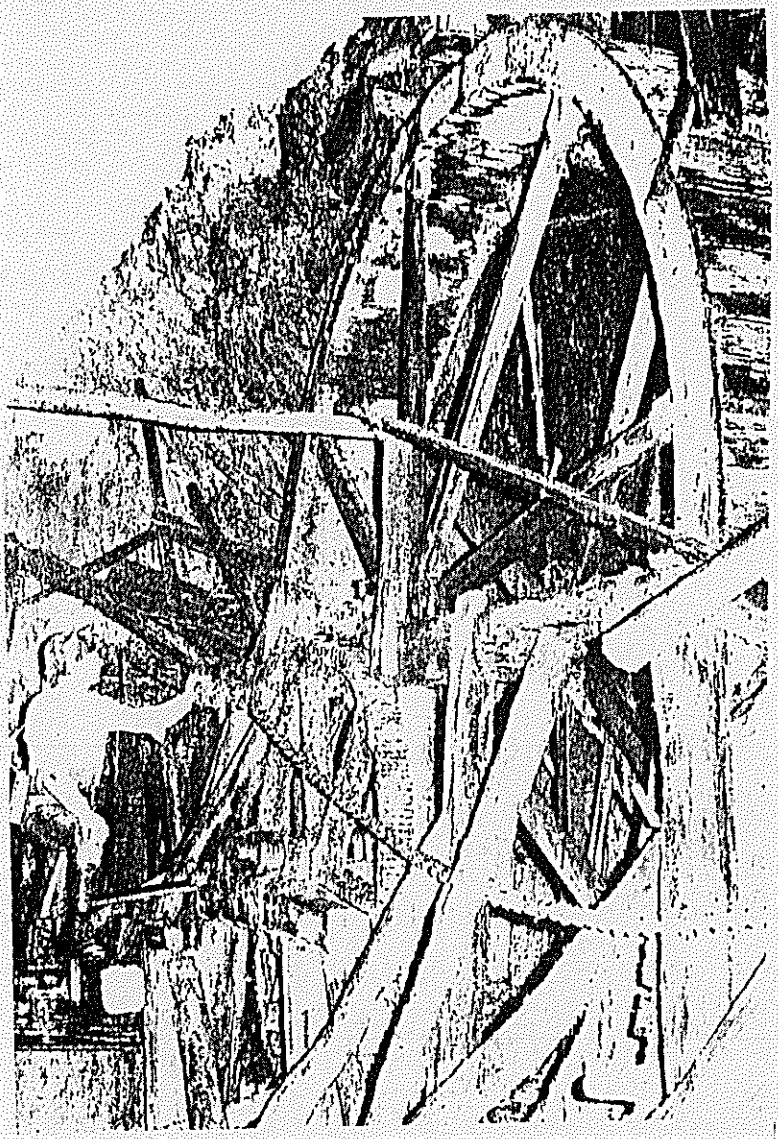
PRN 3949

YSTRAD EINION LEAD MINE, CEREDIGION

Report on Archaeological Recording by Dyfed Archaeological Trust during a Derelict Land Reclamation Scheme .

01/06/94



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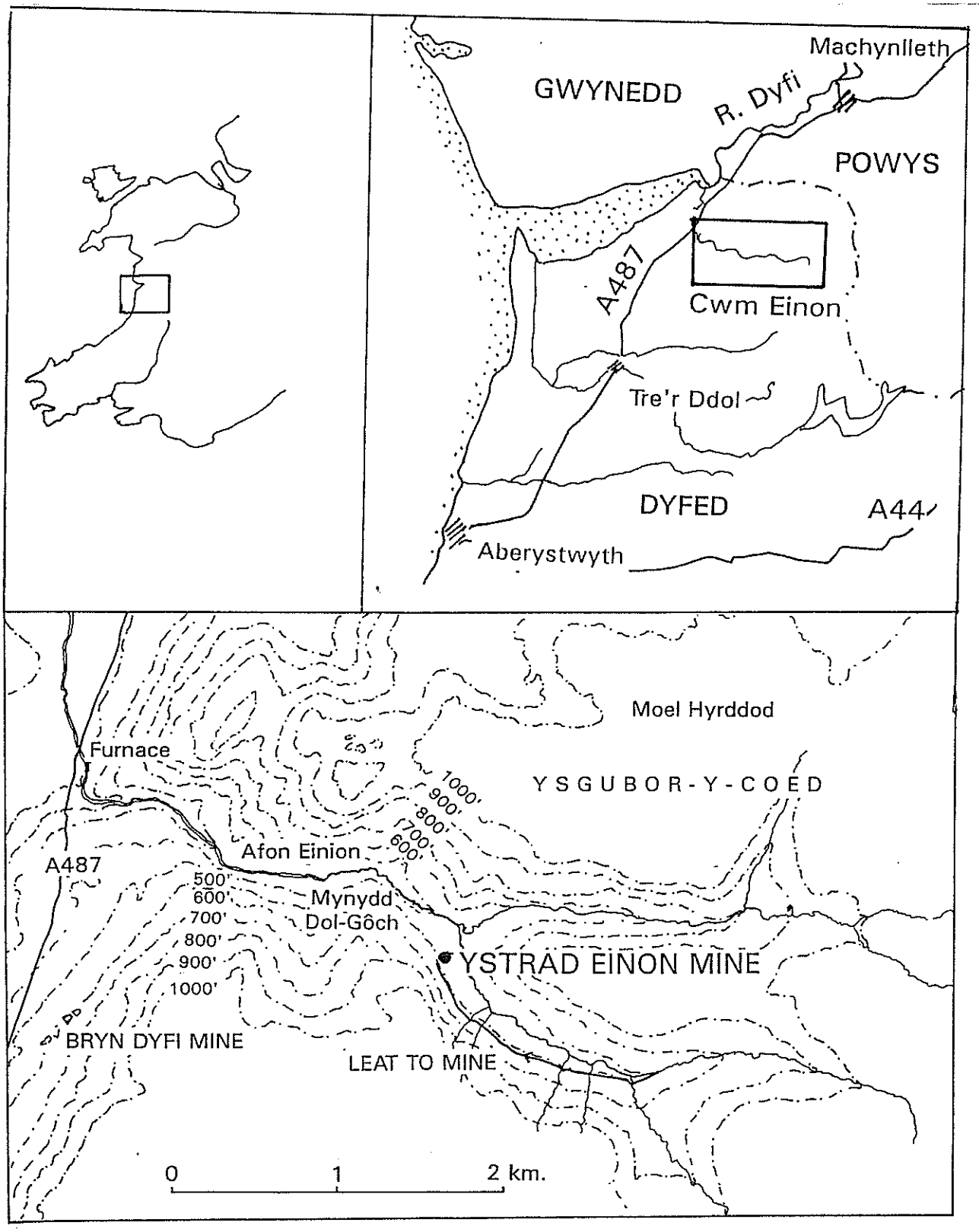


Fig. 1: Ystrad Einon Mine - Location Map

Fig. 2: Annotated 1:2500 Map showing location of early workings - David Bick.

LEVEL.1.
FIRST WORKED BY THE COMPANY OF MINING ADVENTURERS IN 1700. AND SECONDLY BY CHARLES KIRKPATRICK. AND THOMAS READWIN IN 1853. ABANDONED IN 1854.

LEVEL.2.
FIRST WORKED BY FLINT MINING C° 1745 ABANDONED 1770. SHALLOW ADIT CROSS CUT. (LOWER LEVEL THAN LEVEL.1.) MIDDLE ADIT 1760

LEVEL.3.
FIRST WORKED IN 1855 BY THOMAS & HENRY JONES ABANDONED 1864. DEEP ADIT CROSS CUT.
IN 1870 WORKED BY ADAM MASON OF BOLTON WHO IN 1871 FORMED THE MAIN SHAFT TO 12. FATHOMS CONSTRUCTED UNDERGROUND WATER WHEEL AND CONTINUED 24. FATHOMS DOWN. THIS LEVEL WAS CONNECTED TO LEVEL.1. IN 1874 ABSOLOMON FRANCIS SUGGESTED FURTHER INVESTMENT£3000 IN ADDITIONAL WORKS. WHICH LEAD TO THE CONSTRUCTION OF LEVEL 4. AND A NEW SHAFT. AND THE CONNECTING LEVEL TO LEVEL 3. 20 FATHMS. BELOW LEVEL 2. (FLINT MINING C°.).

LEVEL. 4.
CONSTRUCTED IN 1876 AT THE SAME TIME AS THE NEW DRESSING PLANT BUILDINGS AND 3. WATER WHEELS.
A1. STONE BUILT TIMBER LINED FLOORED MAGAZINE. FOR EXPLOSIVES. 1875.
A2. 13. N° FILTER BEDS TO PREVENT POLLUTION.
A3. DRESSING ROOM / CONCENTRATE STORE.
A4. WINDING GEAR AND SHED OFFICE.
A5. SKUTE - CRUSHER HOUSE WITH 30.0" x 3.6" WATER WHEEL DRIVING STONE BREAKER. 18.0" x 3.6" WATER WHEEL DRIVING 6 COMPARTMENT DIGGERS & BUBBLES. 20.0 DIA. 187

SHAFT. 1. CONNECTED TO LEVEL 1.
SHAFT. 2. MASONS SHAFT. 1871 REACHED. DEPTH OF 50 FATHOMS. ENGINE SHAFT WITH KIBBLE - PUMP - WINDING PLANT TEESDALE AND BALANCE BOB ALL CONNECTED TO 22'6" x 3'6" WATER WHEEL FOR PUMPING ADJACENT TO A4. BUILDINGS. (MASON & RICHARDS).
WATER TO THESE WHEELS WAS FED BY A MAIN MADE 1½ MILE WATERCOURSE.
MASONS NEW BLDG'S & WHEELS COMPLETED 1871 WITH DINNER IN BLACK LION, TALYBONT 21ST. SEPTEMBER.

IN 1731 RECORDS OF A COURT CASE INVOLVING THE POLLUTION OF THE RIVER EINION CAUSING STOCK TO DIE LOWER DOWN STREAM THESE 13. FILTER BEDS ARE TO PREVENT POLLUTION OF THE RIVER. SLIME PITS AND SETTLING PONDS. 1875.

OPENSTOPE ON LODE CIRCA. 1720.

THIS MINE PRODUCED ZINC CONCENTRATE. LEAD. SILVER AND COPPER ORE. PRODUCTION CEASED IN 1896. WORKS DISMANTLED AND DERELICT BY 1914. & WORKINGS FLOODED UP TO T & H JONES ADIT.
ALL UNDERGROUND WORK WAS DONE BY HAND. DRILLING & CARTING.

Mynydd Coronwen 1028

YSTRAD-EINION LEAD MINE

1:2500.

18:1:51.

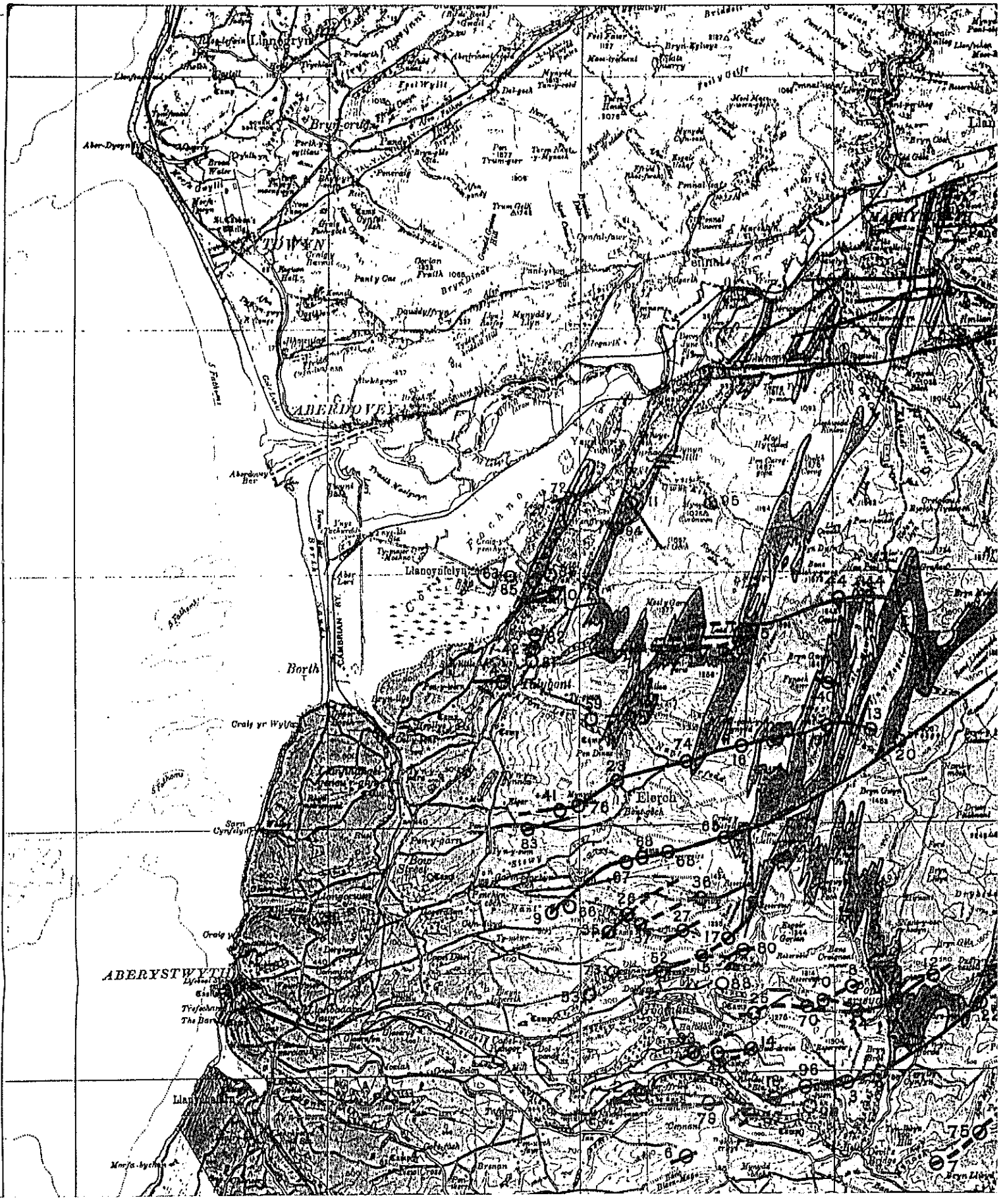


Fig. 3: Geology Map showing Van & Gwestyn Formations, also Lodes reproduced from *Memoirs of the Geological Survey. Vol. XX: Lead & Zinc. The Mining District of North Cardiganshire & West Montgomeryshire* O.T. Jones . HMSO 1922 Mining Facsimiles.

1: Introduction

1.0.1 It is not the intention here to repeat or produce a synthesis of all the available information on the history and topography of Ystrad Einion lead mine. Full references are given in the Bibliography. However a brief summary of the history and a description of the topography of the site is necessary to provide a framework for the following Report.

1.0.2 Ystrad Einon Lead Mine is registered as site 9179 on Dyfed Archaeological Trust's *Sites and Monuments Record* (SN 707938). Parts of the site were Scheduled as an Ancient Monument by the Secretary of State in 1979. Monument No. Cards. 143.

1.1 Brief History

1.1.1 The earliest workings at the uppermost levels were by the Company of Mining Adventurers in 1700. This area was unaffected by the clearance and reclamation scheme. Some extraction continued into the early 18th century, since a court case of 1731 concerned loss of stock through pollution of the River Einion, due to washing of ores. Another level, also above the late 19th century mine, was worked by the Flint Mining Co. in 1745 and abandoned in 1770. A further adit was cut in 1760 (see Fig. 2 for location of 18th century working).

1.1.2 The main period of working dates from the 1870s when the site was laid out anew by Mason & Richards, an operation described in full in the *Mining Journal*. Mason sank a winze (or vertical shaft) to the 12 fathom level. He installed an underground waterwheel, 16 foot in diameter, to help drain the workings. This, together with pumping and drawing machinery, still survives *in situ* although now in a fragile condition. Further machinery was installed by 1877 and a new shaft (the main shaft) sunk. However production, under new management, did not commence until 1891 and ore reserves were disappointing. Working ceased in c. 1900.

1.1.3 The site was first afforested in 1940, with more recent planting by the Forestry Commission in the early 1980s. The site is now part of the estate of Dyfed County Council.

1.2 Description of the Site and Explanation of Processes of Working

1.2.1. The lode ran NE-SW, a direction mostly confined to the Dyfi Estuary area. Working of all periods has thus been confined to the steep hillslopes, south-east of Mynydd Dol-Goch, on the west side of the R. Einion opposite Badger Lodge. (Figs. 1 & 3).

1.2.2. The mining constraints, topography and exceptionally complete remains of later 19th century buildings and workings, give Ystrad Einion its distinctive character. The sucession down-slope from mine shaft to crusher house to ore processing and finally to the slime pits and settlement tanks just above the valley floor can now be readily appreciated from a number of inter-related view points within a short distance of each other (see Figs. 6 & 7).

1.2.3. The principal remains of the site before consolidation and encapsulation works and the construction of new access roads are described below. (areas are coded with the same letter as that used on MRM's master plan QCNSTO88/02 for ease of cross reference; additional features are numbered). This description draws on the Bick Report and also information from Robert Protheroe Jones of the National Industrial & Maritime Museum of Wales, following his site visits in May 1993. The description that follows is intended to provide a framework for more detailed sections below where archaeological recording took place.(Use Fig.5).

1.2.4. At the highest point of the late 19th century site is the **main engine shaft (J)**, cut back against the hillslope, with vertical rock faces on all but the north east side where there is a level platform area. The shaft measures some 8m. x 3 m. and is now blocked at a depth of 100' at the point of intersection with the adit of the `**Middle Level'**. This adit (L1) was driven into the hillside on the south side of, and below the level of, the jiggers and buddles, partly to access the lode and also to drain the workings.

1.2.5 On the north east side of the main shaft is a long, narrow 'T' shaped trench with drystone walling revetting its narrow vertical sides. This is the **angle-bob pit** with parts of the crank shaft which worked the pumps in the shaft still surviving *in situ*. These remains will be visible below the bars of the steel grating which will cap the shaft.

1.2.6. Directly below the cavernous main shaft are two **ore bins** or **ore slides**, constructed on a sloping terrace cut into the steep hillside slope. Here the ore was stored as it came from the shaft. These are now obscured by vegetation and have not been touched by the clearance and reclamation scheme. They are some 1.2 m. deep below surrounding ground level and about 1.5 m. wide. They have flat floors, at present grass and heather covered, and are divided by a low vegetation covered ridge. Below the ore bins was another level platform immediately above the Crusher House, now cut back and reduced in area (see below for recording details). This is bounded by a vertical stone revetment, 1.2m high, which is pierced by a single 'v' shaped, **wooden launder or chute**. The revetment wall was mortared and possibly rendered; there is a clear break in build some 2.5 m south of the shute where the revetment walling is of a cruder, drystone construction. This may indicate that the working area in front of the chute was covered.

1.2.7. At many Cardiganshire lead mines, similarly sited working areas contained a 'picking grate' for the preliminary washing, sorting and preparation of the ore for the crusher house. The rectangular plank-floored, wooden frame which survived at Ystrad Einion prior to the removal of spoil to relieve pressure on the rear of the Crusher House, was probably part of such an operation. The precise details of operation are not known, certainly the leat could have supplied water to wash the ores. It is likely (see below) that machinery, partly revealed during consolidation work in the annexe at the rear of the Crusher

House, was for stone-breaking. This may have been supplied via a timber barrow run.

1.2.8 Also below, and just to the north east of the main engine shaft are the fragile remains of **buildings and a wheel pit (waterwheel 1)** with remains of many iron holding-down rods. The **pumphouse**, the northernmost of the buildings, housed water-powered machinery for winding gear for an **incline**, a steep slope on which a tramway was constructed, branching off from the main **tramway** level along the contour of the hillslope in front of the buildings. The waterwheel also powered the angle bob by means of flat rods between the two. Surviving physical evidence for this is a vegetation-obscured **stone pier or base** between the shaft and the 'office' buildings. The building with a hearth and chimney was in fact the **blacksmith's shop** with a forge - necessary for making, servicing and maintaining all the iron work needed for machinery etc at the remote mine.

1.2.9. The wheel was powered by water brought by a **leat** at a higher level adjacent to the main shaft (for recording of which see below and also see Figs. 1 & 5). Water was presumably supplied to the waterwheel by means of wooden launders or chutes partly raised off the ground on now-vanished timber supports and in other areas via buried, plank-lined culverts.

1.2.10 Visually the main feature of Ystrad Einion is the **Crusher House** and it was the works necessary to safeguard this structure which formed the core of Dyfed County Council's Consolidation and Reclamation Scheme. The building is sited below the ore bins and ore-preparation areas, and is described in detail below. The large **waterwheel (waterwheel 2)** that powered the crusher rolls was fed, David Bick suggests, via culverts and launders from the tailrace at the now buried base of the upper wheelpit next to the Blacksmith's workshop. By contrast the tailrace 'gate' from the base of this larger wheelpit is clearly visible and from thence water was led to another lower level of **dressing or jigger floors** and then, below that , are the two **buddle pits.**

1.2.11 The dressing floor was again constructed by terracing into the hillslope and then constructing a stone revetment of the faces of the resultant platforms. A 9 m. wide levelled area, not cleared or recorded in any detail, is set outside the front of the crusher house. This is bounded by 1.5 m high drystone revetment demarcating the edge of the lower floor. The revetment is partly constructed of vertically pitched stone, now bowing out, and roughly coursed walling. The lower level housed the six compartment **jigs**, water-powered sieves that agitated the ore, now broken down into smaller sized grains after going through the crushing rollers. The sieves were raised and lowered into tubs of water by a lever or levers. This action separated the ore from the waste. The heavy, pure, ore would sink to the bottom, with mixed ore and stone above. On the surface would be the worthless spar. It was the middle layer of material which was then 'buddled' in the buddle pits constructed at another, lower level. Buddling was a further separation process to recover ore (see below for a detailed description of the buddle pits) . The jigger floor area measures some 14 m. in length, extending up to the

lower wheelpit (**waterwheel 3**) and 4.4 m. in width. Apart from some clearance of scrubby vegetation, it has not been affected by the clearance and reclamation scheme and future excavation might possibly reveal remains of jigs and water sources.

1.2.12. The same water wheel (waterwheel 3) powered the operation of both the jigs and the buddles. Its tailrace issued through a stone and brick arch, similar to that for the tailrace of the Crusherhouse wheelpit, for the final stage of the ore dressing processes - to percolate through and separate the fine slimes of ore and waste in the **slime pits and settlement tanks**, finally to re-enter the River Einon. The slime pits and the buddles are described in more detail below since this area has been wholly remodelled to take a membrane to seal in polluted wastes from continuing to contaminate the River.

1.2.13. Other physical features on the site are or were the **spoil tips**. A large tip on the south side of the main shaft is of 'development' rock, non ore-bearing spoil from sinking the main shaft. This is still largely intact and is traversed by the reclamation scheme flight of steps. Another lower tip of coarse material from the 'Middle Level', now obscured and partly removed by Forestry tracks, is sited at a lower level south east of the settlement tanks. A third, large, development rock tip was sited at some distance from the main site, derived from **Level 3** (see Fig. 2, Bick's annotated plan. Most of this tip was removed during the scheme and is thus described separately below. Older, earlier, **shafts and levels** exist within the afforested slopes Level 3. The **underground water wheel** is sited in a Level west of, but connected to Level 3.

1.2.14. Also on the now-afforested slopes, formerly accessible by tramway, is a circular stone structure, the late 19th century **powder magazine**, restored as part of Dyfed County Council's scheme of works.

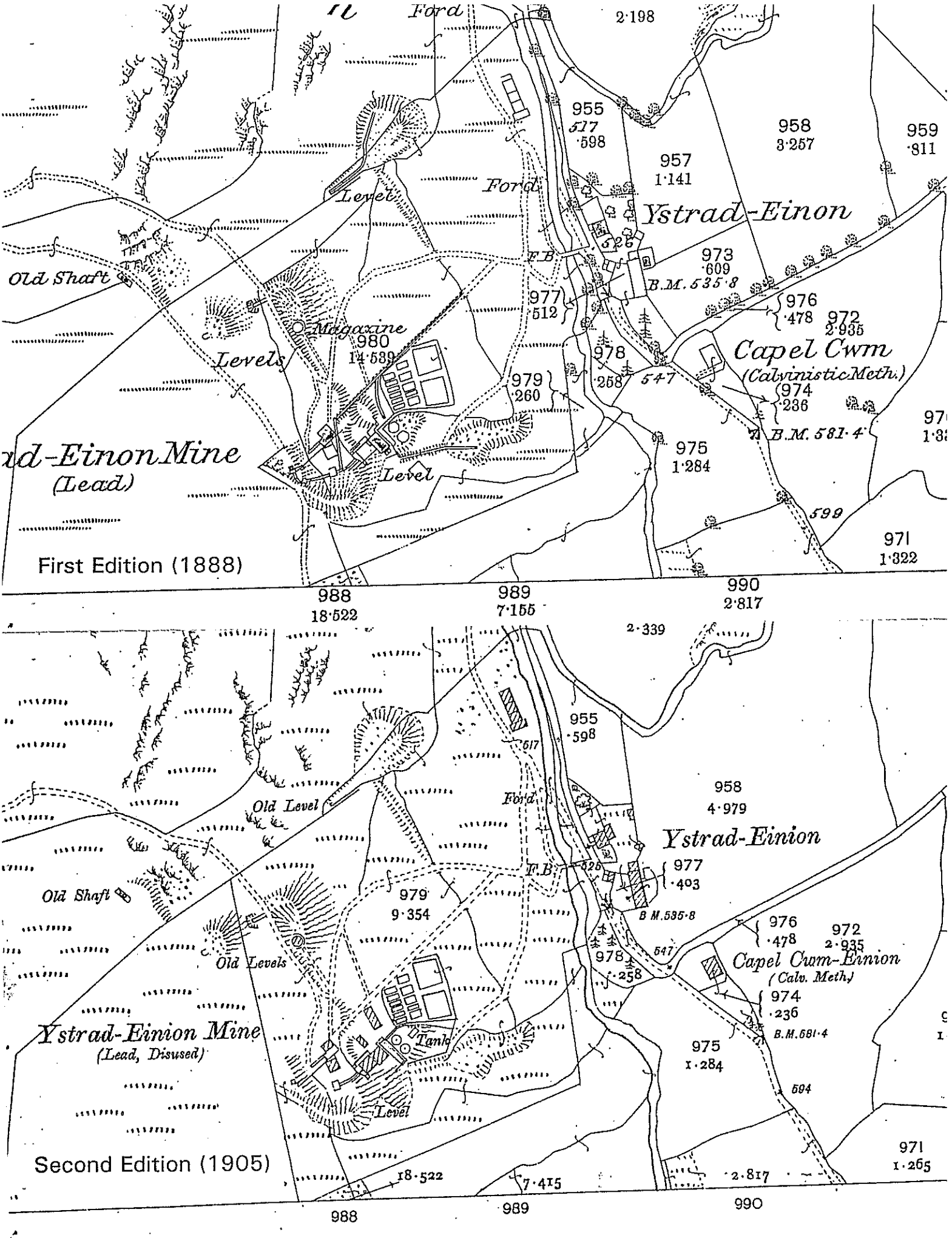


Fig. 4: First (1888) & Second (1905) O.S. 1:2500 Maps of Ystrad Einon.

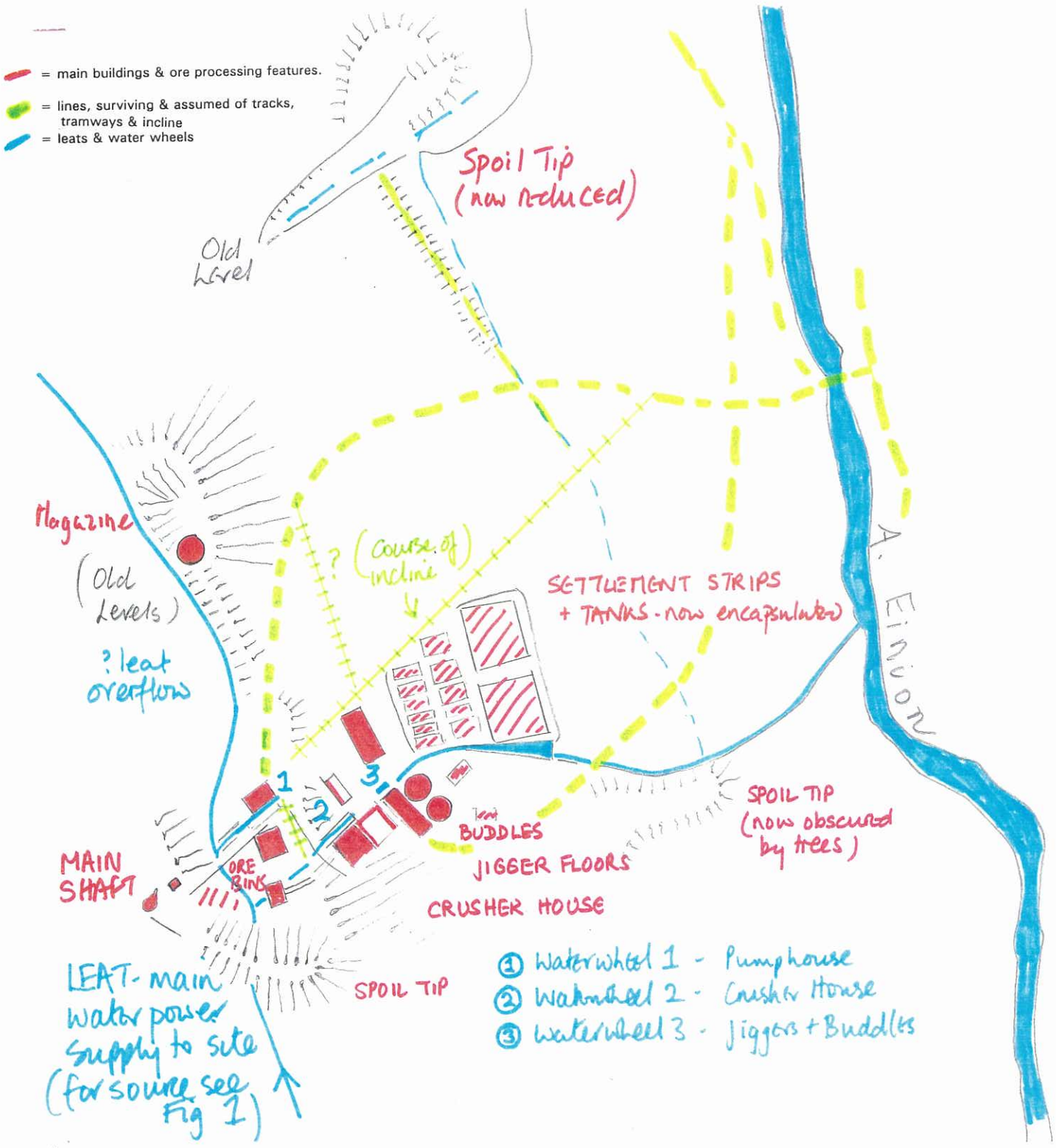


Fig 5: Sketch plan, derived from 2nd edn. OS 1:2500 colour coded to show principal functional elements of Ystrad Einion Lead Mine, & the importance of water power in processing the ores.

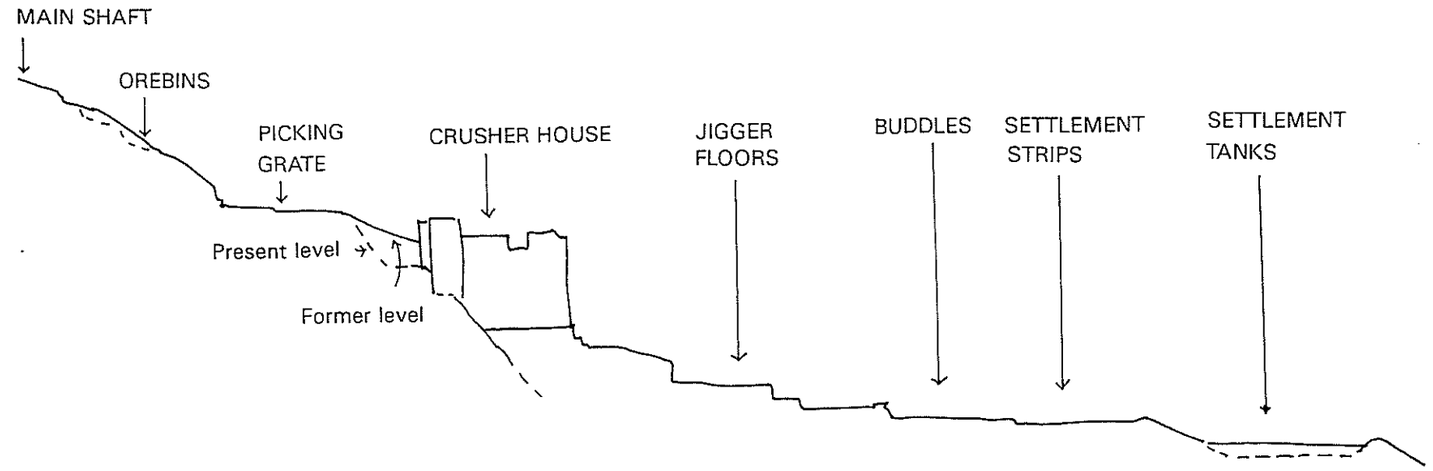


Fig. 6. Profile of former and existing surface levels from main shaft to settlement tanks surveyed by DAT.

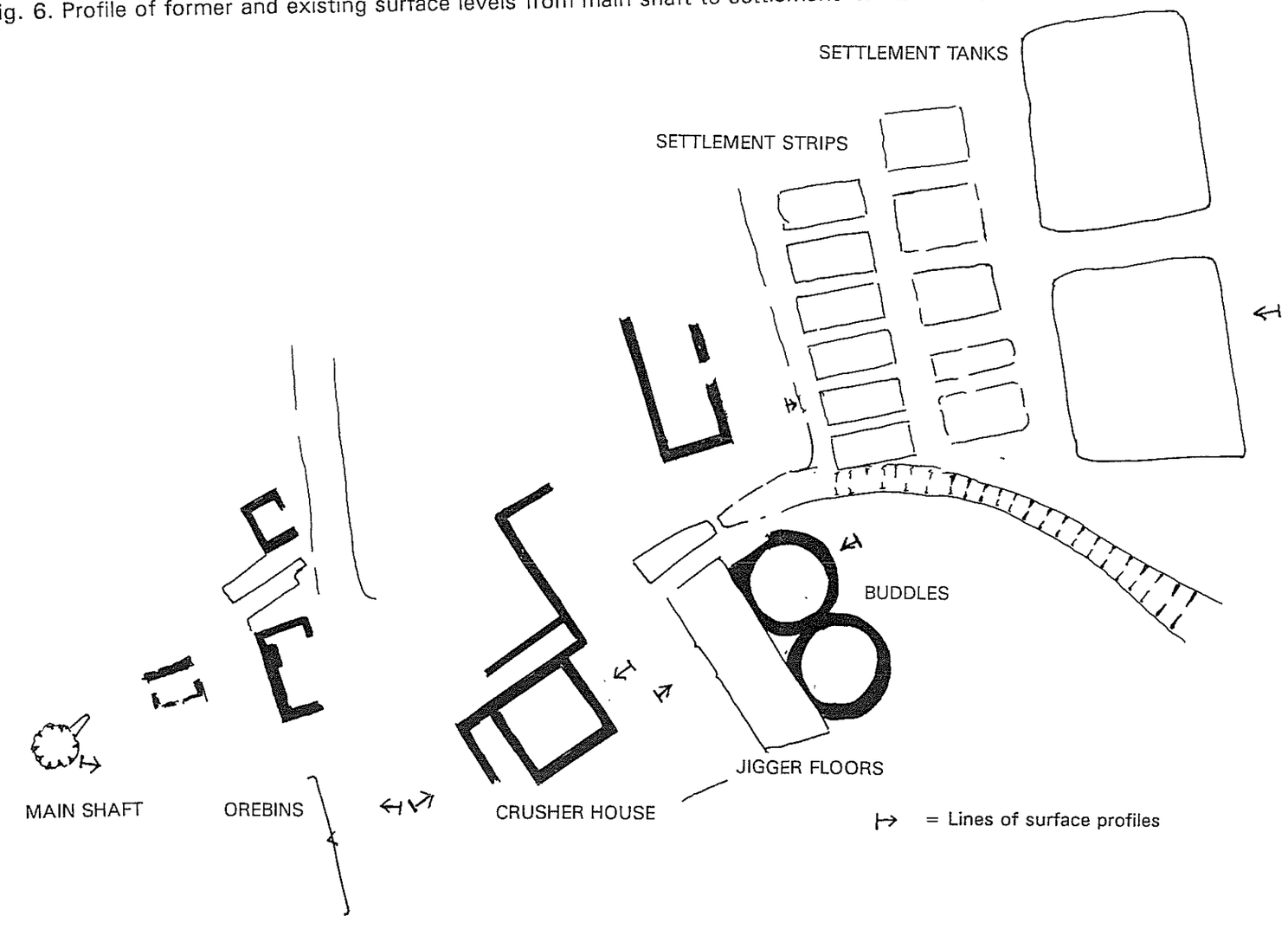


Fig 6: Site Plan showing positions of stepped profile of surface levels from main shaft to settlement tanks (1:200) Outline of buildings & other features taken from Dyfed County Council's Master Site Plan (QCNST088/02); captions & indications of profile positions by Dyfed Archaeological Trust.

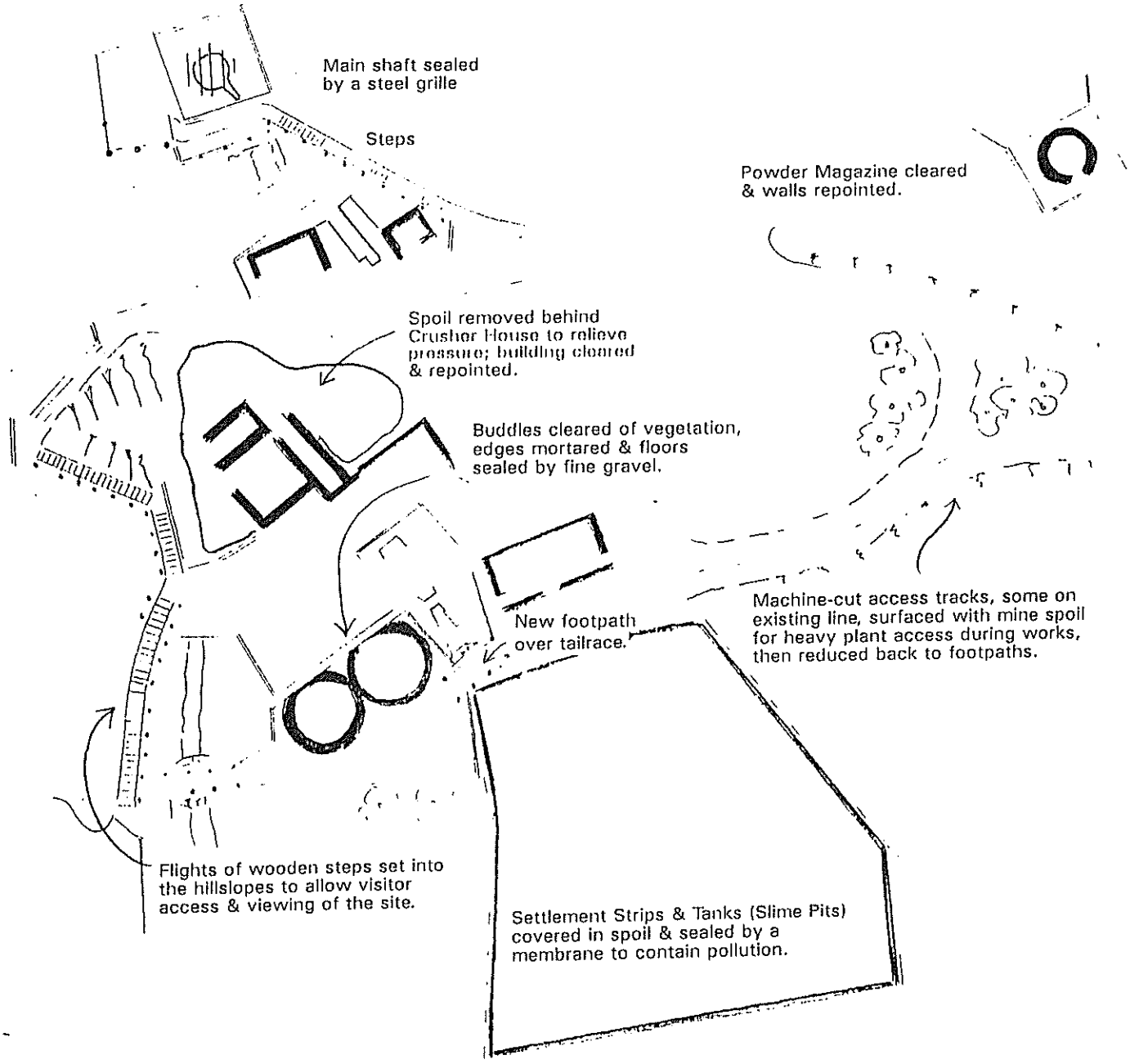


Fig. 7: Summary by DAT of the principal works for DCC/WDA Reclamation & Consolidation Scheme at Ystrad Einion. Main structures, fencing, steps, access & other works areas redrawn by DAT from photocopied reduction of DCC's Master Plan: Site Proposals; captions by DAT.

2. Background to the Derelict Land Reclamation Scheme

2.1 Clouston Report:

2.1.1 In 1988, Dyfed County Council commissioned a Survey of the Metal Mines of the Cambrian Mountains from Brian Clouston and partners and Parkman Consulting Engineers, with funding from the Welsh Development Agency. (hence referred to as "The Clouston Report"). The Report was intended to provide a comprehensive appraisal of the metal mines with particular reference to:

- `the preparation of co-ordinated proposals for the removal of hazard, pollution and dereliction'
- `the maximising of aesthetic and related cultural opportunities'.
- `the encouragment of related development opportunities, especially connected with tourism'.

2.1.2 The Clouston Report suggested that Ystrad Einion Mine, sited at the head of the scenic 'Artists' Valley', had potential for restoration and development as a minor visitor attraction and highlighted the intact underground waterwheel on the site. The relatively complete state of the mining remains were noted as well as the small amount of mine waste and lack of recorded pollution.

2.2 Report by David Bick

2.2.1. The Planning Department of Dyfed County Counil prepared drawings in support of detailed proposals for the site layout and treatment of the Crusher House. These formed the basis for an application for Scheduled Monument Consent by the County to Cadw on 21st November 1990. On 24 January 1991 Dyfed County Council commissioned a Report from Mr David Bick which aimed . . 'to further, from an industrial archaeological standpoint, the broad objectives identified for the site in the Clouston Report and by the County Planning Department' (hence The Bick Report).

2.3 DCC/WDA Scheme

2.3.1 MRM engineering consultants were also commissioned by Dyfed County Council to carry out detailed survey and prepare a scheme of works to put into effect the County's designs. Through detailed analysis of the settlement tanks area, it was discovered that there was a far greater level of pollution than hitherto recognized. MRM then drafted a proposal for encapsulation of the settlement tanks by a membrane. This would seal in the toxic wastes and prevent them polluting the watercourses. The whole scheme was forwarded as part of the Welsh Development Agency's Land Reclamation programme.

2.3.2. The reclamation and consolidation works (see Fig. 7) involved the removal of trees from the settlement tanks, infilling of the lower tanks with spoil from the spoil tip adjacent to Level 3 and encapsulation with a membrane. The spoil tip also provided hard-core for surfacing the widened existing and new access tracks across the site to allow for the movement of heavy plant. A new access was made to the Main Shaft which has been capped by a steel grille. Spoil was removed from the rear of the Crusher House to relieve pressure on the rear wall and the area re-graded. The interior of the Crusher House was cleared of

collapse and vegetation and walls taken down and rebuilt and the whole repointed. The Buddles were cleared and their edges consolidated by mortaring. In addition to the foot access, provided by the access tracks, flights of wooden steps allow safe visitor access and view points to the upper parts of the site.

2.4 Previous Archaeological Work.

2.4.1. Survey and small scale excavation and clearance was carried out by Marilyn Palmer, now of Leicester University, in the mid 1980s. Her work in the area of the ore bins, the buddles and slime pits as part of a programme of research into ore dressing techniques. (see Palmer & Neaverson 1988 for a summary of results.) The Trust intends to visit Marilyn Palmer and seek further information on the site to forward to Dyfed County Council. Ms Palmer has agreed to hand over the site archive then for deposition in the National Monuments Record, Aberystwyth.

2.5. Scheduled Monument Consent and Brief for Archaeological Recording

2.5.1 Scheduled Monument Consent for works including the stabilisation of the existing stone ruin, the capping of open mine shafts, the gating of levels, forming of steps and footpaths and erection of safety railings was granted by the Secretary of State subject to certain conditions on 29th April 1992. These included making a detailed photographic survey of all areas affected in advance of proposed works. Also, prior to capping of the slime pits, a detailed plan of the surviving earthworks was required to be made at 1:200 scale. All excavation work was to be monitored and recorded by the County Council's consultant archaeologist.

2.5.2 The archaeological requirements were specified in more detail in a 'Brief for Archaeological Recording' subsequently issued by Cadw.

2.6: Commissioning of Dyfed Archaeological Trust & outline of work carried out.

In January 1993, Dyfed County Council invited Dyfed Archaeological Trust to tender for carrying out the required archaeological work. Archaeological recording and monitoring work was carried out in August and September 1993. Field work and recording was carried out mainly by D. H. Phillips and also by H. J. James. This Report has been written by H. J. James from a draft compiled by D. H. Phillips.

3: Archaeological Recording

This is described in the same order as the sequence of structures and processing areas in the introductory description which in turn follows the working sequence of activities at the mine.

3.1. Main Shaft and leat

3.1.1. It was necessary to cut a new access track to the main shaft in order to bring up and assemble the steel grillage which now covers it. After on-site discussion, it was agreed that the end of the leat on the north side of the shaft should be slightly cut back in order to keep the track away from the pump house, wheel pit and flat-rod stone pier, and to avoid damage to any buried traces of the wooden supports for a launder to supply water from the leat to the upper wheel.

3.1.2. A record was made of the exposed section of the leat, which is of simple construction following the contour along the hill slope. It was constructed by cutting back into the slope, forming a channel perhaps some 1.2 m wide originally, and by using the resultant clayey spoil to form a bank (1.5 m. wide, c. 0.6 m. high) on the down-slope side. It is clear from surface inspection, and from the 1st & 2nd edn. 1.2500 O.S. maps (Fig. 4) that the leat must be culverted beneath the huge spoil tip from the shaft. Dense afforestation obscures the course of the leat approaching the spoil tip from the south.

3.2. Pumphouse, Wheel pit and Blacksmith's shop

3.2.1 These buildings are in a fragile condition and even clearance with hand tools of the trees and vegetation choking them could cause further instability. There are still a number of iron tie rods for machinery and fittings visible within the structures. However their clearance and consolidation did not form part of the recent phase of Dyfed County Council works on the site. It was agreed therefore that the Trust should make a measured record of the present condition of the structures in case of further collapse. (See Fig. 2, Bick's A4 and Fig. 8).

3.2.2. At the northern end of this complex, now bounded by the flight of wooden steps for visitor access to the main shaft, is a building constructed on a terrace cut back into the hill-slope. This comprises a small-rectangular stone structure with a single entrance from the track and former tramline in front. This is described as a 'cabin' by Bick and Robert Protheroe Jones suggests that it was a shelter for the operator of the winding gear, and the flat-rods operating the angle-bob pumping machinery in the shaft. To the rear of the building and directly accessible from it through a brick faced entry gap is a raised stone and brick seating constructed on a terrace into the hill slope. Internally the area measures 1.9 m. in length, 1.7 m. in width and opens directly on its southern side to the adjacent wheel pit. Secured within the walls on the four corners are substantial holding down tie rods, housed within a tube of galvanised sheeting. These are all that remain of the winding drum itself and its steel cabling, which was powered by the waterwheel in the adja-

cent waterwheel pit (**Waterwheel 1**). The winding gear operated wagons on the incline down the steep slope to the east.

3.2.3 The wheel pit was cut back into the hill-slope and the cutting revetted with a stone face; the rear being clearly visible. There has been considerable collapse of the northern, free-standing walled edge of the pit and its southern wall is leaning inwards. at a dangerously unstable angle. Holding down rods and seating arrangements for the wheel housing are still visible. The recorded dimensions of this upper wheel are: 22 foot diameter, 3 ' 6" width. R. Protheroe-Jones suggests that the angled end of the wheelpit wall fronting the tramway , making the northern wall shorter than the southern, is deliberate in oreder to accomodate the alignment of the tramway in front, which in turn was constrained by the contours of the hill slope.

3.2.4. On the south side of the wheel pit and set back from the tramway is a rectangular length of stone with brick upper courses which was the seating for a flywheel to the main waterwheel. This is some 1m. wide and 5m. long. Three protruding and one truncated iron holding down rods survive within the build of this seating and there is more iron work within the collapsed material adjacent to the tramway. Originally the southern wall of the wheel pit and the flywheel seating were constructed flush against each other. Because the southern wheelpit wall is now leaning inwards the northern face of the flywheel seating is exposed. This has revealed a wooden, plank lined culvert which was constructed within and on the concealed northern face of the flywheel seating. Although conducting water, its source and purpose are not known. The flywheel, powered from the main wheel itself powered the flat-rods which operated the angle bob pumping the main shaft.

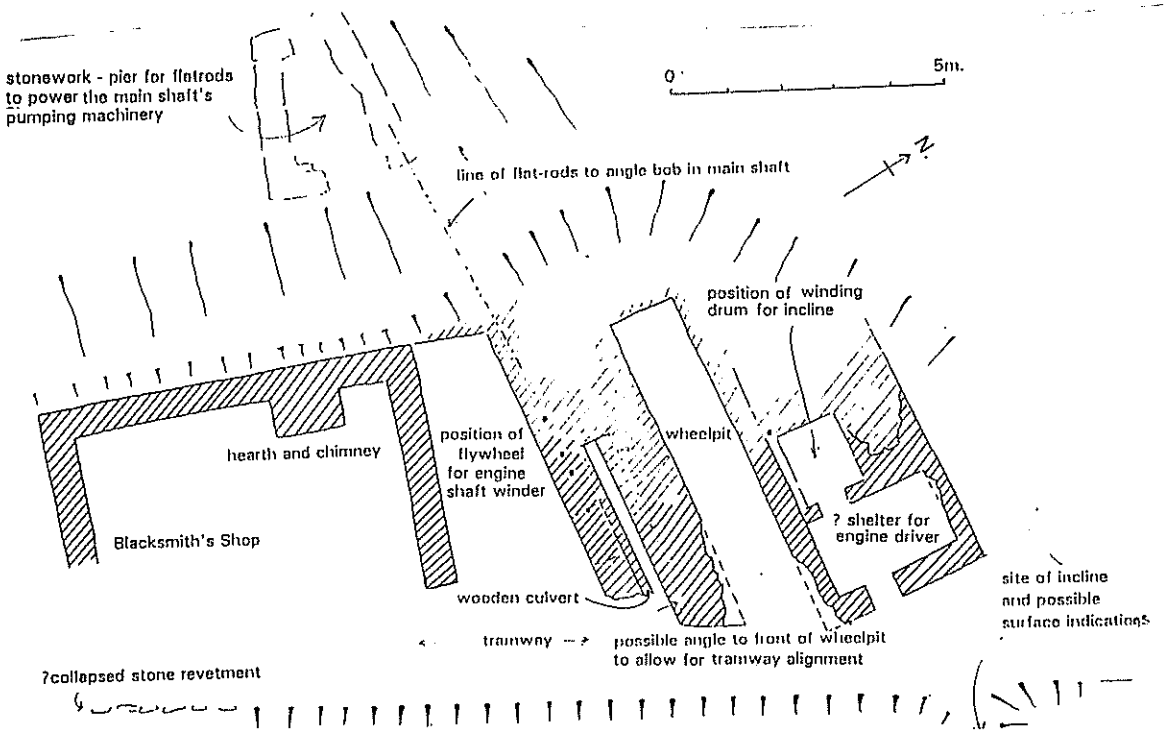


Fig. 8: Sketch Plan by DAT at 1:50, base information enlarged from DCC's 1:200 Site Plan with adjustments made following on-site recording and with interpretative captions by DAT.

3.2.5. The Blacksmith's shop may always have been open on the tramway side . A hearth and chimney are well preserved aginst its western, upslope side where the building sits hard against the cut back slope. An opeing on the north wall allowed sight of if not access to the flywheel housing. No clearance work was carried out on this complex although some of the larger trees have been cut down, their stumps remain.

3.3 Description of area between the Oreslides and the Crusher House.

3.3.1 This area was the least well recorded and understood, partly due to the fact that a considerable amount of material was removed and levels regraded before archaeological recording took place, and partly because there was never the intention to carry out an archaeological excavation in the area which could have resolved details of interpretation of the remains. A description of the area and the clearance work is therefore given followed by a suggested interpretation at the end of the descriptive sections. It is likely that Dr Marilyn Palmer will be able to supply more information from her own, earlier investigation of this area.

3.3.2. The revetment wall in front of the ore-slides or bins was of two phases of build (see Film D 12 & 13). This has been described above in the opening descriptive section. In front of the revetted face of the oreslides and the 'v' shaped wooden launder piercing the walling was a levelled rectangular terrace accessed on its northern side by the tramway and bounded on its southern side by the steep, unstable slopes of a spoil tip. The terraced working area has now been cut back a little and the area in front of it now been regraded to a more stable angle. It is now bounded to the south by flights of wooden steps to give access to the main shaft from the forestry road on the southern side of the mining complex. Plate 1a shows part of the area prior to consolidation works, with part of the wooden frame or grate in place. rectanglar wooden frame.

3.3.3 In front of the terrace was an unstable area of stone tip which was piled up against the rear wall of the annex to the crusher house. The elevation (Fig. 10 S.W. elevation) shows the profile of this tip before removal. Part of the tip had been removed when Trust archaeologists arrived on site. In order to prevent any damage by heavy plant operating in the confined space of the upper ore-processing terrace from the tramway, it was decided to continue removal of stone from the south east and construct a ramp of spoil to allow access for a machine to that point and not the upper terrace or tramway - both areas likely to contain buried features. Scheme engineers also wished to remove more stone from the rear of the building to relieve presssure on the rear walls. Virtually all the stone was removed and the slope cut back into soft clay. A hitherto unknown rock overhang with a descending opening choked with spoil was revealed - all seeemingly development rock similar to that below the main shaft. It was decided to go no further down than the surface levels thus reached. It was difficult to distinguish subsoil clay from redeposited material but it was evident that the consolidated

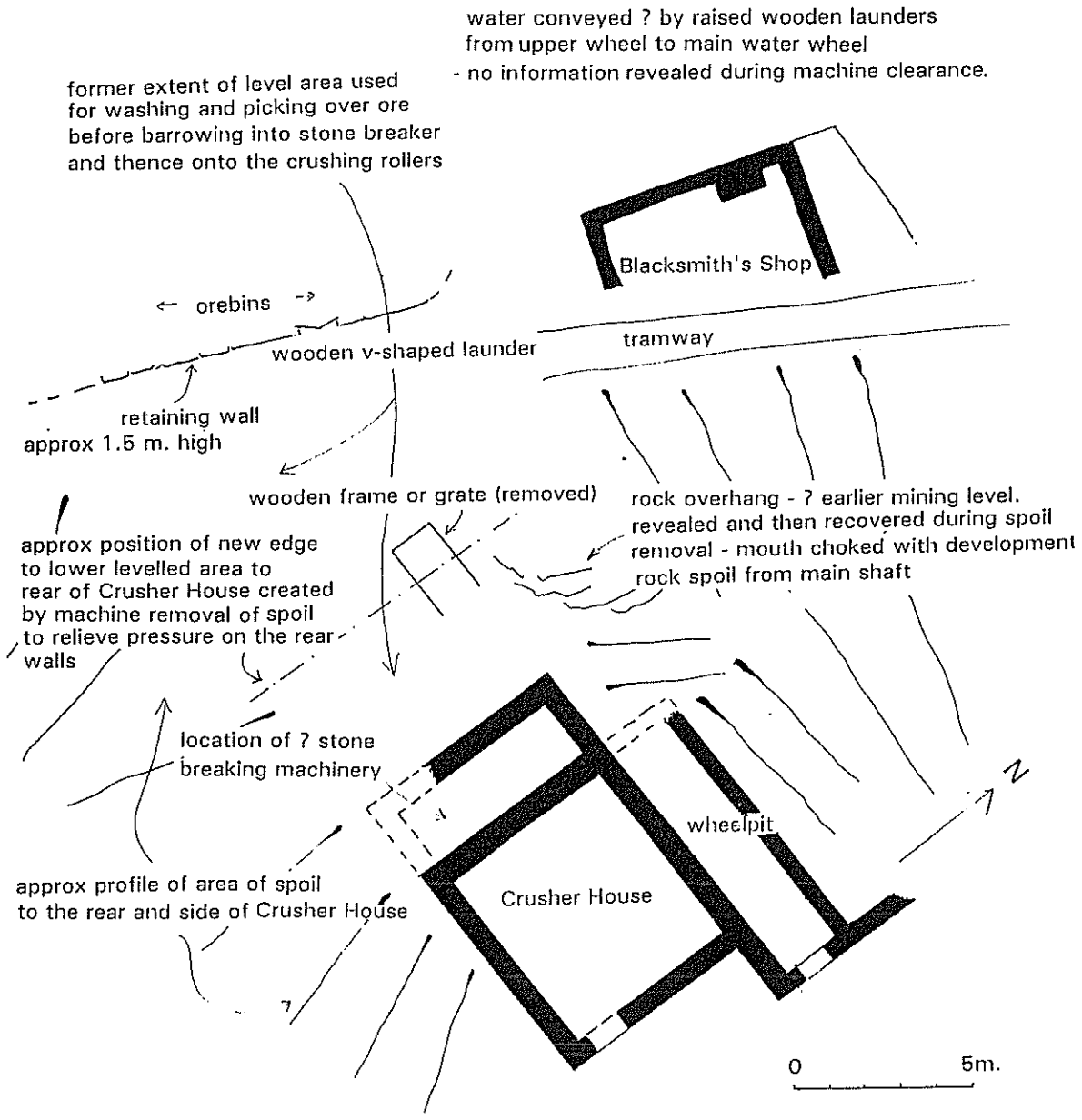


Fig. 9. Annotated plan (1:200) of area between the Orebins and the Crusher House. Block outlines of buildings taken from DCC's 1:200 site plan, all other information by DAT following on-site survey and recording.

level created by the clearance and restoration scheme must still be on material redeposited against the rear of the building since the base of the wall and its foundation trench were not reached.

3.4 The Crusher House

3.4.1 Measurements were checked and details added to the elevation drawings of the exterior of the building and the ground plan of the interior as clearance proceeded and more of the structure was revealed. The elevations and plans at a scale of 1:50 were produced by Dyfed County Council's Planning Department (Job No. DS/DL 11.1, Drg. No. 102.E 16.9.1990) and have been annotated and redrawn by DAT. It appears that the crusher house was built of local shales.

Description of Elevations:

3.4.2. The front (north-eastern face) of the Crusher House survived to a height of some 6.7 m. It was entered by a 1m wide, 2.2 m. doorway with a rounded brick arch of two layers of bricks. Clearance of the inside revealed the threshhold, formed of a wooden sill with two stone steps outside down to a partly revealed concrete forecourt level. From that forecourt ground level, and up to a height of 2.2 m. above it, the front wall was 1 m. thick, thence narrowing to 0.65 m. the change being marked by a narrow external ledge. To the right of the entrance is a rectangular opening 0.9 m. wide and 1.2m high which had a decayed wooden lintel formed of two planks through the thickness of the wall. This has been replaced. Two m. above the opening are the remains of two smaller square openings, 0. 4 x 0.4 m. the left hand one still with a slate slab capping. These have been consolidated and the surviving wall height and profile retained in the restoration. By analogy with other Ceredigion mines Crusher Houses , these openings contained levers and weights to adjust the position of the crusher rollers.

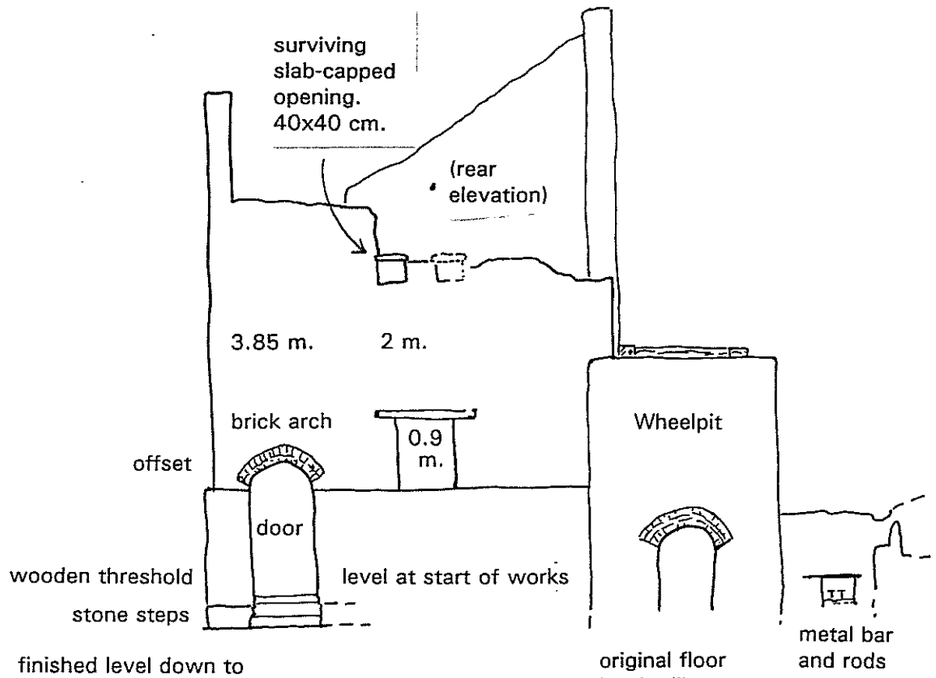
3.4.3 The side (south eastern elevation) has survived to its original height and even before removal of spoil showed clearly how the crusher house was built by cutting back into the hill slope. This side of the building was 8 m. high (the lowest floor level of the interior established by uncovering the entrance threshold) and 7 m. long. At the top of the wall, and off centre was a rectangular opening 1.1 m. wide, 1.2 m. high. This was presumably capped by a continuous length of wooden wall plate along the top of the wall to support the roof.

3.4.4 The wheel pit was on the north west side of the building and this is described together with the north west elevation since it was evidently constructed at the same time as the rest of the crusher house. The rear, upslope, end of the wheel pit was not revealed during the clearance and consolidation work and is obscured by a tip line of development rock which surrounds the whole of the rear of the building (see below). The probable position of the rear wall of the wheel pit is shown dotted on the plan. The internal dimensions are some 9 m. x 1.5 m. in width. The base level inside the wheel pit is still obscured by spoil but the maximum exposed depth of 4 m. is probably close to the original depth from the top of the surviving wooden bearers for

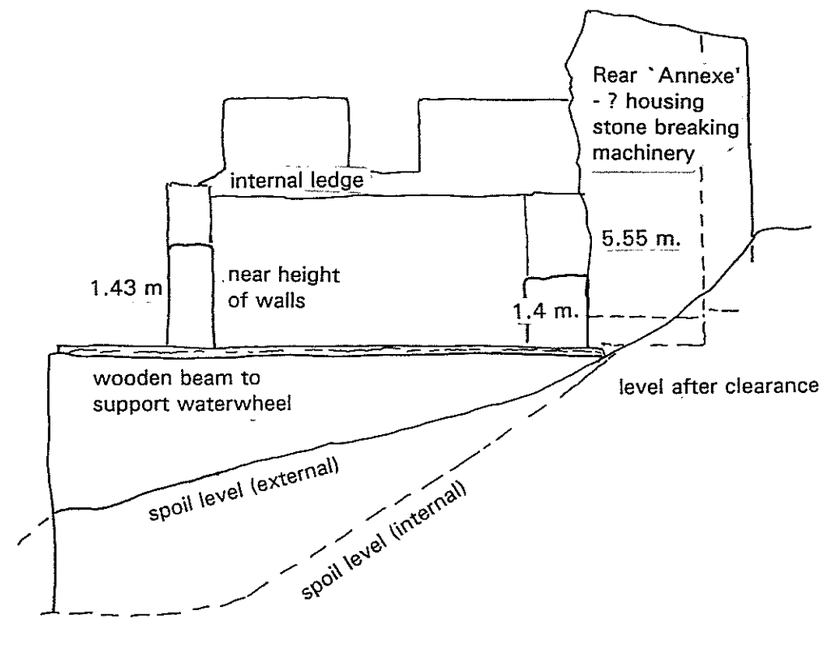
Fig. 10 Crusher House Elevations

Scale 1:50: Annotated by DAI with captions & measurements & details revealed by clearance & consolidation work, from DCC's original elevations

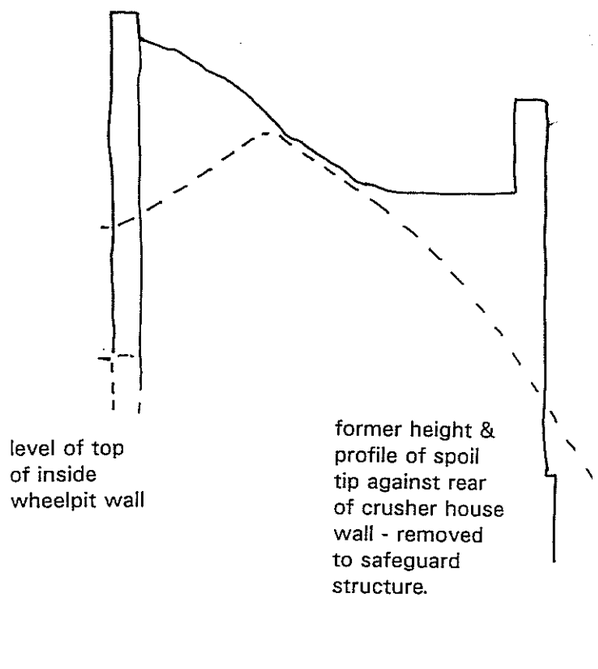
NORTH-EAST (FRONT) ELEVATION

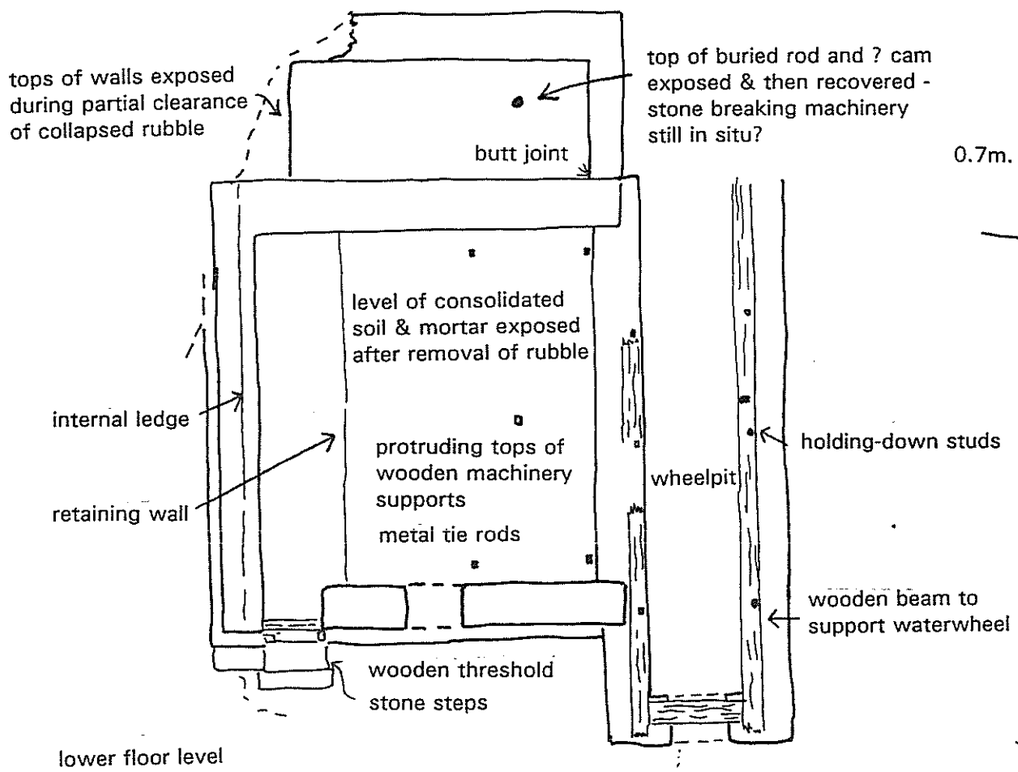


NORTH-WEST ELEVATION

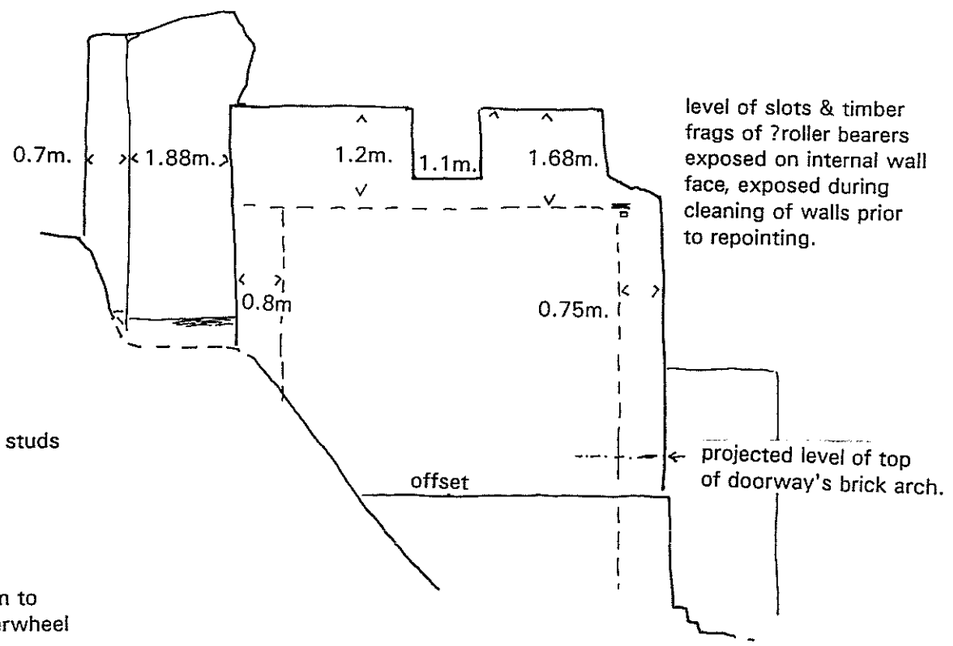


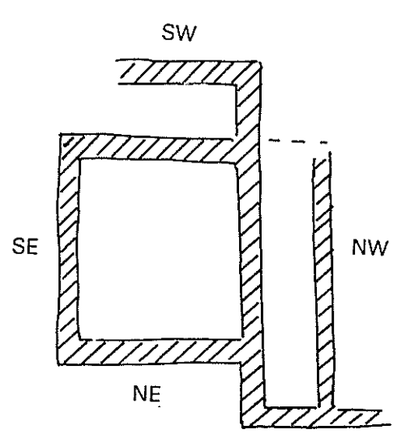
SOUTH-WEST (REAR) ELEVATION





SOUTH-EAST ELEVATION





BLOCK PLAN 1.200 showing orientation of elevations

the support of the wheel along the top of the wheel pit walls. The timber supports for the wheel were recorded in detail. They are very decayed. It was decided to leave them in situ but they cannot be expected to survive for much longer and there was no possibility within the clearance and consolidation budget for constructing replicas.

3.4.5 The annotated plan of the top of the wheel pit walls shows the dimmensions and position of surviving iron fittings. A record was made of other recesses within the sides of the wheel pit at a lower level, presumably to lock the wheel. It is probable that the Crusher House was completely open on the wheelpit side above the timber seatings and spanned only by timber beam to support the roof.

3.4.5 The rear, upslope, south western elevation of the building was, at the start of clearance works, obscured by a mound of rock spoil tip. It was judged essential to significantly lower this level to remove pressure from the rear walls of the Crusher House, which was causing severe instability to the whole structure. The rear wall was that of another structure abutting the main crusher house. This area was emptied of collapsed masonry and the surface cleared over by D. H. Phillips. The top of a piece of machinery was revealed, also the side wall. This was covered over again, but could be exposed and investigated in any future programme of works. This was probably a stone breaker further reducing the ore-containing rock in size before it passed through the crushing rolls.

Interior layouts:

3.4.6. The interior of the building had been hand cleared of rubble by the time the Trust archaeologists visited the site. This revealed what were probably surface levels left when the bulk of the machinery for the crushing rollers was removed. The interior was at two levels. The entrance gave access into a narrow lower level and to the right a higher earth and mortar platform revetted by a drystone wall. The higher level appeared to be make-up material re-instated around base supports for the crushing machinery, both to give support and absorb vibration. Four vertical iron tie rods protruded from this make up material, 1.8 (imperial) apart close to the front and rear walls. Centrally between them protruded sawn off wooden supports for the crushing machinery once in place above.

3.4.7 The most important of the fragments of machinery remaining inside and put to one side by the workmen (see list of artefacts at the end of the report and Plate 5)) was a large casting identical to that shown as the bearer for the crusher rolls themselves. This was found on the floor of the lower, entrance area, presumably left because it was too heavy to transport.

3.5 The Buddles (Fig. 11 & Plate 3b)

3.5.1 The two circular buddles below the ore processing floors are another prominent feature of the site. They were investigated by Palmer and Neaverson in the mid 1980s (see published report and forthcoming archive in the National Monuments Record). The Trust, and contractors' staff working under Trust direction, cleaned over the interiors of the buddles afresh to check on floor levels and any surviving timber features in order to advise on consolidation. The upper capping course of large stones around the edge of the buddles has been mortared for the first time to give greater stability, and the interiors filled with a fine gray gravel to seal surviving fragments of wooden floor and sides, and also to inhibit plant growth.

3.5.2. The Buddles were laid out in a prepared area directly below the 'jigger' floors, presumably to the required depth and position below those floors and for water-powered machinery for operating the sweeps to be supplied from the third and lowest of the sequence of waterwheels on the Ystrad Einon site. Possibly, the floor levels were surveyed in first over an area of made ground, then the round sides built up and defined by drystone walling, and finished off with larger capping stones which extended beyond the rim of the buddle making them flush with the ground surrounding them. Certainly the revetment walling (of two phases of build) to the jigger platform is built over the edge of the Buddles. At the base of this 1.2 m. high revetment and not quite centrally located between the buddles is the broken-off timber planking of yet another culverted water chute. It is not known where this was supplied from. It is likely also that the launders taking the watery waste from the Buddles to the settling tanks or slime pits were placed at the required level of fall and then the ground made up around and covering them. Finally a rather roughly built, curving, drystone wall revetted the bank on the south side of the tailrace from the lowest waterwheel.

3.5.3 Buddle 1 (6.1 m. in diameter) was shallower than the adjacent Buddle 2 to the north. Its depth measured from the top of surviving capstones close to the buttonhole launder to the top of the surviving plank of the sloping radial floor was 0.32 m. The floor plank rested on a better preserved ring of overlapping straight planks around the edge. The Palmer and Neaverson Report contains a photograph of these excavated remains and details of the sweeps which buddled the ore and waste. The 'buttonhole launder' on the edge of the buddle has its base at timber floor level. This was part excavated by the Trust in order to establish its course. This was necessary in order to advise the contractors of the sensitivity of the raised platform area east of the Buddles and its vulnerability to heavy plant tracking across it. The planked launder made a sharp angled turn to the north a short distance after exiting the buddle and discharged through drystone walling revetting the raised area of made ground on the east side of the buddles. Levels were taken on the base of the buttonhole launder on the edge of the buddle and at its exit point giving a fall of some 0.2 m. over a 13 m. length.

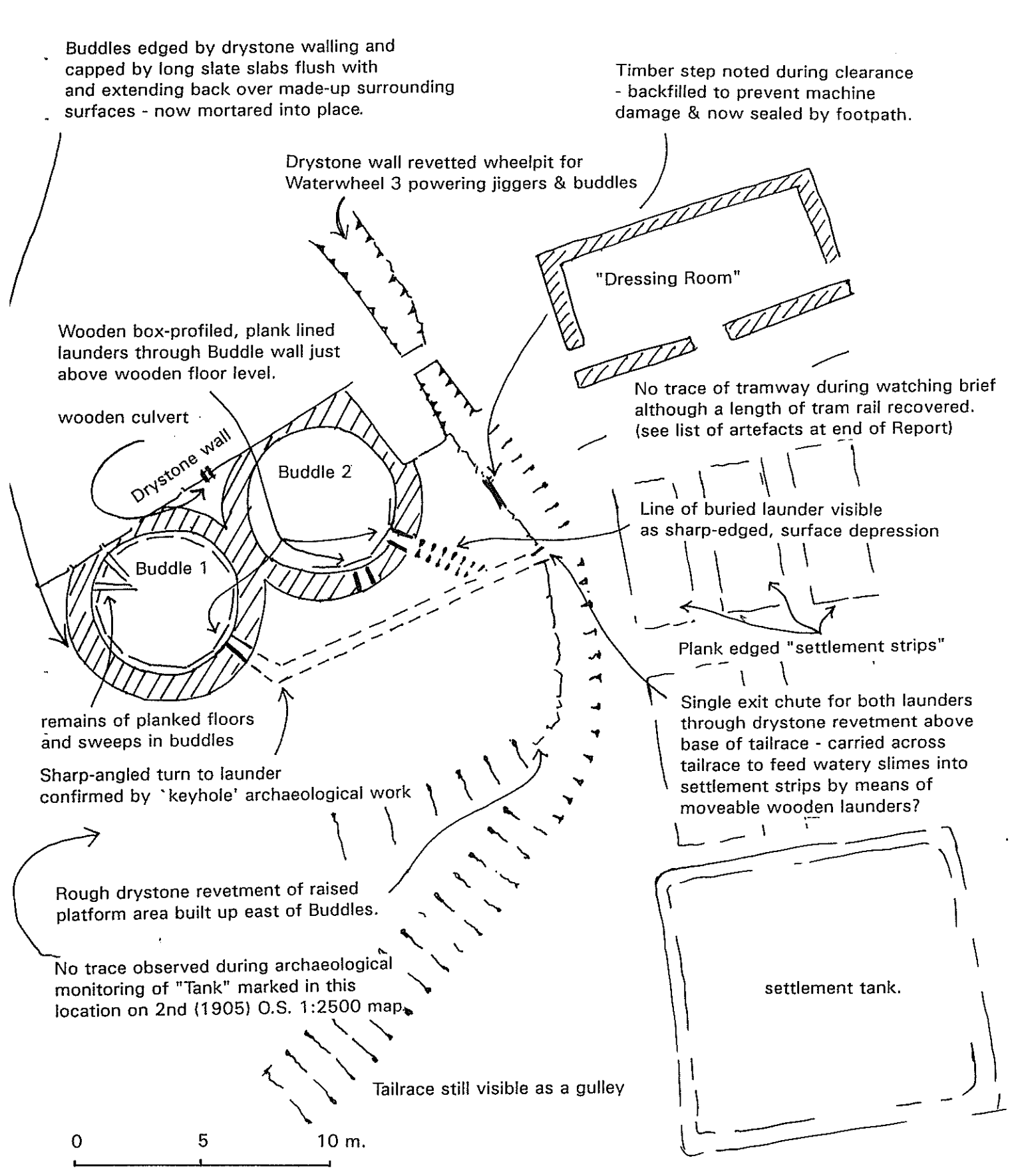


Fig. 11: Annotated 1:200 Sketch Plan of Buddles. Block outline of structures taken from DCC's 1:200 Master Site Plan, all other sketch survey and interpretative captions by DAT.

3.5.4. **Buddle 2** was slightly shallower although of the same diameter as Buddle 1; they were clearly constructed at the same time since they shared a common joining wall. One buttonhole launder on the eastern side did not appeare to have ever functioned. The working launder was further around the circumference of the Buddle. This exited in a short straight north eastwards length where it must have joined the launder from Buddle 1, its course being visible of the ground surface as a narrow linear despression, suggesting that its box planked lining had collapsed. Its fall was 10 cm steeper than that from Buddle 1.

3.6 `The Slime Pits'

3.6.1. Even after all the processes described above, some ore still remained in the fine waste and could be recovered. It was also necessary to take measures to avoid pollution of the river Einon by contaminated waste. This was done by channelling the slimy wastes from the buddles, via the launder above the tailrace into a series of plank-lined, rectangular 'settling strips' on two terraced levels and finally down to two deep settlement tanks.

3.6.2 This whole area at Ystrad Einon Mine has been densely afforested by the Forestry Commission. Four of the strips nearest to the buddles were cleared and excavated by Palmer and Neaverson within this area in the 1980s. The trees were felled as part of the reclamation scheme. The whole area has been now been sealed by a membrane and covered in spoil to prevent seepage of contaminated material into the river. It was not possible to make a completely fresh survey of the whole of the slime pits due to the fact that the ground was considerably disturbed by mechanical felling of the trees. In addition, a raised road made of spoil from the furthest spoil tip had already been constructed down the northern side of the area of the settlement strips to give access for lorries infilling the settlement tanks, before Trust staff arrived on site (see Plate 3a).

3.6.3 However, a plan made by an officer of Dyfed County Council's Planning Department of the area, complemented by the evidence of numbers and location of settlement strips and settlement tanks, and recording of sections across the area, have all allowed a reasonably complete record to be made. The settlement area was constructed at two levels. The upper level contained two lines of settlement strips. So far as could be ascertained in the disturbed conditions of the site there were two lines of six and five rectangular strips, as shown on the two editions of 1880 & 1906 of the O.S 1:2500 maps. Two metres below the strips were two large settlement tanks, approximately 12 m. square and at least 3 m. deep.

3.6.4. The site of the large settlement tanks, the lowest processing area, had been well chosen to utilise the natural, impermeable, leached clay of the subsoil and the peaty soils and vegetation which had developed over it. The settlement strips had been dug down to the level of the clay to form their floor and they were edged by wooden planks, pegged into place and revetted by peaty turves. Average dimensions were 6 x 3 m and c. 0.3 m.

deep. A low bank or bund separated the strips from the tanks. It was simply constructed of upcast peaty turves set over the subsoil clay and held in place with a clay capping (see Fig. 13). It is likely that the initial dense afforestation of the whole area of the slime pits had destroyed most of the traces of wooden launders leading water off the settlement strips after the heavier ore particles had settled to their base and down to the tanks themelves. The clearance of the trees by the contractors and removal of stumps in 1993, work necessary to prepare the area for an impermeable membrane, further obscured the site.

3.6.5 The first edition 1:2500 Map of the site (Fig. 4) shows an incline and tramway extending down on the northern side of the settlement tanks. (see also Plate 3a). No trace of this was observed during recording. However, it is probable that if it survived the afforestation of the area, the remains lie north and not below the contractors' hard-core access track to allow infilling of the settlement tanks.

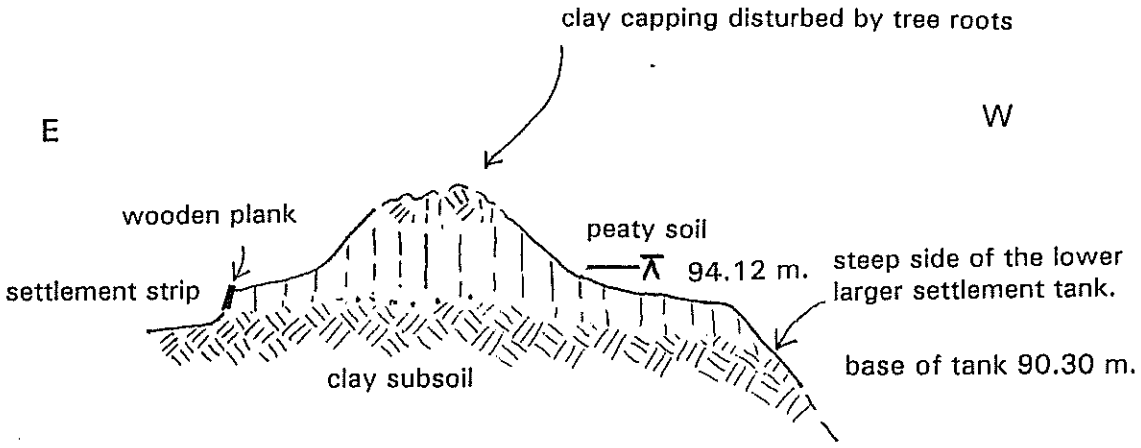


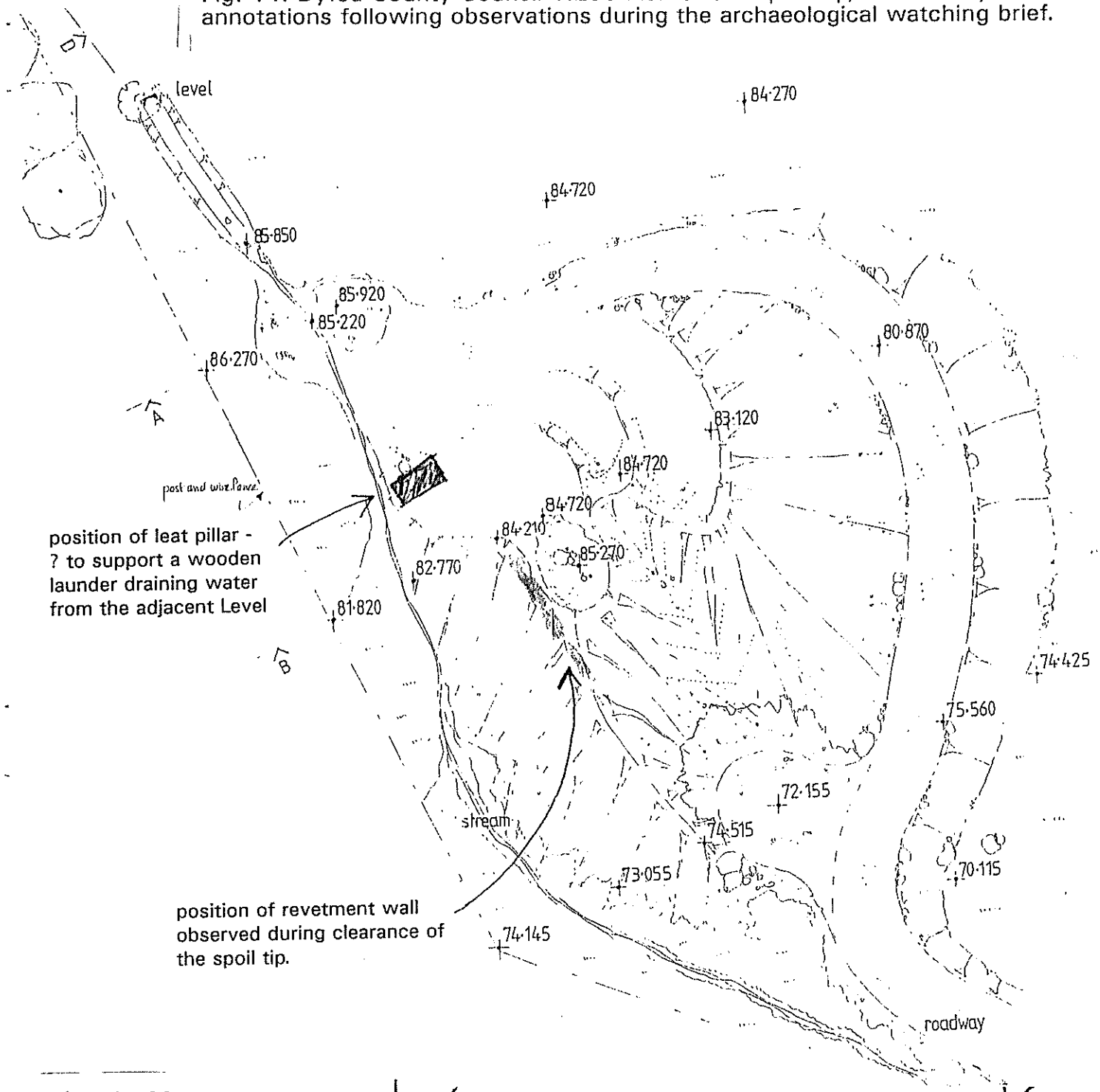
Fig. 13: Sketch Section of the bank between the lower row of settlement strips and the main deep settlement tank. Scale 1:20.

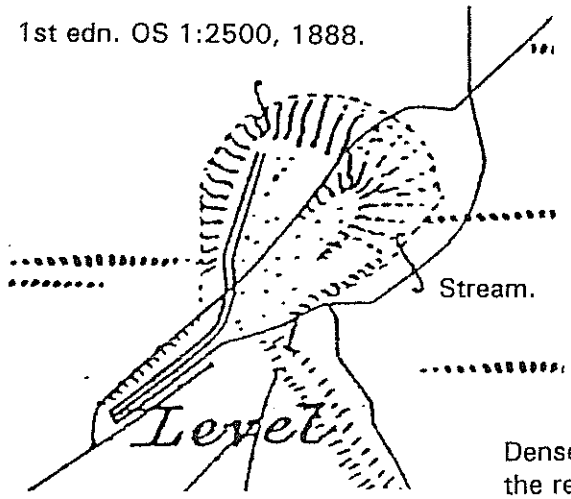
3.7 Spoil Tip at Deep Adit Level

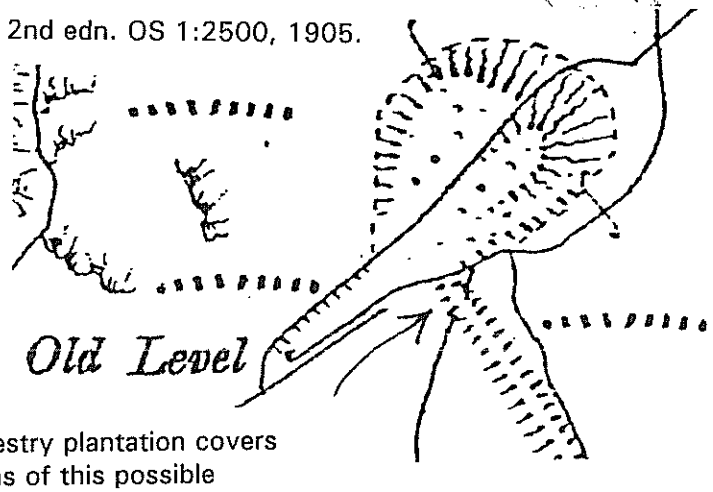
3.7.1 A large spoil tip at the mouth of the Deep Adit level was sited some 100m. north of the ore processing areas (see Fig. 14 7 Plates 4a & b). It was noted in May 1993, during R. Protheroe Jones' rapid survey of the site, that the toe of this coarse development rock tip had already been quarried away for use as hardcore. The Reclamation and Consolidation programme required the spoil from the tip for infilling the settlement tanks prior to laying down the membrane and also for surfacing the access tracks (later to be used as footpaths). The spoil tip had been revetted on its south eastern side by dry stone retaining walls and it was agreed at the preliminary site visit to undertake a day's rapid investigation, by machine, of the tip to look for and record any other structural evidence. In the event this was not done, but it was clear from watching spoil removal that the only structural elements in the tip were the side retaining walls. Due to a modification of the scheme for encapsulating the slime pits, it was not necessary to remove the whole of the tip. Sufficient therefore remains to indicate its former extent and the retaining walls and traces of a wooden launder and leat pillar have been preserved.

3.7.2 The water issues from the tunnel like entrance to Level 3 and was possibly culverted before being discharged down the side of the Spoil Tip and thence to enter the R. Einion. Today the water takes a ragged course down a channel alongside the remains of the spoil tip. The 1st and 2nd editions of the O.S. 1:2500 maps (see Fig. 4) both show a length of causeway abutting the Spoil Tip from the south east. This cannot at present be traced and its purpose remains uncertain. Possibly the length closest to the tip now lies below the wide, metalled modern access track but where this diverges from the original causeway line the area is covered in impenetrable tree growth. The short length of tramline issuing from Level 3 out onto the Spoil Tip shown on the first edition, allowing easier exit and disposal of development rock spoil from the level, was obviously out of use by 1905 and is not shown on the 2nd edition. A piece of tramline was recovered during clearance.

Fig. 14: Dyfed County Council 1:200 Plan of the Spoil Tip, reduced by 50% with annotations following observations during the archaeological watching brief.







Dense forestry plantation covers the remains of this possible tramway causeway.

4: Photographic Recording.

4.1 The Scheduled Monument Consent of 29th April 1992 for the reclamtion and consolidation works required that "a detailed photographic survey though not involving any photogrammetry should be undertaken of all areas to be affected by the proposed works". Seven (nos A-G) 36 mm. 36 exp. black and white films were used to make the record and one colour slide film. The list below describes each shot; the numbers and alphabetic prefix are shown on the site plans (DCC/MRM site plans) with an arrow indicating the direction of view. Copies of the contact prints are included in this Report.

FILM A

1. Settling pond (south) from west
2. Settling pond (south) from west
3. Settling pond (north) from south-west corner
4. Settling pond (north) from south-east corner
5. Settling pond (south) from north-east corner
6. Settling pond (south) from north-east corner
7. Southern group of slime pits from south-east corner of dressing room i.e. from west
8. Slime pit on south-west corner of complex from east showing wooden structure
9. Slime pit on south-west corner of complex from east showing wooden structure
10. Slime pit on south-west corner of complex from south showing wooden structure
11. Slime pit complex (west group) from south
12. East section of walling - to south-west of slime pit complex and north-east of buddles
13. Central section of walling - to south-west of slime pit complex and north-east of buddles
14. West section of walling - to south-west of slime pit complex and north-east of buddles
15. Jigger & buddle wheelpit from north-east
16. Jigger & buddle wheelpit from north
17. Jigger & buddle wheelpit from north-east
18. Jigger & buddle wheelpit from east
19. Jigger & buddle wheelpit from east
20. Jigger & buddle wheelpit from north-east, 2m in front of fence
21. Jigger & buddle wheelpit from north-east, 2m in front of fence
22. Jigger & buddle wheelpit from north-east, showing detail of arch
23. Jigger & buddle wheelpit from north-east, showing detail of arch
24. Jigger & buddle wheelpit from south-west inside wheelpit 25. Jigger & buddle wheelpit from south-west from inside wheelpit 26. Jigger & buddle wheelpit from south-west showing detail of arch from inside wheelpit
27. South-west interior elevation of jigger & buddle wheelpit from north-east inside wheelpit
28. Detail of top of wall at north-east end of jigger & buddle wheelpit from above
29. Detail of top of wall at north-east end of jigger & buddle wheelpit from above
30. North section of jigger & buddle wheelpit to north-east of arch from above i.e. south-west
31. North section of south-east wall of jigger & buddle wheelpit to north-east of arch from north-west and above
32. North section of west wall of jigger & buddle wheelpit to north-east of arch from south-east and above
33. South-west section of jigger & buddle wheelpit to south-west of arch from east
34. South section of jigger & buddle wheelpit to south-west of arch from north
35. South-west section of jigger & buddle wheelpit to south-west of arch from east

FILM B

1. North-west section of walling on north-west side of jigger & buddle wheelpit to south-west of arch from south-east
2. North-west section of walling on north-west side of jigger & buddle wheelpit to south-west of arch from south-east
3. Jigger & buddle wheelpit from south-west and above

4. South-east section of walling on south-east side of jigger & buddle wheelpit to south-west of arch from north-west
5. South-east section of walling on south-east side of jigger & buddle wheelpit to south-west of arch from north-west
6. Jigger & buddle wheelpit to south-west of arch from north
7. Section of walling to north-west of jigger & buddle wheelpit from north-east
8. Section of walling to north-west of jigger & buddle wheelpit from north-east
9. Jigger & buddle wheelpit to south-west of arch from north
10. Jigger & buddle wheelpit to south-west of arch from north-east
11. West section of south-east external elevation of dressing room/storehouse12. West section of south-east external elevation of dressing room/storehouse13. West section of south-east external elevation of dressing room/storehouse14. Central section of south-east external elevation of dressing room/storehouse
15. East section of south-east external elevation of dressing room/storehouse
16. Dressing room/storehouse from south-east17. Cross-section of north-east wall of dressing room/storehouse from south-east
18. Cross-section of north-east wall of dressing room/storehouse from south-east
19. South section of north-east external elevation of dressing room/storehouse
20. South section of north-east external elevation of dressing room/storehouse
21. Central section of north-east external elevation of dressing room/storehouse
22. Central section of north-east external elevation of dressing room/storehouse
23. Central section of north-east external elevation of dressing room/storehouse
24. North section of north-east external elevation of dressing room/storehouse
25. North section of north-east external elevation of dressing room/storehouse
26. North section of north-east external elevation of dressing room/storehouse
27. Dressing room/storehouse from north-east28. East section of north-west external elevation of dressing room/storehouse
29. Central section of north-west external elevation of dressing room/storehouse
30. Central section of north-west internal elevation of dressing room/storehouse
31. East section of north-west internal elevation of dressing room/storehouse
32. North section of north-east internal elevation of dressing room/storehouse
33. North section of north-east internal elevation of dressing room/storehouse
34. Central section of north-east internal elevation of dressing room/storehouse
35. Central section of north-east internal elevation of dressing room/storehouse
36. Central section of north-east internal elevation of dressing room/storehouse

FILM C

1. Central section of north-east internal elevation of dressing room/storehouse
2. South section of north-east internal elevation of dressing room/storehouse
3. South section of north-east internal elevation of dressing room/storehouse
4. East section of south-east internal elevation of dressing room/storehouse
5. Central section of south-east internal elevation of dressing room/storehouse
6. West section of south-east internal elevation of dressing room/storehouse
7. South section of south-west internal elevation of dressing room/storehouse
8. South section of south-west internal elevation of dressing room/storehouse
9. Central section of south-west internal elevation of dressing room/storehouse
10. Central section of south-west internal elevation of dressing room/storehouse
11. North section of south-west internal elevation of dressing room/storehouse
12. South buddle from south-west and above i.e. from jigger floor13. South buddle from south and above i.e. from jigger floor
14. South buddle from south-west and above i.e. from jigger floor15. South buddle from west and above i.e. from jigger floor
16. Wooden structure on north side of south buddle from south
17. North buddle from south-west and above i.e. from jigger floor
18. North buddle from south and above i.e. from jigger floor
19. North buddle from west and above i.e. from jigger floor
20. North buddle from south and above i.e. from jigger floor
21. South-east elevation of wall adjoining north-east section of jigger and buddle wheelpit and, adjacent to north

buddle
22. South-east elevation of wall adjoining north-east section of jigger and buddle wheelpit and, adjacent to north buddle
23. North section of north-east elevation of retaining wall between jigger floors and north buddle
24. Central section of north-east elevation of retaining wall between jigger floors and north buddle
25. South section of north-east elevation of retaining wall between jigger floors and north buddle
26. North section of north-east elevation of retaining wall between jigger floors and south buddle
27. Central section of north-east elevation of retaining wall between jigger floors and south buddle
28. South section of north-east elevation of retaining wall between jigger floors and south buddle
29. East corner of retaining wall between jigger floors and south buddle
30. East section of south-east elevation of retaining wall to jigger floors
31. West section of south-east elevation of retaining wall to jigger floors
32. East section of south-east elevation of retaining wall to crusher house level above and south-west of jigger floors
33. West section of south-east elevation of retaining wall to crusher house level above and south-west of jigger floors
34. South section of north-east elevation of retaining wall to crusher house level above and south-west of jigger floors
35. South section of north-east elevation of retaining wall to crusher house level above and south-west of jigger floors
36. Central section of north-east elevation of retaining wall to crusher house level above and south-west of jigger floors
37. North section of north-east elevation of retaining wall to crusher house level above and south-west of jigger floors

FILM D

1. North section of north-east elevation of retaining wall to crusher house level above and south-west of jigger floors
2. South-west corner of jigger and buddle wheelpit from east
3. North-west internal elevation of unknown building to north of Crusher house wheelpit
4. North section of south-west internal elevation of building to west of Crusher house wheelpit
5. South section of south-west internal elevation of building to west of Crusher house wheelpit
6. Opening between south corner of building of unknown purpose and Crusher house wheelpit, from north-east
7. Wooden frame above and to south-west of crusher house from above i.e. south-west
8. South-west elevation of crusher house from above i.e. south-west
9. South-west elevation of crusher house from above i.e. south-west
10. South section of retaining wall to east and below former site of ore-slides
11. Central section of retaining wall to east and below former site of ore-slides
12. V-shaped wooden planking within central section of retaining wall to east and below former site of ore-slides
13. North section of retaining wall to east and below former site of ore-slides
14. South section of south-west internal elevation of office building/ blacksmith's shop
15. South section of south-west internal elevation of office building/ blacksmith's shop
16. North section of south-west internal elevation of office building/ blacksmith's shop
17. Area between office building/blacksmith's shop and pumping & winding wheelpit from north-east
18. Pumping & winding wheelpit from east
19. Pumping & winding wheelpit from north-east
20. Pump house from north-east
21. Pump house from east
22. North-west external elevation of pumphouse
23. North-west external elevation of office building/blacksmith's shop from north
24. North-west external elevation of office building/blacksmith's shop from north
25. North section of south-west internal elevation of office building/ blacksmith's shop showing detail of chimney
26. North-west internal elevation of office building/blacksmith's shop
27. North-west internal elevation of office building/blacksmith's shop from east
28. Top of chimney from above i.e. south-west
29. West section of north-west external elevation of office building/blacksmith's shop
30. Area between office building/blacksmith's shop and pumping & winding wheelpit from above i.e. south-west

31. Detail of top of wall on south-east side of pumping & winding wheelpit from above i.e. south-west
32. Pumping & winding wheelpit from above i.e. south-west
33. West section of south-east wall of pumping & winding wheelpit from north-west and above
34. Central section of south-east wall of pumping & winding wheelpit from north-west and above
35. South-west interior elevation of pumping & winding wheelpit from north-east inside wheelpit
36. South-west interior elevation of pumping & winding wheelpit from north-east inside wheelpit

FILM E

1. West section of north-west wall of pumping & winding wheelpit from south-east and above
2. Central section of north-west wall of pumping & winding wheelpit from south-east and above
3. South-east (external) elevation of wall on south-east side of pumping & winding wheelpit from east
4. North-west wall of pumping & winding wheelpit from north-east
5. East section of north-west (interior) elevation of pumping & winding wheelpit from south-east
6. North-west wall of pumping & winding wheelpit from north-east
7. South-east (external) elevation of wall on south-east side of pumping & winding wheelpit from east
8. West section of north-west wall of pumping & winding wheelpit from south-east and above
9. Pumping & winding wheelpit from above and south in direction of pump house
10. Pumping & winding wheelpit from north-east
11. Pumping & winding wheelpit from north-east
12. Winding machine base (to north-west of pumping & winding wheelpit) from above i.e. south-west
13. East section of south-east (interior) wall of pumping & winding wheelpit from north-west and above
14. South-west internal elevation of pump house15. North-west internal elevation of pump house16. South-east internal elevation of pump house17. North-east internal elevation and north corner of pump house from south
18. North-east external elevation of magazine
19 to 25 (Inclusive). Internal elevations of magazine from north-east side of entrance, rotating anti-clockwise to opposite side of entrance east of centre
26. South-east external elevation of crusher house
27. South-east external elevation of crusher house
28. North section of south-west external elevation of crusher house
29. North section of south-west external elevation of crusher house
30. West section of south-east external elevation of crusher house
31. West section of south-east external elevation of crusher house
32. West section of south-east external elevation of crusher house
33. West section of south-east external elevation of crusher house
34. West section of south-east external elevation of crusher house

FILM F

1. West section of south-east external elevation of crusher house
2. West section of south-east external elevation of crusher house
3. South section of south-west external elevation of crusher house
4. South-west external elevation of crusher house
5. South-west external elevation of crusher house
6. South section of south-west external elevation of crusher house
7. North section of south-west external elevation of crusher house and wheelpit from above i.e. south-west
8. Wooden frame to south-west of crusher house from north-east
9. Crusher house from east
10. Crusher house from east
11. Crusher house from east
12. South section of north-east external elevation of crusher house
13. South section of north-east external elevation of crusher house
14. South section of north-east external elevation of crusher house
15. Central section of north-east external elevation of crusher house
16. North section of north-east external elevation of crusher house
17. North section of north-east external elevation of crusher house
18. South section of north-east external elevation of crusher house
19. East section of north-west external elevation of crusher house wheelpit

20. Central section of north-west external elevation of crusher house wheelpit and south-east internal elevation of crusher house to rear
21. West section of north-west external elevation of crusher house wheelpit and south-east internal elevation of crusher house to rear
22. West section of north-west external elevation of crusher house wheelpit and south-east internal elevation of crusher house to rear
23. Top of crusher house wheelpit from north-west and, south-east internal elevation of crusher house to rear
24. Top of crusher house wheelpit from north-west and, south-east internal elevation of crusher house to rear
25. West section of north-west external elevation of crusher house wheelpit and south-east internal elevation of crusher house to rear
26. West section of north-west external elevation of crusher house wheelpit and south-east internal elevation of crusher house to rear
27. Top of crusher house wheelpit from north-west and, south-east internal elevation of crusher house to rear
28. Top of crusher house wheelpit from north-west and, south-east internal elevation of crusher house to rear
29. West section of north-west external elevation of crusher house from north
30. West section of north-west external elevation of crusher house from north
31. South-east internal elevation of crusher house
32. Lower section of south-west internal elevation of crusher house
33. South section of south-west internal elevation of crusher house
34. North section of south-west internal elevation of crusher house
35. North section of south-west internal elevation of crusher house

FILM G

1. West section of north-west internal elevation of crusher house and top of wheelpit
2. East section of north-west internal elevation of crusher house and top of wheelpit
3. North-west internal elevation of crusher house and top of wheelpit
4. North-west internal elevation of crusher house and top of wheelpit
5. North section of north-east internal elevation of crusher house
6. South section of north-east internal elevation of crusher house
7. East corner of interior elevation of crusher house from west
8. North corner of interior elevation of crusher house from south
9. East corner of interior elevation of crusher house from west
10. South corner of interior elevation of crusher house from north
11. Central section of south-east internal elevation of crusher house
12. West corner of interior elevation of crusher house from east
13. North section of south-west internal elevation of crusher house
14. North section of south-west internal elevation of crusher house
15. Crusher house wheelpit from above i.e. south-west
16. Crusher house wheelpit from above i.e. south-west
17. Top of wall on south-east side of crusher house wheelpit from south-west
18. Top of wall on north-west side of crusher house wheelpit from south-west
19. North-east interior elevation of crusher house wheelpit from south-west inside wheelpit
20. North section of south-east interior elevation of crusher house wheelpit from west inside wheelpit
21. North section of north-west interior elevation of crusher house wheelpit from south inside wheelpit
22. South section of north-west interior elevation of crusher house wheelpit from east inside wheelpit
23. South section of south-east interior elevation of crusher house wheelpit from north inside wheelpit
24. South-west interior elevation of crusher house wheelpit from north-east inside wheelpit
25. South section of south-east wall of crusher house wheelpit from north-west and above
26. Central section of south-east wall of crusher house wheelpit from north-west and above
27. Central section of south-east wall of crusher house wheelpit from north-west and above
28. North section of south-east wall of crusher house wheelpit from north-west and above
29. North section of south-east wall of crusher house wheelpit from north-west and above
30. South section of north-west wall of crusher house wheelpit from south-east and above
31. Central section of north-west wall of crusher house wheelpit from south-east and above
32. Central section of north-west wall of crusher house wheelpit from south-east and above
33. North section of north-west wall of crusher house wheelpit from south-east and above
34. North section of north-west wall of crusher house wheelpit from south-east and above

35. Central section of top of crusher house wheelpit from south-east inside crusher house

FILM H (colour)

1. Main building/ore processing complex from south-east
2. Main building/ore processing complex from south-east
3. Main building/ore processing complex from south-east
4. Main building/ore processing complex from south-east
5. Main building/ore processing complex from south
6. Main building/ore processing complex from south
7. Main building/ore processing complex from south
8. Main building/ore processing complex from south
9. Main building/ore processing complex from south-west
10. Main building/ore processing complex from south-west
11. Crusher house from above i.e. south-west
12. Crusher house and southern part of main building/ore processing complex from above i.e. south-west
13. Crusher house from south-east
14. Southern part of main building/ore processing complex from north-east
15. Southern part of main building/ore processing complex from east
16. Southern part of main building/ore processing complex from east
17. Southern part of main building/ore processing complex from south-east
18. Central part of main building/ore processing complex from north-east
19. Northern part of main building/ore processing complex from south-east
20. Northern part of main building/ore processing complex from south-east
21. Northern part of main building/ore processing complex from east within slime pit complex
22. Northern part of main building/ore processing complex from north-east
23. Main building/ore processing complex from north with dressing room in foreground
24. East part of main building/ore processing complex from north-west with dressing room in foreground
25. Northern part of main building/ore processing complex from above i.e. west
26. Office/blacksmith's shop from south

The Finds.

These were all recovered when the interior of the Crusher House was cleared of collapsed masonry and spoil down to latest working levels by the contractors. All metal material was put to one side for examination by Dyfed Archaeological Trust.
It had been agreed beforehand that Dyfed County Council would follow Dyfed Archaeological Trust's recommendation that any material found on site during the course of works be offerred to Ceredigion Museum, Aberystwyth. The Curator of Ceredigion Museum, Michael Freeman, advised that he was not able to take the material found, but advised that it be offerred to the Mid Wales Mining Museum at Llywernog. Heather James accordingly took the objects to the Museum, but all the identifiable objects could be duplicated in the Museum's collection. The material was accordingly returned back to Ystrad Einion and is stored inside the Crusher House.
Three objects could be identifed : a conical shaped solid iron`pin' possibly to secure part of the waterwheel housing, an iron handle of circular bar iron with a central loop, belonging to an ore-bucket or 'kibble', and an iron collar joint.(see photocopies). Some lengths of tramrail were also recovered.
A list of all the material with accompanying colour photographs forms part of the Site Archive, to be deposited by Dyfed County Council in the National Monuments Record.

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Plate 1a: View from rear of Crusher House, showing part of wooden frame still in position and height of spoil - March 1993.

Plate 1b: View from the 'Storehouse' above the slime pits, looking up to the Crusher House, before reclamation. March 1993.

Plate 2a: View of south-east side of Crusher House, across to the still afforested slime pits, view from the slopes of the spoil tip below the main shaft. March 1993

Plate 2b: View across the Buddles, up to the jigger floor and front of the Crusher House.

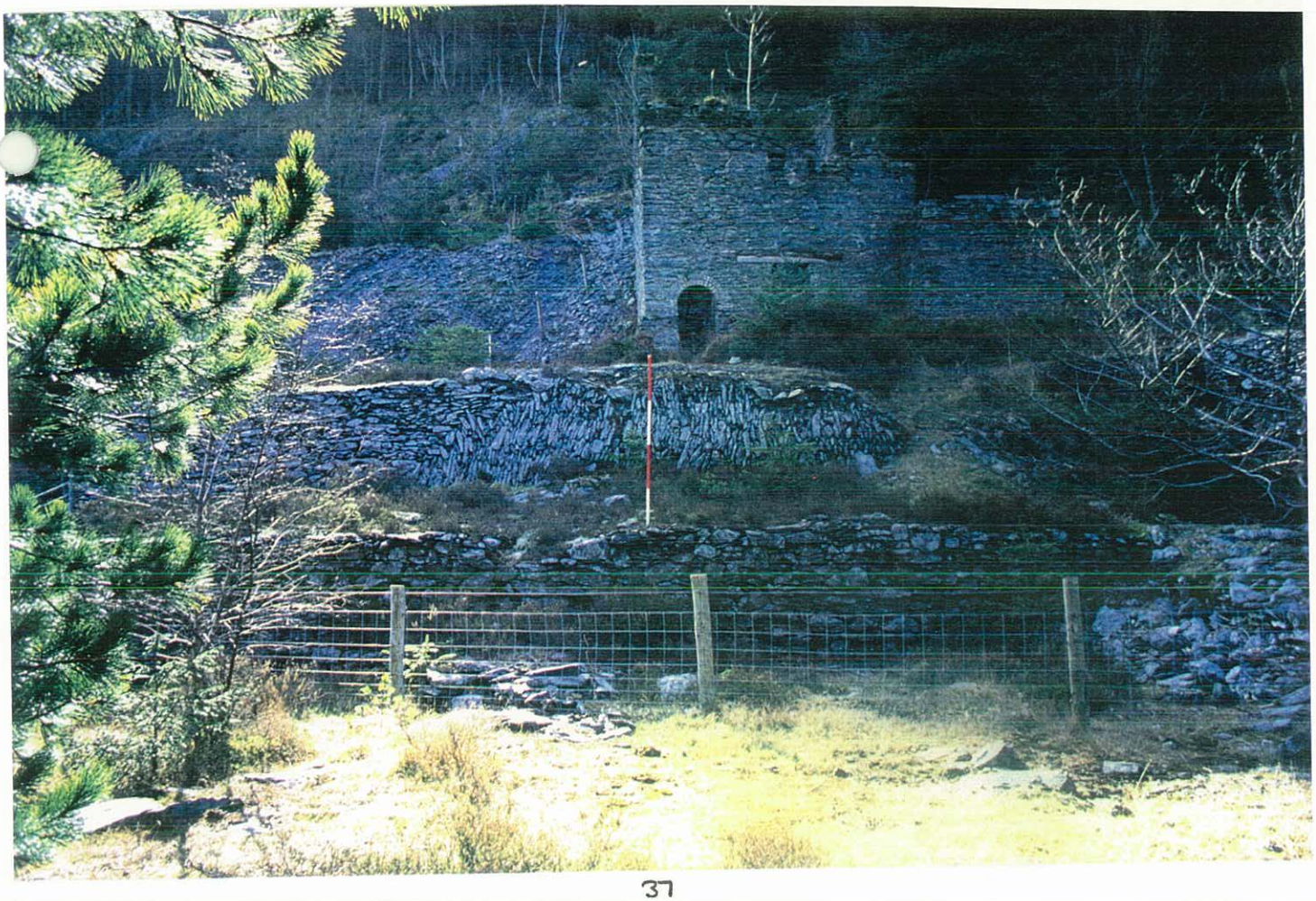


Plate 3a: Planning the slime pits after tree clearance, August 1993. Viewed from the jigger floor, tape lies along the tailrace of the lowest waterwheel.

Plate 3b: View from the jigger floor of the Buddles, before clearance and consolidation, August 1993.

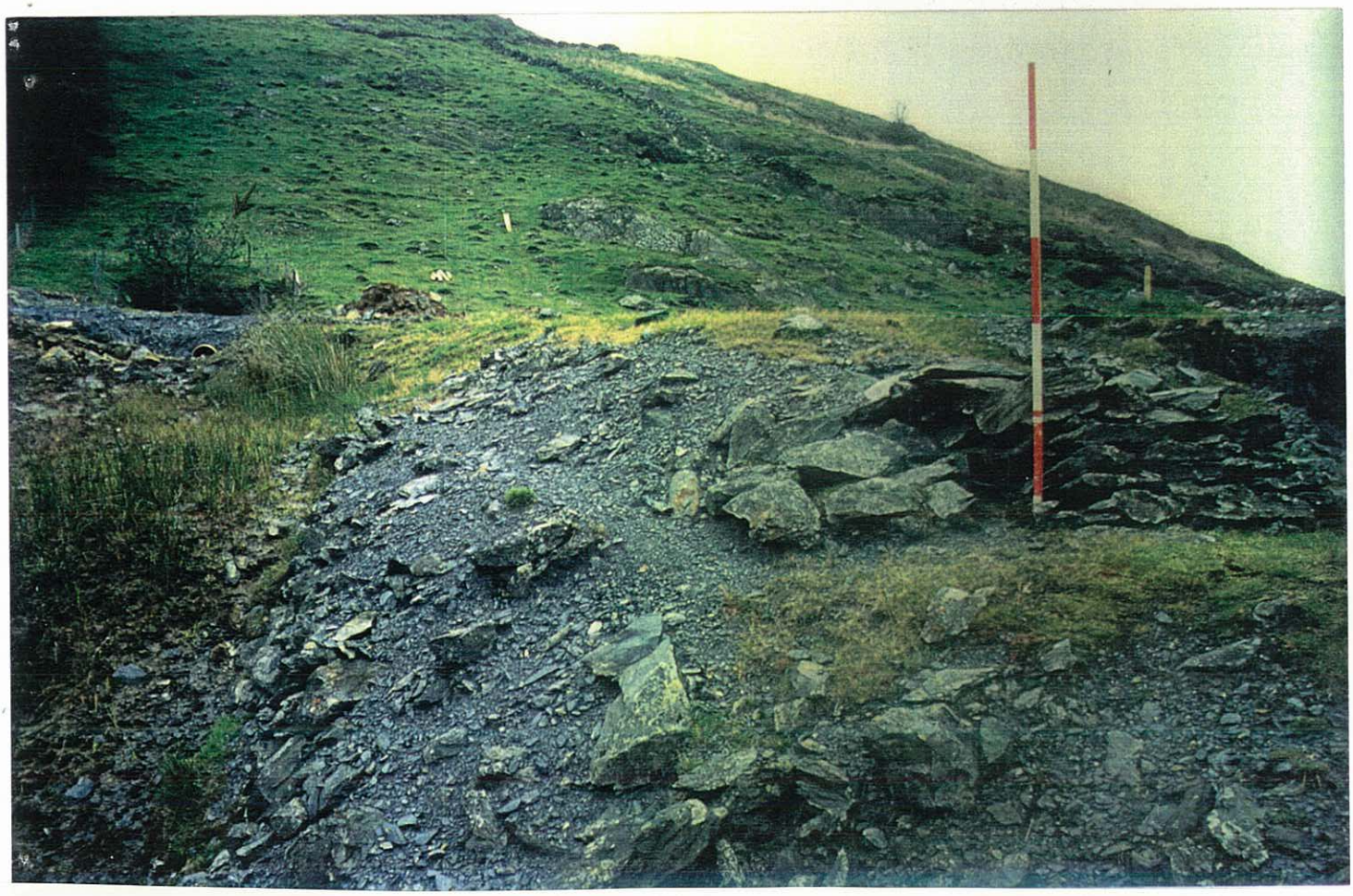
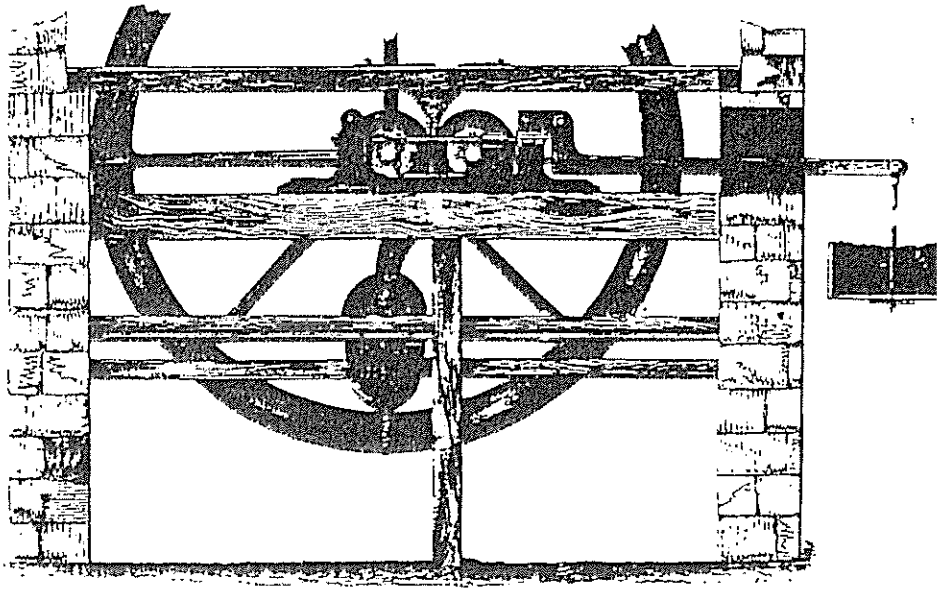


Plate 4a: Spoil Tip below the Old Level - Bick's level 3 (arrowed), showing leat pillar, marked by ranging pole. August 1993.

Plate 4b: Spoil Tip during clearance in August 1993, showing revetting and remains of wooden launder and pegged support (arrowed).

Plate 5a: Casting discovere during clearance of the interior of the Crusher Hou August 1993.

5b: Diagram showing similar casting.



MID-19th CENTURY ORE-CRUSHER

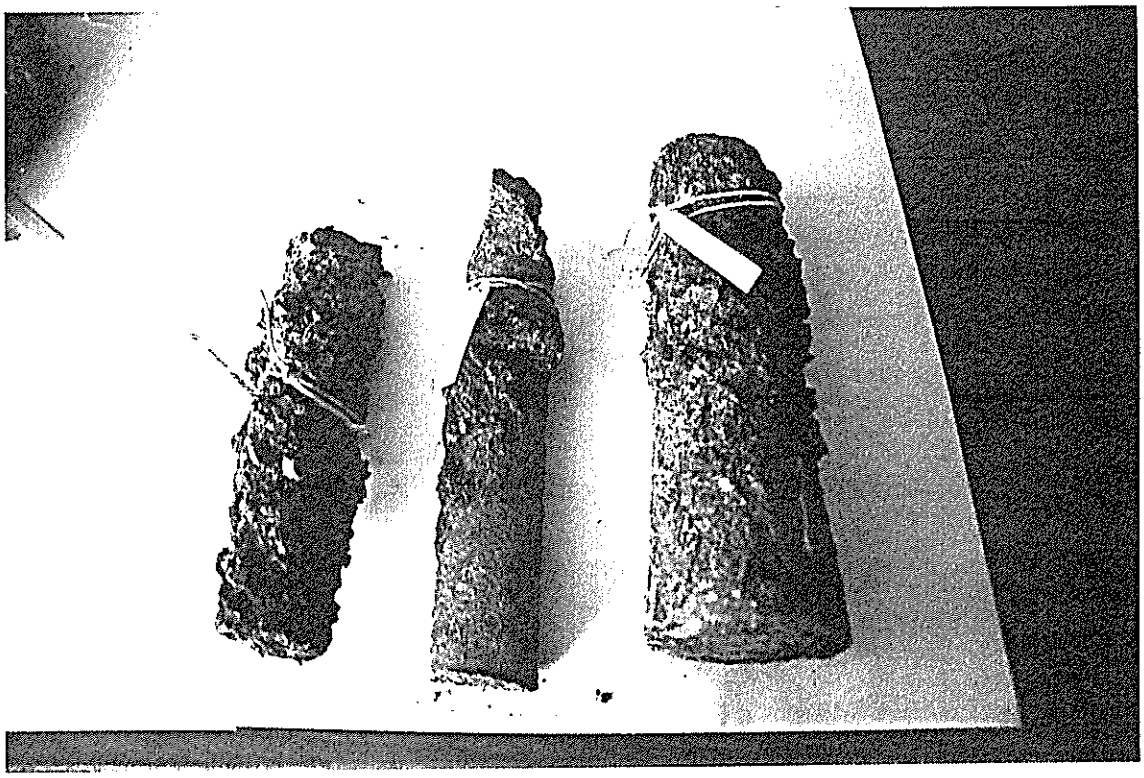


Plate 6a: Iron 'pins' from the Crusher House

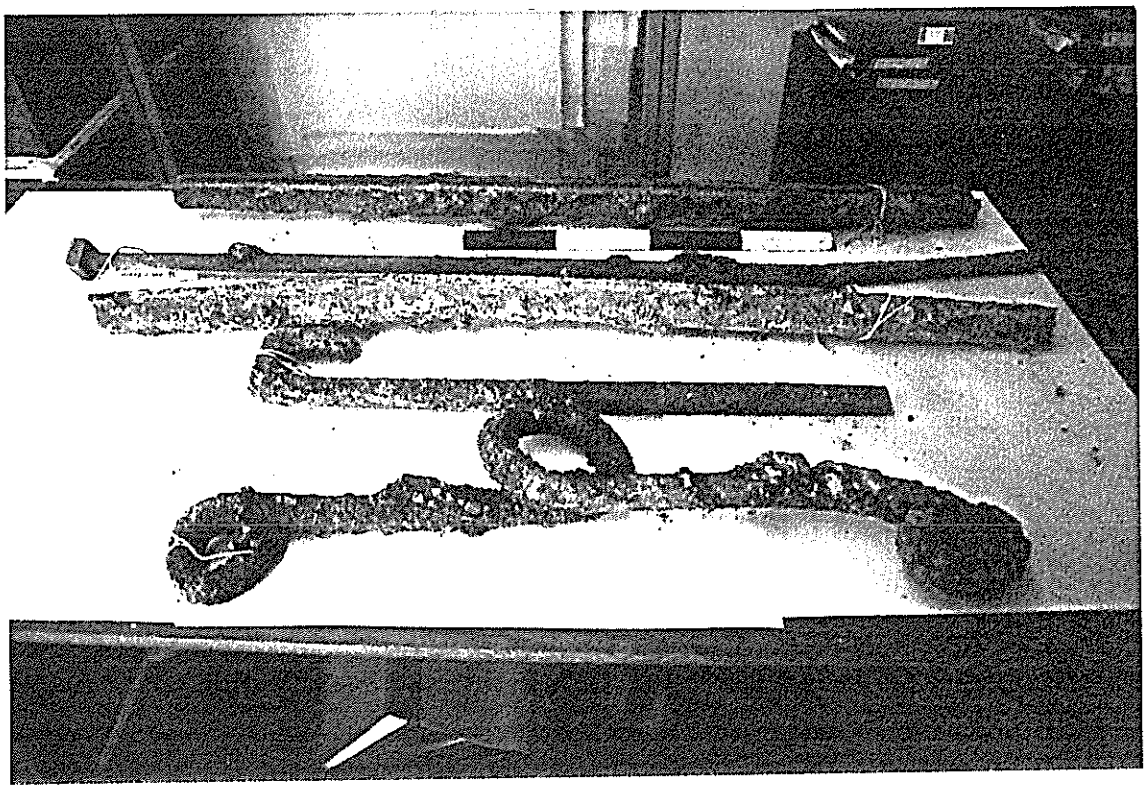


Plate 6 b: Holding-down stud, tramrail, bar and handle of a 'kibble' or ore-bucket - all except the tramrail, from the Crusher House.