

Report No. BC/MB/06.19.09.

Site Investigation Report on Land at Tynycoedcae Farm, Merthyr Tydfil

Prepared on behalf of:

Mr M Barrett and Ms J. DAVIES.

By:



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**THE ENTERPRISE CENTRE, MERTHYR INDUSTRIAL PARK,
PENTREBACH, MERTHYR TYDFIL, SOUTH WALES, CF48 4DR.
TEL: 01443 693353, FAX: 01443 693351
EMAIL: SALES@BLANDFORDCONSULTING.COM
WWW.BLANDFORDCONSULTING.COM**

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Site Investigation Report: Land at Tyncoedcae Farm, Merthyr Tydfil.

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Appendix

Geotechnical Logs, Photographs and Sketches of Trial Pits.

Site Investigation Report: Land at Tyncoedcae Farm, Merthyr Tydfil.

1 Introduction

This report has been prepared on behalf of our client:

***Mr M. Barrett and Ms Julie Davies,
Tyncoedcae Farm,
Swansea Road
Merthyr Tydfil,
CF48 1PB***

and relates to a parcel of land alongside the A465(T) near Swansea Road in Merthyr Tydfil, where it is proposed to construct a detached dwelling. This report discusses the geology and the findings of a site investigation carried out at the Site and makes recommendations on the most appropriate foundation option.

The following sources of data were used in the compilation of this report:

- i) Research of published geological records;*
- ii) Interrogation of Public Health England's Interactive Radon Gas Map, accessed 17th July 2019;*
- iii) The findings of the site investigation undertaken at the Site and*
- iv) the archive records of Blandford Consulting.*

The findings of this report are necessarily based upon the data used in its compilation and may be amended in the future in the light of additional material information. The report must only be used in its entirety for its stated purpose.

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2 Brief Description of the Site

The parcel of land that is the subject of this report, 'the Site' is located at Tyncoedcae Farm, situated immediately north of the A465 (T) Heads of the Valleys Road near Swansea Road in Merthyr Tydfil. It is located in the countryside, outside the settlement boundary, approximately 4km north-west of the centre of Merthyr Tydfil, on north-easterly slopes of Cwm Ffrwd (see Figure 1 and *General Location Plan*, drawing no. BC/MB/06.19.11.01). The Site is an enclosure on the farm that is unoccupied; it is irregular in outline and occupies an area of approximately 0.1 hectares (see *Site Investigation Plan*, drawing no. BC/MB/06.19.09.03). The Site is almost level at an approximate elevation of 300m aod.

Figure 1
Aerial View of the Site



3 Geology of the Site

The Site is situated fairly centrally on the northern edge of the former South Wales Coalfield and is underlain at shallow depths by strata assigned to the Lower Coal Measures, a sub-division of the Upper Carboniferous Period. The most recently published geological sheets

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at the 1:10,560 scale (SO 00 NW) shows the inferred position of the outcrop of the *Gastrioceras subcrenatum* Marine Band to be present 50m north of the Site; the Marine Band marks the base of the Coal Measures (see *Geology Plan, drawing no. BC/MB/06.19.11.02*). The Site lies north of and beyond the limits of the area underlain by those coal measures that supported mining of coal and ironstone.

The coal measures of the South Wales Coalfield have been affected by large faults. In the Merthyr Tydfil area these large faults have a slightly sinuous trace at the surface and average trends towards the north-west. The published geological sheet indicates that the Site is not affected by such large scale faulting.

The published geological sheet shows the coal measures to be overlain with deposits of glacial till, Boulder Clay and that the Site is not affected by landslip.

4 Mining History

The Site lies north of and beyond the limits of the coal measures that include the coal seams and ironstone veins that supported the former mining operations. There are no coal measures underlying the Site that contain coal seams or ironstone veins that could have supported a mining operation.

5 Mine Gases

There are no old workings in the vicinity of the Site that could act as the source of mine gases.

6 Radon Gas

Government advice is that the risk from Radon gas should be assessed for all new developments. This has been done by accessing Public Health England's interactive Radon gas

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map, which identifies that the Site lies within an area where the maximum Radon potential is between 5% and 10%. The risk from Radon gas should be further assessed by obtaining from the British Geological Survey a Geo Report.

7 Site Investigation

7.1 Site Investigation Programme

The site investigation comprised of four (4) mechanically excavated trial pits sunk to a maximum depth of 3.10 metres below ground level (mbgl) in order to assess the near surface soils to determine their condition and acceptability for shallow based foundations. The soils were logged and sampled in accordance with BS 5930: 2015: Code of practice for site investigations British Standards Institution and in accordance with BS EN 1997-2 (2007). Geotechnical Logs and Photographs for the Trial Pits are contained in Appendix I to this report.

7.2 Groundwater Environment

Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) Maps are managed by Natural Resources Wales (NRW) and inspection of these maps indicated the following:

-  The Site is not within a designated river flood risk zone.
-  The Site has a moderate to high risk of surface water flooding along its western boundary.
-  The Site is not within a Groundwater Source Protection Zone.
-  The Site is defined as Low Vulnerability: Secondary Aquifer for Superficial Deposits.
-  The Site is defined as Low Vulnerability: Secondary Aquifer for Bedrock.
-  There are no designated Water Abstraction Licences within influencing distance.

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7.3 Environmental Issues

An environmental assessment is outside the scope of this ground investigation. Given that the Site is remote from both past and current industrial areas of the locality it is considered to have little or no risk of there being “potentially contaminated” material on the Site and none was encountered in the trial pits. No potentially contaminated material was observed in the trial pits.

7.4 Ground Conditions and Conceptual Model.

A conceptual soil and bedrock model has been developed based on the results of the site investigation and logging, site-based observation and supporting photography.

Table 2
Conceptual Soil and Bedrock Model

Designation	TP1	TP2	TP3	TP4
Total Depth	2.90	2.95	3.10	3.05
Soils				
Topsoil	-	-	-	0.35
Made Ground (Engineering Fill)	-	-	0.40	-
Made Ground (Re-worked Superficials)	0.40	0.60	-	-
Glacial Till	>2.50	>2.35	>2.70	>2.70

7.5 Groundwater Model

No groundwater was encountered during the site investigation and groundwater should be considered as having no discernible relevance to the foundation design.

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8 Foundation Options

8.1 Shallow Foundations

The Made Ground encountered is not suitable for founding on. The underlying Boulder Clay encountered in all four trial pits is suitable to act as a founding medium for conventional strip/trench foundations. The Boulder Clay was found to be variously 'soft', 'stiff', 'very stiff' and 'firm'. In Trial Pits 1 and 2 'soft' areas were encountered at depths down to 1.30m and 2.40m respectively. Foundations must be taken down to below the 'soft' areas and should extend a minimum of 300mm below any 'soft' areas encountered in order to ensure that the foundations are bearing on 'stiff' or 'firm' Boulder Clay.

All foundations must extend to a minimum of 750mm below ground level to protect them from frost action. Where foundations are stepped to account for 'soft' areas the deeper excavations should be backfilled with lean mix, mass poured concrete.

A raft foundation is considered not to be appropriate. The 'soft' areas in the Boulder Clay do not extend across the whole of the footprint of the building and are at differing depths with the result that there is a risk of differential settlement.

8.2 Deep Foundations

Deep foundations in the form of piles would be appropriate and would transfer the loading of the dwelling to below the 'soft' areas. The most appropriate pile solution would be bored mini-piles extending down into the bedrock. Further site investigation would be required in order to design the piles.

8.3 Temporary Works

The recommended shallow foundation solution would require excavations in excess of 1.00 metres below ground level, consequently, the health and safety of personnel should

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be considered when developing the construction works. The nature of the materials encountered may result in some instability of side walls.

9 Aggressive Attack of Buried Concrete

BRE Special Digest 1:2005 offers advice on the assessment of the chemical conditions on the soils and their potential to attack buried concrete. The Site does not lie within the area where the principal sulphate and sulphide bearing strata is present (Figure C2 of the Digest), nor is it within an area where coal mining or metal processing slags resulting from coal mining activities are found (Figure C3 of the Digest). The Design Class for the Site is DS1 and the ACEC class is AC1.



**Dr Malcolm Blandford,
Chartered Geologist.**

Report Date: 19th July 2019.

***Blandford Consulting,
Consultant Geologists and Geotechnical Engineers,
The Enterprise Centre, Merthyr Industrial Park, Pentrebach, Merthyr Tydfil, CF48 4DR.
Tel. No. (01443) 693353. Fax. No. (01443) 693351.***

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BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution

BS 5930+A2: 2010: Code of practice for site investigations (Amendment 2). British Standards Institution

BS 5930: 2015: Code of practice for site investigations British Standards Institution.

BS EN ISO 14688-1:2002+A1: 2013: Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution

BS EN ISO 14688-2:2004+A1: 2013: Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution

Lle Cymru Portal – Development Advice Maps & Flood Risk [Welsh Government] [online resource]

Natural Resources Wales, Flood Risk Map Wales [online resource]

Public Health England's Radon gas map [online resource]

PLANS



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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Geologists Working With The Environment...

Study on Land at Tyncoedcae Farm,
Swansea Road, Merthyr Tydfil.

General Location Plan.

Plan Scale: 1:50,000.

Key to Symbols:



Approximate Position of Site.

Note:
North is at top of plan.

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Drawing No: BC/MB/06.19.11.01.



Geology Plan.



Note:
North is at top of plan.



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Drawing No: BC/MB/06.19.11.02.

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Study on Land at Tyncoedcae Farm,
Swansea Road, Merthyr Tydfil.

Site Investigation Plan.

Plan Scale: 1:200.

Key to Symbols:

-  **Approximate Site Boundary.**
-  **Approximate Position of Trial Pit.**

Note:
North is at top of plan.

Contains OS Data
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Drawing No: BC/MB/06.19.11.03.

APPENDIX

GEOTECHNICAL LOGS AND PHOTOGRAPHS OF TRIAL PITS



*The Enterprise Centre,
Merthyr Industrial Park,
Pentrebach,
Merthyr Tydfil,
South Wales,
CF48 4DR.*

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PROJECT: Tyncoedcae Farm, Merthyr Tydfil

CLIENT: Mr Barrett & Ms Davies

Trial Pit: 1

Equipment Used: Zaxis 130 LCN



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Depth	Description	Legend	Backfill/ Installations			
0.40m	MADE GROUND: Compact, dark brown, sandy slightly clayey gravel cobble and boulder of sub-rounded to rounded sandstone and angular brick. Short length of rebar.		0.40m			
0.85m	Soft to very stiff, yellow mottled brown gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		0.45m			
1.30m	Soft, light grey, slightly sandy gravelly CLAY . Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Sub-rounded to rounded cobble also present. (Boulder Clay).		0.45m			
2.90m	Very stiff, light grey, slightly sandy gravelly CLAY . Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Sub-rounded to rounded cobble and boulder also present. (Boulder Clay).		>1.60m			
Trial Pit terminated at 2.90m.						

Stability: No shoring installed. Stable.

Dimensions: Length 2.20m, width 0.70m, depth 2.90m

Samples Collected: None

Groundwater: Damp at 1.30m.

Comments:

Date: 26th June 2019

Orientation: 145 degrees

Engineer: Dr Malcolm Blandford

Report No: BC/MB/06.19.11.

Photo Plate 1, Trial Pit 1



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PROJECT: Tyncoedcae Farm, Merthyr Tydfil

CLIENT: Mr Barrett & Ms Davies

Trial Pit: 2

Equipment Used: Zaxis 130 LCN



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Depth	Description	Legend	Backfill/ Installations			
0.60m	MADE GROUND: Compact, dark brown, sandy slightly clayey gravel cobble and boulder of sub-rounded to rounded sandstone and angular brick.		0.60m			
0.85m	Firm to very stiff, yellow mottled brown gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		0.45m			
1.80m			1.20m			
2.20m	Very stiff, light grey, slightly sandy gravelly CLAY . Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Sub-rounded to rounded cobble and boulder also present. (Boulder Clay).		0.20m			
2.40m	Soft, light grey, slightly sandy gravelly CLAY . Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Sub-rounded to rounded cobble also present. (Boulder Clay).		0.40m			
2.95m	Very stiff, light grey, slightly sandy gravelly CLAY . Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Sub-rounded to rounded cobble and boulder also present. (Boulder Clay).		>0.55m			
3	Trial Pit terminated at 2.95m.					
4						

Stability: No shoring installed. Stable.

Dimensions: Length 2.20m, width 0.70m, depth 2.95m

Samples Collected: None

Groundwater: Damp at 1.80m.

Comments:

Date: 26th June 2019

Orientation: 147 degrees

Engineer: Dr Malcolm Blandford

Report No: BC/MB/06.19.11.

PROJECT: Tyncoedcae Farm, Merthyr Tydfil

CLIENT: Mr Barrett & Ms Davies

Trial Pit: 3

Equipment Used: Zaxis 130 LCN



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Depth	Description	Legend	Backfill/ Installations			
0.40m	MADE GROUND: Compact, dark grey sandy gravel of angular limestone and brick. (Engineering Fill)		0.40m			
1.55m	Stiff to firm, grey gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		1.15m			
3.10m	Stiff to firm, brown mottled yellow, gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		>1.55m			
Trial Pit terminated at 3.10m.						

Stability: No shoring installed. Stable.

Dimensions: Length 4.60m, width 0.70m, depth 3.10m

Samples Collected: None

Groundwater: No groundwater encountered.

Comments:

Date: 26th June 2019

Orientation: 128 degrees

Engineer: Dr Malcolm Blandford

Report No: BC/MB/06.19.11.

PROJECT: Tyncoedcae Farm, Merthyr Tydfil

CLIENT: Mr Barrett & Ms Davies

Trial Pit: 4

Equipment Used: Zaxis 130 LCN



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Depth	Description	Legend	Backfill/ Installations			
1	TOPSOIL: Loose, brown, slightly clayey sandy, many roots.		0.35m			
	Firm, yellow mottled grey gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		1.20m			
	Firm, grey mottled brown gravelly CLAY with cobble and boulders. Gravel is fine to medium and coarse, sub-rounded to rounded sandstone. Cobble and boulder are sub-rounded to rounded sandstone. (Boulder Clay).		>1.60m			
3	3.05m					
Trial Pit terminated at 3.05m.						
4						

Stability: No shoring installed. Stable.

Dimensions: Length 4.00m, width 0.70m, depth 3.05m

Samples Collected: None

Groundwater: No groundwater encountered.

Comments:

Date: 26th June 2019

Orientation: 218 degrees

Engineer: Dr Malcolm Blandford

Report No: BC/MB/06.19.11.

Photo Plate 2, Trial Pit 4



Geologists Working With The Environment...

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Study on Land at
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