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COAL MINING RISK ASSESSMENT
AT
LAND ADJACENT TO 145
TOFTSHAW LANE, EAST BIERLEY
FOR
Mr Hammond
REPORT REF: MH 3276

Engineering Geologists and Environmental Scientists



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ASHTON BENNETT CONSULTANCY
Engineering Geologists & Environmental Scientists

OCTOBER 2016

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1. INTRODUCTION

This report describes the results of a Coal Mining Risk Assessment undertaken on a plot of land adjacent to 145 Toftshaw Lane, East Bierley, Bradford, West Yorkshire, BD4 6QS. The work was undertaken on behalf of the client Mr Mark Hammond of Manor Farm, Roade Hill, Ashton, Northampton NN7 2JH. The assessment was carried out by this Consultancy, the Ashton Bennett Consultancy.

The purpose of this Coal Mining Risk Assessment was to assess the risk of past shallow and deep underground coal and fireclay mining being present beneath the site and potentially affecting proposals to redevelopment on the site. The mining risk assessment involved the collation and assessment of available information on the site including geological maps, topographical maps, available borehole records and a Coal Authority Report.

This report describes the research work carried out, presents the results of the Coal Mining Risk Assessment (CMRA) and assesses the risk to the site from deep and shallow underground coal mining and disused mine shafts and adits.

2. THE SITE

The site is located to the south of Toftshaw Lane which lies between Toftshaw New Road to the west and Tong Street to the east. The site lies to the north west of East Bierley which lies south east of Bradford in West Yorkshire. The site entrance is located from Toftshaw Lane and lies adjacent to the last house, Number 145, westwards on the south side of the Lane.

The site is rectangular in shape with a small building in the central area and is presently occupied by gardens.

The site is bounded to the west by a hedge partition with open fields beyond. The site is bounded to the east by the house and garden of number 145 with further houses beyond. The site is bounded to the north by Toftshaw Lane with mill buildings beyond forming part of the West Yorkshire Industrial Estate. The site is bounded to the south by open ground.

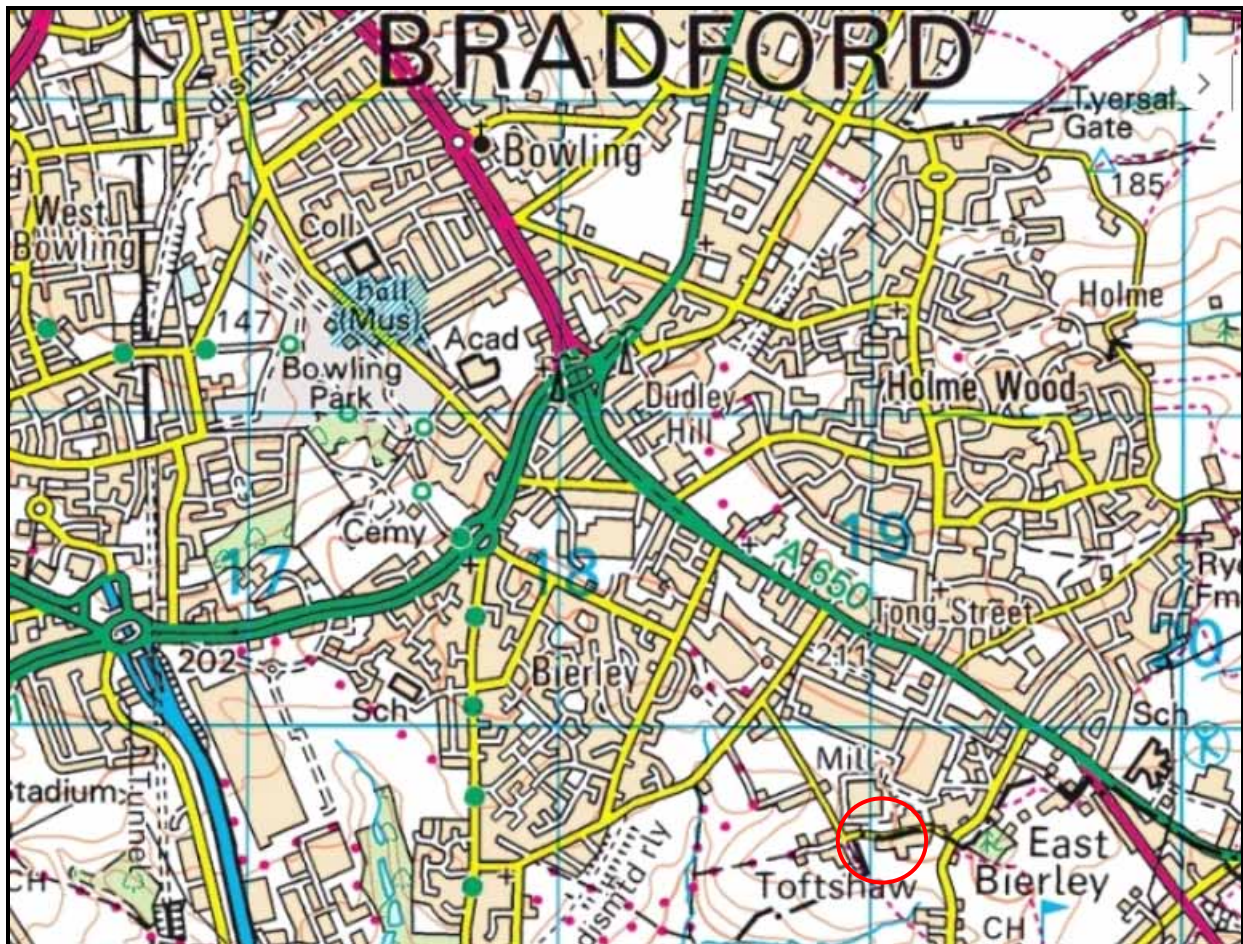


Figure 1 Site Location Plan



Figure 2 Detailed Site Location Plan

The site is centered at National Grid Reference 419046^E 429608^N at a height of approximately 196.5m above Ordnance Datum.

A Site Location Plan is presented as Figure 1 and a Detailed Site Location Plan as Figure 2 and a Geology Plan and BGS Borehole Location Plan as Figure 3, The Area of the Coal Authority Report is shown as Figure 4 and a Coal Seam Plan as Figure 5. Potential Mine Shaft Collapse is presented as Figure 6. The Coal Authority Report is presented in Appendix A.

3. REPORT OBJECTIVE AND REPORT SCOPE

The objective of this Coal Mining Risk Assessment (CMRA) desk study is to examine the topographical, geological and mining data readily available for the site and determine the risk to the proposed development from past deep and shallow underground coal and fireclay mining and disused mine shafts and adits.

In addition to the above this study has used the extensive knowledge and experience of the staff of Ashton Bennett Consultancy to assess the data and to interpret the data findings.

4. SITE GEOLOGY

4.1 Geology

The published British Geological Survey (BGS) maps at a scale of 1:10,000 show the site area to be underlain by the Lower Coal Measures consisting of fine grained sandstone, mudstone and siltstone and interbedded coal seams of the Upper Carboniferous Period. The strata immediately beneath the site are sandstone of the Fallhouse Rock Sandstone underlain by mudstone interbedded with the Blocking Rider Coal and Blocking Coal in turn underlain by further sandstones and mudstones interbedded with numerous workable coal seams. A plan of the geology and boreholes used for geological sequence confirmation is presented in Figure 3.

The sequence of strata beneath the site comprises:

TABLE 1
Shallow Strata Beneath Site Estimated From Geological Plans

Strata	Thickness in m	Depth in m bgl Based on local borehole
Sandstone		GL-2.00
Mudstone		2.00-4.00
Fallhouse Rock Sandstone	6 to 12	5.00 to 12.00
Blocking Rider Coal	0 to 0.10	12.00
Blocking Coal	0.50 to 0.80	13 to 15
Mudstone		
Sandstone		

BGS boreholes hold records of local boreholes which have been used to assist in interpretation of the geology. Three boreholes sunk to the east of the site indicate the Blocking Coal to lie at 18.29m increasing to 26.52m with distance to the east. The strata dip to the east and it is likely therefore that the Blocking Coal will lie at shallower depth beneath the site to the west of these boreholes.

TABLE 2
LOCAL BOREHOLES

BGS Reference no	Location	Geology in m bgl
SE12NE857	419120E 429690N	Blocking Coal at 18.29m bgl.
SE12NE600	419330E 429610N	GL-8.83m of colliery waste, 8.83-10.06 Clay
SE12NE859	419400E 429680N	Blocking Coal at 26.52m bgl Shertcliffe Coal at 87.17m bgl and 0.23m in thickness

The Coal Authority have no records of the Blocking Coal being mined beneath the site, but it is possible that it was mined before 1872 when it became law to deposit abandonment plans of mining with the then Ministry of Power.

4.2 Geological Faults

The geological maps indicate the presence of several known geological faults. There are two NW-SE trending faults to the south west and north east of the site. Both faults have downthrown younger strata to the north east compared to older strata to the south west. There are no faults

shown to cross the site, however the Coal Measures strata are heavily faulted from past tectonic activity and unrecorded faults may also be present.

The faults are unlikely to detrimentally affect the stability of the site unless shallow mined ground is present beneath the site.

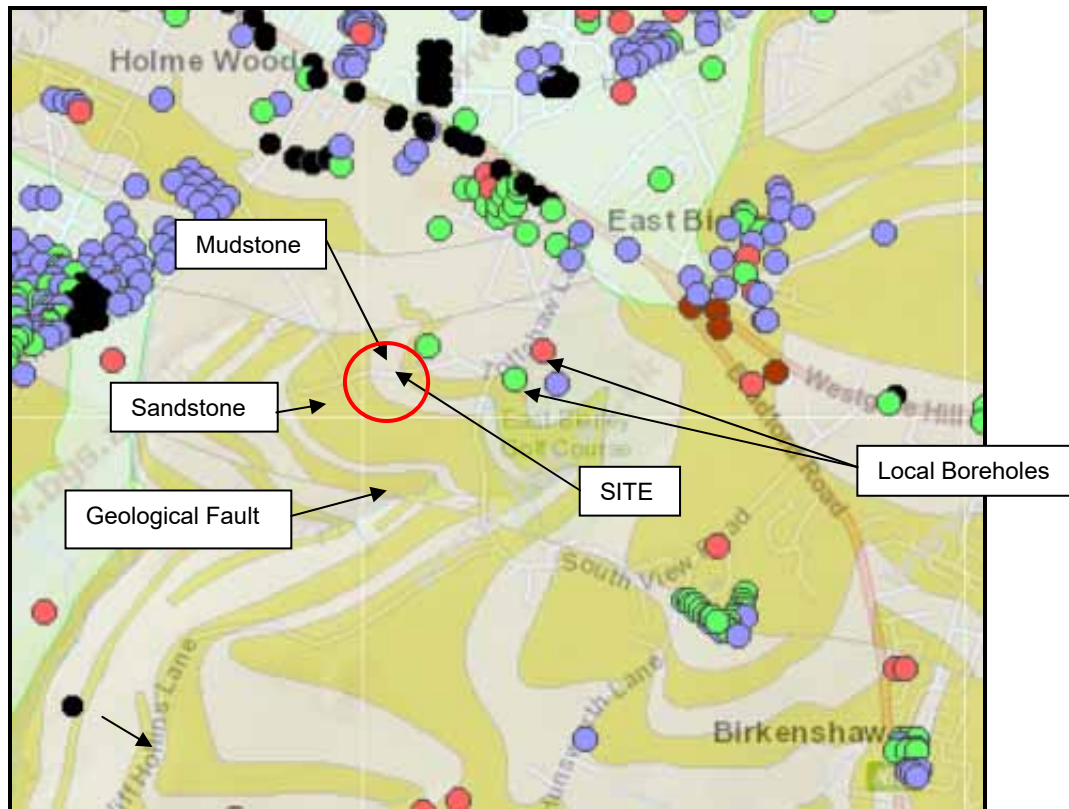


Figure 3 Geology and BGS Borehole Location Plan

5. MINING

5.1 The Coal Authority Report

The Mining Report from The Coal Authority for the site states that the property is in a surface area that could be affected by underground mining in two seams of coal at 60m and 130m depth and last worked in 1931. The Coal Authority state that any movement in the ground due to this coal mining activity should have stopped.

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 prior to any site works or future development activity.

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

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.

5.2 Shallow Coal Mining

The Coal Authority Report states that the property is in the likely zone of influence from workings in 2 seams of coal at 60m and 130m bgl and last worked in 1941. The Coal Authority records only date from 1872 and as shallow mining often occurred before that date, there are often no records of the early mined coal seams. The coal seams present at shallow (<30m bgl) depth beneath the site are shown in Table 2 with the possibility of the each seam being worked.

The shallow coals present beneath the site include the Blocking Rider Coal and the underlying Blocking Coal. As the Toftshaw Colliery was situated to the immediate east of the site it is possible that the Blocking Rider Coal and Blocking Coal may have been mined beneath the site. It is also possible that these coals were abandoned before it became compulsory to deposit abandonment plans.

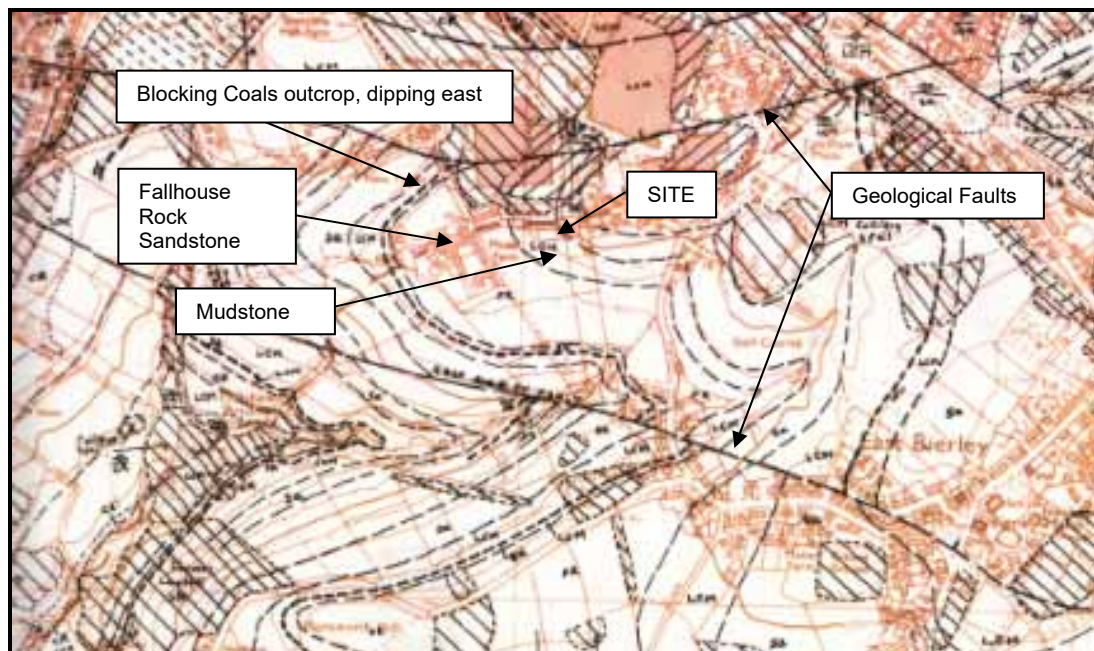


Figure 5 Coal Seam Plan

If the coal seams were mined and voids remain in the mined seams and if insufficient competent strata lies above the voids, then the voids may migrate by successive roof collapse over the years producing subsidence at ground level.

If sufficient thickness of competent strata overlies voids then the voids may become choked before they reach the ground surface.

As there are two coal seams within the upper 30m bgl beneath the site, and the Blocking Coal is known to have been mined locally, there is a **medium to high risk** that the site could suffer ground subsidence in the future if the coal was mined beneath the site and if voids migrate to the ground surface. This will depend on the exact depth of any mined coal seam.

TABLE 2
Estimated Coal Seams beneath Site

Strata	Thickness in m	Depth in m bgl Based on local borehole	Workings recorded by Coal Authority	Possible workings before Coal Authority Records
Sandstone		GL-2.00		
Mudstone		2.00-4.00		
Fallhouse Rock Sandstone	6 to 12	5.00 to 12.00		
Blocking Rider Coal	0 to 0.10	12.00		Possible
Blocking Coal	0.50 to 0.80	13 to 15		Possible
Mudstone				
Sandstone				
Mudstone				
Sandstone				
Lousey Coal	0.40 to 0.80	30 to 40		Possible
Trub Coal	0.10 to 0.80	30 to 40		Possible
Mudstone				
Churwell Coal	0.20 to 0.50	45 to 65		
Mudstone				
Shertcliffe Coal	0.40 to 0.80	60 to 80	YES	
Clifton Rock Sandstone				
32 Yard Coal	0.00 to 0.30			
22 Yard Coal	0.10 to 0.40			
Mudstone				
Crow Coal	0.00 to 0.70	122 to 140		Possible
Mudstone				
Black Bed Coal	0.80 to 1.80	130 to 150	YES	

Note. There are additional thin coals, mudstone and sandstone sequences not shown.
The line thickness does not represent the thickness of the named stratum.

5.3 Deep Coal Mining

The Coal Authority have records of two coal seams being mined at >30m bgl beneath the site. These workings are at around 60m and 130m and are likely to represent mining in the Shertcliffe and Black Bed Coal seams. These coal workings are overlain by sufficient competent strata to prevent voids migrating to the ground surface through successive roof collapse and causing ground subsidence. It is a **low risk** that the deep mining in these seams or in other coal seams at >30m bgl will detrimentally affect the stability of the site.

5.4 Mine Shafts

The Coal Authority Report states that there are no known mine entries within, or within 20 metres of, the boundary of the property.

The Coal Authority records are incomplete and any circular features detected on site should always be assessed by an engineer in case they represent an unstable mine shaft which would require stabilisation for development to continue.

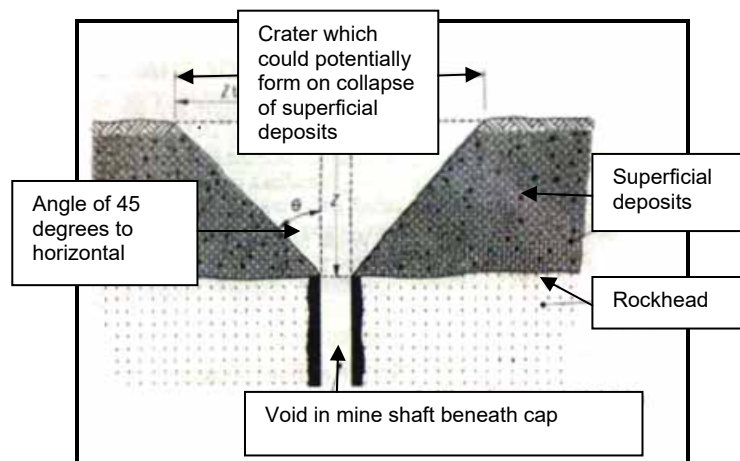


Figure 6 Potential Mine Shaft Collapse

5.5 Mine Gas

It would be prudent to monitor for mine gases on the site, as shallow mining is recorded locally, in order to design any required precautions for development.

6. RISK ASSESSMENT

The Coal Mining Risk Assessment undertaken has indicated that the site is underlain by the Coal Measures comprising mudstones, sandstones and interbedded coal seams. Based on the BGS geological maps and Coal Authority Report, the site is expected to be underlain by sandstones and mudstones with two shallow (<30m bgl) interbedded coal seams and further sandstones and mudstones with deeper (>30m bgl) interbedded coal seams, two of which, at 60m and 130m bgl are recorded as mined beneath the site.

The two coal seams at <30m bgl include the Blocking Rider and Blocking Coals. The Blocking Coal is recorded as having been mined in the vicinity of the site from Toftshaw Colliery to the east of the site. If the seam is mined beneath the site the seam may contain voids and there may be insufficient strata overlying the mined coal seam to prevent voids migrating by successive roof collapse and causing ground settlement and structural damage to the overlying development in the future. The Blocking Rider Coal which lies stratigraphically above the Blocking Coal is unlikely to have been worked.

The shallow coal (The Blocking Coal) therefore may pose a medium to high risk to future development.

The Coal Authority have records of coal being mined at 60m and 130m beneath the site. These workings are likely to be within the Shertcliffe and Black Bed Coal seams. Any subsidence from mining at depths >30m bgl should be complete. If voids remain in any pillar and stall workings in the deep coal seams (>30m bgl), and provided the workings are less than 3.0m in thickness, then it is unlikely they will migrate to the surface and cause ground subsidence due to the thickness of competent strata overlying the workings.

The risk of the site being detrimentally affected by workings in coal at depth (>30m bgl) is a low risk due to the cover of competent strata, provided the workings are less than 3.0m in thickness.

The risk that collapse of underground workings could cause subsidence at the ground surface above is normally empirically assessed using the T10 rule (developed by the National Coal Board in 1973 and based on experience) whereby if a thickness of 10 x the worked seam thickness of competent cover (i.e. rock) is present over the worked seam then it is deemed sufficient to be able to choke the voided ground without giving rise to surface settlement.

The Blocking Coal lies at <30m bgl beneath the site and may have been worked before records of abandoned mines were required by law, and may therefore be unrecorded as worked by the Coal Authority.

The Coal Authority record the Blocking Coal as worked at <30m bgl in the vicinity of the site and given the expected thickness of up to 0.80m, it is considered **a medium to high risk that the proposed development could be affected by past underground unrecorded shallow coal mining.**

Based on the local geology, the risk of a **disused mine shaft** detrimentally affecting the site is considered a **low risk.** Precautions should be taken to check for any circular features on the ground before and during development.

7. CONCLUSIONS AND RECOMMENDATIONS

The evidence gathered in this coal mining risk assessment report suggests that there is a **medium to high risk** to the proposed development from shallow coal mining causing ground subsidence in the future. It is thus recommended that the footprint of the proposed development is proof drilled to investigate the ground sequence down to a depth of 30m prior to any construction taking place to check the depth of any workings in the underlying shallow coal seams. It is recommended that the proposed investigation follows the following course:

- Initially, four boreholes on the proposed development plot taken down to prove at least 30m of competent bedrock to confirm the ground conditions and assess the presence of any voids in the ground and the thickness of any competent cover above the voids.
- If the coal seams are not mined, or if sufficient competent strata overlies any voids to prevent then causing ground settlement, then ground stabilisation will not be required and founding strata can be determined.
- If insufficient competent cover is found over any mined coal seams then additional boreholes will be required over the footprint of the structure to confirm the extent of workings (on the basis that the boreholes striking coal could have struck a pillar).
- If underground workings are proved and there is insufficient competent cover then ground treatment is likely to be required prior to proceeding with construction to stabilise the ground and further consideration will be required for foundation design.

The risk of collapse of voided shafts and voided mined ground increases with time due to the rotting of timber supports and punching of support pillars into the mine roof and migration of voids upwards by successive roof collapse.

Ashton Bennett would be able to design and supervise the proposed drilling works together with any follow-on ground treatment work that may be necessary and provide an updated risk assessment report for issue to the regulatory authorities as required. Ashton Bennett will acquire the necessary Coal Authority Permits required to drill through the coal.

8. GENERAL REMARKS

This report truly reflects the conditions found during the coal mining risk assessment study. Whilst the mining risk assessment was undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained and the ground and mining conditions expected. It is possible that other undetected information, undetected ground conditions and undetected mining conditions may exist. The mining risk assessment was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. The conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

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Tristan Bennett
BSc

Frances A Bennett
BSc, CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AIEMA, MIEEnvSci.

Appendix **A**





The Coal
Authority

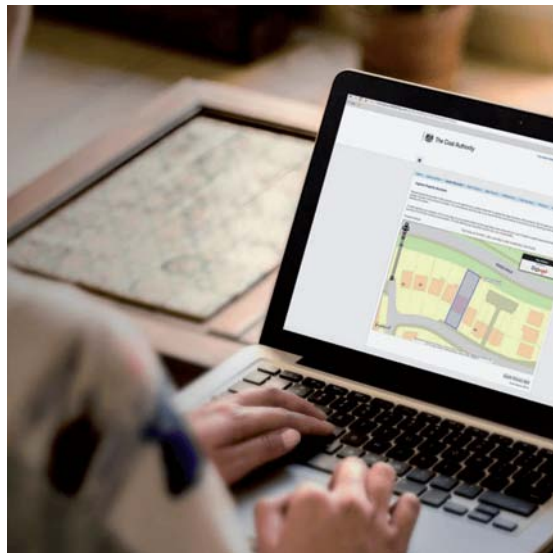
Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

145 TOFTSHAW LANE
BRADFORD
BRADFORD MDC
BD4 6QS

Date of enquiry: 17 October 2016
Date enquiry received: 17 October 2016
Issue date: 17 October 2016

Our reference: 51001279875001
Your reference: 3276



CON29M Non-Residential Mining Report

This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

ASHTON BENNETT CONSULTANCY

Enquiry address

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Approximate position of property



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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	Yes
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 2 seams of coal at 60m to 130m depth, and last worked in 1941.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe 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 prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section 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 plans to grant a licence to remove coal using 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 known coal mine entries within, or within 20 metres of, the boundary of the property.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

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, 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 Authority, under its Emergency Surface Hazard Call Out procedures.

12. Withdrawal of support

The property is in an area where a notice to withdraw support was given in 1945.

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.

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

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In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore 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 good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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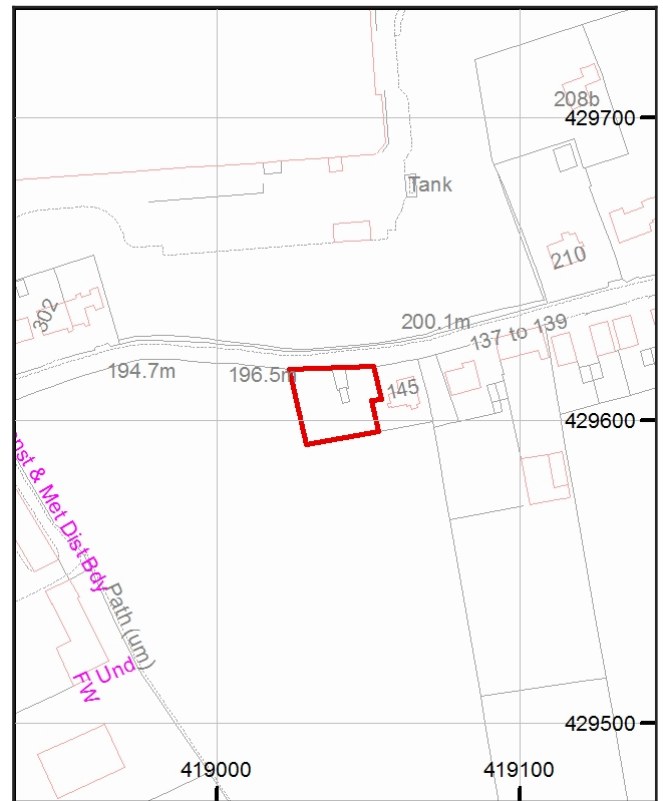
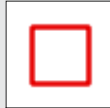
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Enquiry boundary

Key

Approximate position of enquiry boundary shown



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Tax point date	17 October 2016
Issued to	ASHTON BENNETT CONSULTANCY UNIT K BRIDGE MILLS HOLMFIRTH WEST YORKSHIRE HD9 3TW
Property search for	145 TOFTSHAW LANE BRADFORD BRADFORD MDC BD4 6QS
Reference number	51001279875001
Date of issue	17 October 2016
Cost	£77.00
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VAT registration	598 5850 68

