COAL MINING RISK ASSESSMENT

AT

LAND OFF LEDBURY ROAD
SMITHIES, BARNSLEY

FOR

MR D BARLOW

REPORT REF: MDB 3252

Engineering Geologists and Environmental Scientists

Ashton Bennett

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MAY 2016

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APPENDICES

1. INTRODUCTION

This report describes the results of a Coal Mining Risk Assessment (CMRA) undertaken at land off Ledbury Road in Smithies, Barnsley, South Yorkshire, S71 1XE.The work was undertaken at the request of the client M rD Barlow. 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 mining and mine shafts 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 detailed geological and coal seam 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.

2. THE SITE

The site is located to the east of the connecting A61 Wakefield Road and Rotherham Road A633 to the north east of Barnsley Town Centre in South Yorkshire. The site is located at the end of Ledbury Road off the A61 Wakefield Road. Access to the site is gained via the end of Ledbury Road along the south west boundary of the site or via Wingfield Road along the east boundary of the site.

The site is bounded to the north, west, south and east by wooden fencing with residential gardens and property beyond. The site is bounded in the north west by wooden fencing with agricultural land beyond. The site area is mostly grass and shrubs with occasional trees. An electrical sub station is located next to the east boundary of site.

Figure 1 Site Location Plan

Figure 2 Detailed Site Location Plan

The site is centered at National Grid Reference 434998^{E} 408990^{N} at a height of approximately 85m 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 as Figure 3. 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 mining and disused mine shafts.

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 Geological Faults

The BGS map indicates the presence of several geological faults trending SW to NE, and lying to the immediate north west of the site and to the south east of the site. Geological faults trending NW to SE also lie to the SW of the site.

It is possible that smaller faults sub parallel to these may exist in the strata causing fissuring and fracturing to the rock. Due to the cessation of tectonic activity in the area, faulting is unlikely to detrimentally affect the site stability, unless voids are present in shallow mined coal seams.

4.2 Geology

The published British Geological Survey Map (BGS) shows the site to be underlain by mudstone, siltstones, sandstones and coal seams of the Carboniferous Middle Coal Measures. Superficial deposits are not indicated to overlie the solid strata. Weathered bedrock may be present at shallow depth.

The site is underlain by the Woolley Edge Rock Sandstone of the Middle Coal Measures, which is underlain by mudstone with two interbedded coals seams, the Meltonfield Coal and Two Foot Coal, and a marine band. This is in turn underlain by the Abdy Rock Sandstone, underlain by mudstone with interbedded Abdy Coal, underlain by thin sandstone with interbedded mudstone with the Top Beamshaw Coal and Low Beamshaw Coal. This is then underlain by Kents Rock Sandstone and Kents Thin Coal with further mudstones, sandstones and coal seams at greater depths.

A borehole sunk for Wharncliff Woodmoor Colliery at a distance to the east of site in 1954 encountered 35.29m of sandstone underlain by the Meltonfield Coal at 38m bgl and the Two Foot Coal at 50.77m bgl. The depths of these coals may be different beneath the site.

A full discussion of the coal seams underlying the site, and mining history of the site is presented in Section 5.

4.3 Engineering Geology

Any made ground present on the site is expected to be in a loose state of compaction. A comprehensive intrusive geotechnical ground investigation should be undertaken to assess suitable foundation strata before any new build construction is undertaken on the site.

It is possible that the made ground may be highly compressible and that the underlying clays may shrink and swell under varying moisture conditions and these possibilities need to be investigated before new construction in order to design foundations.

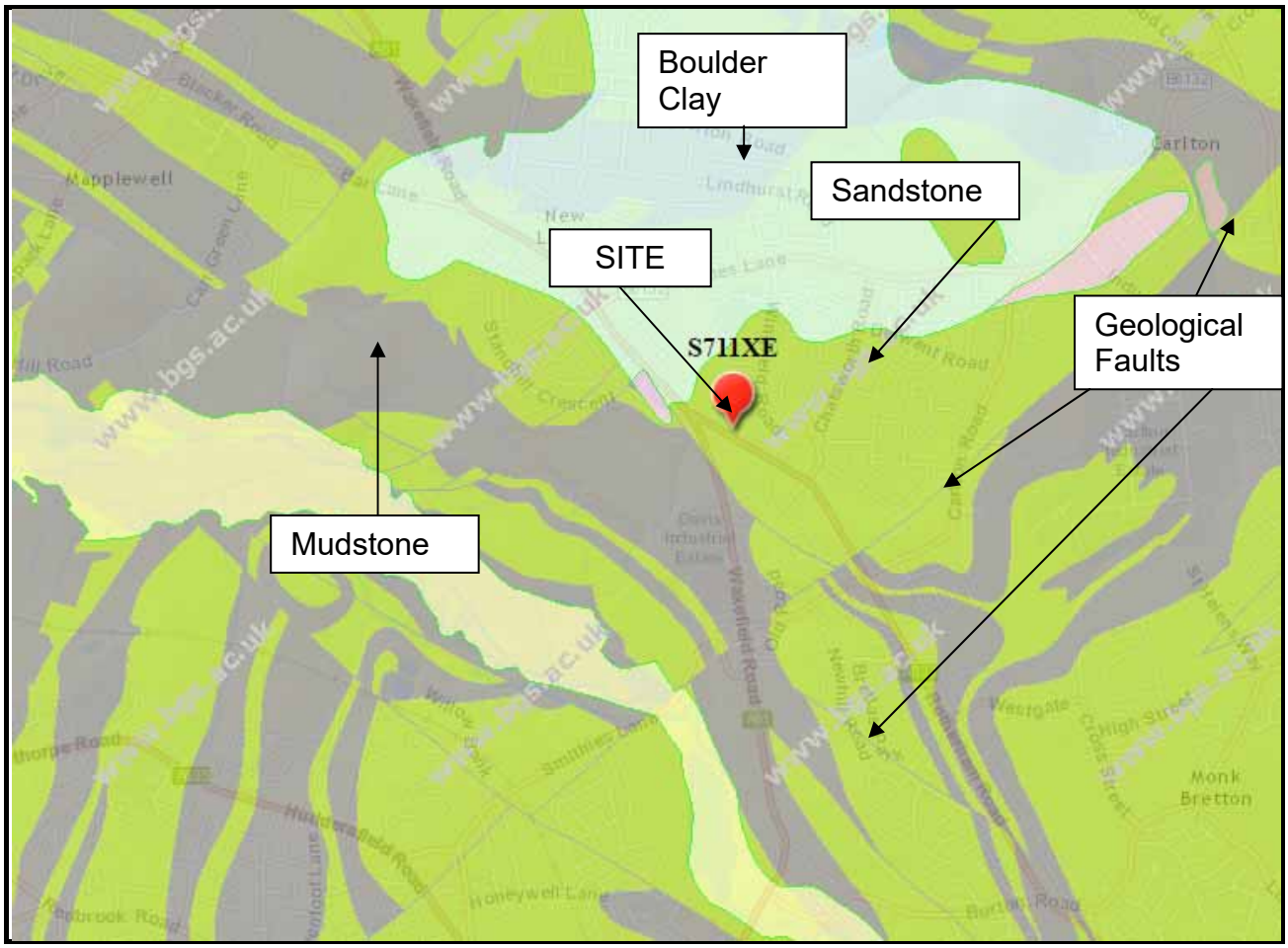

Figure 3 Geology Plan

5. MINING

5.1 The Coal Authority Report

The Mining Report obtained by the client from The Coal Authority for the site states that according to their records the property is not in the zone of likely physical influence from any present underground workings, however the property is in a surface area that could be affected by underground mining in 7 seams of coal at shallow to 370m depth and last worked in 1956.

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods. The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods. The property is not in an area that is likely to be affected at the surface from any planned future workings. However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

The Coal Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that may have been affected by coal mining. The property is not within the boundary of an opencast site from which coal has been removed by opencast methods. The

property does not lie within 200m of the boundary of an opencast site from which coal is being removed by opencast methods. The property is not within 800m of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods. The property is not within 800m of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted. No known coal mine entries are within, or within 20metres of the boundary of the property, however, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50m, since October 1994. There is no current stop notice delaying the start of remedial works or repairs to the property. The Authority is not aware of any request having been made to carry out preventative works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.

There is no record of any mine gas emissions requiring action by the Coal Authority, under its Emergency Surface Hazard Call Out procedures. The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

The Coal Authority Report is presented in Appendix A and should be read in full.

5.2 Shallow Coal Mining

The Coal Authority Report believes that there is coal at or close to the surface beneath the site and this coal may have been worked at some time during the past. The Coal Authority Mine Abandonment 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 1 with the probability of each seam being worked.

Based on local knowledge, the Meltonfield Coal may lie around 20m to 30m bgl and the Two Foot coal at 40m to 45m bgl. These are only approximations from a borehole that encountered 35m of sandstone above the Meltonfield Coal. If, at the site location, a lesser thickness of sandstone is present, then the shallowest coal may be at <10m bgl and have insufficient competent strata to prevent any voids reaching the ground surface in the future.

The Meltonfield Coal is around 0.91m in thickness and the Two Foot is 0.60m in thickness and both were worked locally.

Where coal seams were mined, voids will 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 may be one coal seam within the upper 30m bgl beneath the site, there is a risk that the site may be affected in the future by ground subsidence.

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TABLE 1
Estimated Shallow Coal Seams beneath Site North of Geological Fault

Strata	Thickness in m	Estimated Depth bgl in m	Worked On Site	Worked in vicinity of Site
Woolley Edge Rock Sandstone	34	**0-20**		
Mudstone				
Meltonfield Coal	0.91	**20-30**	**unknown**	**Yes**
Mudstone				
Two Foot Coal	0.60	**40-45**	**unknown**	**Yes**
Abdy Edge Sandstone	10			
Abdy Coal	1.29	**55-60**	**unknown**	**Yes**
Mudstone				

Note. There are additional mudstone and sandstone sequences not shown.

5.3 Deep Coal Mining

The Coal Authority have records of deep (>30m bgl) coal mining up to 370m beneath the site. Any recorded or unrecorded coal workings in deep coal seams are likely to be overlain by sufficient competent strata to prevent ground subsidence occurring. It is a low risk that any deep mining in these seams will detrimentally affect the stability of the site.

5.4 Mine Shafts

The Coal Authority Report states that the Coal Authority do not have records of any mine shaft within or within 20m of the site boundary. 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 or day hole.

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 the site is expected to be underlain by sandstone in turn underlain by mudstones with shallow (<30m) interbedded coal seams and further sandstones and mudstones with deeper interbedded coal seams.

The Coal Authority records only date from 1872 and any coal mined before this date may be unrecorded.

The shallowest coal seam, the Meltonfield Coal has been mined in the area. If the Meltonfield was mined beneath the site, the coal seam is likely to contain voids and there may be insufficient strata overlying the coal seams to prevent voids migrating by successive roof collapse and causing ground settlement and structural damage to the overlying development in the future.

Any **shallow coal** (<30m bgl) workings therefore pose a **medium risk** to future development.

Any subsidence from coal mining at depths of >30m bgl should be complete. If voids remain in any pillar and stall workings in the deep coal seams (>30m bgl) 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.

The Coal Authority Report states that the Coal Authority do not have records of any mine shaft within or within 20m of the site boundary. Their records however are not complete and there are recorded shafts in the locality. It is considered a **low risk that there is a mine shaft on the site**, however any circular features should be investigated by a mining engineer.

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.

Given the expected shallow depth of the Meltonfield Coal over the site and confirmation from the Coal Authority that shallow coal may have been worked beneath the site, it is considered **a medium risk that the proposed development could be detrimentally affected by past underground shallow coal mining.** It is therefore recommended that boreholes are sunk to determine the depth of the coal seam and its condition in order to determine the risk to proposed development.

It is also recommended that the site is tested for the presence of mine gas.

7. CONCLUSIONS AND RECOMMENDATIONS

The evidence gathered in this coal mining risk assessment report suggests that there is a **medium risk** to the proposed development from shallow coal mining which could cause 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 taken down to prove at least 30m of competent strata bedrock to confirm the ground conditions and particularly the coal depths 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.
- Monitoring the boreholes for methane gas.

Ashton Bennett would be able to 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, MIEnvSci.

Appendix **A**

The Coal Authority

Resolving the impacts of mining

CON29M Non-Residential Mining Report

LEDBURY ROAD
BARNSLEY
S71 1XE

Date of enquiry:	19 April 2016
Date enquiry received:	19 April 2016
Issue date:	19 April 2016
Our reference:	51001145590001
Your reference:	3254

CON29M Non-Residential Mining Report

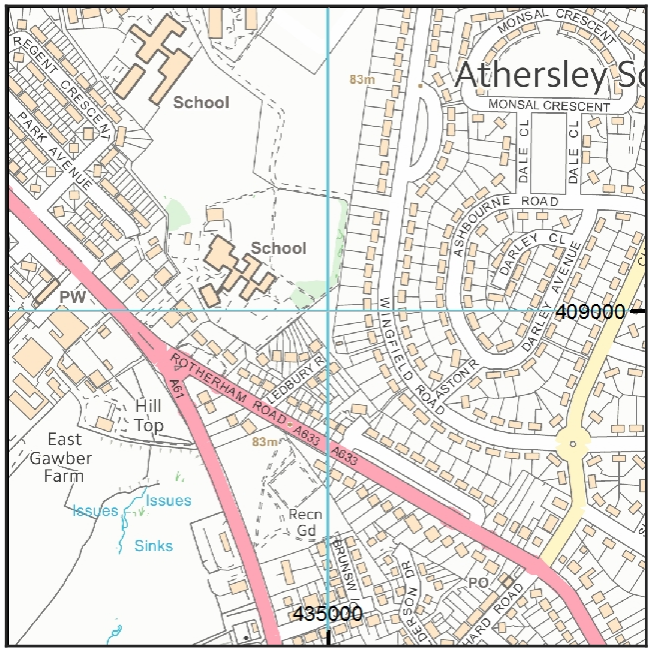
This report is based on, and limited to, the records held by the Coal Authority and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Client name

ASHTON BENNETT CONSULTANCY

Enquiry address

LEDBURY ROAD, BARNSLEY, S71 1XE



Approximate position of property

Mapping sourced from Ordnance Survey

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/coalauthority

Summary

Has the enquiry boundary identified evidence 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 7 seams of coal at shallow to 370m depth, and last worked in 1956.

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.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

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 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.

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 notices to withdraw support were given in 1982.

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

The Coal Authority own the copyright in this report and the information used is protected by our database right.

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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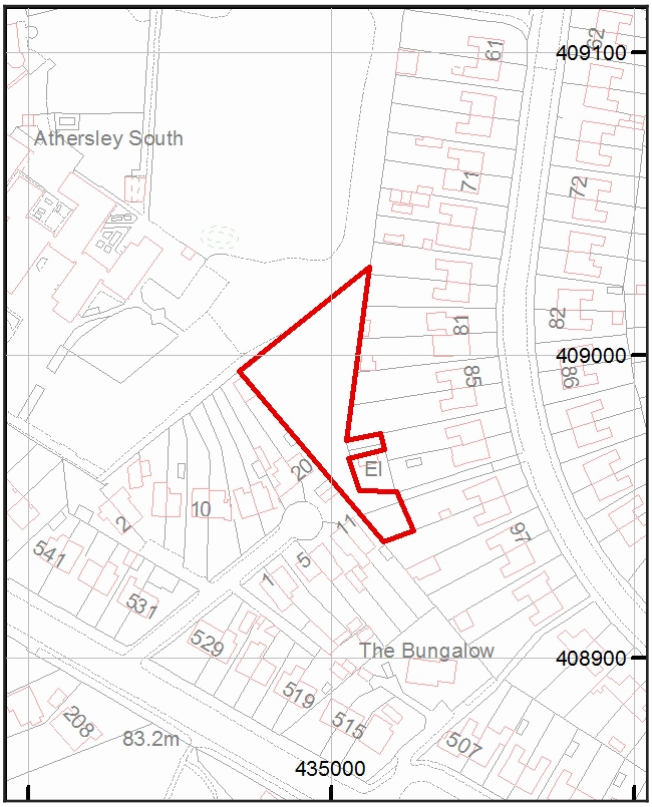
Enquiry boundary

Key

Approximate position of enquiry boundary shown



Mapping sourced from Ordnance Survey

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VAT receipt	
Issued by:	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date:	19 April 2016
Issued to:	ASHTON BENNETT CONSULTANCY UNIT K BRIDGE MILLS HOLMFIRTH WEST YORKSHIRE HD9 3TW
Property search for:	LEDBURY ROAD BARNSLEY S71 1XE
Reference number:	51001145590001
Date of issue:	19 April 2016
Cost:	£77.00
VAT @ 20%:	£15.40
Total received:	£92.40
VAT registration:	598 5850 68