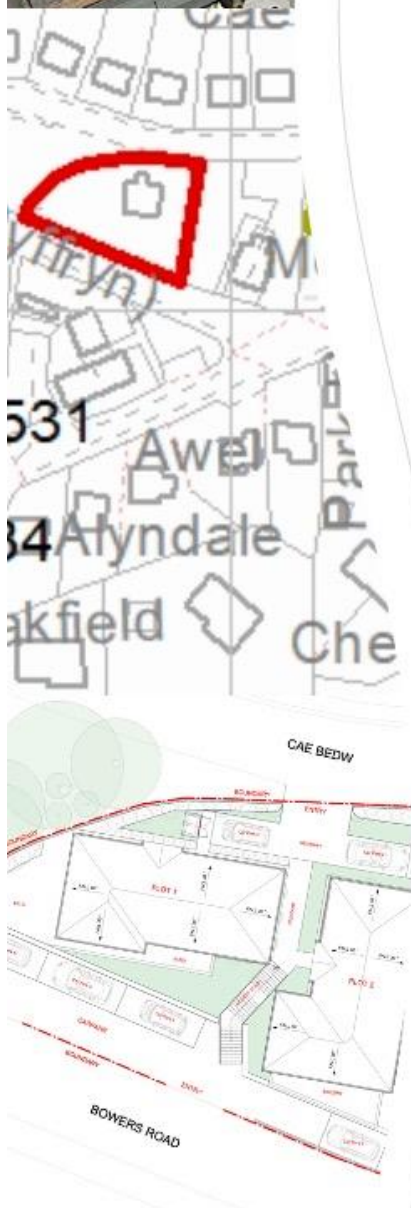




EARTH ENVIRONMENTAL
& GEOTECHNICAL

Coal Mining Risk Assessment

Wylfa

Bowers Road

Acrefair

May 2021

On behalf of



Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Tel : 01619756088

Email
headoffice@earthenvironmental.co.uk

www.earthenvironmental.co.uk

COAL MINING RISK ASSESSMENT

WYLFA

BOWERS ROAD

ACREFAIR

FOR

TAYLOR GREEN HOMES LTD

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business & Arts Centre
Houldsworth Street
Stockport
SK5 6DA

www.earthenvironmental.co.uk

Tel 0161 9756088

Report No. A4173/21

MAY 2021

Report Title:	Wylfa, Bowers Road, Acrefair, Wrexham Coal Mining Risk Assessment	
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Drafted By:	E Czarnecki	
Reviewed By:	A Czarnecki BSc (Hons) CGeol	<i>A Czarnecki</i>
Authorised By:	A Czarnecki BSc (Hons) CGeol	<i>A Czarnecki</i>

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1.0 INTRODUCTION

Appointment

- 1.1 Earth Environmental & Geotechnical Ltd have been commissioned by Taylor Green Homes Ltd (the Client), to undertake a Coal Mining Risk Assessment for a proposed development on land along Bowers Road, Acrefair.
- 1.2 It is understood that the Client is seeking planning permission (P/2021/0422) for the construction of two bungalows.
- 1.3 This Coal Mining Risk Assessment is required to accompany a planning application to Wrexham Borough Council.

Objective

- 1.4 The purpose of the Coal Mining Risk Assessment is to collate available geological, mining and historical data in order to assess the potential for the site to be affected by underground mining.
- 1.5 This report has been drafted in accordance with the Coal Authority (CA) Guidance Risk Based Approach to Development Management, Version 4, 2017.

Sources of Information

- 1.6 The Coal Mining Risk Assessment compiles a review of the following information sources:
 - British Geological Survey of England, Sheet 121 Wrexham, 1/50,000, 1993 edition.
 - British Geological Survey of England, Denbighshire, Six Inch to One Mile, 1925 edition.
 - Coal Authority Interactive Map Viewer.
 - Coal Authority Mining Report.
 - British Geological Survey online borehole records.
 - Google Earth imagery.
 - Online Historical Ordnance Survey maps.
 - Site Investigations in Areas of Mining Subsidence, FG Bell, 1975.
 - The threat of abandoned mines on the stability of urban areas, Barry Clarke, IAE2006 Paper Number 379, The Geological Society of London, 2006.
 - The collapse of shallow coal mine workings, Durham theses, Durham University, Garrard, 1981.
 - Construction over abandoned mineworking's, CIRIA Special Publication 32, 2002.
 - Abandoned Mineworking's Manual, CIRIA 2019.
 - Wrexham Borough Council planning portal.
 - GroundSolve Grouting Report, 30th August 2018.
 - NKC Geotech Site Investigation Report, February 2001.

2.0 SITE LOCATION AND DESCRIPTION

- 2.1 The site is located approximately 917m north of Cefn-mawr village centre and lies at an elevation of 140m AOD (centre of site).
- 2.2 The approximate National Grid Reference for the centre of the site is SJ27674 43319 with the closest postcode being LL14 3TF.
- 2.3 The site is sloping forming part of a former mineral railway embankment and coal spoil heap. The southern boundary is formed by Bethania Road.
- 2.4 A location plan is shown below as Figure 1 together with an aerial photograph as Figure 2 (overleaf).

Figure 1 Site Location Plan

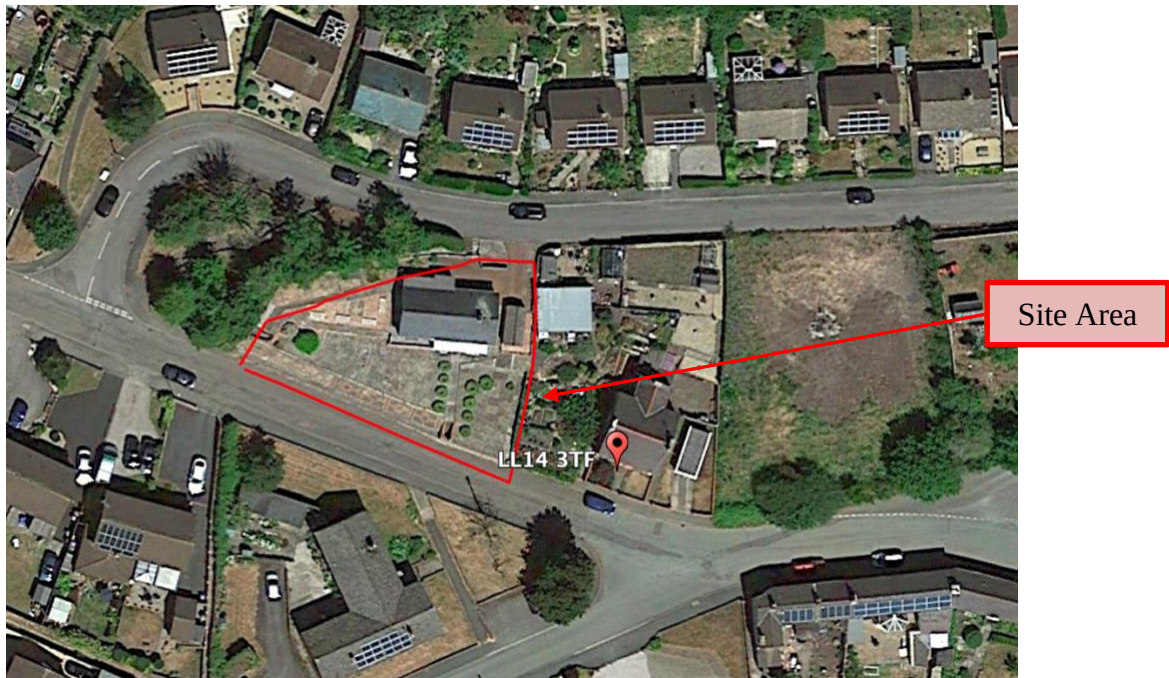


Figure 2 Site Photograph



3.0 ASSESSMENT OF DATA

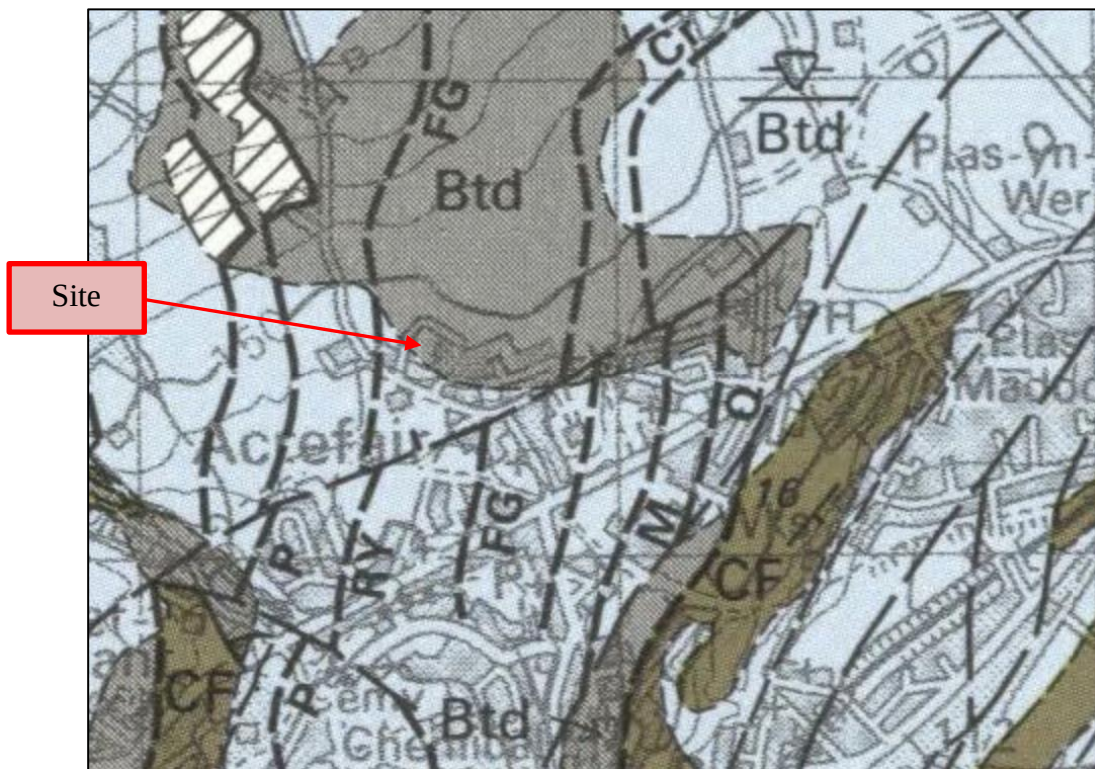
Geological Information

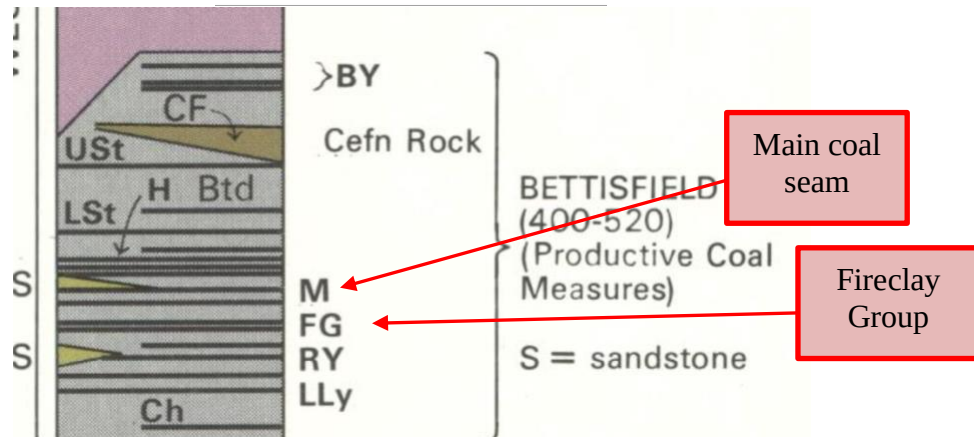
- 3.1 The geology of the site has been determined from geological maps for the area and examination of Coal Authority (CA) records.

British Geological Survey Published Data Assessment

- 3.2 The site is underlain by superficial deposits of Devensian Till, comprising Diamicton, commonly known as Boulder Clay.
- 3.3 The solid geology beneath the site is shown to be the Pennine Lower Coal Measures Formation consisting of coal seams, sandstones, siltstones and mudstones.
- 3.4 There are BGS borehole records that allow for further assessment of the local geology or shallow coal mining regime.
- 3.5 An extract from the most recently published geological map showing the approximate site location and key local geological features are presented below in Figure 3.

Figure 3 Geology Map Extract

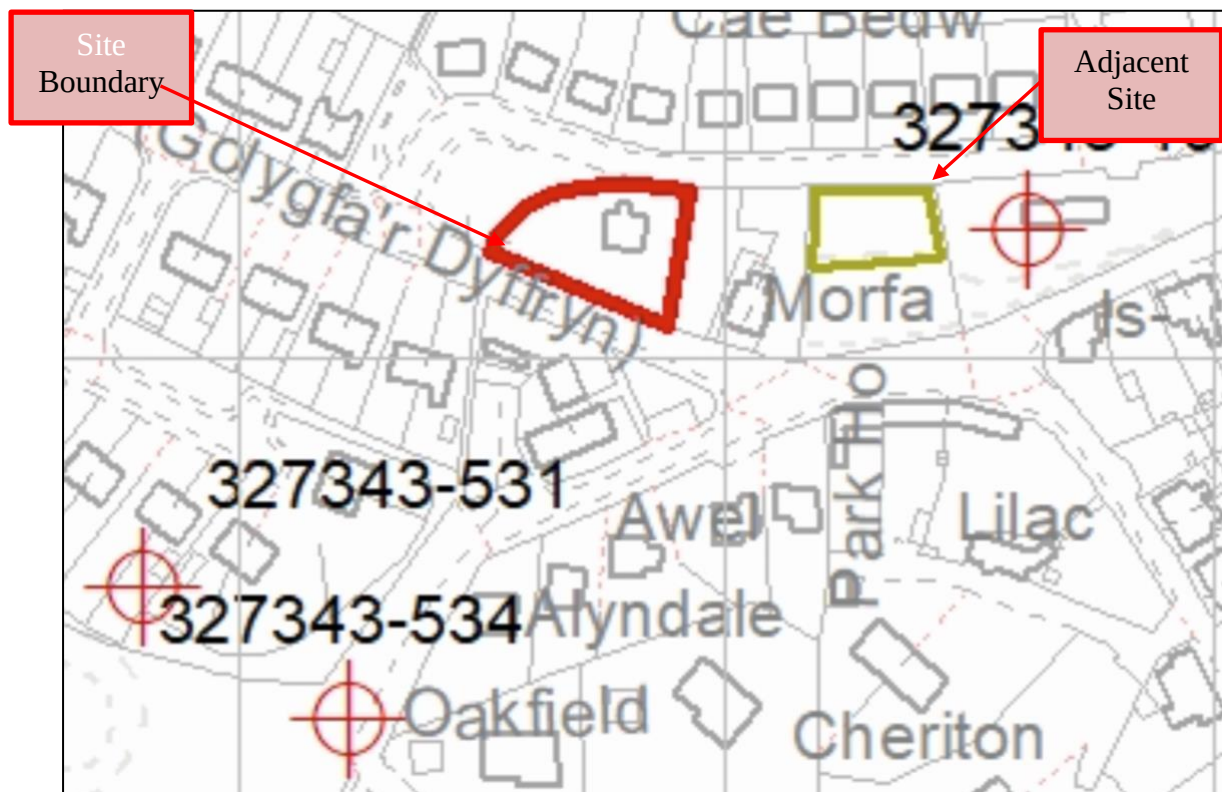




Coal Authority Records

- 3.6 Reference to the Coal Authority Online Interactive viewer shows the site to be located within a Development High Risk Area.
- 3.7 A Coal Authority Mining Report (extract shown as Figure 4) has been acquired for the site and reveals that there are proven records of past underground mine workings beneath the site.

Figure 4 Coal Authority Map Extract



- 3.8 The shallowest worked coal beneath the site was the Firecamp, that was last worked in 1880 at a depth of 19m below ground level. The 2m thick coal seam dips at 8.1degrees to the south-east. The next worked coal seam was the Stone (0.60m thick) , that was last worked in 1912 at a depth of 29m.
- 3.9 The Coal Authority report suggests that there are no probable unrecorded shallow workings beneath the site.
- 3.10 A previously investigated site is shown 26m to the east that is annotated as “Adjacent Site”.
- 3.11 There are no records of any outcrops, shafts, managed tips, remediated sites, areas of coal mining subsidence within 50m of the site.

Adjacent Site Investigation

- 3.12 A site investigation was conducted on an adjacent site (See Figure 4) in 2001 by NKC Geotech.
- 3.13 Two rotary open hole boreholes encountered made ground to 4.5m with old coal workings at 14.8-15.5m and 15.0-17.0m.
- 3.14 A mudstone rockhead was found at a depth of 6.5m.
- 3.15 The coal seam workings were identified as within the Yard coal.

Adjacent Grouting Works

- 3.16 Grouting works were initiated on the adjacent site in July 2018. The work by Forkers identified a combination of grout and intact coal within a series of 3m centred boreholes.
- 3.17 No voiding was found and no grouting was required as the site had been stabilised before.

Historical information

- 3.18 The available historical plans dating back to 1874 show no mining features on the site or in the general area. A coal mine is shown to the east of the Adjacent Sites shown Figure 4.
- 3.19 The site is located on a former mineral railway embankment.

4.0 COAL MINING RISK ASSESSMENT

Scope of Coal Mining Risk Assessment

- 4.1 Objectives of the coal mining risk assessment are to provide a desk-based assessment of available geological and mining information relating to the site (and wider area) and to use this information so as to identify risks present to the development from the legacy of mining.
- 4.2 As part of the risk assessment, potential mitigation measures (if required) should be considered, including any necessary remedial works.
- 4.3 The outcome of the risk assessment should demonstrate to the Local Authority that the proposed development is or can be made safe (and stable) to meet the requirements of the National Planning Policy Framework (NPPF).

Data Limitations

- 4.4 It should be appreciated that it did not become a legal requirement to deposit coal mining abandonment plans until the 1870's and that this requirement was not rigorously enforced for some time after. Many shallow coal seams were worked prior to the introduction of first edition Ordnance Survey Maps and information on these workings is often not available. Therefore, if coal seams were accessible then there is the potential that they could have been worked by formal or informal means.
- 4.5 It is also possible that if unrecorded workings are present then unrecorded mine entries may be present.

Coal Mining Risks

- 4.6 The risks associated with coal mining are as follows:
 - Collapse of relict workings beneath buildings causing damage to the building fabric and infrastructure.
 - Migration of mine gases from old mine workings and mine entries resulting in accumulation of flammable and asphyxiating gases in confined areas.
 - Consolidation of relict workings and overlying strata causing structural defects in building fabric and infrastructure.
 - Failure of mine entries causing loss of ground beneath building and external areas.
 - Spontaneous combustion of old mine workings.

Conclusions

- 4.7 The development area lies within a Coal Authority Development High Risk Area to worked coal seams beneath the site.

Proposed Mitigation Strategy

- 4.8 There is a risk to the development from coal mining activity beneath the site and as a result a site investigation is required.
- 4.9 It is possible that the site investigation may prove that as on the adjacent site the shallow mineworkings have already been grouted.
- 4.10 The site investigation will require a permit from the Coal Authority together with the development of a risk assessment and method statement.
- 4.11 This report should allow for planning permission to be granted with relevant conditions.

APPENDIX 1

COAL AUTHORITY MINING REPORT

APPENDIX 2

REPORT LIMITATIONS

REPORT LIMITATIONS

This contract was completed by Earth Environmental & Geotechnical Ltd on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with all reasonable skill, and care, bearing in mind the project objectives, the agreed scope of works, the prevailing site conditions, the budget and staff resources allocated to the project.

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The report was written in 2021 and should be read in light of any subsequent changes in legislation, statutory requirements and industry best practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of Earth Environmental & Geotechnical Ltd. In the absence of such written advice of Earth Environmental & Geotechnical Ltd, reliance on the report in the future shall be at the client's own and sole risk. Should Earth Environmental & Geotechnical Ltd be requested to review the report in the future, Earth Environmental & Geotechnical Ltd shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between Earth Environmental & Geotechnical Ltd and the client.

The observations and conclusions described in this report are based solely upon the services that were provided pursuant to the agreement between the client and Earth Environmental & Geotechnical Ltd. Earth Environmental & Geotechnical Ltd has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report.

Earth Environmental & Geotechnical Ltd is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, Earth Environmental & Geotechnical Ltd did not seek to evaluate the presence on or off the site of electromagnetic fields, lead paint, radon gas or other radioactive materials.

The services are based upon Earth Environmental & Geotechnical Ltd observations of existing physical conditions at the site gained from a walkover survey of the site together with Earth Environmental & Geotechnical Ltd interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and whilst Earth Environmental & Geotechnical Ltd have no reason to doubt the accuracy and that it has been provided in full from those it was requested from, the items relied on have not been verified.

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Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and Earth Environmental & Geotechnical Ltd] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site.