

REF: 1892/MGE/MineRep/sdi

Andrew Russell
Axis Ltd
Unit 11
Well House Barns
Chester Road
Bretton CH4 0DH

2nd June 2020

Dear Andrew,

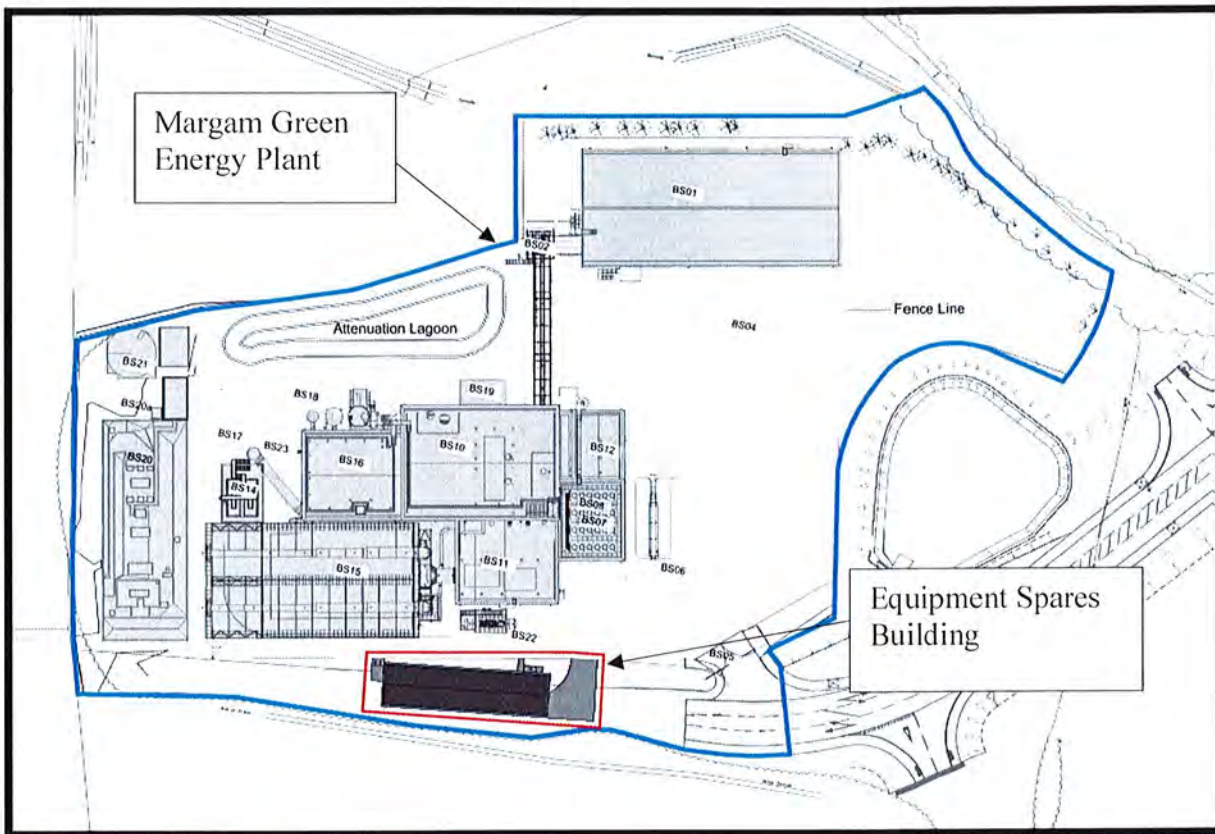
RE: MARGAM GREEN ENERGY PLANT: MINING REVIEW

1.0 Introduction

It is proposed to build a new Equipment Spares Building at the Margam Green Energy Plant (MGEP), Longlands Lane, Margam, South Wales. It will provide storage space for the MGEP facility, and comprises a large warehouse type structure, with a heavy-duty apron for forklift access via large roller-shutter doors.

A site investigation and geotechnical report has been undertaken by Quantum for the overall MGEP site. A Coal Mining Risk Assessment is required for the Equipment Stores Building. Therefore, Axis Ltd have appointed GroundSolve Ltd (GSL) to undertake this exercise.

The location of the proposed development within the MEGP is presented below. It will be a large steel framed structure, with conventional industrial cladding:



Site Location

This letter report presents a review of the available information and presents a mining risk assessment for the new building.

2.0 Sources of Information

The following sources of information have been reviewed as part of this study.

- Sheet 247, geology plan at a scale of 1:50,000,
- Sheet SS 78 NE, geology plan at a scale of 1:10,560,
- Geology memoirs, Swansea Sheet 247, 1907,
- BGS Boreholes and mine plans obtained from web site,
- Site Location plan,
- Site Layout plan,
- Proposed elevations,
- Ground Investigation for development at Margam for Western Logs Group, Geotechnical Report No X071043, Quantum, November 2007,
- Groundsure Environmental Data Report June 2008,
- Groundsure Geology and Ground Stability Report, June 2008,
- Quantum Borehole logs and location plan, May 2008,
- Coal Authority Web site.

2.1 Geology

The geology has been studied on the 1:10,560 geology plan, Sheet SS 78 NE, and the associated geological memoirs, dated 1907. The information from the geology plan has been reproduced on Figure 1.

The geology plan shows the site to be underlain by alluvium overlying the Middle Coal Measures. The conjectural outcrop of four coal seams are shown in the vicinity of the site, namely in descending order, with their typical thickness recorded below:

Seam	Thickness (m)
2 FT 9"	4ft 6" (1.37m)
Upper 4 FT	4ft (1.22)
Lower 4 FT	4ft 6" (1.37m)
6 FT	5ft 6" (1.68)

Immediately south of these outcrops is the conjectural position of a thrust fault, which passes through the position of the proposed new structure. This means that the above seams are also repeated to the south of the thrust fault. A thrust fault generally being a low angle fault. The dip of the strata is shown dipping at 19° to the north west, as obtained from workings in the 5 FT coal seam.

The memoirs record the above seams to have been worked in the Morfa Colliery (Grange Pit), which is 1.5km west of the site and on the other side of Morfa Fault, which downthrows the seams to the east. A summary of the pit sequence is presented below.

Strata	Thickness (m)	Separation (m)
Superficial Deposits	22.10	
North Fawr Seam	2.61	
		28.2
Three feet seam	0.92	
		28.0
South Fawr Seam	2.0	
		20.0
Clay Vein	1.22	
		18.0
Four feet seam	1.22	
		28.0
Six feet seam	2.0	
		44
Nine feet seam	1.22	

2.2 Coal Authority Report

A Coal Authority Report dated March 2012 has been provided for the wider site area, the main findings are listed below and the report presented in full in Appendix A.

- The site is in the likely influence from workings in two seams of coal at 220 to 350m, last worked in 1913.
- Any ground movements associated with these workings should have ceased.
- In addition, the site is in an area where the Coal Authority believes there is coal at or close to surface, which may have been worked in the past.

- There are no known coal mine entries on, or within 20m of the boundary of the site.
- The site is not in a past opencast area.
- No settlement claims have been received in the vicinity of the site.

The report concluded that a prudent developer would seek appropriate technical advice before any works are undertaken.

In addition, the Coal Authority web site recorded:

- The site is in a high-risk development area,
- There are no recorded workings beneath the site,
- The site is not indicated to be in an area of probable shallow coal workings.

2.3 Previous Boreholes

Previous boreholes were found on the BGS web site, which were drilled for coal exploration. These are summarised below and presented in Appendix B. The location of these boreholes is presented on Figure 1.

The Margam No 1 Boring drilled in 1934 is summarised below, with the interpretation of seams from the logs.

Strata	Depth (m)	Separation (m)	Interpretation
Superficial Deposits	0.0- 15.24		
Rock	15.24-24.40		
Coal	24.40-25.40		North Fawr
Rock	25.40-36.60		
Marine Band	36.60	28.65	
Rock	36.60-54.05		
Coal	54.05-54.35		Three Feet
Rock and MB	54.35-80.20	25.85	
Coal	80.2-80.80		
Rock	80.80-91.60	10.8	
Coal	91.6-92.1		
Rock	92.10-106.4	14.3	South Fawr
Coal	106.4-107		
Final Depth	115		

The dip of the strata is recorded as between 15 and 20°.

Morfa No 1 Borehole drilled in 1894; the seam interpretation is by GSL.

Strata	Depth (m)	Interpretation
Superficial Deposits	0.0-32.30	
Rock	32.30-50.0	
Coal	50.0-54.5	Three Feet
Final Depth	58.53	

In addition, mine plans from Morfa Colliery to the west of the site were found showing workings in the following seams.

- North Fawr,
- South Fawr,
- Four Feet,
- Six Feet,
- Nine Feet.

2.4 Previous Investigations

Four shell and auger boreholes were drilled in May 2008 to a maximum depth of 10m. The borehole logs and a location plan are presented in Appendix C.

The boreholes revealed made ground overlying a thin layer of peat overlying alternating layers of sand/silt, sand and gravel.

3.0 Identification and Assessment of Site-Specific Risks

The Coal Authority report has revealed that the site is in an area where coal is believed to be close to surface, which may have been worked in the past. It became law to deposit all mine plans after 1872, which means that:

- The Coal Authority do not have any plans of the shallow seams being worked,
- If worked, it would have been prior to 1872.

The geology plans record the conjectural outcrop of four coal seams across the site and immediate vicinity trending in a WNW – ESE direction, with the dip of the strata shown as 19° just east of due north, see Figure 1. The thrust fault to the south also follows the same trend as the seams, with both following the strike of the beds, i.e. at right angles to the dip direction.

None of the coal seams shown to outcrop within the wider site area will underlie the proposed Equipment Spares building, due to the dip being towards the northeast, and the presence of the thrust fault at the southern end of the proposed building.

While no boreholes have been drilled on the site to prove the underlying solid strata, two boreholes have been drilled to the east of the site, which are on the same strike as the strata beneath the site and are therefore considered to have recorded similar strata as that expected beneath the site.

The No 1 Margam borehole drilled in 1934 proved the North Fawr seam at a depth of 24.40m and the Three Feet seam at 54.05m depth. No workings were recorded in either seam. Note the Three Feet seam is considered to represent the 2 FT 9 seam of the geology plan.

The Morfa No 1 borehole drilled immediately south east of the Margam No 1 borehole encountered a very thick coal seam at a depth 50.0m, which is considered to be the Three Feet seam. The North Fawr seam not being encountered, as it would have already cropped due to the greater thickness of superficial deposits. The increased thickness of the seam is probably due to it being within the thrust fault. No workings were encountered in this seam.

It can therefore be concluded that the geology plan is inaccurate and given a dip of 19° to the north the Three Feet seam would not outcrop, as it would run into the thrust fault.

In terms of presenting a risk to the site the Three Feet seam at a depth of 50m is considered to be at sufficient depth, so as not to present a risk to the site. However, the North Fawr seam was encountered at a depth of 24.40m, with a rock cover of 9.16m and a superficial cover of 15m. Consequently, even if workings had been pursued in this seam then the risk to the development is considered to be very low.

We must then consider the potential for this seam to have been subject to earlier unrecorded mine workings. Early workings would typically work those seams that were easily accessible, i.e. they were at or near to crop. In addition, the mine drainage would have been an early consideration.

In this case, the site is covered in a substantial layer of superficial deposits, up to 30m thick, which would have been water bearing. Consequently, significant exploration would have been required to find the seams, which would not have been necessary given the extensive outcropping coal seams on the hills immediately east of the site. In addition, sinking shafts to depth in saturated granular soils would have been extremely difficult for early miners and would have required substantial dewatering and expense.

The next consideration would be that the workings would have required substantial pumping to keep them dry. Finally, if coal had been worked, workings would have been short lived due to them quickly becoming uneconomical due to the thrust fault, which crosses the site. For early miners a thrust fault would have provided significant difficulties, such as:

- The seams would change dip rapidly as they approach the thrust fault, making mining difficult and expensive,
- Significant quantities of water would be encountered in the fault,
- The coal would be shattered and of poor quality.

With the amount of easily winnable coal available locally at the time, this would not have been an attractive proposition to the early miners.

It must therefore be concluded that early unrecorded coal workings are highly unlikely. Finally, for workings to have been undertaken some evidence of ground disturbance would have been recorded in the form of excavations for shafts etc. There are no records in this area apart from the much later Morfa Colliery. This is confirmed by examination of a recent aerial photograph taken from the internet, which is presented below:



4.0 Mitigation Strategy Proposal

Due to the depth of the coal seams present and absence of evidence for shallow workings, mitigation strategies are not considered necessary.

5.0 Conclusions

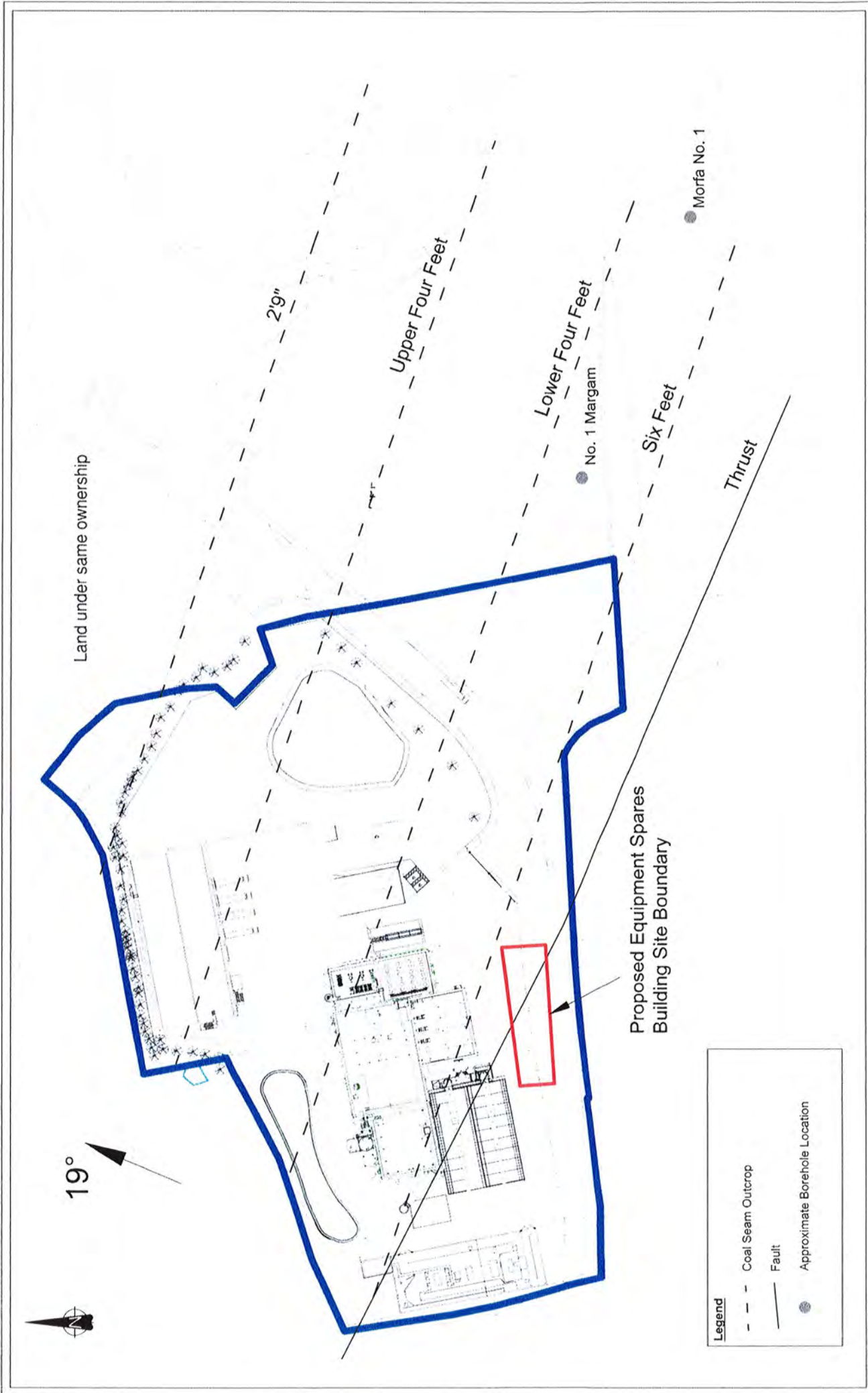
It is concluded that the risk to the site from abandoned shallow mine workings is negligible.

We trust this is satisfactory, should you have any queries please call Mike Scott on 01244 661361.

Yours sincerely

M J Scott

FIGURES



SCALE 1:1250 @ A3

FIGURE 1

SITE LAYOUT, GEOLOGY & LOCATION OF BOREHOLES

APPENDIX A

Coal Authority Report

T. Llewellyn Jones

Solicitors and Commissioners for Oaths
This Firm is authorised and regulated by the Solicitors Regulation Authority

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GUILDHALL CHAMBERS

2 CHURCH PLACE, NEATH

WEST GLAMORGAN, SA11 3LL

and at Colwinston, Cowbridge

Our Ref.: SLJ/JD/20188/318/2

Your Ref.:

1 March, 2012

Dear Mr Welch,

Re: Biomass – Phase 2

I enclose Coal Authority Search as requested.

Yours sincerely

S. E. Llewellyn Jones

D. Welch, Esq.

E-mail Only:

cc. D.J. James, by e-mail

cc. A. Whittall, by e-mail

cc. Cliff Patten, by e-mail



08042846 Doc Date 22/02/2012 Printed by DE507

P2012/0189

Development Control
Application Documents - DC
Supporting Information
Other
coal authority search

T. Llewellyn Jones is the trading name of TLJ Law Limited
Company Number 7200518

Community
Legal Service



Criminal
Defence Service



The COAL AUTHORITY

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

**TLJ LAW LIMITED
2 CHURCH PLACE
NEATH
WEST GLAMORGAN
SA11 3LL**

Our reference:	71000200777002
Your reference:	slj jd 20188 318 2
Date of your enquiry:	29 February 2012
Date we received your enquiry:	29 February 2012
Date of issue:	01 March 2012

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

Non-Residential Coal Authority Mining Report

LAND AT, MARGAM, PORT TALBOT,

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

The property is in the likely zone of influence from workings in 2 seams of coal at 220m to 350m depth, and last worked in 1913.

Any ground movement from these coal workings should have stopped by now.

In addition 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.

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 in an area for which a licence to remove or otherwise work coal using underground methods was granted in December 2008. The grant of this licence is conditional on the applicant securing any other rights, permissions (including planning permission) and consents to enable operations to be carried out.

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

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 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

APPENDIX B

BGS Boreholes



**British
Geological Survey**

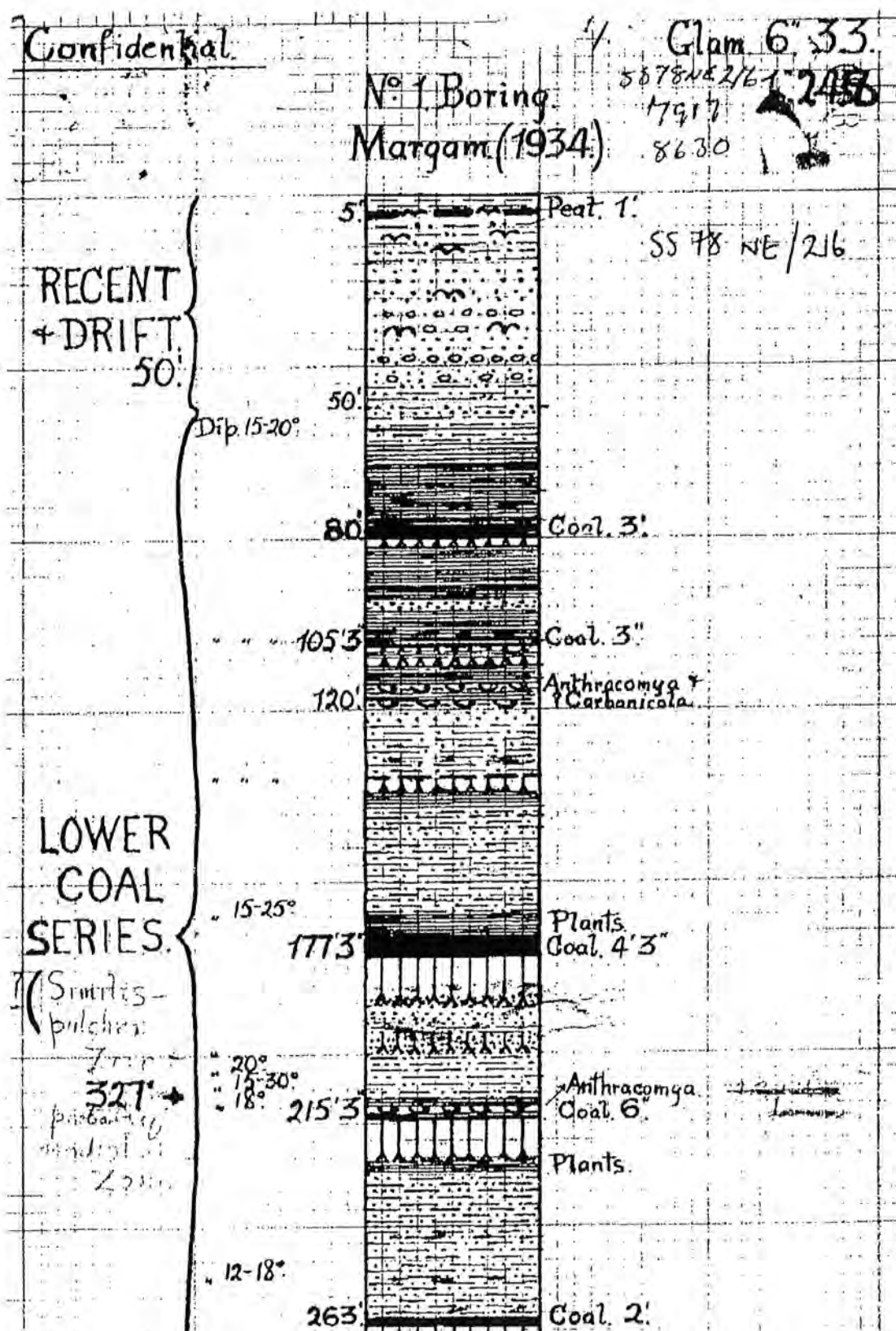
NATURAL ENVIRONMENT RESEARCH COUNCIL

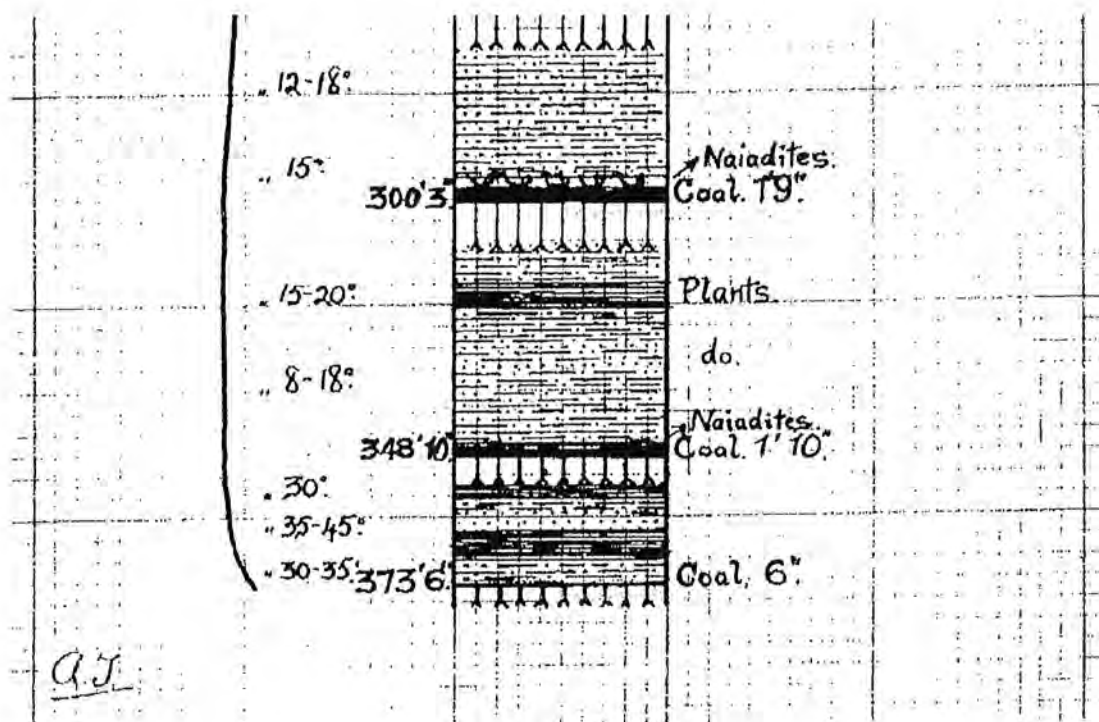
BGS ID: 370829 : BGS Reference: SS78NE216

British National Grid (27700) : 279170,186300

Report an issue with this borehole

<< < Prev Page 1 of 4 ☒ Next > >>







**British
Geological Survey**

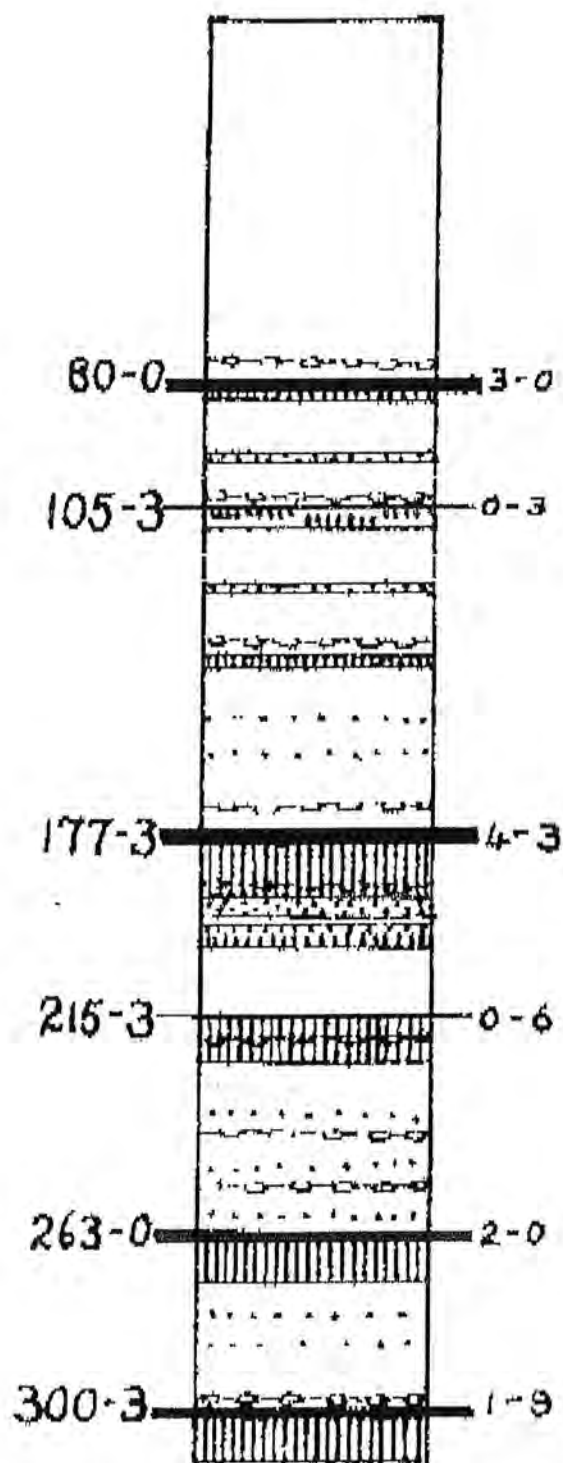
NATURAL ENVIRONMENT RESEARCH COUNCIL

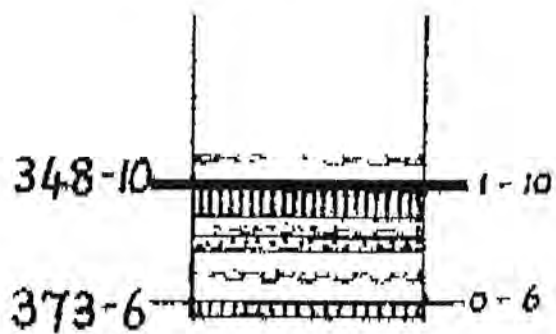
BGS ID: 370829 : BGS Reference: SS78NE216

British National Grid (27700) : 279170,186300

[Report an issue with this borehole](#)

<< < Prev Page 2 of 4 ☒ Next > >>





GLAM

Confidential

8378 ME 1216

33 NW

GEOLOGICAL SURVEY AND MUSEUM BOREHOLES AND SHAFTS

BORE or SHAFTE	No. 1. (<i>Margam No. 1</i>)	County <i>Glam.</i> 6-in. Map <i>33 N.W.</i>
----------------	--------------------------------	---

130 yds SSW. of *Jin-y-caau*, Margam
Port Talbot

GSM 100/397

Surface level _____ O.D. _____ One-inch Map <i>247 (SE edge)</i>
Communicated <i>21-9-34 + 1-10-34</i> by <i>Loribbor Fawr Colliers, Ltd.</i>
Date of sinking <i>July - Sept 1934</i> Borer <i>Francois cementation Co. Ltd. (Rover, Tolly)</i>
Specimens <i>B6.2687 - 2737.</i> Vert. Sect. drawn _____

	Description:	THICKNESS.		DEPTH.	
		Feet.	Inches.	Feet.	Inches.
	Brown clay } excavated	4		4	
	Peat } by hand for	1		5	
	Grey sandy clay } 12m. stand pipe	11		16	
	Brown sand + gravel }	29		45	
	Light grey sandy clay }	5		50	
	Hard dark grey rock }	1		51	
	Broken dark grey sandy shale	3		54	
	Rotten dark grey shale	1		55	
	Dark grey sandy shale	3		58	
	Mixture of shale, sand & small gravel	16		74	
	Grey shale with ironstone nodules	3		77	
	Coal floor part of which may be ground picks,	3		80	
	Green shale	2		82	
	Dark grey shale	4		86	
	Dark grey sandy clay	8		94	
	Hard dark grey rock with ope veins	2		96	
	Broken dk grey shale with ironst. nodules	6		102	
	Dark grey shale	3		105	
	coal (thin)		3	105	3
	dark grey shale w/tephite	3	9	109	
	Dark grey shale with ironst. nodules	5		114	
	Dark grey shale	4		118	
	Hard dark grey rock	2		120	
	Dark grey shale	13		133	
	Black rock with traces of coal		3	136	3
	Grey fireclay with ironstone nodules	2	9	139	
	Dark grey shale	4		143	
	Hard dark grey rock	2		145	
	Grey sandy shale	5		150	
	Hard dark grey rock	1		151	
	grey sandy shale	16		167	
	Grey shale with ironstone nodules	2		169	
	Dark grey shale	3		172	
	Grey shales (wt. 1%)	1		173	
	coal three feet	4	3	177	3
	Grey fireclay	3	9	181	
	Dark grey shale with ironstone nodules	8		189	
	Broken hard grey rock	4		193	
	Dark grey shale	2		195	

GEOLOGICAL SURVEY AND MUSEUM. BOREHOLES AND SHAFTS.

SS78NE216

Margam B4. N. 1.

Folio

(cont)

County

Glam

6 in. Map

33 NE

Description.	THICKNESS.		DEPTH.	
	Feet.	Inches.	Feet.	Inches.
Prot. forward			195	
Hard grey rock	2		197	
Grey sandy shale	13		210	
Dark grey shale	4		214	
Very dark grey fine clay		6	214	6
Dark grey shale		3	217	
Coal		6	223	
Dark grey fine clay with iron nodules	9	9	232	
Strong dark grey sandy shale	35		267	
Strong dk. grey shaly sandstone	1		268	
Coal	2		270	
Soft dark grey fine clay	9		279	
Strong dark grey sandy shale	16		295	
Dark grey shale	3	6	298	6
Coal	1	9	300	3
Soft dark grey fine clay	9	9	310	
Dark grey sandy shale	5		315	
Dark grey shale	5		320	
Dark grey sandy shale & bands of hard grey rock	5		325	
Strong dark grey sandy shale	8		333	
Strong dk. grey sandy shale with bands of grey rock	7		340	
Dark grey sandy shale	6		346	
Very dark grey shale		2	348	2
Dark grey shale		10	358	
Coal	1	10	368	
Soft dark grey fine clay	5	2	373	
Dark grey shale	1		374	
Very dark grey shale	2		376	
Dark grey sandy shale	2		378	
Hard grey sandstone	3		381	
Dark grey shale	6		387	
Dark grey sandy shale	5		392	
Coal		6	398	6
Strong dk. grey shale w. iron nodules	3	6	404	

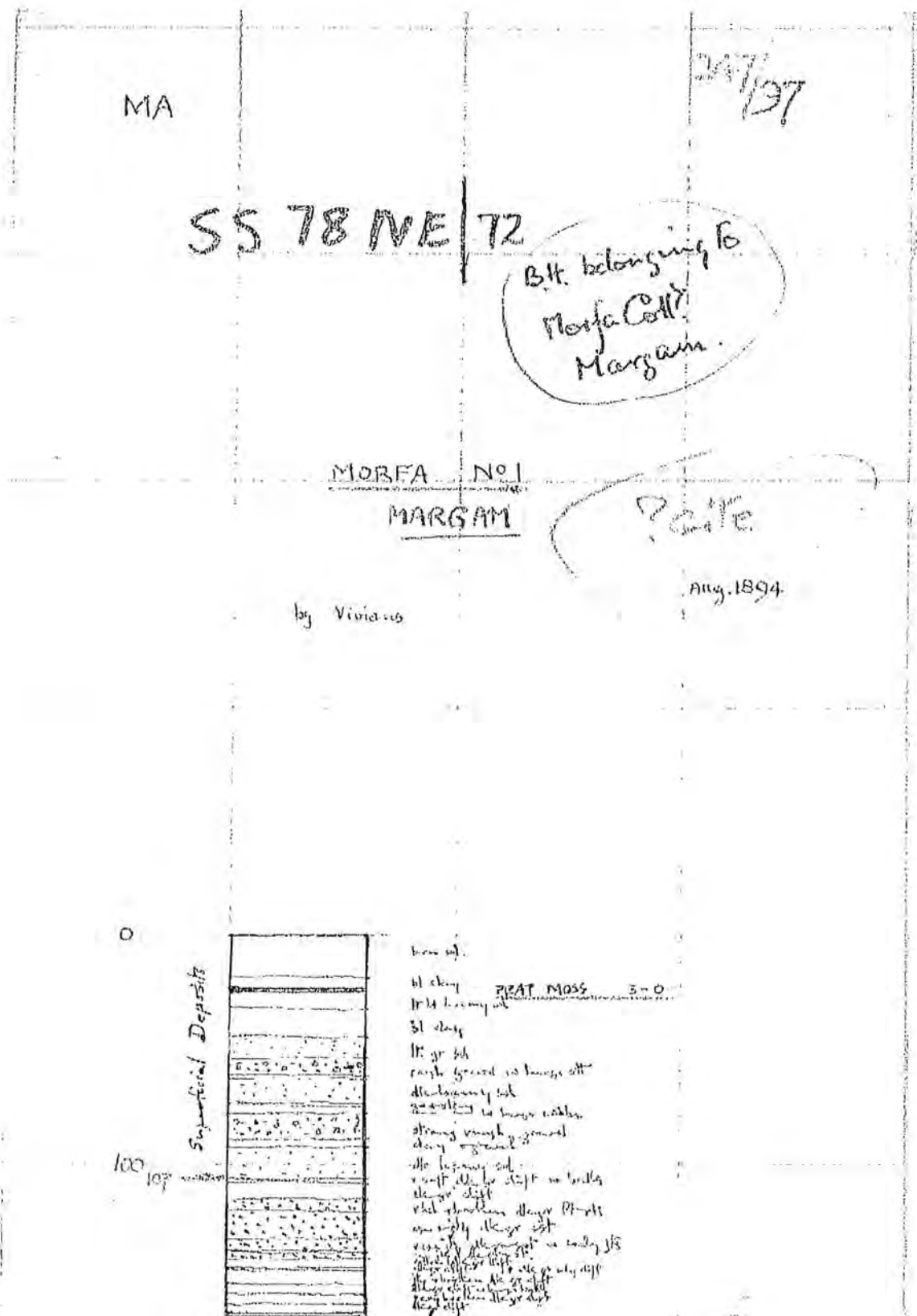


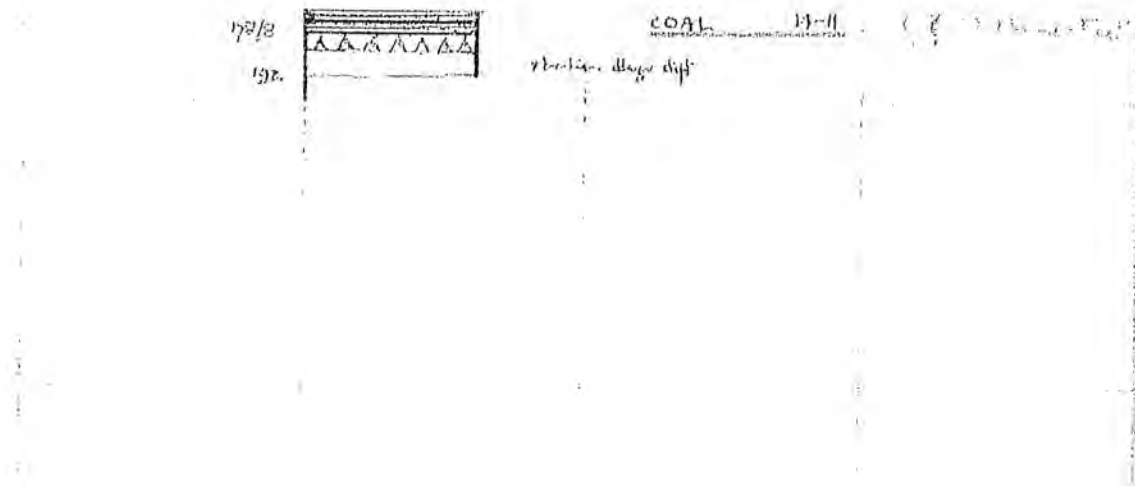
NATURAL ENVIRONMENT RESEARCH COUNCIL

British National Grid (27700) : 279260,186260

[Report an issue with this borehole](#)

<< < Prev Page 1 of 8 ☒ Next > >>





W.R. SS 1926 086260
 (11992) W.L. 50370/0370 10,000 0/39 A. & B.W. Ltd. Gp. 685

248/121

RECORD OF SHAFT OR BORE

Name and Number of Shaft or Bore given by Geological Survey:
~~MORFA~~ MORFA No. 1, MARGAM

Name and Number given by owner (if different from above):
 Morfa (No. 1), MARGAM

Town or Village ~~Knockmoy~~ ~~Knockmoy~~ Date of sinking *c. Aug. 1894*

Exact site
 Belonging to Morfa C.B.L., Margam

Purpose for which made

Level at which bore commenced relative to O.D. If not down bore, state if horizontal or up

Made by *VIVIAN* (B.H. 3 p. 269) for Messrs *Vivian & Sons*

Information from *JOHN-ON & SONS* Date received *April 1941*

Specimens Dip of strata

GEOLOGICAL CLASSIFICATION	DESCRIPTION	THICKNESS		DEPTH	
		Faths	ft. in	Faths	ft. in
	Brown sand	2	5		17 0
	Blue clay		4		21 0
	Peat moss		3		24 0
	Light blue loamy sand	1	1		31 0
	Blue clay	2	1		44 0
	Light grey sand	1	4		54 0
	Rough gravel with large stones	1	3		63 0
			1		64 0
	Dark loamy sand	1	4		74 0
	Gravel & clay		2		76 0
	with large cobbles		3	13	79 0
	Strong rough gravel	1	5		90 0
	clay & gravel		3		93 0
	Dark loamy sand	2	1		106 0
	Very soft dark grey clift with balls of ironstone		1		107 0
	Dark grey clift	1	2		115 0
	Y. hard & broken dark grey basalt rock		5		120 0
	coarse & jointy dark grey sst.	2	1		133 0
	with thin joint of coal		5	25	138 0
	Very coarse & jointy dark grey sst.		1		139 0
	Rotten dark grey clift	2			141 0
	Dark grey clift		5		146 0
	sandy clift		1		147 0
	Very jointy & broken dark grey clift	1			153 0
	Dark grey clift with large balls of ironstone		4		157 0
	Y. broken dark grey clift		4 3		161 3
	Dark grey clift		2 6		163 9
	Coal	2	2 11		178 8
	Broken dark grey fireclay		4 3		182 11
	Very broken dark grey clift	1	3 1	33	192 0

GEOLOGICAL SURVEY AND MUSEUM,
 SOUTH KENSINGTON,
 LONDON, S.W.7.

G.S.M. Office File No.	Site marked on 6" Map by	Site marked on 1" Map by
---------------------------	-----------------------------	-----------------------------



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 370685 : BGS Reference: SS78NE72
British National Grid (27700) : 279260,186260

Report an issue with this borehole

<< < Prev Page 3 of 8 ☒ Next > >>

(11002) WLB0270/0170 10,000 8/70 A.B. & W.L.A. Op. 118

RECORD OF SHAFT OR BORE FOR MINERALS

W42 SS 79260 86260 **248/121** **SS78NE72**

Name and Number of Shaft or Bore given by Geological Survey:
MAREA No.1, MARGAM

Name and Number given by owner (if different from above): **248/121**

Town or Village **MARGAM** Date of sinking **Aug. 1894**

Exact site **Belonging to Morda Cell, Margam**

Purpose for which made _____

Level at which bore commenced relative to O.D. _____ If not down bore, state if horizontal or up _____

Made by **VIVIAN'S (R.L.3 p.269)** for Messrs. **Vivians & Sons**

Information from **JOHN CON & SONS** Date received **April 1941**

Specimens _____ Dip of strata _____

GEOLOGICAL CLASSIFICATION	DESCRIPTION	THICKNESS		DEPTH	
		Faths	Feet	Faths	Feet
	Brown sand	2	5	17	0
	Blue clay		4	21	0
	Peat moss		3	24	0
	Light blue loamy sand	1	1	31	0
	Blue clay	2	1	44	0
	Light grey sand	1	4	54	0
	Rough gravel with large stones	1	3	63	0
			1	64	0
	Dark loamy sand	1	4	74	0
	Gravel & clay		2	76	0
	" " with large cobbles		3	79	0
	Strong rough gravel	1	5	90	0
	clay & gravel		3	93	0
	Dark loamy sand	2	1	106	0
	Very soft dark grey clift with balls of ironstone		1	107	0
	Dark grey clift	1	2	115	0
	V. hard & broken dark grey ferrug. rock		5	120	0
	coarse & jointy dk grey sat.	7	1	133	0
	" " with thin joint of coal		5	138	0
	Very coarse & jointy dark grey sat.		1	139	0
	Rotten dark grey clift		2	141	0
	Dark grey clift		5	146	0
	" " sandy clift		1	147	0
	Very jointy & broken dark grey clift	1		153	0
	Dark grey clift with large balls of ironstone		4	157	0
	V. broken dark grey clift		4	161	0
	Dark grey clift		2	163	0
	Coal	2	2	178	8
	Broken dark grey fireclay		4	182	11
	Very broken dark grey clift	1	3	192	0

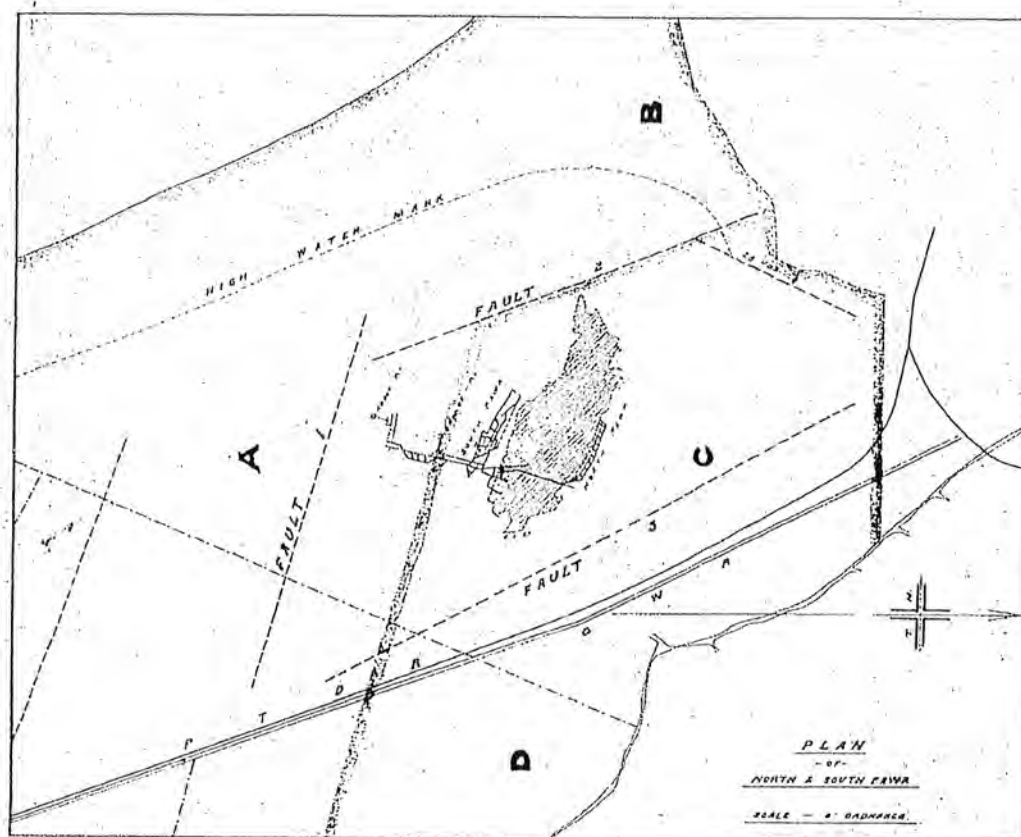


**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 370685 : BGS Reference: SS78NE72
British National Grid (27700) : 279260,186260
[Report an issue with this borehole](#)

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**British
Geological Survey**

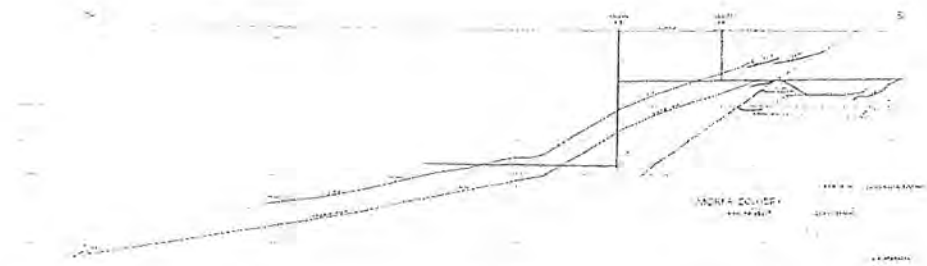
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 370685 : BGS Reference: SS78NE72

British National Grid (27700) : 279260,186260

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**British
Geological Survey**

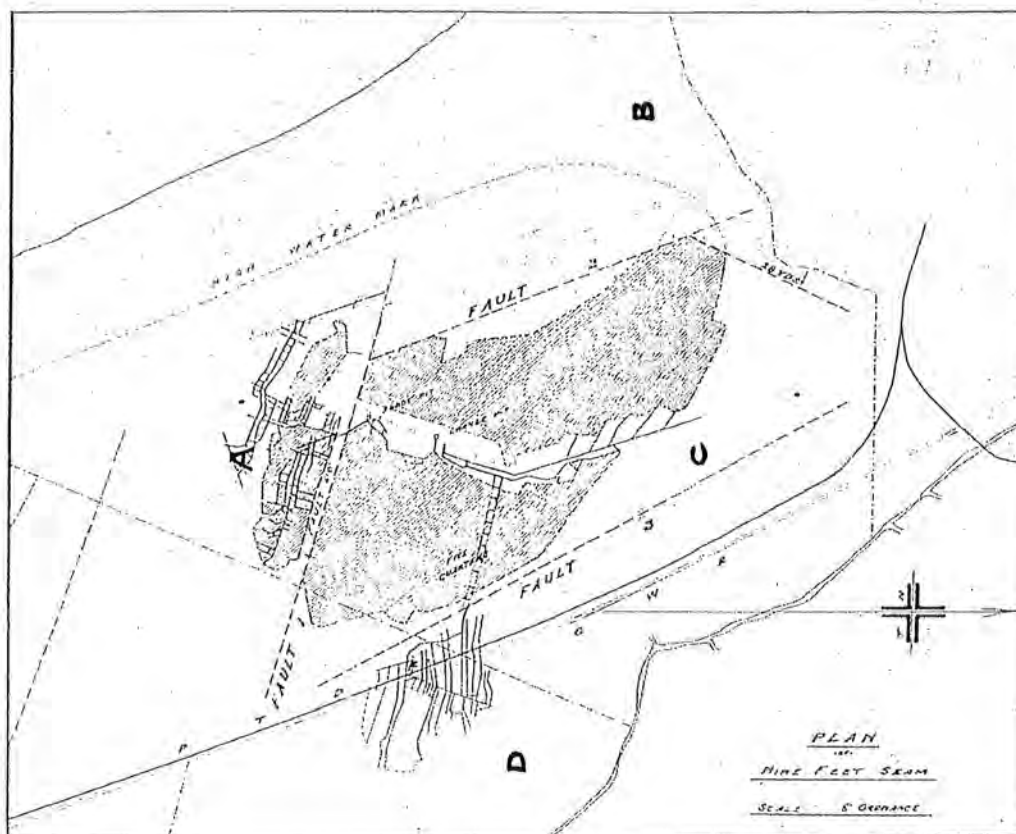
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British National Grid (27700) : 279260,186260

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**British
Geological Survey**

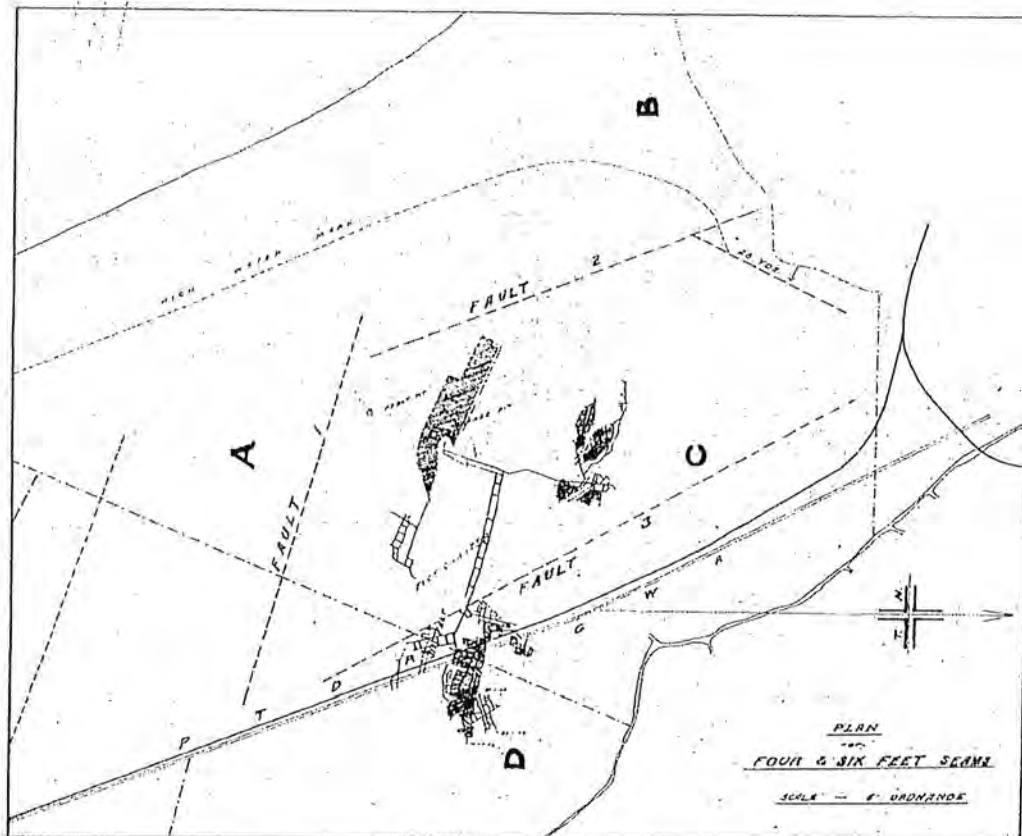
NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 370685 : BGS Reference: SS78NE72

British National Grid (27700) : 279260,186260

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APPENDIX C

Recent Boreholes

Contract : Margam Biomass Plant							Borehole No.	
Client : Western Log Energy							BH1	
Dates : 15/05/08 - 19/05/08			Job Number : P081188		Ground Level :			
Location : Proposed Area for New Biomass Plant			Engineer : Quantum Geotechnical Ltd		Coordinates:			

m B.G.L.	Samples		NO TESTS PERFORMED	STRATA			Water	(Install/Backfill)
	Depth	Type No. - UBlows		Depth (Thickness)	DESCRIPTION	Legend		
	0.20 -	D1	X	(0.20)	TOPSOIL**		(0.20)	
	0.65 -	D2		0.20	MADE GROUND - Compact, brown and grey, slightly sandy (medium) gravel of coarse, angular limestone and sandstone.		0.20	
1	1.00 - 1.50	D3		(0.45)			(0.45)	
				0.65	MADE GROUND - Compact, dark grey, slightly silty sandy (medium) clayey gravel of limestone (hardcore), siltstone and sandstone with fragments of brick, timber and plastic.		0.65	
2				(1.65)			(1.65)	
	2.30 -	D4		2.30	Spongy, dark brown, slightly clayey fibrous PEAT - possible relic topsoil. Strong organic odour.		2.30	
3	2.80 -	D5		(0.50)			(0.50)	
				2.80	Slight blue grey, slightly gravelly slightly clayey fine SAND/ SILT with occasional pseudofibrous plant remains. Gravel of fine, angular and flat mudstone.		2.80	
	3.50 -	D6		(0.70)			(0.70)	
4			3.50	Brown, coarse SAND & GRAVEL. Gravel of fine to coarse, subrounded to rounded of mixed lithologies. Many rounded cobbles throughout.		3.50		
5			(4.00)			(4.00)		
6								
7								
8	7.50 -	D7		7.50	Brown, slightly clayey silty fine to medium SAND.		7.50	
				(1.00)			(1.00)	
9	8.80 -	D8		8.50	Grey, slightly sandy (fine) clayey SILT with some pseudofibrous plant remains.		8.50	
				(1.30)			(1.30)	
10	9.80 -	D9		9.80	Brown and grey, slightly sandy (coarse) fine to coarse, rounded GRAVEL of sandstone and siltstone with many cobbles throughout.		9.80	
				(0.20)			(0.20)	
				10.00	End of Cable Percussive Borehole at 10.00m depth.		10.00	

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
15/05/2008 17:00	2.50	DRY	10.00	200mm	3.50			0.65	0.90	00:45
19/05/2008 08:00	2.50	DRY						1.40	1.70	00:45
19/05/2008 17:00	10.00	DRY						3.70	3.90	00:45
								5.40	5.70	00:45

Remarks: Dando 150 using 200mm casing and tools **Driller's Description									
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	Ty Berwig, Byscia Llanelli, Carmarthenshire SA14 9ST Tel: 01554 744880 Fax: 01554 776150 email: enquiries@quantum-gh.co.uk	Operator: W P Osborn	Logged By: RMCD	Sheet No 1 OF 1	Scale: 1:67.07	All measurements in metres unless otherwise stated.	
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Contract : Margam Biomass Plant										Borehole No. BH2	
Client : Western Log Energy											
Dates : 20/05/08 - 20/05/08					Job Number : P081188			Ground Level :			
Location : Proposed Area for New Biomass Plant					Engineer : Quantum Geotechnical Ltd			Coordinates:			

m B.G.L.	Samples		NO TESTS PERFORMED	STRATA				Water	Install/Backfill
	Depth	Type No. - U/Blows		Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)		
0.50 -	D1		(0.20)	TOPSOIL**		(0.20)			
			0.20	Stone, clay, brick, concrete and steel fill**		0.20			
			(1.00)			(1.00)			
			1.20	Concrete obstruction at 1.20m depth..... Borehole Terminated, moved and setup on BH2A		1.20			

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
20/05/2008 10:00	1.20	DRY						0.90	1.20	01:00

Remarks: Dando 150 using 200mm casing and tools **Driller's Description. Borehole terminated at 1.20m depth - concrete obstruction, moved position to BH2A									
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	Ty Bwrig, Bynae Llanelli, Carmarthenshire SA14 9ST Tel: 01554 741880 Fax: 01554 776150 email enquiries@quantum-gh.co.uk	Operator: W P Osborn	Logged By: RMcd	Sheet No 1 Of 1	Scale: 1:67.07	All measurements in metres unless otherwise stated	
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Contract : Margam Biomass Plant										Borehole No. BH2A	
Client : Western Log Energy											
Dates : 20/05/08 - 20/05/08					Job Number : P081188			Ground Level :			
Location : Proposed Area for New Biomass Plant					Engineer : Quantum Geotechnical Ltd			Coordinates:			

m B.G.L.	Samples		NO TESTS PERFORMED	STRATA				Water	Install/Backfill
	Depth	Type No. - U/Blows		Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)		
				(0.20)	TOPSOIL**		(0.20)		///
				0.20	Stone, clay, brick, concrete and steel fill**		0.20		///
				(1.30)			(1.30)		///
				1.50	Concrete obstruction at 1.50m depth..... Borehole Terminated, moved and setup on BH2B		1.50		///

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
20/05/2008 12:00	1.50	DRY						0.40 1.40	0.60 1.50	00:30 01:00

Remarks: Dando 150 using 200mm casing and tools **Driller's Description. Borehole terminated at 1.50m depth - concrete obstruction, moved position to BH2B									
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	Ty Berwig, Bynoe Llanelli, Carmarthenshire SA14 9ST Tel: 01554 744880 Fax: 01554 776150 email enquiries@quantum-gb.co.uk	Operator: WP Osborn	Logged By: RMcD	Sheet No. 1 Of 1	Scale: 1:67.07	All measurements in metres unless otherwise stated	
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Contract : Margam Biomass Plant							Borehole No. BH2B		
Client : Western Log Energy				Dates : 20/05/08 - 21/05/08		Job Number : P081188		Ground Level :	
Location : Proposed Area for New Biomass Plant				Engineer : Quantum Geotechnical Ltd		Coordinates:			

m B.G.L.	Samples		NO TESTS PERFORMED	Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)	Water	Install/Backfill
	Depth	Type No. - UBlows							
				(0.20)	TOPSOIL**		(0.20)		
1	0.50 -	D1		0.20	MADE GROUND - Compact, brown and grey, slightly sandy (medium) gravel of coarse, angular limestone and sandstone.		0.20		
2	2.00 -	D2		(2.30)			(2.30)		
3	2.50 -	D3		2.50	Spongy, dark brown, slightly clayey 'woody' fibrous PEAT.		2.50		
4	3.20 -	D4		(0.70)			(0.70)		
5	5.00 -	D5		3.20	Dark grey, slightly sandy (medium) silty clayey GRAVEL of fine to coarse, rounded siltstone and sandstone. Occasional rounded cobbles.		3.20		
6				(1.80)			(1.80)		
7	6.80 -	D6		5.00	Grey and brown, slightly sandy (fine) GRAVEL of fine to coarse, rounded siltstone and sandstone.		5.00		
8				(1.80)			(1.80)		
9				6.80	Grey, clayey gravelly SILT. Gravel of fine to coarse, rounded sandstone and siltstone and occasional cobbles.		6.80		
				(2.20)			(2.20)		
				9.00	End of Cable Percussive Borehole at 9.00m depth.		9.00		

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
20/05/2008 17:00	1.50	1.20	9.00	200mm	1.20			0.60	0.80	00:45
21/05/2008 08:00	1.50	1.20						1.00	1.20	00:45
21/05/2008 17:00	9.00	-						1.50	1.80	00:45
								2.00	2.20	00:45
								7.00	7.20	00:45
								8.90	9.00	00:45

Remarks: Dando 150 using 200mm casing and tools **Driller's Description											
QUANTUM Ty Bervig, Bynca Llanelli, Carmarthenshire SA14 9ST Tel: 01554 744880 Fax: 01554 776150 email: enquiries@quantum-gh.co.uk				Operator W P Osborn		Logged By R McD		Sheet No 1 Of 1		Scale 1:67.07	
								All measurements in metres unless otherwise stated		AGS	

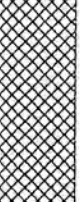
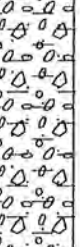
Contract : Margam Biomass Plant Client : Western Log Energy							Borehole No. BH3		
Dates : 22/05/08 - 22/05/08 Location : Proposed Area for New Biomass Plant			Job Number : P081188 Engineer : Quantum Geotechnical Ltd			Ground Level : Coordinates:			

0m B.G.L.	Samples		NO TESTS PERFORMED	STRATA				Water	Install/Backfill
	Depth	Type No. - UBlovs		Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)		
	0.50 -	D1	X	(0.20)	TOPSOIL**		(0.20)		
		0.20		Clay, stone, concrete, brick, boulder fill**	0.20				
1		(1.30)			(1.30)				
		1.50		Concrete obstruction at 1.50m depth..... Borehole Terminated, moved and setup on BH3A	1.50				

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
22/05/2008 10:00	1.50	DRY						1.50	1.50	01:00

Remarks: Dando 150 using 200mm casing and tools **Driller's Description. Borehole terminated at 1.50m depth - concrete obstruction, moved position to BH3A																	
			Ty Borwig, Bynna Llanelli, Carmarthenshire SA14 9ST Tel: 01554 744880 Fax: 01554 776150 email: enquiries@quantum-gh.co.uk			Operator: W P Osborn		Logged By: RMcD		Sheet No: 1 Of 1		Scale: 1:57.07		All measurements in metres unless otherwise stated			

Contract : Margam Biomass Plant							Borehole No.		
Client : Western Log Energy							BH3A		
Dates : 22/05/08 - 23/05/08				Job Number : P081188		Ground Level :			
Location : Proposed Area for New Biomass Plant				Engineer : Quantum Geotechnical Ltd		Coordinates:			

cm B.G.L.	Samples		NO TESTS PERFORMED	STRATA				Water	Install/Backfill
	Depth	Type No. - U/Blows		Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)		
				(0.20)	TOPSOIL**		(0.20)		
0.50 -	D1			0.20	MADE GROUND - Compact, dark grey, slightly silty sandy (medium) clayey gravel of limestone (hardcore), siltstone and sandstone with fragments of brick, tarmac, timber and plastic.		0.20		
1.00 -	D2			(2.10)			(2.10)		
1.50 -	D3								
2.30 -	D4			2.30	Plastic, dark brown, clayey pseudofibrous PEAT.		2.30		
				(1.30)			(1.30)		
3.60 -	D5			3.60	Blue grey, slightly sandy (fine) silty clayey GRAVEL of fine to coarse, rounded sandstone and siltstone.		3.60		
				(2.60)			(2.60)		
6.20 -	D6			6.20	Brown, coarse SAND.		6.20		
				(1.10)			(1.10)		
7.50 -	D7			7.30	Brown, sandy (coarse) GRAVEL of fine to coarse, rounded sandstone and siltstone.		7.30		
				(2.70)			(2.70)		
10.00				10.00	End of Cable Percussive Borehole at 10.00m depth.		10.00		

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
22/05/2008 17:00	10.00	3.60	10.00	200mm	3.60			1.50 8.80	1.80 9.00	01:00 00:45

Remarks: Dando 150 using 200mm casing and tools **Driller's Description									
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	Ty Denwig, Bynoa Llanelli, Carmarthenshire SA14 9ST Tel: 01554 743880 Fax: 01554 776150 email: enquiries@quantum-ge.co.uk	Operator: WP Osborn	Logged By: RMCD	Sheet No: 1 Of 1	Scale: 1:67.07	All measurements in metres unless otherwise stated	
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Contract : Margam Biomass Plant							Borehole No. BH4		
Client : Western Log Energy									
Dates : 23/05/08 - 27/05/08			Job Number : P081188			Ground Level :			
Location : Proposed Area for New Biomass Plant			Engineer : Quantum Geotechnical Ltd			Coordinates:			

m B.G.L.	Samples		NO TESTS PERFORMED	STRATA				Water	Install/Backfill
	Depth	Type No. - UBlows		Depth (Thickness)	DESCRIPTION	Legend	Depth (Thickness)		
0				(0.20)		TOPSOIL**		(0.20)	
0.50	D1			0.20		MADE GROUND - Compact, dark grey, slightly silty sandy (medium) clayey gravel of limestone (hardcore), siltstone and sandstone with fragments of brick, tarmac, timber and plastic.		0.20	
1				(2.80)				(2.80)	
2									
3	3.00	D2		3.00		Blue grey, slightly sandy (fine) clayey silty GRAVEL of fine to coarse, rounded sandstone and siltstone.		3.00	
4	4.00	D3		(1.00)				(1.00)	
5	5.00	D4		4.00		Grey and brown, slightly sandy (fine) silty very clayey GRAVEL of fine to coarse, rounded sandstone and siltstone, with many rounded cobbles. Bands of coarse sand and gravel throughout.		4.00	
6									
7	7.00	D5		(6.00)				(6.00)	
8									
9									
10	10.00	D6		10.00		End of Cable Percussive Borehole at 10.00m depth.		10.00	

Water Observations			Casing		Groundwater			Chiselling		
Date / Time	Depth	Water	Depth	Cas. Dia.	Struck	Behaviour	Sealed	From	To	Hours
23/05/2008 16:30	4.00	DRY	10.00	200mm	1.00		3.00	0.60	0.90	01:00
27/05/2008 08:00	4.00	3.70						1.40	1.70	01:00
27/05/2008 13:00	10.00	-						3.80	4.00	01:00
								4.10	4.30	00:45
								5.00	5.10	00:45
								5.60	5.70	00:30
								7.80	8.10	00:45
								9.00	9.20	00:45

Remarks: Dando 150 using 200mm casing and tools **Driller's Description

	Ty Boreing, Bynna Llanelly, Carmarthenshire SA14 9ST Tel: 01554 743880 Fax: 01554 776150 email: enquiries@quantum-gh.co.uk	Operator: WP Osborn	Logged By: RMCD	Sheet No 1 Of 1	Scale 1:57.07	All measurements in metres unless otherwise stated	