

**Coal Mining Risk Assessment
at
47, Victoria Road
Barnsley
For
Emerald Construction Ltd**

Client:-

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Executive Summary

Proposal	Single storey apartment block and refurbishment of existing dwelling.
Current land use	Existing derelict property and mature gardens lying at approximately 129.0m AOD.
Mining related site history	No historic mining features recorded on the site. The Barnsley colliery was present just northeast and numerous former shafts are present locally together with clay pits and collieries within 500m. The site lies within an area significantly affected by historic mining activities.
Geology	Directly underlain by the Kent's Rock sandstone of the Middle Coal Measures. The Kent's Thin and Kent's Thick coal seams both underlie the site at shallow depth.
Mining history and context	One seam of worked coal is recorded as present at between 90 and 100m, last worked in 1834, however, shallow coal is present beneath the site. The Kent's Thick coal has been historically worked by shafts locally. Numerous former mine entries are recorded northeast, south and southeast of the site. Unrecorded mine entries could be present on the site. The site lies within an area of probable past shallow coal mining and is within a Development High Risk Area as defined by the Coal Authority.
Mining related risks	There is a potential for unrecorded shallow mining beneath the site potentially leading to surface instability – High. Unrecorded former mine entries may be present on the site – Low to Moderate. Mine gases may be present on the site – Low to Moderate.
Mitigation of risks	Proof drilling is recommended to confirm the status of the underlying Kent's Thin and Kent's Thick coal seams. If shallow mining is confirmed as potentially affecting surface stability, consolidation by drill and grout may be required. Vigilance during site enabling works to check for past unrecorded mine

	entries. Incorporation of protection measures for mine gases may be required within new development, subject to the advice of regulators.
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1. Introduction

1.1 Design IT were appointed by Emerald Construction Ltd (EC) to undertake a Coal Mining Risk Assessment (CMRA) for a site at 47 Victoria Road, Barnsley which is proposed for redevelopment as a care facility. A planning application is to be submitted to Barnsley Metropolitan Borough Council (BMBC) and the site is identified as lying within a Coal Authority (CA) Coal Mining Development Referral Area, thus necessitating the requirement for a CMRA in order to provide BMBC with information on historic coal mining and an assessment of its potential impact on land stability.

1.2 The purpose of this CMRA is to:

- Present a desk-based review of all available information on the coal mining issues which are relevant to the application site
- Use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development, and
- Demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land

1.3 To this end the study has included an inspection of published historical maps, published geological data, publicly available planning information and a review of a CA mining report, together with other sources as indicated within the report.

1.4 This report presents the factual information available during this appraisal, interpretation of the data obtained and recommendations relevant to the scope of works outlined above.

1.5 The comments and opinions presented in this report are based on the findings of the available desk study assessment carried out by Design IT. Responsibility cannot be accepted for any conditions not revealed by this desk study and which have not been taken into account by this assessment.

1.6 This report has been prepared for the sole use of EC. No other third party may rely upon or reproduce the contents of this report without written approval of Design IT. If any unauthorised third party comes into possession of this report, they rely on it entirely at their own risk and we do not owe them any Duty of Care or Skill.

2. Site location and description

2.1 The site is centred on National Grid Reference 433982mE 406801mN, at the junction of Victoria Road and Sackville Street, within the northwestern part of Barnsley town centre. A site location plan is included as **Appendix A**.

2.2 The site is irregularly shaped with an area of approximately 0.3ha. It is occupied by an existing derelict 2 storey former residential property together with an associated single storey annex immediately to the north. The remainder of the site comprises gardens and an access driveway with numerous mature trees present within and along the site boundaries. Locally, levels fall towards the east/northeast with the approximate centre of the site lying at around 129.0m AOD. Within the site itself, levels fall by approximately 1 to 2m eastwards and by approximately 2 to 3m northeastwards. Existing residential properties and associated gardens bound the site to the north, east and south with a railway line set within a cutting to the west/northwest.

Proposed development

2.3 It is proposed to construct a single storey apartment block within the northern part (within footprint of existing annex) together with refurbishment of the existing 2 storey property in the central part of the site with associated parking provision, an access driveway and gardens. Details of the proposal are included as **Appendix A**.

Site history

2.4 Historical maps for the site and its surroundings, available from internet based sources, have been reviewed and a summary of this information, specifically relating to mining related features, is provided below.

Date	On site features	Off site features (coal mining related)
1852 – 1889	Open land.	Barnsley colliery c. 200m northeast.
1889 - 1906	Developed with 'Westfield House' residential property and associated gardens.	Old clay pit and shafts c. 500m northwest. Slackhills colliery c. 500m southwest.

1906 – 1970	Addition of several glass houses and outbuildings.	Brick works and clay pit c. 500m southwest.
1970 – present	Addition of annex immediately north of property.	No change.

2.5 In addition to the above nearby coal mining related activities, other collieries including Farm House and Mount Osbourne collieries were present further afield to the southwest and southeast respectively.

3. Geological setting and historical mining context

3.1 Information obtained from various sources pertaining to the site's geology and historical mining perspective is summarised in the table below with information sources identified as appropriate.

Information sources	British Geological Survey (BGS) 1:50 000 scale, sheet 87, Barnsley, bedrock and superficial and 1:10,000 scale, sheet SE30NW, bedrock and superficial. BGS online Borehole Database. Geological Survey memoir 'Geology of the Country around Barnsley', 1947. 'The Geology of the Yorkshire Coalfield', 1878 Green et. al. 'Sections of Strata of the Coal Measures of Yorkshire', Wilcockson W H, 1950 3rd Edition. BMBC online Planning Applications Search. CA online Interactive Viewer. CA mining report, Ref. 51001773132001, 15 January 2018 (included as Appendix B).
Made ground	None shown.
Drift	None present.
Solid	Kent's Rock sandstone of the Middle Coal Measures.
Dip of strata	Approximately 4 to 5° east.
Faults	None are indicated on or within close proximity to the site.
Coal seams	The Kent's Thin coal seam is conjectured as outcropping at the extreme extent of the west/northwestern site boundary and is considered to underlie the site at shallow depth. Likewise, the Kent's Thick coal seam is recorded as outcropping slightly further west/northwest and may also underlie the site at shallow depth. Locally, BGS stratigraphic section thicknesses for these coal seams are; Kent's Thin coal (0.29 to 0.76m) and Kent's Thick coal (0.91 to 1.22m), both coal seams containing significant dirt partings. The separation of the Kent's Thin coal and underlying Kent's Thin coal seam is approximately 20 to 25m, as indicated locally.
Shafts and collieries	The CA Interactive Viewer indicates numerous former mine entries northeast, south and southeast of the site. Historic OS mapping indicates Barnsley colliery close to the northeast and Slackhills colliery further to the southwest. The shaft of Mount Osbourne colliery located southeast of the site

	records the Kent's Thin coal seam as 0.55m thick and overlain by at least 19m of strong sandstone (Kent's Rock sandstone). The underlying Kent's Thick coal seam is approximately 1.35m thick with some 21m of intervening measures between these coal seams.
Nearby intrusive information	A record of the strata as exposed in the adjacent railway cutting and included within Green's publication indicates the Kent's Thin coal seam as approximately 0.6m thick and the underlying Kent's Thick coal seam to be approximately 1.8m thick in total, comprising numerous intermediate shale and mudstone bands. The separation of these coal seams is approximately 18m. Archive ground investigation records at various locations approximately 500m southeast proved the Kent's Thin coal seam (0.6m thick) at 7.8m depth and overlain by some 7.5m of strong sandstone (Kent's Rock sandstone). The underlying Kent's Thick coal seam was proved at thicknesses of between 1.2 and 1.5m. Both coal seams were intact and their separation was not able to be assessed from the different intrusive records.
Coal Authority mining report	One seam of worked coal is recorded as present beneath the site, last worked in 1834. However, any movement should have ceased by now. The site is in an area where there is coal at or close to the surface which may have been worked in the past. The site is unaffected by present or future mining. There are no known mine entries at, or within 20m, of the site. The site is unaffected by any past, present or future surface opencast mining. There are no records of any mine gas emissions requiring action within the site boundary.
Shallow mining	The CA Interactive Viewer indicates the site to lie within an area of probable past shallow coal mining and the site is defined as being located within a Development High Risk Area.
Surface mining	Areas associated with surface coal mining are shown on the CA Interactive Viewer as present to the east and west of the site. However, none are indicated within the site. The historic OS mapping does not show any former quarrying or clay pits as present on or close to the site itself.

4. Risk assessment

4.1 The potential risks to the redevelopment of the site associated with the coal mining legacy of the locality are summarised in the following table.

Coal mining issue	Risk		Risk assessment (Risk rating)
	Yes	No	
Underground coal mining (recorded at shallow depths)	-	No	CA records do not indicate historic recorded shallow mining within the vicinity of the site. However, the former Barnsley colliery was located just northeast of the site and the both the Kent's Thin and Thick coal seams outcrop immediately west of the site, and both are present at shallow depth – Low
Underground coal mining (probable at shallow depths)	Yes	-	The site lies within a DHRA and the CA assesses the site as potentially underlain by past shallow mineworkings. The underlying Kent's Thin and Thick coal seams are present beneath the site at shallow depth. Evidence of widespread historical mining in the locality would suggest potential shallow mining of both these coal seams - High
Mine entries (shafts and adits)	Yes	-	No mine entries recorded on site, however unrecorded mine entries are a possibility. Numerous recorded former mine entries within the locality associated with both shallow and deeper coal seams - Low to Moderate
Coal mining geology (fissures)	-	No	CA information and published geology does not indicate any geological weaknesses on site as a consequence of mining related activities – Low
Record of past mine gas emissions	Yes	-	CA information states no mine gas related issues in the locality. However, given the presence of potential shallow mining beneath the site generation of mine gases is considered possible - Low to Moderate
Recorded coal mining surface hazard	-	No	CA information does not record the presence of any mining surface hazards on or close to the site – Low

Surface mining (opencast workings including clay pits and sandstone quarries)	-	No	CA information state the site to be unaffected by any past, current or future open cast workings. Historical mapping does not record any surface mining features close to the site – Low
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5. Discussion

5.1 The risk assessment above highlights several potential risks posed to the site during redevelopment, namely potential for shallow coal mineworkings, potential for unrecorded mine entries and associated mine gas emissions, cumulatively assessed as **low to high**. These risks are discussed in turn more fully below.

Shallow mineworkings

5.2 Both the Kent's Thin and Kent's Thick coal seams are recorded as underlying the site at shallow depth and may potentially have been historically exploited by unrecorded mining. Given the conjectured location of outcrop of the Kent's Thin coal seam along the site's extreme western boundary, and the recorded dip of the strata as 4 to 5° eastwards, it is estimated that the Kent's Thin coal is likely to be present at very shallow depth beneath the site. Its depth would be from surface to within approximately 3 to 4m of the surface beneath the proposed development with the deeper Kent's Thick coal seam likely to be present some 18 to 20m below the Kent's Thin coal seam. Nearby strata records (adjacent railway cutting) indicate a thickness of 0.6m for the Kent's Thin coal seam and a total thickness of some 1.8m (including mudstone partings) for the underlying Kent's Thick coal seam. Assuming competent sandstone rock head is present within 1m of the surface and that a reduced minimum thickness of competent rock cover of 6 times intact coal seam (a usual 10:1 ratio can be lowered to 6:1 due to the presence of the overlying Kent's Rock sandstone) is required to be present above the Kent's Thin coal seam to maintain surface stability in the event of it having been exploited; then there is considered to be *insufficient* competent rock cover above the Kent's Thin coal seam and *potentially insufficient* competent cover above the deeper Kent's Thick coal seam. However, the surface stability at the site can only be comprehensively determined through undertaking intrusive works. Such intrusive investigations will determine whether mineworkings are present within the Kent's Thin and Kent's Thick coal seams and to what extent, as well as confirming the depth of these coal seams together with their respective thicknesses beneath the site.

Mine entries

5.3 Due to the proximity of the outcrop of the Kent's Thin and Kent's Thick coal seams and numerous recorded abandoned mine entries within the site's locality, the presence of on-site unrecorded former mine entries associated with the exploitation of these seams cannot be discounted. Pre 1849, it was not a statutory requirement to record mine entries and mining plans. Furthermore, CA information records the site as within an area of probable past shallow coal mining. Such features are considered as presenting a potential risk to development by way of instability and potential collapse.

Mine gas

5.4 The potential for upward migration of mine gases beneath the site cannot be discounted. Such gases are particularly prevalent in former pillar and stall workings that remain open and allow them to build up over time. Mine gases pose a potential significant human health risk to the future occupants of dwellings and existing occupants of adjacent dwellings.

6. Proposed mitigation strategy

6.1 A review of geological and historical mining information at the site has shown that there is a **high** risk to surface stability from shallow mineworkings that may be present within the Kent's Thin, and potentially the Kent's Thick, coal seams. Additionally, there is a potential **low to moderate** risk to surface stability by way of unrecorded former mine entries and a **low to moderate** risk exists for the site to be affected by potential mine gas emissions.

Shallow mineworkings

6.2 Geological, historical and CA mapping all demonstrate there to be a plausible risk presented by shallow mineworkings within the Kent's Thin and Kent's Thick coal seams present beneath the site. It would be prudent, therefore, to undertake proof drilling across the site to confirm the depth to rockhead and depth to/nature of the underlying coal seams. Boreholes should be put down to 30m below existing ground levels with appropriate permission and licences obtained from the Coal Authority prior to commencing any such intrusive works. If shallow mining of the above coal seams is proved as presenting a risk to the surface stability of the site then drilling and grouting works would be required to consolidate the workings or the use of an appropriately designed foundation may be appropriate, subject to the findings of an intrusive investigation.

Mine entries

6.3 The presence of unrecorded mine entries should be confirmed. During site enabling works and a site strip the exposed sub soils should be checked for the presence of disturbed and potentially unstable ground associated with backfilling of such features. Vigilance should be taken during such works with respect to any anomalous findings. If mine entries are identified on the site, then these will require treatment by grouting and capping at the surface and the siting of any new development footprint over these features or within influencing distance should be avoided. In such circumstances consultation with the Coal Authority is recommended.

Mine gas

6.4 The incorporation of robust gas protection measures during construction are considered likely within the new development. However, such measures are inherently incorporated within the construction of new buildings by way of use of a well-constructed ground floor slab or use of a suspended floor slab offering a passively vented underfloor void, incorporation of a radon protection membrane (if appropriate) and a damp proof membrane together with the sealing of service entries. The requirement for a gas monitoring programme is not considered warranted, subject to the results of an intrusive investigation. It is recommended that advice and approval is sought from regulators at an early stage.

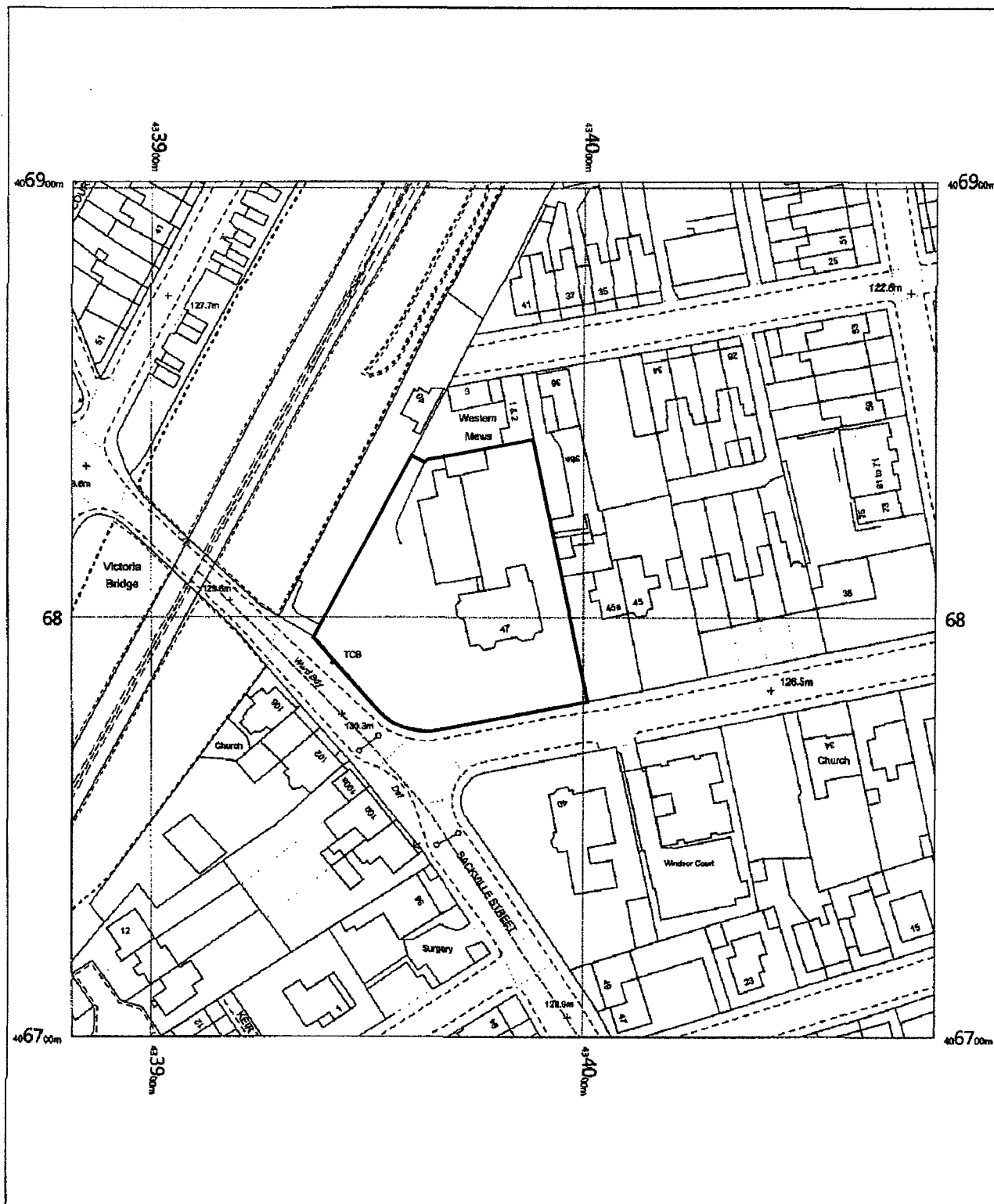
7. Conclusions

7.1 There is a potential risk posed to the redevelopment of the site from historic shallow mineworkings that may be present in the underlying Kent's Thin and Kent's Thick coal seams. Such risks comprise surface instability from collapse of past shallow mineworkings. Proof drilling is recommended to better understand these risks.

7.2 In addition, as there can never be total certainty with regard to unrecorded mine entries, the developer should be made aware of this possibility during site stripping and excavation for foundations. Any evidence of the suspected presence of former mine entries should be investigated further.

7.3 Advice should be sought from regulators as to adoption of appropriate measures to protect against ground (mine) gases within the new development.

Appendix A
Site location plan and proposed development layout



OS MasterMap 1250/2500/10000 scale
 Tuesday, December 12, 2017, ID: BLT-00676979
www.planningapplicationmaps.co.uk

1:1250 scale print at A4, Centre: 433982 E, 406801 N

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Proposed Care Facility at 'Westfield House' 47 Victoria Rd
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Site layout plan.

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Appendix B
Coal Authority mining report



The Coal
Authority

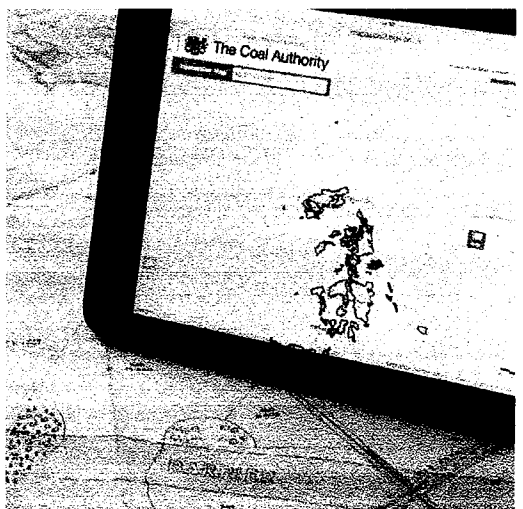
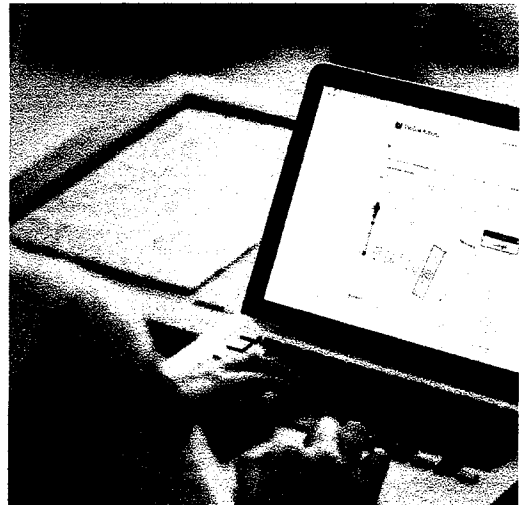
Resolving the impacts of mining

CON29M Residential Mining Report

47 VICTORIA ROAD
BARNSELY
S70 2BU

Date of enquiry: 15 January 2018
Date enquiry received: 15 January 2018
Issue date: 15 January 2018

Our reference: 51001773132001
Your reference:



CON29M 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.

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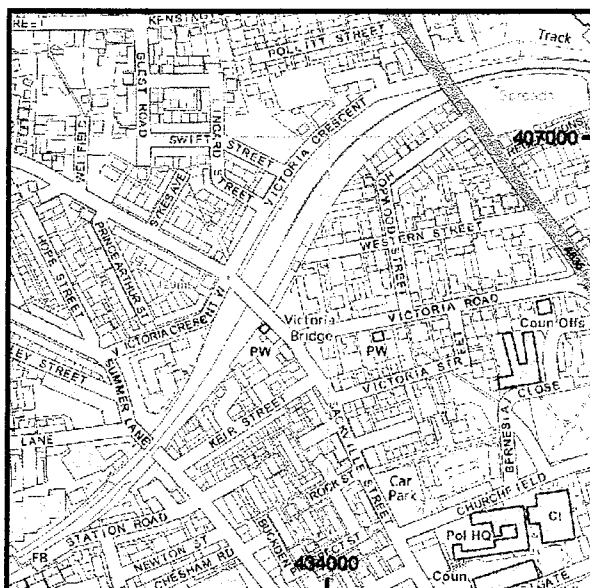
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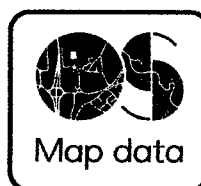
 /company/the-coal-authority

 /thecoalauthority

 /coalauthority



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	No
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	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 1 seam of coal at 90m to 100m depth, and last worked in 1834.

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.

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

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

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

9. Coal mining subsidence

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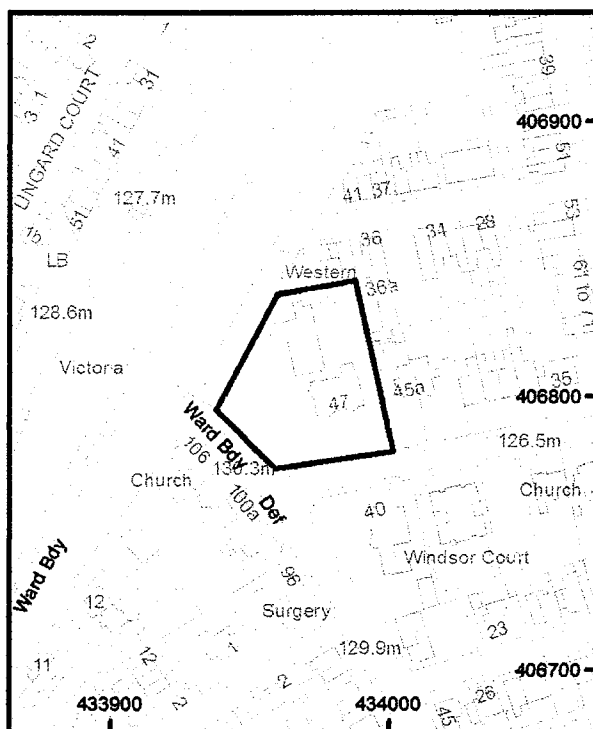
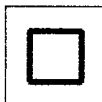
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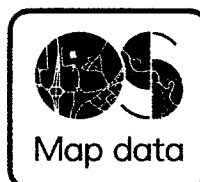
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