

Merthyr College, Merthyr Tydfil

Archaeological Watching Brief

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Summary

Ove Arup & Partners Ltd commissioned the Glamorgan-Gwent Archaeological Trust, Projects Division (GGAT Projects), to undertake a watching brief associated with the geotechnical test pitting and trial trenching on ground at Merthyr College, Merthyr Tydfil.

Limited intrusive groundwork was carried out in the form of two trial trenches and one test pit excavated through the rear access road at the back of the workshop buildings. Trial Trenches 1 and 2 were excavated along the east façade of the upstanding remains of the Ynys Fach blast furnaces. Test Pit 1 was excavated through the ramp leading to the rear access road mentioned above, east of the restored Ynys Fach engine house that is now housing the Heritage Centre. In addition to that, four test pits were excavated on the other side of the workshop buildings, in the lawn of the courtyard comprised between Merthyr College main building and the workshops mentioned above. Test Pit 2 was located in the northeast corner of the courtyard, Test Pit 4 in its northwest corner, Test Pit 5 in its southwest, and Test Pit 6 to its south.

Numerous archaeological features were revealed. All archaeological remains can be ascribed to the Ynys Fach Ironworks. In Trial Trenches 1 and 2, walls presumably belonging to two distinct phases were uncovered where the Ynys Fach casting houses once stood, directly to the east of the upstanding Ynys Fach blast furnaces. In the courtyard, Test Pit 5 revealed a brick layered floor that could be part of the Ynys Fach 'Refinery' building (as described on 19th century Ordnance Survey maps).

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The project has been managed by Richard Lewis BA MIFA and the report was researched and prepared by Sven Egloff MPhil of GGAT Projects. The illustrations were prepared by Paul Jones (Senior Illustrator of GGAT Projects). Figure 2 was based on an architectural plan provided by Arup & Partners Ltd.

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1. Introduction

1.1 Project background and commission

Ove Arup & Partners Ltd commissioned the Glamorgan-Gwent Archaeological Trust Projects Division (GGAT Projects) to undertake an archaeological watching brief during intrusive groundwork for geotechnical purposes at Merthyr College, Merthyr Tydfil. The aim of the watching brief was to assess the survival and condition of any sites of archaeological interest, and the effect the development would have thereupon, and also to determine the presence of hazardous materials. The geotechnical investigation was carried out in the area of the former Ynys Fach Ironworks, where the casting houses, refinery, forge, and workmen's housings once stood. Aerial photographs show that parts of all buildings mentioned above were still upstanding in 1947. This report details the results of the watching brief, and aims to inform layout and foundation design for the reserved matters to minimise impact on the archaeological resource.

1.2 Location

The study area is centred on NGR SO 04582 06097 to the west of Merthyr College main building (Figure 1). The Ynysfach housing area borders its west and southwest sides, separated by the ruins of the Ynys Fach Ironworks furnaces. The ironworks was built against a steep bank, but the development area is on relatively flat land, typically varying between 168m and 170m OD. The planned buildings consisting of several distinct elements accessed off a central spine corridor, are aiming at replacing the current workshops, and are to overlap with the former Ynysfach casting houses, refinery, forge, and railway hub.

1.3 Geology and Topography

Merthyr Tydfil occupies a natural basin at the head of the Taff Valley, surrounded by high hills and ridges reaching 450m OD. The geology of the Merthyr College area is Garw Lower Coal Measures made up of Palaeozoic sandstone and shale, and coal seams. No geological specification is available for the topsoils (SSEW 1983), due to the site being situated within the urban area of Merthyr Tydfil. The grounds on which Merthyr College is located have been shaped by industrial activity, and the site is reportedly sitting on spoil derived from ironworks and colliery waste three to five metres deep (Ove Arup 2008), which was confirmed during the geotechnical trial pitting.

1.4 Archaeological background

The history of the Ynys Fach Ironworks is intimately linked to that of the Cyfarthfa works. It was conceived to supplement the Cyfarthfa furnaces, primarily in order to increase the total output in pig iron. The ironworks was situated on a prime flat of land, abutting a steep sloping hillside, with coal and ore being initially mined only a few yards away. Transportation of materials was available in the form of an easy access to the Glamorganshire Canal, on which Ynys Fach works had its own transshipment point, reached by way of a tram-line.

A working forge is recorded on site in 1769, but unfortunately no name for the leasee of the land at that time is known. Plymouth was in the hands of Anthony Bacon since

he had bought the works in 1765. Following this, the forge in Cyfarthfa was used to process pig iron produced in the Plymouth factory. Charles Wood states in his diary that Cyfarthfa Ironworks commenced in 1766, and it is therefore imaginable that forging was carried out in Ynys Fach prior to the opening of Cyfarthfa. There is no evidence to suggest that Bacon was leasing land at Ynys Fach at this early date. He did, however, lease part of Ynys Fach from the Griffiths family of Gelly in the Parish of Llanwonno, in May 1782, at an annual rent of £3 3s. (The Merthyr Tydfil Heritage Trust)

In September 1782, Bacon leased part of the Cyfarthfa Ironworks to Francis Homfray for a term of 50 years. Homfray was granted the 'Lower Works' or 'Foundry' and a mill at Cyfarthfa for the boring of cannon. It has been suggested that the 'Lower Works' included the forge at Ynys Fach. However, the site is not unequivocally identified. Francis Homfray left for Penydarren in October 1784, and the mill and the forge were taken over by David Tanner of Monmouth. In March 1786, Tanner's lease passed into Richard Crawshay's hands. The cannon boring mill was reportedly so successful that pig iron had to be imported from Dowlais and Plymouth in addition to the Cyfarthfa production.

On Bacon's death in January 1786, lease of the works at Cyfarthfa – with the exception of the above mentioned cannon boring mill and forge, already in Crawshay's possession – was granted by the Court of Chancery to Richard Crawshay and Company, *i.e.* Crawshay, James Cockshutt, and William Stephens from January 1, 1787, until 1795, when Bacon's eldest illegitimate son would reach the age of maturity. The Crawshay – Cockshutt – Stephens partnership was dissolved in 1871, and Richard Crawshay and George Watkins took over the works from 1792 onwards.

At this point, Crawshay's lease of the Lower Works and mill was not due to expire until 1832, whereas his lease of the Cyfarthfa Ironworks would, at best, need to be renegotiated with Bacon's heir at the latest in 1795. Again, assuming that the Lower Works partly, or fully, referred to the forge at Ynys Fach, it is natural to assume that Crawshay would preferably invest in the latter, more secure leasehold for the time being.

In 1794, the Glamorganshire Canal was completed, and Ynys Fach was later granted its own transshipment point.

Ynys Fach Ironworks was opened in 1801. It initially had two blast furnaces, according to planning by engineer Watkin George and built by Thomas Jones of Merthyr Tydfil. These were voluminous furnaces for the period, being 53 feet (*c* 16.15m) high, and 12 feet (*c* 3.65m) across the boshes. They were the second furnaces to have steam-powered air blast in Merthyr Tydfil, the first ironworks using a steam engine owned by Richard Crawshay. As a consequence, output was more regular, and considerably higher than that of the Cyfarthfa works. Between 45 and 62 tons of iron were produced weekly at the waterwheel-powered Cyfarthfa plant, whereas Ynys Fach produced between 65 and 70 tons a week.

The northern engine house, which survived until present day, has a style typical for Cyfarthfa. It comprises three storeys, and its quoins consist of limestone work. It housed a beam engine, possibly similar to the double acting Boulton and Watt blowing engine installed at Dowlais three years previously. The adjacent boiler house supplied steam from coke fired boilers. A 100 feet high square stack stood nearby.

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In 1836, two additional furnaces and adjoining casting houses were erected at Ynysfach (the inscription WC 1836 on the cast iron keystone of furnace no. 3 is still visible today). A new engine house with boiler and chimneystack, built to the south of the new furnaces, provided them with blast power.

A structure depicted on the 1852 map of the Ordnance Survey Department Under the Provisions of the Public Health Act, displayed twelve circular kilns, above the blast furnaces and to the west of these can be seen. These could well be calcining kilns, rather than the limekilns they are referred to as. Due to the limited amount of iron in the Welsh ore, it was common practice in Wales to roast the ore prior to smelting, in order to reduce its carbon and water content. From 1850 on, richer ores were imported from the Continent.

On the hillside, above the calcining kilns lay the coke ovens and coke yards, where coal mined in the Cyfarthfa collieries to the south was prepared and stored, prior to use in the furnaces.

A rectangular building referred to as 'Refinery' on the 1852 map of the Ordnance Survey Department Under the Provisions of the Public Health Act, is linked by rail to the casting houses. Given that no engine house is present in the proximity of the refinery, it is unlikely that forging or rolling took place there. The refinery process – an intermediate stage of puddling – might have been carried out on site, while the actual puddling and rolling processes took place at Cyfarthfa.

Ynys Fach Ironworks closed during the strike of 1874 until Robert Thomson Crawshay's death five years later. While Cyfarthfa was converted to a steel production plant, the Ynys Fach furnaces were reconditioned and held in stand-by in case of a renewed demand for iron. However, Ynys Fach was probably never used again, and by 1905 the masonry was reported to be starting to crumble. The southern engine house was demolished some time after 1905, and the masonry was reused to construct a fan pit at Gethin.

Due to its perceived precarious condition, one boiler stack (belonging to the northern boiler house) was brought down in December 1949 using a charge of explosives.

The majority of the 19th century buildings and canal structures survived until the late 1950s, when development of the college commenced. All buildings were then destroyed, with the exception of the western part of the ironworks and its northern engine house. The canal and all other water retaining structures were also backfilled.

It is likely that most structures that lay beneath the footprint of the college buildings were substantially damaged during construction works.

2. Methodology

The trenches and test pits were excavated using a toothless grading bucket of 0.60m width to varying depths. The prime purpose of the excavations was to produce geotechnical sampling, but the works were also set out so as to allow for a brief assessment of the condition and survival of the putative archaeological features.

A summary written and photographic record was made of all archaeological contexts, in accordance with the GGAT *Manual of Excavation Recording Techniques*. Contexts were recorded using a single continuous numbering system, and are summarised in Appendix 1. All significant contexts were photographed.

The project archive will be deposited with the appropriate organisation, in accordance with the UKIC and IFA Guidelines (*Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation* (2007)). A copy of the report and archive index will be deposited with the regional Historic Environment Record, curated by the Glamorgan-Gwent Archaeological Trust, Swansea and a further copy of the archive index will be deposited with the National Monuments Record, Royal Commission on the Archaeological and Historical Monuments of Wales (RCAHMW), Aberystwyth.

3. Results

Trial Trenches (Figure 1; Plates 1-3)

Three trial trenches were planned at the back of Merthyr College workshop buildings, to the east of the Ynys Fach blast furnaces. Only two were excavated, due to a lack of access to the area of the proposed Trial Trench 3. Several structures were recovered and summarily recorded.

Trial Trench 1

Trial Trench 1 (see Plate 1) was excavated through the tarmac of the rear access road to the back of the workshops. It measured c 7.00m x 1.00m and was excavated mechanically to a maximum depth of 2.80m. The basal deposit encountered was an olive-brown, brittle mudstone bedrock (106). Archaeological structures were present in the form of two abutting walls [104] and [105], running perpendicular to the façade of Ynys Fach Blast Furnace 1. Wall 104 consisted of a mix of sandstones and cream coloured bricks in a dark bluish grey, coarse mortar. Wall 105 was made out of orangey red bricks and cream coloured lime mortar. Walls 104 and 105 were structurally distinct and are likely to represent two construction phases. Overlying this was a hardcore layer of greyish brown stone and sand rubble (102), underlying a tarmac surface (101).



Plate 1: East facing section of Trial Trench 1 with walls 104 and 105 visible in the central area of the photograph.

Trial Trench 2

Trial Trench 2 (see Plate 2) was excavated through the tarmac of the rear access road to the back of the workshops. It measured 8.00m x 1.00m and was excavated mechanically to a maximum depth of 3m. The basal deposit encountered was a beige-brown stone and clay layer (206). Archaeological structures were present in the form of two walls ([204] and [205]) running perpendicular to the façade of the Ynys Fach blast furnaces, between Furnace 2 and Furnace 3. Wall 204 was constructed of roughly hewn sandstone blocks and cream coloured bricks in a light blue sandy

mortar (see Plate 2), and was in line with the northern corner of Furnace 3. It was typologically similar to wall **104** in Trial Trench 1. Wall **205** consisted of orangey red bricks in a creamy lime mortar (see Plate 3), and was situated 1.50m south of the southern corner of Furnace 2. It was typologically similar to wall **105** in Trial Trench 1. Given that Furnaces 3 and 4 were completed 35 years after Furnaces 1 and 2, the two wall phases might reflect the aggrandisement that Ynys Fach Ironworks underwent in 1836. A layer of brown-black coal dust / soot and sand with occasional bricks and infrequent stones (**203**) surrounded walls **204** and **205**. Overlying this was a grey-brown stones and sand rubble (**202**) capped by a tarmac surface (**201**).



Plate 2: East facing section of Trench 2 showing wall 204.



Plate 3: South facing view of Trench 2 showing wall 205.

Test Pits (Figure 1; Plates 4-6)

A total of five test pits were excavated. Of the two test pits planned to the back of the College workshop buildings, to the east of the Ynys Fach blast furnaces (Test Pit 1 and 3), only Test Pit 1 was excavated, to the east of the Ynys Fach north engine house (now housing the Heritage Centre). Test Pits 2, 4, and 5 were excavated in the courtyard between Merthyr College main building and the workshop buildings according to the original plan, with an additional test pit – Test Pit 6 – excavated to the east of Test Pit 5. Several structures were identified and summarily recorded.

Test Pit 1

Test Pit 1 was excavated through the tarmac of the rear access ramp to the back of the workshops, east of the Ynys Fach north engine house. It measured 2.00m x 0.70m and was mechanically excavated to a depth of 1.40m. The deposits encountered were modern make up layers. The basal layer consisted of grey sand and stones (**012**) with occasional bricks and brick fragments. Overlying this was a tarmac surface (**011**). No archaeological finds, features or deposits were encountered.

Test Pit 2

Test Pit 2 was excavated through the lawn at the rear of the Merthyr College main building, in the northern area of the courtyard. It measured c 4.00m x 0.60m and was mechanically excavated to a depth of 3.20m. The deposits encountered were possible industrial spoil heaps and modern make up layers. The basal layer consisted of an orangey red rubble of slag and bricks, with occasional roughly hewn construction stones (**023**). Overlying this was a layer of dark brown to greyish black sand, coal dust / soot, and stone rubble (**022**). The topsoil consisted of humic earth (**021**). No archaeological finds or features were encountered.

Test Pit 4

Test Pit 4 was located on the lawn at the rear of Merthyr College main building, in the westernmost corner of the courtyard. It measured c 4.90m x 0.60m and was mechanically excavated to a depth of 3.00m. The deposits encountered were natural with overlying modern make up layers. The basal layer consisted of glacio-fluvial geology (**045**). Three courses of a brick structure in blue-grey mortar with coarse lime and charcoal inclusions [**044**] stood above the natural geology (**045**). Structure **044** did not appear to be in its original location (not *in situ*), but rather it is likely to have been discarded as part of the terracing works that occurred during the construction of Merthyr College. Overlying the natural geology **045** was a mottled layer of orangey brown clay, olive green clay, dark grey sand, coal dust / soot, occasional large roughly hewn loose stones, and general waste (**043**). Overlying this was a dark grey layer of coal dust / soot, small stones, and sand (**042**). The topsoil consisted of humic earth (**041**).

Test Pit 5

Test Pit 5 was located on the lawn at the rear of Merthyr College main building, to the south of the courtyard. It measured *c* 4.00m x 0.60m and was mechanically excavated to a depth of 1.80m. The excavation was interrupted at the base of the test pit, with what appeared to be a brick laid floor [056] (See Plate 4). The bricks of the floor had an orangey red colour. One large, worked, rectangular, dark-grey stone block [055] – the base of which was possibly level with the brick floor [056] – was sited at the southern end of Test Pit 5 (see Plate 5). This could have been part of a wider structure that was later dismantled. An upright iron bar, which seemed to be anchored in the stone block [055], was also recorded. Overlying 054, 055, and 056 was a layer of black sand, coal dust / soot, and stone rubble (053). The topsoil consisted of humic earth (051).



Plate 4. East facing view of Test Pit 5 showing the brick floor 056 in the centre of the photograph.



Plate 5. East facing view of Test Pit 5 showing the stone block 055, and the iron bar 054 in the top right quarter of the photograph.

Test Pit 6

Test Pit 6 was located on the lawn at the rear of Merthyr College main building, in the south-eastern area of the courtyard, to the east of Test Pit 5. It measured c 4.00m x 0.60m and was mechanically excavated to a depth of 3.60m. The deposits encountered were industrial waste probably related to the Ynys Fach Ironworks. The basal layer consisted of glacio-fluvial geology (**066**). Overlying **066** was a green-brown layer of crumbling, packed slag nodules (**064**). A possible structure of orangey red bricks in blue-grey mortar [**065**] was found above the natural geology **066**, in the narrow south facing section (see Plate 6). Overlying this was a dark brown to black layer of clayey silt and coal dust / soot (**063**). A thin layer of sand, crushed bricks, and clay (**062**) was overlaid by the topsoil, which consisted of humic earth (**061**).



Plate 6. North facing view of Test Pit 6 showing the possible structure 065 in the centre of the photograph.

4. Conclusion

Substantial archaeological remains were present in Trial Trenches 1 and 2, and in Test Pit 5, all of which can be ascribed to the Ynys Fach Ironworks. Due to the geotechnical nature of the groundworks, access to archaeological deposits and structures was limited. However, the archaeological watching brief revealed that the buildings associated with the Ynys Fach Ironworks were not fully removed or levelled during the construction of Merthyr College and the associated workshops, but are still extant in places, possibly to a height of *c* 1.20m. The walls found in Trial Trenches 1 and 2 are located in an area where the Ynys Fach casting houses once stood. Two distinct typological phases were identified, which could mirror the changes and aggrandisement that Ynys Fach underwent in 1836, when two blast furnaces were added to the two initial ones dating 1801.

Test Pit 5 contained a brick floor and a stone block, with a vertical iron bar rising up from it. The bottom of the block was seemingly level with the top of the brick floor. The test pit was excavated within the perimeter of the former 'Refinery' building, and therefore, the brick floor uncovered may belong to this building.

Test Pits 4 and 6 also revealed brick and mortar structures, but due to the location of these potential structures at the narrow end of the test pits, the archaeological value of these remains could not be ascertained. Test Pits 2, 4, 5, and 6 all contained layers of spoil or waste from the Ynys Fach Ironworks.

Hazardous materials, such as asbestos, are often buried in sites with an industrial past. However, no asbestos was identified in any of the excavated areas.

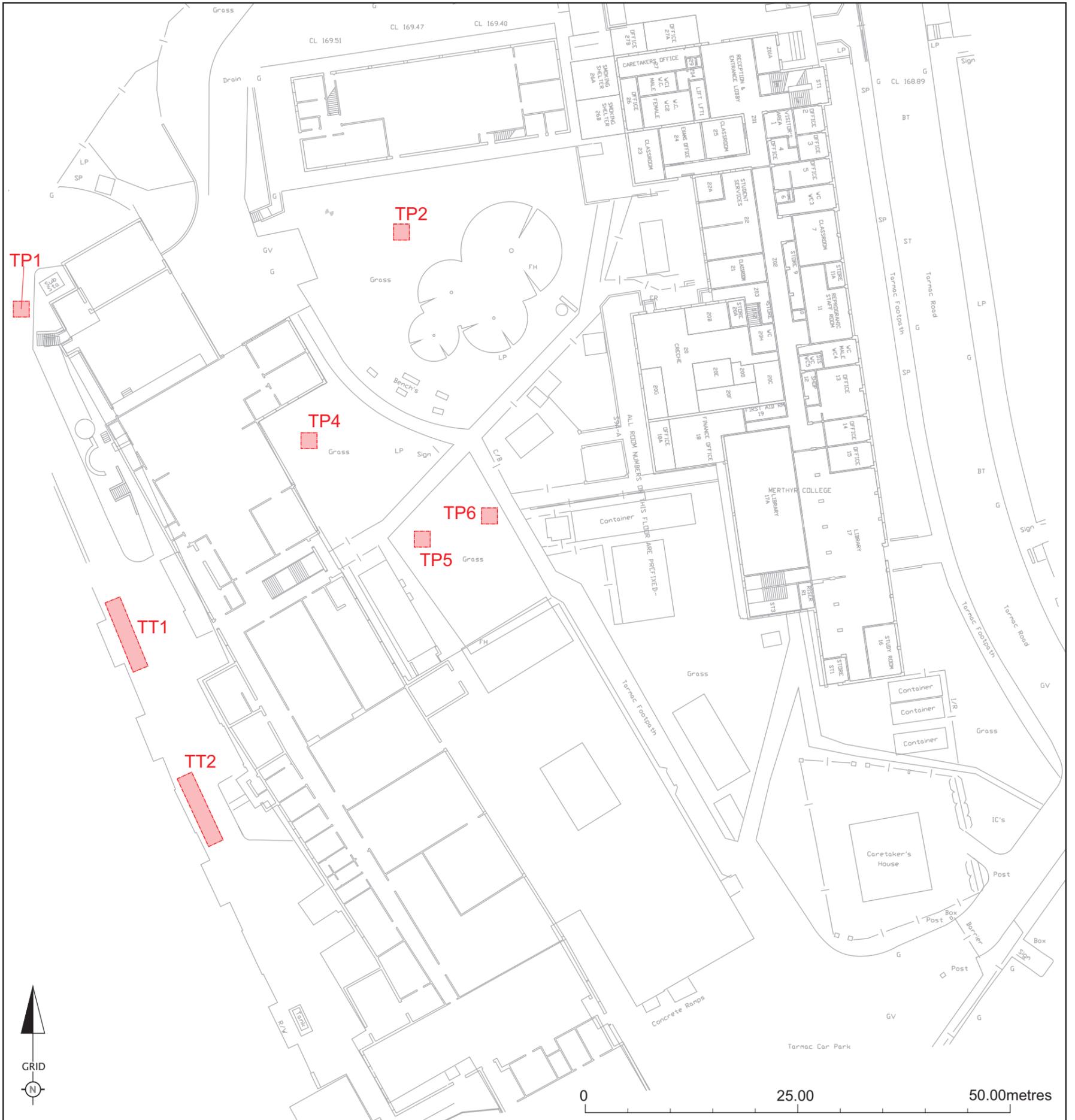


Figure 1. Plan showing Test Pits 1, 2, 4, 5, and 6, and Test Trenches 1 and 2

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Appendix 1: Context list

Context Number	Depth below ground surface (m)	Context Type	Context Description	Period
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Trial Trench 1

101	0 – 0.20	Deposit	Tarmac surface	Modern
102	0.20 – 0.55	Deposit	Grey-brown stones and sand rubble	Modern
103	0.60 – 0.74	Deposit	Black and orangey red layer of coal dust / coal dust / soot, rust, and sand	Post medieval
104	0.60 – n.b.	Structure	Blue-grey, brick, stone, and mortar wall	Post medieval
105	0.65 – 1.80	Structure	Cream coloured brick and mortar wall	Post medieval
106	1.90 – n.b.	Deposit	Olive brown mudstone	Geology

Trial Trench 2

201	0 – 0.08	Deposit	Tarmac surface	Modern
202	0.08 – 0.50	Deposit	Grey-brown stones and sand rubble	Modern
203	0.50 – 1.80	Deposit	Brown-black coal dust / soot and sand layer with occ. bricks and rare stones	Post medieval
204	0.60 – n.b.	Structure	Roughly hewn stones and cream coloured bricks, light blue sandy mortar wall	Post medieval
205	0.90 – n.b.	Structure	Orangey red bricks in cream coloured lime mortar	Post medieval
206	2.00 – n.b.	Deposit	Beige-brown stones and clay	Geology

Trial Trench 3

Not excavated				
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Context Number	Depth below ground surface (m)	Context Type	Context Description	Period
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Trial Pit 1

011	0 – 0.08	Deposit	Tarmac surface	Modern
012	0.08 – n.b.	Deposit	Grey sand with small stones and occ. bricks	Modern

Trial Pit 2

021	0 – 0.10	Deposit	Mid brown clayey silt	Modern
022	0.10 – 1.80	Deposit	Dark brown to greyish black rubble	Modern
023	1.80 – n.b.	Deposit	Orangey red layer of slag, bricks, and occ. roughly hewn construction stones	Modern? Post medieval?

Trial Pit 3

Not excavated

Trial Pit 4

041	0 – 0.20	Deposit	Mid brown clayey silt	Modern
042	0.20 – 0.45	Deposit	Dark grey layer of coal dust / soot, small stones, and sand	Modern
043	0.65 – 1.80	Deposit	Orangey brown clay, olive green clay, dark grey sand, coal dust / soot, occ. large roughly hewn stones, general waste	Modern
044	0.80 – 1.80	Structure?	Possible collapsed or dumped structure: three courses of bricks in blue-grey mortar with coarse inclusions of lime and charcoal	Post medieval
045	1.80 – n.b.	Deposit	Glacio-fluvial geology	Geology

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Context Number	Depth below ground surface (m)	Context Type	Context Description	Period
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Trial Pit 5

051	0 – 0.43	Deposit	Mid brown clayey silt	Modern
052	0.43 – 0.50	Deposit	Sand and gravel	Modern
053	0.50 – 1.80	Deposit	Black coal dust / soot, sand and rubble	Modern
054	0.90 – 1.50	Structure	Metallic post	Post medieval
055	1.50 – 1.70	Structure	One large, dark grey, hewn, rectangular stone, possibly part of a former wall	Post medieval
056	1.80 – n.b.	Structure	Orangey red brick floor	Post medieval

Trial Pit 6

061	0 – 0.15	Deposit	Mid brown clayey silt	Modern
062	0.15 – 0.30	Deposit	Thin layer of sand, crushed bricks, clay	Modern
063	03.0 – 1.00	Deposit	Dark brown to black clayey silt and coal dust / soot	Modern? Post medieval?
064	1.00 – 1.80	Deposit	Packed nodules of slag	Post medieval
065	1.30 – n.b.	Structure?	Possible structure consisting of orangey red bricks in blue-grey mortar	Post medieval
066	1.80 – n.b.	Deposit	Glacio-fluvial geology	Geology

Key

n.b. : not bottomed