

COAL MINING RISK ASSESSMENT OF LAND OFF SOUTH COUSTON CROFTS, ARMADALE, BATHGATE

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PROJECT NUMBER	8431	
PROJECT TITLE	South Couston Crofts	
CLIENT	Colin Slattery 7 Crichtons Way Armadale Bathgate West Lothian EH483GB	
REPORT TITLE	Coal Mining Risk Assessment of Land off South Couston Crofts, Armadale, Bathgate	
REPORT REFERENCE	8431OR01	
REVISION	Date	Checked
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CONTENTS

1	INTRODUCTION	1
1.1	Site Location and Description	1
1.2	Scope of Coal Mining Risk Assessment	1
2	SOURCES OF INFORMATION	1
3	SITE GEOLOGY	2
4	IDENTIFICATION AND ASSESSMENT OF SITE SPECIFIC COAL MINING RISK	2
4.1	Summary of Potential Risks	2
4.2	Assessment of Mineral Instability	2
4.2.1	Underground Coal Workings.....	3
4.3	Assessment of Mine Gas Risk.....	4
5	MITIGATION STRATEGY PROPOSED.....	4
6	REFERENCES	5

APPENDICES

1	DRAWINGS	
	8431OD01	SITE LOCATION PLAN
2	COAL AUTHORITY REPORT	
3	NOTES ON LIMITATIONS	

COAL MINING RISK ASSESSMENT OF LAND OFF SOUTH COUSTON CROFTS, ARMADALE, BATHGATE

1 INTRODUCTION

1.1 Site Location and Description

The ~0.1 ha site is located at approximate National Grid Reference 294115E, 669259N, in the north of the village of Armadale, Bathgate, and is currently a derelict site at a former golf course. On review of google earth aerial imagery, the site appears to be used to store bales of hay and old tyres. It is proposed to develop the site with a residential property with a garage and gardens. The location of the site is shown on Drawing 8431OD01, Appendix 1.

The site is generally flat at an elevation of around 153 m AOD.

1.2 Scope of Coal Mining Risk Assessment

FWS Consultants Ltd (FWS) have been commissioned to prepare a Coal Mining Risk Assessment Report of the proposed development site, in order to provide the Local Planning Authority with information on coal mining and an assessment of its potential impact on land stability.

The Coal Mining Risk Assessment has been undertaken in accordance with the principles of current guidance including the Coal Authority's guidance document "Risk Based Approach to Development Management - Resources for Developers Version 4" (2017) (Ref. 1) and CIRIA "C758 Abandoned Mine Workings Manual" (2019) (Ref. 2).

The purpose of the Coal Mining Risk Assessment Report is to:-

- present a desk based review of available information on the coal mining issues that 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 issues; 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.

2 SOURCES OF INFORMATION

This report is based on the current information of past mining activities relevant to the site. The following sources of information have been used:-

- a site specific Coal Mining Consultants Report dated 3 September 2021 from the Coal Authority (Appendix 2),

- BGS Sheet 031E, Falkirk. 1:50,000 scale geological map Solid Edition, 1997.

Coal Authority interactive website.

3 SITE GEOLOGY

The BGS Geological Map shows the superficial deposits comprise Glacial Till to depths between 3.5 to 5 m bgl, and underlying bedrock geology comprises sandstones, mudstones, siltstones and coals belonging to the Scottish Lower Coal Measures which dip at approximately 3° to the northeast. Rock head is at approximately 148 m AOD (5 m bgl). The Armadale Coal Seam (up to 1m thick) outcrops approximately 100 m to the west and is anticipated at depths of between 11.5 m bgl (141.5 m AOD) in the west and 15.5 m (137.5 m AOD) in the east. The Colinburn Coal outcrops approximately 250 m west of the site and is anticipated at depths of between 25.5 m bgl (127.5m AOD) in the west and 29.5 m bgl (123.5m AOD) in the east. The Crofthead Slatyband Ironstone is also anticipated beneath the site but is anticipated at depths which will not present a significant risk to mineral instability to the proposed development.

The Coal Authority Consultation Report records workings within the Armadale Main Coal and Colinburn Coal beneath the site at depths between 21 m bgl (132 m AOD) and 35 m bgl (118 m AOD), respectively, which would appear contradictory to the BGS map and nearby BGS borehole (NS96NW30) records.

4 IDENTIFICATION AND ASSESSMENT OF SITE SPECIFIC COAL MINING RISK

4.1 Summary of Potential Risks

The table below summarises the potential risks associated with coal mining legacy for the proposed development site identified from the available sources of information.

Table 1: Summary of Mining Legacy Issues

COAL MINING ISSUE	YES	NO	SUMMARY RECORDS
Underground coal mining (recorded at shallow depth)			The site is within the likely zone of influence of workings in two seams of coal at depths between 21 m to 35 m, and last worked in 1905.
Underground coal mining (probable at shallow depth)			The site may be within the zone of influence from ancient (unrecorded) workings in seams of coal at shallow depth.
Mine entries (shaft or adits)			There are no reported mine entries on or within 20 m of the site.
Coal mining geology (fissures)			There are no coal mining geology structures within 100 m of the site.
Record of past mine gas emissions or potential			There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the site.
Recorded coal mining surface hazard			The Coal Authority has no records of coal mining surface hazards relating to the site or immediate surrounding area.
Surface mining (opencast workings)			The site is not located within the boundary of a historical opencast site, and does not lie within 200 m of a current opencast site, or within 800 m of a known future opencast site.
Other potential shallow worked minerals			There is no evidence of quarrying having been carried out on site.

4.2 Assessment of Mineral Instability

The principal factors influencing mineral instability for this site are summarised below.

4.2.1 Underground Coal Workings

Surface settlement above areas of total coal extraction (goaf) is typically rapid and can generally be assumed to be complete after a certain period. Settlement above pillar and stall workings, or old roadways, can be sudden and abrupt; and can occur long after abandonment, sometimes creating surface features known as crown-holes. It is generally considered that a cover of competent rock strata equivalent to ten times the height of the working provides adequate protection against crown-hole development (Ref. 2). Less rock cover can be adequate in certain circumstances (e.g. if the rock cover is particularly strong). Drift deposits give less protection than competent rock, and depending on the nature of the drift material (e.g. whether stiff boulder clay or running sand) considerably more cover may be needed to minimise the risk of surface ground movement. Where mining is identified within seams of less than 1 m thickness, it has been assumed that to accommodate for roadways the minimum worked height will be 1 m, otherwise the working height is assumed to be the seam thickness unless otherwise identified.

Table 2: Mineral Instability Risk Assessment

Seam Name	Seam Description	Workings	Assessment of Risk
Armadale Mains Coal	This seam is shown to outcrop 100 m to the west of the site. It is recorded at a depth of 21 m bgl (132 m AOD) and is 0.8 m thick.	This seam is indicated to have been worked beneath the site at thickness up to 1 m.	The cover of competent rock strata is 16m which is greater than ten times the height of the known workings. As such, recorded workings in this seam will present low risk of mineral instability to the proposed development.
Colinburn Coal	This seam is shown to outcrop 260 m to the west of the site. It is recorded at a depth of 35 m bgl (118 m AOD) and is 1.5 m thick.	This seam is indicated to have been worked beneath the site at thickness up to 1.5 m.	The cover of competent rock between the overlying Armadale Mains Coal is 14 m which is less than ten times the height of the known workings. As such, recorded workings in this seam will present a moderate risk of void migration to the above seam. However, the overall cover of competent rock strata is 30m which is greater than ten times the height of the known workings. As such, recorded workings in this seam will present low risk of mineral instability to the proposed development.

The above assessment is based on the Coal Authority report depths included in the Consultants Mining Report. However, as noted in the earlier Section 3, using the BGS geological map and borehole information (NS96NW30), the Armadale Coal Seam (up to 1m thick) is inferred to outcrop approximately 100 m to the west of the site and would be anticipated at depths of between 11.5 m bgl (141.5 m AOD) in the west and 15.5 m (137.5 m AOD) in the east, which would mean there would only be around 6.5 m of competent rock cover and this would (potentially) pose a high risk of mineral instability to the proposed development.

4.3 Assessment of Mine Gas Risk

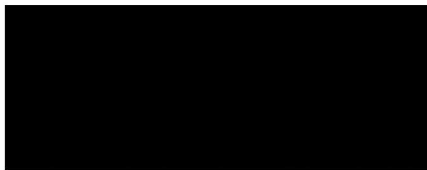
Based on the presence of recorded/unrecorded shallow mine workings, there is a moderate risk of mine gas emission within the site boundary.

5 MITIGATION STRATEGY PROPOSED

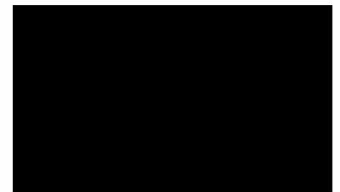
It is recommended that enquiries are made to the Coal Authority to obtain the mine abandonment plans for the Armadale Mains Coal and the Colinburn Coal seams to confirm the lateral extent and depth of the shallow mine workings beneath the site and to also clarify the discrepancies in the depths of working between BGS information and the Coal Authority information.

Subject to the findings of the additional enquiries, it may be necessary to undertake rotary boreholes to a depths of up to 20 m bgl to determine the presence and depth of Armadale Mains Coal and to investigate for evidence of workings. In addition due to the risk of mine gas, it is recommended that gas wells are installed to monitor for mine gas emissions.

Mine stabilisation works including proof drilling and grouting of the Armadale Mains Coal may be necessary across the site if workings are found at depths which pose a risk of mineral instability to the proposed development.



N THOMSON
SENIOR GEOENVIRONMENTAL ENGINEER



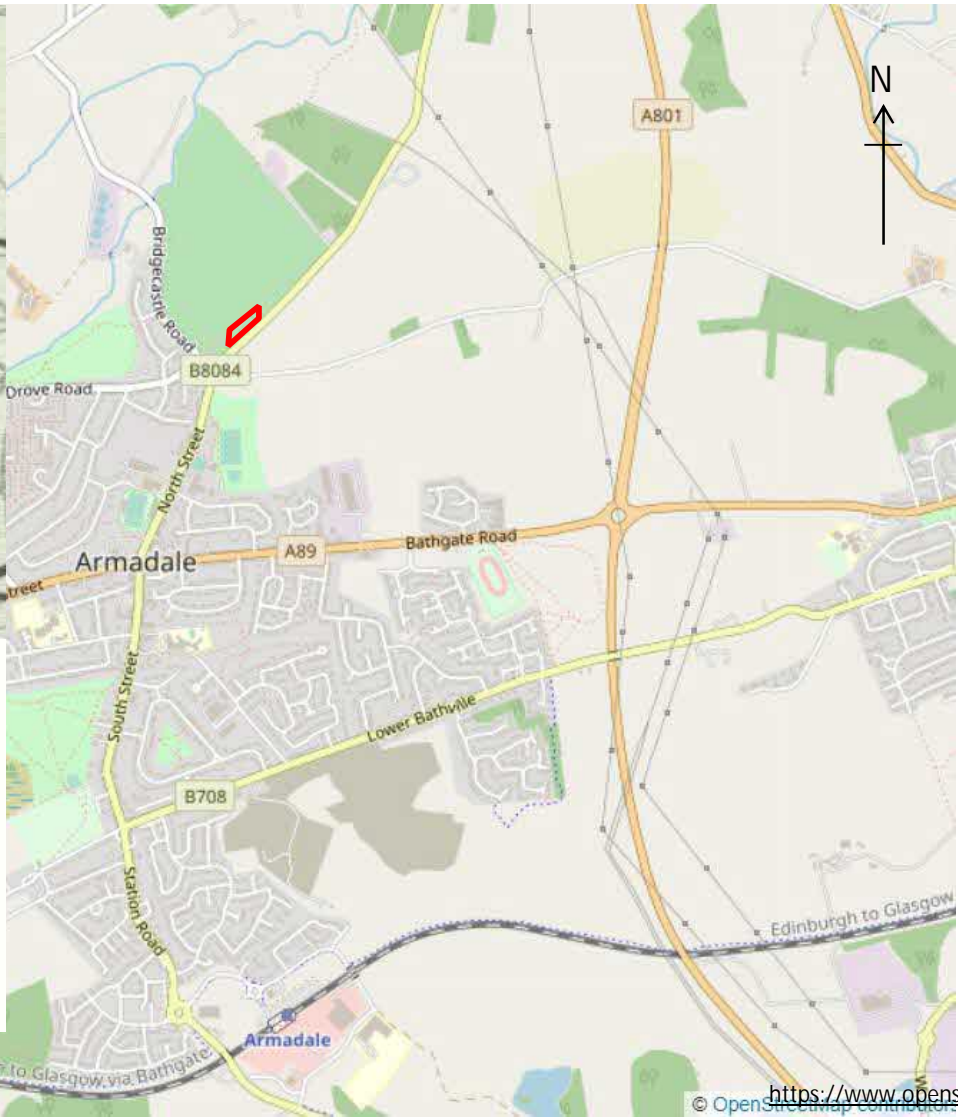
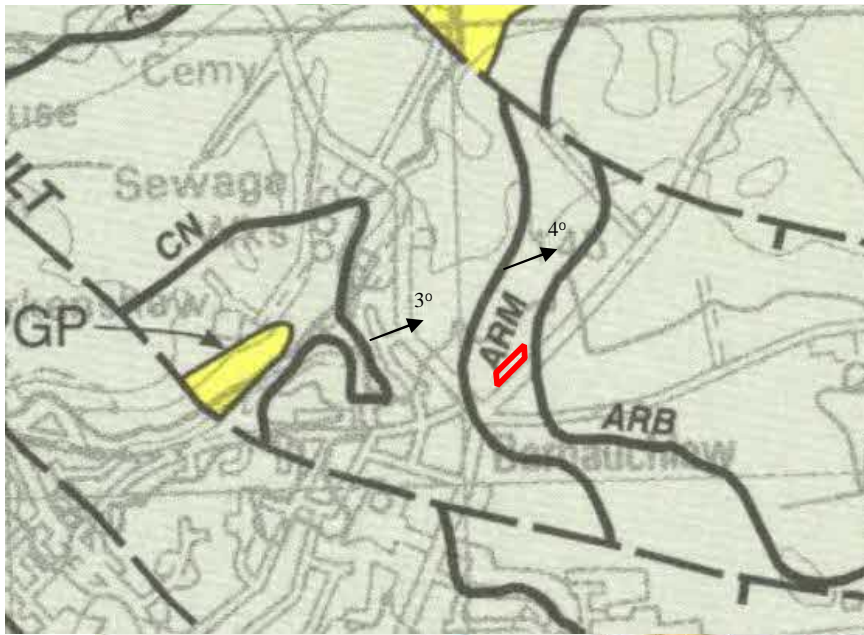
M LAKEY
DIRECTOR

6 REFERENCES

- 1 Coal Authority, 2017, Risk Based Approach to Development Management Resources for Developers, Version 4.
- 2 CIRIA, 2019, C758 Abandoned Mine Workings Manual.
- 3 BGS 1997. BGS Maps Sheet 031E, Falkirk, 1:50,000 scale maps, Solid Edition.

APPENDIX 1

DRAWINGS



UDC	UPPER DRUMGRAY COAL (CARRON MAIN)	LOWER COAL MEASURES (LCMS) cyclic sequences of sandstones, siltstones, mudstones, ironstones, coals and seatracks
MDC	MID DRUMGRAY COAL (MIDDLE SPLINT)	
LDC	LOWER DRUMGRAY COAL (UPPER COXROD)	
SGA	SHOTTS GAS COAL (LOWER COXROD)	
MILL	MILL COAL	
ARB	ARMADALE BALL COAL	
ARM	ARMADALE MAIN COAL	
CN	COLINBURN COAL	
CSI	LOWSTONE MARINE BAND CROFTHED SLATYBAND IRONSTONE	
BGC	DRUM FIRECLAY BOWHOUSEBOG COAL	



NOTES / KEY

SITE LOCATION

DRAWING TITLE

SITE LOCATION PLAN

PROJECT TITLE

SOUTH COUSTON CROFTS

CLIENT

COL-IN SLATTERY

STATUS

FINAL

DRAWN BY

NT

SCALE

AS SHOWN

PROJECT NUMBER

8431

DATE

Sept 2021

DRG. No.

8431OD01

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APPENDIX 2

COAL AUTHORITY REPORT



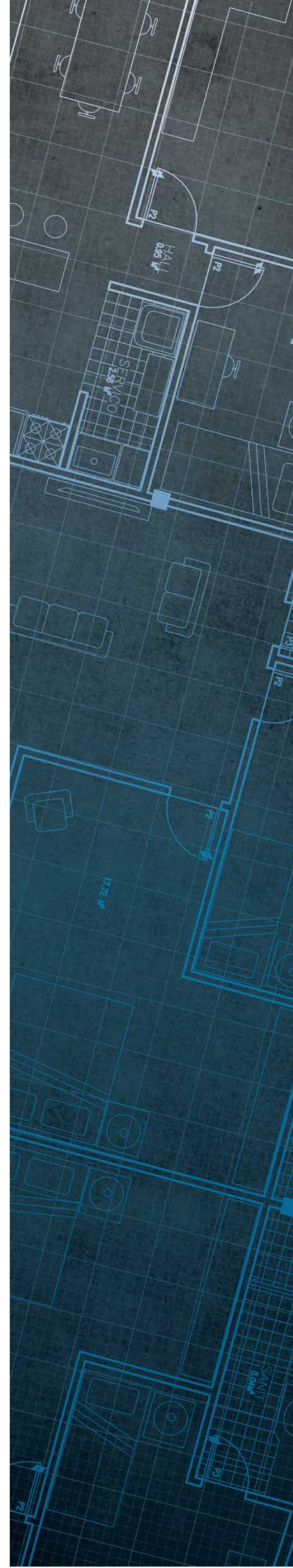
The Coal
Authority

Consultants Coal Mining Report

Former Golf Clubhouse
South Couston Crofts
Armadale
West Lothian
EH48 3QD

Date of enquiry: 3 September 2021
Date enquiry received: 3 September 2021
Issue date: 3 September 2021

Our reference: 51002635190001
Your reference: 8431



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

Nicholas Thomson

Enquiry address

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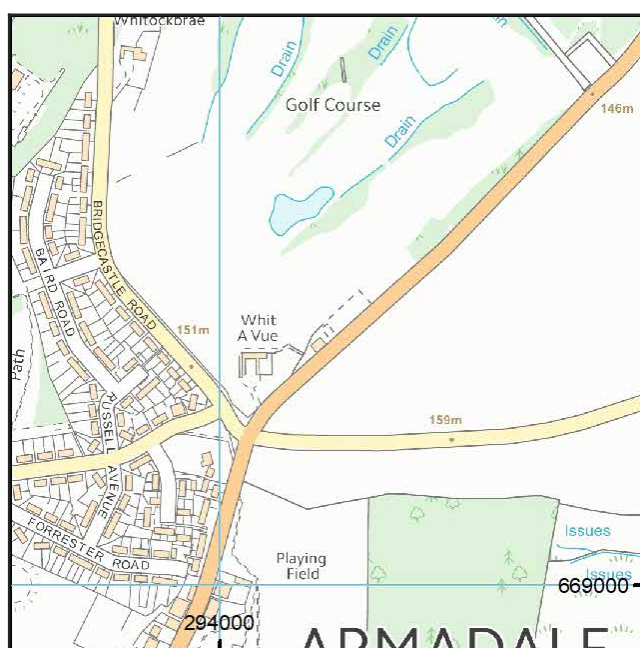
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 /company/the-coal-authority

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Approximate position of property



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Section 1 –Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
COUSTON	ARMADALE MAIN	Coal	7BLK	21	Beneath Property	3.8	North-East	76	1900
BARBAUHLAW	COLINBURN	Coal	732L	35	Beneath Property	3.3	North-East	152	1905
BARBAUHLAW	COLINBURN	Coal	732M	35	Beneath Property	3.3	North-East	61	1899
unnamed	SLATEYBAND IRONSTONE	Coal	7AG0	47	Beneath Property	2.0	North	100	1900
EASTON	KNIGHTSWOOD GAS	Coal	7338	475	South-West	3.1	North	168	1968
EASTON	KNIGHTSWOOD GAS	Coal	7336	483	West	3.1	North	168	1968
EASTON	KNIGHTSWOOD GAS	Coal	7335	484	North-West	3.1	North	168	1966
EASTON	KNIGHTSWOOD GAS	Coal	733B	487	South	4.2	North-East	168	1966
EASTON	KNIGHTSWOOD GAS	Coal	733C	497	South-East	4.2	North-East	168	1957

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

S4069	S4080	14777
S1916	S4083	S3717
S708	S4798	S3556

Our records show we have more plans than those shown above which could affect the enquiry boundary.

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

No outcrops recorded.

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

Please refer to the “Summary of findings” map (on separate sheet) for details of any opencast areas within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 –Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

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

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

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

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 –Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

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

Withdrawal of support notices

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

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

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.

Section 4 –Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

Section 5 –Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial –mitigating the impact of existing pollution or Preventative –preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices




Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

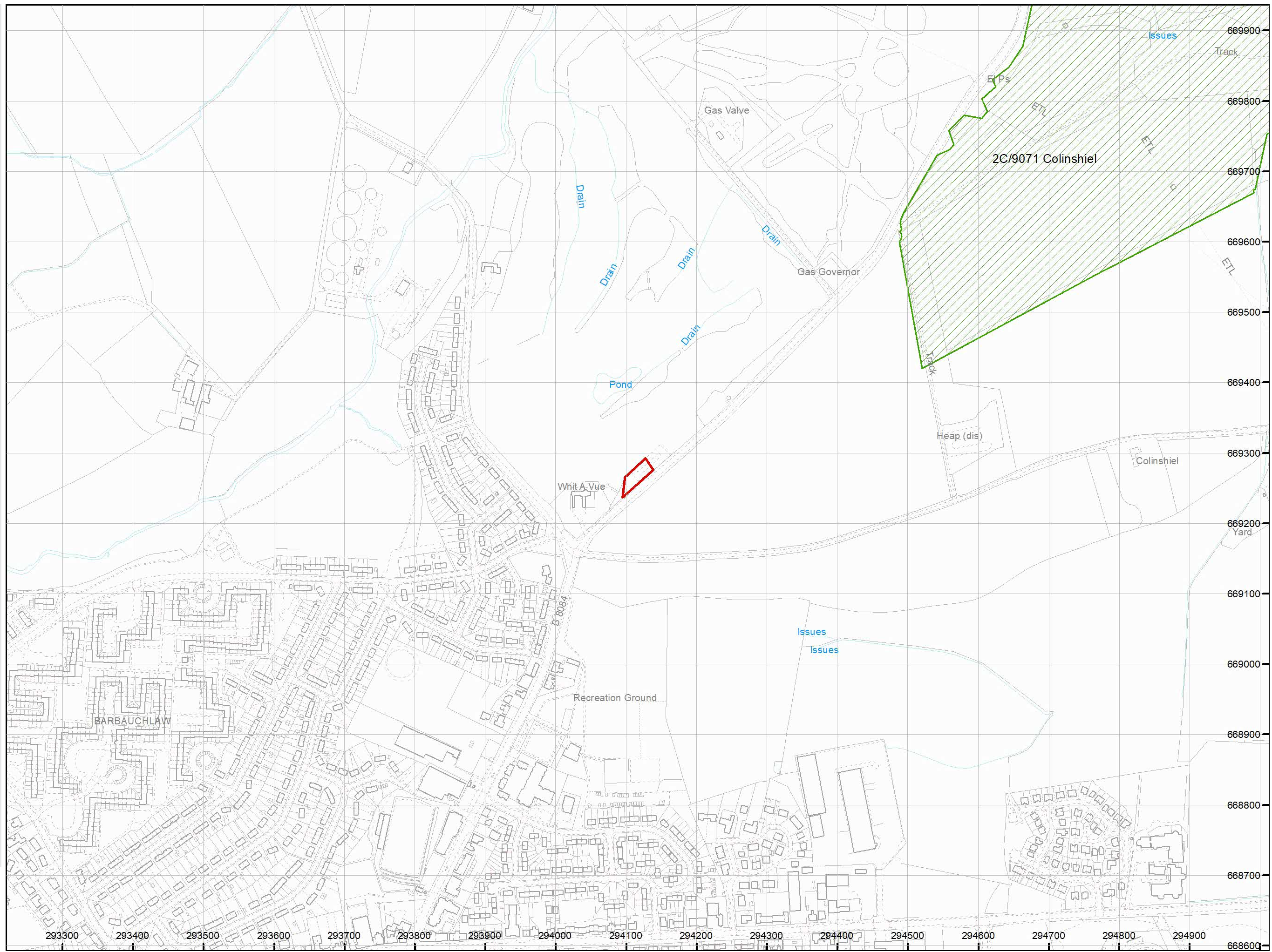
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Opencast mine licence area 
- Unlicensed opencast site 

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APPENDIX 3

NOTES ON LIMITATIONS

NOTES ON LIMITATIONS

- 1 FWS Consultants Ltd (“FWS”) has prepared this report solely for the use of the client and/or his agent (the “Client”) on the basis of exchange(s) of written proposals and instructions, and FWS accepts no responsibility or liability:-
 - a) for use of this report by any party other than the person for whom it was commissioned, or;
 - b) for the consequences of the report being used for any purpose other than that for which FWS was instructed to prepare it.

Should any third party wish to use or rely upon the contents of the report, written approval from FWS must be sought.

- 2 All information supplied by the Client, the Client’s staff and professional advisers, local authorities, other statutory bodies, investigation agencies and publicly accessible databases, shall be provided to FWS in writing, and is accepted as being correct unless otherwise specified in writing by the discloser of the information.
- 3 The conclusions and recommendations in this report represent the professional opinions of FWS derived from currently accepted industry practices, and through the exercising of reasonable skill and care to be expected of a professional geosciences and environmental consultancy of similar size and experience. The assessments and judgments given in this report are directed by and limited to both the finite data on which they are based and the proposed works to which they are addressed.
- 4 Environmental and geotechnical desk studies comprise a study of available information obtained from various identified sources, authorities and parties. The information reviewed cannot be exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. For clarity, no independent verification of this data is carried out by FWS and it is accepted at face value. Any identified risks in desk study reports are perceived risks based on the information available at the time. Actual risks can only be assessed after carrying out a thorough physical investigation of the site that serves to validate such identified risks.
- 5 Data acquisition during site investigations is subject to the limitations of the methods of investigation used, site conditions and access constraints. Exploratory holes undertaken during fieldwork, particularly boreholes and/or trial pits, investigate a small volume of ground in relation to the size of the site and thus can only provide an indication of site conditions. The opinions provided and recommendations given in this report are based on the desk study information and ground conditions apparent at the site of each of the exploratory holes. There may be ground conditions elsewhere onsite that have not been disclosed by the investigation and which therefore have not been taken into account in this report. FWS will take all due care and make commentary on the adequacy of data collection and therefore the ability to highlight the presence or otherwise of exceptional conditions.
- 6 Owing to the natural variation of the systems that are being investigated, and the anthropological impact similarly changing through time, the findings and opinions in this report are relevant to the dates of the site works and should not be relied upon to represent conditions after a reasonable passing of time. Site conditions will change over time due to natural variations and human activities. The comments made on groundwater, surface water and soil gas conditions are based on observations made at the time that the site work was carried out. It should be noted that these conditions will vary owing to seasonal, tidal and meteorological effects. Variation in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, or subsequent developments or activities on the site or adjacent area.
- 7 The scope of the investigation, as agreed between FWS and the Client, was undertaken based on the specific development proposals of the Client and may be inappropriate to another form of development or scheme.
- 8 The opinions expressed in this report regarding contamination, geotechnical and/or waste assessments are based on simple statistical analysis and comparison with available guidance values. No liability can be accepted for the retrospective effects of any changes or amendments to these values.