

ALLTYGRUG ROAD YSTALYFERA

Ground Investigation Report

Report No. KH001

June 2018

On behalf of:

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Prepared for :

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FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

GENERAL

Recommendations made and opinions expressed in the report are based on the strata observed in the borings and trial pits, together with the results of any site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the borings and trial pits or which occur between borings and trial pits. Whilst the report may suggest the likely configuration of strata, both between borings or below the maximum depth of investigation, this is only indicative and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

BORING PROCEDURES

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations, sampling and logging of soils and in-situ testing complies with the recommendations of the British Code of Practice BS 5930 (2015), 'Ground Investigations' and BS 1377-1: 2016, 'Methods of Test for Soils for Civil Engineering Purposes'. Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition whenever it is suspected.

ROUTINE SAMPLING – WHERE UNDERTAKEN

Undisturbed samples of soils, predominantly cohesive in nature, are obtained by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate or impossible, large disturbed samples are collected from the boring tool and sealed in polythene bags. Smaller disturbed samples are also recovered at frequent intervals to allow a visual examination of the full strata section. Groundwater samples are also obtained where inflows of sufficient magnitude are observed.

IN-SITU TESTING – WHERE UNDERTAKEN

Standard penetration tests, utilising the standard split spoon sampler and automatic trip-monkey, are conducted in the granular soils. A summation of the number of blows for 300mm penetration, subsequent to a seating of 150 mm, is recorded on the boring records together with the blow count for each 75 mm penetration. In cases where incomplete penetration is obtained, the number of blows for the recorded value of penetration are noted. In coarse, granular soils, a cone end is fitted to the sampler and a similar procedure adopted. This test is referred to as the 'Dynamic Cone Penetration Test'.

GROUNDWATER

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium water level for any one water strike. Where possible, the daily morning groundwater levels are entered on the borehole records, together with the depth of the boring and depth cased.

Groundwater conditions observed in the borings are those appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

RETENTION OF SAMPLES – WHERE UNDERTAKEN

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded.

1.0. INTRODUCTION

Upon the instructions of Tectonics Drilling Services Ltd, acting on behalf of Jeffrey Davies, 59 Varteg Road, Ystalyfera, a ground investigation has been undertaken on a proposed domestic property site just off Alltygrug Road, Ystalyfera. The instruction to proceed with the production of this report was received in from Tectonics Drilling Services Ltd following the completion of a their ground investigation.

This report presents a factual account of the fieldwork carried out, the strata encountered, groundwater observations, in-situ testing and details subsequent laboratory testing of any samples obtained from the investigation.

Other available sources of information which have been consulted include the published geological maps for the area, as well as readily available historical maps.

General notes on the techniques employed during the investigation and subsequent testing and reporting are described in the Foreword together with the limitations inherent in carrying out site investigation work.

2.0. THE SITE

2.1 THE SITE

The site is located within the town of Ystalfera, South Wales, approximately 3 miles south-west of larger town of Ystradgynlais and approximately 12 miles north of Swansea. The site lies within a predominantly residential area with a known history of coal mining within the vicinity. At the time of the investigation the site comprised a predominantly flat site bounded to the south, east and further north by residential properties. To the west lies an area of elevated woodland land before open land and further residential properties. The site appears to have been previously developed with an old foundation evident at the time of this report. No evidence of invasive species were recorded during this investigation.

The National Grid reference of the site centre is SN 768 092, (see site location plan, Drawing 1, Appendix I).

2.2 GEOLOGY

The British Geological Survey map of the area (Sheet 14 Quarter Inch Geological Map) shows the underlying Geology to initially comprise limited superficial deposits overlying South Wales Middle Coal Measures that typically comprise Mudstone, Siltstone and Sandstone with some interbedded coal measures around 315 million years old from the Lower Coal Series of the Carboniferous. The potential for no superficial deposits to exist is unlikely only that their presence may be so limited that they are not recorded on Geological Maps.

Extracts of these maps are combined and presented as Drawing 2 in Appendix I.

2.3 SITE HISTORY

A review of available Historical Maps suggests the plot of land has not seen major development prior to the construction of what is believed to be single storey garages on the site. The date of construction is unknown. The immediate surrounding area is shown to have residential properties constructed before 1900 as they appear on the 1897 map with no evidence of commercial or industrial land usage implying the area is unlikely to have contaminated land issues although no samples or laboratory testing has been carried so an assessment of contamination has not been carried out in this report.

3.0. FIELDWORK

3.1 GENERAL

The fieldwork comprised the drilling of three rotary open holes in order to assess the underlying geology in terms of any potential mining history highlighted in Section 2.2, superficial deposits as well as the nature and depth to bedrock. On completion of the rotary exploratory boreholes were backfilled with bentonite grout. The rotary exploratory holes were located at the positions shown on the Exploratory Hole Location Plan, Figure 2, Appendix I.

3.2 ROTARY OPEN HOLE BOREHOLES

A total of three rotary open holes were drilled on site to provide a general overview of the underlying Geology as well as to provide information on the type and extent of any superficial deposits through observing the nature of drilling returns and carrying out Standard Penetration Tests (SPT's). The boreholes were drilled at locations deemed to provide the best coverage as well as being in positions where the drilling rig and equipment could reach.

These holes were drilled using a tracked Comachio 205 drilling rig producing a 115mm hole to the desired depth. Open hole drilling techniques provide details of the underlying strata without recovering cored or other samples as well as providing information regarding the competence of the strata. Areas of broken ground and voiding are easily determined by this drilling method with rate of penetration and degree of flush returns providing accurate indicators of the state of the underlying strata.

3.3 IN SITU STANDARD PENETRATION TESTS (SPTS)

A Standard Penetration Test (SPT) is an in-situ dynamic test designed to provide information on the Geotechnical Engineering properties of soils. The SPT allows for recovery of disturbed samples in cohesive soils using a thick walled hollow tube sampler as well as providing a measure of relative density of both granular and cohesive soils through recording the number of blows the test takes to travel 450mm in total.

The blow counts recorded in each SPT are then used to correlate back to a typical relative density used for basic Geotechnical design interpretation of the materials encountered on site by presenting the results of all SPTs carried out graphically.

3.4 SAMPLING

Samples were not taken as part of this investigation and therefore no subsequent Geotechnical or Environmental laboratory testing was carried out.

4.0. LABORATORY TESTING

4.1 GENERAL

No laboratory testing was carried out as part of this investigation.

4.2 ENVIRONMENTAL TESTING

No environmental testing was carried out as part of this investigation.

5.0. GROUND CONDITIONS ENCOUNTERED

The following ground conditions were encountered, with the following information derived from the boreholes logs provided by Tectonics Drilling Services Ltd, presented in Appendix II.

5.1 MADE GROUND

The borehole logs presented in Appendix II suggest there is no Made Ground present on site. However, due to the development history of the site (presence of foundation evident at the surface) would suggest that the presence of some made ground is likely. In this instance the Made Ground is likely to be a re-working of the local Glacial Deposits as opposed to the more traditional Made Ground found in other areas of the Swansea Valley.

5.2 GLACIAL DEPOSITS

Glacial deposits were encountered in all of the exploratory positions to a depth of between 6.0mbgl and 9.8mbgl. The nature of the drilling method used on site does not facilitate great returns for an in-depth description of the soil encountered to be made. However, the borehole logs record 'Boulder Clay' which typically comprises a cohesive deposit containing gravels and cobbles. In the Swansea Valley, Boulder Clay can contain large boulders to small gravel sized fragments as a result of its formation via Glacial Activity where the movement of ice collects a range of sized particles with them becoming incorporated in clay soils to form Boulder Clay.

Full details of the insitu tests are presented on the engineers logs in Appendix II.

5.3 BEDROCK

The onset of bedrock was determined in the rotary boreholes at depths of between 6.0m and 9.8m with the change from superficial material to bedrock identified by a change in drilling. In order to progress the boreholes, the onset of bedrock required change in drilling method from ODEX 115 to DTH Hammer.

The borehole logs record the bedrock to comprise as 'Grey Sandstone with small coal bands throughout' which is typical of Coal Measures in this area. The coal bands, although not recorded in these boreholes, can typically range in thickness from 100m to 300mm prior to entering the main coal bearing strata of the Middle Coal Measures at greater depth.

5.4 GROUNDWATER

Groundwater was encountered in all three of the boreholes at depths of between 3.0m and 3.5m which corresponds to the Glacial Deposits overlying the underlying bedrock. Full details of the groundwater conditions encountered are contained on the engineers logs presented in Appendix II.

5.5 LANDGAS

Landgas monitoring standpipes were not installed as part of this investigation.

6.0. GEOTECHNICAL APPRAISAL

6.1. INTRODUCTION

Part of the brief of this assessment was to provide an understanding of the likely ground conditions on site in order for the development potential of the area to be known. The desk study report previously carried out on the development area highlighted two main areas of potential influence, firstly the potentially contaminative former land use within the council owned part of the site and the potential for shallow mine workings beneath the farmland to the north. The potentially contaminative land use has been discussed within Section 6 of this report with the geotechnical aspects arising from the potential for shallow mine workings to exit on the site discussed below.

6.2. FOUNDATION DESIGN ASSESSMENT

Due to the location of the site, within an area with historical mining activity, the potential for mine workings beneath the site cannot be ruled out. However, each of the three boreholes were drilled to depths of 30mbgl with at least 20m of solid bedrock proved. The drilling of the bedrock recorded 100% flush returns implying no voids are present which also implies solid bedrock. Therefore, it can be said with a fair degree of certainty that there are no mine workings present beneath the site to a depth of 30mbgl.

Traditional site investigations would include an element desk study to research the development history, mining history and contamination history in greater depth allowing for a more targeted ground investigation to be undertaken. That said, the nature of the drilling works carried out has provided sufficient enough information for an assessment of the engineering parameters of the shallow deposits to be determined. When considering the type of proposed development on the site a traditional strip foundation would normally be sufficient. However, in this instance the presence of Boulder Clay coupled with lack of laboratory testing on materials collected from the investigation leads to the recommendation that a raft foundation be used.

Consistent SPT 'N' values of 20 (See Figure 1) were recorded at a depth of 1.0mbgl across the three boreholes in Boulder Clay. Should exploratory trial pits been undertaken across the site the collection of samples for laboratory testing could have occurred and a more confident assessment of the engineering properties of the Boulder Clay but a consistent SPT 'N' value of 20 translates to an Un-drained Cohesive Strength of 90kN/m² which translates to a presumed bearing capacity of 120kN/m² at a depth of 1.0mbgl which should be used as the foundation design value for this development with settlement expected within 25mm.

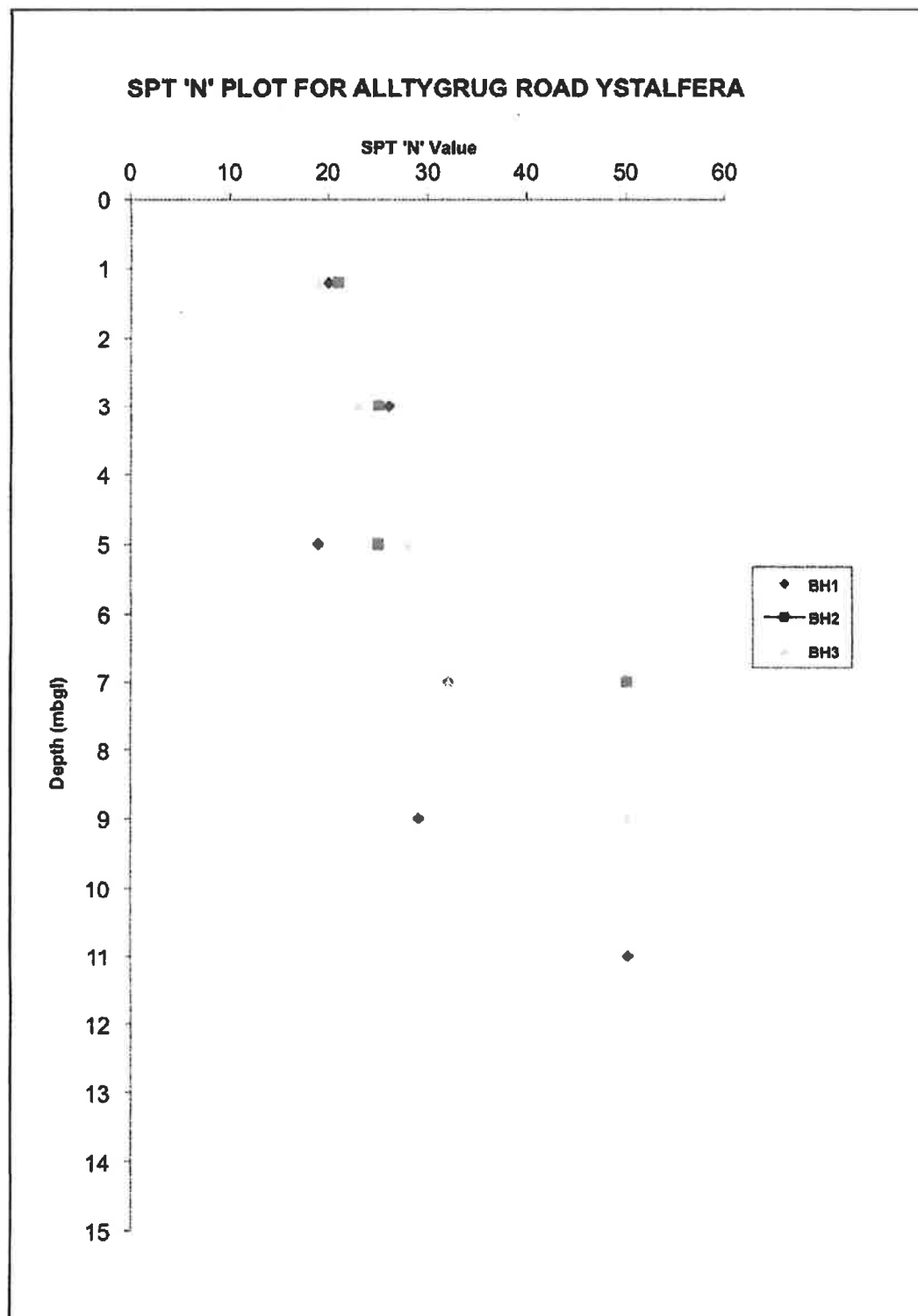


Figure 1 – SPT 'N' Plot for Alltygrug Road Ystalyfera

7.0. DISCUSSION & CONCLUSIONS

A ground investigation was carried out at a site of a proposed two-storey residential development on a currently vacant plot within an existing residential area of Ystalyfera, South Wales. Tectonics Drilling Services Ltd were commissioned to carry out an intrusive Ground Investigation with the drilling of three rotary open hole boreholes within the plots boundary. The borehole logs are presented in Appendix II with a location plan presented in Appendix I.

An interpretive report was commissioned by Tectonics Drilling Services Ltd to provide an overview of the ground investigation with engineering parameters and foundation design recommendations to be made.

The Geological setting of the site suggested little or no superficial deposits overlying Carboniferous Coal Measures comprising Sandstones, Mudstones and Siltstones with intermittent Coal Bands. The borehole logs suggest a Boulder Clay is present to depths of between 6.0mbgl and 9.80mbgl with Bedrock comprising Sandstone and small Coal bands proved to a depth of 30mbgl in each of the three boreholes with no voids or evidence of mine working encountered.

A review of the in-situ tests carried out during the drilling works suggest a design SPT 'N' value of 20 should be taken for the material at 1.0mbgl. The absence of samples and subsequent laboratory testing removes the potential for a greater assessment of the superficial deposits design parameters, however, based on the information obtained a bearing capacity of 120kN/m² is given for the material at 1.0mbgl with a raft foundation recommended for this development.

8.0. REFERENCES

Geological Maps: -

- British Geological Survey Sheet 14, Quarter Inch Scale

Geotechnical Publications:-

- Correlations of Soil Properties (1991) Carter & Bentley
- CIRA 143 – The Standard Penetration Test (SPT) Methods & Use 1995

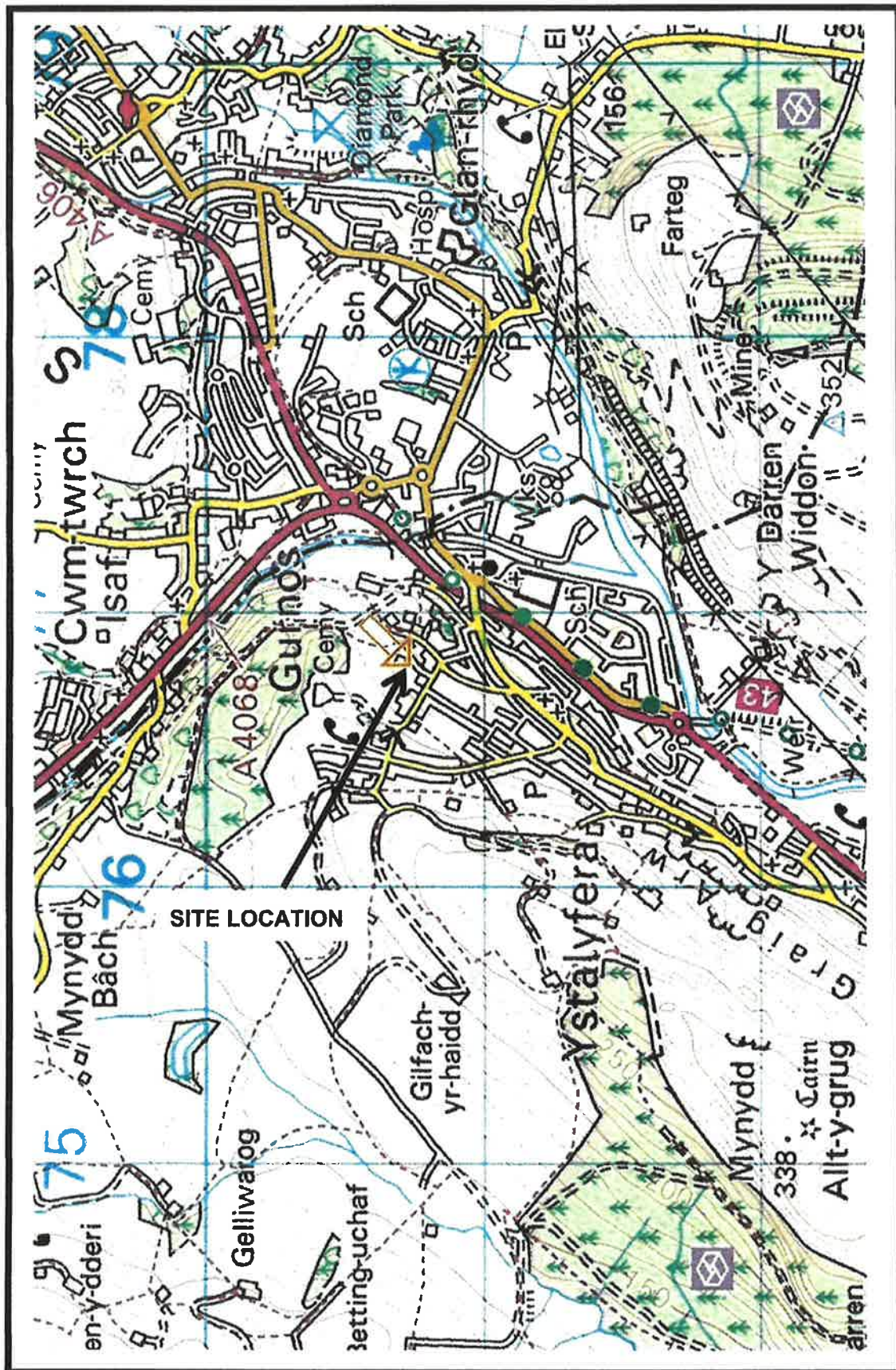
Report compiled by:



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Chartered Geologist

Date: 21st June 2018

APPENDIX I - SITE LOCATION PLAN



Drawing 1 – Site Location Plan

APPENDIX II - EXPLORATORY BOREHOLE LOGS

TECTONICS DRILLING SERVICES

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Drillers Daily Borehole Log

Contract No		Verbal		Driller: KEITH OSBORN Rig: Conachio 205		Contact Name / Site: Allygrug Farm Road Ystalyfera		Borehole Diameter: Type of Bit / Barrel: 115mm Index CASING / SPT/Logging		BOREHOLE NO. 1	
Weather Date		Wed 28 03 18		Days		1		Type of Flush		Air/Mist	
Casing Used		Depth (m): FROM TO GL 10.5m		Strata		Strata Description		Drilling / Coring		Penetration Tests	
Size (mm)		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Casing Used		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Water Strikes		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Depth (m): Inflow: W.L. @ 20 mins Depth Sealed		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Water Levels		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Borehole (m): Casing Depth Water Depth: Time		Depth (m): FROM TO GL 10.5m		From To		Strata Description		Run No.		Run Length	
Date:		Time:		Dayworks		Remarks		Signed: (Driller)		Signed: (For Client)	
Details:		Standing Time:		Standing:		Remarks		Signed: (Driller)		Signed: (For Client)	
Crew:		KEITH OSBORN		NVO		CSCS		Signed: (Driller)		Signed: (For Client)	
Lead Driller		KEITH OSBORN		NVO		CSCS		Signed: (Driller)		Signed: (For Client)	
Driller		Liam Matthews		CSCS		CSCS		Signed: (Driller)		Signed: (For Client)	

TECTONICS DRILLING SERVICES

8 Taweilac, Trecod Penlgeraer, Swansea, SA4 9XU Tel/Fax 01792 895512 Mob 07970 286687 Email: keithos@tadl.com

Drillers Daily Borehole Log

Contract No:		Driller: KEITH OSBORN		Borehole Diameter: 115mm		BOREHOLE NO. 7	
Weather: wet		Rig: Canachio 205		Type of Bit: ODEX CASING / SPT / DTH			
Date: Wed 28 03 18		Contact Name / Site: Altygrug Farm Road Ystalyfera		Type of Flush: Air/Mist			
		Days: 1					
		Verbal					
		Strata					
		Drilling / Coring					
		Depth From					
		Depth To					
		Type OH/C					
		Run No.					
		Run Length					
		Core Recov.					
		From					
		To					
		Blows 1					
		Blows 2					
		Blows 3					
		Blows 4					
		Blows 5					
		Blows 6					
		Inc. (mm)					
		Inc. (mm)					
		Inc. (mm)					
		Inc. (mm)					
		Inc. (mm)					
		Inc. (mm)					
		N Value					
		Strata Description					
		From					
		To					
		BH 2					
		Set up rig on					
		BH 2					
		Brown and grey silty sandy boulder clay					
		GL					
		6m					
		Grey sandstone with small coal bands throughout					
		6m					
		30m					
		Grouted up borehole					
		GL					
		30m					
		Dayworks					
		Date:					
		Time:					
		Dayworks:					
		Details:					
		Standing					
		Date:					
		Time:					
		Standing:					
		Details:					
		Crew					
		Lead Driller: KEITH OSBORN		NVQ		CSCS	
		Driller: Liam Matthews		CSCS			
		Remarks:					
		Signed: (Driller)		Keith Osborn			
		Signed: (For Client)					
		The Signs of these and logs confirm that everything is correct and agreed.					

Drillers Daily Borehole Log

Email: keithross@aol.com

The *Survivor* of these and its contents th of everything is correct and good.

APPENDIX III – GEOLOGICAL MAP EXTRACT
