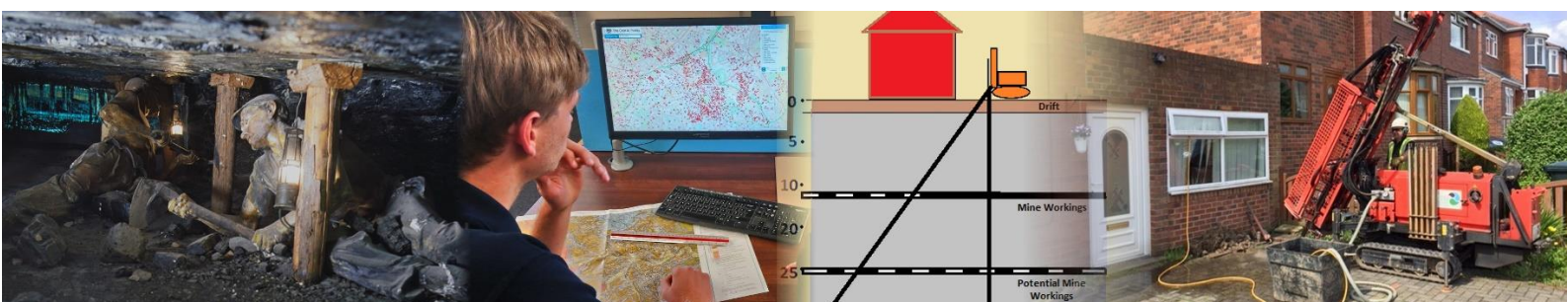




GEOLOGICAL
GEOTECHNICAL
GEOENVIRONMENTAL
CONSULTANCY
DRILLING & DATA ACQUISITION



GEOINVESTIGATE LIMITED

Coal Mining Risk Assessment (CMRA)

LOCATION	Cae Glo Lane, Cefn Mawr, Wrexham, LL14 3DN
ISSUE DATE	2 October 2020
FOR	Mark Rogers
CLIENT REF.	
OUR REF.	G20331

Prepared by

Charlotte Campion MGeoSci (Hons) FGS
Senior Geo-environmental Engineer

Checked by

Ross Nicolson BSc(Hons) MSc(Eng) CEng MIM³
Principal Geotechnical Engineer

SUMMARY FINDINGS

OUTCOME (MITIGATION REQUIRED?) (YES or NO?)

YES. The proposed development is possibly underlain by perhaps 2 levels of very shallow and shallow unrecorded mine working with the potential to significantly impact surface ground stability within the proposed building area. Whether it will impact the development depends on drift/bedrock depth, mine working depth and rock cover thickness. Intrusive ground investigation is therefore required to establish these parameters within the site.

WHAT TO DO NEXT

Obtain quotes for the intrusive site investigation works (if considered appropriate). The cost of the SI works should be a **"lump sum" fixed price**. Geoinvestigate can provide advice and assistance with helping you find suitable site investigation & drilling contractors. Call us on 01642 713779 or email enquiries@geoinvestigate.co.uk.

1. CMRA INTRODUCTION

1.1 SITE LOCATION AND DESCRIPTION

The approximate centre of this site is at National Grid Reference E 328024 N 342727 with a ground height of about 147m AOD. The boundary shown RED in the Coal Authority (CA) report provided in Appendix A corresponds with the planning application area. It is proposed to develop the site with a single new dwelling and associated detached double garage. The location and layout of the proposed development is shown in Appendix B.

Historical Ordnance Survey (OS) mapping of 1873 shows the site to be in an undeveloped parcel of land within an area of residential development. 'Old Shafts (coal)', surface workings, quarries and the 'New British Iron Works' are recorded in the distant vicinity of the site. The map record suggests that the site has not been subject to significant past development. The site is presently occupied by a small garden area and a shed and garage.

The historical map record provides no evidence that the site itself, or adjacent areas, have been subject to surface mining activity. However, in the more distant vicinity there is evidence of extensive underground mining and surface working.

Description & Layout of Proposed Development: It is proposed to develop the site with a single new dwelling and associated detached double garage. The layout of the development is shown in Appendix B.

Risk Methodology Applied: This document and the risk assessment methodology adopted herein is based on CA publication RISK BASED APPROACH TO DEVELOPMENT MANAGEMENT - GUIDANCE FOR DEVELOPERS Version 3, 2014 and Version 4 - 2017. The template contained therein is adopted with amendments made by Geoinvestigate Limited.

2. ASSESSMENT OF SITE-SPECIFIC COAL MINING ISSUES

The table below summarises the potential risks associated with coal mining legacy for the proposed development site identified from the CA report in Appendix A:

Coal Mining Issues	Yes	No	Risk Assessment/Remarks
Past underground coal mining	Yes		2.1.1 (refer below)
Probable unrecorded shallow workings		No	2.1.2
Spine roadways at shallow depth		No	
Mine entries		No	2.1.3
Outcrop	Yes		2.1.2
Geological faults, fissures and breaklines		No	
Opencast Mines		No	
Coal Mining Subsidence		No	
Mine Gas		No	2.1.4
Site investigations		No	

Note: For those coal mining issues above identified as "Yes" or highlighted "YELLOW" a more detailed discussion and assessment are made of the risks to the application site and the proposed development.

2.1 DETAILED DISCUSSION & ASSESSMENT RESPONSE

2.1.1 Past Underground Mining

The Coal Authority report in Appendix A identifies past/recorded underground mining beneath the site in 5 seams of coal at depths between 56m and 173m, last worked in 1867. In our opinion such working lies too deep to impact surface ground stability within the proposed development area.

This does not mean that shallower unrecorded mine working does not exist beneath the site though the Coal Authority do not believe this to be so in this instance. Mine maps and other documents can get lost or destroyed over the years and if mining was very old there may be no records about it whatsoever and local memories fade quickly.

The strata and coal seams dip at 9.0 - 18.4 degrees E and SE.

2.1.2 Probable Unrecorded Shallow Workings

According to the CA report the site does not fall within an area of Probable Unrecorded Shallow Workings. The CA define Probable Unrecorded Shallow Workings as "Areas where the Coal Authority believes there to be unrecorded coal working that exist at or close to the surface" (i.e. less than 30m).

Coal outcrop position is uncertain and occurs very close to and perhaps beneath the site. It is our experience that the CA consider coal outcrop to pose similar risk to probable shallow coal mine working.

The location of the site is shown on the extract of BGS solid geology map presented in Appendix C. The tentative elevation of the site relative to the vertical geology column is shown below the map.

The site is not shown to be underlain by superficial deposits. The bedrock underlying the site is recorded as Cefn Rock (sandstone). However, based on the CA report description of the treatment of mine entry 327342-228 drift/bedrock depth of 5m may be expected at the site.

The CA report shows outcrop of the Sulphur Coal 1.4m west of the site, dipping east under the site. A second outcrop of the same coal is recorded 39.4m west of the site, again dipping east under the property. The geological map does not record the Sulphur Coals adjacent to the site but shows instead a single outcrop of the Quaker Coal along the west site boundary.

Based on the CA outcrop information Sulphur Coals are estimated to underlie the site at a depth <1m and between 6m and 13m. According to the Coal Authority both Sulphur Coals are workable.

In our opinion it is possible that unrecorded mine working may exist in the Sulphur Coals at very shallow and shallow depth and could significantly impact surface ground stability within the development area. Alternatively, it is possible

that these coals were not worked because of their high sulphur content and the toxic and bad odour they may give when burnt. This however is speculation.

2.1.3 Mine Entries

According to the CA report no recorded mine entries are present within the site boundaries but three are recorded within 100m of the site. These are recorded between 50m and 100m to the north and west of the site and are not considered to be within influencing distance of the site.

2.1.4 Mine Gas

No mine gas incident or remediation is recorded within 500m of the proposed development and typically, in the UK mine gas is Low risk. Notwithstanding, given the possible presence of shallow mine working beneath the proposed development area and the serious nature of mine gas it is recommended that the risk is raised to **MODERATE** to perhaps High until proven otherwise by gas testing during drilling.

3. SUMMARY AND OUTCOME

The CA have identified the development site as falling within the Development High Risk Area (DHRA) because of coal outcrop.

This CMRA has identified the possible presence of 2 levels of mine working at very shallow and shallow depth beneath the new building.

Whether shallow mine working actually exists beneath this site and whether it poses a significant risk to the development cannot be properly assessed without additional information namely drift depth, coal seam depth and mine working (if any) depth and rock cover thickness.

In our opinion exploratory drilling is required within the site to obtain this information and enable further assessment of the risks posed by possible shallow mine working at this locality.

Gas monitoring must be carried out during drilling.

4. MITIGATION STRATEGY PROPOSED AND CONCLUSION

To properly determine the coal mining risk at this site it is proposed to drill 2 or 3 boreholes at the property to target depths up to 30m (but not necessarily reaching 30m) to locate shallow coal seams and mine working (if any) below the new development as well as establishing drift and bedrock depth.

Gas monitoring **MUST** be carried out during drilling.

Risks for Different Drilling Scenarios					
Air flush	Mist flush	Foam flush	Water flush	Mud flush	Additional controls
HIGH	HIGH / MED'M	HIGH / MED'M	LOW	LOW	- Monitoring at rig and other open holes. - Seal boreholes

A Coal Authority Permit needs to be obtained (ahead of) further intrusive exploratory drilling. Water Drill Flush to be used when drilling. Permit application must state **WATER ONLY DRILL FLUSH** for the safety of the public and drill crew.

The use of less safe drill flush types would expose both the permit holder and drilling contractor to prosecution by the HSE and hefty fines.

On the basis of the CMRA work to date, we are of the opinion that the mining stability and mine gas risks posed by the strata beneath this site from coal mining legacy can be mitigated by routinely adopted measures and should not preclude planning permission being registered with regard to coal mining legacy issues.

In conclusion we see no reason why Planning Permission should not be granted in the interim with respect to coal mining legacy issues and that these works form a condition on the planning approval.

Appendices:

- A. CA Consultants Coal Mining Report issued 28 September 2020 ref 51002311293001
- B. Site Location, Development Layout & Site Images
- C. Extracts of BGS Geology Map, Sheet 121 Wrexham- at 1:50000 scale

APPENDIX A
COAL AUTHORITY REPORT

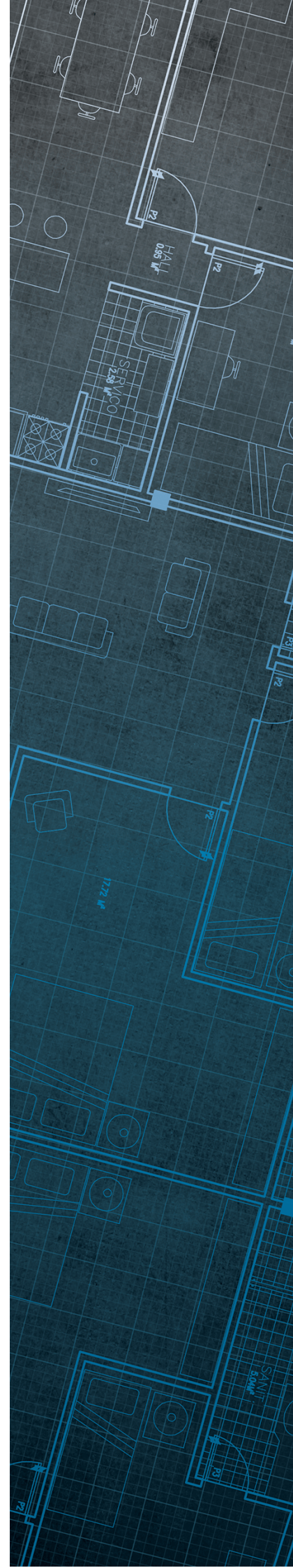


The Coal
Authority

Consultants Coal Mining Report

Cae Coch Lane
Cefn Mawr
Wrexham
LL14 3DN

Date of enquiry:	28 September 2020
Date enquiry received:	28 September 2020
Issue date:	28 September 2020
Our reference:	51002311293001
Your reference:	G20331



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

GEOINVESTIGATE

Enquiry address

Cae Coch Lane
Cefn Mawr
Wrexham
LL14 3DN

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

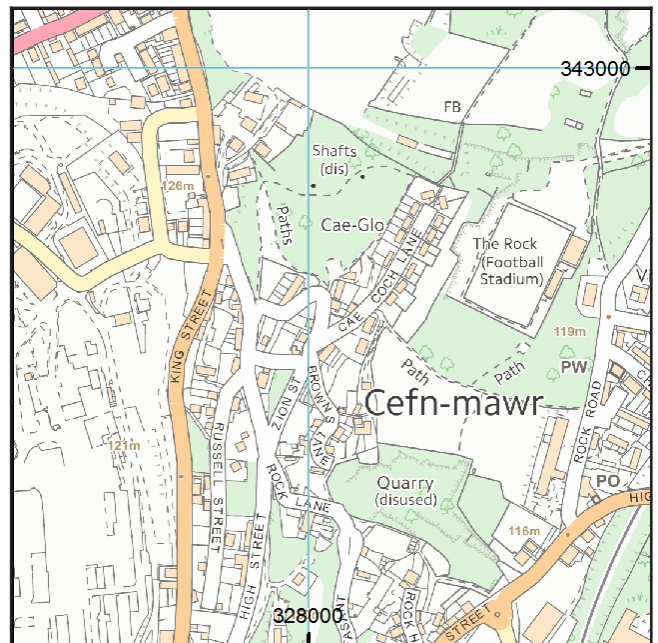
www.groundstability.com

 @coalauthority

 /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
CEFN	WARRAS	Coal	384T	56	Beneath Property	17.9	East	100	1860
unnamed	STONE	Coal	38VS	84	West	9.0	East	200	1860
unnamed	STONE	Coal	38VN	85	North-West	9.0	East	200	1860
unnamed	JOHN O'GATE	Coal	384W	99	Beneath Property	18.0	South-East	60	1860
unnamed	NANT (SOFT 5 QTRS)	Coal	38WK	110	North-West	9.4	East	160	1912
unnamed	NANT (SOFT 5 QTRS)	Coal	38WM	110	West	9.5	East	160	1862
unnamed	RUABON YARD (SOFT 5 QTRS)	Coal	382N	115	North-West	9.0	East	110	1862
unnamed	RUABON YARD (SOFT 5 QTRS)	Coal	3802	116	West	9.0	East	110	1862
unnamed	HALF YARD / QUEEN	Coal	90B9	120	West	9.0	East	50	1860
unnamed	WALL AND BENCH	Coal	380G	120	West	9.0	East	110	1860
unnamed	WALL AND BENCH	Coal	7B4S	120	North-West	9.0	East	110	1860
unnamed	TWO YARD	Coal	38V1	128	Beneath Property	18.0	South-East	180	1862
unnamed	HALF YARD / QUEEN	Coal	3818	137	West	9.0	East	50	1860
unnamed	QUAKER	Coal	3ACY	141	North	18.4	South-East	100	1848
unnamed	QUAKER	Coal	38UG	149	Beneath Property	18.4	South-East	200	1867
unnamed	QUAKER	Coal	3ACZ	163	North-East	18.4	East	200	1868
unnamed	MAIN	Coal	7H2H	169	North	18.4	East	270	1868
unnamed	MAIN	Coal	38SO	173	Beneath Property	18.4	East	270	1846
unnamed	RUABON YARD (SOFT 5 QTRS)	Coal	3801	256	South	18.4	East	110	1867

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	327342-228	327945 342795	This shaft was sunk pre 1875 and was originally filled before 1912. The shaft was located in 1992 by drilling by NKC Geotech Ltd. Wrexham Maelor Borough Council notified British Coal that they proposed to cap this commencing 25th October 1993. They proposed to use a 6m square 0.45m thick concrete cap with 40mm reinforcement bars in both directions in top and bottom faces of cap and founded at rock head some 5m deep. We have no record if these works were or were not carried out.	Coal	
Shaft	327342-575	327917 342727		Coal	
Shaft	328342-453	328003 342791		Coal	

Abandoned mine plan catalogue numbers

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

14884	NW1411	NW1503
5974	13855	NW1401
9549	14892	PO0

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

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
SULPHUR COALS	Coal	Yes	1.4	West	12
SULPHUR COALS	Coal	Yes	39.4	West	188

Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

Opencast mines

None recorded 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

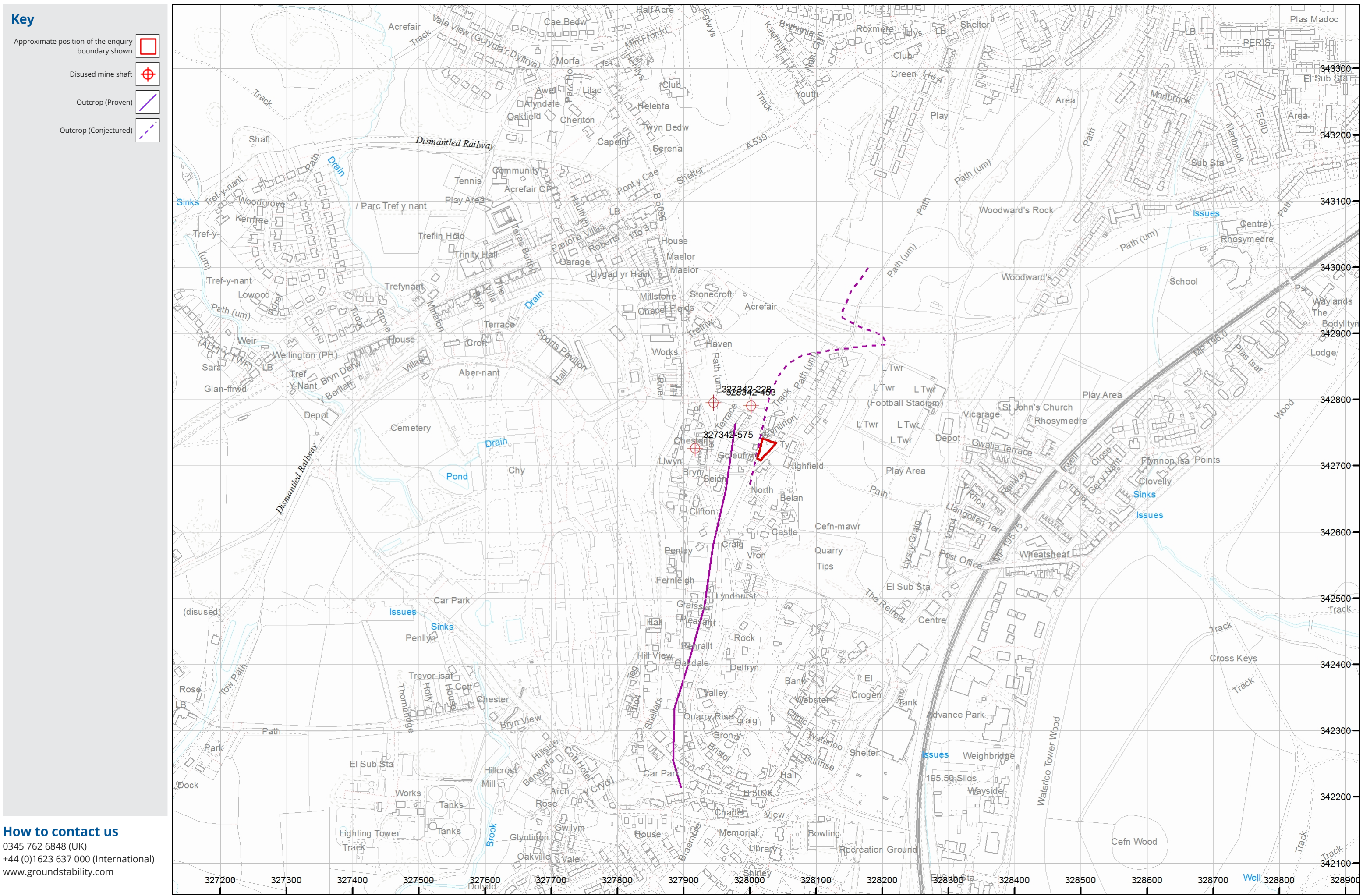
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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VAT receipt

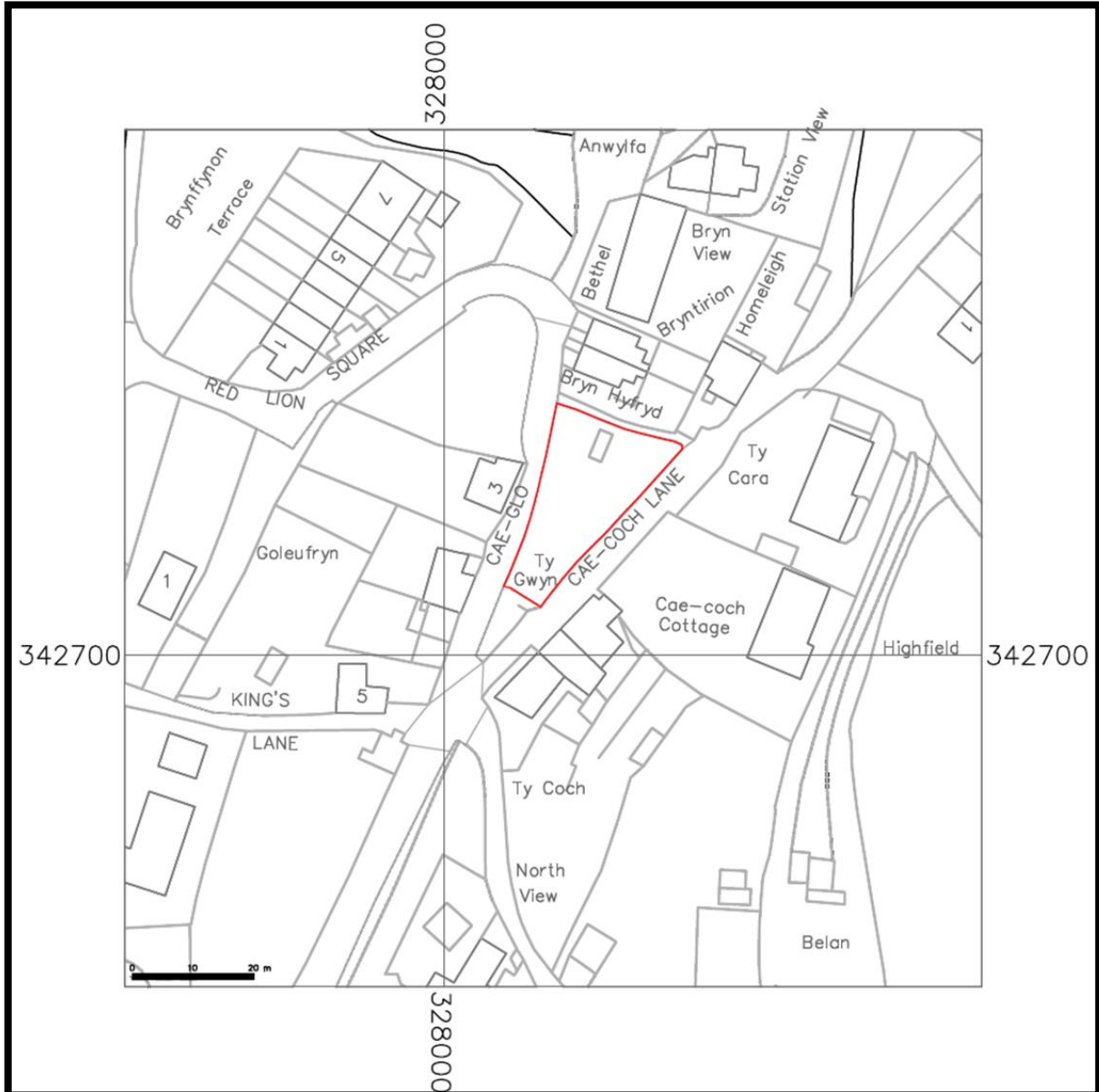
Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	28 September 2020
Issued to	GEOINVESTIGATE TERRY DICKEN INDUSTRIAL ESTATE TERRY DICKEN INDUSTRIAL ESTATE, ELLERBECK WAY STOKESLEY NORTH YORKSHIRE TS9 7AE
Property search for	CAE COCH LANE CEFN MAWR WREXHAM LL14 3DN
Reference number	51002311293001
Date of issue	28 September 2020
Cost	£112.13
VAT @ 20%	£22.43
Total received	£134.56
VAT registration	598 5850 68

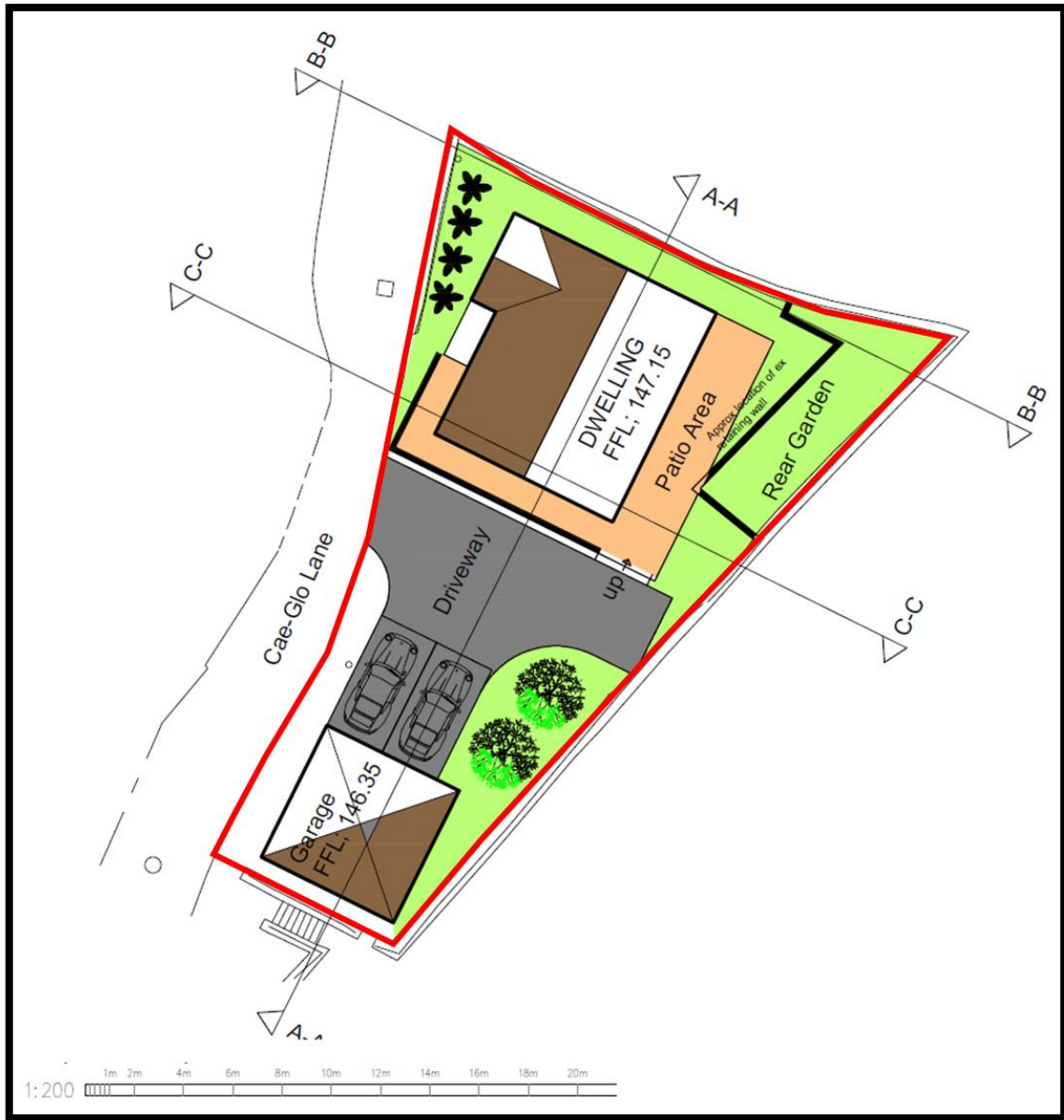
The map highlights any specific surface or subsurface features within or near to the boundary of the site.



APPENDIX B

DEVELOPMENT LOCATION, LAYOUT & SITE IMAGES





APPENDIX C

EXTRACTS BGS GEOLOGY MAP

