

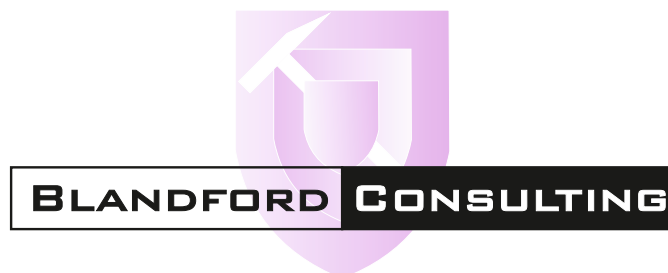
Report No. BC/MB/11.20.04.

Preliminary Site Investigation: Land at Colliers Row, Merthyr Tydfil.

Prepared on behalf of:

Maxiom Developments Ltd.

By:



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Preliminary Site Investigation Report: Land at Colliers Row, Merthyr Tydfil.

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<i>BC/MB/11.20.04.01.</i>	<i>General Location Plan.</i>	<i>1:50,000.</i>
<i>BC/MB/11.20.04.02.</i>	<i>Geology Plan.</i>	<i>1:10,560.</i>
<i>BC/MB/11.20.04.03.</i>	<i>Detailed Location Plan.</i>	<i>1:5,500.</i>
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Appendix I: The Coal Authority's Mining Report, Ref. No. 51001019337002.

Appendix II: Borehole Graphic Logs.

Preliminary Site Investigation Report: Land at Colliers Row, Merthyr Tydfil.

1 Introduction

This report has been prepared on behalf of our client:

***Maxiom Developments Ltd,
5 Thornbury Close,
Merthyr Tydfil,
CF48 1HP***

and relates to land lying to the east of Brondeg and to the north of Colliers Row in Merthyr Tydfil. It is proposed to develop the land for housing. This report discusses the findings of site investigation carried out at the Site. An earlier Geo-Environmental report prepared for the Site included recommendations for exploratory boreholes to examine in greater detail and, where appropriate, stabilise any shallow mine workings that may underlie the Site.

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

- i) *The findings of the Geo-Environmental Report: Land at Colliers Row/Brondeg, Merthyr Tydfil, published by Blandford Consulting, reference no. BC/MB/08.19.04;*
- ii) *The findings of the site investigation undertaken at the Site*
- iii) *the archive records of Blandford Consulting.*

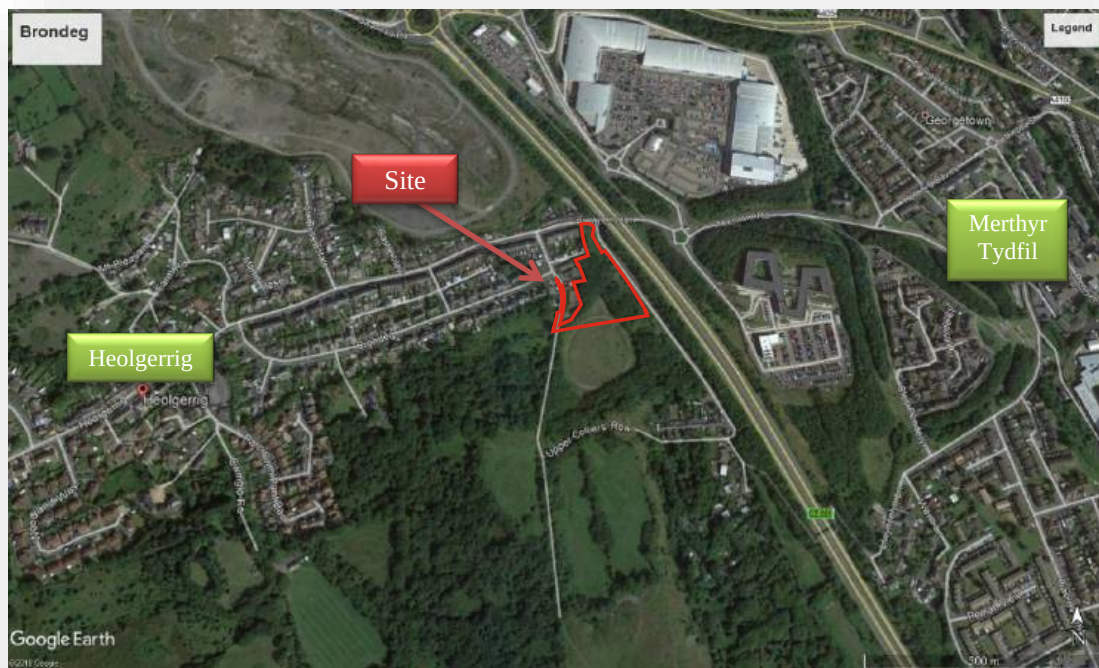
The findings of this report are necessarily based upon the data used in its compilation and may be amended in the future in the light of additional material information. The report must only be used in its entirety for its stated purpose.

/Cont....

2 Brief Description of the Site

The plot of land that is the subject of this report, 'the Site' is located on the western fringes of Merthyr Tydfil, approximately 700m west of the town centre; it is irregular in outline and occupies an area of approximately 0.82 hectares (see Figure 1 and *General Location Plan, drawing no. BC/MB/11.20.04.01*). The Site is located in a residential area on the fringes of the town and is bounded on its western side by residential dwellings and a lane; to the north is Aberdare Road and beyond it the Trago Mills retail site; to the east is the public highway serving Colliers Row, beyond which is the A 470 (T), and to the south there are a mixture of agricultural enclosures and open countryside.

Figure 1
Aerial View of the Site



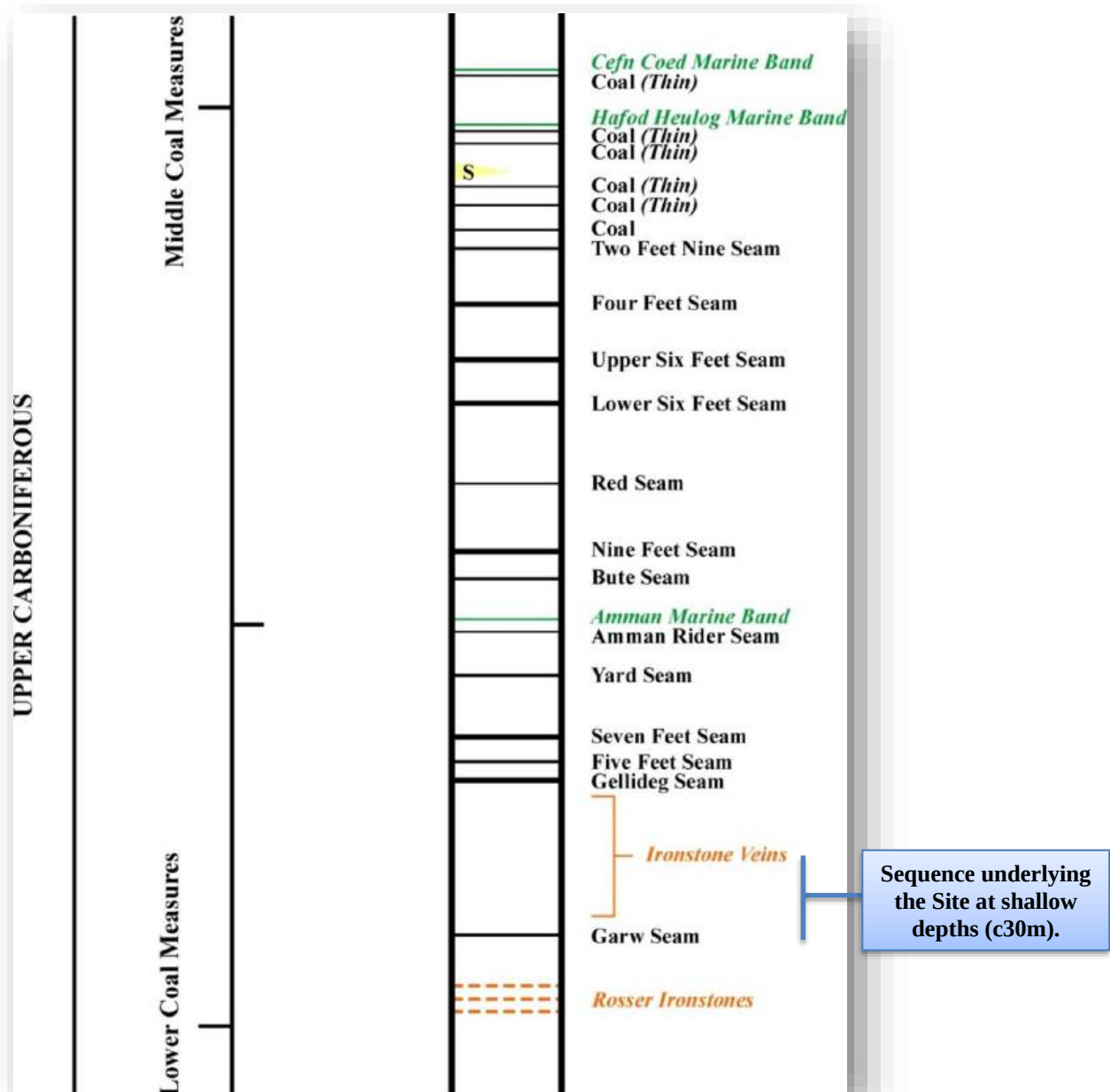
3 Geology of the Site

The Site is situated near the northern margin of the 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 sheet at 1:10,560 scale

/Cont....

(SO 00 NW) shows the inferred positions of the outcrop of the Garw Seam to pass through the Site (see *Geology Plan*, drawing no. BC/MB/11.20.04.02). However, mining records indicate that the outcrops are south-east of the positions shown on the published geological sheet such that the outcrop of the Five Feet/Gellideg Seam passes through the south-west corner of the Site (see *Plan of Old Workings in the Five Feet/Gellideg Seam*, drawing no. BC/MB/11.20.04.04). A number of ironstone bands are present within the coal measures, occurring above and below the Garw Seam (see Figure 2, Part of the Stratigraphic Column).

Figure 2
Part of the Stratigraphic Column.



/Cont....

In the Brondeg area the regional dip of the coal measures is 1 in 12 towards the south, with the result that the coal measures underlying the Site at shallow depths is part of the sequence containing the five ironstone veins and the Garw Seam.

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

The published geological sheet indicates that locally the coal measures are overlain with deposits of glacial till, Boulder Clay; we have no detailed information regarding the thickness and engineering properties of the Boulder Clay in the vicinity of the Site. Published geological records indicate that the Site is not affected by landslip.

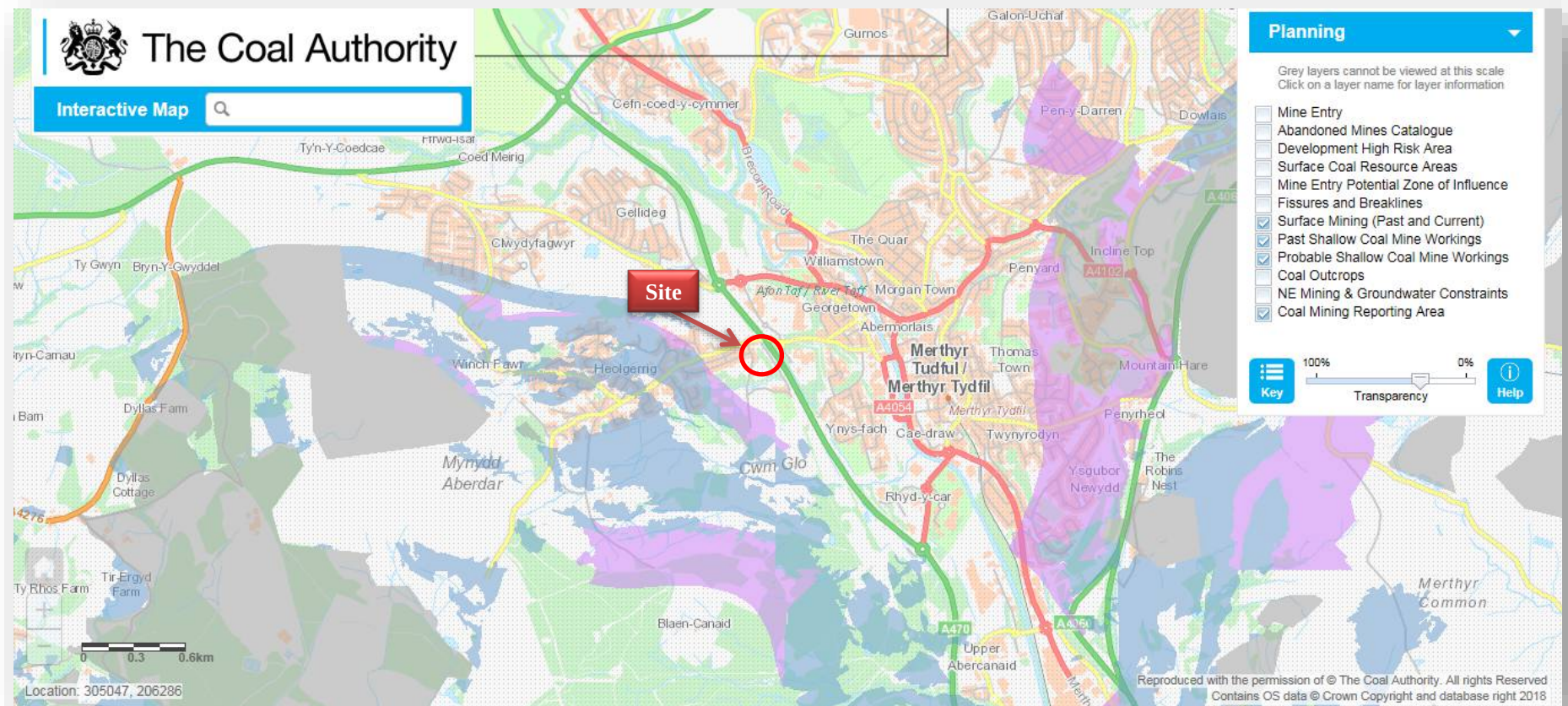
4 Mining History

The area has been subject to extensive mining operations for both coal and ironstone dating back to the earliest part of the nineteenth century. Coal seams and ironstone veins were accessed by adits driven into the mining horizons near their outcrops and by shafts sunk into the deeper coal seams and ironstone veins; there are a large number of disused shafts and adits in the locality. Air shafts were also sunk in order to provide ventilation to the underground mining operations.

The extensive coal mining operations that have taken place in the vicinity of the Site all lie to the west and south-west of the Site. The Five Feet Gellideg Seam is the lowest coal seam in the geological sequence that has been widely mined and the old workings in the Seam do not underlie the Site. The Coal Authority's mining report covers a larger area than the Site but does not include the finger of land along the lane at the western side of the Site. However, the report is broadly applicable to the Site and identifies that there are no shallow coal workings that may affect the Site and there is no disused mine entry within the confines of the Site or within 20m of its boundary. Further, the Site has not been part of an opencast coal site. An inspection of The

/Cont....

Figure 3
Print from The Coal Authority's Interactive Map
 (accessed 21st August 2019)



/Cont....

Coal Authority's interactive map identifies that the inclusion of the finger of land along the lane does not alter any of the findings of The Coal Authority's report.

From the early 1800s extensive underground mining operations took place in the five ironstone veins present above the Garw Seam, together with the Rosser Ironstone Veins. The workings were prosecuted from a number of drift mine entries and shafts that were interconnected and stretched from Clwydyfagwyr at the north end of the Borough southwards to Abercanaid. The Rhydycar Pit, 500m south-east of the Site, was an important part of this extensive mining operation. The underground mining operations for the ironstone veins extend across the area in which the Site is situated. In the Brondeg area the Garw Seam is too thin to have been mined underground as a coal mining operation but the Seam was often mined together with the overlying ironstone vein and the coal used in the smelting operations.

The records held by The Coal Authority are not a complete record of past coal mining activities and the presence of an unrecorded disused mine entry within the confines of the Site cannot be entirely dismissed, particularly in this area where extensive underground mining operations began before comprehensive records were being kept.

Otherwise, there are no active coal mines in the locality, either deep mines or opencast, that would affect the structural integrity of the proposed development.

5 Mine Gases

When coal is mined methane gas is released and may accumulate with other mine gases in the mining voids. A number of studies of the old workings around Merthyr Tydfil and dating back to the mid to late twentieth century have shown that there is little risk from mine gases. This may be as a result of the nature of the coal seams or because the shallow old workings have vented most of the mine gases to atmosphere or is as a result of the combination of the two. There are no recorded shallow coal workings underlying the Site that could act as a source of mine gases and The Coal Authority has no record of an emission of gas at the Site that has required action.

/Cont....

6 Radon Gas

The risk to a residential development on the land from Radon gas has been assessed by referring to Public Health England's interactive map. The map shows that the Site lies within an area where the maximum radon potential is 5-10%. The risk from Radon gas should be assessed in greater detail by obtaining a report from the British Geological Survey.

7 Site Investigation

7.1 Site Investigation Programme

A programme of twelve boreholes was designed for the Site, five on Plot 4 and one borehole on each of the other plots. The programme was designed and supervised by a Chartered Geologist and the boreholes were drilled by Apex Drilling Services. Old workings were encountered in the first of the boreholes drilled on Plot 4, consequently four of the boreholes planned for this plot were not drilled and instead the borehole pattern was changed to one suitable for a drilling and grouting exercise to stabilise the shallow mine workings encountered there. The drilling and grouting exercise is the subject of a separate report.

The borehole positions are shown on the *Borehole Location Plan*, drawing no. BC/MB/11.20.04.05 and the graphic logs of the boreholes are contained at Appendix III.

7.2 Findings of Site Investigation

The borehole provings are summarised in Table 1. Made Ground believed to be colliery spoil was encountered in all fourteen boreholes where its thickness was found to vary between 5.5m and 8.0m. Beneath the Made Ground Glacial Till was encountered in all the boreholes where the driller variously described it as Boulder Clay and elsewhere as Sand and Gravel. The Till was found to vary in thickness between 3.5m and 7.0m. Two ironstone vein horizons were encountered in the boreholes, the Blue and the Big Blue. Old workings were encountered in both ironstone veins in at least some of the boreholes.

/Cont....

Table 1
Summary of Borehole Results

Borehole Number	Made Ground Thickness	Glacial Till Thickness	Blue Ironstone			Big Blue Ironstone			Garw Seam
			Top Depth	Thickness	Rock Cover	Top Depth	Thickness	Rock Cover	Thickness
BH1	6.0	5.0	-	-	-	-	-	-	0.5
BH2	7.0	5.2	-	-	-	25.0	1.7	12.8	-
BH3	6.5	4.5	-	-	-	-	-	-	NDE
BH4	6.0	6.2	19.2	1.8	7.0	-	-	-	1.00
BH5	5.5	7.0	-	-	-	24.7	1.3	12.2	1.00
BH6	6.5	6.0	-	-	-	-	-	-	0.2
BH7	7.0	4.4	-	-	-	-	-	-	0.5
BH8	8.0	3.0	-	-	-	-	-	-	0.7
BH9	8.0	3.5	-	-	-	-	-	-	0.8
Notes: All dimensions are in metres. Red type denotes old workings. Where no details are entered it denotes that the horizon was not specifically identified and therefore showed no evidence of old workings.									

/Cont....

The Garw Seam was encountered at depths to the top of the coal of between 28.0m and 28.5m, the thickness of the coal seam was found to vary between 0.2m and 0.8m. Old workings were encountered in the Seam in Borehole 4, they were found to be 1.0m thickness of soft drill taken to be backfilled old workings.

The old workings encountered in the two ironstone veins were variously found to be broken ground or soft drill (backfilled old workings). The range of thicknesses encountered, when compared to the thickness of overlying bedrock, generally resulted in a strata:void ratio that is less than 10:1. A 10:1 strata void ratio is generally accepted as the limiting ratio whereby old workings are unlikely to reach rockhead. The strata:void ratio for the old workings encountered in the Garw Seam is 13.8:1; the workings are considered to pose no risk to the development.

8 Discussion and Recommendations

8.1 Solid Geology

There are no features associated with the solid geology of the Site that would require any particular measures to be included in the design and construction of the foundations for the proposed development. It is recommended that no further action is required in this respect.

8.2 Mining History

8.2.1 Shallow Mine Workings

The boreholes encountered old workings in two ironstone veins and in the Garw Coal Seam. The old workings in the ironstone veins are generally at depths where they pose a risk of collapsing up to rockhead. Where old workings are present in both ironstone veins there is a risk of them interacting to increase the risk of a collapse to rockhead. The old workings in the Garw Seam are considered to pose a negligible risk of collapsing to rockhead.

/Cont....

It is recommended that as a minimum, where no old workings have been encountered on a given plot that a pattern of five boreholes is completed to confirm that no old workings are present beneath the footprint of the building. For buildings longer than 10m the number of boreholes should be increased to eight. If a borehole encounters old workings at the depths that pose a risk of them collapsing to the surface, then the borehole pattern should be modified to provide a grid suitable for the injection of grout to stabilise the old workings. For plots where the preliminary drilling has encountered old workings, the old workings underlying the plot should be stabilised by means of a drilling and grouting programme.

8.2.2 *Mine Entries*

Our searches found no record of disused mine entries within the bounds of the Site or 20m of its boundaries. Although the presence of an unrecorded entry cannot be entirely dismissed, there are mining records of local underground mine workings and these identify no mine entries within the confines of the Site. The situation should be monitored during site clearance works and further advice sought if any suspicious features are observed.

8.2.3 *Mine Gases*

Various studies of the shallow old workings in the Heolgerrig area have found no particular risk from mine gases. The boreholes were monitored for the presence of mine gases and none were encountered. It is considered that there is a negligible risk from mine gases.

8.3 Radon Gas

Public Health England's online Radon gas map shows that the Site lies within an area where the maximum Radon potential is 5-10%. The risk from Radon gas should be assessed in greater detail by obtaining a report from the British Geological Survey.

/Cont....



**Dr Malcolm Blandford,
Chartered Geologist.**

Report Date: 5th February 2021.

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Consultant Geologists and Geotechnical Engineers,
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PLANS



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Geologists Working With The Environment....

Study on Land at Colliers Row, 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/11.20.04.01.



Study on Land at Colliers Row, Merthyr Tydfil.

Geology Plan.

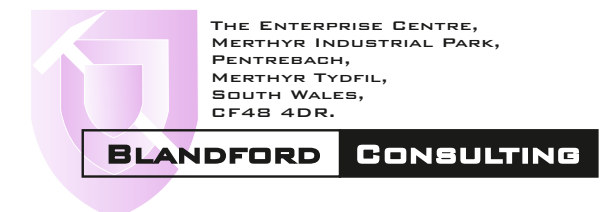
Plan Scale: 1:10,560.

Key to Symbols:

Approximate Site Boundary.

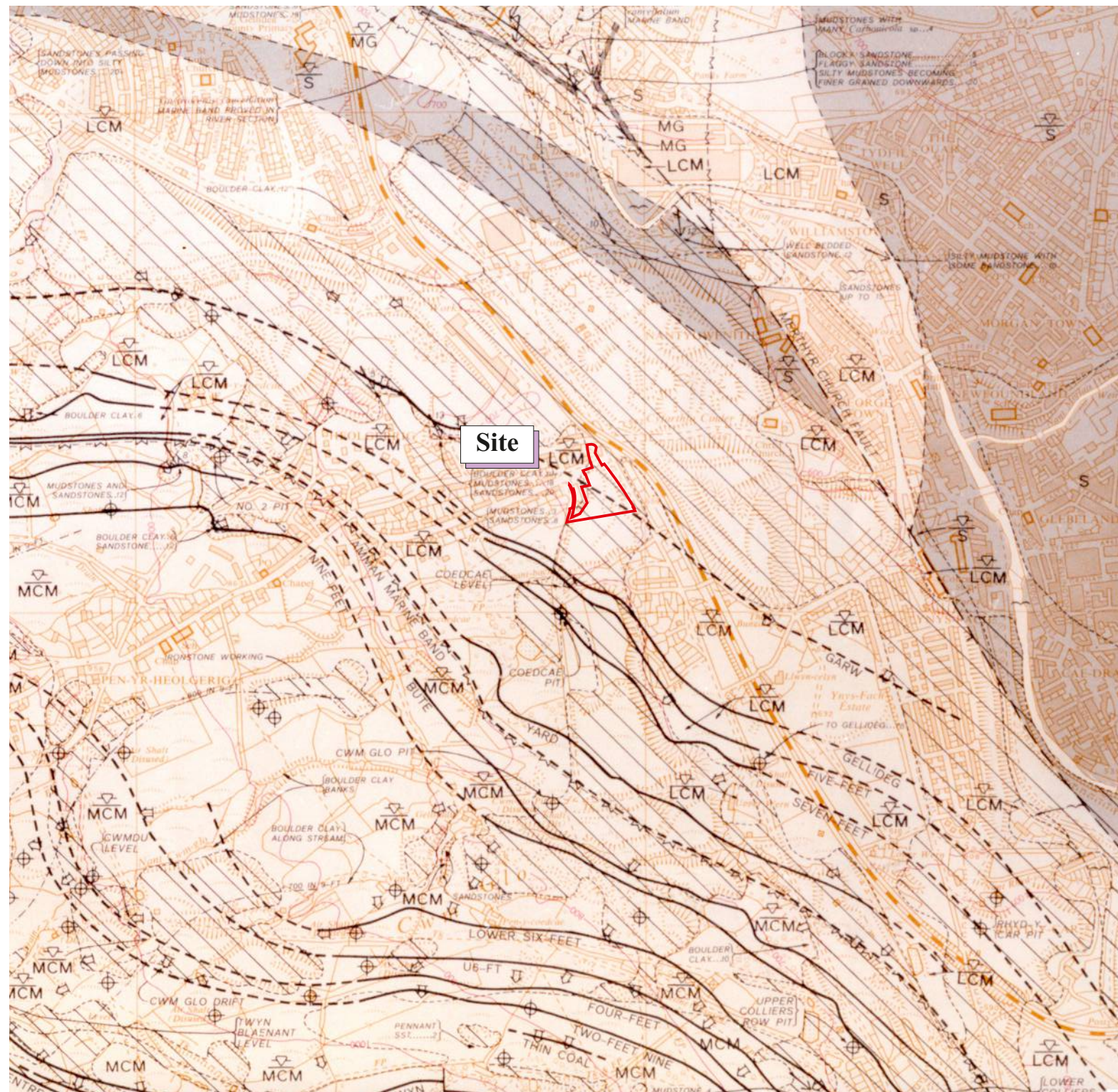
Note:
North is at top of plan.

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Drawing No: BC/MB/11.20.04.02.

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Study on Land at Colliers Row, Merthyr Tydfil.

Detailed Location Plan.

Plan Scale: 1:2,500.

Key to Symbols:

 **Approximate Site Boundary.**

Note:

North is at top of plan.

*Drawing extracted from documents
provided by client.*

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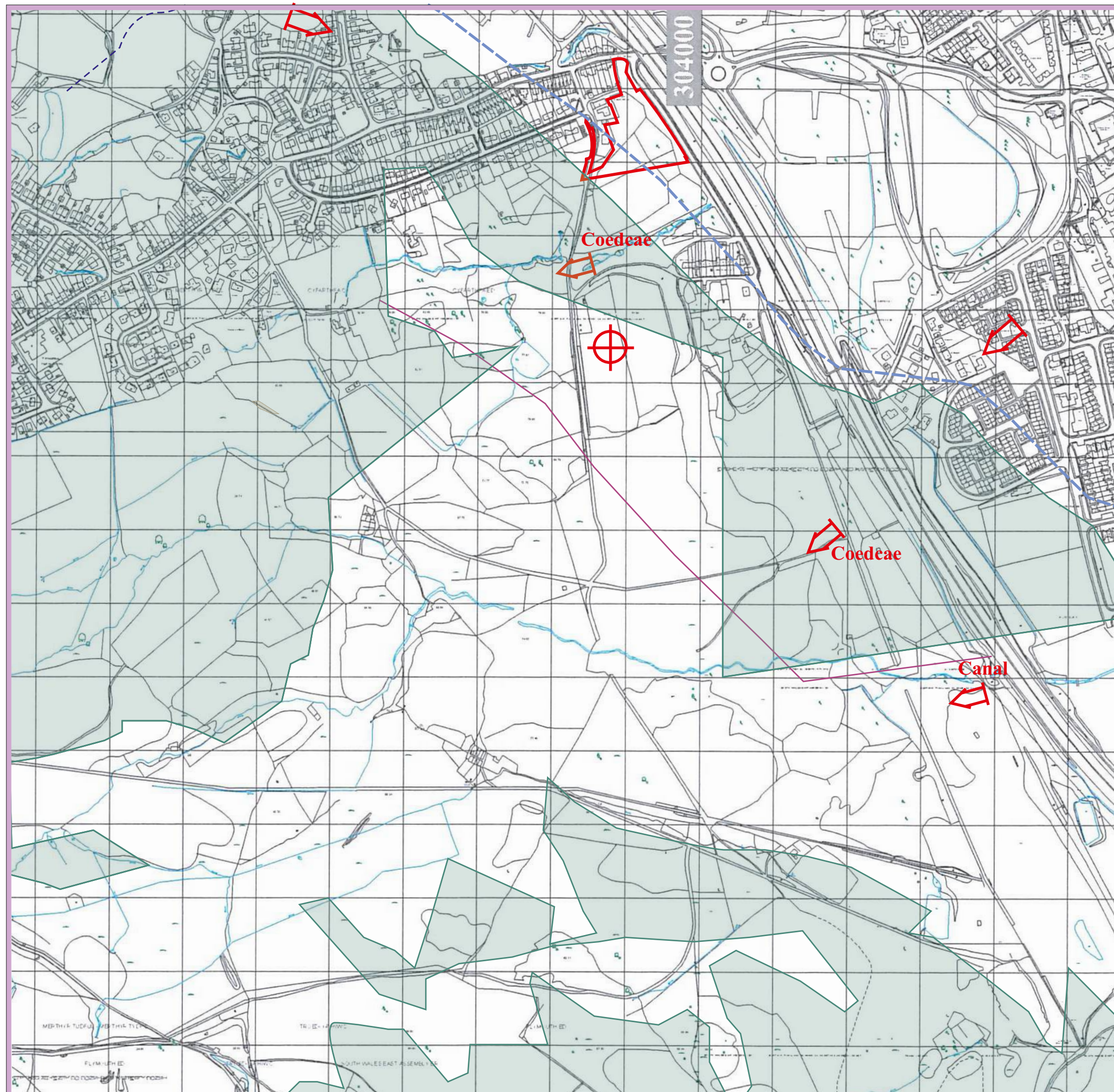


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Drawing No: BC/MB/11.20.04.03.





Study on Land at Colliers Row, Merthyr Tydfil.

Plan of Old Workings in the Five Feet/Gellideg Seam.

Plan Scale: 1:5,000.

Key to Symbols:

-  **Approximate Site Boundary.**
-  **Approximate Position of Disused Shaft.**
-  **Approximate Position of Disused Adit.**
-  **Approximate Position of Outcrop of Five Feet/Gellideg Seam.**
-  **Approximate Extent of Old Workings.**

Note:

North is at top of plan.

*Plan is for identification only, do not
scale from this plan.*

*Additional Mine Entries may be
present in the area.*

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Drawing No: BC/MB/11.20.04.04.

Study on Land at Colliers Row, Merthyr Tydfil.

Borehole Location Plan.

Plan Scale: 1:1,250.

Key to Symbols:

-  Approximate Site Boundary.
-  Borehole That Encountered Solid Ground.
-  Borehole That Encountered Old Workings.

Notes:

North is at top of plan.

Drawing extracted from plan prepared by Monarch Architectural Services.

Borehole positions are approximate and for identification only. Do not scale from this plan.

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Drawing No: BC/MB/11.20.04.05.



APPENDIX I

**COPY OF THE COAL
AUTHORITY'S REPORT
51001019337002**



THE ENTERPRISE CENTRE,
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Geologists Working With The Environment....



Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848 DX 716176 MANSFIELD 5

**LANDMARK INFORMATION GROUP
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SOWTON INDUSTRIAL ESTATE
ABBAY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY**

Our reference: **51001019337002**
Your reference: **74218585_2|**
Date of your enquiry: **27 October 2015**
Date we received your enquiry: **27 October 2015**
Date of issue: **27 October 2015**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report

SITE AT TYNEWYDD, BRONDEG, HEOLGERRIG, MERTHYR TYDFIL,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

According to the records in our possession, the property is not within the zone of likely physical influence on the surface from past underground workings.

However the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on Coal Authority Information section of the report.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

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

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

The 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

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

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

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Location map



Approximate position
of property

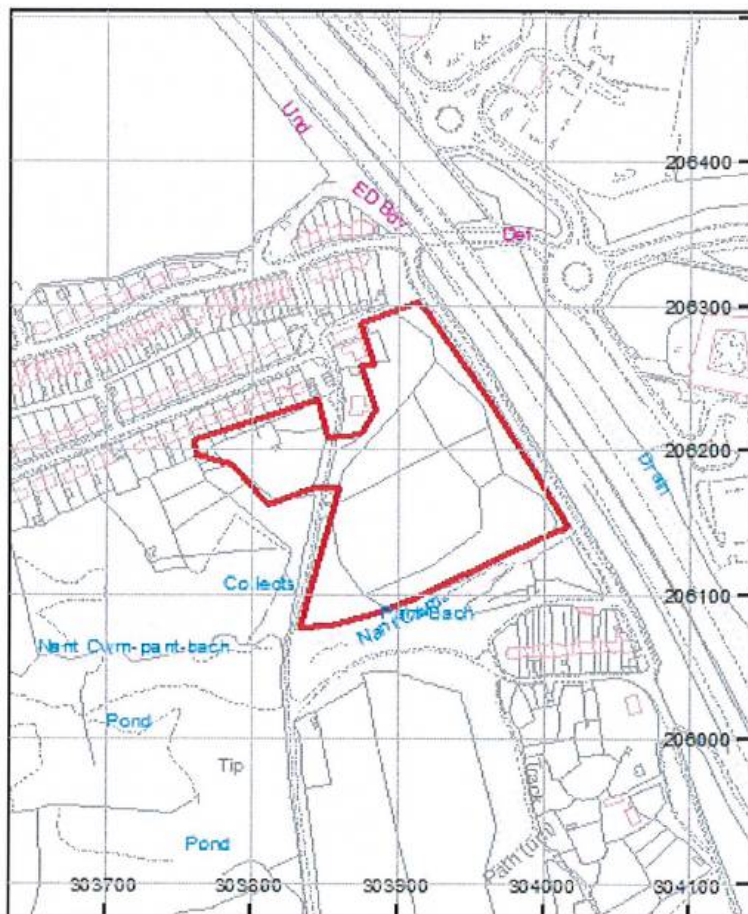


Enquiry boundary

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Key

Approximate position of enquiry
boundary shown



APPENDIX II

GRAPHIG BOREHOLE LOGS



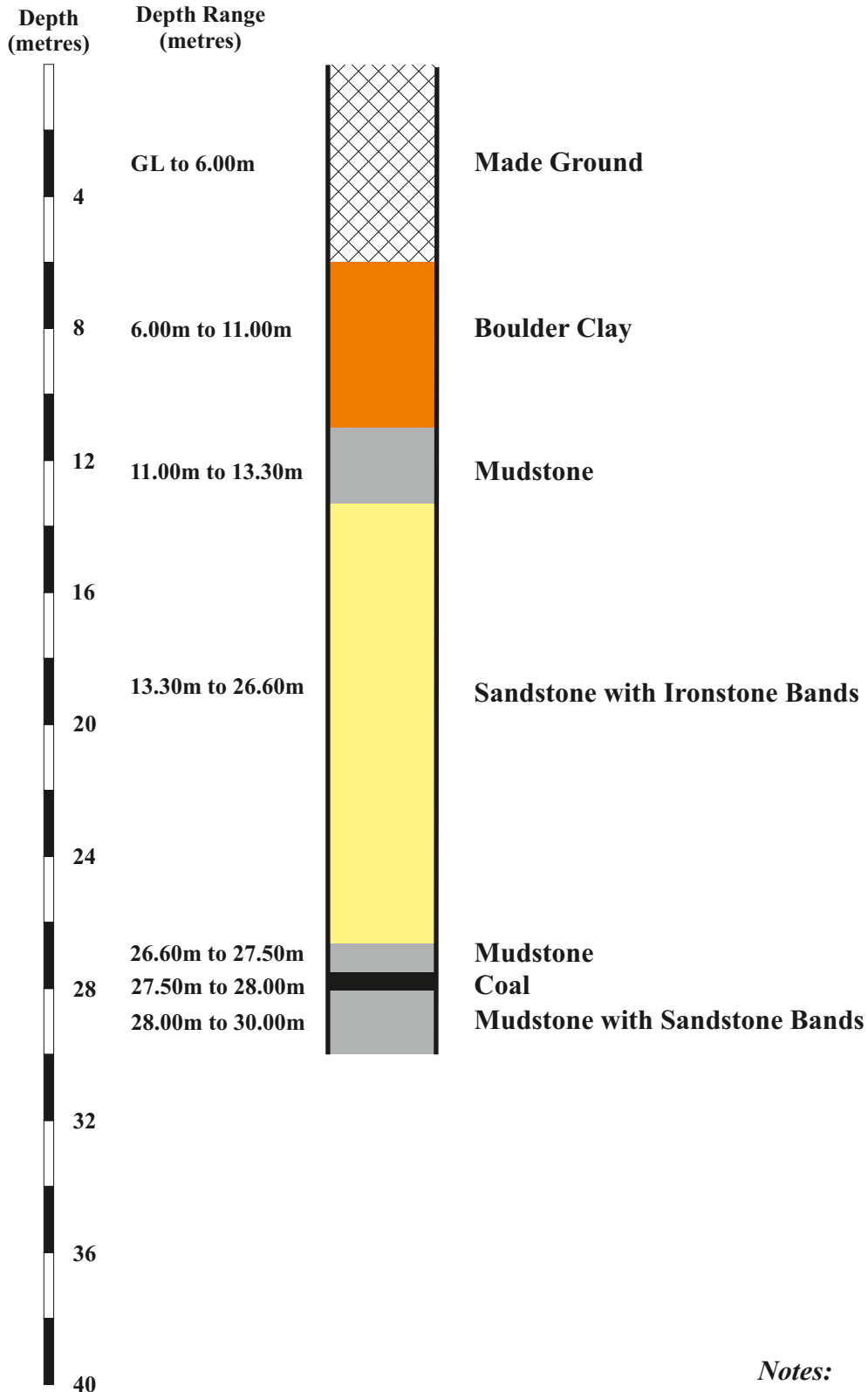
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Geologists Working With The Environment....

Study on Land at Colliers Row, Brondeg

Borehole No. 1

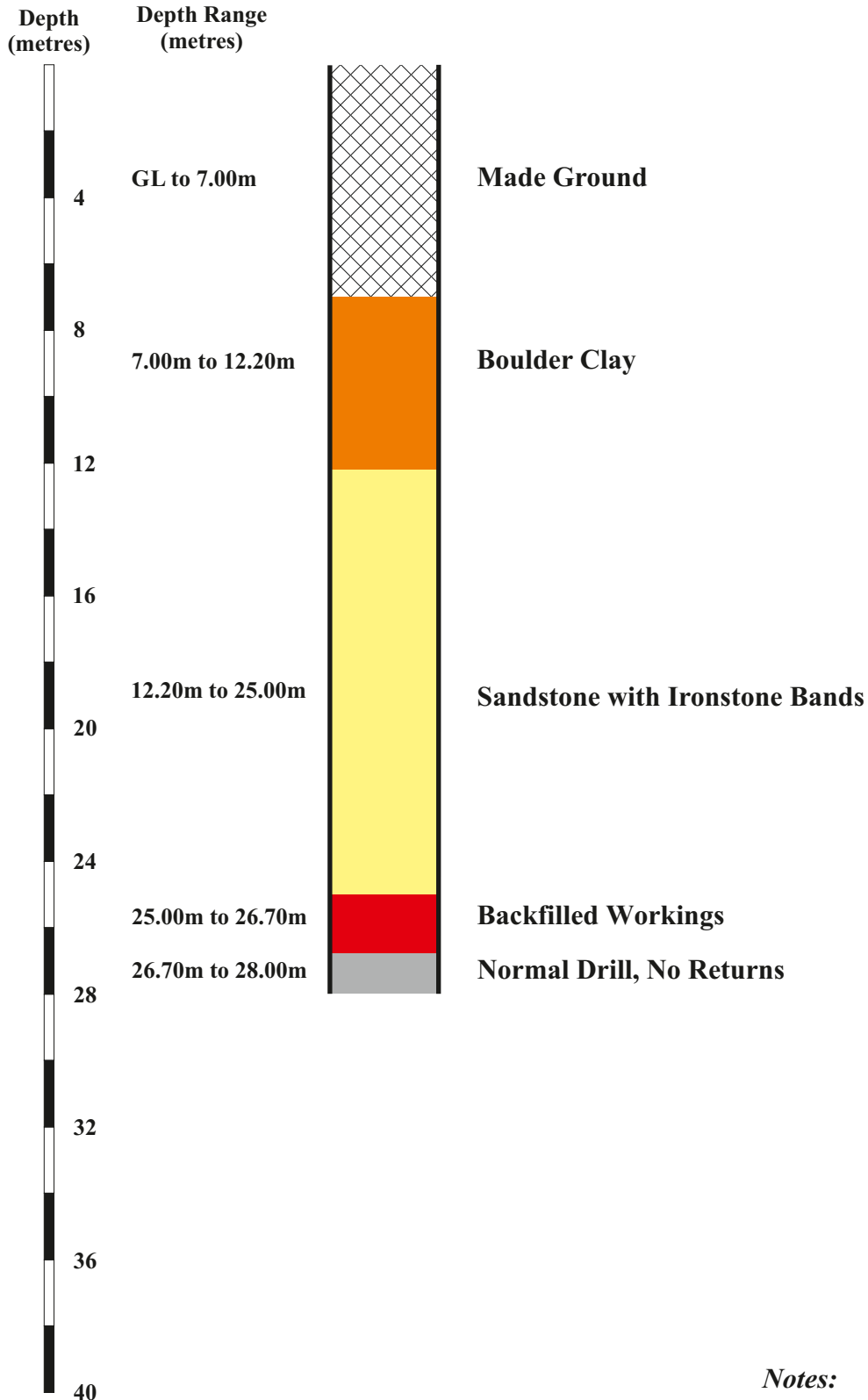


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 30.00m.*
4. *Cased 10.50m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 2

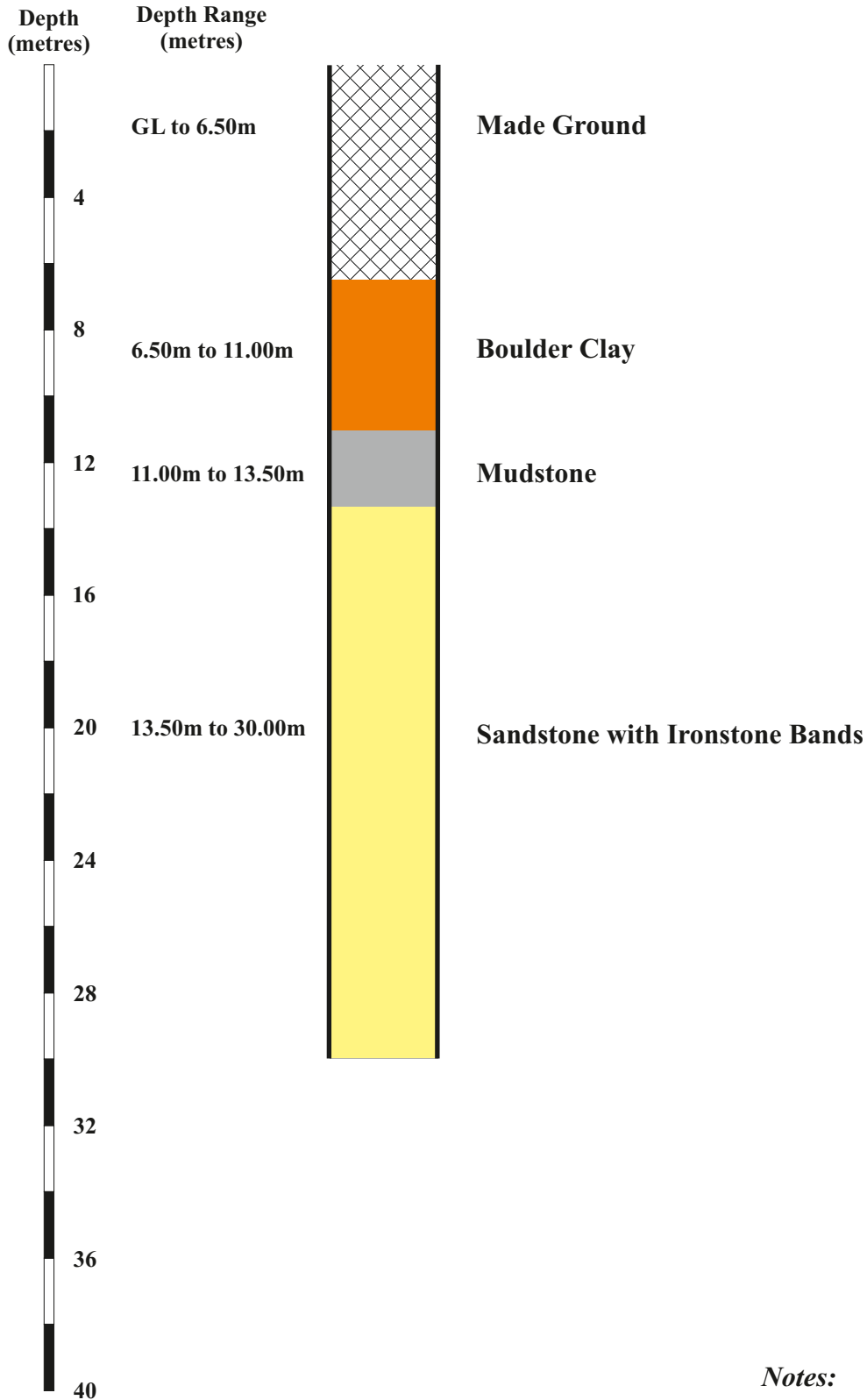


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 28.00m.*
4. *Cased 12.00m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 3

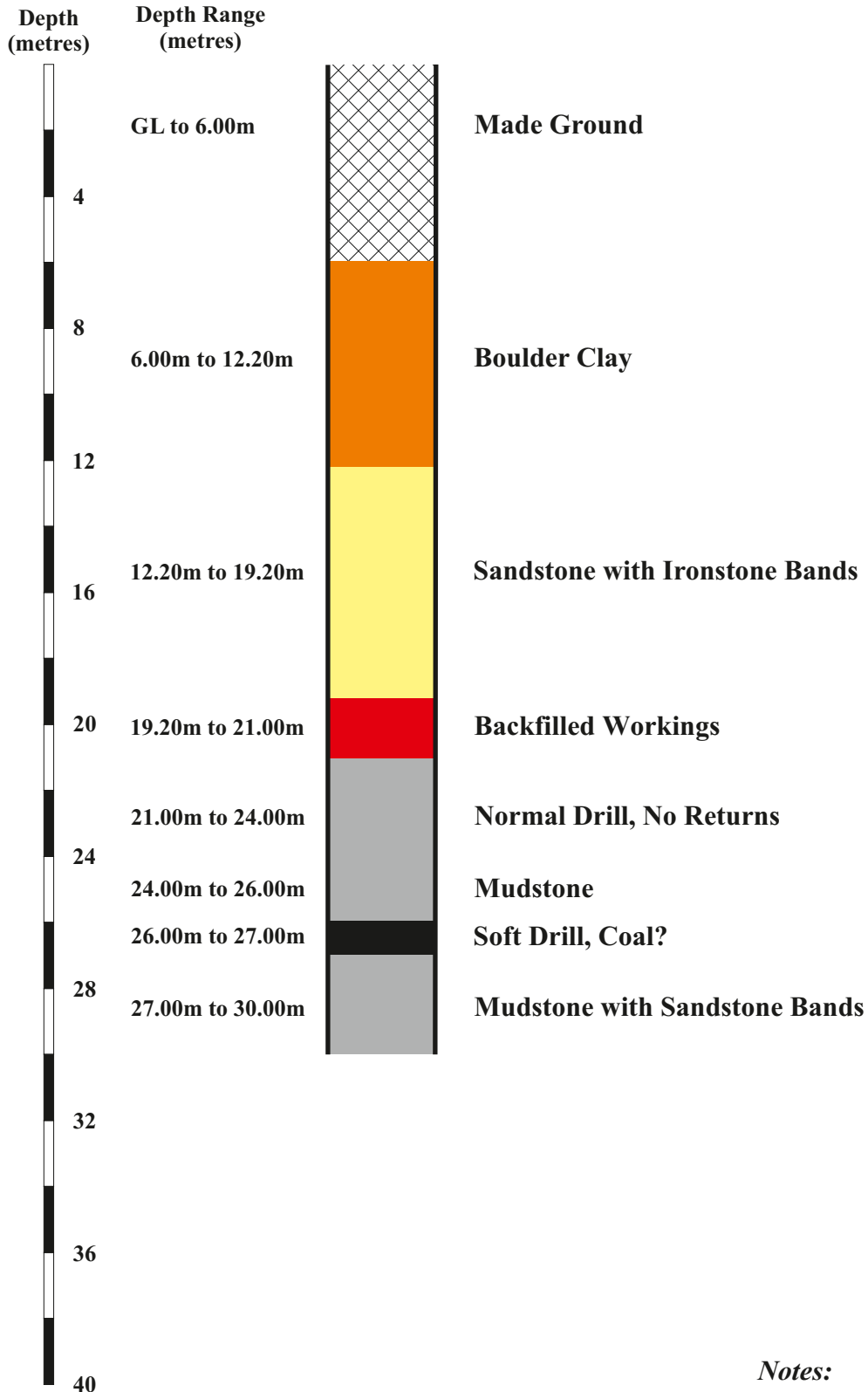


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 30.00m.*
4. *Cased 10.50m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 4

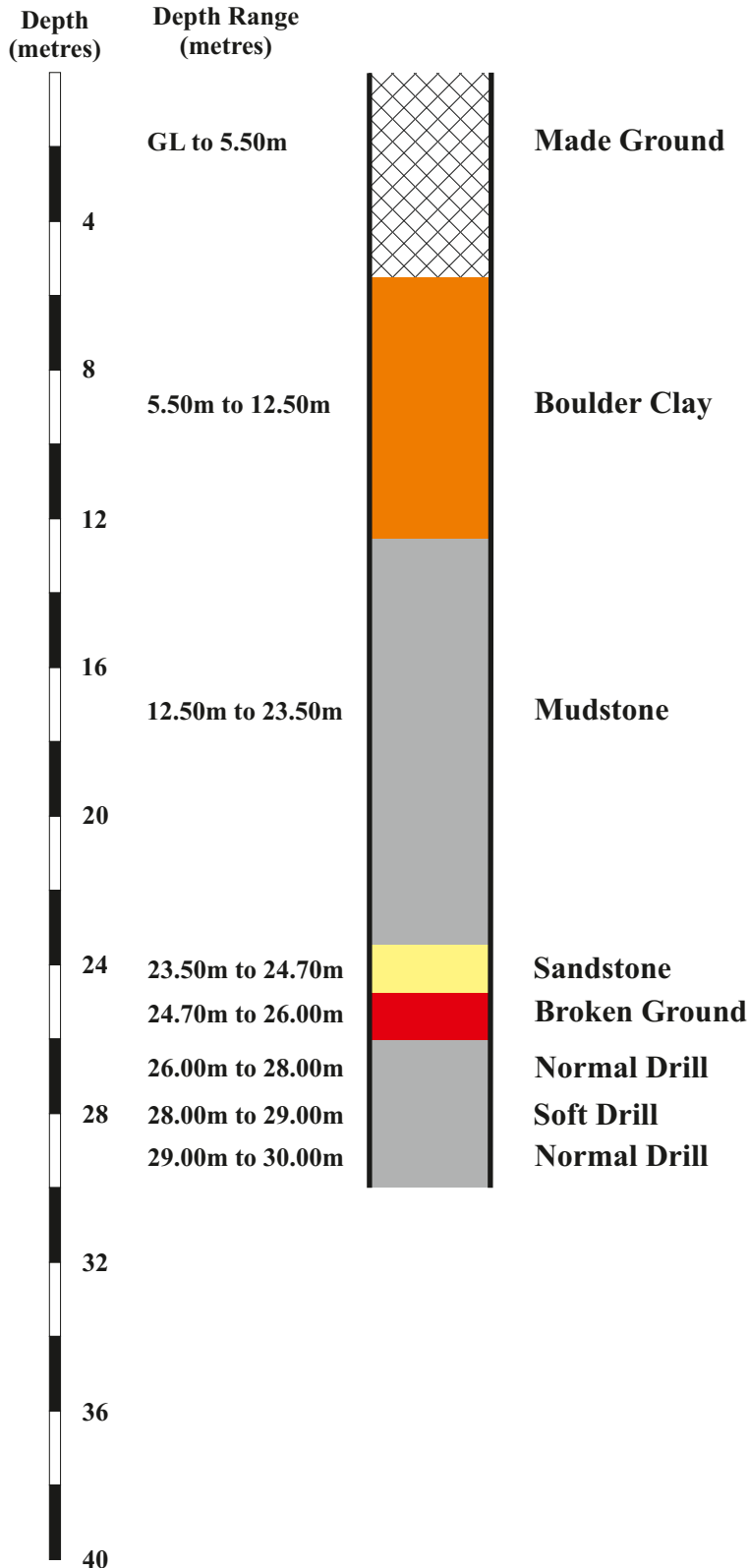


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 30.00m.*
4. *Cased 12.00m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 5

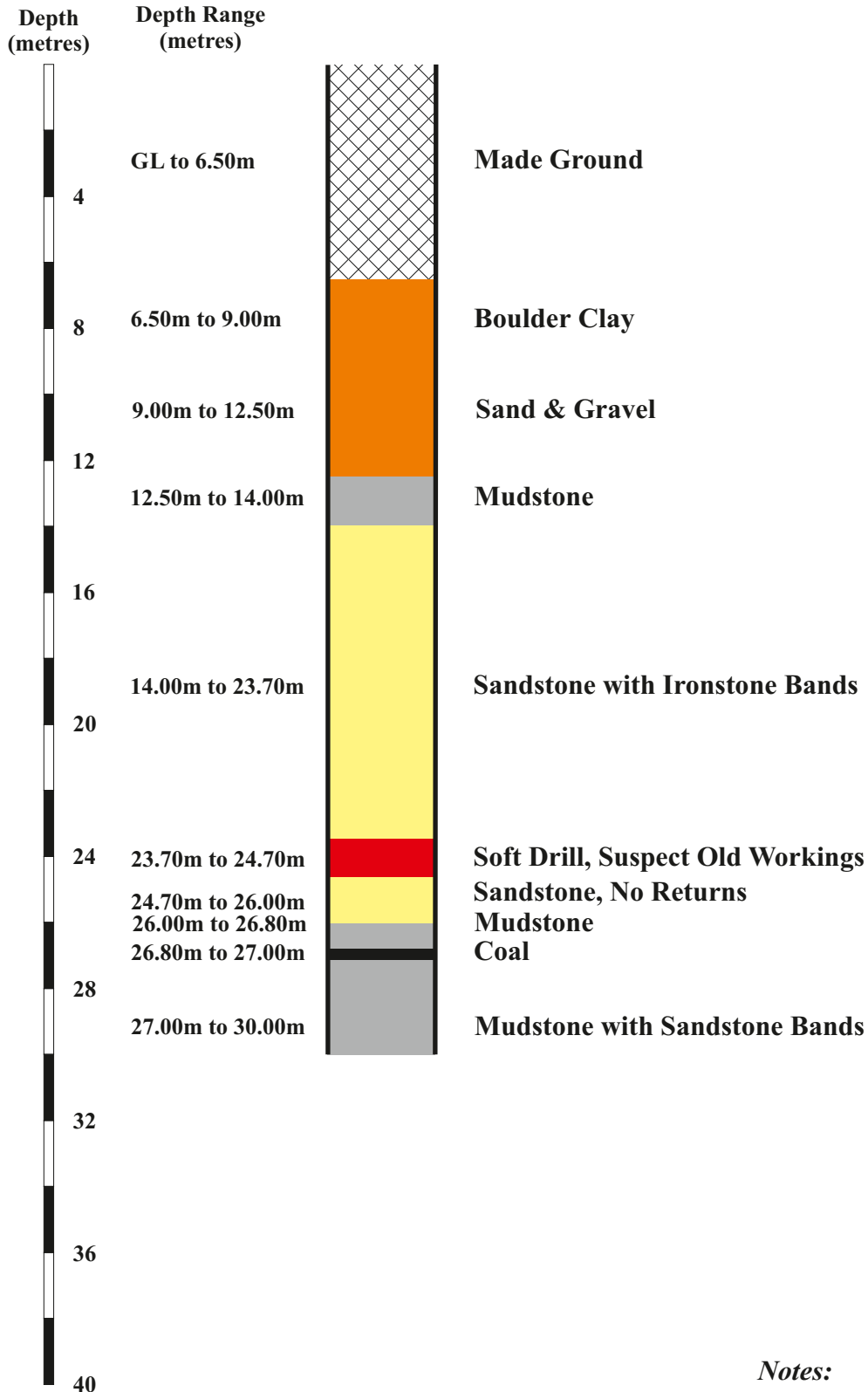


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 30.00m.*
4. *Cased 12.00m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 6

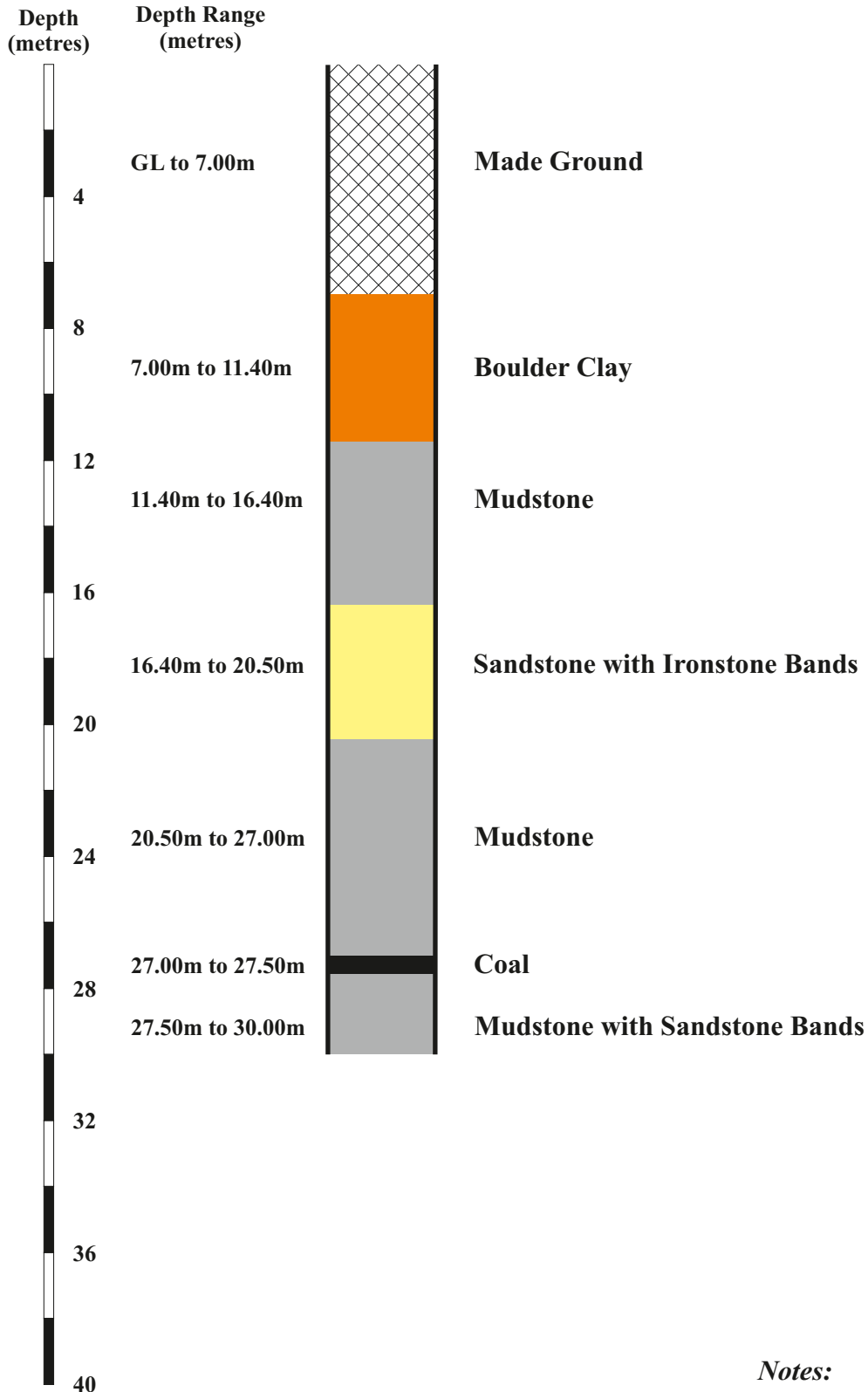


Notes:

1. Driller's Descriptions.
2. Borehole dry.
3. Total depth of borehole, 30.00m.
4. Cased 13.00m.

Study on Land at Colliers Row, Brondeg

Borehole No. 7

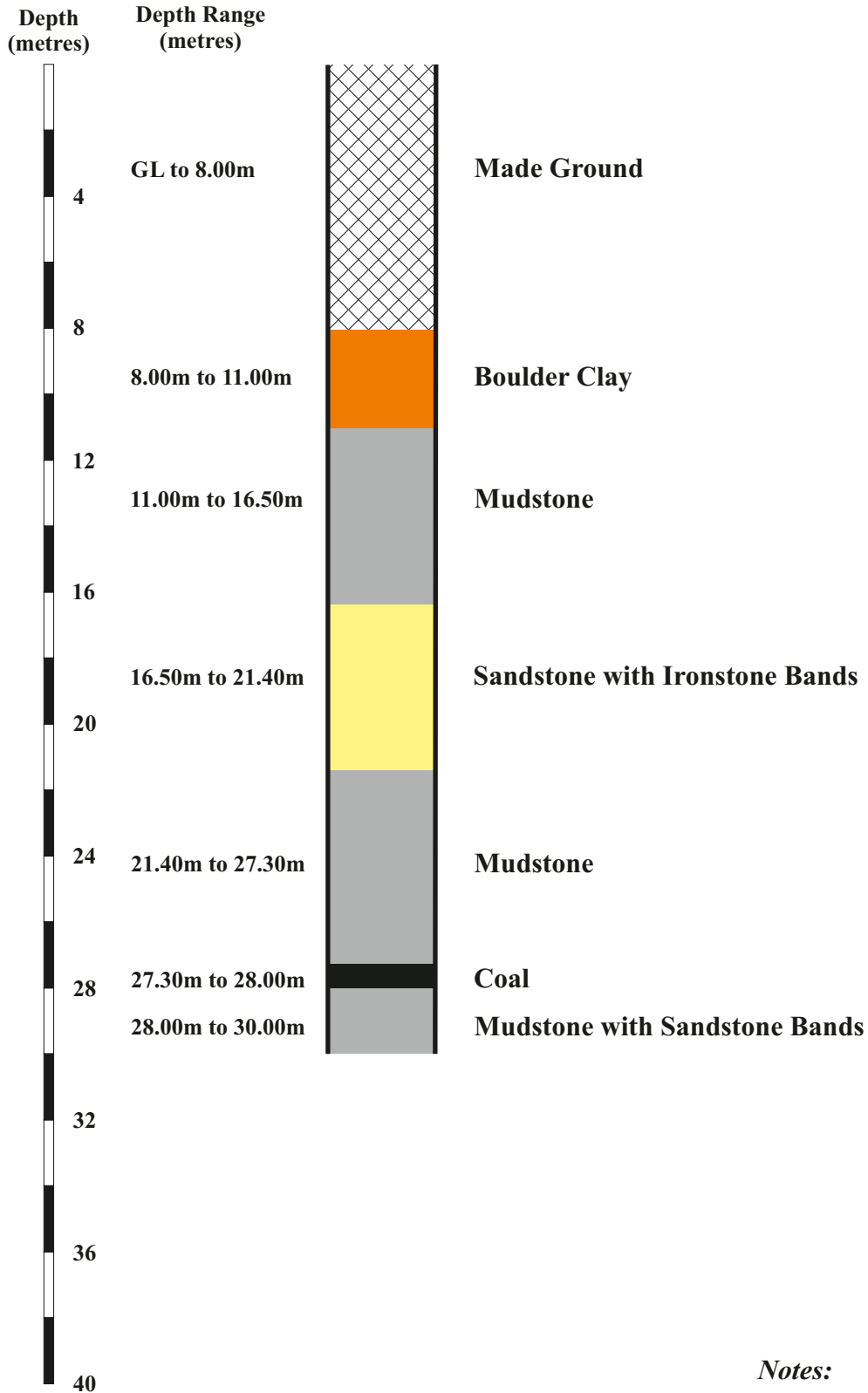


Notes:

1. *Driller's Descriptions.*
2. *Borehole dry.*
3. *Total depth of borehole, 30.00m.*
4. *Cased 10.50m.*

Study on Land at Colliers Row, Brondeg

Borehole No. 8

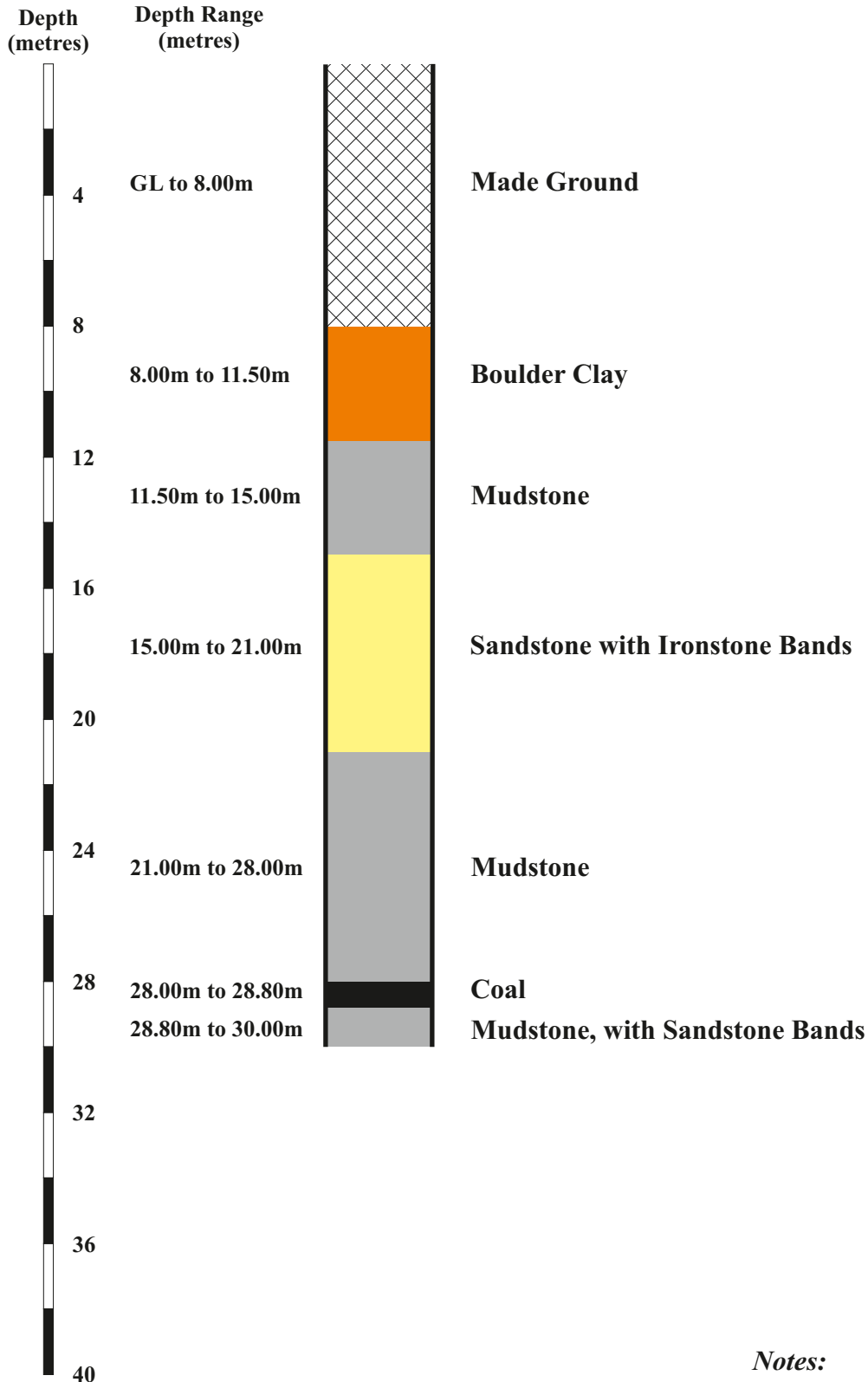


Notes:

1. Driller's Descriptions.
2. Borehole dry.
3. Total depth of borehole, 30.00m.
4. Cased 10.50m.

Study on Land at Colliers Row, Brondeg

Borehole No. 9



Notes:

1. Driller's Descriptions.
2. Borehole dry.
3. Total depth of borehole, 30.00m.
4. Cased 10.50m.



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