Wales and West Housing

Coal Mining Risk Assessment

Report

For

Brymbo Methodist Church

&

Engedi Chapel

June 2023

REPORT NO: 23WWH009/CMRA

- *Desk Studies and Site Walkovers*
- *Intrusive Contaminated Land Investigations*
- *Geotechnical Appraisals and Ground Investigations*
- *Landfill Gas Assessments and Remedial Design*
- *Remediation Design and Implementation*
- *Remediation Project Management and Supervision*
- *Site Abnormal Assessments (Foundations and Contaminated Land)*

GEOTECHNICAL - CONTAMINATED LAND - FLOOD RISK

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BETTS GEO
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1 EXECUTIVE SUMMARY

Note – The following summary is not exhaustive and is to be used for guidance purposes only. The full report should be consulted for full details.

Site Location
The site is located between Tai Owain and the High Street in Brymbo, Wrexham, LL11 5BL. The coordinates on National Grid are 329420, 353850. The proposed site is approximately 1200m2 in total and lies at an elevation of 218m AOD.

Proposed Development
The planning application includes the demolition of the existing buildings and construction of two apartment buildings containing 16No apartments.

Site Description
On Site
The site is currently occupied by the former Brymbo Methodist Church, a two-storey brick building with a slate roof and single storey extensions on the west and southeast sides. On the north of the plot is the former Presbyterian Chapel. To the south of the Methodist Church there is an area of tarmac hardstanding and the site is surrounded by brick and stone walls and metal fencing. The site slopes from north to south with the buildings being lower than ground level at the north and east of the site. Retaining walls support the northern, western and eastern sides and there are services to the site.

Published Geology
The BGS map shows the geology (1:10,000) beneath the site as the following:

- Pennine Coal Measures Formation – Mudstone, Siltstone & Sandstone
- Cefn Rock Sandstone
- Inferred coal outcrop adjacent to the west of the site – Crank Seam (on BGS 1:10,000 map but not on CA plot).

Coal Mining
There is a **High risk** unrecorded shallow workings on the site due to the Crank Seam mapped to the west of the site and dipping beneath it and the cavities, infilled ground and coal seams encountered on a previous site investigation to the north of the site.

The underground workings recorded by the Coal Authority as being 102m beneath the site are considered at a sufficient depth and age (last worked 1906) not to pose a risk to development at the surface.

An intrusive investigation consisting of rotary drill holes should be undertaken to confirm the extent (subject to CA licence). It is suggested in the first instance as a preliminary investigation that 3 No 30m deep rotary boreholes are undertaken within the development area.

There is a risk of ground gas which will require monitoring, therefore a shallower 3-4m rotary or window sampling holes are recommended in the footprint of the proposed buildings.

In conclusion, the site is situatable for residential development, post competition of appropriate coal mining mitigation measures which may include grouting. The extent of the mitigation measures and grouting volumes will be determined by, and are subject to, the completion of intrusive ground investigation. This ground investigation may be undertaken in several stages.

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2 SITE DESCRIPTION

2.1 Introduction

This investigation was carried out on the instruction of Wales and West Housing. The purpose of the work was to carry out a Coal Mining Risk Assessment Report to evaluate available geological, mining, and historical data to assess the potential for the site to be affected by underground mining. The report has been prepared in accordance with the Coal Authority (CA) Guidance Risk based Approach to development management (Version 4 2017) to support a planning application to Wrexham County Borough Council. The planning application includes the demolition of the existing buildings and construction of two apartment buildings containing 16No apartments. A proposed layout has been provided below:



Engedi Chapel, Brymbo Residential Development: Location and Proposed Site Plan, from Wrexham County Borough Council

2.2 Site Location

The site is located between Tai Owain and the High Street in Brymbo, Wrexham, LL11 5BL. The coordinates on National Grid are 329420, 353850. The proposed site is approximately 1200m^2 in total and lies at an elevation of 218m AOD.

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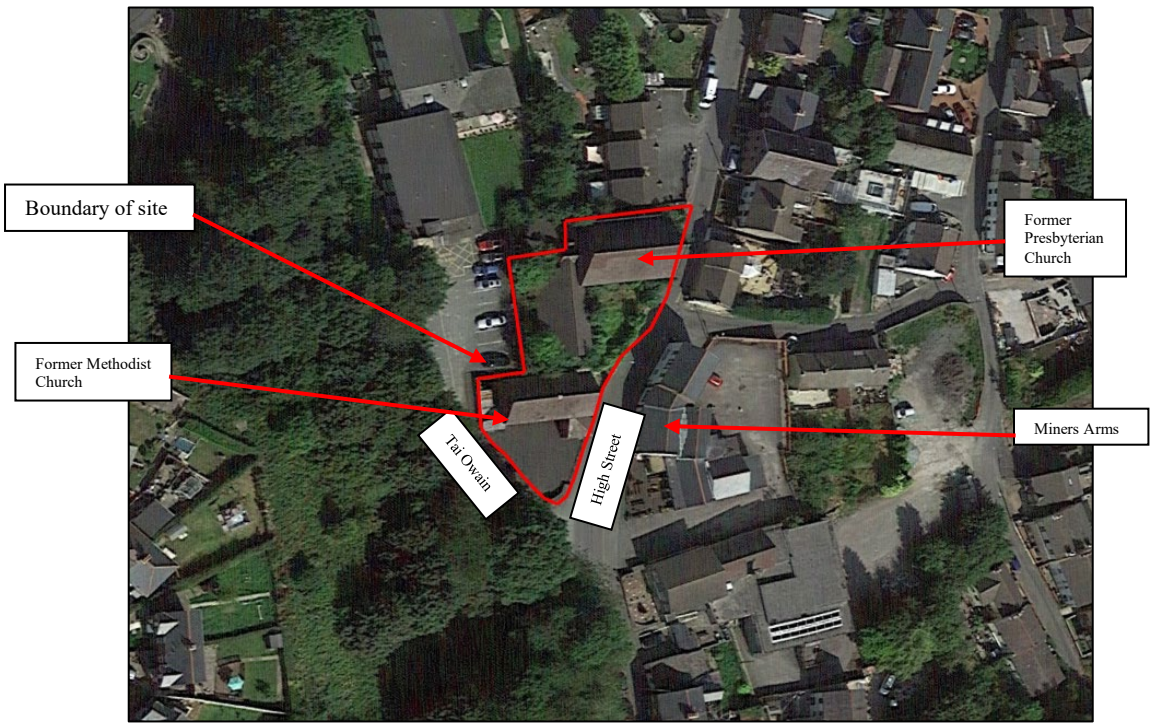
2.3 Site Description

2.3.1 On Site

The site is irregular in shape, encompassing, two titles (CYM471346 and CYM366359) with vehicular access via a gate from the corner of Tai Owain and the junction the High Street. The site also has pedestrian accesses directly from the High Street.

The site is currently occupied by the former Brymbo Methodist Church, a two-storey brick building with a slate roof and single storey extensions on the west and southeast sides. On the north of the plot is a derelict, sandstone chapel, the former Engedi Presbyterian Chapel which was constructed between 1840 and 1861 and replaced an earlier church on the site circa. 1820. To the south of the Methodist Church there is an area of tarmac hardstanding and the site is surrounded by brick and stone walls and metal fencing. The site slopes from north to south with the buildings being lower than ground level at the north and east of the site. Retaining walls support the northern, western and eastern sides and there are services to the site.

An extract highlighting the main features on site can be seen below;



Engedi Chapel, Brymbo Residential Development: Location Plan, from Google Earth 2023

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Site Photographs from Google Earth Street View 2023

The site boundaries are as follows;

- **North –** A sandstone retaining wall and metal fence with carpark at ground level and a stone wall at street level separating newly built residences to north.
- **East –** A small sandstone retaining road and the High Street.
- **South –** Junction of the High Street and Tai Owain Road
- **West –** A sandstone retaining wall topped with a wooden fence and brick wall which is part of the chapel extension. Footpath and Tai Owain Road.

2.3.2 Surrounding Area

Opposite the site to the west is the Miners Arms pub and to the north is a row of newly built detached two storey brick residences. A wooded area rises steeply to the west.

The area is mainly residential, with narrow streets and a mix of terraced traditional stone cottages and new detached brick dwellings, the topography sloping to the east.

Surrounding land uses for the site are as follows:

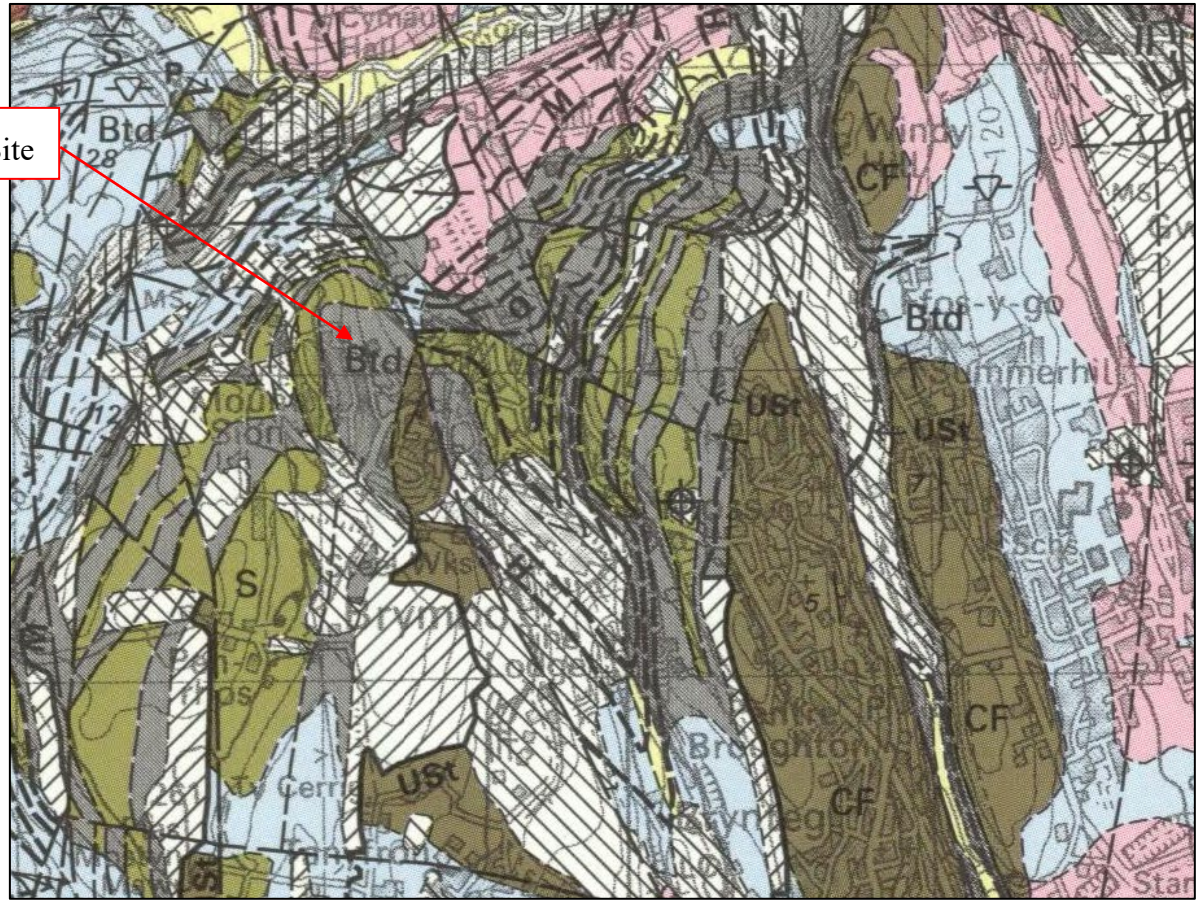
- **North** – Residential
- **East** –Residential / Public House
- **South** – Residential
- **West**– Care home / sheltered housing

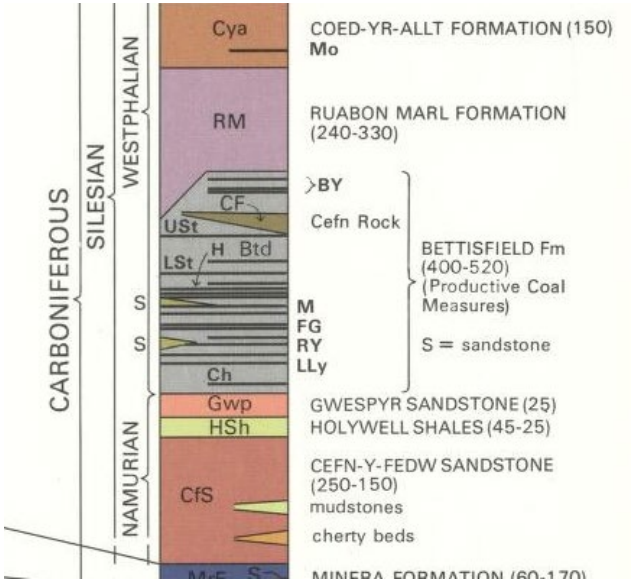
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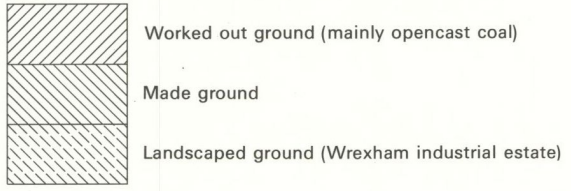
3 GEOLOGY

The following section details the published and available geological data available for the site and the surrounding area.

3.1 British Geological Survey Published Data



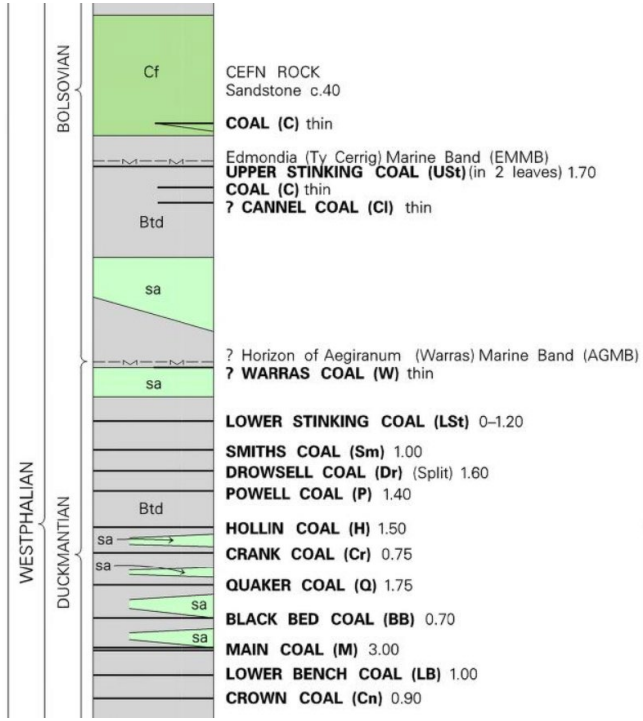




British Geological Survey 1:50,000 map 121 Wrexham published 1991

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British Geological Survey 1:10,000 map SJ25SE published 1996

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3.1.1 Superficial Geology

The site is not shown to be underlain by any superficial deposits or made ground however map indicates the surrounding area has abundant worked out and infilled open cast workings and made ground.

3.1.2 Bedrock Geology

The bedrock geology is the Carboniferous Pennine Coal Measures which are commonly divided into the Lower and Middle Coal Measures, however are undifferentiated in the Denbighshire Coalfield. They have also been previously known as the Bettisfield Formation (see legend). Here the coal measures consist of grey to dark grey highly carbonaceous mudstone with subsidiary felspathic sandstones, siltstones, seat earths (fireclays) and coal seams. The sandstone units are often mapped separately e.g. the Cefn Rock which is depicted on the geological maps as outcropping to the west of the inferred N-S Brymbo fault.

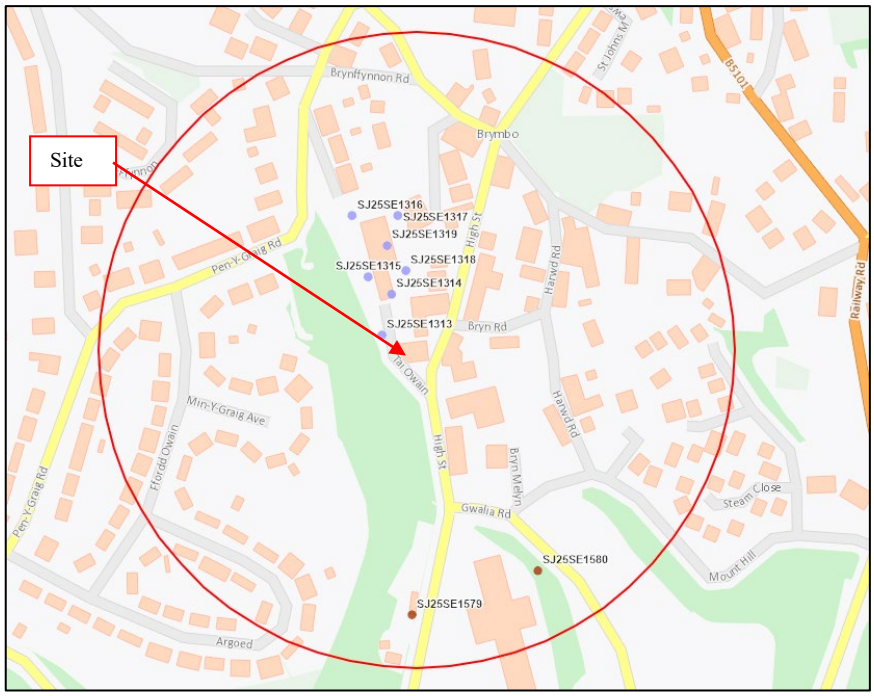
The topography slopes to the east with coal seams also gently dipping to the east, outcropping on the valley sides. Thes are mapped as being cut by a pervasive N-S fault set and shorter crosscutting E-W faults.

The nearest coal seam appears to be the Crank Coal which is mapped outcropping adjacent to the west of the site, is truncated by the Brymbo Fault which downthrows the Cefn Rock against the Pennine Coal Measures. The Crank Coal is underlain (approximately 10m) by the Quaker Coal Seam (Also known as the Brassey Seam) which outcrops to the east of the site.

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3.1.3 Borehole Records

There are 9 Borehole Records within 200m of the site, the closest being SJ25SE1313 (BH1), 13.5m to the northwest, one of 7 holes (BH1-BH77) drilled in 1976 for an apartment building / care home on Tai Owain / Long Row, north of the site. Drilled to approximately 2-4m for geotechnical purposes, all the holes encountered fill material of brick, stone and ash (MADE GROUND) from 0.30cm to a maximum of 2.13m (1.21m closes to the site) underlain by brown weathered sandstone with hard and soft bands. No coal seams were logged.



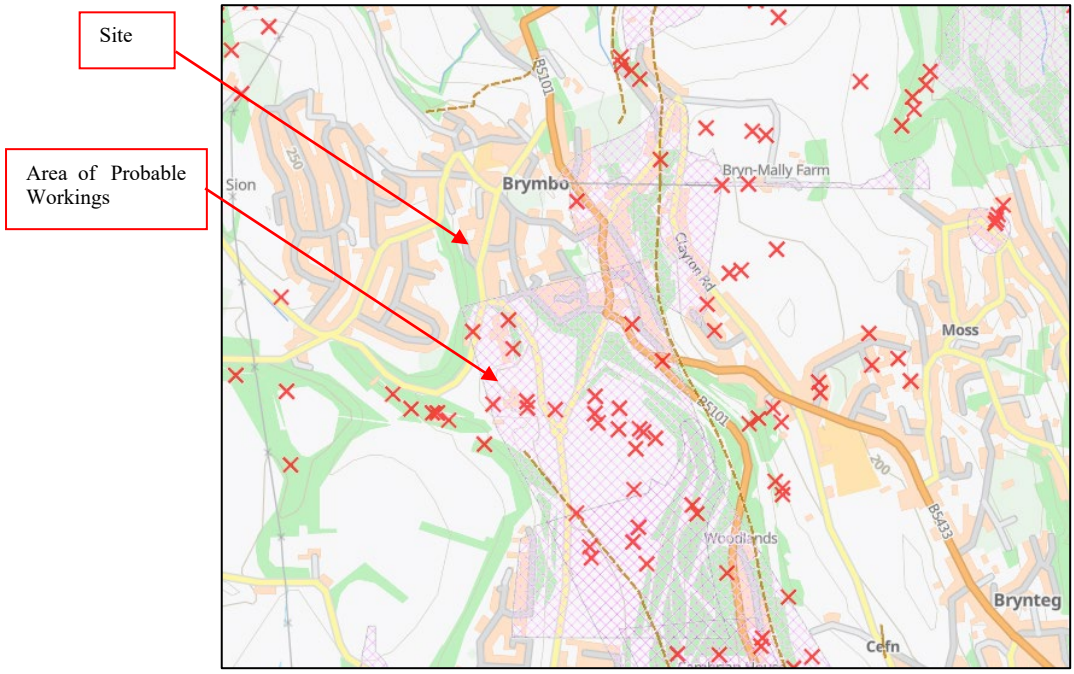
Screeen shot of British Geological Survey GeoIndex https://mapapps2.bgs.ac.uk/geoindex/home.html

To the south there are two shaft records SJ25SE 1579 and 1570, acquired by the BGS from the National Coal Board shaft register for Brymbo Colliery, however neither have any further details.

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4 COAL AUTHORITY RECORDS

Reference to the Coal Authority Viewer shows the site to be within a Coal Mining Reporting Area but just outside of a Development High Risk Area or area of Probable Shallow Workings.



Screeen shot of Coal Authourity Interactive Viewer https://mapapps2.bgs.ac.uk/coalauthority/home.html

4.1.1 Mine Entries

The closest mine entries are those 160-220m to the south of the site, perviously mentioned in the BGS borehole section, relating to the Brymbo Colliery shafts. No further data is available regarding these, other than an assumed shaft diameter of 2m. No treatment details are recorded and the departure (positional accuracy) is 8m.
There is also a 19m deep treated shaft 250m to the northeast to the west of the B5101.

4.1.2 Underground Mining

The Coal Authority Viewer indicates there are underground workings beneath the site, recording a seam dipping at 11.3° to the ENE (70°).

A Consultants Coal Mining report has been acquired for the site which records the “Wall and Bench” Coal Seam being extracted beneath the site at a depth of 102m, dipping 11.3° East and having an extraction thickness of 70 cm. This was last mined in 1906.
There are two further records of deeper seams (Quaker and Wall and Bench) being mined in the vicinity of the site. (See extract overleaf)

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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
unnamed	WALL AND BENCH	Coal	3V5K	102	Beneath Property	11.3	East	70	1906
unnamed	QUAKER	Coal	7OLK	124	South	8.0	East	100	1800
unnamed	WALL AND BENCH	Coal	3V3J	139	South-West	8.1	East	50	1913

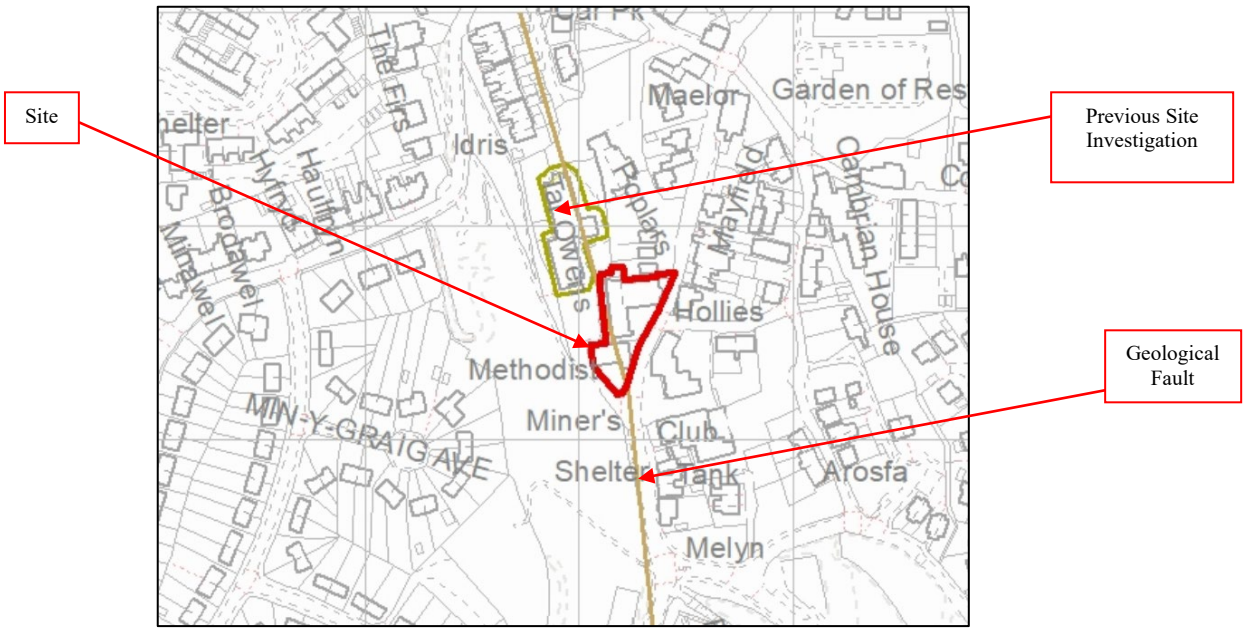
The Brymbo Fault is mapped as transecting the site north to south. The depth of workings within the Quaker Seam does not correspond with published geology (should be much shallower) but is assumed to be a result of the faulting.

The Consultants Mining Report indicates that there are no unrecorded probable shallow workings, mine entries within 100m or coal seam outcrops intersecting with the site boundary.

It does not record any remediated sites or evidence of coal mining subsidence within 50m of the boundary and there is no record of mine gas, Coal Authority managed tips or mine water treatment schemes within 500m.

4.1.3 Previous Site Investigations

There is a previous site investigation recorded 3.5m to the west of the site (see below) for which Betts Geo have acquired the logs relating to a rotary drilling campaign at Long Row in April 1978 for Wrexham Maelor Council.



Coal Authourity Plot from Consultants Report

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Two rotary holes drilled on the site (no co-ordinates included on the logs) encountered:

RH1

0 - 0.6 m Brick Fill
0.6 – 1.8 m Presumed Fill (soft drilling)
1.8 - 3.4 m Brown Sandy Clay
3.4 – 3.7m Red Shale (soft drilling)
3.7 – 5.2 m Cavity
5.2 – 7.0 m Presumed Broken Mudstone (very soft drilling)
7.0 – 11.0 m Grey Fine-grained Sandstone
11.0 – 14.6 m Grey Mudstone
14.6 – 15.0 m Black Shale
15.0 – 16.2 m Black Coal
16. 2 – 16.4 m Pink Fireclay
16.4 – 21.0 Grey Sandstone

RH2

0 – 1.8 m Brick Fill
1.8 – 7.0 m Presumed Collapsed Ground with Clay and Grey Mudstone
7.0 – 9.0m Grey Fine-grained Sandstone (EOH)

Correspondence relating to the results of the drilling indicated that there is an extreme likelihood of shallow workings being present beneath the Long Row site and a recommendation to drill investigative drillholes with a view to grouting.

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5 MINING HISTORY

Coal has been mined in the area since the Middle Ages and possibly earlier. The earliest workings were likely to have been excavations of outcrops, progressing to bell pits and adits. With the demand for coal increasing during the industrial revolution, deeper mining utilising shafts became more prevalent.

After the Second World War opencast mining developed as the main mining method.

Prior to 1872 there was no legislation that required underground workings and shafts to be recorded therefore there is little evidence of historical mining before this point especially in built up areas. After 1872 plans were required to be deposited with the Mines Record Office, however artisanal and illegal workings persisted that were not recorded, or plans were inaccurate. There is therefore a possibility that shallow workings could occur anywhere that coal seams exist close to the surface, especially where there are thicker more productive seams (e.g. Main and Quaker Coal Seams).

Fireclay (seat earth) was also a valuable commodity and has been extracted where coal was mined across the coalfield. Iron Ore nodules, widespread throughout the Bettisfield Formation were worked extensively in Brymbo in the 19th Century. (Hains 1991)

During the 19th Century the main group of pits in Brymbo belonged to the Brymbo Company which exploited coal and ironstone on what was formally the Brymbo Hall estate purchased in 1792 by pioneer industrialist John Wilkinson, although small coal pits existed on the estate prior to this.

The earliest historical map available for the site is the 1873-1874 map which shows a chapel on the northeast of the site surrounded by fields. To the west is “Long Row” a terrace of miner’s cottages. The Brymbo Iron Works (later Brymbo Steel Works) with tramways and slagheaps to the south and railway were a prominent feature of Brymbo at this time.

By 1899 the site was occupied by two chapels and an old quarry is marked to the west of the site.

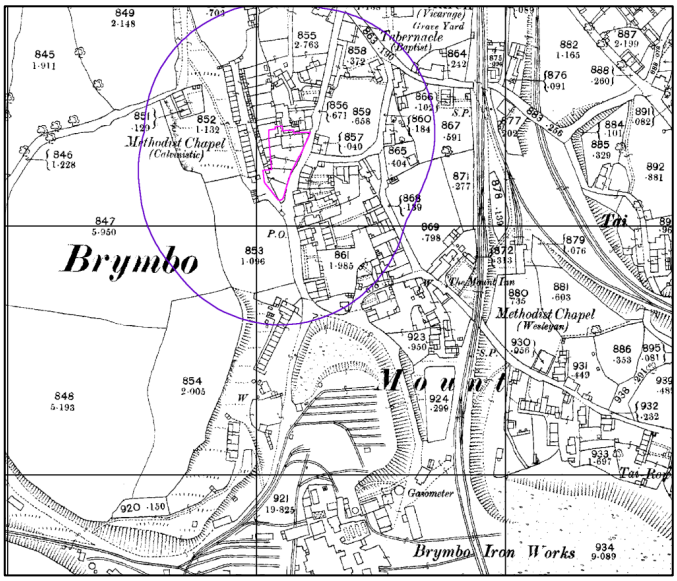
The 1888-1913 Ordnance Survey map shows numerous old shafts and working collieries including the Brymbo Colliery to the south and the “Wonder Pit” sunk in 1835, the name apparently referring to the exceptional quality of coal. (see below)

The economic depression of the 1930’s saw the gradual decline of heavy industry in Brymbo with the closure of a number of collieries and the temporary closure of the steel works. The “Blast Pit” colliery was part of and located within the steel works.

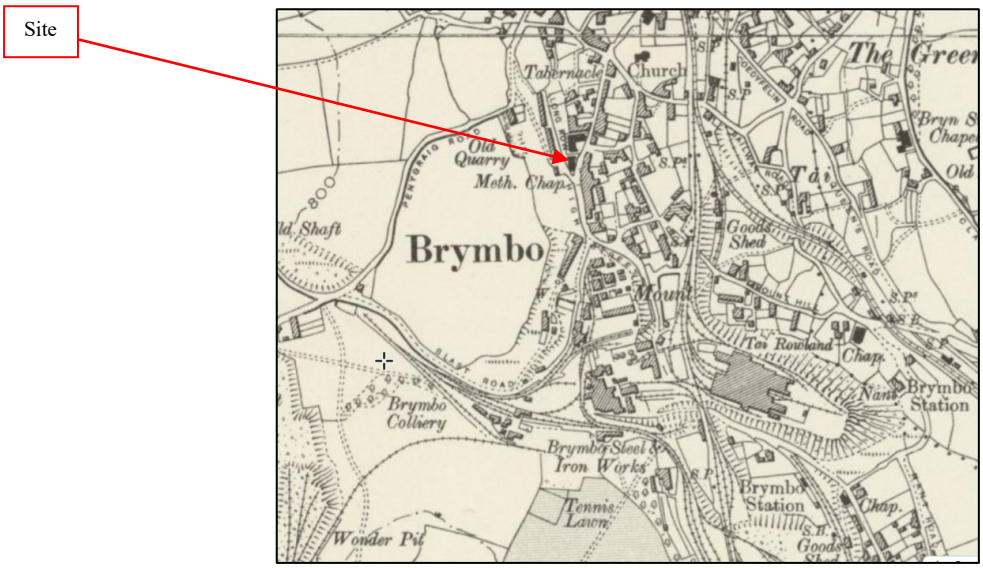
The Iron and Steel Works became part of British Steel in 1967 which was also the year in which the last colliery (Brymbo Co. drift mine) closed.

The steelworks closed in 1990 and the land has been largely remediated and repurposed for residential housing.

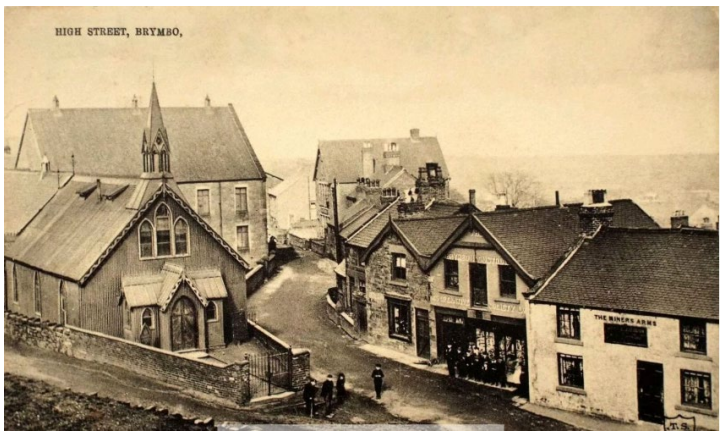
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Ordnance Survey 1873-1874



Ordnance Survey 1888-1913 showing wider area with collieries



High Street Brymbo 1908 from www, Wrexham-history.com

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6 CONCLUSION

Due to the legacy of artisanal coal mining in Brymbo, mapped outcrops of the coal seam adjacent to the west which dips beneath the site, along with previous rotary holes on a site investigation to the north encountering cavities, a coal seam and infilled ground, it is concluded that there is a ***High*** risk of unrecorded shallow workings.

The published 1:10,000 BGS map details a shallow seam dipping beneath the site identified as the Crank Seam. The Coal Authority mapping and reporting does not show this seam as evident. We suspect that this is due to the Coal Authority relying upon digitised 1:50,000 BGS mapping opposed to the more detail plans available.

The underground workings (in the Wall and Bench seam much deeper than the Crack Seam) recorded by the Coal Authority as being 102m beneath the site are considered at a sufficient depth and age (last worked 1906) not to pose a risk to development at the surface.

An intrusive investigation consisting of rotary drill holes should be undertaken to confirm the extent (subject to CA licence). It is suggested in the first instance as a preliminary investigation that 3 No 30m deep rotary boreholes are undertaken within the development area. Due to the existence of a recorded fault additional boreholes may be required upon the findings of the 3.

In conclusion, the site is situatable for residential development, post completion of appropriate coal mining mitigation measures which may include grouting. The extent of the mitigation measures and grouting volumes will be determined by, and are subject to, the completion of intrusive ground investigation. This ground investigation may be undertaken in several stages.

There is a risk of ground gas which will require monitoring, therefore a shallower 3-4m rotary or window sampling holes are recommended in the footprint of the proposed buildings.

Based upon experience of the Coal Authority it is anticipated that they will place the following condition (or very similar) onto the application

The undertaking of intrusive site investigations, prior to the commencement of development, is considered to be necessary to ensure that adequate information pertaining to ground conditions and coal mining legacy is available to enable appropriate remedial and mitigatory measures to be identified and carried out before building works commence on site. This is in order to ensure the safety and stability of the development, in accordance with paragraphs 178 and 179 of the National Planning Policy Framework.

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7 REFERENCES

7.1 BS 5930:2015 Code of Practice for Ground Investigation.

7.2 Update of Ecological Appraisal Bats and Birds December 2021 by Greenscape Environmental

7.3 BGS 1:10,000 geology map SJ25SE, published 1996

7.4 BGS 1:50,000 geology map 121 Wrexham, published 1991

7.5 Coal Authority Report and Interactive Viewer

7.6 CIRIA . Abandoned mine workings manual (C758D)

7.7 History of the township of Brymbo https://thefireonthehill.wordpress.com/

7.8 North East Wales Heritage Forum https://www.newalesheritageforum.org.uk/

7.9 Applied geological mapping in the Wrexham area: geology and land-use planning. Technical Report WA/91/4 British Geological Survey, B.A. Hains

7.10 Correspondence and Logs relating to Long Low Site investigation 1978 Neil Catlow and NKC drilling for Wrexham Maelor Council.

7.11 Phase I Preliminary Risk Assessment (PRA) Sutcliffe Investigations March 2023

7.12 Wrexham History www.wrexham-history.com

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