



- **Contaminated Land Appraisals**
- **Brownfield Remediation Solutions**
- **Site Investigation Services**
- **Earthworks Design and Control**
- **Flood Risk Assessments**

Mr Alex Barnes
Barnes Homes Ltd
Victoria Springs
Wakefield Road
Liversedge
West Yorkshire
WF15 6BU

21st January 2025

Ref C723/01/ATS

Dear Alex,

Ref: Shallow Mining Investigation on land adjacent to 480 Halifax Road, Liversedge, Wakefield, WF15 8DX

1. Introduction

On the instructions of Barnes Homes Ltd, G&M Consulting Ltd (G&M) have carried out an intrusive mining investigation on land adjacent to 480 Halifax Road, Liversedge, Wakefield, West Yorkshire, WF15 8DX. The work was carried out in support of a planning application associated with the development of the site for the development of the site with three residential dwellings.

The investigation work was undertaken to provide information on the underlying ground conditions and assess the likelihood of historical shallow mine workings affecting the site. G&M was present on site during the fieldwork, and this report presents the findings of the investigation.

The site has been subject to a Phase 1 desk study report and coal mining risk assessment (CMRA), Report Ref C4499/24/E/6873, dated August 2024, prepared by Rogers Geotechnical Services Ltd, details of which are summarised in Section 2 of this report and a full copy is presented in Attachment A of this report.

The site is on the western edge of the town of Liversedge, approximately 9 km south of Bradford City centre. The grid reference for the site is SE 187 240.

The site currently comprises the former rear garden to the residence at No 480 Halifax Road, which is located to the south of the site.

The comments and opinions presented in this report are based on the findings of a review of available information and ground conditions encountered during the intrusive investigation work. There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report

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Responsibility cannot be accepted for conditions not revealed by the investigation. Any diagram or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

2. CMRA

The CMRA should be read in conjunction with this report. A summary of the findings from the CMRA are as follows:

Geological Appraisal

On the basis of the information revealed from the Geology of Britain Viewer¹⁵, it is noted that the site is situated within the Pennine Lower Coal Measures Formation. The regional solid geology shows the nearest dip marker being 3° to the south west, however, it should be appreciated that there is no dip marker present within the same faulted block as the site.

There are two notable coal seams that are shown to outcrop within the local area. Information regarding this seam is summarised as follows:

Seam Name	Seam thickness ^{5*}	Outcrop distance from site ^{5*}	Anticipated depth below site
Wheatley Lime Coal (WL)	0.4 – 1.2m	135m SE	Approximately 13m
Middleton Main Coal (MM)	0.2 – 1.8m	270m NW	Not expected to underlie the site.

In this instance, whilst it is not expected that the Middleton Main (MM) coal will be present beneath the site. This is due to the site being topographically lower than the coal outcrop. Stratigraphically, the next seam within the sequence according to the Generalised Vertical Section (GVS) is the Wheatley Lime (WL) coal. This seam was noted to outcrop topographically below the site. Additionally, the site is located approximately 135m Above Ordnance Datum (AOD) and the WL is located 129m AOD. As such, using trigonometry it can be reasoned that the Wheatley Lime may be present approximately 13m beneath the site.

Risk Assessment

The risk to the stability of the proposed residential development has been evaluated from the data obtained and with reference to the following ratings and definitions:

- Low - The possibility of instability is unlikely therefore no further action is necessary.
- Moderate - The possibility of instability is likely and further investigation or remedial action may be required.
- High - The possibility of instability is highly likely and further investigation or remedial action will be necessary.

Item	Risk attributed to	Coal Seam(s) Considered	Risk Rating
4.3	Shallow coal workings	Wheatley Lime Coal.	Moderate
4.4	Coal workings at depth	Workings from 131m depth.	Low
4.5	Mine gas	Shallow coal workings.	Moderate

Risks Posed by Shallow Coal Workings

On the basis of all of the information provided above, the Wheatley Lime coal could be present within 30m of the surface at the site. Whilst this seam may be of limited thickness, the possibility of the seam being worked below the site cannot be ruled out. Historic coal mining activity is evident in the nearby area, and therefore it is considered that if coal was known to be close to ground level it could have been removed illicitly via shallow mining methods with relative ease.

It may be noted that guidance available from both the NHBC and the CIRIA publication, SP32 - *construction over abandoned mine workings*, suggests that competent overburden thickness above a coal seam should be greater than 10 times the thickness of a seam plus seam thickness in order that the collapse of workings would pose a low risk to surface structures.

On this basis, assuming a maximum thickness of the coal seams, the table below suggests the thickness of competent overburden required above each seam to mitigate instability at the surface.

Seam Name	Seam thickness	Anticipated depth below site	Required thickness of competent overburden
Wheatley Lime (WL) coal	1.2m	Approximately 13m	13.2m

Due to the ambiguity with the projected depth of the seam beneath the site, it is possible that there may not be a sufficient thickness of competent overburden above the shallowest seam in order to prevent the risk of instability posed by the presence of any illicit workings. Therefore, a moderate risk rating has been assigned to this seam, and further investigation is recommended to prove or disprove the presence of illicit mining activity.

Risks Posed by Coal Workings at Depth

In regard to deeper mining which could affect the site, the worked coal seams are present at significant depths. Indeed, 3 sets of workings are present between 131m to 169m depth, with the greatest extraction thickness measuring 0.77m in thickness. Should collapse occur in these workings, there is significant overburden to prevent surface instability.

Risks Posed by Mine Gas

This assessment has identified that there is potential for shallow mine workings to be present beneath the proposed development. Whilst the Consultants Coal Mining Report has not reported any incidents of mine gas within the vicinity of the development, shallow mining activity represents a credible source of ground gas. As such, a moderate risk rating has been assigned, and further assessment may be required. Should evidence of workings be proven via further intrusive works, it is strongly recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance

3. Fieldwork

The fieldwork was carried out on the 14th January 2025 and comprised the drilling of three rotary open-holes, referenced BH1, BH2 and BH3, which were drilled to a maximum depth of between 16 m and 30 m below ground level (bgl), to allow logging of the soils and solid strata through examination of flush returns and rate of penetration of the drill bit. Drilling was initially progressed using 150mm diameter augers through the superficial soils, and a casing set into the underlying bedrock, to aid flush returns.

The drilling works were undertaken by Cape Site Services Ltd, using a Beretta T21 tracked rotary drilling rig and carried out under the Terms and Conditions of the Coal Authority Permission No 29371, a copy of which is presented in Attachment B of this report.

Drilling was undertaken using water flush and the boreholes were backfilled on completion.

The locations of the exploratory holes are shown below.



4. Ground Conditions

The driller records a 'clay brown grey' subsoil to depths of between 1.0 m and 2.0 m bgl. In BH3, a 500mm surface layer of 'fill', is also recorded.

The superficial soils were underlain by Coal Measures bedrock in all of the locations to the full depth of each borehole. The superficial soils are underlain by a '*mudstone grey brown silty friable*' (driller's description) to depths of between 4.0 m and 5.5 m bgl, below which a '*sandstone grey some brown with hard bands*', is recorded to depths of between 9.0 and 11.0 m bgl. Below this sandstone the driller records a predominantly bedrock sequence of mudstone, to the base of each of the boreholes

Within the depth of the boreholes a single seam of coal was recorded, as detailed below;

BH No	Depth (m bgl)	Depth to top of Coal (m bgl)	Thickness (mm)	Likely Seam
1	30.0	17.0	600	Wheatley Lime
2	17.5	16.5	600	Wheatley Lime
3	17.0	16.1	600	Wheatley Lime

The seam of coal appeared to be intact, with no loss of flush, soft or broken ground noted in any of the boreholes.

A thin 100mm coal was recorded by the driller in BH3 at 1.0 m bgl, but not in BH1 or BH2. Due to the thin nature and apparent lateral impersistence, this seam is not discussed further or considered to be a developmental issue.

Based on the CMRA, it is considered that the deeper seam of intact coal encountered is likely to be the Meltonfield coal.

The exploratory hole records are presented in Attachment C of this report.

During the drilling, monitoring of methane, carbon monoxide, hydrogen sulphide and oxygen was undertaken at the borehole surface. No significant concentrations of methane, carbon monoxide or hydrogen sulphide were recorded, as detailed on the attached logs no gases were noted during drilling.

6. Conclusions/Recommendations

On the instructions of Barnes Homes Ltd, G&M Consulting Ltd (G&M) have carried out an intrusive mining investigation on land adjacent to 480 Halifax Road, Liversedge, Wakefield WF15 8DX. The work was carried

out in support of a planning application associated with the development of the site with three residential dwellings.

The drilling works were carried out in accordance with the CA permission 29371

No evidence of soft or voided strata, or significant loss of flush was noted during the drilling.

A single 600mm thick seam of intact coal was encountered in all of the boreholes at depths of between 16.1m and 17.0 m bgl , within a sequence of overlying sandstone and predominantly underlying mudstones. Based on a review of stratigraphic column, it is considered that the seam represents the Wheatley Lime coal.

Based on the evidence of the three boreholes drilled it does not appear that the site is adversely affected by shallow mine workings within 30 m of the ground surface of the locations investigated.

Notwithstanding the above, as a general rule of thumb used to assess the risk from pillar and stall mining, the rule is 10x seam thickness for competent rock cover. A 600 mm thick seam would need to have 6 m or less of competent rock cover for workings to affect the surface. The shallowest seam depth recorded at 16.1 m bgl gives 14.1 m of overlying competent rock cover (taking into account the 2.0 m of superficial soils at this location). This suggests that the seam or any associated workings (not evidenced during the investigation) are outside the zone of influence for a development at ground level and that no further remedial measures are required.

As a precautionary measure it is recommended that the properties benefit from gas protection measures.

We trust this report and the attachments meet with your approval and are sufficient for your present needs. You should submit this document to the local authority for their comment/approval, prior to commencing any development work on site

Yours sincerely

Andrew Swinbourne
For and on behalf of **G&M Consulting Ltd**
Attachments



ATTACHMENT A – P1/CMRA

Environmental
Geotechnical
Specialists



PHASE 1 ENVIRONMENTAL DESK STUDY & COAL MINING RISK ASSESSMENT REPORT

< ENVIRONMENTAL > < GEOTECHNICAL >

job number	date
site address	
written by	checked by
issued by	

 Please consider the environment before printing this report.



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Report on a Phase One Desk Study and Coal Mining Risk Assessment

Location:	Land Adjacent 480 Halifax Road Liversedge, Wakefield, West Yorkshire, WF15 8DX	
For:	Barnes Homes Ltd	
Report No.	C4499/24/E/6873	Report date: August 2024

For and on behalf of **Rogers Geotechnical Services Ltd**

Steven Hale BSc FGS
Geo-environmental Technician

Scott Alexander BSc FGS
Senior Geo-environmental Engineer

1. Introduction

The site comprises a plot of disused land adjacent to 480 Halifax Road. The site is approximately 0.12 hectares in size and its National Grid reference is centred around 418744 424063.

It is understood that the development proposals currently comprise the construction of three detached, single storey, residential dwellings with associated garden areas and parking. In order to assist with this decision-making process, and any planning and construction aspects of the development, a phase one environmental desk study has been commissioned and is the subject of this report.

In accordance with issued guidance, a site walkover was conducted on the 6th August 2024 and the following observations were made:

General site description/current site use

The site comprises a gravel lane that leads to an area of land heavily vegetated with mature deciduous trees, overgrown shrubs and grasses. The site is currently used as an external garden area to the adjacent house. Access to the site was limited due to the density of the vegetation.

Site boundaries/access

Access can be gained via the gravel track which runs northwards to the west of 474 and east of 482 Halifax Road.

Topography

The site appears to lie flat, however, this was difficult to ascertain due to the overgrown vegetation restricting vision.

Surface cover of site

At the time of the walkover overgrown vegetation covered the majority of the site, restricting vision. A small patio area was observed at the very southern end of the main area of the site.

Visible evidence of contamination/ contaminative sources

No visible evidence of contamination was noted; however, inspection was restricted due to the overgrown vegetation.

Presence of vegetation and wildlife

Overgrown vegetation was present to the majority of the site, including mature trees. This will need to be cleared prior to any site investigation. Vegetation seems to be healthy with no evidence of degradation. There were no obvious signs of invasive flora, fauna, nesting birds, burrowing animals or edible plants observed during the time of the site walkover.

Services

The status of underground services is unknown. There were no overhead services present within the site at the time of the walkover.

Site neighbours

The site is surrounded by residential dwellings.

In order to ensure that the site is fully characterised and to comply with the Environment Act 1995¹, a Phase One Desk Study and Coal Mining Risk Assessment has been commissioned by Barnes Homes Ltd. The desk study is intended to assess the environmental impact of historical, current and future factors on the development. This report will present the data obtained and provide a conceptual ground model and preliminary risk assessment as well as discussing the scope of any intrusive investigation that may be required. This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese Knotweed).

2. Review and Summary of Published Data

As a part of this desk study the following data has been considered.

- Site Plans - Appendix 1
- Groundsure Reports - Appendix 2
- Historical maps - Appendix 3
- Photographs - Appendix 4
- Consultants Mining Report - Appendix 5

The data obtained from the above-mentioned sources has been summarised below².

¹S57 of the Environment Act 1995 inserted the contaminated land regime into the Environmental Protection Act 1990 (Part 2A). The regime 'provides a risk based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment' See <http://www.environment-agency.gov.uk/research/planning/40405.aspx>. This places a duty on local authorities to inspect their areas for contaminated land and require its remediation using the 'suitable for use' approach. Much of this duty is discharged via the planning regime under the Town and Country Planning Act 1990 as historical land contamination is a 'material planning consideration.' The local authorities are required to secure the removal of unacceptable risks via remediation of the land, to therefore ensure the site is suitable for its new use. This is fulfilled via completion of a Phase One Environmental Desk Study, Phase Two Intrusive Investigation, Phase Three Remediation Strategy and Phase Four Validation Report. Therefore, as a minimum, once a site has been developed it should not be capable of being designated as 'contaminated land' under Part 2A of the Environmental Protection Act 1990, as inserted by the Environment Act 1995 (see also PPS 23 Planning and Pollution Control Section 8)

² This report is a summary only and reference must be made in full to the information provided in the Groundsure Report.

2.1 Historical Land Use

Table 1: Historical Land Use³

HISTORICAL MAPPING SUMMARY		
Map Dates	On site	Within 250m
1854 -1894	The site appears to be part of a field of unknown use.	A residential dwelling called Grange View is present adjacent to the site which remains to the present day. Rayner's Mill – 240m W Clough Beck – 240m S
1907-1922	The site remains unchanged.	Residential property constructed – immediately adjacent to SW. Clough Lane Leather Works and associated chimney – 230m SE
1931 – 1933	The site remains unchanged.	The surrounding land use remains unchanged.
1938 – 1948	The site remains unchanged.	A number of residential properties have been constructed adjacent to the north of the site.
1951 – 1958	A small structure is now present to the centre of the site.	Clough Lane Leather Works is now labelled as 'New Mill (Disused)'. Garage – 170m E
1966 – 1975	Two more small structures are now present to the centre of the site. A track is also present leading from the structures to Halifax Road.	
1985 – 1993	The site remains unchanged.	New Mill (Disused) has now been demolished.
2001 – 2003	The site remains unchanged.	The surrounding land use remains unchanged.
2010 – 2024	The three small structures have been demolished at some point during this period as they were no longer present during the walkover.	The surrounding land use remains unchanged.

NB. All distances given are approximate only.

2.2 Published Geology and Geological Hazards

Table 2: Geological Data for the Site

BGS MAPPING DATA			
Strata Type	Strata Name ⁴	Previous Name ⁴	Description ⁵
Superficial Geology	None	-	-
Solid Geology	Pennine Lower Coal Measures Formation	-	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.
GEOLOGICAL FEATURES			
Type	Location	Features	Comments
Mining Activity	On site	Coal mining	The site is located within a coal mining area as defined by the Coal Authority.
Linear Features	35m NE, 110m NE, 134m SW, 150m N, 150m S, 167m S & 233m N	Faults (inferred)	None anticipated to affect the proposed development
	135m SE	Coal seams	Wheatley Lime (WL) coal
	270m NW		Middleton Main (MM) coal

³ See Appendix 3

⁴ Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

⁵ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

Landslip Deposits	No data	No data	Not indicated to present on site or within the surrounding area.
BGS BOREHOLE DATA			
Reference ⁶	Location	Strata Description	Depth
-	-	None within 250m.	-
NATURAL GROUND SUBSIDENCE & HAZARDS ⁷			
Type		Risk Rating	
Potential for shrinking or swelling clay ground stability		Negligible to Very Low.	
Potential for running sand ground stability		Negligible.	
Potential for compressible ground stability		Negligible.	
Potential for collapsible ground stability hazards		Very Low.	
Potential for landslide ground stability		Very Low.	
Potential for ground dissolution stability		Negligible.	
Radon		The property is in a lower probability radon area (between 1% and 3% of homes are estimated to be at or above the Action Level). No radon protective measures are necessary.	

2.3 Construction Issues

2.3.1 Foundation Construction

On the basis of the prevailing geology and assuming that there are no areas of significantly filled ground, it is anticipated that shallow strip or spread foundations could be utilised at this site. It should be appreciated that an intrusive investigation will be required to validate this opinion. Moreover, it is possible that undifferentiated strata within the Lower Pennine Coal Measures Formation may include very fine-grained rocks which are likely to have weathered to cohesive soils at or near the surface. Such soils could be sensitive to soil moisture variations and thus be susceptible to desiccation as result of tree root action. In light of this, it is possible that footings within the zone of influence of trees (existing or previously removed), may need to be founded at extended depths in excess of 1m.

2.3.2 Site Won Materials

Where sandstone and residual soils of sandstone outcrop beneath the site these may be suitable for re-use as an engineered material .

Where cohesive soil is present this is likely to be relatively difficult to re-engineer as a construction material. However, depending on the results of laboratory testing, it may be possible to modify/stabilise the soil using lime and/or cement to form a suitable sub-base replacement for pavements and hard standings.

⁶ <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

⁷ See Groundsure report

2.3.3 Disposal of Site Materials

If made ground is present then contamination/WAC testing will be required to establish the nature of the underlying soil before disposal to a licensed landfill site. However, it is anticipated that the naturally occurring soils would not be significantly contaminated, thus would probably be accepted by a waste disposal site catering for inert material.

2.4. Coal Mining

The Groundsure Report states that the site is within an area that may be affected by coal mining. A Coal Authority Mining Report has therefore been obtained that is included in appendix 5 of this report and may be summarised as follows:

Table 3: Summary of the Consultant's Coal Mining Report

Has the report highlighted evidence or potential of:			
Ref	Mining Feature	Yes/No	Comments
1	Underground Coal Mining	Yes	Black Bed coal – 131m depth – Beneath site – Dipping 3.2° S – 0.67m thick – Last mined 1889 Black Bed coal – 145m depth – South east of site – Dipping 2.9° SE – 0.77m thick – Last mined 1897 Black Bed coal – 169m depth – South east of site – Dipping 1.8° S – 0.77m thick – Last mined 1906
2	Probable Unrecorded Shallow Workings	No	-
3	Spine Roadways at Shallow Depth	No	No spine roadway recorded at shallow depth.
4	Mine Entries	No	No mine entries recorded within 100m of the site
5	Abandoned mine plans	Yes	Plans of abandoned mine workings below the site are suggested to be available by the Coal Authority.
6	Outcrops	No	No outcrops recorded.
7	Geological Faults	No	No faults, fissures or breaklines recorded.
8	Opencast Mines	Yes	A large unlicensed opencast site was recorded 410m SW.
9	Coal Authority Managed Tips	No	None recorded within 500 metres of the enquiry boundary.
10	Site Investigations	No	None recorded within 50 metres of the enquiry boundary
11	Remediated Sites	No	None recorded within 50 metres of the enquiry boundary.
12	Coal Mining Subsidence	No	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 31st 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.
13	Mine Gas	No	None recorded within 500 metres of the enquiry boundary.
14	Mine Water Treatment Schemes	No	None recorded within 500 metres of the enquiry boundary.
15	Future underground mining	No	For further information please see section 3 of the Consultant's Coal Mining Report (ref 51003441151001).
16	Coal mining licensing	No	

17	Court orders	No	
18	Section 46 notices	No	
19	Withdrawal of support notices	No	
20	Payments to owners of former copyhold land	No	

2.5 Waste Management and Gas Monitoring

Table 4: Landfill Data and Artificial Ground, Recorded and Anticipated

ENVIRONMENT AGENCY, LOCAL AUTHORITY, BGS & HISTORIC LANDFILLS			
Waste Type	Location	Comments	Monitoring Requirement
Active Landfill	-	None recorded within 250m	-
Historic Landfill	-	None recorded within 250m	-
Historic waste sites	-	None recorded within 250m	-
Licensed waste sites	-	None recorded within 250m	-
Waste Exceptions	-	None recorded within 250m	-
MADE GROUND & INFILLED GROUNDWORKINGS			
Description	Location	Comments	Monitoring Requirement
Records of Potentially Infilled Features	165m NW	Made Ground (Undivided) – Artificial Deposit	No

2.6 Hydrogeology, Hydrology

Table 5: Ground/Controlled Water Sensitivity and Flooding

ENVIRONMENT AGENCY AQUIFER DESIGNATION ⁸		
Strata	Designation	Description
Solid Geology On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
GROUNDWATER SENSITIVITY ⁹		
Description	Location	Details
Source Protection Zone ¹⁰	-	None recorded within 250m.
Abstraction Licences	-	None recorded within 250m.
Discharge Consents	18m S	28 Quaker Lane – Effluent Type: Sewage – Receiving Water: Trib of Spen River.

⁸ See Appendix 2

⁹ See Appendix 2

¹⁰ See Appendix 2

Records of Part A(2) and Part B Activities and Enforcements	133m SW	Arrow Service Station – Process: Waste Oil Burner 0.4 MW – Historical Permit Part B
CONTROLLED WATERS¹⁰		
Description	Location	Details
River Network Entries	240m S	Clough Beck
Surface Water Features	Within 250m	3 recorded within 250m of the site, no further information given.

2.7 Sensitive Land Use

Table 6: Sensitive Land Uses within 250m

REGISTERED SENSITIVE LAND USES¹¹		
Description	Location	Details
None identified within 250m of the proposed development		

2.8 Industrial Land Use and Potential Sources of Contamination

In order for a conceptual site model and preliminary risk assessment to be completed the historical maps and Groundsure data requires analysis to identify any past or present activities on the site and in the area that may have the potential to cause contamination on the site. Guidance has been issued by the Environment Agency, NHBC and Chartered Institute of Environmental Health.¹² Within this document, annex 3 provides examples of important contaminants that are associated with individual uses of land. This data assists in the formulation of any chemical testing regime.

Those that we consider potentially contaminative according to the guidance are given below:

Table 7: Potentially Contaminative Sources

HISTORICAL		
Land Use	Location	Classification
Historical construction	On site	Associated with small structures present on site.
Clough Lane Leather Works/New Mill	230m SE	Unspecified works/factories/features.
Raynor's Mill	240m W	
Garage	170m E	Road vehicle fuelling, service and repair: garages and filling stations.
CURRENT		
Owens Corning Veil UK	240m W	Unspecified works/factories/features.
Union Motors	170m E	Road vehicle fuelling, service and repair: garages and filling stations.

¹³ See Appendix 2

¹⁴ Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 Volume 1 and 2.

3. Preliminary Qualitative Risk Assessment

The potential of contamination hazards on the land has been identified and the risks associated with them are assessed in the following preliminary risk assessment in accordance with industry practice and the 'suitable for use' approach. This has been conducted using the source-pathway-receptor approach. This method dictates that there must be a risk contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed DEFRA and The Environment Agency state that **'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'**

R&D Publication 66: 2008 states that the groups at risk of harm (receptors) can be identified by the following categorisation:

1. Humans: site personnel, end users, visitors and adjacent land users.
2. The water environment – receptors: groundwater, surface water, coastal waters and artificial drainage.
3. Ecosystems: plants and animals.
4. Construction/building materials/services

In order to complete a conceptual site model and therefore a preliminary risk assessment, an appraisal of the sources of contamination, potential and actual, on and in the area of the site has therefore been completed with reference to this pollution linkage.¹³

¹³This assessment has been based on the information as to the proposed development that has been provided by the client. If the plans should change, the assessment should be re-evaluated.

3.1 Conceptual Ground Model & Preliminary Qualitative Risk Assessment

It is understood that the development proposals currently comprise the construction of three detached, single storey, residential dwellings with associated garden areas and parking. In view of the sensitivity of the end users it is considered that the soil screening values (SSVs) for a residential with plant uptake end use should be employed.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

- N/A -** A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
- Low -** A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
- Moderate -** The linkage exists but further field or laboratory data is required to confirm that the contaminant has reached the receptor and the levels of contaminant are harmful.
- High -** The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.



Table 8: Conceptual Site Model and Preliminary Qualitative Risk Assessment

CONCEPTUAL SITE MODEL			PRELIMINARY RISK ASSESSMENT	
Pathways	Receptor	Linkage Present?	Risk Rating	Notes
Direct contact/dermal absorption/soil ingestion	Operative	Yes – operatives are likely to come in contact with the soil. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – end users are likely to come in contact with the soil. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Inhalation of Dust/Vapours	Operative	Yes – contact with soil likely during works. However, no credible source likely to be present on site.	Low	Dust may be generated during site activity. Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – dust may be produced by the end users. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Ingestion of fruit/vegetables and/or waters	Operative	No – no edible plants or contained water sources in the area of the proposed new works.	N/A	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – soft landscaping proposed as part of the new development. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	



Migration of hazardous gases via permeable strata	Operative	Yes – no credible source likely to be present on site or in the surrounding area.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User		Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Spillage/loss/run off direct to receiving water	Controlled Waters	Yes – controlled waters within 250m. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
Migration via permeable unsaturated strata	Controlled Waters	Yes – Secondary A aquifer present beneath the site. However, no credible source of contamination likely to be present on site.	Low	
Run off via drainage/sewers etc	Controlled Waters	Yes – old services may be present onsite, however no credible source likely to be present on site.	Low	
Direct contact with contaminated soils	Plants	Yes – some soft landscaping areas may be present as part of the proposed development. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion. Presence of suitable growing medium should be investigated.
Uptake via root system			Low	
Direct contact with contaminated soils/ Direct contact with contaminated groundwater	Building Materials	Yes – foundation and service installation materials may be affected by the site soil.	Low	Further testing required to reach a firm conclusion.

Migration of mine gas via permeable strata	Operative	Yes – the site is located within a reported coal mining area and there is potential for underground workings to be present. Recorded workings are at significant depth and no direct pathways to surface are anticipated. Should shallow unrecorded workings be encountered then hazardous ground gases may be present.	Moderate	Further investigation required to reach a firm conclusion.
	End User			
Exposure to Radon	Operative	Yes – The Site is located in an area where 1% and 3% of properties are at or above the action level.	Low	The publication BR211 states that no protection measures are necessary.
	End User			
Mining Instability	End User	Yes – while the Consultants Coal Mining Report reports no shallow workings, these cannot be ruled out due to the potential presence of the Wheatley Lime (WL) coal seam which is expected to be present without competent overburden.	Moderate	Further investigation required to reach a firm conclusion. See Section 4.
Unexploded Ordnance (UXO) Risk	Operative	Yes – the Zetica ¹⁴ online maps indicate that the site is at low risk from UXO.	Low	Unlikely to be affected by UXO.

Notes:

1. The above data and table is a qualitative assessment of the probable risks identified at this site, based on the information made available to us from the client, third party professional data and walkover survey.
2. Should any additional or new data come to light, the risk assessment should be revisited and any necessary changes made to any recommendations resulting from this study.
3. Where further testing is recommended as part of the risk assessment, this is in order to provide a quantitative assessment of any contamination issues. It should at all times be considered that uncertainties may remain, and therefore any testing regime and ground investigation philosophy should be ready to accommodate any necessary alterations should any data come to light or it become evident that it has not been previously considered.

¹⁴ Pre-desk study assessment [online resource from www.zeticauxo.com].

4. Coal Mining Risk Assessment

4.1 Geological Appraisal

On the basis of the information revealed from the Geology of Britain Viewer¹⁵, it is noted that the site is situated within the Pennine Lower Coal Measures Formation. The regional solid geology shows the nearest dip marker being 3° to the south west, however, it should be appreciated that there is no dip marker present within the same faulted block as the site.

There are two notable coal seams that are shown to outcrop within the local area. Information regarding this seam is summarised as follows:

Table 9: Summary of Coal Seams Within the Vicinity of the Site.

Seam Name	Seam thickness ^{5*}	Outcrop distance from site ^{5*}	Anticipated depth below site
Wheatley Lime Coal (WL)	0.4 – 1.2m	135m SE	Approximately 13m
Middleton Main Coal (MM)	0.2 – 1.8m	270m NW	Not expected to underlie the site.

In this instance, whilst it is not expected that the Middleton Main (MM) coal will be present beneath the site. This is due to the site being topographically lower than the coal outcrop. Stratigraphically, the next seam within the sequence according to the Generalised Vertical Section (GVS) is the Wheatley Lime (WL) coal. This seam was noted to outcrop topographically below the site. Additionally, the site is located approximately 135m Above Ordnance Datum (AOD) and the WL is located 129m AOD. As such, using trigonometry it can be reasoned that the Wheatley Lime may be present approximately 13m beneath the site.

4.2 Risk Assessment

The risk to the stability of the proposed residential development has been evaluated from the data obtained and with reference to the following ratings and definitions:

- Low - The possibility of instability is unlikely therefore no further action is necessary.
- Moderate - The possibility of instability is likely and further investigation or remedial action may be required.
- High - The possibility of instability is highly likely and further investigation or remedial action will be necessary.

Table 10: Development Specific Risk Assessment

Item	Risk attributed to	Coal Seam(s) Considered	Risk Rating
4.3	Shallow coal workings	Wheatley Lime Coal.	Moderate
4.4	Coal workings at depth	Workings from 131m depth.	Low
4.5	Mine gas	Shallow coal workings.	Moderate

4.3 Risks Posed by Shallow Coal Workings

On the basis of all of the information provided above, the Wheatley Lime coal could be present within 30m of the surface at the site. Whilst this seam may be of limited thickness, the possibility of the seam being worked below the site cannot be ruled out. Historic coal mining activity is evident in the nearby area, and therefore it is considered that if coal was known to be close to ground level it could have been removed illicitly via shallow mining methods with relative ease.

It may be noted that guidance available from both the NHBC and the CIRIA publication, SP32 - *construction over abandoned mine workings*, suggests that competent overburden thickness above a coal seam should be greater than 10 times the thickness of a seam plus seam thickness in order that the collapse of workings would pose a low risk to surface structures.

On this basis, assuming a maximum thickness of the coal seams, the table below suggests the thickness of competent overburden required above each seam to mitigate instability at the surface.

Table 11: Required Thickness of Competent Overburden			
Seam Name	Seam thickness	Anticipated depth below site	Required thickness of competent overburden
Wheatley Lime (WL) coal	1.2m	Approximately 13m	13.2m

Due to the ambiguity with the projected depth of the seam beneath the site, it is possible that there may not be a sufficient thickness of competent overburden above the shallowest seam in order to prevent the risk of instability posed by the presence of any illicit workings. Therefore, a moderate risk rating has been assigned to this seam, and further investigation is recommended to prove or disprove the presence of illicit mining activity.

4.4 Risks Posed by Coal Workings at Depth

In regard to deeper mining which could affect the site, the worked coal seams are present at significant depths. Indeed, 3 sets of workings are present between 131m to 169m depth, with the greatest extraction thickness measuring 0.77m in thickness. Should collapse occur in these workings, there is significant overburden to prevent surface instability.

4.5 Risks Posed by Mine Gas

This assessment has identified that there is potential for shallow mine workings to be present beneath the proposed development. Whilst the Consultants Coal Mining Report has not reported any incidents of mine gas within the vicinity of the development, shallow mining activity represents a credible source of ground gas. As such, a moderate risk rating has been assigned, and further assessment may be required. Should evidence of workings be proven via further intrusive works, it is strongly recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance

5. Intrusive Investigation

5.1 Site Investigation Philosophy

The information from the Phase 1 Desk Study shows there are limited potential sources of contamination on the site and in the surrounding area. In view of the above, it is not considered necessary to undertake an intrusive geo-environmental investigation.

It is incumbent upon the developer to carefully inspect any exposed soil during the ground-works phase of the contract. Should any contamination become evident or organic made ground be revealed, it is recommended that a pragmatic approach be adopted, with observational techniques being employed at each stage of the work. In the unlikely event that contamination is revealed, work should stop in the affected area and chemical testing be undertaken to evaluate the risk of harm to the receptors. In the event that this occurs it is recommended that the following testing regime be implemented on soil samples:

- **Metals** – Cd, Cr, Cu, Hg, Ni, Pb, Zn, V.
- **Semi Metals and Non-Metals** – As, Se, Free Cyanide and Phenols.
- **Hydrocarbons** – Polycyclic aromatic hydrocarbons (PAH EPA16), Total petroleum hydrocarbons (TPH CWG).
- **Others** – pH, Organic Content.
- **Asbestos**

5.1.1 Ground Gas Assessment

Given the limited sources of ground gas and potential limited potential or made ground it may be possible to undertake a desk based assessment where made ground thickness is less than 1m, and a determination of generation risk of made ground and natural deposits be undertaken in line with the *CL:AIRE, RB17, Pragmatic Approach to Ground Gas Risk Assessment 2012*. Should made ground be encountered which exceeds this thickness then standpipes and a period of ground gas monitoring may be required.

5.2 Geotechnical Assessment - Coal

In light of the potential risks of instability at the site from the working of shallow coal, it cannot be recommended that development takes place without further investigation to conclusively determine the presence of such workings. This work should include physical drilling methods to explore the ground conditions.

General practice is to undertake rotary openhole boreholes at three locations across the site to mitigate against the potential for drilling through intact columns associated with pillar and stall workings. Furthermore, it is normal to investigate the ground to 30m below ground level; any workings below this depth are unlikely to result in significant instability. However, in this case, the risk of instability is due to shallow workings, therefore, drilling to these depths may not be necessary and the objective should be to ensure that the shallow seams are un-worked or have sufficient competent cover. Given that there exists a risk from a single coal seam, the Wheatley Lime, it is recommended that boreholes be commenced to prove/disprove the presence of workings in this coal seam. It is considered that one of the boreholes should penetrate to a depth of 30m and should competent bedrock be proven the other two coal seams could be terminated below the depth of the target coal seam estimated to between 10m and 15m below the surface of the site. In any event, it is considered that approval should be sought with the Local Authority as to the efficacy of this

approach. Should any shallow workings be encountered then a ground gas risk assessment will become necessary via installation of standpipes.

5.3 Geotechnical Assessment

In any event, it is recommended that a geotechnical ground investigation be completed in order to obtain geotechnical information, as this will facilitate the safe design of the foundations for the proposed development. Such an investigation may be required by planning authorities and insurance providers. The following investigation strategy could be considered:

Sampling Method

It is anticipated that a windowless sampling drilling rig will be able to gain sufficient data in regard to the near surface soils. Moreover, such equipment should be able to undertake Standard Penetration Testing (SPT) and/or Dynamic Probing. If weak ground becomes evident, then the use of light cable percussive drilling will be required.

Soakaway Design

Should soakaway data be required for drainage design, trial pits could be excavated and infiltration tests conducted. Alternatively, these tests could be undertaken within boreholes.

Geotechnical Testing

An allowance for geotechnical testing of the soils should be included in any ground investigation.

Reporting

The above data will need to be formulated into a formal assessment that should include the following:

- Geotechnical recommendations.
- Coal mining legacy investigations.
- Contamination assessment, if required.
- Any recommendations for further work.

As soon is as practicable, and prior to the above, this Phase 1 report should be forwarded to the relevant authorities, in order to ensure they have sufficient time to review and discuss any issues.

It is of note that Rogers Geotechnical Services would be happy to assist in any further intrusive investigation that may be required.

6. References

- British Standards Institution (2015 + A1: 2020), BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011) +A1:2013, BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- British Standards Institution (2013), BS 8576 *Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds*.
- Department for Environment, Food and Rural Affairs and the Environment Agency, DEFRA R&D Publications, Environment Agency, Bristol.
- CLR 2, 1994, *Guidance on preliminary site inspection of contaminated land*, Volume 1.
- CLR 4, 1994, *Sampling Strategies for contaminated land*.
- R&D Publication 66: 2008 *Guidance for the Safe Development of Housing on Land Affected by Contamination*.
- CIRIA Report C665 (2007), *Assessing risks posed by ground gasses in buildings*.
- The Environment Agency: *Groundwater source protection*.



ATTACHMENT B

COAL AUTHORITY DRILLING PERMIT



Mining
Remediation
Authority

Permit to Enter or Disturb Mining Remediation Authority Interests

Permit 29371

Name and Address of Permit Holder:

*Barnes Homes Yorkshire Ltd
Victoria Springs
Wakefield Road, Liversage
Wakefield
West Yorkshire
WF15 6BU*

Site Location:

*Land adjacent to 480 Halifax Road
Liversage
Wakefield
WF15 8DX*

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

Ground investigation by three boreholes to 30m to determine presence of shallow mine workings 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, CH₄, CO₂, O₂, H₂S 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: Granted Date: **3rd January 2025**

For and on behalf of the Mining Remediation Authority

Nominated Representative: David Wilson, Permitting Manager;



Mining
Remediation
Authority

Granted Permit Boundary

Permit Ref: 29371

Permit Boundary:



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The Mining Remediation Authority is the trading name of the Coal Authority ('TCA') established pursuant to Section 1 of the Coal Industry Act 1994, of 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG. The Coal Authority remains the legal name of the Authority



ATTACHMENT C
DRILLER'S RECORDS

Client: Barnes Homes Yorkshire Ltd	Site: Land at 480 Halifax Rd, Liversedge, Wakefield. WF15 8DX		Cape Site Services unit 2, rear of Castle Buildings Carlton Road, Barnsley, S71 3HX	
Date: 14/01/2025	Method: water flush	Permit No: 29371		
Driller: Ian Wiles			Driller Assistant: Richard Hawkins, Simon Fish,	
			Page No: 1	

Measurements In Meters

BH No:	FROM	TO	THICKNESS	DESCRIPTION
1				
	0	1.8	1.8	Clay brown grey
	1.8	4.0	2.2	Mudstone grey brown silty friable
	4.0	9.0	5.0	Sandstone grey silty some brown with hard bands
	9.0	17.0	8.0	Mudstone grey very silty
	17	17.6	0.6	Coal
	17.6	30.0	12.4	Mudstone grey silty
2				
	0	2.0	2.0	Clay brown grey
	2.0	4.8	2.8	Mudstone grey brown silty friable
	4.8	9.5	4.7	Sandstone grey silty some brown with hard bands
	9.5	16.5	7.0	Mudstone grey very silty
	16.5	17.1	0.6	Coal
	17.1	17.5	0.4	Mudstone grey silty
3				
	0	0.5	0.5	Fill
	0.5	1.0	0.5	Clay brown grey
	1.0	1.1	0.1	Coal
	1.1	5.5	4.4	Mudstone grey brown silty friable
	5.5	11.0	5.5	Sandstone grey silty some brown with hard bands
	11.0	16.4	5.4	Mudstone grey very silty
	16.1	16.7	0.6	Coal
	16.7	17.0	0.3	Mudstone grey silty

Environmental
Geotechnical
Specialists



PHASE 1 ENVIRONMENTAL DESK STUDY & COAL MINING RISK ASSESSMENT REPORT

< ENVIRONMENTAL > < GEOTECHNICAL >

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issued by	

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Rogers Geotechnical Services Ltd
Offices 1 & 2 Barncliffe Business Park, Near Bank, Shelley, Huddersfield, HD8 8LU
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1.	Site Plans
2.	Groundsure Reports
3.	Historical Maps
4.	Photographs
5	Consultants Coal Mining Report



Report on a Phase One Desk Study and Coal Mining Risk Assessment

Location:	Land Adjacent 480 Halifax Road Liversedge, Wakefield, West Yorkshire, WF15 8DX	
For:	Barnes Homes Ltd	
Report No.	C4499/24/E/6873	Report date: August 2024

For and on behalf of **Rogers Geotechnical Services Ltd**

Steven Hale BSc FGS Geo-environmental Technician	Scott Alexander BSc FGS Senior Geo-environmental Engineer

1. Introduction

The site comprises a plot of disused land adjacent to 480 Halifax Road. The site is approximately 0.12 hectares in size and its National Grid reference is centred around 418744 424063.

It is understood that the development proposals currently comprise the construction of three detached, single storey, residential dwellings with associated garden areas and parking. In order to assist with this decision-making process, and any planning and construction aspects of the development, a phase one environmental desk study has been commissioned and is the subject of this report.

In accordance with issued guidance, a site walkover was conducted on the 6th August 2024 and the following observations were made:

General site description/current site use

The site comprises a gravel lane that leads to an area of land heavily vegetated with mature deciduous trees, overgrown shrubs and grasses. The site is currently used as an external garden area to the adjacent house. Access to the site was limited due to the density of the vegetation.

Site boundaries/access

Access can be gained via the gravel track which runs northwards to the west of 474 and east of 482 Halifax Road.

Topography

The site appears to lie flat, however, this was difficult to ascertain due to the overgrown vegetation restricting vision.

Surface cover of site

At the time of the walkover overgrown vegetation covered the majority of the site, restricting vision. A small patio area was observed at the very southern end of the main area of the site.

Visible evidence of contamination/ contaminative sources

No visible evidence of contamination was noted; however, inspection was restricted due to the overgrown vegetation.

Presence of vegetation and wildlife

Overgrown vegetation was present to the majority of the site, including mature trees. This will need to be cleared prior to any site investigation. Vegetation seems to be healthy with no evidence of degradation. There were no obvious signs of invasive flora, fauna, nesting birds, burrowing animals or edible plants observed during the time of the site walkover.

Services

The status of underground services is unknown. There were no overhead services present within the site at the time of the walkover.

Site neighbours

The site is surrounded by residential dwellings.

In order to ensure that the site is fully characterised and to comply with the Environment Act 1995¹, a Phase One Desk Study and Coal Mining Risk Assessment has been commissioned by Barnes Homes Ltd. The desk study is intended to assess the environmental impact of historical, current and future factors on the development. This report will present the data obtained and provide a conceptual ground model and preliminary risk assessment as well as discussing the scope of any intrusive investigation that may be required. This report does not consider ecological impacts (e.g. bats) or botanical risks (e.g. Japanese Knotweed).

2. Review and Summary of Published Data

As a part of this desk study the following data has been considered.

- Site Plans - Appendix 1
- Groundsure Reports - Appendix 2
- Historical maps - Appendix 3
- Photographs - Appendix 4
- Consultants Mining Report - Appendix 5

The data obtained from the above-mentioned sources has been summarised below².

¹S57 of the Environment Act 1995 inserted the contaminated land regime into the Environmental Protection Act 1990 (Part 2A). The regime 'provides a risk based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment' See <http://www.environment-agency.gov.uk/research/planning/40405.aspx>. This places a duty on local authorities to inspect their areas for contaminated land and require its remediation using the 'suitable for use' approach. Much of this duty is discharged via the planning regime under the Town and Country Planning Act 1990 as historical land contamination is a 'material planning consideration.' The local authorities are required to secure the removal of unacceptable risks via remediation of the land, to therefore ensure the site is suitable for its new use. This is fulfilled via completion of a Phase One Environmental Desk Study, Phase Two Intrusive Investigation, Phase Three Remediation Strategy and Phase Four Validation Report. Therefore, as a minimum, once a site has been developed it should not be capable of being designated as 'contaminated land' under Part 2A of the Environmental Protection Act 1990, as inserted by the Environment Act 1995 (see also PPS 23 Planning and Pollution Control Section 8)

² This report is a summary only and reference must be made in full to the information provided in the Groundsure Report.

2.1 Historical Land Use

Table 1: Historical Land Use³

HISTORICAL MAPPING SUMMARY		
Map Dates	On site	Within 250m
1854 -1894	The site appears to be part of a field of unknown use.	A residential dwelling called Grange View is present adjacent to the site which remains to the present day. Rayner's Mill – 240m W Clough Beck – 240m S
1907-1922	The site remains unchanged.	Residential property constructed – immediately adjacent to SW. Clough Lane Leather Works and associated chimney – 230m SE
1931 – 1933	The site remains unchanged.	The surrounding land use remains unchanged.
1938 – 1948	The site remains unchanged.	A number of residential properties have been constructed adjacent to the north of the site.
1951 – 1958	A small structure is now present to the centre of the site.	Clough Lane Leather Works is now labelled as 'New Mill (Disused)'. Garage – 170m E
1966 – 1975	Two more small structures are now present to the centre of the site. A track is also present leading from the structures to Halifax Road.	
1985 – 1993	The site remains unchanged.	New Mill (Disused) has now been demolished.
2001 – 2003	The site remains unchanged.	The surrounding land use remains unchanged.
2010 – 2024	The three small structures have been demolished at some point during this period as they were no longer present during the walkover.	The surrounding land use remains unchanged.

NB. All distances given are approximate only.

2.2 Published Geology and Geological Hazards

Table 2: Geological Data for the Site

BGS MAPPING DATA			
Strata Type	Strata Name ⁴	Previous Name ⁴	Description ⁵
Superficial Geology	None	-	-
Solid Geology	Pennine Lower Coal Measures Formation	-	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.
GEOLOGICAL FEATURES			
Type	Location	Features	Comments
Mining Activity	On site	Coal mining	The site is located within a coal mining area as defined by the Coal Authority.
Linear Features	35m NE, 110m NE, 134m SW, 150m N, 150m S, 167m S & 233m N	Faults (inferred)	None anticipated to affect the proposed development
	135m SE	Coal seams	Wheatley Lime (WL) coal
	270m NW		Middleton Main (MM) coal

³ See Appendix 3

⁴ Sources: British Geological Survey (NERC) Map Sheets 77; Huddersfield; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

⁵ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

Landslip Deposits	No data	No data	Not indicated to present on site or within the surrounding area.
BGS BOREHOLE DATA			
Reference ⁶	Location	Strata Description	Depth
-	-	None within 250m.	-
NATURAL GROUND SUBSIDENCE & HAZARDS ⁷			
Type		Risk Rating	
Potential for shrinking or swelling clay ground stability		Negligible to Very Low.	
Potential for running sand ground stability		Negligible.	
Potential for compressible ground stability		Negligible.	
Potential for collapsible ground stability hazards		Very Low.	
Potential for landslide ground stability		Very Low.	
Potential for ground dissolution stability		Negligible.	
Radon		The property is in a lower probability radon area (between 1% and 3% of homes are estimated to be at or above the Action Level). No radon protective measures are necessary.	

2.3 Construction Issues

2.3.1 Foundation Construction

On the basis of the prevailing geology and assuming that there are no areas of significantly filled ground, it is anticipated that shallow strip or spread foundations could be utilised at this site. It should be appreciated that an intrusive investigation will be required to validate this opinion. Moreover, it is possible that undifferentiated strata within the Lower Pennine Coal Measures Formation may include very fine-grained rocks which are likely to have weathered to cohesive soils at or near the surface. Such soils could be sensitive to soil moisture variations and thus be susceptible to desiccation as result of tree root action. In light of this, it is possible that footings within the zone of influence of trees (existing or previously removed), may need to be founded at extended depths in excess of 1m.

2.3.2 Site Won Materials

Where sandstone and residual soils of sandstone outcrop beneath the site these may be suitable for re-use as an engineered material .

Where cohesive soil is present this is likely to be relatively difficult to re-engineer as a construction material. However, depending on the results of laboratory testing, it may be possible to modify/stabilise the soil using lime and/or cement to form a suitable sub-base replacement for pavements and hard standings.

⁶ <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

⁷ See Groundsure report

2.3.3 Disposal of Site Materials

If made ground is present then contamination/WAC testing will be required to establish the nature of the underlying soil before disposal to a licensed landfill site. However, it is anticipated that the naturally occurring soils would not be significantly contaminated, thus would probably be accepted by a waste disposal site catering for inert material.

2.4. Coal Mining

The Groundsure Report states that the site is within an area that may be affected by coal mining. A Coal Authority Mining Report has therefore been obtained that is included in appendix 5 of this report and may be summarised as follows:

Table 3: Summary of the Consultant's Coal Mining Report

Has the report highlighted evidence or potential of:			
Ref	Mining Feature	Yes/No	Comments
1	Underground Coal Mining	Yes	Black Bed coal – 131m depth – Beneath site – Dipping 3.2° S – 0.67m thick – Last mined 1889 Black Bed coal – 145m depth – South east of site – Dipping 2.9° SE – 0.77m thick – Last mined 1897 Black Bed coal – 169m depth – South east of site – Dipping 1.8° S – 0.77m thick – Last mined 1906
2	Probable Unrecorded Shallow Workings	No	-
3	Spine Roadways at Shallow Depth	No	No spine roadway recorded at shallow depth.
4	Mine Entries	No	No mine entries recorded within 100m of the site
5	Abandoned mine plans	Yes	Plans of abandoned mine workings below the site are suggested to be available by the Coal Authority.
6	Outcrops	No	No outcrops recorded.
7	Geological Faults	No	No faults, fissures or breaklines recorded.
8	Opencast Mines	Yes	A large unlicensed opencast site was recorded 410m SW.
9	Coal Authority Managed Tips	No	None recorded within 500 metres of the enquiry boundary.
10	Site Investigations	No	None recorded within 50 metres of the enquiry boundary
11	Remediated Sites	No	None recorded within 50 metres of the enquiry boundary.
12	Coal Mining Subsidence	No	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 31st 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.
13	Mine Gas	No	None recorded within 500 metres of the enquiry boundary.
14	Mine Water Treatment Schemes	No	None recorded within 500 metres of the enquiry boundary.
15	Future underground mining	No	For further information please see section 3 of the Consultant's Coal Mining Report (ref 51003441151001).
16	Coal mining licensing	No	

17	Court orders	No	
18	Section 46 notices	No	
19	Withdrawal of support notices	No	
20	Payments to owners of former copyhold land	No	

2.5 Waste Management and Gas Monitoring

Table 4: Landfill Data and Artificial Ground, Recorded and Anticipated

ENVIRONMENT AGENCY, LOCAL AUTHORITY, BGS & HISTORIC LANDFILLS			
Waste Type	Location	Comments	Monitoring Requirement
Active Landfill	-	None recorded within 250m	-
Historic Landfill	-	None recorded within 250m	-
Historic waste sites	-	None recorded within 250m	-
Licensed waste sites	-	None recorded within 250m	-
Waste Exceptions	-	None recorded within 250m	-
MADE GROUND & INFILLED GROUNDWORKINGS			
Description	Location	Comments	Monitoring Requirement
Records of Potentially Infilled Features	165m NW	Made Ground (Undivided) – Artificial Deposit	No

2.6 Hydrogeology, Hydrology

Table 5: Ground/Controlled Water Sensitivity and Flooding

ENVIRONMENT AGENCY AQUIFER DESIGNATION ⁸		
Strata	Designation	Description
Solid Geology On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.
GROUNDWATER SENSITIVITY ⁹		
Description	Location	Details
Source Protection Zone ¹⁰	-	None recorded within 250m.
Abstraction Licences	-	None recorded within 250m.
Discharge Consents	18m S	28 Quaker Lane – Effluent Type: Sewage – Receiving Water: Trib of Spen River.

⁸ See Appendix 2

⁹ See Appendix 2

¹⁰ See Appendix 2

Records of Part A(2) and Part B Activities and Enforcements	133m SW	Arrow Service Station – Process: Waste Oil Burner 0.4 MW – Historical Permit Part B
CONTROLLED WATERS¹⁰		
Description	Location	Details
River Network Entries	240m S	Clough Beck
Surface Water Features	Within 250m	3 recorded within 250m of the site, no further information given.

2.7 Sensitive Land Use

Table 6: Sensitive Land Uses within 250m

REGISTERED SENSITIVE LAND USES¹¹		
Description	Location	Details
None identified within 250m of the proposed development		

2.8 Industrial Land Use and Potential Sources of Contamination

In order for a conceptual site model and preliminary risk assessment to be completed the historical maps and Groundsure data requires analysis to identify any past or present activities on the site and in the area that may have the potential to cause contamination on the site. Guidance has been issued by the Environment Agency, NHBC and Chartered Institute of Environmental Health.¹² Within this document, annex 3 provides examples of important contaminants that are associated with individual uses of land. This data assists in the formulation of any chemical testing regime.

Those that we consider potentially contaminative according to the guidance are given below:

Table 7: Potentially Contaminative Sources

HISTORICAL		
Land Use	Location	Classification
Historical construction	On site	Associated with small structures present on site.
Clough Lane Leather Works/New Mill	230m SE	Unspecified works/factories/features.
Raynor's Mill	240m W	
Garage	170m E	Road vehicle fuelling, service and repair: garages and filling stations.
CURRENT		
Owens Corning Veil UK	240m W	Unspecified works/factories/features.
Union Motors	170m E	Road vehicle fuelling, service and repair: garages and filling stations.

¹³ See Appendix 2

¹⁴ Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 Volume 1 and 2.

3. Preliminary Qualitative Risk Assessment

The potential of contamination hazards on the land has been identified and the risks associated with them are assessed in the following preliminary risk assessment in accordance with industry practice and the 'suitable for use' approach. This has been conducted using the source-pathway-receptor approach. This method dictates that there must be a risk contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed DEFRA and The Environment Agency state that **'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'**

R&D Publication 66: 2008 states that the groups at risk of harm (receptors) can be identified by the following categorisation:

1. Humans: site personnel, end users, visitors and adjacent land users.
2. The water environment – receptors: groundwater, surface water, coastal waters and artificial drainage.
3. Ecosystems: plants and animals.
4. Construction/building materials/services

In order to complete a conceptual site model and therefore a preliminary risk assessment, an appraisal of the sources of contamination, potential and actual, on and in the area of the site has therefore been completed with reference to this pollution linkage.¹³

¹³This assessment has been based on the information as to the proposed development that has been provided by the client. If the plans should change, the assessment should be re-evaluated.

3.1 Conceptual Ground Model & Preliminary Qualitative Risk Assessment

It is understood that the development proposals currently comprise the construction of three detached, single storey, residential dwellings with associated garden areas and parking. In view of the sensitivity of the end users it is considered that the soil screening values (SSVs) for a residential with plant uptake end use should be employed.

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

- N/A -** A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
- Low -** A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
- Moderate -** The linkage exists but further field or laboratory data is required to confirm that the contaminant has reached the receptor and the levels of contaminant are harmful.
- High -** The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.



Table 8: Conceptual Site Model and Preliminary Qualitative Risk Assessment

CONCEPTUAL SITE MODEL			PRELIMINARY RISK ASSESSMENT	
Pathways	Receptor	Linkage Present?	Risk Rating	Notes
Direct contact/dermal absorption/soil ingestion	Operative	Yes – operatives are likely to come in contact with the soil. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – end users are likely to come in contact with the soil. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Inhalation of Dust/Vapours	Operative	Yes – contact with soil likely during works. However, no credible source likely to be present on site.	Low	Dust may be generated during site activity. Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – dust may be produced by the end users. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Ingestion of fruit/vegetables and/or waters	Operative	No – no edible plants or contained water sources in the area of the proposed new works.	N/A	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User	Yes – soft landscaping proposed as part of the new development. However, no credible source likely to be present on site.	Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	



Migration of hazardous gases via permeable strata	Operative	Yes – no credible source likely to be present on site or in the surrounding area.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
	End User		Low	
	Neighbours	Yes – residential dwellings are present all around the site. However, no credible source likely to be present on site.	Low	
Spillage/loss/run off direct to receiving water	Controlled Waters	Yes – controlled waters within 250m. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion.
Migration via permeable unsaturated strata	Controlled Waters	Yes – Secondary A aquifer present beneath the site. However, no credible source of contamination likely to be present on site.	Low	
Run off via drainage/sewers etc	Controlled Waters	Yes – old services may be present onsite, however no credible source likely to be present on site.	Low	
Direct contact with contaminated soils	Plants	Yes – some soft landscaping areas may be present as part of the proposed development. However, no credible source likely to be present on site.	Low	Should olfactory evidence be observed on the site, then contamination testing may be required to reach a firm conclusion. Presence of suitable growing medium should be investigated.
Uptake via root system			Low	
Direct contact with contaminated soils/ Direct contact with contaminated groundwater	Building Materials	Yes – foundation and service installation materials may be affected by the site soil.	Low	Further testing required to reach a firm conclusion.

Migration of mine gas via permeable strata	Operative	Yes – the site is located within a reported coal mining area and there is potential for underground workings to be present. Recorded workings are at significant depth and no direct pathways to surface are anticipated. Should shallow unrecorded workings be encountered then hazardous ground gases may be present.	Moderate	Further investigation required to reach a firm conclusion.
	End User			
Exposure to Radon	Operative	Yes – The Site is located in an area where 1% and 3% of properties are at or above the action level.	Low	The publication BR211 states that no protection measures are necessary.
	End User			
Mining Instability	End User	Yes – while the Consultants Coal Mining Report reports no shallow workings, these cannot be ruled out due to the potential presence of the Wheatley Lime (WL) coal seam which is expected to be present without competent overburden.	Moderate	Further investigation required to reach a firm conclusion. See Section 4.
Unexploded Ordnance (UXO) Risk	Operative	Yes – the Zetica ¹⁴ online maps indicate that the site is at low risk from UXO.	Low	Unlikely to be affected by UXO.

Notes:

1. The above data and table is a qualitative assessment of the probable risks identified at this site, based on the information made available to us from the client, third party professional data and walkover survey.
2. Should any additional or new data come to light, the risk assessment should be revisited and any necessary changes made to any recommendations resulting from this study.
3. Where further testing is recommended as part of the risk assessment, this is in order to provide a quantitative assessment of any contamination issues. It should at all times be considered that uncertainties may remain, and therefore any testing regime and ground investigation philosophy should be ready to accommodate any necessary alterations should any data come to light or it become evident that it has not been previously considered.

¹⁴ Pre-desk study assessment [online resource from www.zeticauxo.com].

4. Coal Mining Risk Assessment

4.1 Geological Appraisal

On the basis of the information revealed from the Geology of Britain Viewer¹⁵, it is noted that the site is situated within the Pennine Lower Coal Measures Formation. The regional solid geology shows the nearest dip marker being 3° to the south west, however, it should be appreciated that there is no dip marker present within the same faulted block as the site.

There are two notable coal seams that are shown to outcrop within the local area. Information regarding this seam is summarised as follows:

Table 9: Summary of Coal Seams Within the Vicinity of the Site.

Seam Name	Seam thickness ^{5*}	Outcrop distance from site ^{5*}	Anticipated depth below site
Wheatley Lime Coal (WL)	0.4 – 1.2m	135m SE	Approximately 13m
Middleton Main Coal (MM)	0.2 – 1.8m	270m NW	Not expected to underlie the site.

In this instance, whilst it is not expected that the Middleton Main (MM) coal will be present beneath the site. This is due to the site being topographically lower than the coal outcrop. Stratigraphically, the next seam within the sequence according to the Generalised Vertical Section (GVS) is the Wheatley Lime (WL) coal. This seam was noted to outcrop topographically below the site. Additionally, the site is located approximately 135m Above Ordnance Datum (AOD) and the WL is located 129m AOD. As such, using trigonometry it can be reasoned that the Wheatley Lime may be present approximately 13m beneath the site.

4.2 Risk Assessment

The risk to the stability of the proposed residential development has been evaluated from the data obtained and with reference to the following ratings and definitions:

- Low - The possibility of instability is unlikely therefore no further action is necessary.
- Moderate - The possibility of instability is likely and further investigation or remedial action may be required.
- High - The possibility of instability is highly likely and further investigation or remedial action will be necessary.

Table 10: Development Specific Risk Assessment

Item	Risk attributed to	Coal Seam(s) Considered	Risk Rating
4.3	Shallow coal workings	Wheatley Lime Coal.	Moderate
4.4	Coal workings at depth	Workings from 131m depth.	Low
4.5	Mine gas	Shallow coal workings.	Moderate

4.3 Risks Posed by Shallow Coal Workings

On the basis of all of the information provided above, the Wheatley Lime coal could be present within 30m of the surface at the site. Whilst this seam may be of limited thickness, the possibility of the seam being worked below the site cannot be ruled out. Historic coal mining activity is evident in the nearby area, and therefore it is considered that if coal was known to be close to ground level it could have been removed illicitly via shallow mining methods with relative ease.

It may be noted that guidance available from both the NHBC and the CIRIA publication, SP32 - *construction over abandoned mine workings*, suggests that competent overburden thickness above a coal seam should be greater than 10 times the thickness of a seam plus seam thickness in order that the collapse of workings would pose a low risk to surface structures.

On this basis, assuming a maximum thickness of the coal seams, the table below suggests the thickness of competent overburden required above each seam to mitigate instability at the surface.

Table 11: Required Thickness of Competent Overburden

Seam Name	Seam thickness	Anticipated depth below site	Required thickness of competent overburden
Wheatley Lime (WL) coal	1.2m	Approximately 13m	13.2m

Due to the ambiguity with the projected depth of the seam beneath the site, it is possible that there may not be a sufficient thickness of competent overburden above the shallowest seam in order to prevent the risk of instability posed by the presence of any illicit workings. Therefore, a moderate risk rating has been assigned to this seam, and further investigation is recommended to prove or disprove the presence of illicit mining activity.

4.4 Risks Posed by Coal Workings at Depth

In regard to deeper mining which could affect the site, the worked coal seams are present at significant depths. Indeed, 3 sets of workings are present between 131m to 169m depth, with the greatest extraction thickness measuring 0.77m in thickness. Should collapse occur in these workings, there is significant overburden to prevent surface instability.

4.5 Risks Posed by Mine Gas

This assessment has identified that there is potential for shallow mine workings to be present beneath the proposed development. Whilst the Consultants Coal Mining Report has not reported any incidents of mine gas within the vicinity of the development, shallow mining activity represents a credible source of ground gas. As such, a moderate risk rating has been assigned, and further assessment may be required. Should evidence of workings be proven via further intrusive works, it is strongly recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance

5. Intrusive Investigation

5.1 Site Investigation Philosophy

The information from the Phase 1 Desk Study shows there are limited potential sources of contamination on the site and in the surrounding area. In view of the above, it is not considered necessary to undertake an intrusive geo-environmental investigation.

It is incumbent upon the developer to carefully inspect any exposed soil during the ground-works phase of the contract. Should any contamination become evident or organic made ground be revealed, it is recommended that a pragmatic approach be adopted, with observational techniques being employed at each stage of the work. In the unlikely event that contamination is revealed, work should stop in the affected area and chemical testing be undertaken to evaluate the risk of harm to the receptors. In the event that this occurs it is recommended that the following testing regime be implemented on soil samples:

- **Metals** – Cd, Cr, Cu, Hg, Ni, Pb, Zn, V.
- **Semi Metals and Non-Metals** – As, Se, Free Cyanide and Phenols.
- **Hydrocarbons** – Polycyclic aromatic hydrocarbons (PAH EPA16), Total petroleum hydrocarbons (TPH CWG).
- **Others** – pH, Organic Content.
- **Asbestos**

5.1.1 Ground Gas Assessment

Given the limited sources of ground gas and potential limited potential or made ground it may be possible to undertake a desk based assessment where made ground thickness is less than 1m, and a determination of generation risk of made ground and natural deposits be undertaken in line with the *CL:AIRE, RB17, Pragmatic Approach to Ground Gas Risk Assessment 2012*. Should made ground be encountered which exceeds this thickness then standpipes and a period of ground gas monitoring may be required.

5.2 Geotechnical Assessment - Coal

In light of the potential risks of instability at the site from the working of shallow coal, it cannot be recommended that development takes place without further investigation to conclusively determine the presence of such workings. This work should include physical drilling methods to explore the ground conditions.

General practice is to undertake rotary openhole boreholes at three locations across the site to mitigate against the potential for drilling through intact columns associated with pillar and stall workings. Furthermore, it is normal to investigate the ground to 30m below ground level; any workings below this depth are unlikely to result in significant instability. However, in this case, the risk of instability is due to shallow workings, therefore, drilling to these depths may not be necessary and the objective should be to ensure that the shallow seams are un-worked or have sufficient competent cover. Given that there exists a risk from a single coal seam, the Wheatley Lime, it is recommended that boreholes be commenced to prove/disprove the presence of workings in this coal seam. It is considered that one of the boreholes should penetrate to a depth of 30m and should competent bedrock be proven the other two coal seams could be terminated below the depth of the target coal seam estimated to between 10m and 15m below the surface of the site. In any event, it is considered that approval should be sought with the Local Authority as to the efficacy of this

approach. Should any shallow workings be encountered then a ground gas risk assessment will become necessary via installation of standpipes.

5.3 Geotechnical Assessment

In any event, it is recommended that a geotechnical ground investigation be completed in order to obtain geotechnical information, as this will facilitate the safe design of the foundations for the proposed development. Such an investigation may be required by planning authorities and insurance providers. The following investigation strategy could be considered:

Sampling Method

It is anticipated that a windowless sampling drilling rig will be able to gain sufficient data in regard to the near surface soils. Moreover, such equipment should be able to undertake Standard Penetration Testing (SPT) and/or Dynamic Probing. If weak ground becomes evident, then the use of light cable percussive drilling will be required.

Soakaway Design

Should soakaway data be required for drainage design, trial pits could be excavated and infiltration tests conducted. Alternatively, these tests could be undertaken within boreholes.

Geotechnical Testing

An allowance for geotechnical testing of the soils should be included in any ground investigation.

Reporting

The above data will need to be formulated into a formal assessment that should include the following:

- Geotechnical recommendations.
- Coal mining legacy investigations.
- Contamination assessment, if required.
- Any recommendations for further work.

As soon is as practicable, and prior to the above, this Phase 1 report should be forwarded to the relevant authorities, in order to ensure they have sufficient time to review and discuss any issues.

It is of note that Rogers Geotechnical Services would be happy to assist in any further intrusive investigation that may be required.

6. References

- British Standards Institution (2015 + A1: 2020), BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- British Standards Institution (2011) +A1:2013, BS 10175: *Investigation of potentially contaminated sites – Code of Practice*, British Standards Institute.
- British Standards Institution (2013), BS 8576 *Guidance on Investigations for Ground Gas – Permanent Gases and Volatile Organic Compounds*.
- Department for Environment, Food and Rural Affairs and the Environment Agency, DEFRA R&D Publications, Environment Agency, Bristol.
- CLR 2, 1994, *Guidance on preliminary site inspection of contaminated land*, Volume 1.
- CLR 4, 1994, *Sampling Strategies for contaminated land*.
- R&D Publication 66: 2008 *Guidance for the Safe Development of Housing on Land Affected by Contamination*.
- CIRIA Report C665 (2007), *Assessing risks posed by ground gasses in buildings*.
- The Environment Agency: *Groundwater source protection*.



ATTACHMENT B

COAL AUTHORITY DRILLING PERMIT



Mining
Remediation
Authority

Permit to Enter or Disturb Mining Remediation Authority Interests

Permit 29371

Name and Address of Permit Holder:

*Barnes Homes Yorkshire Ltd
Victoria Springs
Wakefield Road, Liversage
Wakefield
West Yorkshire
WF15 6BU*

Site Location:

*Land adjacent to 480 Halifax Road
Liversage
Wakefield
WF15 8DX*

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

Ground investigation by three boreholes to 30m to determine presence of shallow mine workings 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, CH₄, CO₂, O₂, H₂S 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: Granted Date: **3rd January 2025**

For and on behalf of the Mining Remediation Authority

Nominated Representative: David Wilson, Permitting Manager;



Mining
Remediation
Authority

Granted Permit Boundary

Permit Ref: 29371

Permit Boundary:



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The Mining Remediation Authority is the trading name of the Coal Authority ('TCA') established pursuant to Section 1 of the Coal Industry Act 1994, of 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG. The Coal Authority remains the legal name of the Authority



ATTACHMENT C
DRILLER'S RECORDS

Client: Barnes Homes Yorkshire Ltd	Site: Land at 480 Halifax Rd, Liversedge, Wakefield. WF15 8DX		Cape Site Services unit 2, rear of Castle Buildings Carlton Road, Barnsley, S71 3HX	
Date: 14/01/2025	Method: water flush	Permit No: 29371		
Driller: Ian Wiles		Driller Assistant: Richard Hawkins, Simon Fish,		
		Page No: 1		

Measurements In Meters

BH No:	FROM	TO	THICKNESS	DESCRIPTION
1				
	0	1.8	1.8	Clay brown grey
	1.8	4.0	2.2	Mudstone grey brown silty friable
	4.0	9.0	5.0	Sandstone grey silty some brown with hard bands
	9.0	17.0	8.0	Mudstone grey very silty
	17	17.6	0.6	Coal
	17.6	30.0	12.4	Mudstone grey silty
2				
	0	2.0	2.0	Clay brown grey
	2.0	4.8	2.8	Mudstone grey brown silty friable
	4.8	9.5	4.7	Sandstone grey silty some brown with hard bands
	9.5	16.5	7.0	Mudstone grey very silty
	16.5	17.1	0.6	Coal
	17.1	17.5	0.4	Mudstone grey silty
3				
	0	0.5	0.5	Fill
	0.5	1.0	0.5	Clay brown grey
	1.0	1.1	0.1	Coal
	1.1	5.5	4.4	Mudstone grey brown silty friable
	5.5	11.0	5.5	Sandstone grey silty some brown with hard bands
	11.0	16.4	5.4	Mudstone grey very silty
	16.1	16.7	0.6	Coal
	16.7	17.0	0.3	Mudstone grey silty