

GLAMORGAN
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TRUST

**GLAMORGAN-GWENT ARCHAEOLOGICAL TRUST
CONTRACTS SECTION**

**ARCHAEOLOGICAL EXCAVATION
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FAN LEAD MINE

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Summary

An excavation was carried out at the Fan Lead Mines in advance of a land reclamation scheme, in fulfilment of a condition imposed on planning permission. The work commissioned was to locate and record buildings of archaeological significance within two areas defined by a brief provided by the planning authority's archaeological advisers, Clwyd-Powys Archaeological Trust. In both areas, engine houses and their associated structures were located.

In area 1, two buildings (numbers 29 and 30) had previously been noted, but further excavation revealed that this area contained an Engine House, with a later crusher mount, a double boiler house, and what is thought to have been an Angle-Bob pit.

In area 2, the presence of an Engine House had been noted due to the uncovering of the engine block. Investigation of the surrounding area, uncovered, in addition to the engine block, a secondary machine mount, possibly a clutch base, the location of the boiler, and a coal store.

Acknowledgements

This report was prepared by DN Williams BA PIFA, Project Officer (Assessments), Glamorgan-Gwent Archaeological Trust (Contract Section); and the project was managed by M Locock BA AIFA Projects Manager, (Assessments). The project was jointly directed by the author and M Lawler BA, who would like to acknowledge the assistance given to project by the following people and organisations:

Powys County Council, who commissioned the reclamation project; Trafalgar House, the main contractor for the work, and Richards Moorehead and Laing Ltd, especially J Perkins the on-site engineer. We would also like to thank D Bick for his historical research and advice in the field, and M Walters, of the Clwyd-Powys Archaeological Trust (CPAT). Lastly we would like to thank R Protheroe-Jones, Research Assistant at the National Industrial and Maritime Museum, Cardiff, and the site staff, M Bernthal, R Linnard, and N Wilson.

1. Introduction

1.1 Development proposal and commission

The archaeological investigation was commissioned by Trafalgar House in order to excavate and record structures of archaeological importance, affected by the land reclamation works in OS field number 855 (approved planning application M23155). Archaeological work was necessary due to the deterioration of the site and its structures, the two areas recorded being the most complete.

The Trafalgar house group was commissioned to carry out the reclamation by Powys County Council, the project was partly funded by the Welsh Development Agency. Trafalgar House sub-contracted the archaeological works to the Glamorgan-Gwent Archaeological Trust (Contracts Section).

1.2 Specification for the assessment

The specification (Appendix 1) was drawn up by the Glamorgan-Gwent Archaeological Trust (Contracts Section) to fulfil a brief (Brief SA1 58) provided by the Clwyd-Powys Archaeological Trust, acting as the planning authority's archaeological advisers.

Monitoring visits were made to the site by M Walters of CPAT over the four week period of excavation.

1.3 Scope of the report

The report describes the physical environment of the site (section 2), a brief history of the site (section 3), previous fieldwork (section 4) and the fieldwork results (section 5).

1.4 Abbreviations used in the report

References to documents and published works are given in brackets: the full titles will be found in the bibliography. Archaeological deposits are identified by their three-figure context numbers; excavation areas are listed as 1 and 2. References to Ordnance Survey are mentioned as OS, and field numbers given are OS numbers.

2. Physical environment

2.1 Topography

Van Lead Mines are located at Y-Fan, Llanidloes, Powys (old Montgomeryshire), just south of the B4518, and on the banks of Van Pool (SN 944 875). The site lies in the bottom of a valley, on a south-facing slope (OS field number 855), and the area is currently the subject of a land reclamation scheme that is relocating hazardous waste material, and landscaping the area.

2.2 Surface geology

The sub-surface of this area is made up of a band of Palaeozoic rock over 10,000 feet thick, consisting of shales, mudstones, silty flags, grits and conglomerates. This band is referred to as the Llandovery Series, and ores including lead, zinc, copper and iron are found in veins within it, especially in mid Wales.

The surface of the site was comprised entirely of waste tips from the 19th-century industrial workings.

3. Site History

The search for ore was started in 1850 by Messrs Lefaux, Howell and Morris, but after two unsuccessful years of prospection they stopped. Then in 1854, when in the ownership of E Morris and under the management of Captain Williams from Flintshire, the search was resumed, and rich ore was discovered almost immediately. Unfortunately, the difficulties of extracting the ore meant that the site remained unremunerative until 1862, when a lode of sufficient size was located. In April 1866, the first ore from the mine was sold.

In the same year a large water wheel was constructed (visible at the base of the left hand, inclined plane from the pithead on Plate 1) to drive a crushing machine; this is the only structure to have a known date at present. It was 50 ft x 4 ft, built by Leigh and Gilbert Howell of the Bagillt Foundry, and was christened Mary Emma (Bick 1990, 42).

In 1867, Mr E Morris died, and his executors put the mine up for sale by a Court of Chancery order. The mining house of John Taylor and Sons was offered the chance of buying the mine for £40,000 but they declined. As a consequence, Van was sold for £46,000 to the executors, who formed a company, with T Munday as chairman and W Lavington as secretary. The decision of John Taylor and Sons not to buy the site was soon shown to have been a bad one, for in 1870 the market value of the site was over £1,000,000 (Bick 1990, 42).

The best year for the mine was in 1876, when it was over 600ft deep, employed 700 men, and produced 6850 tons of lead ore and over 2000 tons of blend. At this time Van was one of the largest lead mines in Europe, and provided a great stimulus for British lead-mining as a whole.

By 1878, however, its output was falling, and the site closed in 1921, having produced a total of 125,163 tons of lead and zinc ores.

4. Previous Archaeological Investigation

An archaeological investigation had been carried out on the site by SJS Mining Services (Phase 1), prior to the commencement of work by GGAT (Contracts), and this highlighted two areas of interest (fig.1). In Area 1, buildings 29 and 30 were located, and in Area 2 building number 9 was uncovered.

Building 29 (Area 1)

Building 29 (Fig 2, Plates 8 and 9) was partly excavated, and revealed two rows of five tie-rods built into the masonry. This structure was thought to represent a wheelpit, housing a wheel 9.15m in diameter and 0.75m wide. Further excavation showed the pit to be of an unorthodox design, and this interpretation is now in some doubt.

It is noted that on photographs c.1890 (Plate 1), that between the number 30 and 9 engine house, a cable can be seen running over dollies, in a manner that suggests a pumping rod. Bick (1991 p.14) noted that "the cable does not reach the number 30 engine house but appears to be fixed to a tall upright post to which stays are affixed and appears to be a remarkably tall King post of a pumping bob". This raised the possibility that the building housed some form of angle bob, operating a reciprocating machine such as a pump.

Building 30 (Area 1)

This structure (Fig.2, Plates 3 and 4) was thought to have housed a Stamps engine, but its period of use is unclear. In a photograph of c.1890 (Plate 1), although smoke is seen rising from the yellow brick octagonal stack, there is no sign of the beam protruding through the bob wall, as one would expect from this type of engine. One would normally expect to see a large flywheel in front of the engine, but no indication of this was found.

Building 9 (Area 2)

The most important feature found in this area was the Engine Block (fig.8, Plate 13), fully described by Bick (1991, 7 and 7a). It consisted of 21 large pieces of Millstone Grit that had been carefully shaped and fitted together. Cut into the blocks were recesses for cranks, holes for tie rods, and joist sockets for the floor; also visible was part of the base flange of the 30" cylinder, tie rods, and the main 6" inlet pipe.

Two types of engine that could be mounted on this sort of base (Bick 1991,7a) are a six-column compound engine and a large single-cylinder A-frame beam engine. The former was built by Easton, Amos and Company of London, in 1864, consisted of a beam, biased 60/40 in favour of the cylinder end. This suggests that

the cylinders were arranged on Woolf's Principle, with 10" high pressure, and 17" low pressure cylinders. The framework is of cast iron with Greek columns that supported the beam and linkage; in addition to the flywheel, it had a wide pulley driving the flat belts. The latter example was built in 1852 in Birmingham. The steam inlet and valve chest sit immediately behind the steam cylinder, the condenser pump and hot well lie between the cylinder and the axis of the beam. This type of engine is most probably the type used on this site.

Further investigation by SJS Mining Services uncovered what were thought to be the north and west walls of the engine house, and the overall dimensions of the building were estimated to be 6m wide x 9m long.

5. Excavation results

5.1 Method

The fieldwork involved the excavation by machine of two areas, each approximately 15m x 20m. An untoothed bucket was used to excavate the areas in spits until the archaeological deposits were reached. This work was carried out under archaeological supervision and features of interest were then excavated by hand in order to define their nature. Once excavated, these features were recorded, photographed and drawn.

Once this had been completed, building 29 and 30 were reburied, and building 9 was backfilled so that only the upper portions of the walls were exposed.

The site grid referred to in the text is independent, and not tied into the national grid.

The levels are related to Ordnance Datum, taken from the temporary bench-marks established by Trafalgar House.

5.2 Features identified

Area 1

Area 1 was the first area to be excavated, and this included building numbers 29 and 30 (figs 2, 6; Plates 3, 8).

Building 30

The Phase I construction of the engine house (fig 2, Plates 3 and 4) was a rectangular structure made of shale, bonded with lime mortar, and measured 8.6m x 8.2m. Built into this structure were three wells, 007,008,009 (fig 2,4,6), the central one (008) being the Hot Well. The west well (007) was 2.5m x 0.9m, and was excavated to a depth of 3.6m. The only features uncovered were two voids (013,014) in the east wall (Fig 5), that led into the central well (008); they were both 0.6m x 0.25m, and extended for a distance of 1m. Within each of these openings large wooden beams (045,046) 0.25m square had been inserted in the roof, apparently as a support, but the size of the beams was excessive for this purpose.

The central well, or hot well, (figs 4 and 5) measured 2.5m x 2.35m and was excavated to a depth of 3.75m. Within the west wall 034, voids 013 and 014 were noted, as well as wooden planks 048,050,051 and 052, that averaged 0.1m thick, built into the wall. The lower portion of the wall (025) was built out from the upper (034) by 0.4m, forming a shelf onto which a wooden plank (027) had been laid, but not firmly attached; presumably this was to support a floor. The east wall (035) proved to be of similar construction but with an important difference. A yellow-brick vaulted culvert (011), 0.65m wide, had been constructed joining the hot well to the east well. The north wall (033) proved to be of most complex, with bolting holes (017,018) extending into the main body of the structure. Each void measured 0.38m x 0.35m, was 2.14m deep: visible within each hole were two 0.04m diameter bolts. Bolts 021 and 161 were positioned 0.50m and 1.64m (respectively), into void 017; their dimensions were the same as bolts 022 and 163 that were found in void 018.

The east well measured 2.65m x 1.3m and was excavated to a depth of 3.5m. The only features were within the west wall, and included voids 010 and 012, corresponding to voids 013,014 in the west well, and the brick-vaulted culvert 011.

The uppermost feature, visible prior to excavation, consisted of a concrete base (Fig 3, Plates 3 and 4) 6.4m x 3.35m and 0.2m thick. On this platform were several concrete machine bases and tie rods; the use of red brick was noted. A further use of red brick was uncovered in the south wall of the structure, where a cross-shaped mounting 2.5m x 2m had been built (fig 4).

Building 29

This structure (fig. 2,6, Plates 8 and 9), a possible angle-bob pit, appears to represent a single phase of construction. It was rectangular in shape, measuring 12m x 3.5m, and made predominantly of shale with a lime mortar. Along the top of the east wall (112), were four 0.04m diameter tie rods, 115,119,123, and 127, (Bick mentions five tie rods, 1991, 14). These were 1.20m apart, and were mirrored on the west wall (113) by 131,135,139 and 143. These rods appeared to have been cut off, leaving an average of 1.10m visible above the masonry.

At both ends of the structure, wells (147,154) had been constructed (figs.2,6, Plates 8,9,10 and 11); these were not fully excavated due to the presence of two timber cross-beams (Plates 8 and 10). In the north well (147), the upper beam (148) was aligned east/west, and was located within beam slots found in the east and west walls. The beam was secured at both ends by square iron plates (150), held in place by a nut and bolt (149), the bolt having been built into the walls. This beam was also visible in the exterior walls and was flush with them. The lower beam (151) was of similar dimensions, and on the same alignment, but was built within, and not through, the two side walls. This arrangement of wooden beams was also uncovered in the south well, and although the upper beam was missing, the tie rods 156 and 158 remained in situ.

These wells were connected by two channels (fig. 6). The upper channel (Plate 9), 114, was aligned north/south, and was 6.5m in length by 1.9m wide. At the centre of this channel was a wooden beam 0.1m wide, that spanned the trench east/west, 0.35m above the base of the trench. The second channel, 152 (Fig. 6, Plate 11), underlay the first, was brick-lined (Plate 11) and measured 1.9m wide.

Other Structures

The boiler house was situated to the north of the engine house (fig.2). The building was 18.2m east/west by 6.9m north/south, and some 2m of wall was visible above the old ground surface. This building was then sub-divided by a central wall, 0.9m wide and aligned east/west, so that two boilers could be inserted. Two manhole-type openings were located at the east end of both sections, and were found to contain steam inlet pipes for the boilers: immediately east of these, a rough flag stone floor was uncovered.

The flues and stack were located at the south end of this structure. Both flues (fig. 2,3) were made of yellow brick, and while the northern boiler flue had been infilled by red brick, the other had the remains of an iron flue door. Both these flues opened onto a single, upward-sloping yellow-brick ramp, that measured 1.3m x 0.8m, and that in turn led into the stack. The exterior of the stack itself measured 2.8m x 2.4m and was

constructed of shale and lime mortar, but only 0.3m was visible above ground level.

Area 2

This was the second area to be excavated, in the area of the engine block.

Building 9

The engine block (fig. 8, Plate 13) located in this area had previously been described (page 8), but little was known about the building in which it was situated.

The engine house itself was 19.4m x 5m, and lay on a northwest/southeast alignment (fig. 7). It was constructed of mostly shale and lime mortar, and contained the engine block, and a second machine base, possibly for a clutch mechanism. The latter mount measured 6.2m x 5m and consisted of several distinct features. The main base was aligned northeast-southwest, and measured 3.75m x 1m by 0.8m thick (Plate 14). It was made of brick bonded with lime mortar and had two rows of three, 0.04m diameter, iron bolts bedded into the upper surface at 1.4m intervals. The area to the northeast of this (Plate 14) consisted of a shale platform, 4.25m x 1.4m, with 0.4m and 1.2m thick brick walls running northeast-southwest, at both the south and north end respectively. To the southwest, three sides of a rectangular brick-built structure was located measuring 4.45m x 2.5m, the northwest end consisting of a single large rectangular block of Millstone Grit that measured 1.80m x 1m. The area within the structure was filled with collapsed rubble and not excavated.

At the northwest end of the boiler house was a stack (fig. 7, Plate 19) that measured 2.3m x 2.25m, by 2m in elevation. Leading into this was a flue, measuring 2.2m x 0.55m, made of brick, that abutted and followed the line of the northwest wall of the engine house. The depth of the flue was not obtained as it was not excavated.

Other structures

Immediately to the southwest of the engine house was the boiler house (Fig 7, Plate 12). This was a rectangular building 13.8m x 3.8m that was excavated to a depth of 2.3m. It was bonded to the engine house and made of shale with lime mortar. The wall at the southeast end of the building had been demolished and there were two doorways, each 2.5m wide, one leading into the engine house, and the second leading into the coal bunker.

At the northwest end of the boiler house several features were identified. The back wall was brick-lined (Plate 18), and in the southwest corner the brick lining curved rather than following the 90 degree corner of the shale wall. In the opposite corner, a hole pierced the wall between the boiler house and the engine house, and this was lined with a heavily corroded metal door and frame. Its location suggests that this was the southwest end of

the flue system already discussed. The floor at this end was brick-lined and resting on this, three low brick features were identified. Two were 0.8m apart and 0.3m in height, possibly representing the boiler supports, and the second was a curved brick wall leading into the flue.

Adjoining the boiler house was the coal bunker (Plate 12). It was the same size as the boiler house, and had a coal chute, made of a single stone slab 1.95m in length, located in the southwest wall. No brick lining was identified in this room, and no flue opening was uncovered, where one might be expected, if this had been used as a boiler house.

5.3 Finds Report

From the large quantity of scrap iron and other objects present on the site, a total of nine objects were retained; all came from unstratified levels of Area 1 (366), and the total weight of objects was 41.1 kg

Most objects were probably discarded parts of broken machinery; the two pieces which could be positively identified include a sash weight of 6.2 Kg and a frogged brick stamped "PARK BRICK AND T. CO, NEWTOWN" of relatively recent date.

A more detailed list of weights and measurements can be found in the site archive.

J Compton/S H Sell (GGAT)

5.4 Finds not retained

Several finds were left on site, either because of their size, or because they were undiagnostic. The undiagnostic finds consisted of pieces of metalwork, including nails, bolts and numerous fragmentary pieces of metal plate, along with broken wooden beams.

The three diagnostic finds, both from building 30, included two portions of the broken engine block (Plate 5), and a wooden beam with an iron attachment (Plates 6,7), that was possibly a section of the bob beam.

6. Conclusions

From the historical research and data collected during excavation, it is possible to suggest the nature and timing of development on this site.

In 1867 a waterwheel (Plate 1) was erected at the north end of the site to drive a crusher, which is thought to have been for a rolls machine and not a stamps engine (Protheroe-Jones pers comm).

Then, in 1871 or slightly earlier, the Number 9 Engine House was erected, possibly to drive buddles and jigs located in the buildings immediately to the northeast (fig 1 and 7). Power was possibly transferred through a clutch mechanism based on the second machine base. This engine was run from a single boiler that was located to the southwest of the engine house, and the coal bunker was situated alongside.

As production increased, so did the need for processing, and so in the late 1880s the Halvans mill was built (Green 1983 p.37). It is suggested that this housed more jigs (and possibly further buddles), run off the Number 30 Engine House. The type of engine contained by this structure is uncertain, as the mountings were masked by concrete 006, but the location of the four engine bolts within the bolting holes of the hot well, suggests that the engine base was 1.16m square (3' 10").

Engine House number 9 was altered at some stage, either to provide extra drive for the Halvans Mill, or perhaps to replace power lost due to a damaged boiler, as indicated by the bricking up of the second flue of the number 30 boiler house. The power could have been transferred by a second clutch mechanism alongside the first (which would explain the size of the machine base), the power being transferred to the mill through flat rods. Plate 1 shows the position of the Dolly-wheel stands (the flat rods are only just visible), but what is clear is that the flat rods emanated from between the engine house and the boiler house. This suggests a later addition, as it means that the flat rods were squeezed up against the boiler. It also suggests, that the feature to the northwest of the boiler house (Fig. 1,7; Plate 16,17) is a flywheel pit.

Building 29 is possibly associated with this transfer of power, and although its exact function is uncertain, it is possibly the base of an angle bob.

In the late 1890's, the steam engine in building 30 was replaced by a gas engine, as shown by the later concrete base, and although building 29 appears to have been dismantled (Plate 1), the flat rods were left in situ.

The site was eventually closed down in 1921, and has since been used for waste tipping.

Appendix One

Archaeological Investigation Specifications

Former Fan Lead Mines, Llanidloes, Powys

GGAT (Contracts Section) carries out projects for individual clients, and has amassed considerable experience and expertise in the successful execution of competent fieldwork within deadlines. In the past year, it has undertaken more than 60 desk-top studies, field evaluations, excavations and watching briefs, for a range of clients from the Welsh Office to private landowners. All work is managed to achieve the highest professional standards, and all senior staff are corporate members of the Institute of Field Archaeologists. The project will be carried out in accordance with the GGAT Contracts Guidelines for the Execution of Assessment Projects.

This specification was drawn up to fulfil the brief for the work supplied by CPAT (Brief SAI 58), to which the project will conform except where noted.

1. Objectives

- 1.1 Determination of the character, distribution and importance of surviving archaeological deposits by excavation, survey and watching brief.
- 1.2 Preparation of site archive.
- 1.3 Preparation of report on results of fieldwork.

2. Integrated Survey

- 2.1 Buildings Survey - Recording of surviving buildings or other structures of historic, architectural or archaeological importance: Buildings 29 and 30, and Building 9, by drawn survey, photography and written records.
- 2.2 Watching Brief - A watching brief will be maintained should significant deposits be exposed by subsequent groundworks.

3. Excavations

- 3.1 Manual excavation (following mechanical removal of topsoil) of archaeological areas to establish the character, distribution and importance of deposits relating to known or potential archaeological features.

Two areas will be excavated, in the approximate positions shown on the provided plan; Area 1 will be 20m x 20m; Area 2 will be a maximum of 10m x 8m.

- 3.2 Throughout each area, the minimum number of archaeological deposits exposed necessary to establish the character and chronology of past human activity will be manually excavated.

Each area will be excavated to the base of that part of the stratigraphy which contains archaeological and related palaeoenvironmental evidence to determine the potential range and depth of such deposits. If the depth of deposits encountered is such that safe manual excavation is precluded, an attempt will be made to establish the depth of deposits by hand-auger or else by machine-cut trench.

- 3.3 Recording - The techniques employed will conform to best current professional practice. Archaeological deposits will be recorded with a single continuous context numbering system, in accordance with GGAT's Manual of Excavation Recording Techniques, a copy of which is deposited in the county SMR. Contexts will be drawn at a suitable scale (usually 1:20) in plan, and where appropriate in section. All significant contexts will be photographed in 35mm colour transparency and monochrome film.

- 3.4 Finds - all finds will be retained and recorded by context, and temporarily stored in stable conditions.

- 3.5 Sampling - should deposits be encountered with a high potential for the preservation of palaeoenvironmental material, bulk soil samples will be taken for possible subsequent analysis.

- 3.6 Arrangement of appropriate specialist services, as necessary.

4. Post Fieldwork Phase

- 4.1 Preparation of site archive of archaeological records relating to trial excavations to the specifications as laid down in Management of Archaeological Projects, English Heritage, 1991, Appendix 3.

- 4.2 Assessment of archaeological data.

- 4.3 Preparation of the research archive, to the specifications laid down in Management of Archaeological Projects, English Heritage, 1991, Appendix 6.

- 4.4 Deposition of the research archive with the County SMR, should no further work be undertaken.
- 4.5 Deposition of the site archive, including artefacts and ecofacts, excepting those which may be subject to the laws of Treasure Trove, with an appropriate institution subject to the agreement of the site owners. (Agreement with an appropriate Institution to accept this material needs to be made in advance of the project commencing.) Deposition of a copy of the site archive with the National Archaeological Record, indexed in accordance with their Draft Guidelines for the Deposition of Excavation Records.
5. Assessment
- 5.1 Assessment of information gathered through the execution of sections 2-4.
6. Reports
- 6.1 Client - Synthesis of data gathered through the execution of 2-4, 5.1 & 5.2 together with inclusion of supporting evidence in appendices as appropriate.
- 6.2 Academic - Archaeological digest report, suitable for publication in a regional or national learned journal (e.g. Archaeology in Wales).
- 6.3 Preliminary notification to Cadw: Welsh Historic Monuments of sites which may satisfy the Secretary of State's criteria for statutory protection.
7. Staff
- 7.1 The project will be managed by AG Marvell BA MIFA, and M Locock BA AIFA, and executed by M Lawler BA and D N Williams BA, two of the Contracts Section's Project Officers, who are experienced in this type of work. Field staff will be experienced archaeologists drawn from the team regularly used by GGAT Contracts. Finds analysis will be carried out by in-house specialists with relevant expertise.
8. Insurance
- 8.1 The GGAT Contracts Section is fully insured for this type of work, and holds substantial Professional Indemnity cover. Details of policies can be supplied on request.

9. Health and Safety policy

- 9.1 GGAT has prepared a Health and Safety statement, a copy of which is available on request. The Trust will not endanger the health, safety and welfare of its employees or others in the execution of its projects.

10. Reinstatement

- 10.1 On completion of the fieldwork, GGAT will hand the areas over to Trafalgar House for treatment as they see fit.

11. Scope of the work

- 11.1 The work outlined in this specification will be carried out to the highest professional standards, and the conclusions drawn will be based on a considered review of the evidence available. However, the archaeological resource is unpredictable, and the encountering of unexpected archaeological deposits on the site cannot be ruled out.

12. Variations to the brief

- 12.1 The provisions of the brief will be met, except where, in **GGAT Contracts'** considered opinion, an alternative methodology is more appropriate to the specific nature of the site and the archaeological deposits encountered. The planning authority's archaeological advisers will be informed of any such variation.

13. Monitoring

- 13.1 It is noted that the brief asks for provision to be made by the client for monitoring by the planning authority's archaeological adviser.

Appendix Two: Archaeological records made during excavation

Context Record for Area A

No	Type	Description	Phase
001	Structure	Engine house	1
002	Structure	South wall of engine house	1
003	Structure	East wall of engine house	1
004	Structure	West wall of engine house	1
005	Structure	North wall of engine house	1
006	Structure	Concrete crusher base	1
007	Void	Western well in engine house	1
008	Void	Central hot well	1
009	Void	Eastern well in engine house	1
010	Structure	Northern beam slot linking 008,009	1
011	Structure	Brick lined tunnel between 008,009	1
012	Structure	Southern beam slot linking 008,009	1
013	Structure	Northern beam slot linking 007,008	1
014	Structure	Southern beam slot linking 007,008	1
015	Structure	Brick lining of crusher beam mount	1
016	Structure	Original engine mount platform	1
017	Void	Western bolting hole for engine	1
018	Void	Eastern bolting hole for engine	1
019	Void	Western bolt run	1
020	Void	Eastern bolt run	1
021	Feature	Metal bolting pin in void 019	1
022	Feature	Metal bolting pin in void 020	1
023	Structure	Wooden load bearing lintel in 033	1
024	Structure	Wooden bolting hole lintel in 033	1
025	Structure	Western shelf in void 008	1
026	Structure	Eastern shelf in void 008	1
027	Structure	Wooden plank on shelf 025	1
028	Structure	Wooden plank on shelf 026	1
029	Layer	Building debris on engine house	3
030	Layer	Building debris in 007	3
031	Layer	Building debris in 008	3
032	Layer	Building debris in 009	3
033	Structure	South facing wall of void 008	1
034	Structure	East facing wall of void 008	1
035	Structure	West facing wall of void 008	1
036	Structure	North facing wall of void 008	1
037		Discarded	
038		Discarded	
039		Discarded	
040		Discarded	
041	Structure	South brick lining of void 011	1
042	Structure	South brick lining of void 011	1
043		Discarded	
044	Structure	Wooden strengthening in wall 035	1
045	Structure	Wooden beam forming roof of 013	1
046	Structure	Wooden beam forming roof of 014	1
047	Structure	Three wooden liners to void 013	1
048	Structure	Wooden lintel to voids 014,013	1

No	Type	Description	Phase
049	Structure	Three circular holes cut into 048	1
050	Structure	Wooden strengthening in wall 034	1
051	Structure	Wooden strengthening in wall 034	1
052	Structure	Wooden strengthening in wall 034	1
053	Void	Beam slot	1
054	Structure	Brick lining of void 053	1
055	Structure	Wooden plank	2
056	Structure	Concrete crusher mount	2
057	Structure	Six bolting pins on 056	2
058	Structure	Crusher beam mount	2
059	Structure	Crushing cylinder mount	2
060		Discarded	
061		Discarded	
062	Structure	Stack base	1
063	Structure	Stack walls	1
064		Discarded	
065	Structure	Southern boiler house	1
066	Structure	Northern boiler house	1
067	Structure	Northern boiler house wall	1
068	Structure	Western boiler house wall	1
069	Structure	Central boiler house wall	1
070	Void	Northern flue	1
071	Void	Eastern flue	1
072	Structure	Western wall, flue 070	1
073	Void	Flue opening, flue 070	1
074	Structure	Brick filling of void 073	2
075	Structure	East brick wall of flue 070	1
076	Void	Flue opening in flue 071	1
077	Feature	Metal door surround in flue 076	1
078	Structure	South brick wall of flue 071	1
079	Structure	Brick flue ramp	1
080	Structure	Wooden roof support	1
081	Structure	Wooden roof support	1
082	Void	Inlet pipe man hole	1
083	Structure	Metal inlet pipe	1
084	Structure	Walls surrounding void 082	1
085	Structure	Brick back wall of void 082	1
086	Structure	East wall of boiler house 065	1
087	Structure	Northern boiler support	1
088	Structure	Southern boiler support	1
089	Structure	Brick boiler platform	1
090	Void	Northern inlet pipe man hole	1
091	Structure	Metal rim to void 090	1
092	Structure	Brick surround of void 090	1
093	Structure	Wooden beam	1
094	Structure	Wooden beam	1
095	Layer	Flagstone floor	1
096	Layer	Large flat slab	1
097	Structure	Wooden plank	1
098	Structure	Wooden plank	1
099	Structure	Wooden plank	1
100	Structure	Brick, hole fillers	1

No	Type	Description	Phase
101	Structure	Wooden plank	1
102	Structure	Wooden plank	1
103	Structure	Wooden plank debris	1
104	Structure	Wooden plank debris	1
105	Structure	Wooden plank	1
106	Structure	Wooden plank	1
107	Layer	Brick infill	1
108	Structure	Bob Pit	2
109	Structure	South wall of Bob pit	2
110	Structure	West wall of Bob pit	2
111	Structure	North wall of Bob pit	2
112	Structure	East wall of Bob pit	2
113	Structure	Central pin mounting	2
114	Void	Central channel	2
115	Void	Bolting hole	2
116	Structure	Surround of bolting hole	2
117	Structure	Wooden lining of void 115	2
118	Feature	Bolting pin	2
119	Void	Bolting hole	2
120	Structure	Surround of bolting hole	2
121	Structure	Wooden lining of void 119	2
122	Feature	Bolting pin	2
123	Void	Bolting hole	2
124	Structure	Surround of bolting hole	2
125	Structure	Wooden lining of void 123	2
126	Feature	Bolting pin	2
127	Void	Bolting Hole	2
128	Structure	Surround of bolting hole	2
129	Structure	Wooden lining of void 127	2
130	Feature	Bolting pin	2
131	Void	Bolting hole	2
132	Structure	Surround of bolting hole	2
133	Structure	Wooden lining of void 131	2
134	Feature	Bolting pin	2
135	Void	Bolting hole	2
136	Structure	Surround of bolting hole	2
137	Structure	Wooden lining of void 135	2
138	Feature	Bolting pin	2
139	Void	Bolting hole	2
140	Structure	Surround of bolting hole	2
141	Structure	Wooden lining of void 139	2
142	Feature	Bolting pin	2
143	Void	Bolting Hole	2
144	Structure	Surround of bolting hole	2
145	Structure	Wooden lining of void 143	2
146	Feature	Bolting pin	2
147	Void	North well	2
148	Structure	Wooden beam cutting void 147	2
149	Structure	Metal bolting pin	2
150	Structure	Metal bolting plate	2
151	Structure	Lower wooden beam in void 147	2

No	Type	Description	Phase
152	Void	Central tunnel in bob pit	2
153	Structure	Brick arch over void 152	2
154	Void	Southern well of the bob pit	2
155	Void	Beam slot	2
156	Structure	Bolting pin	2
157	Void	Beam slot	2
158	Structure	Bolting pin	2
159	Structure	Lower wooden beam in void 154	2
160	Structure	South facing brick arch over 152	2
161	Void	Back bolt run in 017	2
162	Feature	Bolting pin in void 161	2
163	Void	Back bolt run in 018	2
164	Feature	Bolting pin in void 163	2

Context Record for Area B

No	Type	Description	Phase
165	Structure	Engine House	1
166	Structure	Engine block	1
167	Structure	Millstone grit engine block	1
168	Structure	Millstone grit engine block	1
169	Structure	Millstone grit engine block	1
170	Structure	Millstone grit engine block	1
171	Structure	Millstone grit engine block	1
172	Structure	Millstone grit engine block	1
173	Structure	Millstone grit engine block	1
174	Structure	Millstone grit engine block	1
175	Structure	Millstone grit engine block	1
176	Structure	Millstone grit engine block	1
177	Structure	Millstone grit engine block	1
178	Structure	Millstone grit engine block	1
179	Structure	Millstone grit engine block	1
180	Structure	Millstone grit engine block	1
181	Structure	Millstone grit engine block	1
182	Structure	Millstone grit engine block	1
183	Structure	Millstone grit engine block	1
184	Structure	Millstone grit engine block	1
185	Structure	Millstone grit engine block	1
186	Structure	Millstone grit engine block	1
187	Void	Circular bolt hole in block 167	1
188	Structure	Bolting pin in void 187	1
189	Void	Circular bolt hole in block 167	1
190	Structure	Bolting pin in void 189	1
191	Feature	Carved letter "A" on block 167	1
192	Feature	3 Construction marks on 167,168	1
193	Feature	Wheel mounting in both 167,168	1
194	Feature	Worn groove central to 193	1
195	Void	Circular bolt hole in block 168	1
196	Structure	Bolting pin in void 195	1
197	Void	Circular bolt hole in block 168	1
198	Structure	Bolting pin in void 197	1
199	Feature	Carved letter "A" on block 168	1
200	Feature	2 Construction marks on 168,169	1
201	Structure	Carved shelf on blocks 167,168	1
202	Void	Circular bolt hole in block 169	1
203	Structure	Bolting pin in void 202	1
204	Void	Circular bolt hole in block 169	1
205	Structure	Bolting pin in void 204	1
206	Feature	Lewis hole in block 167	1
207	Feature	Lewis hole in block 168	1
208	Feature	Lewis hole in block 169	1
209	Feature	Carved letter "A" on block 169	1
210	Feature	Engine mounting	1
211	Structure	Carved shelf on block 169	1
212	Feature	1 construction mark on 169,170	1

No	Type	Description	Phase
213	Structure	Semi-circular engine mount	1
214	Void	Circular bolt hole in block 170	1
215	Structure	Bolting pin in void 214	1
216	Void	Circular bolt hole in block 170	1
217	Structure	Bolting pin in void 216	1
218	Feature	Carved letter "A" on block 170	1
219	Structure	Rectangular engine mount on 170	1
220	Structure	Rectangular shelf on block 170	1
221	Feature	6 inch steam inlet	1
222	Feature	Carved letter "B" on block 171	1
223	Feature	Lewis hole in block 171	1
224	Structure	Rectangular engine mount on 171	1
225	Void	Circular bolt hole in block 171	1
226	Structure	Bolting pin in void 225	1
227	Structure	Lead packing in void 225	1
228	Feature	3 construction marks on 171,172	1
229	Void	Bolt hole on junction of 171,172	1
230	Structure	Bolting pin in void 229	1
231	Void	Bolt hole on junction of 171,172	1
232	Structure	Bolting pin in void 231	1
233	Structure	Carved circular engine mount	1
234	Void	Circular bolt hole in block 172	1
235	Structure	Bolting pin in void 234	1
236	Structure	Lead packing in void 234	1
237	Feature	Lewis hole in block 172	1
238	Feature	Carved letter "B" on block 172	1
239	Structure	Large sloping cut in block 172	1
240	Structure	Carved shelf on block 172	1
241	Feature	Wheel mounting in block 172	1
242	Feature	Worn groove central to 241	1
243	Void	Circular bolt hole in block 172	1
244	Structure	Bolting pin in void 243	1
245	Void	Circular bolt hole in block 172	1
246	Structure	Bolting pin in void 245	1
247	Feature	2 construction marks on 172,173	1
248	Feature	Lewis hole in block 173	1
249	Structure	Carved shelf on block 173	1
250	Feature	Carved letter "B" on block 173	1
251	Feature	Carved letter "B" on block 173	1
252	Void	Circular bolt hole in block 173	1
253	Structure	Bolting pin in void 252	1
254	Void	Circular bolt hole in block 173	1
255	Structure	Bolting pin in void 254	1
256	Void	Circular bolt hole in block 174	1
257	Structure	Bolting pin in void 256	1
258	Void	Circular bolt hole in block 174	1
259	Structure	Bolting pin in void 258	1
260	Feature	Carved letter "B" on block 174	1
261	Structure	Carved engine mount on block 174	1
262	Structure	Carved engine mount on block 174	1
263	Structure	Carved engine mount on block 174	1

No	Type	Description	Phase
264	Structure	Millstone grit engine block	1
265	Void	Hot well	1
266	Layer	Oil waste	1
267	Later	Brick hot well floor	1
268	Feature	Machine cut in block 184	1
269	Void	Bolting hole in block 184	1
270	Structure	Bolting pin in void 269	1
271	Structure	Holding bolt on pin 270	1
272	Layer	Oil waste	1
273	Layer	Brick floor	1
274	Void	Bolting hole in block 184	1
275	Structure	Bolting pin with square nut	1
276	Void	Bolting hole in block 184	1
277	Structure	Bolting pin with horseshoe nut	1
278	Layer	Oil waste	1
279	Feature	Wheel type pit in 175,177	1
280	Feature	Worn groove in base of 279	1
281	Void	Bolt hole in block 176	1
282	Structure	Bolting pin in void 281	1
283	Layer	Destruction debris	1
284	Feature	Feeder pipe	1
285	Layer	Unsafe destruction debris	1
286	Void	Stack	1
287	Structure	Stack walls	1
288	Void	Entrance from flue to stack	1
289	Structure	Metal lintel of void 288	1
290	Void	Flue	1
291	Structure	Brick arch over flue 290	1
292	Structure	South brick wall of flue 290	1
293	Structure	North wall of engine house	1
294	Structure	West wall of Engine house	1
295	Void	Beam slot in wall 294	1
296	Void	Bolt hole in wall 294	1
297	Structure	Surround of void 296	1
298	Structure	Wooden lining of void 296	1
299	Structure	Metal bolting pin in void 296	2
300	Void	Bolt hole in wall 294	1
301	Structure	Surround of void 300	1
302	Structure	Wooden lining of void 300	1
303	Structure	Metal bolting pin in void 300	2
304	Void	Bolt hole in wall 294	1
305	Structure	Surround of void 304	1
306	Structure	Wooden lining of void 304	1
307	Structure	Metal bolting pin in void 304	1
308	Structure	Wall abutting 294	1
309	Void	Doorway between engine and boiler	1
310	Structure	Brick archway	1
311	Structure	Bolting pin	1
312	Structure	West wall of Engine house	1
313	Structure	Brick lining of wall 312	1
314	Structure	Brick platform support	1

No	Type	Description	Phase
315	Structure	Brick machine mount	1
316	Structure	Bolting pin in 315	1
317	Structure	Bolting pin in 315	1
318	Structure	Bolting pin in 315	1
319	Structure	Bolting pin in 315	1
320	Structure	Millstone grit block	1
321	Layer	Unexcavated destruction debris	1
322	Structure	West wall of engine house	1
323	Structure	Brick end to wall 322	1
324	Structure	Brick wall abutting 315	1
325	Structure	Shale wall underlying 324	1
326	Structure	Concrete platform	1
327	Structure	Concrete platform underlying 326	1
328	Structure	Shale base for concrete 327	1
329	Structure	Brick lining of 326	1
330	Structure	Brick wall	1
331	Structure	Shale wall underlying 330	1
332	Feature	Bolting pin in 326	1
333	Feature	Bolting pin in 326	1
334	Structure	Shale platform	1
335	Structure	Brick lining of platform 334	1
336	Structure	Fireplace	1
337	Void	Pipe hole in wall 322	1
338	Feature	Metal outlet pipe	1
339	Structure	Boiler house	1
340	Layer	Destruction debris	1
341	Structure	Central wall of boiler house	1
342	Structure	Brick plinth on wall 341	1
341	Structure	North wall of boiler house	1
342	Void	Possible wheel pit	1
343	Structure	Brick blocking of void 342	1
344	Structure	West wall of wheel pit	1
345	Structure	East wall of wheel pit	1
346	Structure	Brick wall underlying 341	1
347	Structure	Brick lining north wall 339	1
348	Structure	Brick platform abutting 347	1
349	Void	Flue through wall 294	1
350	Feature	Metal surround of void 349	1
351	Feature	Iron flue door	1
352	Structure	Brick wall leading to 349	1
353	Structure	Brick wall abutting 341	1
354	Structure	Coal bunker	1
355	Layer	Destruction debris	1
356	Structure	North wall of coal bunker 354	1
357	Structure	West wall of coal bunker 354	1
358	Structure	South wall of coal bunker 354	1
359	Void	Doorway between 339 and 354	1
360	Feature	Coal Shute	1
361	Structure	Brick lining of coal chute 360	1
362	Structure	Wooden upright associated with 360	1
363	Structure	Shale wall west of wall 357	1
364	Void	Beam slot in wall 357	1

No	Type	Description	Phase
365	Structure	Brick liner of void 364	1
366	Layer	Unstratified material from Area 1	3

Appendix Four: Catalogue of site archive

The site archive is currently held at GGAT, Swansea, as Site 236, classified according to the NMR categories of archive material, and includes the following:

- A. Copy of the report
- B. Notes made during excavation, including site notebook, contexts sheets
- C. Drawing catalogue, site drawings
- D. Site photographs - catalogue, colour transparencies, BW contact sheet
- E. Finds catalogue, individual finds records, finds reports
- I. Archive reports, drafts of the final report
- J. Publication drawings
- K. Press releases etc.
- L. Brief and specification for the report
- M. Miscellaneous correspondence
- N. General miscellaneous

There is no material in classes F G H

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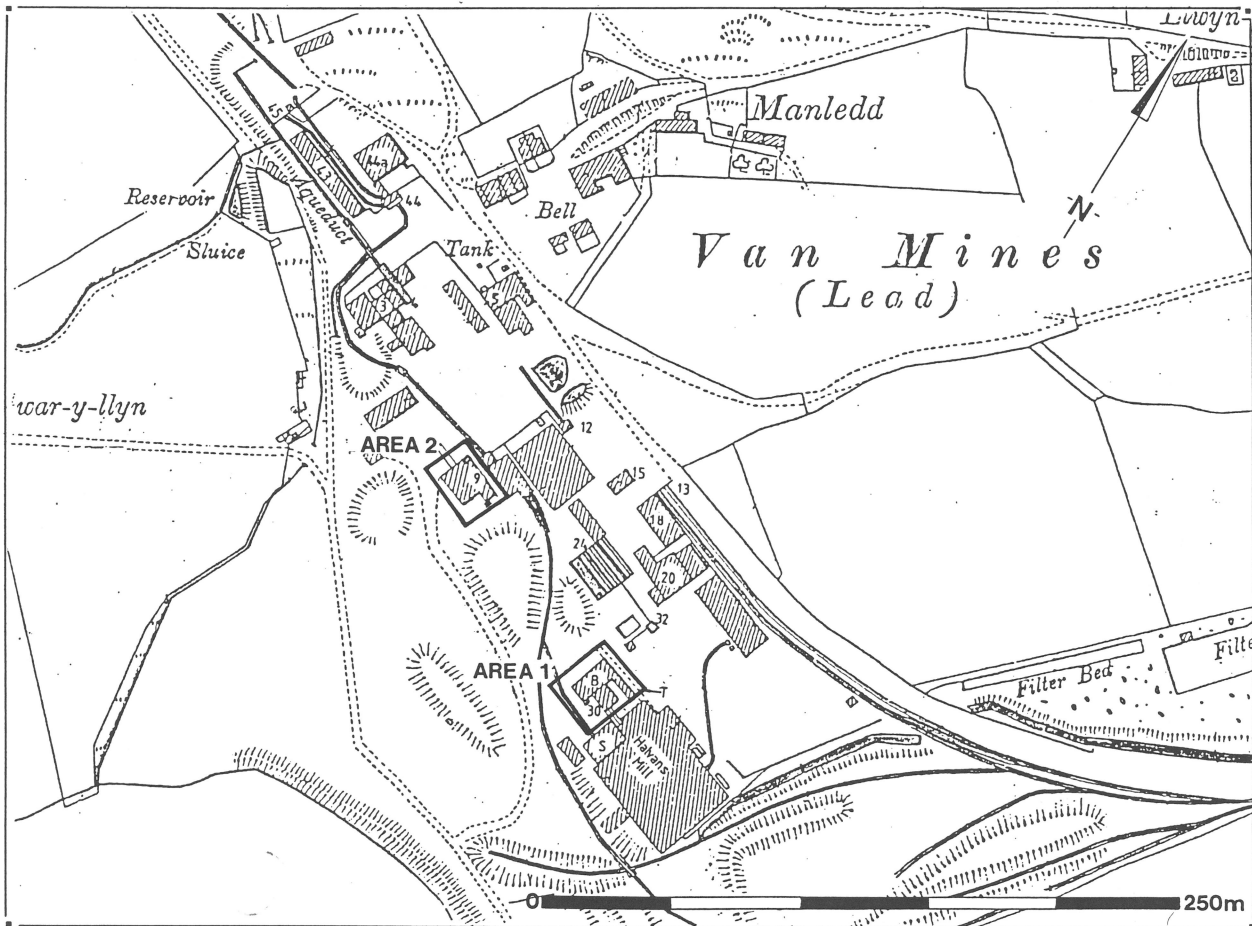
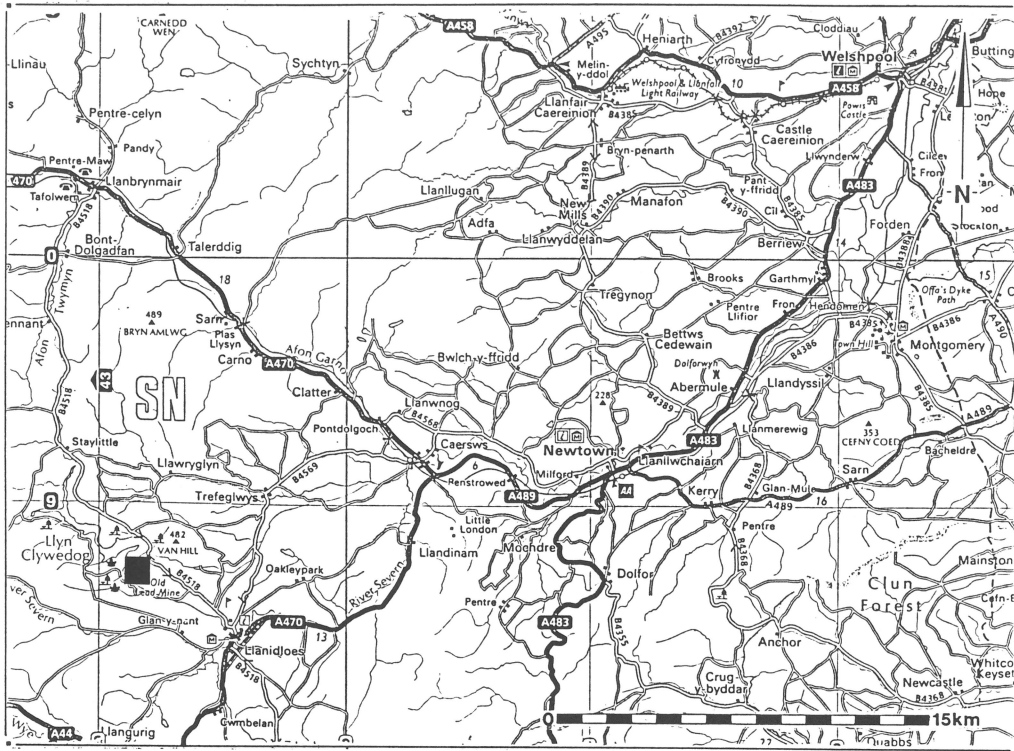


Figure 1 Site location plans identifying the two areas of excavation

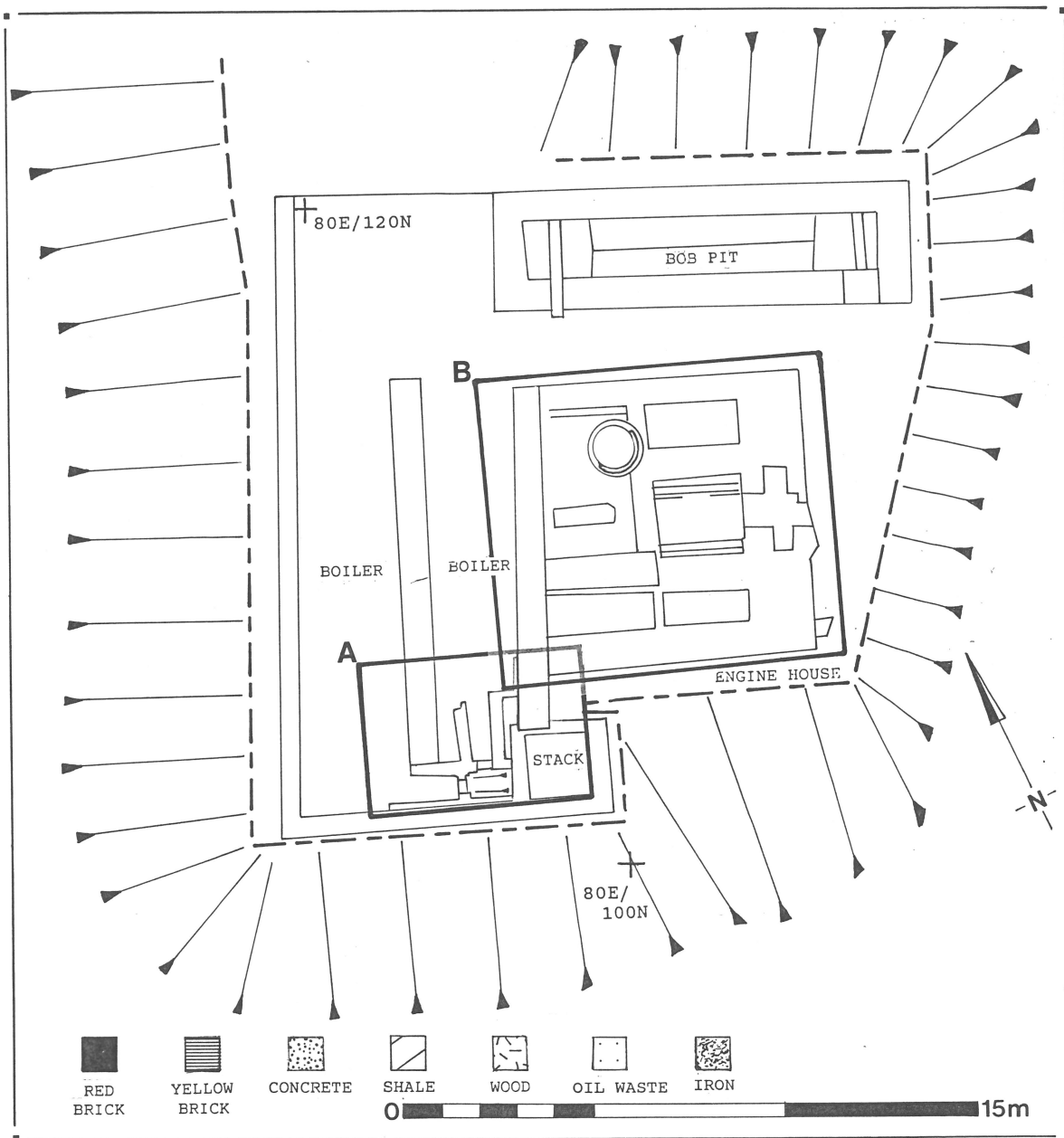


Figure 2: Layout of structures in Area 1 (the key is for all drawings)

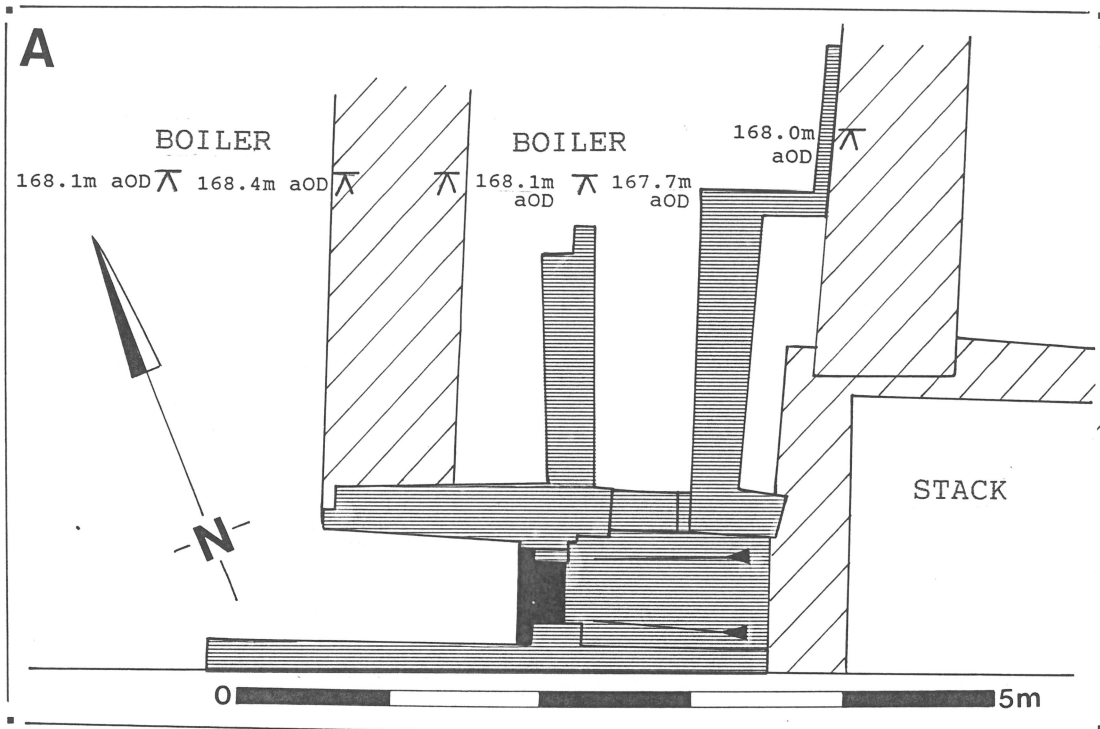


Figure 3: Detail of flue system showing later blocking

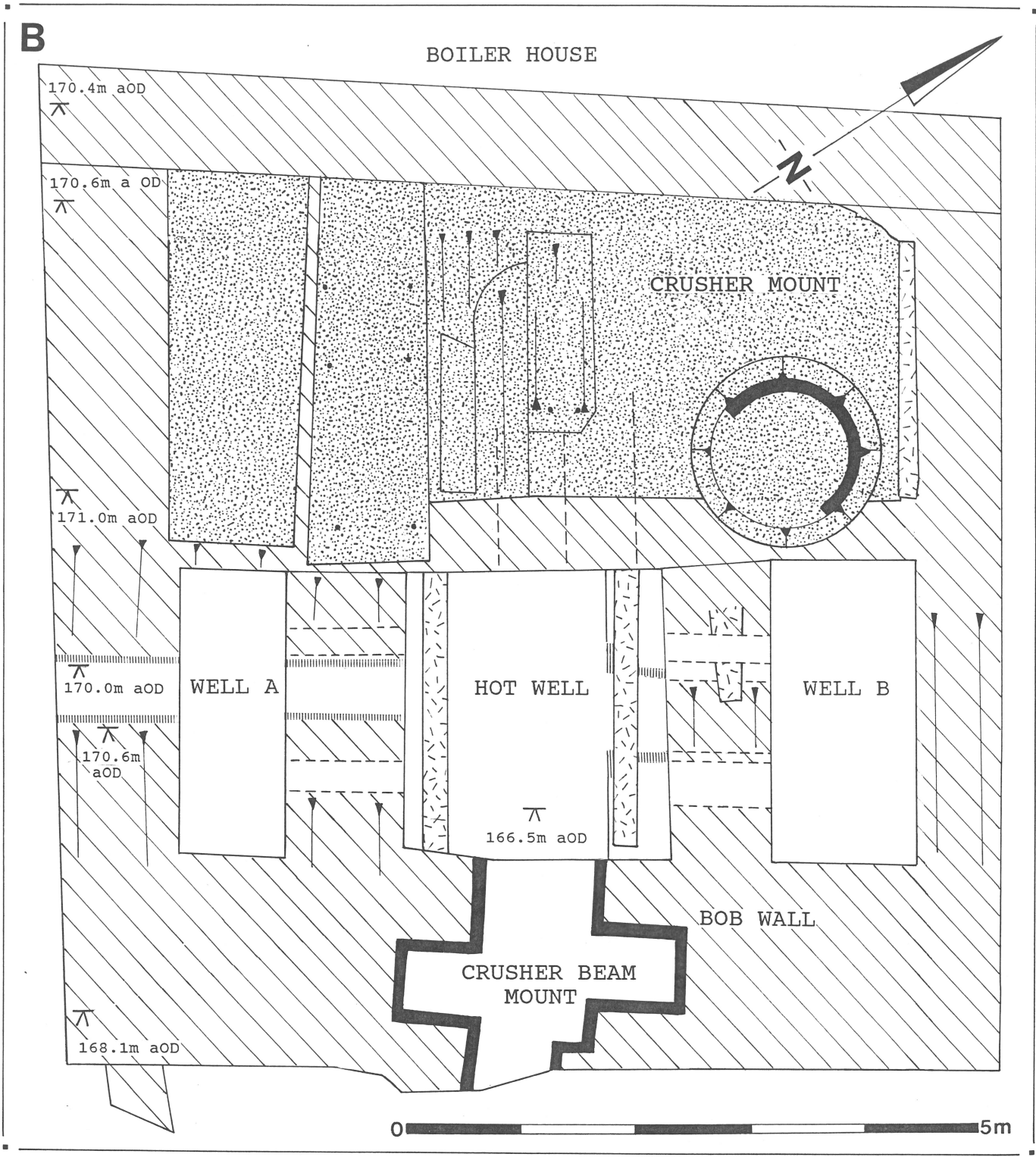


Figure 4: Plan view of engine house (see fig 6)

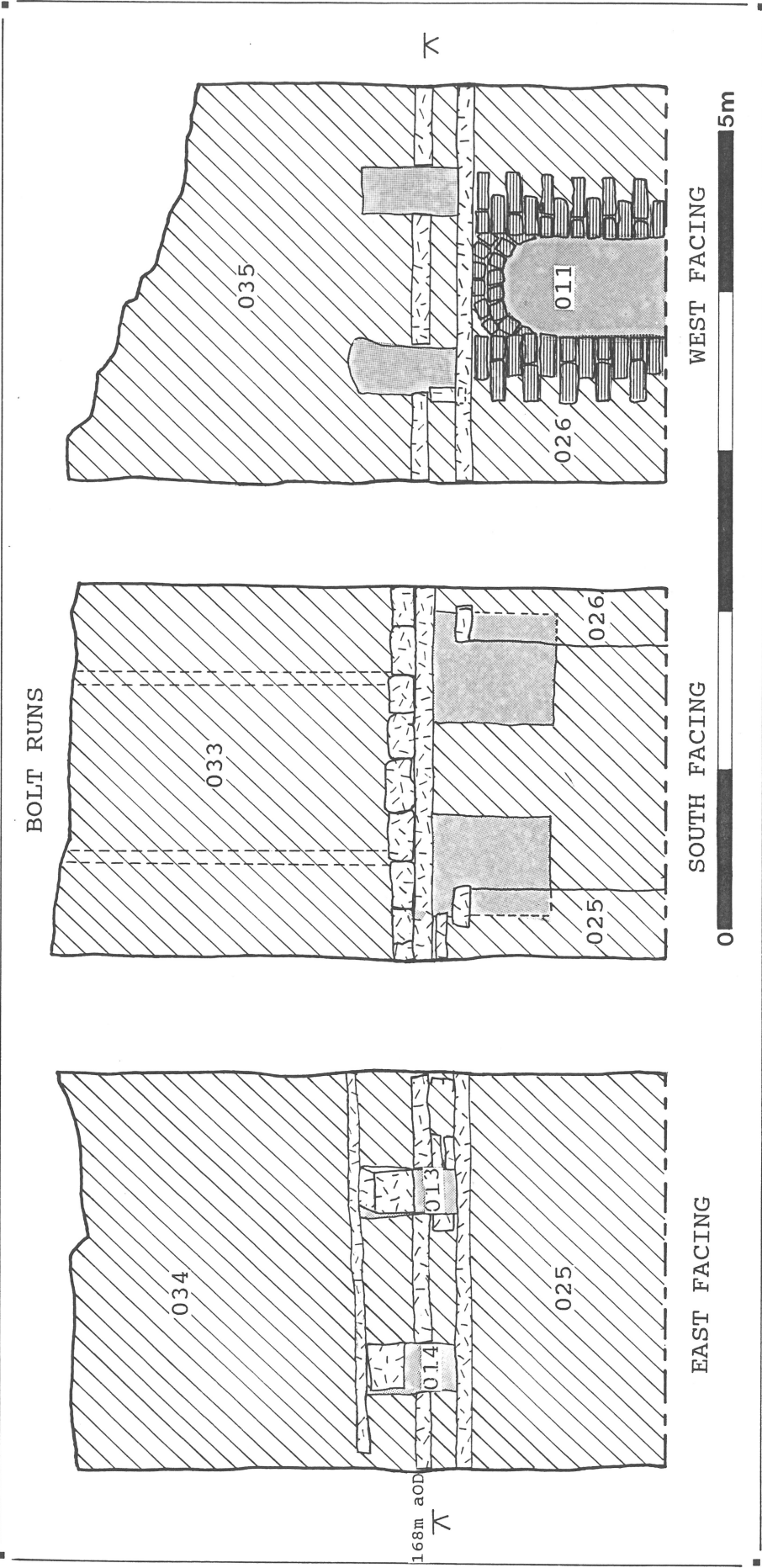


Figure 5: Elevations of the central Hot Well

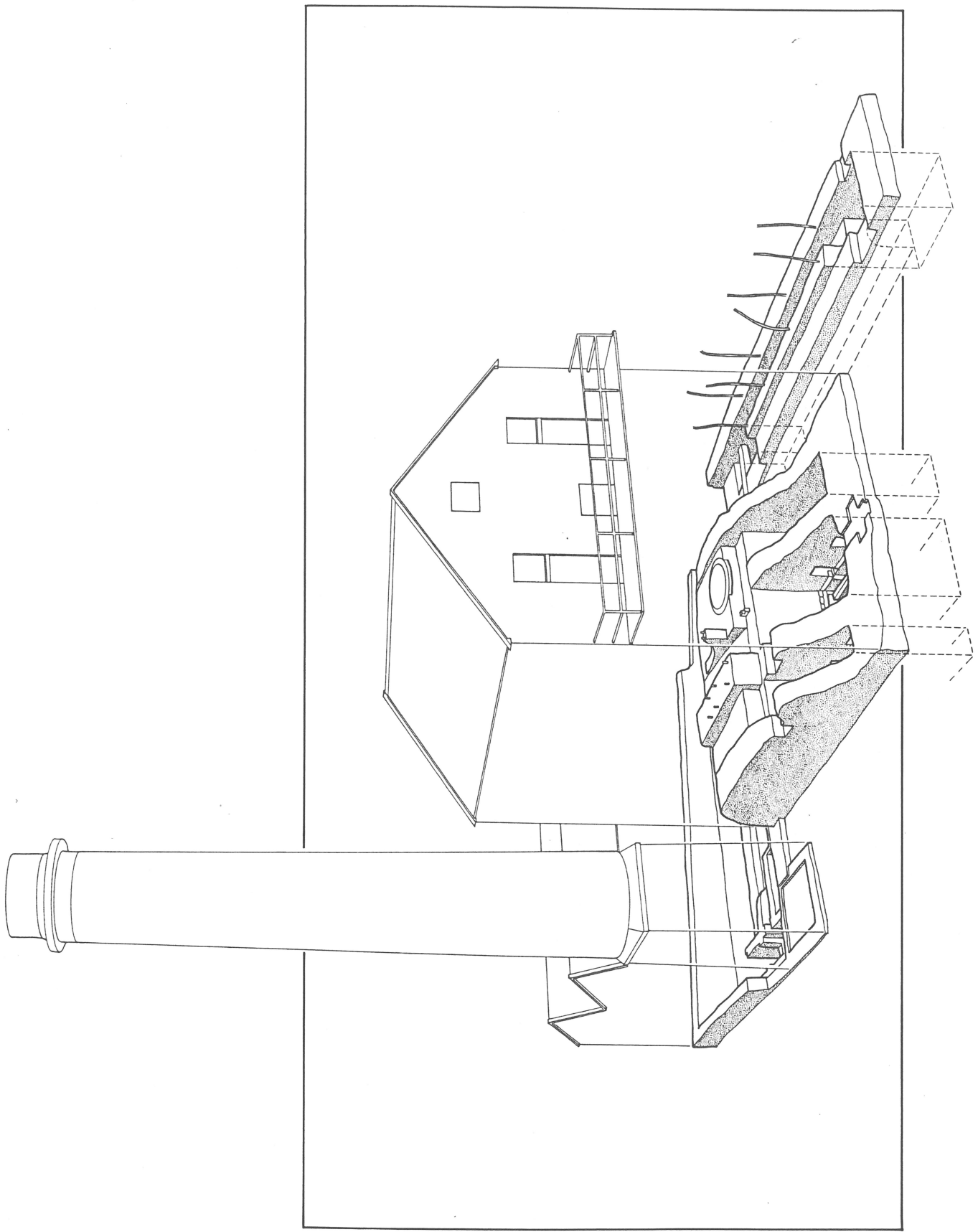


Figure 6: Isometric drawing of remaining structures and projected reconstruction

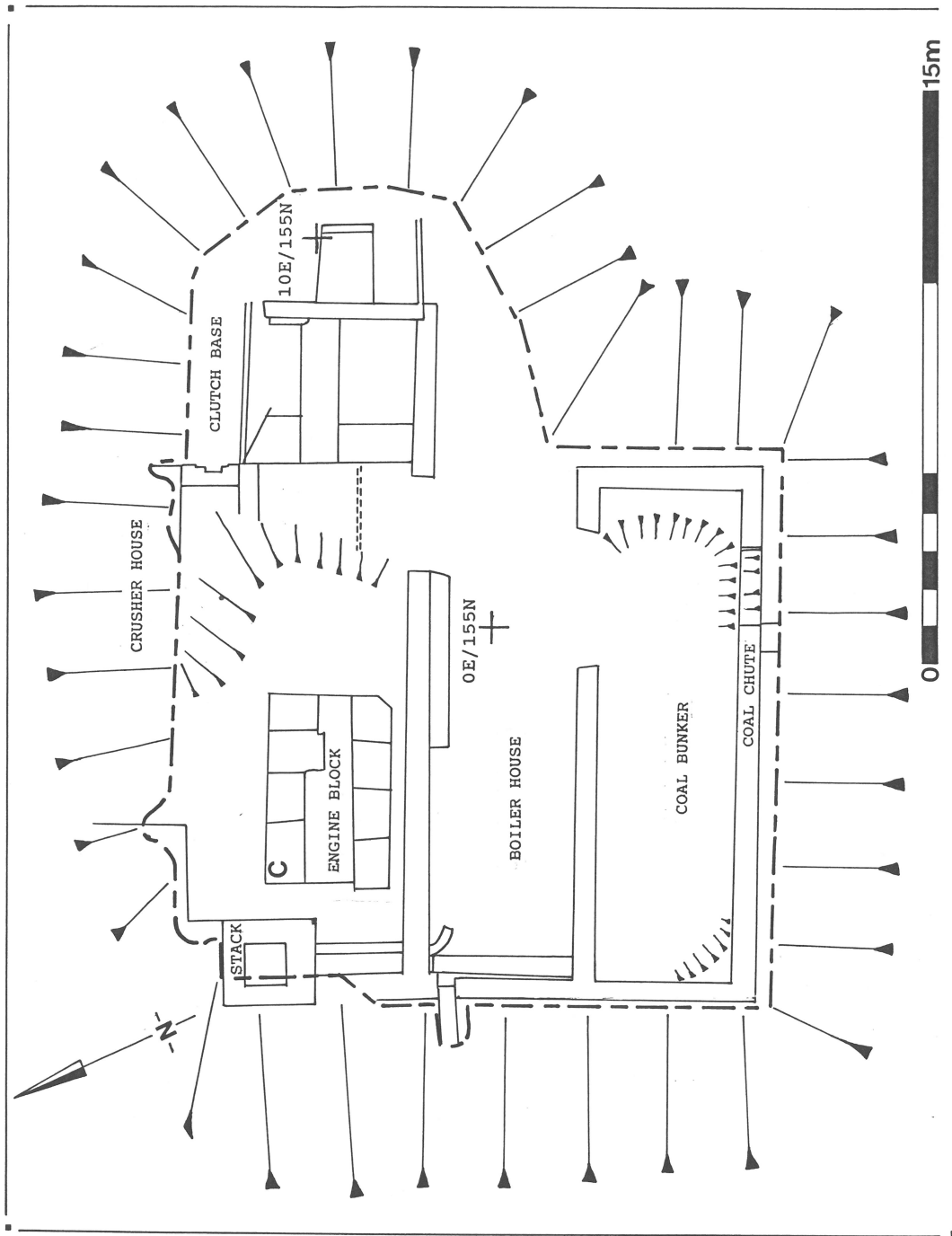


Figure 7: Layout of structures in Area 2

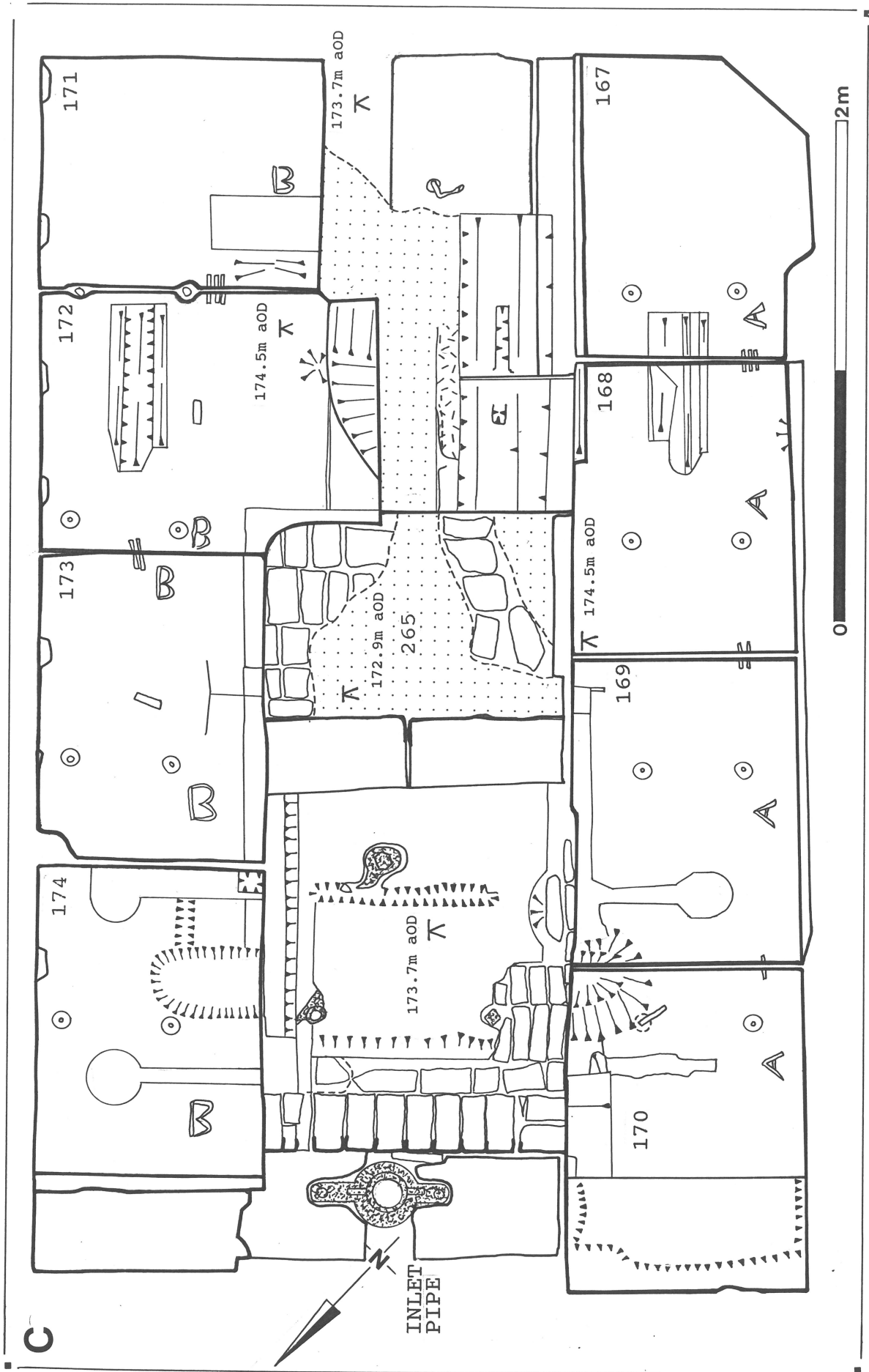


Figure 8: Detailed plan of engine block in Area 2

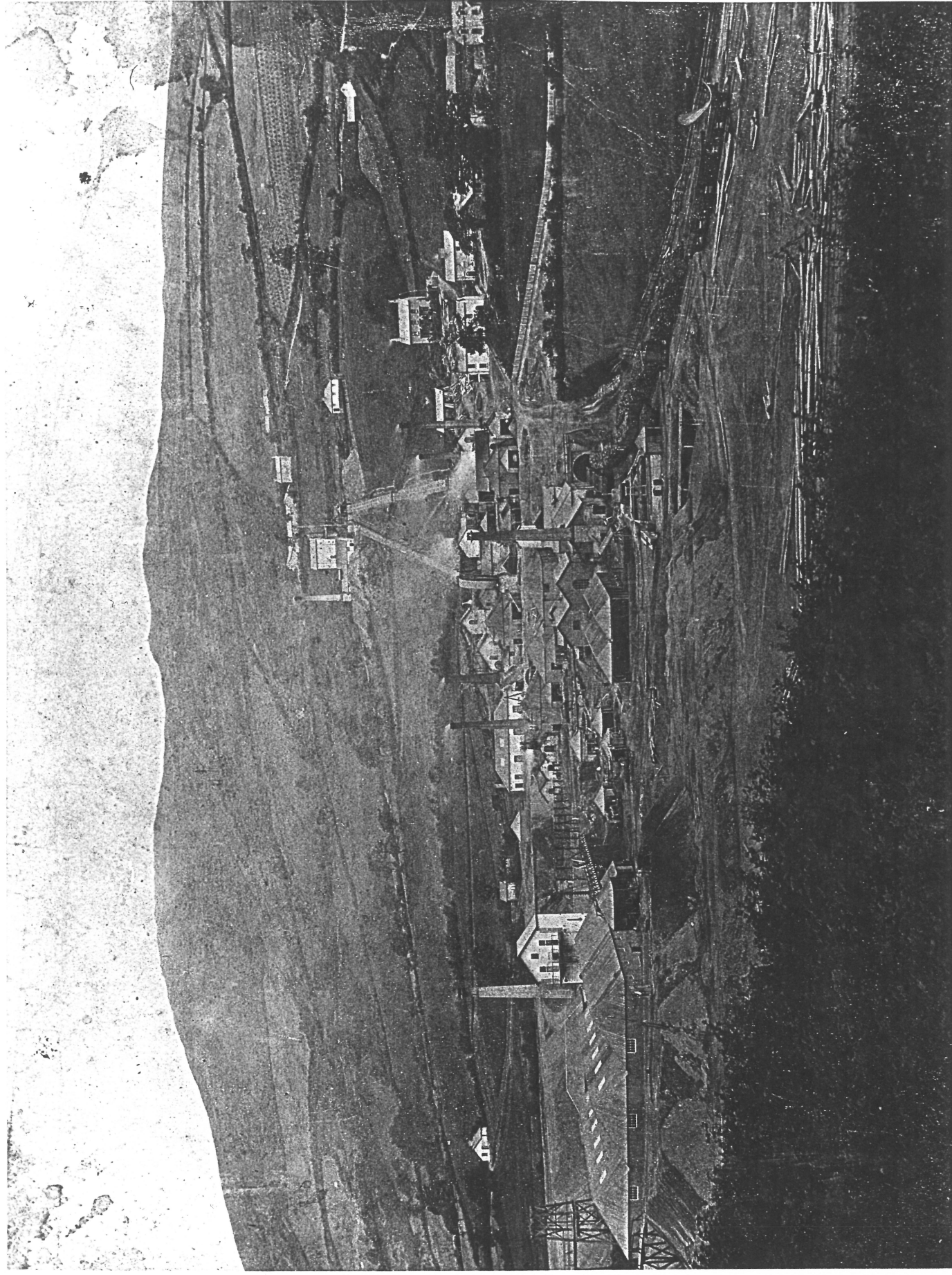


Plate 1: A view of the Van Lead Mine taken c .1890 (photograph held at the National Industrial and Maritime Museum Archive Office, Cardiff)



Plate 2: A view of the Van Lead Mine taken during excavation

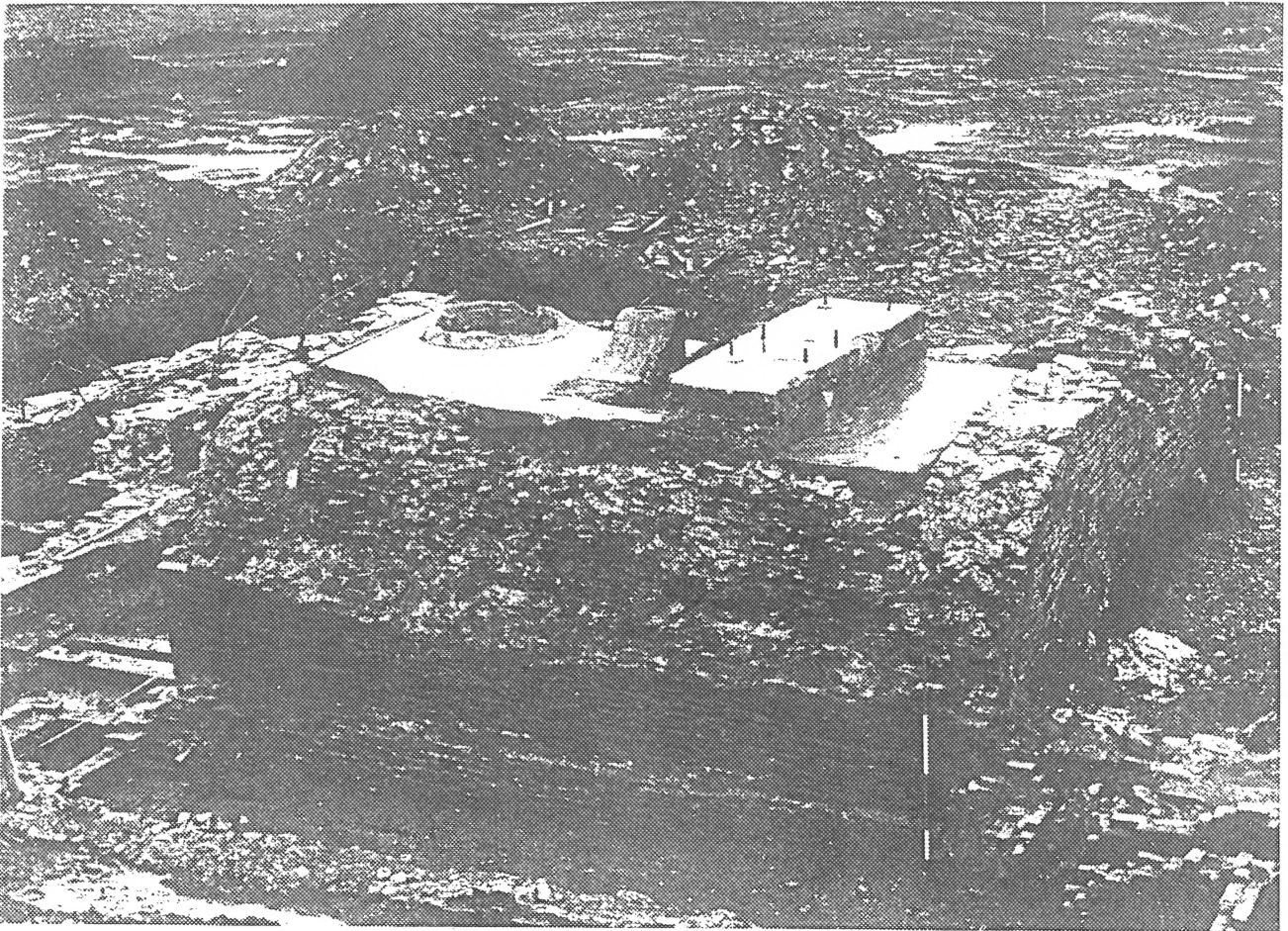


Plate 3: The number 30 engine house from the northwest. The boiler house is visible in the foreground, and building 29 can be seen to the left. (2m scale)



Plate 4: The number 30 engine house from the south (2m scale)

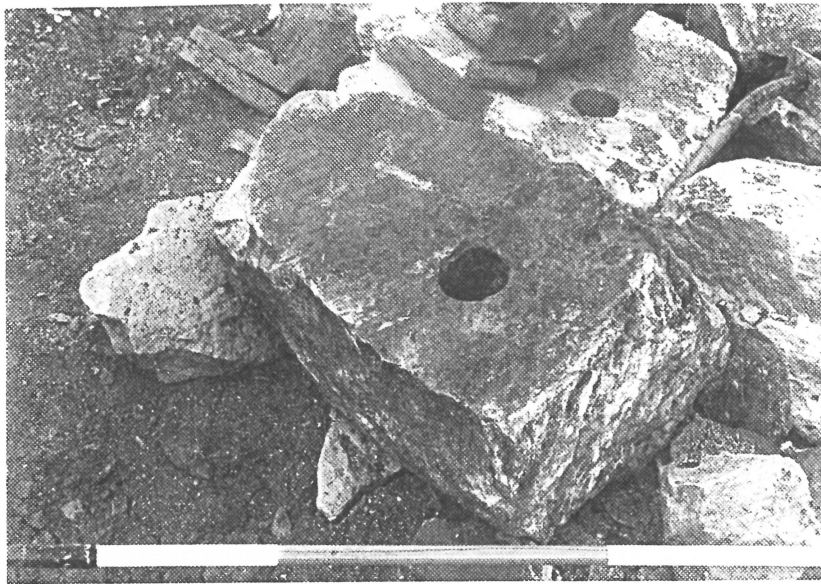


Plate 5: Remains of the engine block from Area 1
(scale divisions 0.50m)

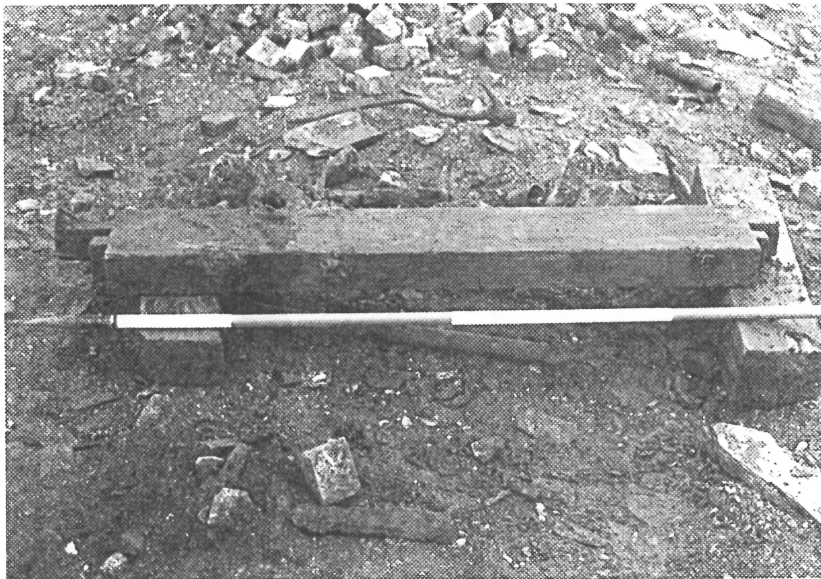


Plate 6: Remains of the possible Bob beam
(scale divisions 0.50m)



Plate 7: Detail of iron fitting on Bob beam
(scale division 0.50m)

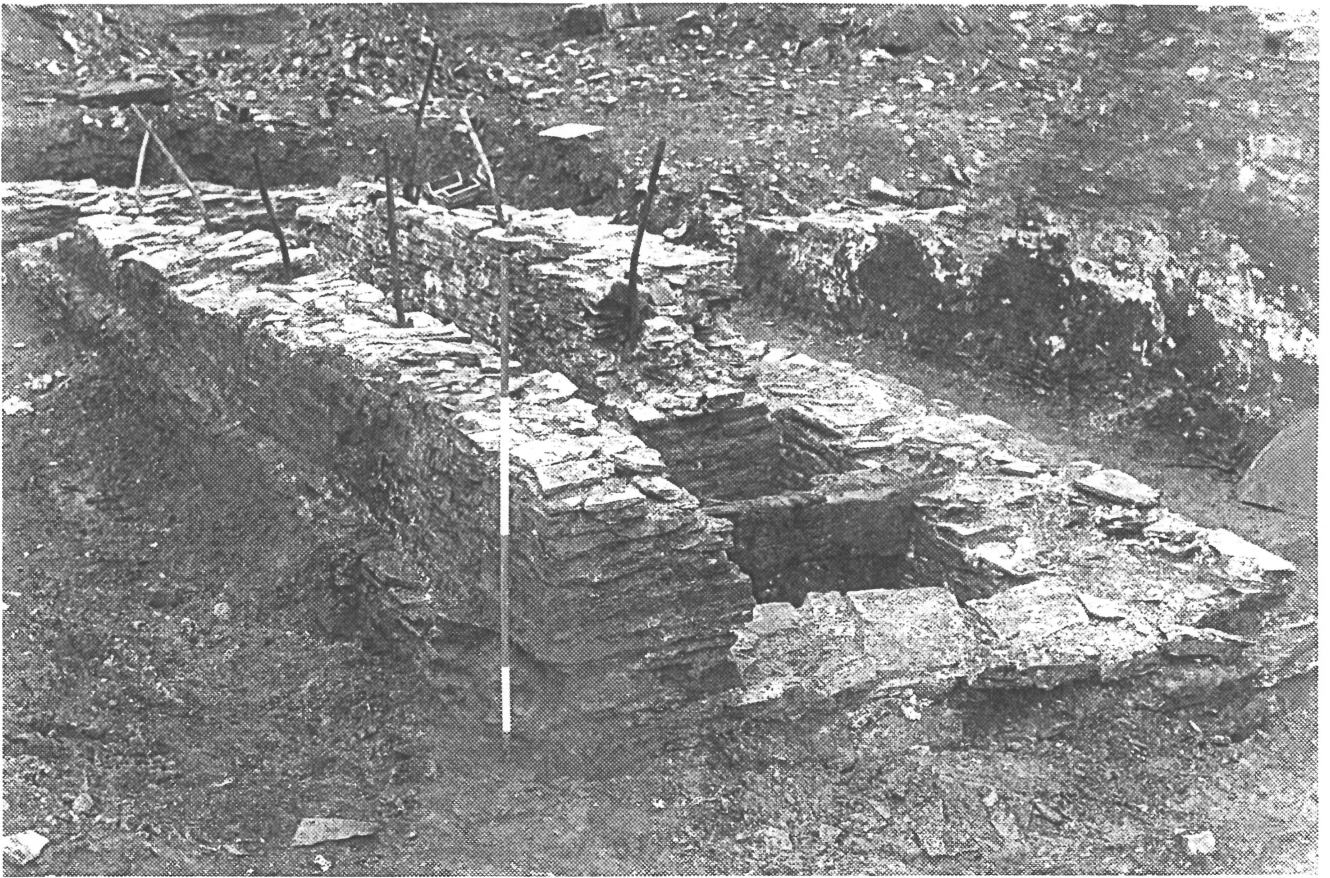


Plate 8: Building number 29 from the north (2m scale)



Plate 9: Building 29 from the northwest (2m scale)

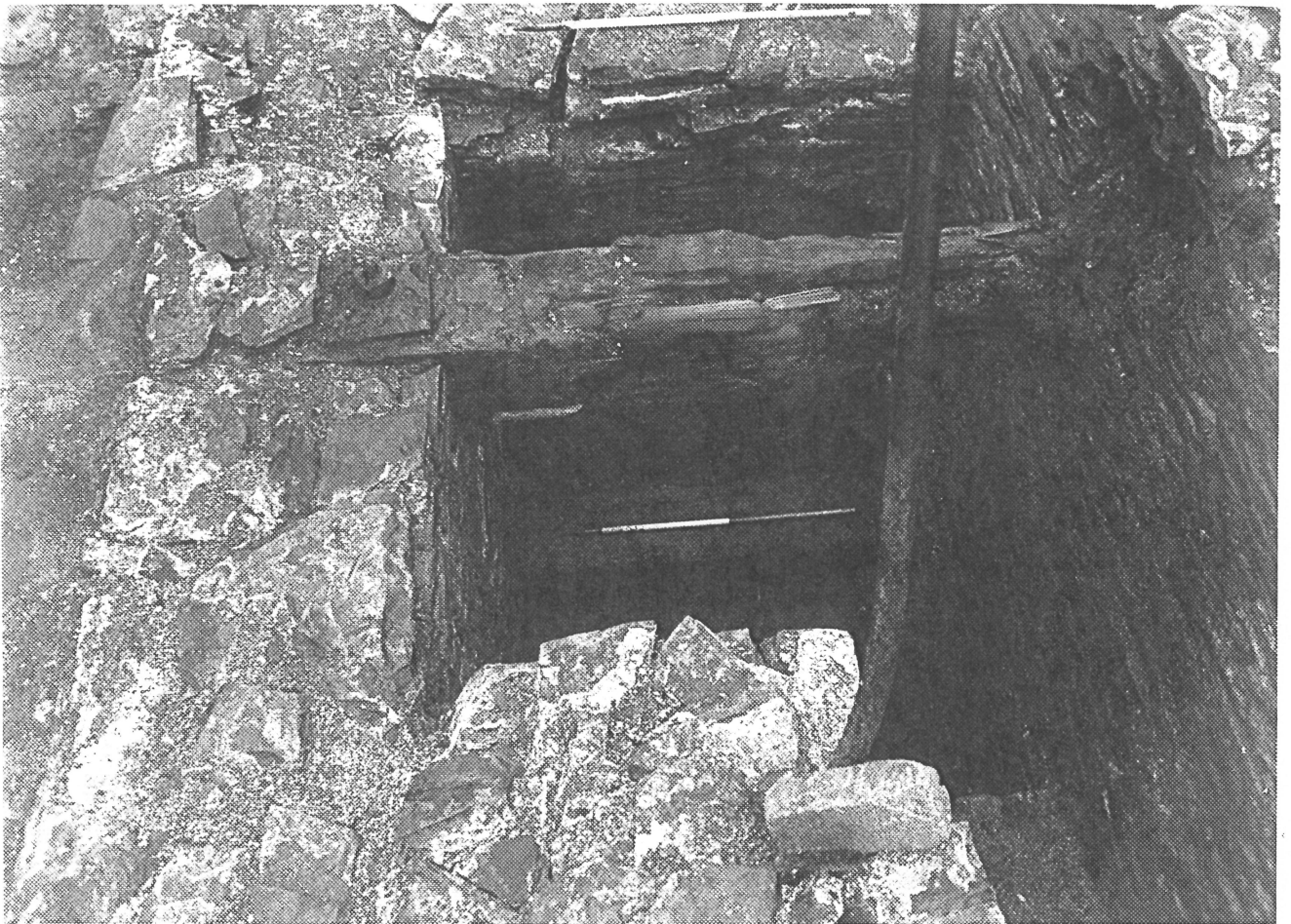


Plate 10: West well of building 29 from the southeast (1m scale)



Plate 11: West end of the brick lined lower culvert (1m scale)

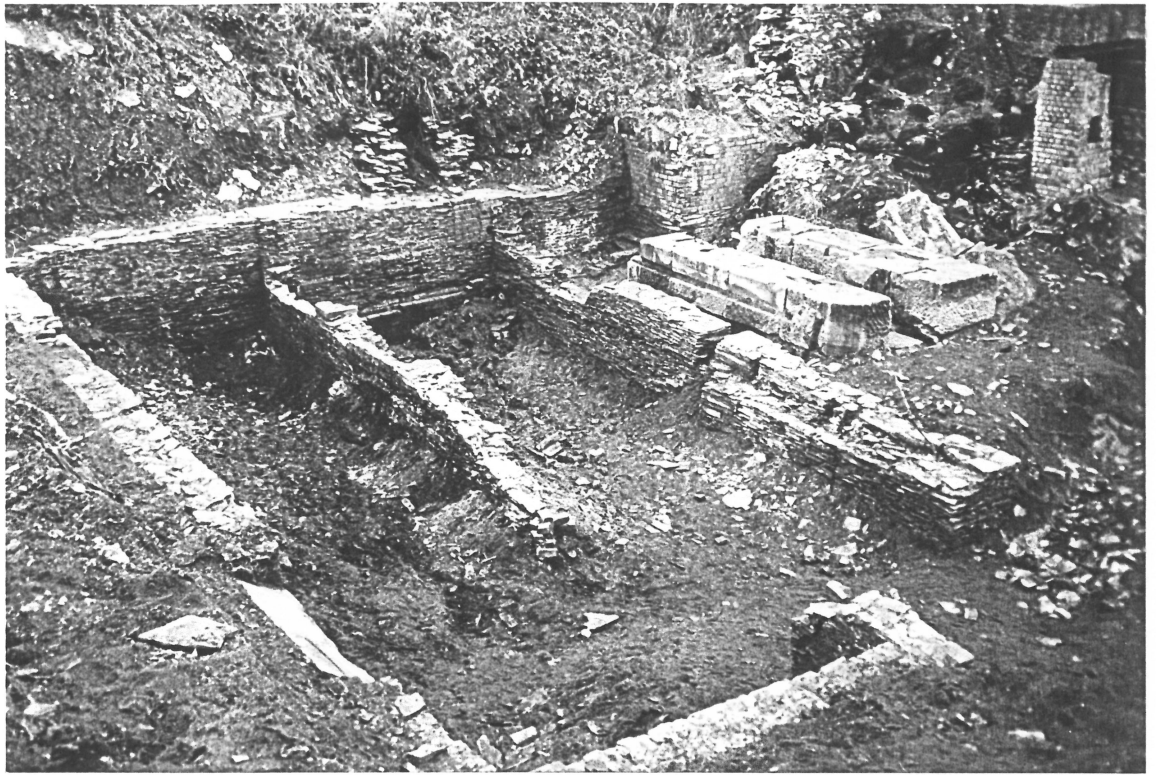


Plate 12: General shot of Area 2 from the south, with the engine block to the right

Plate 13:

General shot of the engine block from the northwest, with the possible clutch base at the rear.



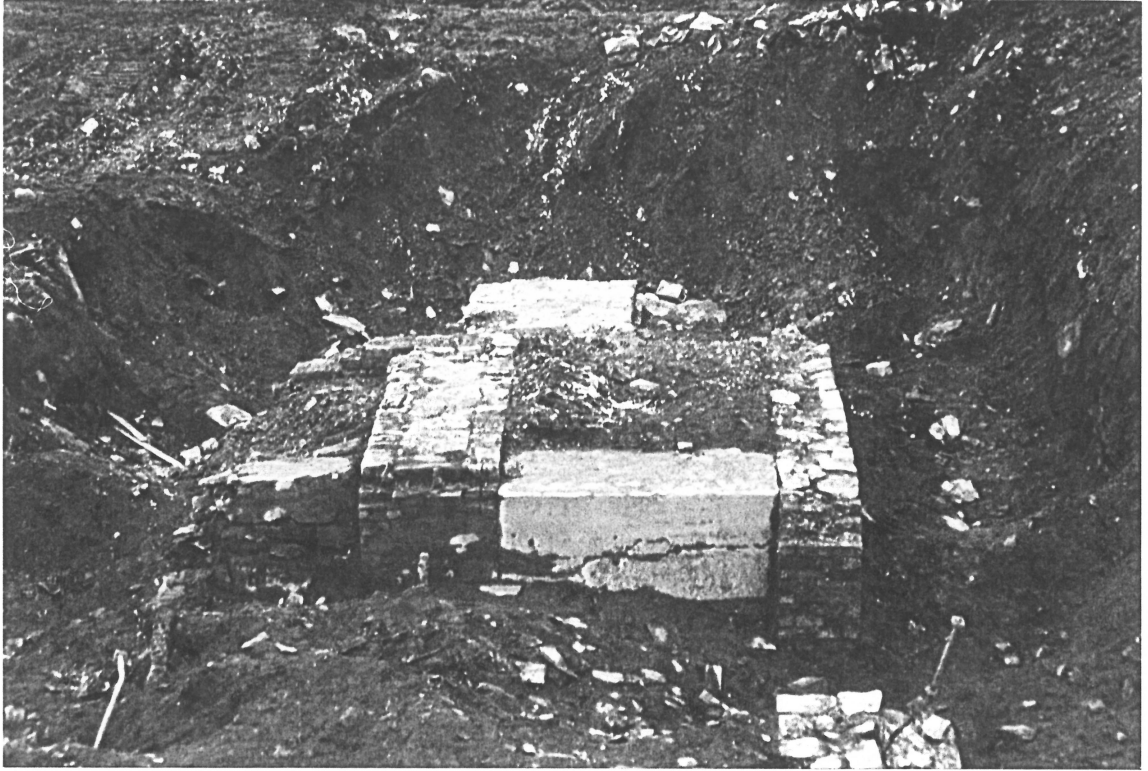


Plate 14: View of the possible clutch base from the northwest



Plate 15: View of the possible clutch base from the south

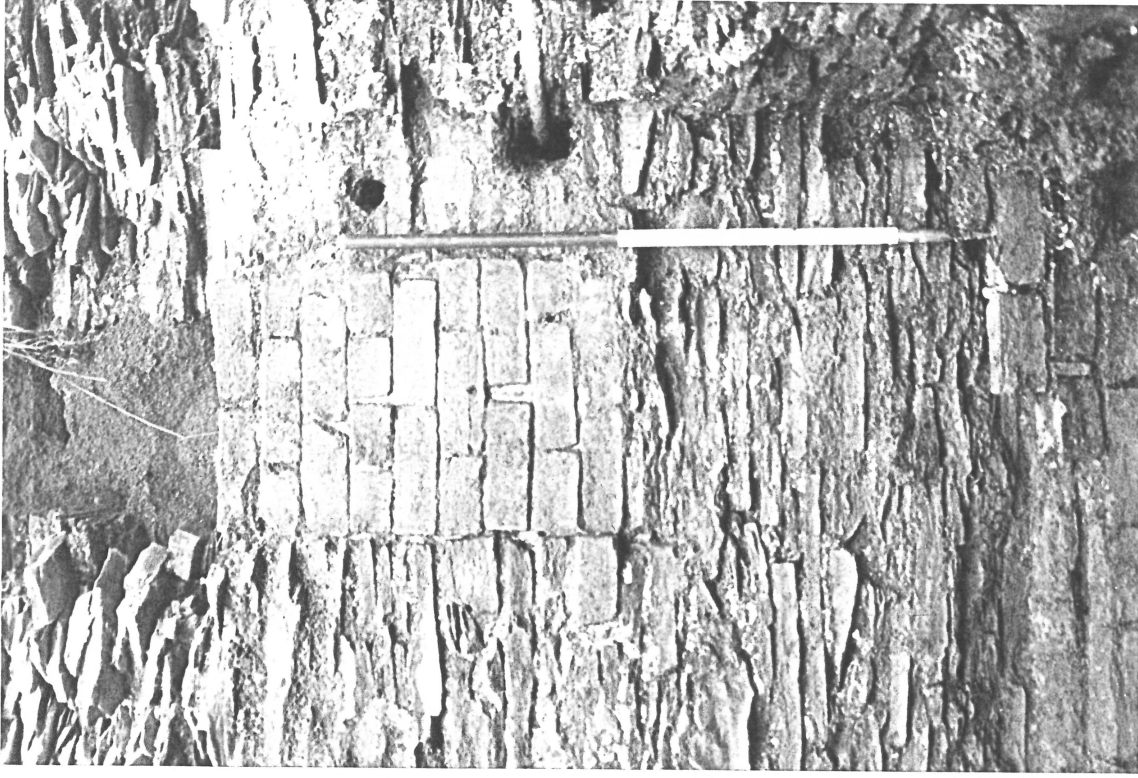


Plate 17: Later blocking of the flywheel pit
(1m scale)

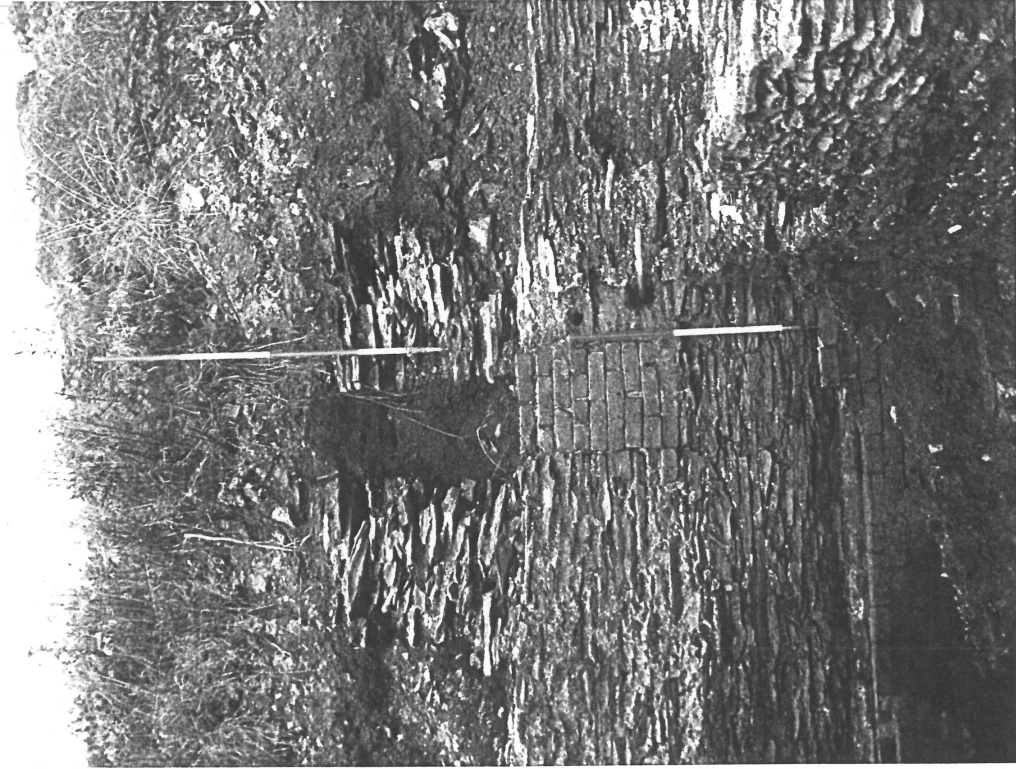


Plate 16: View of the flywheel pit located on
the northwest wall of the boiler house
in Area 2 (1m and 2m scale)

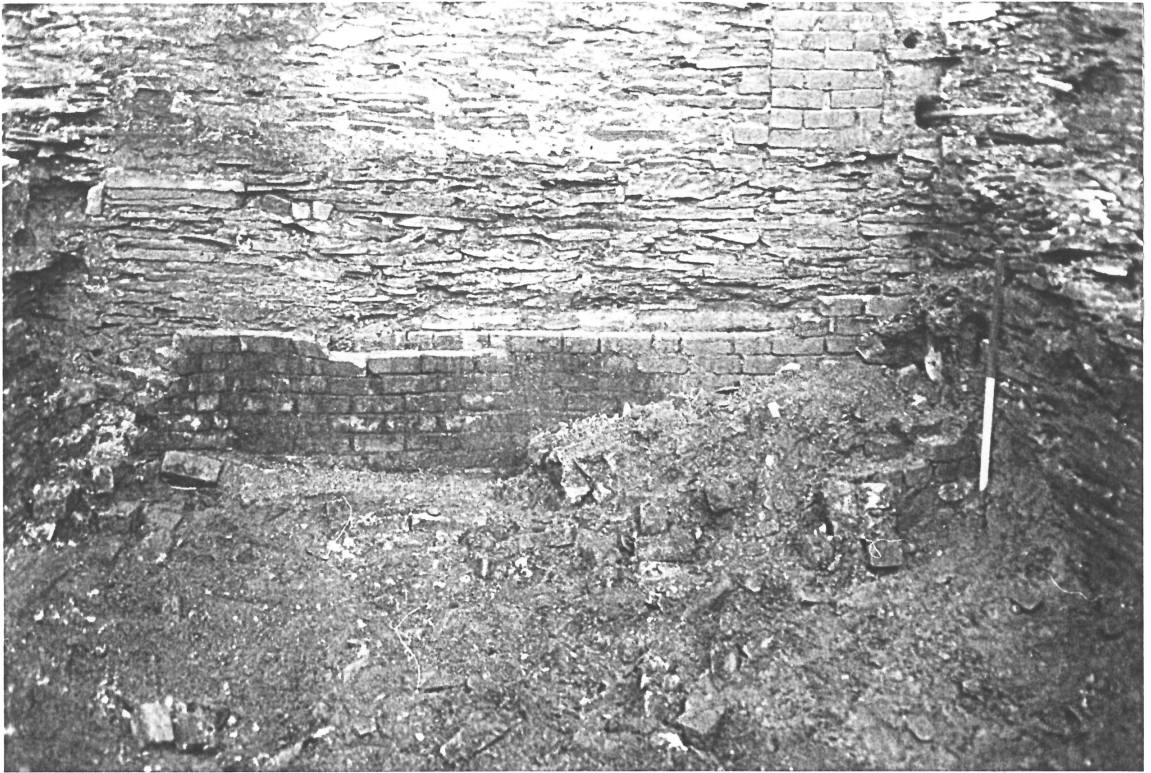


Plate 18: View of brick lining on the northwest wall of the boiler house in Area 2 (1m scale)



Plate 19: View of the stack (to the right) and the flue (lower centre) in Area 2 (1m scale)