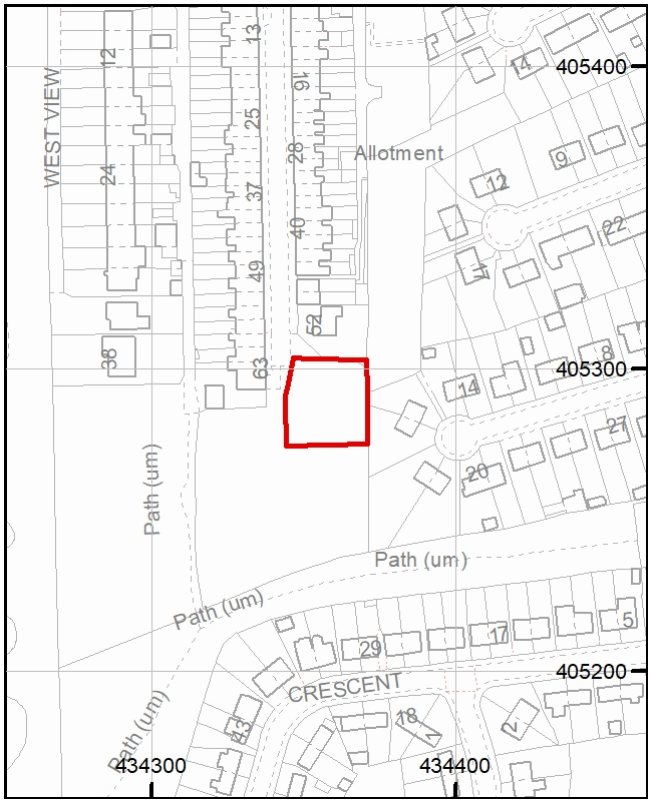
Professional opinion

According to the official mining information records held by the Coal Authority at the time of this search, evidence of, or the potential for, coal mining related features have been identified. In view of the coal mining circumstances we would recommend that any planned or future development should follow detailed technical advice before beginning work on site. Please see page 3 for further details on Future development.

Enquiry boundary

Key

Approximate position of enquiry boundary shown



We can confirm that the location is **on the coalfield**

Map data

This report is prepared in accordance with the latest Law Society's Guidance Notes 2018, the User Guide 2018 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.

Accessibility

If you would like this information in an alternative format, please contact our communications team on 0345 762 6848 or email communications@coal.gov.uk.

Professional opinion

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed.

If you are looking to develop, or undertake works, within a coal mining development high risk area your Local Authority planning department may require a Coal Mining Risk Assessment to be undertaken by a qualified mining geologist or engineer. Should you require any additional information then please contact the Coal Authority on 0345 762 6848 or email cmra@coal.gov.uk.

Site investigations

The following site investigation(s) took place in the location area:

A site investigation was carried out in March 2018 by Geocore Site Investigation Limited, Tralee Close, Kirkleatham Business Park, Redcar, Clevelandon, TS10 5SG behalf of Arc Environmental Ltd, Solum House, Unit 1, Elliott Court, St Johns Road, Meadowfield, Durham, DH7 8PN.

Additional information regarding these investigations may be available from the company or companies listed above.

Detailed findings

Information provided by the Coal Authority in this report is compiled in response to the Law Society's CON29M Coal Mining enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL.

1 Past underground coal mining

The property is in a surface area that could be affected by underground mining in 5 seams of coal at 140m to 450m depth, and last worked in 1975.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. Your attention is drawn to the Professional opinion sections of the report.

2 Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3 Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4 Mine entries

There are no recorded coal mine entries known to the Coal Authority within, or within 20 metres, of the boundary of the property.

This information is based on the information that the Coal Authority has at the time of this enquiry.

Based on the Coal Authority's knowledge of the mining circumstances at the time of this enquiry, there may be unrecorded mine entries in the local area that do not appear on Coal Authority records.

5 Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6 Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7 Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8 Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9 Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10 Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11 Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

12 Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13 Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14 Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Statutory cover

Coal mining subsidence

In the unlikely event of any coal mining related subsidence damage, the Coal Authority or the mine operator has a duty to take remedial action in respect of subsidence caused by the withdrawal of support from land or property in connection with lawful coal mining operations.

When the works are the responsibility of the Coal Authority, our dedicated public safety and subsidence team will manage the claim. The house or land owner ("the owner") is covered for these works under the terms of the Coal Mining Subsidence Act 1991 (as amended by the Coal Industry Act 1994). Please note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

If you believe your land or property is suffering from coal mining subsidence damage and you need more information on what to do next, please use the following link to our website which sets out what your rights are and what you need to consider before making a claim.
www.gov.uk/government/publications/coal-mining-subsidence-damage-notice-form

Coal mining hazards

Our public safety and subsidence team provide a 24 hour a day, 7 days a week hazard reporting service, to help protect the public from hazards caused by past coal workings, such as a mine shaft or shallow working collapse. To report any hazards please call 0800 288 4242. Further information can be found on our website: www.gov.uk/coalauthority.

Glossary

Key terms

adit - horizontal or sloped entrance to a mine

coal mining subsidence - ground movement caused by the removal of coal by underground mining

Coal Mining Subsidence Act 1991 - the Act setting out the duties of the Coal Authority to repair damage caused by coal mining subsidence

coal mining subsidence damage - damage to land, buildings or structures caused by the removal of coal by underground mining

coal seams - bed of coal of varying thickness

future opencast coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal from the surface

future underground coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal underground. Although it is unlikely, remaining coal reserves could create a possibility for future mining, which would be licensed by the Coal Authority

mine entries - collective name for shafts and adits

payments to owners of former copyhold land - historically, copyhold land gave rights to coal to the copyholder. Legislation was set up to allow others to work this coal, but they had to issue a notice and pay compensation if a copyholder came forward

shaft - vertical entry into a mine

site investigation - investigations of coal mining risks carried out with the Coal Authority's permission

stop notice - a delay to repairs because further coal mining subsidence damage may occur and it would be unwise to carry out permanent repairs

subsidence claim - a formal notice of subsidence damage to the Coal Authority since it was established on 31 October 1994

withdrawal of support - a historic notice informing landowners that the coal beneath their property was going to be worked

working facilities orders - a court order which gave permission, restricted or prevented coal mine workings

Appendix C
Exploratory Hole Logs

PWA Geo-environmental Summit House, Riparian Way BD20 7BW	# ROTARY LOG	Borehole ID: **RH01** Sheet 1 of 2

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434364, N405301		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 01/06/2023		Logged By: TW

Install.	Water Strike	Depth (m)	Type	Coring			Depth (m)	Legend	Stratum Description	Scale
				TCR	SCR	RQD				
							0.30		Vegetation over dark brown clayey SAND. TOPSOIL	
									Light brown clayey SAND.	1
										2
							2.90		Weak grey fine SANDSTONE / SILTSTONE.	3
							4.00		Weak grey fine silty MUDSTONE.	4
							5.10		Weak to moderately weak dark grey silty MUDSTONE.	5
										6
										7
							7.90		Coal (intact).	8
							8.20		Weak to moderately weak grey silty MUDSTONE.	
										9
										10

Remarks: No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 20.00m bgl in siltstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

pwa Geo Environmental	PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH01** Sheet 2 of 2

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434364, N405301		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 01/06/2023		Logged By: TW

Install.	Water Strike	Depth (m)	Type	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Legend	Stratum Description	Scale
									Weak to moderately weak grey silty MUDSTONE.	
							12.20		Coal (intact).	
							12.40		Weak to moderately weak grey SILTSTONE.	
							20.00			

Remarks:
No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 20.00m bgl in siltstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

pwa Geo Environmental	PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH02** Sheet 1 of 2

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434353, N405285		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 03/07/2023		Logged By: CK

Install.	Water Strike	Depth (m)	Type	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Legend	Stratum Description	Scale
							0.60		Dark brown slightly clayey gravelly fine to coarse SAND with common anthropogenic material and cobbles. Gravel is angular to subangular fine to coarse brick concrete and sandstone. MADE GROUND Soft light brown and orange mottled CLAY.	1 2
							3.10		Weak yellowish brown MUDSTONE.	3
							4.20		Weak to moderately weak dark grey MUDSTONE.	4 5 6 7 8 9 10

Remarks:
No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 20.00m bgl in siltstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH02** Sheet 2 of 2

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434353, N405285		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 03/07/2023		Logged By: CK

Install.	Water Strike	Depth (m)	Type	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Legend	Stratum Description	Scale
									Weak to moderately weak dark grey MUDSTONE.	11
										12
										13
							14.00		Weak to moderately weak light grey MUDSTONE.	14
										15
										16
										17
										18
							19.00		Weak to moderately weak light grey SILTSTONE.	19
							20.00			20

Remarks:
No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 20.00m bgl in siltstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH03** Sheet 1 of 3

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434366, N405284		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 03/07/2023		Logged By: CK

Install.	Water Strike	Depth (m)	Type	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Legend	Stratum Description	Scale
							0.20		Vegetation over dark brown gravelly fine to coarse SAND with common anthropogenic material and cobbles. Gravel is angular to subangular fine to coarse brick concrete and sandstone. MADE GROUND	1
							0.80		Soft yellowish brown CLAY.	
							1.30		Soft yellowish brown sandy CLAY. Soft light brown very sandy slightly gravelly CLAY. Gravel is subangular coarse mudstone.	2
							3.00		Weak grey MUDSTONE.	3
							7.50		Weak to moderately weak dark grey MUDSTONE.	4 5 6 7 8 9 10

Remarks:
No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 21.00m bgl in mudstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

pwa Geo Environmental	PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH03** Sheet 2 of 3

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434366, N405284		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 03/07/2023		Logged By: CK

Install.	Water Strike	Depth (m)	Type	Coring TCR	Coring SCR	Coring RQD	Depth (m)	Legend	Stratum Description	Scale
									Weak to moderately weak dark grey MUDSTONE.	
							10.50		COAL (intact).	
							10.70		Weak to moderately weak dark grey MUDSTONE.	11
										12
										13
										14
							15.00		Weak to moderately weak light grey MUDSTONE.	15
										16
										17
										18
										19
										20

Remarks: No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 21.00m bgl in mudstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

pwa Geo Environmental	PWA Geo-environmental Summit House, Riparian Way BD20 7BW	**ROTARY LOG**	Borehole ID: **RH03** Sheet 3 of 3

Project Name:	Tower Street	Project Number: 23095	Elevation:	Hole Type: RO
Project Location:	Tower Street, Barnsley	Coordinates: E434366, N405284		Scale: 1:50
Client Name:	Mr & Mrs Barton	Dates: 03/07/2023		Logged By: CK

Install.	Water Strike	Depth (m)	Type	Coring			Depth (m)	Legend	Stratum Description	Scale
				TCR	SCR	RQD				
							20.40		Weak to moderately weak light grey MUDSTONE.	
							20.60		COAL (intact).	
							21.00		Weak to moderately weak light grey MUDSTONE.	

Remarks:
No visual or olfactory evidence of contamination.
Rock strength is based on drillers logs and is for indicative purpose only.
Borehole drilled by rotary open hole using water flush.
Borehole terminated at 21.00m bgl in mudstone.
Upon completion the borehole was backfilled with arisings.
Position data for indicative purposes only.

Key:
UCS - Compression Sample
PL - Point Load Sample
D - Disturbed sample
ES - Environmental Sample

PWA Geo-Environmental Ltd
Summit House, Riparian Way,
Cross Hills, Keighley,
West Yorkshire, BD20 7BW

t: 01535 633350
e: info@pwaite.co.uk
w: www.pwageo.co.uk

Registered in England 6939651