THE CLWYD-POWYS ARCHAEOLOGICAL TRUST

# Pennant Mine, Rhuallt, Clwyd ARCHAEOLOGICAL EVALUATION



**CPAT Report No 52** 

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Report prepared for Mr & Mrs K Groves

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## 1 INTRODUCTION

- 1.1 The Clwyd-Powys Archaeological Trust was commissioned in February 1993 by Mr and Mrs K. Groves of Aber-Elwy, Lower Denbigh Road, St Asaph, to carry out an evaluation of visible features of archaeological significance associated with the former Pennant Lead and Barytes Mine and surrounding agricultural land near the village of Rhuallt, Clwyd. The evaluation was required as part of the client's planning application for a change of use of the land to a countryside centre (Rhuddlan Borough Council planning application 2/TRE/0018/93/P).
- 1.2 Documentary research, field survey and excavation was carried out in March 1993 and this report prepared immediately afterwards.

## 2 LOCATION

- 2.1 The area affected by the planning application covers an area of approximately 19ha located 1km east of Rhuallt and centred at SJ0860 7530 (Fig 1).
- 2.2 Topographically, the land includes a dry wooded valley which falls gradually from an altitude of 700m OD in the east to 590m OD at the western side. The valley base and lower slopes are occupied by the old mine complex which extend from Pennant View on the side of the A55 road eastwards to a point adjacent to Bryngwyn Mawr Farm, a total distance of approximately 400m. The upper slopes to the north and south above the mine are occupied by pasture fields bounded on their eastern and southern perimeters by unclassified roads.

## 3 METHODS OF ASSESSMENT

#### 3.1 Field survey

This was carried out over a period of four days between March 1st - 10th 1993. It involved a detailed examination of the surface features of the mine complex and the adjacent fields. All recognisable features were measured, photographed, recorded and located cartographically. An evaluation of underground features was not undertaken.

## 3.2 Documentary and cartographic research

Documentary sources examined in relation to the mine complex included:

Memoirs of the Geological Survey, SRMR, Vol II Special Report of the Mineral Resources of Great Britain, Vol 13, Geological Survey, 1922 The Grosvenor (Halkyn) Manuscripts Mining Journals (various) Mineral Statistics The Clwyd Archaeological Record (Clwyd-Powys Archaeological Trust)

Cartographic sources examined included:

Mine plans 1860 - 1919 25 inch Ordnance Survey Sheets, 1872, 1875, 1899, 1910, 1913

#### 3.3 Archaeological Evaluation

Excavation trenches as detailed below.

## 4 EXCAVATION

- 4.1 Two trenches were excavated to investigate the possible presence of features of archaeological significance (Fig 2).
- 4.2 Trench A, 5.0m x 1.5m, was located across the possible line of a Roman road at SJ 0859 7526. Ploughsoil was removed mechanically to the level of the undisturbed subsoil and this surface and exposed vertical sections cleaned manually, recorded and photographed. There was no indication of the presence of a buried road surface at any point in the excavated area.
- 4.3 Trench B, 4.5 x 1.5m, was aligned E W across the eastern side of a continuous subrectangular low bank visible on the surface and which enclosed a level area. It had been proposed that this was the site of a small reservoir possibly related to the Pennant mine workings.

Ploughsoil was removed mechanically to the level of the undisturbed subsoil and the surface and exposed sections cleaned manually, recorded and photographed.

At a point 1.3m west of the inner edge of the bank and at a depth of 0.25m below the ground surface, a linear feature 0.40m wide at its base and 0.13m deep extended across the trench in a direction parallel to the bank. This was filled with uncoursed large fragments of grey shale and brick. The feature is most satisfactorily interpreted as a vertically truncated bedding-trench possibly representing the base of a wall which was subsequently demolished. To the west of this feature there were no indications of the former existence of a reservoir or pond. Further excavation would be necessary to determine the course of the bedding-trench and the function of the subrectangular enclosure.

## 5 HISTORICAL DEVELOPMENT OF THE PENNANT LEAD AND BARYTES MINE

- 5.1 The mine has been worked intermittently from the early 1700s to as late as 1920. Initially lead ore was mined from two east west trending lodes which cut a sequence of Silurian shales and which appear to peter out in the vicinity of Bryngwyn Mawr Farm. Subsequently, after the mid-1870s and into the earlier part of the 20th century the barium minerals barytes and witherite were extracted.
- 5.2 Inferences to early mining activity in this area are provided by references to possible trial pits which predated 1719 when Sir Richard Grosvenor of Eaton leased the mines. The positions of subsequent early 18th century shafts on the outcrop of the lode are shown on lease plans contained in the Grosvenor Papers.
- 5.3 During the late 18th and early 19th centuries several shafts were sunk and extensive workings were carried out above the 40 yard level almost to the surface between Old Whim Shaft and East Whim Shaft on the two principal lodes of the mine. During this period, the 40 yard adit level was driven several hundred metres from the western end of the mine to the Old Whim Shaft. The ore won was dressed a short distance from the mouth of the adit where water was available at that time.
- 5.4 For a period around 1835, the mine is known to have been at a standstill, but with the advent of the Pennant Mine Company in 1859 further development took place. A mine plan of c 1860 (Fig 3), shows six shafts which (with the exception of New Sinking on South Lode) were sunk down to the 40 yard adit level whose portal lies to the south of Pennant View. From west to east these shafts are named Old, Deep, Footway, Old Whim, and East Whim. Several features to the east of the adit level are also shown. At points outside the proposed development area two reservoirs, a possible crusher house and a powder magazine are shown, whilst within the proposed development area another ancillary building, possibly a store, was located.
- 5.5 Although no Mine Plan is available for the later 19th century information given in the Mining Journal (published weekly) indicates that by 1871 a pumping engine operating a 30 inch single acting pump was in operation and the Old Whim Shaft had been deepened below the Adit Level to become the main Engine Shaft. The 25 inch Ordnance Survey Map (1st Edition) also shows that an engine house had

been erected by 1871 with adjacent Boiler House and chimney (Fig 4). Two other buildings to the southeast of the Engine House are also shown. The more northerly of the two, whose long axis is aligned with the Engine Shaft, may have housed a 12 HP engine and winding drum. From this complex, ore was carried to dressing floors by self-acting incline.

- 5.6 The 1910 Edition 25 inch Ordnance Survey Map (Fig 5) still shows the Engine House, Boiler House and chimney but, additionally, also a capstan pit located at a point adjacent to the Engine Shaft. Various descriptions given in current editions of the Mining Journal indicate that the Incline was constructed c 1875/77 which would have transported ore to new Dressing Floors located to the west of the Adit Portal.
- 5.7 A brief description of the Pennant workings in 1919 is given in the Special Report on the Mineral Resources of Great Britain, Vol 13, published by the Geological Survey of 1922. The Old Engine Shaft is reported to be 103 yards deep with 60 and 80 yard levels below Adit whilst the East Whim shaft to the east had been deepened to 80 yards and renamed the Bryngwyn Shaft. By then, the main Engine House had fallen into disuse and pumping had been transferred to the New Engine Shaft (Fig 6). A small steam engine was installed for both winding and pumping on concrete mounts adjacent to the shaft.
- 5.8 During the earlier 20th century the emphasis changed from the mining of lead ore to the production of barytes and witherite. On the valley floor to the south-west of the New Engine Shaft, a new dressing floor was erected to separate barium minerals and blende, the former evidently being further prepared in the refurbished older mill. From 1913 to 1920 when the mine closed, some hundreds of tons were treated, although a high proportion of this may have come from the re-processing of old dumps.
- 5.9 Production of lead ore from 1858 amounted to some 800 tons, whilst that of barium minerals exceeded 3000 tons. However, in light of the estimate of 1000,000 tons of spoil made in 1919, very considerable tonnages were mined before records were available.

## 6 SURVIVING FEATURES OF THE MINE (Fig 2)

#### Leat PRN 105413 (SJ 0878 7534)

Width 1.10m; depth 0.2m. Continuous length 10.3m truncated at eastern end by the modern road. Continues eastwards beyond the road.

#### Chimney PRN 105414 (SJ 0877 7537)

Basal courses of chimney, 2.45m sq at base. Surviving height of coursed walling 1.2m. Quantities of demolition rubble on south, west and east sides.

#### Boiler House PRN 105415 (SJ 0877 7535)

Two parallel linear banks c 6.7m long aligned north/south representing the demolition phase of the Boiler House. A 2.0m length of surviving coursed walling at the south-west corner indicates that both Boiler House and Engine House were single phase structures. The Boiler House was originally built to house a 30ft x 6ft boiler. It was probably demolished to facilitate removal of boiler when it was abandoned.

#### Engine House PRN 105416 (SJ 0877 7535)

A stone-built single phase structure originally of three storeys. Structural walls on the west, north and east sides are c 0.90m thick but the south wall which originally supported the bob-beam of the pumping mechanism is substantially thicker (1.33m). A tall opening in this wall (c 3.0m high), immediately adjacent to and above the Engine Shaft probably housed winding gear. A brick-arched entrance doorway is centrally placed in the north wall with two windows above. There is an entrance doorway also at the southern end of the east wall and a window at the southern end of the west wall. All windows and the winding gear opening have wooden lintels which are showing signs of decay. In particular, the lintel above the south wall opening and the wall above is in a state of collapse. Within the building, stone foundation block with two visible engine mounting holes at the north end originally supported a single-phase, steam-driven 30 inch engine. The foundation block overlooks a water sump immediately adjacent to it.

#### Old Whim, Engine or Old Engine SHaft PRN 105417 (SJ 0877 7534)

A 94.2m deep open shaft immediately to south of Engine House associated with South Lode workings. Maximum diameter at surface 7.2m, sloping steeply to c 4.5m diameter at c 3.0m. A stream flows into the shaft from the east and the surrounding ground shows signs of instability. The shaft was initially identified in 1754 and became known as the Old Whim at a date shaft prior to 1859. In the 1860s it was known as the Engine shaft and subsequently, in the early 20th century, as the Old Engine shaft.

#### Track PRN 105418 (SJ 0876 7537 - SJ 0877 7536)

A short length of track 7.5m long x 1.7m wide possibly originally leading to the Boiler/Engine House complex from the longer track (PRN 105420).

#### Earthworks PRN 105419 (SJ 0879 7533)

Low earthworks c 25m south-east of Old Whim Shaft possibly defining the foundations of two former buildings. The most southerly is visible as two parallel linear banks c 4.0m long and 2.5m apart aligned east/west. The most northerly bank has c 0.8m of visible coursed stonework at its south-east end. Immediately to the north, a level platform 3.0m wide is enclosed on its north and east sides by slight turf-covered banks. To the west, the area is obscured by dense gorse.

## Trackway PRN 105420 (SJ 0868 7537 - SJ 0876 7537)

An 85m length of track aligned approximately east/west visible as a clearly defined scarp on the north side of the valley. There is an entrance from the modern road at the eastern end, but beyond 85m to the west its course is obscured by dense gorse. Probably the same track as that defined on 25 inch maps of 1871 and later.

#### Collapsed stop or infilled trial shaft PRN 105421 (SJ 0867 7537)

A circular depression 2.00m diameter and a maximum of 0.75m deep centrally. This appears to be a relatively recent subsidence.

#### Deep or New Engine Shaft PRN 105422 (SJ 0862 7540)

A shaft of maximum 8.50 diameter at its collapsed surface. It is currently being infilled with rubbish of variable composition which has resulted in instability around the shaft collar. It is unfenced on the northeast side. Protruding from amongst the rubbish is an iron A-bob formerly used formerly a part of the pumping mechanism. This shaft above the North Lode workings may have existed as early as 1719. It was adapted for pumping and ore-raising in the 20th century phase of activity when a steam pump was installed. It is over 73m deep.

#### Engine platforms PRN 105423 (SJ 0862 7540)

Concrete platforms extending over an area of c 60 sq m immediately to the west of the New Engine shaft formerly the foundations of machinery and pumping mechanism.

## Coursed wall PRN 105424 (SJ 0862 7539)

A continuous length of wall 5.50m long and of surviving maximum height 0.80m. Aligned approximately east/west at the foot of a steep bank above which are engine platforms (PRN 105423). Probably the surviving remains of a building.

#### Old Shaft PRN 105425 (SJ 0858 7537)

An open, unfenced shaft c 5.0m maximum diameter at the surface and sloping steeply to c 3.20m at about 3.0m. A gully 21m long which may represent surface workings on the back of the South Lode runs on an east/west alignment towards the shaft. At a point 8.0m from its eastern end is a surface depression c 0.70m maximum depth possibly representing a collapsed stope.

#### ?Collapsed wall PRN 105426 (SJ 0860 7538)

A possible collapsed stope or largely infilled trial shaft 3.20m maximum diameter x 0.25m deep.

#### Cistern PRN 105427 (SJ 0857 7537)

A rectangular concrete cistern 5.00m x 4.40m x 1.65m deep. This has a vertically corrugated inner surface probably representing the use of corrugated iron sheeting as shuttering during its construction. A narrow gap 0.5m wide x 0.17m deep close to the south-west corner possibly represents an overflow control devise. This cistern was associated with the barytes processing phase of 1919-1921.

#### ?Collapsed stope PRN 105428 (SJ 0862 7537)

A semicircular depression 9.00m x 5.00m x 1.70m deep with collapsed sides situated on west-facing slope. Possibly associated with the North Lode workings.

#### Incline PRN 105429 (SJ 0857 7537 - SJ 0868 7532)

The substantial remains of a self-acting incline which was used to transport ore to the dressing floors during the mid-19th century. Within the proposed development area its visible length is c 115m. It starts at its eastern end from a level area of c 270 sq m from which heading in a north-easterly direction are faint traces of a trackway although the area is obscured by gorse. Being a self-acting incline it is predictable that excavation here might reveal the foundations of a small drum-house. From its eastern end the incline takes the form of an embankment 10m wide for a distance of 60.00m. Thereafter, it continues for a further 55m as a gradually deepening cutting c 8.50m wide and maximum 1.80m deep at its western end within the proposed development area. A more recent trackway crosses the incline close to the western boundary.

## Pipeline PRN 105430 (SJ 0862 7535 - 0868 7533)

An 8cm diameter screw-thread, jointed pipeline is intermittently visible for a distance of 65m along the base of the incline embankment on its northern side. It re-emerges to the west at a point on the northern edge of the incline cutting immediately above Old Shaft (PRN 105425) which evidently it crossed to feed the cistern (PRN 105427).

#### Barytes Mill PRN 105431 (SJ 0860 7530)

The partly exposed level concrete foundation platforms on two levels located centrally in the valley. On the upper level, the bases of a grinding mill and jigs remain and machinery mounts with mounting bolts are visible. At the north-eastern corner of the area a raised rectangular stone platform 4.15m x 1.45m x 1.10m high supports three circular stone or concrete features each 1.25m in diameter and 0.06m thick and which are banded by iron hoops. These are tentatively interpreted as structures associated with a decrepitation plant used to separate the barytes from zinc ore by a process of roasting. Immediately in front of this raised platform is a small in situ iron air receiver. Partly obscured concrete floors are visible on the lower level 4.60m below and immediately to the west. This area may have been for storage and possibly garaging purposes.

#### ?Trial shaft PRN 105432 (SJ 0854 7536)

A circular depression 5.80m in diameter and 0.90m deep centrally located on a slight slope. Spoil is visible along the north and east sides as low mounds. Possibly associated with the South Lode.

#### ?Trial shaft PRN 105433 (SJ 0853 7536)

A slight circular depression 3.20m in diameter and 0.30m deep, 4.00m south of PRN 105432. Possibly associated with the South Lode.

#### ?Shaft PRN 105434 (SJ 0850 7537)

A circular depression of max.diameter 10.70m and 2.30m depth centrally from which a well-established beech tree is growing. This feature is marked on the 1875 edition 25 inch OS map. Probably associated with the South Lode workings.

#### Shaft PRN 105435 (SJ 0844 7541)

A fenced open shaft of maximum diameter 10.30 sloping downwards steeply to a diameter of c 3.30m. This is possibly an air shaft down to the Adit Level or an area of collapse on the Adit. This is marked on the 1875 edition 25 inch OS map.

#### ?Shaft PRN 105436 (SJ 0845 7537)

A roughly semi-circular depression 7.90m x 3.50m x 1.35m deep. Rubbish has been tipped into it from the southern side. The feature is marked on the 1875 edition 25 inch OS map.

## 7 CONCLUSIONS

- 7.1 The examination of historical documentary and cartographic sources together with a detailed field survey of the proposed development area indicate that the Pennant Mine complex is of significant importance both in terms of the industrial history of Clwyd and in the more general terms of industrial archaeology.
- 7.2 Primarily because the mine is in a relatively undisturbed state important features associated with the mine survive within the area. The Engine House (PRN 105416) and the chimney (PRN 105414) together form aScheduled Ancient Monument (De 137), and other features such as the engine platforms (PRN 105423) associated with the New Engine shaft (PRN 105422), the A-Bob contained in this shaft, the Barytes Mill (PRN 105431), the self-acting incline (PRN 105429) are of significant interest not only as integral parts of the mine but also as indicators of the variety of processes that have existed on the site during the course of its long history.
- 7.3 It is evident that the area may contain several other features of significance which if subjected to a programme of excavation would present a more complete picture of the mine's industrial history and help to clarify and emphasise different aspects of the mine's workings. In particular, the area around the Old Engine shaft (PRN 105417) could be productive as might also the level area at the head of the incline where the foundations of a drum-house might lie.
- 7.4 The area occupied by the Pennant mine is compact and limited in relation to the total area proposed for development. Development proposals would not have a major impact on features associated with the mine located within the proposed area or on other features located elsewhere in the valley. On the upper slopes of the valley, currently pasture land, field survey revealed no features of archaeological interest and evaluation excavation indicated that the earthworks investigated did not form an integral part of the mine complex.
- 7.5 Considerations of safety are important in the area occupied by the Pennant mine. The four open shafts examined had no adequate safety barriers around them and such considerations of safety should also be extended to areas of past or current subsidence such as features regarded as possible collapsed stopes.
- 7.6 Consideration should also be given to the state of deterioration evident in the walls of the Engine House and to the unguarded vertical drop from the upper to the lower levels of the Barytes Mill.

## ACKNOWLEDGMENTS

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A Adit Level

B Trial?

## O SHAFTS

1

Air?

- On South Lode? 2
- 3 ..
- 41 4 .. ...
- Old Б
- Collapsed Stope? 6
- Deep or New Engine 7
- Footway 8
- Old Whim, Engine or Old Engine 9
- 10 On South Lode
- 11 Collapsed Stope?
- 12 East Whim or Bryngwyn



FIG 5



300

- 5 Old
- 6 Collapsed Stope?
- 7 Deep or New Engine

8 Footway

- 9 Old Whim, Engine or Old Engine
- 10 On South Lode
- 11 Collapsed Stope?

NATURAL SCALE OF 1/2500 FIG 6

METRES

100

200