

 **NKC Geotech Ltd**

engineering geologist specialising in the investigation and treatment of disused mineworkings

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Mineshaft Investigation

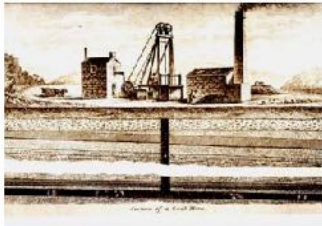


Rig on Bh 3

Proposed dwelling at Hillcroft, Pentre Bychan, Wrexham LL14 4DT

Tatham Developments
Tatham Farm
Tatham Road
Ruabon
Wrexham
LL14 6RF

2429
30 July 2024



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Site

A site for residential development adjacent to Hillcroft, Pentre Bychan, Wrexham LL14 4DT.

Mining investigation by

Neil Catlow B.Sc F.G.S Engineering geologist.

Summary of relevant mining information

CIRIA Special Publication C758D 'Abandoned Mineworkings Manual

Coal Authority Report 51002171888001 Dated September 2019

BSP CMRA 19-0594 for this site October 2019

Ordnance Survey 1:2500 First Edition 1875

Geological Survey 1:10560 plans

Mineplan 875 Pentre Bychan Colliery

Nkc Geotech Ltd investigations with relevance to this site:

3582 Fennant House, Fennant Road

0825 Bryn yr Owen, Ponciau

9048 Fennant Road, Ponciau

Geology

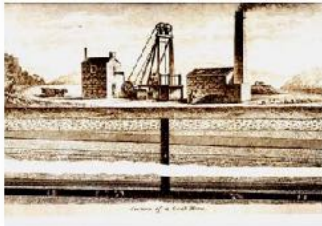
The site lies on Carboniferous Bettisfield Formation rocks that form the Wrexham Coalfield, regionally dipping to the east at 1 in 8 but locally at perhaps 1 in 2. These rocks are predominantly shales and sandstones laid down in a tropical delta environment when Europe lay on the equator as part of the continent of Pangea between 310M and 320M years ago. The Bettisfield Formation strata varies between 230m and 520m in thickness depending on locality and contains seams of coal upto 4.5m in thickness at vertical intervals typically varying from 4.0m to 20.0m. Those coal seams which were of economic importance were given an identity when they were of sufficient quality and thickness to justify extraction by mining. Typical names for local coal seams reflect primarily on locality, quality and thickness, for example Main Coal, Cefn Coal and Wall & Bench Coal.

The Geological Survey records show the strata under the site is located between two large north-south faults, both with downthrows to the east. These are the Ty Gwyn Fault to the west, and the Minera Fault to the east. Rockhead under the site is the Cefn Rock Sandstone, this sandstone lying above the Cefn Coal seam.

Past underground coal mining

Coal mining in Pentre Bychan is recorded in 1715 in the western part of the area from Bryn yr Owen Colliery, coal being sold to Brymbo Ironworks in 1720. Pentre Bychan Colliery comprised over 10 shafts dispersed over the fields between Pentre Bychan, Ponciau and Fennant Road. Several shafts were sunk before 1854 in the land east of Bryn yr Owen in anticipation of working the Main Coal, and the colliery is recorded as being worked by the Bryn yr Owen company by 1838. Bersham Colliery which closed in 1986, was sunk in 1870 to work the Main Coal at a depth of 380m, this seam being at this greater depth than at Bryn yr Owen because of the two faults referred to above.

The mineplans of the Turnpike Pits of Pentre Bychan Colliery show the limited extent of the workings within the faulted area, and the colliery was abandoned in 1878. No.8 Pit, Coal Authority shaft 330347-001, is located on the site, and the No.9 Pit (Engine Pit), 330347-015, used for pumping by a steam engine located mid-way between the two shafts so the engine could also wind coal from the No.8 Pit as shown on the 1875 Ordnance Survey, lies 15m south of the site boundary close to the current property Derwen. A small reservoir to supply condensing water to the engine was located at a higher level. The shafts are 108m and 114m deep respectively, sunk to a coal seam thought at the time to be the Main Coal but which was subsequently proved to be the poor quality but equally thick Cefn Coal.



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It is probable that the coal seam was initially proved by boring prior to 1854 and the identity of the seam optimistically assumed to be the valuable Main Coal. The workings from the Turnpike Pits are restricted to a small area and unconnected to the other Pentre Bychan collieries, reflecting the poor quality of the Cefn Coal which was mined. The No.8 Pit was filled prior to 1945 and was subsequently landscaped to enlarge the garden of Hillcroft.

The shaft filling subsided periodically over time, being most recently topped up with garden refuse, until a serious subsidence event occurred in 2000 requiring the remedial works in 2001 by Wardell Armstrong on behalf of the Coal Authority. This remedial work comprised a reinforced concrete cap 600mm thick and 6.0m square placed on fill at a depth of 1.0m below ground level. An access manhole was provided in the centre of the cap and this is visible on the site today.

Current intrusive investigation

Three rotary water-flush boreholes were drilled to 15.0m depth to determine the depth to rockhead across the site in order to precisely calculate the Coal Authority (CA) Zone of Influence (Zol) for Shaft 330347-001.

The 3 boreholes show rockhead increasing in depth from 6.7m to 9.2m as the ground level at Wrexham Road rises to the west of the site where the shaft is located. The glacial deposits overlying rockhead are brown sandy clays with sand layers.

The Zol is an area of potential instability around a mineshaft which is conical in section and calculated as being equivalent in radius to the 'depth to rockhead' + 'the shaft radius'. The CA will not permit construction of a building within the Zol unless significant structural precautions against subsidence are taken with foundations. The proposed building has been re-located outside the Zol from the initial proposal. A light raft designed to span 3.0m should be used in view of the sandy subsoil deposits and the high water table.

Shaft 330347-001 proposed remedial works

The shaft will require drilling and grouting to the full depth of 108m before any foundations are constructed. This remedial work was recommended by Wardell Armstrong in 2001 and confirmed by BSP in their CMRA of 2019. The shaft diameter is 3.0m as stated by the CA surveyor who inspected the subsidence prior to the remedial capping works in 2001, and the filling may have a high water table. Water previously flowed out of the shaft in periods of heavy rainfall and consequently a drain was constructed and connected to the existing surface water drainage in Wrexham Road in 2004.

The filling may only be 70 years old and settlement or slumping would be expected in the period since then.

The existing concrete raft is a satisfactory cap for the proposed development and would be an additional safety feature for the proposed grouting works.

For Nkc Geotech Ltd

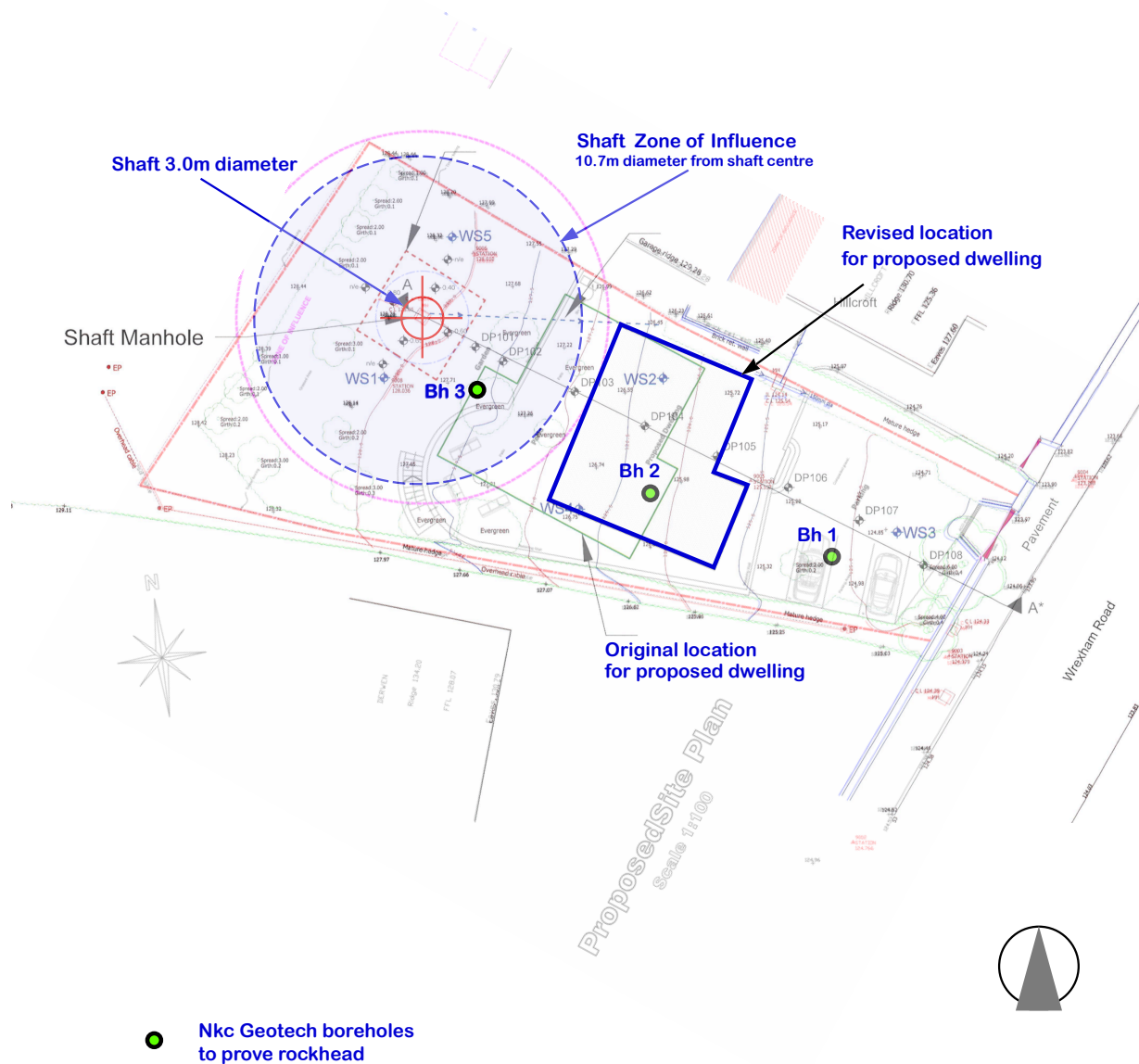
Neil Catlow, B.Sc, F.G.S



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Plan of boreholes
Scale 1:500 @ A4

Shaft 330347-001 No.8 Pit





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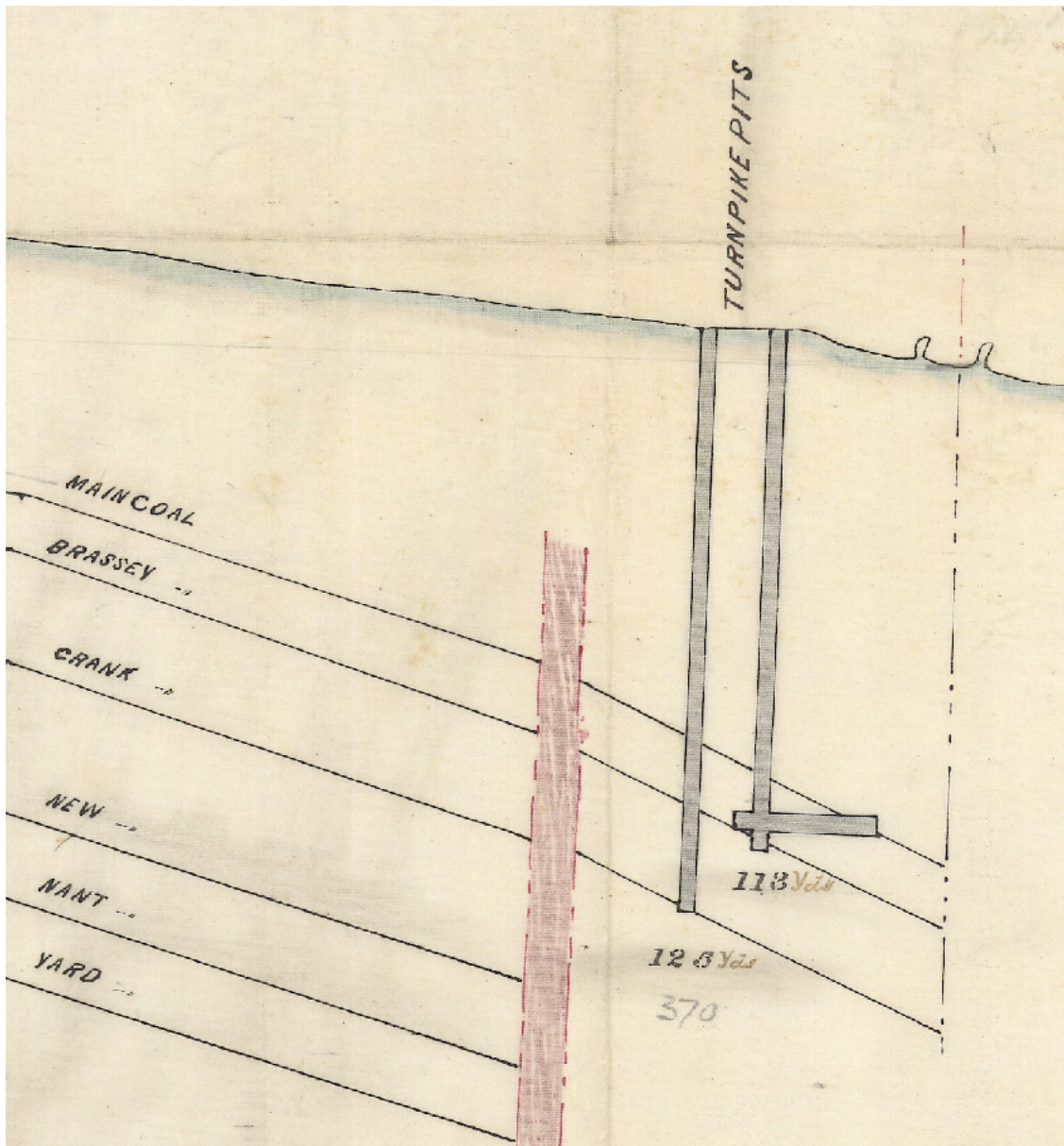
Pentre Bychan Colliery Turnpike Pits section

Shaft 330047-005, No.9 Pit (also Engine Pit), sunk to the lowest part of the mine at 125 yards for pumping (left).
Shaft 330047-001, No.8 Pit, for coal winding with an inset at the Main Coal level, (right).

The two hedgerows to the right mark the Shrewsbury & Wrexham Turnpike of 1751, and also the eastern mineral boundary in the centre of the road.

The vertical red area is the Ty Gwyn Fault. The geological structure on the section is shown as it was anticipated in 1838, the true complexity of the geological structure only became fully known after opencast prospecting in 1944.

The true depth of the shafts as sunk and worked may be only 89m according to later mineplans. Note the crudely erased pencil depths and the overwriting in ink.

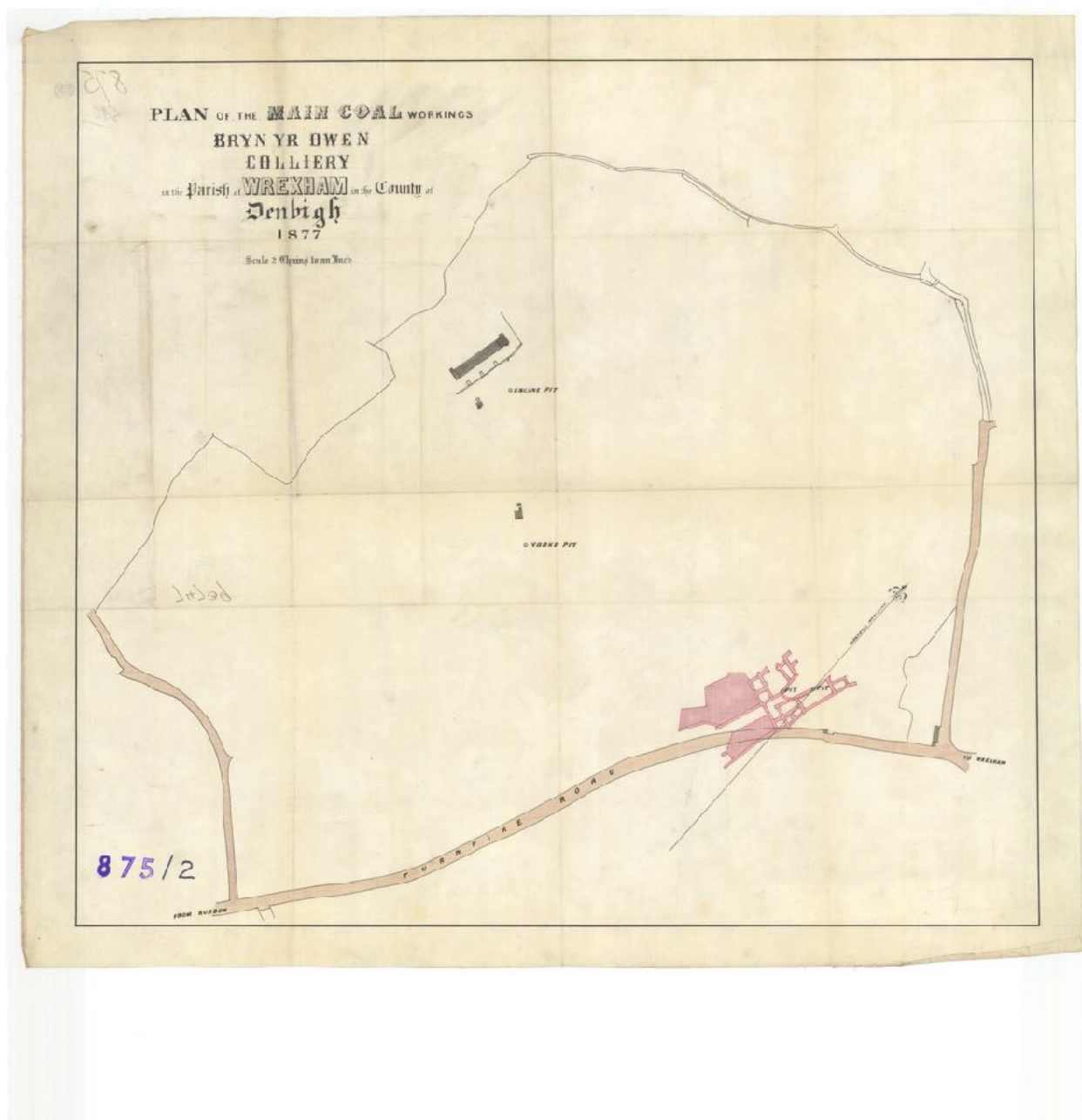




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Plan of the Main Coal workings from the Turnpike Pits dated 1877.

Bryn yr Owen Colliery is shown to the west. No.8 Pit is the Pit furthest right near the North Point, No.9 Pit shown adjacent.



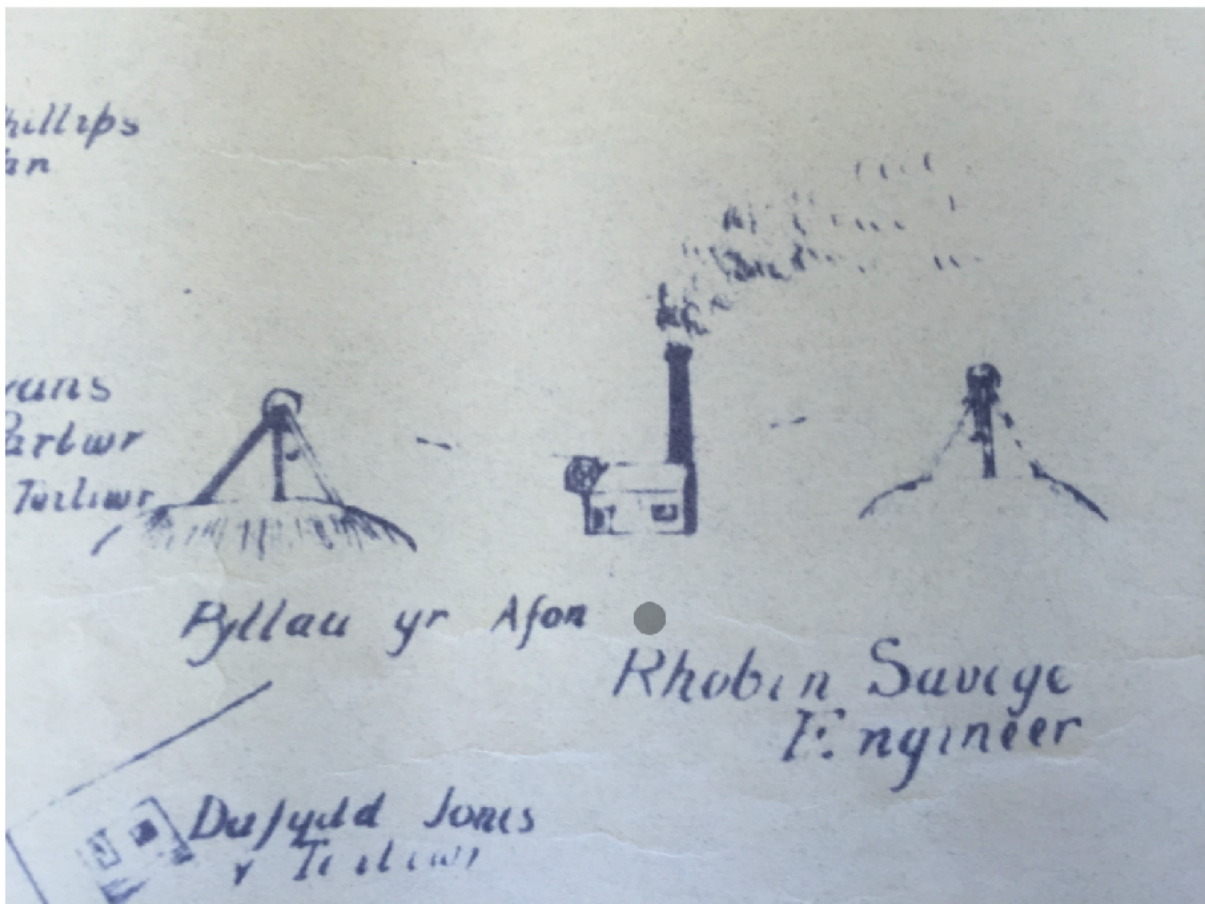


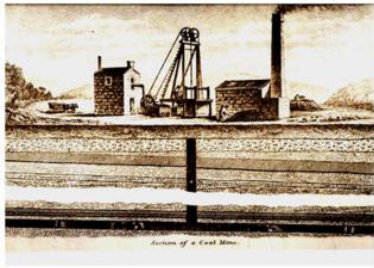
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A local colliery at Bonc Wen in Rhos showing the arrangement of an engine house working from a location mid-way between two shafts of 90m depth.

Extract from the 1835 sketch plan of Rhos and its inhabitants by John Platt.

Denbighshire Records Office reference DRO NTD/640





Bh 1

REF	2429	SITE	Hillcroft, Pentre Bychan, Bersham	PRINTOUT	1 August 2024
Bh	1	CLIENT	Tatham Developments	SCALE	1:200
		TITLE	proving rockhead at No.8 Shaft, Pentre Bychan Colliery	GL AOD	
		ORIGIN	printout direct from rig on site drilled & logged by Neil Catlow	RIG	Montabert Hydrofore
				ORIENTATION	vertical
				FLUSH	mains water supply
				BIT	75mm T/C

DEPTH	STRATA	GRAPHIC	DESCRIPTION	SPT N value	INTERPRETATION
0.0	0.0	fill			
0.5	0.5	clay	grey shale with coal fragments orange, brown, soft with frequent sand layers	not taken	ground level
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5	5.6	clay	grey brown, silty, with stones, firm		
6.0					
6.5	6.7	shale	black, firm drilling		rockhead
7.0					
7.5					
8.0	8.2	mudstone	grey, firm drilling		
8.5					
9.0					
9.5					
10.0					
10.5					
11.0					
11.5					
12.0					
12.5					
13.0					
13.5					
14.0					
14.5					
15.0	15.0		bottom of hole		
15.5					
16.0					
16.5					
17.0					
17.5					
18.0					
18.5					
19.0					
19.5					
20.0					
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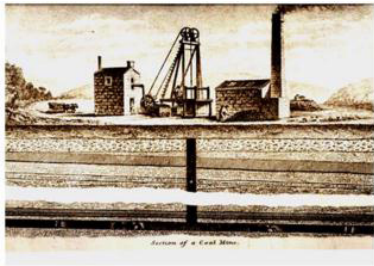


drilled and logged by
Neil Catlow B.Sc FGS

IN HOLE GAS TESTING

%	O2	20.6
%	CH4	0.0
%	CO2	0.0
%	LEL	0.0
ppm	H2S	0.0
ppm	CO	0.0

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REF 2429
Bh 2

SITE CLIENT Hillcroft, Pentre Bychan, Bersham
Tatham Developments

TITLE proving rockhead at No.8 Shaft, Pentre Bychan Colliery

ORIGIN printout direct from rig on site
drilled & logged by Neil Catlow

PRINTOUT 1 August 2024
SCALE 1:200
GL AOD

RIG	Montabert Hydrofore
ORIENTATION	vertical
FLUSH	mains water supply
BIT	75mm T/C

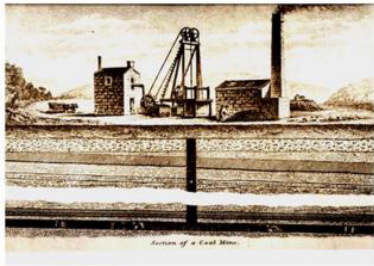
DEPTH	STRATA	GRAPHIC	DESCRIPTION	SPT N value	INTERPRETATION
0.0	0.0	fill			
0.5	0.5	clay	grey shale with coal fragments orange, brown, soft with frequent sand layers	not taken	ground level
1.0					
1.5					
2.0					
2.5					
3.0					
3.5					
4.0					
4.5					
5.0					
5.5					
6.0					
6.5					
7.0					
7.5	7.5	clay	grey brown, silty, with stones, firm		
8.0					
8.5	8.4	shale	grey, firm drilling		rockhead
9.0					
9.5					
10.0					
10.5					
11.0					
11.5	11.5	sandstone	grey, firm drilling		Cefn Rock
12.0					
12.5					
13.0					
13.5					
14.0					
14.5					
15.0	15.0		bottom of hole		
15.5					
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18.5					
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19.5					
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1.0						
1.5	1.6	clay		orange, brown, soft with frequent sand layers		
2.0						
2.5						
3.0						
3.5						
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4.5						
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5.5						
6.0						
6.5						
7.0						
7.5						
8.0						
8.5	8.6	clay		brown, silty, with stones, firm		
9.0	9.2	shale		dark grey, firm drilling		rockhead
9.5						
10.0						
10.5						
11.0	11.1	sandstone		grey, firm drilling		Cefn Rock
11.5						
12.0						
12.5						
13.0						
13.5						
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14.5						
15.0	15.0			bottom of hole		
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