Land to the northwest of Tremadog (Llidiart Yspytty)

Archaeological Excavation

GAT Project No. G1736
Report No. 626
February 2006

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust
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Prepared for

North West Wales NHS Trust

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By

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LAND TO THE NW OF TREMADOG (LLIDIART YSPYTTY): ARCHAEOLOGICAL EXCAVATION (G1736)

INTRODUCTION

The North West Wales NHS Trust commissioned Gwynedd Archaeological Trust to undertake an archaeological excavation in advance of a new hospital at Tremadog, Gwynedd. The development is centred on SH 557403 (figure 1) and the affected area is indicated on the site plan (figure 2). The development area contains remains of 19th century ironstone mining, with associated tramways and a toll road. Adjacent to the site is a Roman bathhouse (now buried beneath the garden of the adjoining house). The development area falls within a designated Landscape of Historic Interest (HLW (Gw) 7 Aberglaslyn) and within Historic Landscape Characterisation Area 35, Llidiart Yspytty (GAT Report 422).

An archaeological assessment was undertaken in May 2002 (GAT Report no. 455), and updated to take into account a revised layout in February 2004 Service (Hopewell and Gwyn 2004, GAT Report no. 519). Recommendations were made for evaluation and recording, which were undertaken in May and June 2004 (Davidson and Roberts 2004, GAT Report no. 546). Recommendations for mitigation following the evaluation work included excavation at two sites, and detailed recording of other features. The present report presents the results of this mitigation work, including an illustrated site narrative, specialist reports on artefacts and environmental evidence, radiocarbon dates and a discussion of the importance of the site. A watching brief was undertaken while the infrastructure works were carried out. This is described in Roberts 2006 (GAT Report no. 607) and any additional information is discussed in the appropriate place in this report.

Gwynedd Archaeological Planning prepared a Brief for this project. A project design was prepared conforming to the requirements specified within the Brief, and in the *Standard and Guidance for Archaeological Excavation* (Institute of Field Archaeologists, 1995, rev. 1999). The aims of the mitigation work were to undertake sufficient excavation and recording to create a detailed record of those features identified during the assessment and evaluation phases of the project as worthy of preservation by record. The excavation took place between 4th January and 1st February 2005, inclusive.

Acknowledgements

Thanks are due to the archaeologists who excavated the site, Matt Jones, Peter Jones and Chris Lane, and to Tanya Berks and John Roberts for surveying the site. Andrew Davidson managed the project and the mechanical excavator and driver that stripped the trenches were hired from Porthmadog Services. Thanks to Peter Hughes for discussing the local history of the area and special thanks to Mike Heslop of the North West Wales NHS Trust.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The development area lies on a strip of pasture between the spectacular cliffs of Craig y Castell and the reclaimed estuary of Traeth Mawr, varying in altitude from c.10m to 30m OD (figures 1 and 2, plates 1 and 2). This formed part of the farm of Llidiart Yspytty. A sharp break of slope forming a low cliff face in places separates the north and south parts of the site. The A487 runs below this along the south-western boundary of the site.

A detailed history of the site has been compiled in the desk-top assessment report (Hopewell and Gwyn 2004), so a summary only is included here. Finds of Mesolithic/Neolithic date were recovered during trial excavations on Y Bryn, 50m to the south of the development site in 1995 (Hopewell 1995). Bricks and human remains apparently dating from the Roman period were discovered in the vicinity of Llidiart Yspytty c. 1810 and in 1876 workmen engaged in building a drain identified further remains. Excavations carried out in 1908 revealed a Roman structure with hypocausts, interpreted as a bath-house. Pottery indicated that this was used from the 2nd to the 4th century (Breese and Anwyl 1909). This site is now preserved under the garden of a new house by the A487 south-east of the development site.

The establishment of a church dedicated to St Beuno in Penmorfa suggests a settlement in the 7th century, but otherwise there is no evidence for the area until the late 16th century when the name Llidiart Yspytty is first recorded. The reference suggests that there was a route across Traeth Mawr and a landing point for a ferry boat here. The name, Llidiart Yspytty, meaning 'gateway to the hospital', may have referred to a *hospitium* under the patronage of the Knights of St John or another order, but there is no other evidence for this. The discovery of skeletons by the road in 1820, later reburied in Penmorfa church, may be connected with a *hospitium*. By the 18th century the name was applied to a farm, the farmhouse of which still stands to the north of the school. The connection of the name *castell* to this site almost certainly refers to the crags above rather than to a man-made castle or fort.

The estate of Tremadog was bought by William Alexander Madocks in 1798 and he reclaimed Traeth Mawr to increase his land holdings by building an embankment at Porthmadog. The town of Tremadog developed on the reclaimed land, and Llidiart Yspytty was severed from the sea. In 1810 the Caernarvonshire Turnpike Trust took over and improved the old road from Llidiart Yspytty to Penmorfa and Caernarfon. This road ran through the middle of the development site, partially along what is now a farm track. However, in 1845 the Caernarfon road was rebuilt on its present alignment.

The craggy outcrop in the southern part of the site is composed of iron stone and this was mined, possibly from 1754, but certainly by 1770. The mine was at its most productive between 1839 and about 1850, but it had closed down by 1851. The first railway from the mine to Porthmadog was constructed in 1840-41. It ran from the northern side of the mine workings, south-east past Llidiart Yspytty House. The line was subsequently relaid, probably in 1848, to run to the base of the workings, along the southern boundary of the site, abandoning the original line. However, to reach the top of the workings a loop of line was added. In 1855-7 the railway was completely rebuilt and extended from this curved loop to the north-west to give access to the Gorseddau Slate Quarry, some 3 miles to the north. The mine site, now closed down, continued to have a function as a station and slate yard on the Gorseddau tramway. By the 1860s the quarry had also closed, and in 1872-5 the railway was regauged and adapted for a locomotive running to Cwm Pennant, but this railway saw little use and was lifted before the end of the 19th century.

METHODOLOGY

Excavation

(See figure 3 for trench location)
During the evaluation phase the foundations of a stone structure were discovered in an exploratory trench (trench 3). The trench was extended at the time but the full extent of the feature was not established, nor could its date and function be determined. One of the main aims of the excavation was to fully investigate this structure and to adequately record it. Trench 3 was extended to 9m by 9m to establish the limits of the structure. The topsoil and old backfill was stripped mechanically, then the trench was cleaned by hand and all further investigation was carried out by hand. In order to investigate whether there were any other structures related to those in trench 3 a long narrow trench measuring 52.5m by 1.5m (trench 11), was dug along the natural terrace south-east from trench 3 to the development site boundary.

There was an intention, if the stone structure proved to be important, to reconstruct it within the new hospital. For this reason the structure was not dismantled to investigate beneath it, but left *in situ* and the main stones numbered so that their lifting, transport and rebuilding could be planned for and arranged (see appendix V). Investigation under this feature will take place when it is lifted.

Evaluation trench 4 cut across a tramway but this needed investigating in plan to fully understand its construction and to search for any remaining track furniture. It was hoped that the exploration of a wider area would reveal any earlier phases of tramway construction. A 21m by 10m trench (trench 9) was opened along the presumed line of the tramway, either side of the evaluation trench 4. The topsoil was stripped mechanically from the full width of a narrow terrace initially identified as the tramway. As features were identified in this area they were cleaned and investigated by hand. At the western end of the stripped area a slot was dug mechanically across the whole width of the terrace to allow the

section to be recorded. At the eastern end of the stripped area a slot was dug mechanically across the tramway alone to further investigate its structure in plan and section.

The tramway extended to the north-west through a rock cutting to serve the Gorseddau Slate Quarry. In order to compare this tramway to that found in trench 4 an 11m by 3m trench (trench 7) was dug along the tramway (feature 17) within the rock cutting. The topsoil was stripped by machine, and two slots were dug through the trackbed material to determine its depth. The trench was then cleaned by hand.

A trench (trench 8) measuring 7m by 2m was dug perpendicularly across the open area were the tramway and toll road ran beside each other (feature 11). This was intended to provide another view of the tramway, and also to investigate the relationship between the tramway and the road. The topsoil and hard core was stripped mechanically. The tramway was then investigated by hand.

On the southern boundary of the development site was an agricultural building (feature 14). The superstructure of the building was recorded and surveyed, and trench 10 (measuring 7.0m by 1.7m) was dug inside to investigate its foundations and search for any earlier phases to the structure. Rubble was also cleared from the eastern end of the building.

A 3CX JCB mechanical excavator with a 1.80m toothless ditching bucket was used for most of the work, but a 4 tonne tracked excavator was also used due to the site becoming increasingly wet and slippery. All machining was undertaken under archaeological supervision. All trenches were planned, at 1:20 where significant features were present, and the trenches were located using a total station theodolite. Sections were drawn where necessary at either 1:10 or 1:20. All relationships between features or deposits were investigated and recorded. All artefacts from hand dug or cleaned contexts were retained.

Photographic surveys

Much of the area had been photographed during the assessment phase of the project, but some additional photography was necessary. Basic photographic surveys were carried out of the open workings (feature 7) and the area of industrial remains (feature 8). A photographic record was also made of the eastern part of the turnpike road (feature 9), the earthworks of the tramway (feature 10), the railway siding area (feature 11) and the rock cutting for the Gorseddau tramway (feature 17). A detailed photographic record was made of the agricultural building (feature 14). Colour slide and print film was used and the photographs have been catalogued and archived.

Measured surveys

The western part of the toll road (feature 12) and adjacent leat (feature 13) had previously been surveyed. A contour survey carried out for the Hospital Trust also provided detail of much of the site, especially the embankment for the Gorseddau tramway (feature 17), but further detail was required in places. A detailed survey was carried out using a total station theodolite to record the rock cutting and other surface traces of the tramways. The possible remains of a wall relating to the site of a building (feature 18) were located and notes made on them. A slate slab containing various holes was noticed by the tramway and its location recorded. The slab was described as feature 21. A measured survey of the agricultural building (feature 14) was carried out, including plans and elevations drawn at appropriate scales.

Post-excavation work

The site records were checked and archived. Artefacts were washed, catalogued (see appendix IIa for summary of finds) and sent to appropriate specialists for analysis. The Roman pottery was analysed by Jeremy Evans (see appendix IIb for full report), the post-medieval pottery and glass was studied by Jon Goodwin of Stoke-on-Trent Archaeology (appendix IIc) and the palaeoenvironmental study was carried out by Örni Akeret of Palaeoecology Research Services (appendix IIIb and c). Selected material from four samples of charred plant remains were sent for radiocarbon dating by Beta Analytic Inc., Miami, Florida. The results are presented in full in appendix IV. This report was produced including

the results of the mitigation work, an interpretation of the archaeological findings both within the site and in the wider landscape. Unstratified post-medieval artefacts and modern artefacts were discarded, all other finds are held by Gwynedd Archaeological Trust along with the archive (project number G1736) pending transferral to the appropriate museum.

RESULTS OF EXCAVATION

The trench numbering system is continuous from the evaluation. The trenches investigating the tramways are discussed together, but the other trenches are described separately. See appendix I for trench summaries and more detailed descriptions of each context. Archaeological deposits are numbered within rounded brackets, and cuts within square brackets.

Trench 3

(Figures 4 ,5, 6)

Excavated remains

This trench was located in the eastern part of the development site on a terrace in the hill slope. The terrace appeared to be of natural origins, probably enhanced by ploughing. During the evaluation the remains of a stone structure were identified. The evaluation trench was extended to locate the limits of the structure and the remains were thoroughly investigated.

Early activity

Over the red-brown shaley sub-soil ((311), (314)) patches of an old ground surface (363) survived protected by some of the later stone features. Two small features [333] and [361] could hint at early activity on the site, but alternatively may be animal burrows.

Pre-corn drier features

The first clear activity was the construction of a line of large slabs up to 0.7m in length (323) (plate 4). These slabs resembled the capping of a drain but there was no drain below them. They ran roughly north to south forming a pathway from the middle of the trench to the near the southern baulk. At the southern end of (323) was a shallow hollow in the sub-soil and three postholes. The postholes (340, 343, 346) held well made stone post sockets (339, 342, 345) (plate 3), which, together with a presumed fourth posthole under the baulk, could have supported a small timber structure (group no. 362). The area inside (362) was covered by a charcoal rich deposit (332). Immediately east of the pathway, but not quite parallel to it was a stone drain (336) (plate 4). This had slabs as cap stones and small blocks as side stones, but no base. The drain ended exactly level with (323) and the western side of the drain seemed to have been built to fit against the slabs of (323). It is therefore, assumed that the slab pathway was laid first and the drain constructed against it, but that both were in use together. The flow of water through the drain may have caused the hollow between the postholes. Although later structures were not removed to prove this, it is assumed that drain (336) joined to an L-shaped similar drain (325) (plate 5) further north to create a T-shaped drainage system.

The corn drier

The main construction phase overlay these features. A rectangular stone structure with a T-shaped flue (366) was built, comprising two parallel stone platforms (306 and 317) c. 0.5m apart, with stone facing (312) forming the top of the ‘T’ (plates 6, 7 and 8). The rectangular stone platforms (306, 317) survived to up to two courses high and were fairly neatly faced. The cores of the platforms were of rubble, but even these stones were quite carefully laid. The two platforms were parallel and of the same construction so there is little doubt that they are contemporary. The facing stones (312) forming the top of the ‘T’ were similar to the faces of the platforms. The north-eastern end of (312) was bonded into (306) demonstrating that this was also contemporary, and that all three elements were built together as a single structure. Presumably the south-western end of (312) originally joined (317) but later stone robbing had disturbed this area. Occasional flat slabs (355) in the base of the flue may have been the partly robbed out remains of a floor to the flue, but it is not clear why such a floor was necessary, other

similar structures excavated elsewhere do not have floors to their flues. These slabs may, therefore, relate to earlier activity associated with the slab path (323).

The north-western end of the structure (366) was built up against a very broad wall (305). This wall was constructed with large boulders forming a rough facing and a rough, rubble core. Wall (305) was built before structure (366) as (312) had been built against (305), but it is likely that they were part of the same building phase and (305) was built to protect and contain (366). At its south-western end (305) turned sharply towards the south-east, and may have continued along the south-western side of (317) at least as far as structure (362), although it had been entirely robbed away. The south-western face of (317) was slightly less regular than the other faces suggesting that it may have been built directly up against (305). The north-eastern end of wall (305) was also robbed out. There was a slight hint that it may have turned to the north, but the general trend of the wall was to curve towards the east and it may also have enclosed (366) on the north-eastern side. Without more evidence it is impossible to say whether wall (305) supported a roof. It was thick enough to do so, but this interpretation is based on the assumption that most of this hypothetical structure had been robbed away; a possibility that was not proved.

Structure (366) has been interpreted as a T-shaped corn-drier and the large wall (305) as a windbreak, protective wall or the remains of a building. The increased density of charcoal and traces of *in situ* burning (e.g. 327) demonstrated that the corn-drier had been fired from the eastern end, although there was no well defined stoking pit. Deposit (322) spread over the south-eastern end of the flue contained quantities of charcoal and burnt clay and presumably represented the use of the kiln. The upper part of this deposit was mixed into the layers above and was recorded separately as (318 and 321). The density of charcoal and traces of burning had declined considerably at the western end of the flue. The charcoal rich deposits also spread eastwards outside the kiln where it was recorded as (319). Against the south-eastern end of (317) was a square pad of stones (349) with yellowish-grey clayey silt (348) built up against its northern side. This clayey deposit (348) seemed to form a lining to the entrance of the flue. Presumably there was originally a matching structure against the eastern end of (306) but this had been largely disturbed by the construction of a later oven. 'Cheek pieces' to control the heat entering the flue are recorded from other sites (e.g. Atworth villa, Wiltshire (Goodchild 1943, 150)) and this may be a similar structure.

The ovens

At the north-eastern corner of (366), and probably roughly contemporary with it, was a small circular structure built of stone and clay (359) (plate 9), which is interpreted as an oven. This survived mainly as a floor composed of stone blocks set within clay, but a short arc of wall survived on the western side. A thin spread of charcoal (365) around the western and southern sides of (359) seemed to be related to its use. There was very little charcoal actually within (359) and there was little sign of heat reddening of stones or clay, so it seems not to have been fired to a high temperature. Oven (359) seems to have collapsed inwards fairly early in the site's history as its infill (350, 352) was sealed by a charcoal rich deposit (326) probably originating from an adjacent, slightly later oven (wall 330, floor 331). Oven (330/331) was shown to be later than (359) because a charcoal rich deposit (365) related to the use of (359) extended underneath oven (330/331). The later oven (plate 10) was composed of a low circular wall (330) formed of yellow-grey clayey silt bonding together fairly small stone blocks, and a circular floor (331) formed of thin unworked slabs. Most of the slabs were severally cracked due to heating. The reddened clay in the floor and heat cracked slabs suggest a higher, but still quite moderate, temperature in this oven. There is no trace of walling round the eastern arc, and presumably this was the entrance into the oven. This oven also seems to have collapsed inwards with a strong red clayey silt (324) containing large chunks of charcoal possibly representing the lining of the oven, and a less burnt yellowish-grey clayey silt over the top, possibly part of the superstructure of the oven.

The corn-drier (366) probably functioned throughout the use of both ovens. The corn drier (366) pre-dates oven (330/331) but the deposits relating to the latest use of the corn-drier (318, 319, 322) overlap the walls of the oven, showing that the drier continued in use after the oven was built. Some of (319) may also include material raked out from the oven. A thick deposit of charcoal-rich material (326) was dumped around the northern side of oven (330/331), partially covering the demolished oven (359). This material was more likely to come from the later oven than from the corn-drier. The outer face of the oven wall, especially on the northern side is very rough, with stones projecting and no obvious covering. Deposit (326) had built up around and between these projecting stones and may have been deposited soon after the oven was built to make up the ground level here. Deposit (326) had been

partially cut away by a foundation trench [364] for a short section of walling (357/358). This wall had a rather rough northern face (357) surviving in places up to 2 courses high, and a rubble core (358). It was built against the north-eastern side of (306) and filled the angle between (306) and (305). It seemed to be extending the width of the platform (306), though it was less well built and did not extend the full length of (306). This suggests that during or after the use of oven (330/331) the corn drier was extended and therefore was presumably still functioning.

Abandonment and later use

When the corn-drier was abandoned its flue was infilled by yellowish brown clayey silt (303) with patches of heat reddened material and stone slabs. This seems to have originated from the superstructure of the drier. Considerable amounts of stone fell from wall (305) as the structures started to collapse, forming a spread of rubble (304, 320) (plate 11). However, probably more stone was robbed to build nearby field walls. Because of this stone robbing it is impossible to know the original height of (305) nor its extent. Some large facing stones were also removed from within the otherwise surviving section of (305), leaving hollows and a jumble of smaller stones ((328), [329]). A red-brown silty colluvium (313) buried the rubble. A sub-circular heap of stones, apparently a field clearance cairn, was piled against large stone protruding at the northern end of wall (305), and another layer of shaley colluvium (315) spread over the site. The movement of colluvium suggests that the land upslope was being ploughed. The field cairn also suggests the removal of surface stones to improve the land and aid ploughing. This agricultural activity could be medieval in date, though no artefacts of that period were recovered, however, it could date from later periods, such as the Napoleonic wars when arable agriculture was extended in may parts of the country.

A rather poorly defined linear feature [354] with some stone slabs in the base of its fill (353) ran north-south across the eastern side of the trench. This was interpreted as the remains of levelling for a field boundary, probably of 19th century date. This field wall probably accounts for much of the stone robbing from the corn-drier.

The original evaluation trench 3 had investigated the area to the west of the structures and determined that no other features were likely to survive here. To similarly test the terrace to the east of the structures a narrow evaluation trench (trench 11) was dug along the terrace south-east of trench 3 (figure 4). Trench 11 was dug down to the grey shaley sub-soil (1103) along its length. The modern drain [307] was located in its north-western end. A steep sided sub-circular hollow was investigated [1105] but this was considered most likely to be of periglacial origin. Towards the south-eastern end of the trench was a broad shallow cut [1107], which continued a slight earthwork feature visible on the ground surface. This was probably the remains of a 19th century field boundary.

Artefacts

Very few artefacts were recovered from the area of the corn-drier. Of the 6 sherds of Roman pottery only one was unstratified and 4 came from the stone rubble (304) originating from the collapse of the wall (305). A post-medieval pot sherd and modern glass were also recovered from the rubble, demonstrating disturbance and bioturbation in this deposit. The single stratified pot sherd could only be roughly dated to the 1st to 3rd centuries AD. However, this sparse selection of pottery does suggest that there was occupation on this site in the 2nd century, and hints at occupation in the later 1st and 3rd centuries (see appendix IIb for full Roman pottery report).

Pottery recovered from the topsoil during stripping included sherds from the late 17th-18th century as well as 19th century material. This probably represents agricultural activity, including the construction of the field wall just east of the corn-drier.

Several contexts ((319), (322), (324), (326) and (332)) produced partially vitrified burnt clay fragments. These were identified as oven lining by Peter Crew, Archaeologist for the Snowdonia National Park (pers. com.). Contexts (324) and (326) are directly related to the abandonment and collapse of the ovens. Deposit (319) may have represented the raking out of oven (330/331), and (332) may also have resulted at least partly from this process, so some of the lining may have been removed during the use of the ovens.

Contexts (322), (324), and (326) produced very small quantities of hammerscale (less than 1g) and (335) produced slightly more with 3g. (335) is the fill of the drain (336), built beneath the ovens and probably associated with the slab pathway (323). Hammerscale are the tiny iron flakes and droplets

resulting from smithying. However, this probably does not indicate smithying on the site as the quantities of hammerscale are very small and may be residual from activities taking place elsewhere.

Built into the southern platform (317) of the corn-drier was about a third of the lower stone of a rotary quern (see appendices IId and IIe and figure II.1). This was broken when it was built into the platform and so was used prior to the construction of the corn-drier and not related to the use of this or the bread ovens. It could have been associated with the pre-corn drier activity represented by the pathway (323), alternatively it could have been used elsewhere and brought onto the site as a convenient flat stone for building. However, it does suggest milling nearby, although at a time prior to the construction of the corn-drier. Milling is unlikely to have occurred far from an occupation site.

Six pieces of heavily corroded iron were recovered from contexts (318) and (322) within the flue of the corn-drier. X-ray revealed these to be parts of a single object, which after conservation was reconstructed as a U-shaped bar with a rectangular cross section and two right angled bends. There is a square shaped hole at each of these bends (see appendix IIf and figure II.2). The function of this object is not yet known but it is likely to have been a fitting within the corn-drier.

Palaeoenvironmental evidence

Bulk soil samples were collected from all important deposits. These were wet sieved and charred plant remains were recovered from 8 deposits associated with the corn-drier and the two ovens. These were sent for analysis to Palaeoecology Research Services, Shildon, Co. Durham and were studied by Orni Akeret (see appendix III for full reports).

Three of the samples from the fill of the flue of the corn-drier ((318), (321) and (322)) contained quantities of charred cereal remains and wood charcoal. These were submitted for detailed analysis to investigate the use of the corn-drier. The other samples, including those related to the use of the ovens, produced few or no seeds. The variety of species represented in the charcoal suggested that any available wood was used for fuel, although contexts (332) and (358) contained mainly hazel charcoal, perhaps indicating some selectivity in fuel collection. Two burnt bone fragments were recovered from context (332), but these were too poorly preserved to be identified.

The samples from the corn-drier flue contained appreciable quantities of charred cereal remains, though preservation was poor and 56% could not be identified to genus or species level. Chaff was probably significantly under-represented due to the poor preservation. (318) was the upper part of the flue fill and (322) the lower part, with most of the cereal remains concentrated in (318) and very little in (322). (321) was the part of the fill closest to the fire, and this also contained fewer cereal remains than (318). The few seeds from wild plants that were present were mostly those of arable weeds.

At least 6 cereal species were represented, probably indicating multiple usages of the corn-drier. Spelt wheat was most common, with emmer wheat also present. Spelt wheat is generally common in Roman corn-driers, but there was also relatively large numbers of oat grains, which are not normally found in corn-driers (Van der Veen 1989, 316). Barley, which is usually common in corn-driers only occurred in small numbers on this site. There were also traces of rye and naked wheat. The relative scarcity of glume bases to glume wheat grains could imply dehusking of the glumed wheats before charring, but the proportions could also be explained by differential preservation of the fragile chaff. This cannot account for the scarcity of weed seeds, which are often resilient, so the cereals were probably cleaned of weed seeds and debris before processing in the drier.

Some of the cereal grains had sprouted before charring, but only a small proportion, although again differential preservation probably accounts for much of this. The sprouted grains indicate that malting is a possible function of this structure.

Dating

Four samples were selected for radiocarbon dating. Contexts (318) and (321) were deposits containing material from the use of the flue, (324) was the burnt clay lining from the collapsed interior of oven (330/331) and (332) was the charcoal rich deposit from inside the small structure (362) defined by the post sockets. In all cases specific pieces of short lived material were selected for dating (for details see

appendix IIIc, PRS report 2005/91, table 2) and were analysed by accelerator mass spectrometry (see appendix IV for calibration plots). The results were as follows:

Context 318 (Beta-205125) 1840+/-40 BP, Cal AD 80 to 250
Context 321 (Beta-205126) 1820+/-40 BP, Cal AD 100 to 260 AND Cal AD 290 to 320
Context 324 (Beta-205127) 1830+/-40 BP, Cal AD 90 to 260
Context 332 (Beta-205128) 1770+/-40 BP, Cal AD 140 to 380

In their uncalibrated form the first three dates are identical and the fourth (Beta-205128) overlaps significantly with the others at 2 standard deviations and can also be considered identical. The error on the dates is small, but wiggles in the calibration curve for this period have further extended the error range so that the material could have come from any date between AD 80 and AD 380. The stratigraphy demonstrates that the first three deposits are essentially contemporary, so it is justifiable to combine these dates. This was done using the OxCal program with the Intcal04 calibration data (Bronk Ramsey 1995 and 2000; Reimer et al 2004). The combination gives a date of 1830+/-23 BP, which calibrates to AD 120 to 250. This is a slight improvement and gives a rough date for the activity in the second and third centuries AD. These dates highlight the problems of dating Roman period contexts. Even when the original assay is precise the date ranges produced are too large to throw much light on a period much more precisely dated by historical and artefactual methods.

Tramways (trenches 7, 8 and 9)

A tramway is visible as an embankment running across the western end of the development area, this passes through the middle of the site in a rock cutting and its route across the south-eastern part of the site is defined by a scarp in the hill slope. Documentary evidence shows that the earliest tramway, constructed in 1841, reached only as far as the iron mines, but was extended to the north-west in 1855-57 to serve the Gorseddau slate quarry. The total station theodolite survey of the surface remains of the Gorseddau tramway recorded the exact line of the tramway across the eastern part of the site and clarified the fine detail of surviving earthworks (figure 3). Trenches 7, 8 and 9 were excavated to study the construction of these tramways and to distinguish the two phases.

Trench 9 (figures 4, 7 and 8) was opened across the full width of a terrace visible on the surface as an earthwork. It was demonstrated that this terrace was essentially an original feature reused by the tramways. The flat area of the terrace was created by a level deposit of colluvium (907), which probably indicates that the site had been ploughed in the past. This terrace and that higher up the slope, on which trench 3 was opened, are probably partly the result of the underlying bedrock and partly from ploughing forming rough lynchets.

Running east-west across the southern part of this terrace and heading directly for the open cast ironstone mine workings was the bed of a tramway (plates 12 and 13). The trackbed was created from a compact deposit composed mainly of shale fragments (904) laid in a trench or terracing cut [905]. The southern edge of this had been severely eroded. Towards the eastern end eroded material (908) had been deposited obscuring the southern side of the trackbed, towards the western end much of the trackbed has been eroded away entirely.

A collection of stones in a deposit (906) similar to the colluvium was noticed. On investigation these appeared to be contained in a poorly defined cut [909] and this feature was cut by the tramway, but it is likely that this feature is just a hollow in the colluvium and of little significance.

Cutting through the eastern end of (904) was a trench [903] of a later tramway. This was aligned north-west to south-east, 3.75m wide with straight parallel sides, and a flat base (plates 14 and 15). A compact deposit of shale fragments (916) covered the base of [903], and formed the trackbed. The surface of this was very flat, except against the north-eastern side of the cut where there was a narrow gully. The trackbed did not extend across the full width of the trench; a gap on the south-western side of [903] created a broader gully, which was filled a soft dark grey organic silt (911), suggesting that the gully functioned as a drain. On the flat surface of the trackbed were parallel lines (912) up to 0.14m wide and between 0.33m and 0.38m apart. These had no depth and were caused by staining of the trackbed material where timbers had been present. Some of the timber still survived. The surviving timber was thin and fragile but it seems probable that these lines represent the position of timber

sleepers for the tramway running in the base of the trench. The timber was identified as larch or spruce, presumably from forestry plantations (Akeret 2005/23 in appendix IIIb)

Some erosion of the north-eastern side of the trench had occurred (910); then, when the tramway was abandoned the trench was backfilled with brown loam and large boulders (902). The opportunity seems to have been taken to dispose of large field stones by depositing them in this trench. A fairly modern ceramic drain pipe was laid along part of the tramway cutting and buried under (902) to provide land drainage in this wet area.

This tramway [903] continued to the north-west into the rock cutting (feature 11) where it was inspected in trench 8 (figures 9 and 10, plate 16). This demonstrated that the vertical wall of the cutting was one side of an extension of the trench [903] seen in trench 9. The south-west side of the trench, recorded as [808] in trench 8, was only 0.4m deep and not visible on the ground surface. The trackbed in the base of [808] was a compact layer of shale (814), and the shadow of a timber sleeper (810) also survived in trench 8. When the tramway was abandoned it was backfilled with a deposit composed largely of clinker and cinders (804) covered by a brown silty loam (802) which contained a modern, plastic capped bottle.

Trench 8 also revealed the remains of the toll road where it came closest to the tramway. This showed that the Gorseddau phase of the tramway did not cross or interfere with the road, although the latter had been down graded to a farm track when the tramway was built. A shallow cut [812] aligned roughly east-west with gently sloping northern side and flat base was made for the road, which was surfaced with shale and black ironstone fragments (811).

There was another opportunity to inspect the toll road in the watching brief when it was cut through in the western part of the site. However, here no road metalling or other evidence for the road's construction survived (Roberts 2006).

The tramway in the rock cutting continued north-west and was again investigated by trench 7 (figures 11 and 12, plate 17). Here the base of the cutting was covered by a compact layer of shale (702) to create a more flexible trackbed than would have been provided by the shale bedrock.

West of trench 7 the tramway ran on an embankment and this was breached by the infrastructure groundworks and recorded during the watching brief (Roberts 2006). The embankment was 1.3m high at this point and comprised a sequence of layers formed of shale, gravel and stone. These were capped by a 0.1m thick layer of stone to form the trackbed. No evidence of sleepers or other track furniture were recovered.

Artefacts
Most of the finds from these trenches were recovered from the spoil removed by the mechanical digger. This pottery ranged from the late 17th to the late 19th century (see appendix IIc for full report on the post-medieval artefacts). The earlier trackbed (904) must have been created from local deposits as it has incorporated 2, unsurprisingly eroded, fragments of Roman pottery (see appendix IIb). Most of the stratified pottery from trench 9 came from (911), the fill of the drainage gully along side the later trackbed. This was dated to the early-mid 19th century, as would be expected from the known history of the tramway. A sherd of bottle glass dates from slightly earlier. The abandonment deposit in trench 8 (804) produced late 19th-early 20th century pottery and late 19th century bottle glass, again as expected. The material included preserve jars, an inkpot, an egg cup and a plant holder as well as fragments of plates, bowls and pans.

Agricultural building (feature 14)

Building F14 is located immediately east of the track that was formerly the pre-1845 turnpike road (figure 3). Its overall dimensions are 22.0m by 6.8m (figures 13, 14 and 15, plates 18 and 19), and the walls survive to eave level (2.2m high). The building, orientated west-north-west to east-south-east, is constructed from local materials, i.e. ironstone, shale, granite and slate, and has been extended to the west.

The original structure measured 10.4m by 6.8m, and has particularly large stones (up to 1.4m in length) forming the corners and entrances. Mostly it is a drystone construction but traces of sandy grey-white mortar could be seen in places, and the interior was rendered. Part of its north-west gable survives to a height of 3.7m, although the south-eastern wall survives only to eave level. Very little trace of the roof remains, suggesting that the roofing slates were quite new and worth reclaiming. This suggestion is supported by the apparent rebuilding of the upper part of the walls incorporating roofing slates, presumably from the original roof, which was replaced. There is an odd projection on the south-eastern wall making it very thick in the southern corner. The purpose of this was unclear but it is possible that this corner collapsed at sometime and was rebuilt into a sort of buttress.

This building has doors in the north-west and south-east walls; the former has been partially rebuilt with bricks. There was also a door in the south-western wall, but this has been carefully blocked in a style similar to the walls. This would have given access onto the road and may have been blocked when the toll road was relocated. Inside there are raised stall areas along each long wall with a walkway paved with large slate slabs between. A branch of the walkway also leads to the blocked door in the south-western wall. The stall area along the south-western wall was largely robbed out, and few stones remained *in situ*, but along the opposite wall the stall area was well preserved. The stalls, 1.9m wide, were defined by posts set in the floor and holes in the wall to take timber supports (plate 20). The floor posts were concreted in place, but the holes in the wall were contemporary with the original construction, demonstrating that it was originally built as a cowshed. There was a shallow concrete trough running along the base of the wall and an iron pole in the northern corner to which a chain would be attached to secure a cow. The slate flooring extended beyond the south-eastern doorway to create a flagged surface in front of the building. Short sections of ceramic drain pipes had been built into the tops of the long walls to provide ventilation.

Trench 10 (figure 13, plate 21), which was dug inside feature 14 to investigate both the original building and its extension. This showed that both parts were constructed directly on the shale bedrock (1004), which here is rather weathered. No earlier activity was revealed. One posthole [1006] was found, but this probably related to a stall on the south-western side of the building.

The north-western extension measuring 11.6m by 6.8m, incorporated fewer large stones than the original structure. It had two sets of opposing entrances, three of which were blocked and one still functioned. There was no evidence of a gable end and it is possible that this end was never roofed. The only section of wall surviving to full height (2.2m) was capped by flat stones. Trench 10 demonstrated that the extension never had a floor, not even of rammed earth, and was probably always floored by turf, also suggesting that it was not roofed.

Study of the structural remains showed that although it has had quite a complex history of alteration and extension the building was originally constructed as a cow shed and was not a reused mine building. A small corked glass bottle was found in a hole inside the south-western wall of the cowshed. This has been identified as a bottle for some household product and dates from *c*.1880 or later. It has been suggested that it held a solution of asafoetida for dosing either the cattle or the cowman. This was a common herbal remedy in the area and apparently was often dispensed in similar bottles.

Site of 19th building (feature 18)

(Figure 16, plate 22)
Trench 1 dug in the evaluation phase found no traces of foundations of this building but did demonstrate that the rock cut channel (feature 13) continued through this area, although it did become smaller and shallower. It was noticed that a line of large stones, up to 0.75m in length, along the edge of the toll road seemed to be *in situ*. These projected above the level of the road and did not appear to be part of the road revetment. Other tumbled stones lay around the line of larger stones. The line was 8.0m long and with the tumble 1.6m wide. It is located immediately north of the rock cut channel and on the southern end of the road. Reconsideration of this area suggests that this line of stones is the remains of the foundation for the north wall of the building shown on the 1887 map. As the rock cut channel, which appears to be a leat carrying water from the mine, runs through this building it is suggested that it may have housed a water wheel to power some machinery related to the mine. Its location next to the toll road may suggest that it was constructed before the road went out of use, i.e. prior to 1845.

Slate slab with various slots and graffiti (feature 21)

(Figure 3, plates 23 and 24)
A long sub-rectangular slate slab lay near the north-western end of the tramway cutting. It had clearly been moved from its original location. This slab was 2.1m long and 0.4m wide at the base, tapering to 0.21m wide at the top. It had 5 rectangular mortise holes cut into it, these were equidistant (0.2m apart) along the middle of the top half of the slab. There were also 4 smaller holes, 2 situated in the base of a shallow groove cut transversely across the stone. Various pieces of graffiti have been engraved into the slab but most of these are very faint and not legible. One however reads 'A.M.R.' with 'DE' written in smaller letters immediately above. This slab seems rather elaborate for a gate post and may have been a support for some machinery or structure specific to the use of the iron mine or its infrastructure.

DISCUSSION

Trench 3

Corn-driers became most common in Roman Britain in the 3rd and 4th centuries and were generally restricted to the south and east of Britain, including south-eastern Wales (Arnold and Davies 2000, 78-79). The most common type has a T-shaped flue like that at Llidiart Yspytty (Goodchild 1943, 148, 151, Van der Veen 1989, 302-303). A T-shaped corn drier was found at Plas Coch, Wrexham (Wait 1996) and Arnold and Davies (2000, 71) note how unusual this location is. They state that "…corn-driers – are unknown in rural settlement contexts further west and are more in keeping with what might be found in south-eastern Wales or in the English lowlands". A corn-drier, which was probably T-shaped (part remained unexcavated under the baulk) was also found in Chester and dated to the post-Roman period (Ward 1994, 75-77). There are no Roman corn-driers listed in the Gwynedd Sites and Monuments and the discovery of one at Llidiart Yspytty extends the geographical range of this feature type well beyond what was previously known. It also appears to be rather early as the pottery evidence, slight as it is, points to a second century date. The radiocarbon dates are also consistent with this, although they could also support a third century date.

There is some argument as to how corn-driers functioned. Goodchild (1943, 149-151) refers to a well preserved example from the Roman villa at Atworth, Wiltshire with the remains of a double stone slab floor. The hot air from the flues was directed into the space between the floors, so heating the upper floor without scorching or smoking the grain. Single floors are also attested and the hot air is deflected from the back of the cross flue into the drying area, or drawn in by chimneys or vents in the roof (Van der Veen 1989, 314). Ethnographic parallels all suggest use of a permeable floor ((Scott 1951), which would be very difficult to find archaeologically, but where evidence survives in the Roman examples it points to solid floors. Experiments with reconstructed corn-driers at Butser Farm (Reynolds and Langley 1979, Reynolds 1981, 37-43) used a solid floor of chalk slurry over timber joists and an oak plank floor. In the present case the yellow-brown clayey silt (303) that had collapsed into the flues suggests that the drying floor was of timber covered by clay.

The nature of the superstructure of these corn-driers has not been established. Reynolds and Langley (1979, 29) argue that they must have been enclosed inside a roofed structure both to maintain the temperature and protect the grain from the weather. However, many corn-driers were located within other buildings, providing protection (e.g. Llantwit Major, Glamorgan (Nash-Williams 1953, 122-124), Whitton, South Glamorgan (Jarrett and Wrathmell 1981, fig 27, 51) and Atworth, Wiltshire (Goodchild 1943, 149-151)). The corn-drier at Atworth had no evidence for a superstructure, so Goodchild (1943, 149-151) postulated a timber one. For the experimental reconstructions stone, open framed timber and timber with hurdles were all tried as superstructures, in all cases with thatched roofs (Reynolds and Langley 1979, Reynolds 1981, 37-43). Ethnographic parallels were usually enclosed but there are descriptions of unenclosed kilns from Wales. The grain was laid on a floor over a pit dug into a bank or hillock (Scott 1951, 203-204), but these were only simple kilns and it seems likely that the most complex T-shaped driers were enclosed.

The present example does not provide any evidence of the type of superstructure, although the rough foundation (357/358) to the north of the main platform could have supported a wall on this side. Comparison with these other examples strongly suggests that the broad wall (305) was part of a roofed

structure entirely surrounding the corn-drier. As the drier was positioned in the corner of this building the construction of a wall on the northern side of the drying floor would have enclosed it on three sides, possibly enough to maintain the required temperature, when it was also protected within the larger building.

The corn-driers at Whitton and Atworth had upright slabs forming cheek-pieces at the entrance to the main flue. Those at Atworth had slots to support a means of controlling the draught, and therefore the temperature, by regulating the air flow (Goodchild 1943, 148). The Llidiart Yspytty kiln did not have comparable features but the additional stone pad (349) on the end of platform (317) with the clay lining (348), and presumably matching structures on the northern side may have been related to a similar function.

There are fewer parallels for the other features in trench 3. The only site found in a literature search with ovens closely associated with a T-shaped corn-drier was at Wakerley, Northamptonshire (Jackson and Ambrose 1978, 141-144). There were many ovens and kilns on the site but the only T-shaped one had a small oven at its north-east corner in almost exactly the position of oven (359) in relation to the Llidiart Yspytty corn-drier (366). However, in the Wakerley case the small oven was stratigraphically later than the abandonment of the corn-drier and they were not in contemporary use. The 2 ovens at Llidiart Yspytty are small and were not fired to a high temperature so it is assumed that they were for baking. At Shugborough Hall, Staffordshire an experiment was carried out with a reconstruction of a clay lined oven similar to the present ovens, but based on an Anglo-Saxon example. This was used to bake bread, which it did successfully, but also demonstrated that the temperatures needed for bread did not result in the firing of the clay lining (Moffett 1994, 61). The association of the corn-drier and ovens suggests that the grain was dried prior to milling, that it was milled close by and then baked in the ovens. Unfortunately this sequence of activity can not be conclusively proved and no evidence of the milling phase was found.

No close parallel was found for the complex of pathway (323), drain (336/325) and timber structure (362), which seemed to precede the corn-drier, but probably not by long. If wall (305) was part of a building it is likely that this complex was enclosed within it, and that there was probably an entrance where (362) was located.

The term corn-driers has been used throughout this report, but this interpretation should be treated with some care. Ethnographic and Roman literary sources demonstrate that grain required drying when: it was harvested before it was fully ripe, either through necessity or cultural preference; to parch the husks of emmer and spelt wheats to aid threshing, and to dry grain harvested in bad weather prior to milling (Scott 1951, 196). Most of these uses relate to poor weather and short seasons, and most later uses of corn driers are restricted to the north and west of Britain, Ireland and Scandinavia. The predominance of Roman corn-driers in south-eastern Britain suggests different reasons for drying grain, as there is no independent evidence for a deterioration in the weather (Fowler 2002, 286). The parching of the husk may have been most important here, but drying grain prior to milling can also make milling quicker and more efficient (Moffett 1994, 61). Two experiments were carried out at Butser Farm with reconstructed corn-driers examples (Reynolds and Langley 1979, Reynolds 1981, 37-43), which convinced Reynolds that the structures would be highly inefficient to simply dry grain but were well designed as malting floors. Neither reconstruction directed the hot air into the drying chamber as seems the case in many examples, so future experiments might contribute to the discussion. Van der Veen (1989, 313) studied the charred remains from 21 Roman corn-driers and concluded that both roasting of germinated grain for production of malt and the preparation of grain for consumption and storage (i.e. parching/drying) occurred at corn-driers with T-shaped flues. Some sites strongly suggest malting was the main activity. At Whitton a corn-drier very similar to the Llidiart Yspytty example had an adjacent stone trough (Jarrett and Wrathmell 1981, fig 27, 51). At Scole in Norfolk (Flitcroft, M, 1994, 324) a channel, a large wooden tank and a series of trough were associated with a large corn drying oven. Charred remains of sprouting grains suggested grains were steeped in the wooden tank and malted in the corn-drier. Many sites do not produced charred grain and it is possible that the structures were used for drying other foods or products (Jarrett and Wrathmell 1981, 51). A T-shaped drier excavated in Oxfordshire was demonstrated to have been used for drying pots prior to firing (Young 1972).

The charred remains from Llidiart Yspytty included some germinated grain, so malting is possible on this site. Most of the cereal were of hulled species and needed parching to make the spikelets brittle and

aid their removal prior to consumption or storage. It is likely that this was a major function of the corn-drier. Drying would also make milling the grain easier. The proximity of the ovens to the corn-drier suggests that the grains were parched, the hulls removed and the grain was milled on site, then baked as bread. Unfortunately there is no evidence of the milling phase as the rotary quern fragment found pre-dated the corn-drier and ovens.

The corn-drier obviously would not have functioned alone, but as part of a settlement complex. Activity at the bath-house excavated in 1908 was dated from the second to the fourth century AD (Breese and Anwyl 1909). The corn-drier also appears to have been in use in the second century with activity possibly continuing into the third century. These two structures are therefore likely to be part of the same complex. The possibility that they were associated with a fort guarding a Roman ironstone mine founders on the absence of any traces of a fort plus the lack of evidence for mining the ironstone here in the Roman period. It has also been suggested that there was a *mansio*, a hostel for travellers. Breese and Anwyl (1909, 493) note evidence for a ford across Traeth Mawr from Llidiart Yspytty to a point near Penrhyndeudraeth. This would be on the main road to Segontium, the precise line of which is not known in this area, but two of the three likely routes pass Llidiart Yspytty (Hopewell 2005). The buildings of the proposed *mansio* might be concealed beneath the present buildings, the school seems a promising site.

The tramways

The earlier trackbed seen in trench 9 (904) must belong to the first tramway to serve the open cast working. This tramway was built in 1841 (Caernarfon and Denbigh Herald, 25 September 1841). It came straight up the hill from Tremadog, running to the north of the school; the boundary shown on the 1887 OS map (figure 21 (a)) preserves its line. The scarp running north-west to south-east across the eastern field reflects its line, but at its north-western end it curved to the west heading directly for the open cast workings. The line was soon re-routed to run at the base of the iron mine. A map dating to about 1848 (figure 19) shows a railway running right past the southern edge of the mine (a), although no trace of this exists on the ground west of the mine. At this date or soon after a loop line was built from the lower track to the top of the mine, presumably incorporating part of the earlier track. This loop was then extended in the 1850s to serve the Gorseddau slate quarry. Cuts [903], [808] and [703] as recorded in the trenches, and the rock cutting, appear to be all part of the reconstruction and extension of the line to the quarry. This work must have destroyed most of the earlier tramway within the development area, with the exception of its north-western end. At this phase the south-eastern end of the rock cutting (feature 11) was used as a slate storage yard and the slate slab (809) was probably left from this period. It seems odd that the Gorseddau tramway ran in the base of a trench for part of its route. The site at present has problems with waterlogging and it seems probable that the tramway would have problems with flooding. However the gullies at either side of the trackway must have been adequate to drain it. The narrow, closely spaced sleepers suggest a light horse drawn tramway, but they were long enough, at 1.2m, to accommodate a 3ft gauge railway as specified in the historical records. There is no evidence of relaying the trackbed in the 1870s and it seems that the 2ft railway was merely laid on the previous trackbed and sleepers.

The end of the 1841 tramway must have crossed the toll road to reach the open cast workings, but the later tramway ran next to what was then a track.

The agricultural building (feature 14)

Study of this building has revealed that it has had a fairly complex history with a door in the south-western wall being blocked, the roof probably being replaced, an extension constructed on the north-western end, then three of the four side entrances into this being blocked. However, the floor is original and the design of this and support holes for stalls in the north-eastern wall, which are also original, demonstrate that this building was constructed as a cowshed and is not a reused mining building. The OS County Series maps (figures 21-23) show that the field walls were positioned rather differently around the building than they are today, placing the cowshed in the trackway rather than in the field. The paved area to the south-east of the building was probably bounded by the field wall that ran to the northern corner of the building in 1900. The length of the building shown on the maps shows that the extension was built by 1887. The building is shown on a map of 1871 (figure 20) when there was a

small shed in the place of the extension, which was presumably built between 1871 and 1887. The original cowshed probably appears on the plan of the railway from Porthmadog, dated to c.1848 (figure 19 (b)). Errors in the mapping make its identification a little uncertain but there seems to be no other likely candidate for the structure shown on the map near Llidiart Yspytty iron works. The cowshed is shown on a map dated 1841 (figure 18), but not on the tithe map (figure 17). The date of the tithe map is not known, but they are often dated around 1839 or 1840 in this area. The cowshed is, therefore, presumably early 19th century in date.

Site of the 19th century building (feature 18) and the slate slab (feature 21)

Further investigation of feature 18 suggests that part of the foundations of the north wall of this structure may survive. Its location on the leat (feature 13) suggests its use for water power, but no documentary evidence has yet been found to indicate what function it may have served. It first appears on the 1871 map (figure 20), but it must have been built soon after 1840 if it was related to the iron mine as is likely.

The purpose of the slotted slate slab (feature 21) is not clear at present, but if it could be preserved in the hospital grounds it would be available for future study.

CONCLUSION

The complex of features in trench 3 is generally well preserved, despite some stone robbing. The corn-drier extends the geographical range of these structures well beyond that previously known. No other examples of Roman date have been found in North West Wales, but this site shows that others may be there to be found. The corn drying complex reinforces the evidence from the possible bathhouse excavated in 1908, that there was Roman activity here of some importance. Both bath house and corn-drying kiln could be associated with either civilian or military settlement, and the likelihood is that the settlement focus lay somewhere between trench 3 and the bath house. This may have already been destroyed by the outskirts of Tremadog, but its possible presence should be considered if other development occurs in this area.

The presence of some sort of settlement here reinforces the probability that the Roman road to Caernarfon ran close to the present site. The discovery of a corn-drying kiln demonstrates that there was arable agriculture in the area in the Roman period, although almost certainly as part of a mixed farming system.

Whether the corn-drier is rebuilt in the hospital or not it is recommended that when it is moved the area under the corn-drier platform is inspected by an archaeologist. The extension of the slab pathway under this area needs to be recorded and any other possible features will need to be investigated.

The industrial remains are of regional interest as they contribute significantly to the understanding of the infrastructure of the iron mine. The earliest tramway has been identified and its route has been established to diverge from that of the later tramway at its north-western end. The type of construction used has been established in both cases and no evidence has been found for extensive reconstruction of the tramway in the 1870s when it was adapted for the use of a locomotive running to Cwm Pennant.

The agricultural building (feature 14) was confirmed to be a 19th century cowshed. It has been recorded and no further work is recommended, although it is suggested that the large slate flags are used within the new hospital if possible as they would make an attractive feature.

BIBLIOGRAPHY

Arnold, CJ and Davies, JL, 2000, *Roman and Early Medieval Wales*

Breese, CE and Anwyl, E, 1909, Roman building at Glasfryn, Tremadoc, Caernarvonshhire. *Archaeologia Cambrensis* **6th series, 9**, 473-94

Bronk Ramsey C. 1995 Radiocarbon Calibration and Analysis of Stratigraphy: The OxCal Program *Radiocarbon* **37(2)** 425-430

Bronk Ramsey C., 2000, Comment on 'The Use of Bayesian Statistics for 14C dates of chronologically ordered samples: a critical analysis', *Radiocarbon*, **42** (2) 199-202

Davidson, A and Roberts, J, 2004, Land to the north-west of Tremadog (Llidiart Yspytty): Archaeological evaluation. *Gwynedd Archaeological Trust Report No*. **546**

English Heritage, 1991, Management of Archaeological Projects

Fowler, PJ, 2002, *Farming in the first millennium AD*

Gwynedd Archaeological Trust, 2003, Historic landscape characterisation – Vale of Ffestiniog. *Gwynedd Archaeological Trust Report No*. **422**

Goodchild, RG, 1943, T-shaped corn-drying ovens in Roman Britain. *The Antiquaries Journal* **XXIII**, 148-153

Hopewell, D, 1995, A487 Porthmadog Bypass, proposed roundabout west of Tremadog. *Gwynedd Archaeological Trust Report No*. **182**

Hopewell, D, 2005, Roman roads in North-west Wales. *Gwynedd Archaeological Trust Report No*. **572**

Hopewell, D and Gwyn, D Rh, 2004, Land to the north-west of Tremadog (Llidiart Yspytty): Archaeological assessment. *Gwynedd Archaeological Trust Report No*. **519**

Jackson, DA and Ambrose, TM, 1978, Excavations at Wakerley, Northants 1972-75. *Britannia* **9**, 115-242

Jarrett, MG and Wrathmell, S, 1981, *Whitton: An Iron Age and Roman Farmstead in South Glamorgan*

Moffett, L, 1994, Charred cereals from some ovens/kilns in late Saxon Stafford and botanical evidence for the pre-burgh economy. In, *Rackham, J* (ed), 55-64

Nash-Williams, VE, 1953, The Roman villa at Llantwit Major, Glamorgan. *Archaeologia Cambrensis* **CII part 2**, 89-163

Rackham, J, 1994, Environment and economy in Anglo-Saxon England: a review of recent work on the environmental archaeology of rural and urban Anglo-Saxon settlements in England. *CBA Research Report* **89**

Reimer PJ, MGL Baillie, E Bard, A Bayliss, JW Beck, C Bertrand, PG Blackwell, CE Buck, G Burr, KB Cutler, PE Damon, RL Edwards, RG Fairbanks, M Friedrich, TP Guilderson, KA Hughen, B Kromer, FG McCormac, S Manning, C Bronk Ramsey, RW Reimer, S Remmele, JR Southon, M Stuiver, S Talamo, FW Taylor, J van der Plicht, and CE Weyhenmeyer. 2004 *Radiocarbon* 46:1029-1058.

Reynolds, PJ, 1981, New approaches to familiar problems. In Jones, M and Dimbleby G, *The Environment of Man: the Iron Age to Anglo-Saxon period. BAR* **87**, 19-49

Reynolds, PJ and Langley, JK, 1979, Romano-British corn-drying oven: an experiment. *Archaeological Journal* **136**, 27-42

Roberts, J, 2005, Land to the NW of Tremadog (Llidiart Yspytty): archaeological watching brief. *Gwynedd Archaeological Trust Report No*. **607**

Scott, L, 1951, Corn drying kilns. *Antiquity* **25**, 196-208

Van der Veen, M, 1989, Charred grain assemblages from Roman-period corn driers in Britain. *Archaeological Journal* **146**, 302-319

Wait, GA, 1996, Plas Coch, Wrexham. *Archaeology in Wales* **36**, 73-74

Ward, SW, 1994, No. 1 Abbey Green 1975-8. In Ward, SW, *Excavations at Chester: Saxon occupation within the Roman fortress*, 69-84

Young, C, 1972, The Oxford Potteries. *Current Archaeology* **31**, 209

Archival sources

Caernarfon Record Office

Tithe maps of Ynyscynhaearn parish and Penmorfa parish
X/Plans/R/69 – deposited plans of Gorseddau Junction and Portmadoc Railways (1871)

National Library of Wales

Harrison Deeds Box 65 parcel 4 (1841 lease)
MAP 5753 (c. 1848)

Ordnance Survey

25" Caernarvonshire County Series XXXIV 11 and 12 (1889, 1900, 1915)

Newspapers

Carnarvon and Denbigh Herald: 5 September 1840, 25 September 1841, 4 June 1842

APPENDIX I
Trench summaries

Trench 3
Size: 9m x 9m
Orientation: E-W
Depth: 0.4m max.

Context no.	Description	Interpretation	Below	Above
301	Dark grey loam.	Topsoil		302, 310, 315, 328
302	Yellowish grey clayey silt with patches of heat reddened material and stone slabs	Collapsed superstructure of oven	301	324
303	Yellowish brown clayey silt with patches of heat reddened material and stone slabs	Collapsed superstructure of corn-drying kiln	329	318/321
304	Rubble composed of large and medium sized stones with brown silt matrix	Collapse from walls, particularly (305)	315	305, 332, 338, 341, 344
305	Broad wall faced with boulders and with rubble core	Protective wall around corn-drying kiln	304, 306, 312, 320	363
306	Rectangular platform with fairly neat faces of partially shaped stone and core of unworked stones.	N platform of corn-drying kiln	330	305, 323
307	Linear, vertically sided cut	Trench for modern drain	308	353
308	Stones on edge on either side of base of [307]	Support for drainage pipe	309	307
309	Ceramic pipe	Modern drainage pipe	310	308
310	Brown silt with large and medium sized stones	Fill of [307]	301	309
311	Red-brown loamy silt with shale fragments	Sub-soil below corn-drying kiln	333, 361	bedrock

312	Line of facing stones forming W end of T-shaped flue	Part of corn-drying kiln	318/321	305
313	Red-brown silt with few shale fragments	Colluvium	315	357
314	Red-brown loamy silt with shale fragments	Sub-soil beyond corn-drying kiln	327, 333, 340, 343, 346, 356, 361, 363	bedrock
315	Dark brown silty loam with c.50% shale fragments and stones	Colluvium with loose rubble	301	304, 313, 351
316	Number given to N face of 306, before it was realised it was all one context.			
317	Rectangular platform with fairly neat faces of partially shaped stone and core of unworked stones. Parallel to 306 and about 0.5m way from it	S platform of corn-drying kiln	349	333
318	Dark brown loamy silt with c.10% charcoal	Deposit containing material from flue use	303	312, 322
319	Dark brown loamy silt with charcoal dust	Burnt material from firing of corn-drying kiln	354	327, 330
320	Brown silty loam around large stone rubble	Collapse, mainly from 305	351	305
321	Yellow-grey clayey silt with charcoal	Deposit in W end of flue, mixing charcoal from firing with 303	303	312, 355
322	Brown clayey silt with high proportion of charcoal and burnt clay fragments	Deposit from firing of corn-drying kiln	318	348, 355
323	Large unworked slabs laid in a line. Resemble capping stones for a drain but no drain beneath them	Pathway? Possibly related to 362	306, 347, 349	360, 363
324	Red, red-brown and yellow-grey clayey silt with large chunks of charcoal	Collapsed interior of oven?	302	330, 331
325	Stone drain with slabs as cap stones and small blocks as side stones, but no base	Drain	330, 337	356
326	Dark brown silt with occasional stones and a fairly high proportion of charcoal	Charcoal rich layer deposited after oven 359 went out of use	364	330, 350
327	Small patch of burnt sub-soil forming shallow hollow. Deposits burnt black and reddish brown	Surviving remains of in situ burning representing remains of stoking pit for corn-drying kiln	319	314
328	Brown silty loam with c.50% small and medium stones	Fill of holes produced by robbing out wall stones	301	329

329	Irregular hollows along line of wall 305 and to lesser extent S end of 312. Also includes robbing of both ends of 305	Stone robbing activity	328	303
330	Low circular wall formed of yellow-grey clayey silt bonding together fairly small stone blocks	Wall of possible oven	319, 324, 326	306, 325, 336, 365
331	Circular floor formed of thin unworked slabs. Most are severally cracked due to heating	Floor of oven with wall 330	324	325, 336, 365
332	Dark brown silty loam with occasional large stones and a fairly high concentration of charcoal	Charcoal rich deposit contained within structure 362	304	339, 345
333	Narrow linear cut with steep sides and rounded base	Possible animal burrow, but could be early feature	334	311
334	Red-brown silty clay with occasional charcoal	Fill of 333	317, 355	333
335	Dark brown silty loam with occasional charcoal	Fill of drain 336	?	336
336	Stone drain with slabs as cap stones and small blocks as side stones, but no base	Drain	330/331, 335, 348	347
337	Dark brown silty loam with occasional charcoal	Fill of drain 325	?	325
338	Brown silt	Fill of posthole [340]	304	339
339	3 stones set on edge round 3 sides of cut [340]	Stones placed to create post socket	332, 338	340
340	Small, rectangular, steep sided cut with flat base	Posthole, part of 362	339	314
341	Brown silt	Fill of posthole [343]	304	342
342	3 stones set on edge round 3 sides of cut [343]	Stones placed to create post socket	341	343
343	Small, sub-rectangular, steep sided cut with flat base	Posthole, part of 362	342	314
344	Brown silt	Fill of posthole [346]	304	345
345	4 stones packed round sides of cut [346]	Stones placed to create post socket	332, 344	346
346	Sub-circular, steep sided cut with flat base. Severely disturbed on E side by animal burrow	Posthole, part of 362	345	314
347	Poorly defined cut, not emptied. Steep sides and flat base.	Cut for drain 336	336	323
348	Yellowish-grey clayey silt built up against 349 and sloping down over flags 323 to for side of flue	Clay lining to E end of flue	322	336, 349
349	Block of stones forming extension to platform 317. Stones are	Extension to 317, or special structure at entrance to	348	317, 323

	fairly neatly laid with no bonding	flue		
350	Brown and yellow-grey clayey silt with some large stones	Deposit overlying collapse of oven 359	326	352
351	Apparently sub-circular pile of stones piled against large stone protruding from remains of N end of wall 305	Possible field cairn	315	320
352	Yellowish-brown clayey silt with some stones, especially slabs, sloping into hollow made by oven 359	Collapsed oven structure?	350	359
353	Grey-brown and pale grey gritty loam with deposit of orange clay. Contains some stones laid flat in places	Fill of 354	307	354
354	Very poorly defined cut. Seen as consistent straight edge in plan running down E side of trench	Possible levelling cut for foundation of field wall	353	319
355	Flat slabs up to 0.7m in length scattered over base of flue. The one closest to the flue entrance is heavily cracked by heat	Presumed remains of flooring of flue, but could survive from some earlier feature	322	334, 360
356	Poorly defined cut, not emptied. Steep sides and flat base.	Cut for drain 325	325	314
357	Wall face, survives to 2 courses high in places. Stones unworked.	Face of wall foundation to N of platform 306	313	364
358	Irregularly deposited stones forming core of wall with face 357	Core of wall foundation to N of 306	313	364
359	Circular structure made of stone blocks set in yellow-grey clay to for floor with traces of wall surviving around W arc. Wall is similarly made of fairly small blocks bonded by yellow-grey clay	Oven	352, 365	363
360	Dark brown silt with flecks of charcoal	Fill of 361	323, 355	361
361	Oval cut with steep sides and rounded base	Possible terminal of animal burrow	360	311
362	Group number for 3 postholes (with a 4th presumably under the baulk) located at SE end of path 323	Possible small timber structure		
363	Thin deposit of brown silt surviving patchily under some of the stone features	Possible old ground surface	305, 323, 359	314
364	Cut with fairly gently sloping sides and flat base	Foundation cut for wall 357/358. Only seen at E end	357/358	326
365	Very dark grey silt with a high proportion of charcoal forming a layer around W and S sides of 359	Charcoal layer related to use of oven 359	330	359
366	Group number for corn-drying kiln, including 306, 312, 317, 348, 349, 355, 357, 358	T-shaped corn-drying kiln		

Trench 7
Size: 11m x 3m
Orientation: NW-SE
Depth: 0.4m max.

Context no.	Description	Interpretation	Below	Above
701	Dark grey loam.	Topsoil		702
702	Compact deposit composed almost entirely of shale.	Trackbed	701	703
703	NW-SE aligned cutting through bedrock, with vertical NE side, more gradual SW side and flat base.	Cutting for tramway	702	704
704	Solid shale	Bedrock	703	

Trench 8
Size: 7m x 2m
Orientation: NE-SW
Depth: 0.6m max.

Context no.	Description	Interpretation	Below	Above
801	Dark grey loam.	Topsoil		805, 809
802	Brown silty loam with shale fragments.	Backfill of tramway trench	809	803
803	Brown silty loam with c.50% white stones	Dump of white stones	802, 805	804
804	Deposit composed largely of clinker and cinders in grey gritty loam.	Backfill of tramway trench	803	806
805	Very compact gravel and crushed iron stone in pale grey clayey grit.	Surface patching	801	803, 811
806	Red brown clayey silt with shale fragment and some stones.	Eroded or redeposited sub-soil	804	807, 810
807	Rough line of stones against SE side of cut 808.	Line of stones, part of backfill	806	808

808	Vertical sided, flat bottomed cut defined on NW side by rock cutting.	Trench/cutting for tramway	807, 810	813
809	Slate slab leaning against NW side of cut 808.	Slate slab, presumably from Gorseddau slate quarry.	801	802
810	Brown sandy silt and stained natural defining a narrow strip across base of cut 808.	Trace of sleeper for tramway	806	808
811	c.80% shale and black iron stone in dark brown gritty loam.	Probable surface of toll road	805	812
812	Shallow linear cut aligned c.E-W with gently sloping N side and flat base.	Cut for road	811	813
813	Orange gritty clay overlying bedrock.	Natural subsoil	808, 812	

Trench 9
Size: 21m x 10 m
Orientation: NW-SE
Depth: 0.8m max.

Context no.	Description	Interpretation	Below	Above
901	Dark grey loam.	Topsoil		902, 908
902	Dark brown silty loam with c.30% large stones up to 0.6m in length.	Backfill of tramway cut	901	910, 911
903	Linear, straight, parallel sided cut, with steep sides and flat base. There is a shallow gully along the northern side of the base and a larger gully along the southern side.	Cut for Gorseddau tramway	916	904
904	Deposit composed mainly of shale fragments in grey silt matrix.	Trackbed of 1840 tramway	903, 908	905
905	Linear, straight, parallel sided cut, with flat base. N side slopes at c.45 degrees and has a step or shelf in it.	Terrace for 1840 tramway	904	906
906	Red-brown gritty silt with shale fragments and stones up to 0.4m in length concentrated towards the top of the deposit.	Fill of 909	905	909
907	Reddish brown clayey silt with c.20% shale fragments and occasional large stones.	Colluvium	909	914
908	Soft grey silt with shale sand.	Erosion from trackbed 904	901	904

909	Poorly defined linear cut with rounded western terminal. Gradually sloping N side, S side and most of base cut away by 905.	Possibly natural hollow in colluvium.	906	907
910	Soft brown silt, with grey and orange shaley silt lower down.	Erosion from side of cut 903	902	912
911	Soft dark grey organic silt.	Water borne deposit in gully along S side of cut 903	902	916
912	4 parallel narrow stains, c.0.35m apart and up to 0.14m wide. On base of cut 903.	Traces of sleepers for tramway.	910	916
913	Orange and yellow silt with shale fragments.	Subsoil/altered bedrock	915	Bedrock
914	Dark red-brown loam with charcoal flecks. Similar to 907.	Fill of 915	907	915
915	Small cut with V-shaped profile seen in E facing baulk of trench 9.	Small cut feature, function unknown	914	913
916	Densely packed shale fragments	Trackbed	911, 912	903

Trench 10
Size: 7.0m x 1.7m
Orientation: NW-SE
Depth: 0.4m max.

Context no.	Description	Interpretation	Below	Above
1001	Dark grey loam.	Topsoil		1002
1002	Remains of trough with slate base and concrete sides.	Feed trough	1001	1003
1003	Loose brown loam mixed with shale.	Soil produced by root activity and other disturbance under wall and internal features of building F14.	1002	1004
1004	Yellow and orange silt mixed with fragmented shale.	Altered surface of bedrock.	1003, 1006	
1005	Soft brown gritty silt with wood fragments.	Fill of 1006		1006
1006	Nearly square cut with rounded corners, steep sides and flat base.	Posthole	1005	1004

APPENDIX II

ARTEFACTS

Appendix IIa
Summary of artefacts

Trench	Context	Artefact type	Number	Period
T3	Unstratified	Pottery, rim sherd	1 sherd	Roman (mid 2nd-later 3rd century AD)
		Pottery	7 sherds	Post-medieval (mostly mid-late 19th century, with 2 sherds of late 17th-18th century)
		Clay pipe stem	1 fragment	Post-medieval (19th century)
		Vitrified ceramics and slaggy material	120g	Roman?
		Brick/tile	3 pieces	?
	301	Long cross penny from metal detecting	1	
	304	Pottery	4 sherds	Roman (mid 2nd-later 3rd century and later 1st-2nd century AD)
		Pottery	1 sherd	Post-medieval (first quarter 18th century)
		Vessel glass	1 sherd	Modern
		Ceramic building material	2 pieces	?
	315	Iron objects (1 very heavily corroded)	3	?
	317	Part of rotary quern	1	Roman
	318	Heavily corroded iron objects	2	Roman?
	319	Partially vitrified ceramics and slaggy material	210g	Roman
	322	Heavily corroded iron objects	4	Roman?
		Iron concretions	4	Roman?
		Partially vitrified ceramics	135g	Roman
		Hammerscale	<1g	Roman
	324	Partially vitrified ceramics	210g	Roman
		Hammerscale	3 tiny frags	Roman
	326	Pot, base sherd	1	Roman (1st-3rd century AD)
		Vitrified ceramics	5g	Roman
		Hammerscale	<1g	Roman
	332	Partially vitrified ceramics	320g	Roman?

	335	Hammerscale	3g	Roman
T7	701	Pottery	1 sherd	Post-medieval (19th century)
		Iron object (hook?)	1	Post-medieval
		Clay pipe stem	1 piece	Post-medieval (19th century)
T8	802	Pottery	1 sherd	Post-medieval (mid-late 19th century)
		Glass bottle with plastic cap, possible port or sherry bottle	1	Modern (discarded)
	803	Pottery	4 sherds	Post-medieval (mid 19th-early 20th century)
		Moulded window glass	1 piece	20th century
	804	Pottery	13 sherds	Post-medieval (late 19th-early 20th century)
		Bottle glass	1 piece	Post-medieval (*c*.1875-1890)
		Core of hole drilled to split slate	1	Post-medieval
T9	Unstratified	Large iron nails	2	Post-medieval
		Iron objects	3	Post-medieval
		Pottery	12 sherds	Post-medieval (late 17th-late 19th century)
		Vessel glass	1 sherd	Post-medieval (late 18th-mid 19th century)
		Iron objects (wire?)	2	Post-medieval
		Leather (shoe uppers ?)	2 pieces	Post-medieval/modern?
		Brick/tile	3 pieces	?
		Coin (1860 half penny)	1	1860
	904	Pottery	2 sherds	Roman
	906	Pottery	1 sherd	Medieval/Roman?
	911	Pottery	1 sherd	Post-medieval (mid-late 19th century)
		Vessel glass	1 sherd	Post-medieval (early-mid 19th century)
	912	Timber	2 pieces	Post-medieval
F14	Interior of SW wall	Glass asafoetida? Bottle	1	*c*.1880+

Appendix IIb
The Roman pottery from G1738 Llidiart Yspytty, Tremadog

By Jeremy Evans (12 March 2005) with contribution by M Ward

Catalogue

1) U/S Trench 3

A wide-mouthed jar in Severn Valley ware with a hooked rim, cf Webster (1976) nos 23 and 25, mid 2nd-later 3rd century. Cross-joins (304) D. 30?cms, RE >4% Wt 27g

2) Context 304 Trench 3

Two joining rimsherds and a bodysherd from a Severn Valley ware wide-mouthed jar with a hooked rim. Cross-joins No 1 (from U/S Trench 3) above. D. *c*30cms, RE 8%, Wt 44g

3) Context 304 Trench 3

An oxidised mortarium bodysherd, probably later 1st-2nd century, probably from a fairly local source. The fabric has an orange core, margins and surfaces with common moderate-coarse sand *c*0.3-0.4mm in a 'clean' matrix. Trituration grits; common fine white quartz, brown sandstone(?) and black, white and red (?)granitic grits, *c*1-1.5mm. Wt 62g

4) Context 326 Trench 3

An eroded Baetican Dressel 20 rim fragment, 1st-3rd century. D. 14?cms RE 10%, Wt 34g (not illustrable)

5) Context 904 Trench 9

a) An eroded oxidised fragment, probably pottery.
The fabric has an orange core, margins and surfaces with some moderate sand *c*0.3mm in a 'clean' matrix. Wt >1g

b) An excoriated samian bodysherd. An eroded sherd lacking all surfaces, but presumed to be CG ware AD 120-200 Wt 1g

6) Context 906 Trench 9

An oxidised fragment of fired clay. Wt 1g

Discussion

Little can be said about this collection, given its size. There is positive evidence for occupation on this site in the 2nd century. It might, or might not, have been occupied in the later 1st or 3rd centuries. There is far too little material for absence of material of a particular date to be really significant (although even in this size of group it is a little odd that there is no BB1).

Appendix IIc
Post-Medieval Pottery and Glass Report: Llidiart Yspytty, Tremadog, Gwynedd, NGR SH 557 402, Site Code: G1736

Report No. 152, April 2005

By Jonathan Goodwin of Stoke-on-Trent Archaeology, Bethesda Street, Hanley, Stoke-on-Trent, Staffordshire ST1 3DW (Tel: 01782 235413, Fax: 01782 232500, Email: jon.goodwin@stoke.gov.uk, Website: www.stoke.gov.uk/archaeology)

Contents

Non-technical summary

Stoke-on-Trent Archaeology undertook, on behalf of Gwynedd Archaeological Trust, the analysis of a small assemblage of post-medieval ceramics and glass excavated from Llidiart Yspytty, Tremadog, Gwynedd. The analysis was limited to the cataloguing of the ceramic and glass assemblage, most of which was 19th century and comprised a typical selection of material that was readily available during the period.

1.0 Introduction

1.1 Stoke-on-Trent Archaeology were appointed by Gwynedd Archaeological Trust in February 2005, to undertake the analysis of a small assemblage of post-medieval pottery and glass from excavations at Llidiart Yspytty, Tremadog, Gwynedd (SH 557402). The site includes the remains of a 19th-century ironstone mine, associated tramways and a toll road, and was excavated in advance of development between 4th January and the 1st February 2005.

2.0 Methodology

2.1 The pottery and glass assemblage comprises forty-three sherds of ceramic material and five fragments of bottle and window glass. The assemblage was recovered from contexts [304], [701], [802], [803], [804] and [911], and, in addition, two unstratified groups from trenches 3 and 9.

2.2 The production of a basic catalogue of the ceramic and glass assemblage represents an appropriate level of recording for the Tremadog material. This is due to the relatively small size of the ceramic and glass assemblage and the fact that the two unstratified groups contain over fifty per-cent of the ceramic material collected. The ceramic catalogue (table 1) provides details of ware type, vessel form, decoration, completeness, quantity (by sherd count) and probable date. The glass has been treated in a similar fashion, with a description of colour, function, completeness and date provided for each fragment (table 2).

2.3 No further analysis or interpretation of the material was carried out beyond the production of the catalogues.

3.0 Acknowledgements

3.1 This report was written by Jonathan Goodwin of Stoke-on-Trent Archaeology. Thanks are due to David Barker of the Archaeology Service for his comments on aspects of the ceramic assemblage and to Jane Kenney of Gwynedd Archaeological Trust.

Table 1: Ceramic Material

Trench	Context	Description of Ware	Surface dec	Dec in/on body; overglaze	Vessel form/ description	base	body	rim/edge	handle	spout	knob	profile	bowl	stem	No. sherds	Date	Notes
3	**304**	**Stoneware**			**cup**	*									**1**	first quarter 18th **century**	
	u/s	**Blackware**			**mug?**		*								**1**	**late 17th-18th century**	
		slipware	**trailed white slip**		**dish**		*								**1**	**late 17th-18th century**	
		drab ware			**cylindrical mug**	*									**1**	**mid-late 19th century**	
		white-bodied e'ware	**transfer-printed, blue**		**cup**	*									**1**	**mid-late 19th century**	
		white-bodied e'ware	**transfer-printed, blue**		**plate**			*							**1**	**mid-late 19th century**	
		white-bodied e'ware	**transfer-printed, blue**		**plate**			*							**1**	**late 19th century**	**"Asiatic Pheasants" design**
		bone china			**cup**	*									**1**	**late 19th century**	
		pipe clay			**clay pipe**									*	**1**	**19th century**	
7	**701**	**stoneware**			**inkpot**			*							**1**	**19th century**	
		pipe clay			**clay pipe**									*	**1**	**19th century**	
8	**802**	**whitebodied e'ware**			**bowl**	*									**1**	**mid-late 19th century**	
	803	**whitebodied e'ware**	transfer-printed, green		**bowl/basin**		*								**2 con j.**	**mid-late 19th century**	
		stoneware	moulded vertical reeding		**preserve jar**			*							**1**	late 19th century	

Trench	Context	Description of Ware	Surface dec	Dec in/on body; overglaze	Vessel form/ description	base	body	rim/edge	handle	spout	knob	profile	bowl	stem	No. sherds	Date	Notes
		coarse e'ware			**pan?**		*								**1**	**late 19th-early 20th century**	**white slip on interior**
	804	**coarse e'ware**			**pan**		*	*							**7, 2 con j.**	late 19th-early 20th **century**	**white slip on interior with brown line around rim**
		stoneware		moulded vertical reeding	**preserve jar**		*	*							**3 con j.**	**late 19th century**	
		china/ continental procelain			**egg cup**	*									**1**	**late 19th century**	
		white-bodied e'ware	transfer-printed, blue		**plate**	*									**1**	**mid-late 19th century**	**"Asiatic Pheasants" design**
		majolica		moulded floral design	**plant holder**		*								**1**	**late 19th century**	
9	**911**	**white-bodied e'ware**	transfer-printed, blue		**plate**			*							**1**	**mid-late 19th century**	**moulded rim, "Asiatic Pheasants" design**
	u/s	**mottled ware**		turned lines	**large mug**		*								**1**	**Late 17th-18th century**	

Trench	Context	Description of Ware	Surface dec	Dec in/on body; overglaze	Vessel form/ description	base	body	rim/edge	handle	spout	knob	profile	bowl	stem	No. sherds	Date	Notes
		white salt-glazed stoneware		turned lines	undiagnostic hollow ware		*								**1**	**Second half 18th century**	
		creamware			undiagnostic hollow ware		*								**9**	Late 18th-early 19th century	external glaze appears confined to upper part of vessel
		white-bodied e'ware			**preserve jar**			*							**1**	**mid-late 19th century**	
		soft-fired, iron-rich fabric with coarse inclusions			**brick/tile?**										**3**	**????**	**highly abraded**

Abbreviations used in the table: e'ware = earthenware
conj. = conjoining

Table 2: Glass

Trench	**Context**	**Description**	**Form/description**	**Base**	**Body**	**Neck**	**Window**	**Profile**	**No. Fragments**	**Date**	**Notes**
8	803	clear/aqua	moulded window				*		1	20th century	

		glass	glass								
	804	aqua glass	bottle – mineral water			*			1	*c*.1875-1890 (possibly as late as 1900)	Codd's Patent
9	911	green glass	bottle - beer/wine			*			1	early-mid 19th century	
	u/s	green glass	bottle - beer/wine	*					1	late 18th-mid 19th century	Pontil mark suggests that the bottle predates the use of clamps in the production process - *c*.1850
F14		aqua glass	bottle - household?					*	1	*c*.1880+	Blown in 1-piece mould with sheared lip. Cork *in situ*. Sheared lips usually feature on bottles containing household products - ink (unlikely in this case), polish. varnish etc. Polychrome printed design indicating contents is present but indistinct.

Appendix IId
Description of a fragment of a rotary quern
Jane Kenney

Fragment of the lower stone of a rotary quern (SF1, context 317)
(see figure II.1)
The piece represents about a third of the lower stone of a rotary quern. It retains part of the central hole into which a peg would have been inserted around which the upper stone would have rotated. The hole has been drilled from both the top and the bottom, the 2 holes meeting very slightly off line. The base of the stone has been pecked flat and the rim has been pecked into a neat arc. The upper surface has been shaped to rise up towards the centre. The top stone would have been shaped to fit over this shallow cone, holding it in place as it turned and directing the ground flour down towards the rim of the quern. The surface retains a band of the rough pecking which would have initially provided a rough surface for grinding, but the cone area has been worn smooth and there is wear towards the rim of the quern.

There is a small patch of orange-brown concretion on the upper surface. This resembles an iron oxide compound but could be a lichen growth and either way it is likely to be post depositional and not related to the use of the quern.

Rotary querns replaced saddle querns in the first millennium BC. The stationary lower stone provided the grinding surface, while the upper stone rotated around a central spindle fixed into the centre of the lower stone. The grain was fed into top of upper stone (Fowler 1983, 186).

Fowler, PJ, 1983, *The Farming of Prehistoric Britain*

Appendix IIe
Report on the petrology of a rotary quern from Tremadog
By David Jenkins (22/06/05)

The petrology of a large fragment of a rotary quern supplied by Jane Kenney from an excavation in the Tremadog area, Gwynedd (G1736: T3-317) was examined by optical stereomicroscope with the following results.

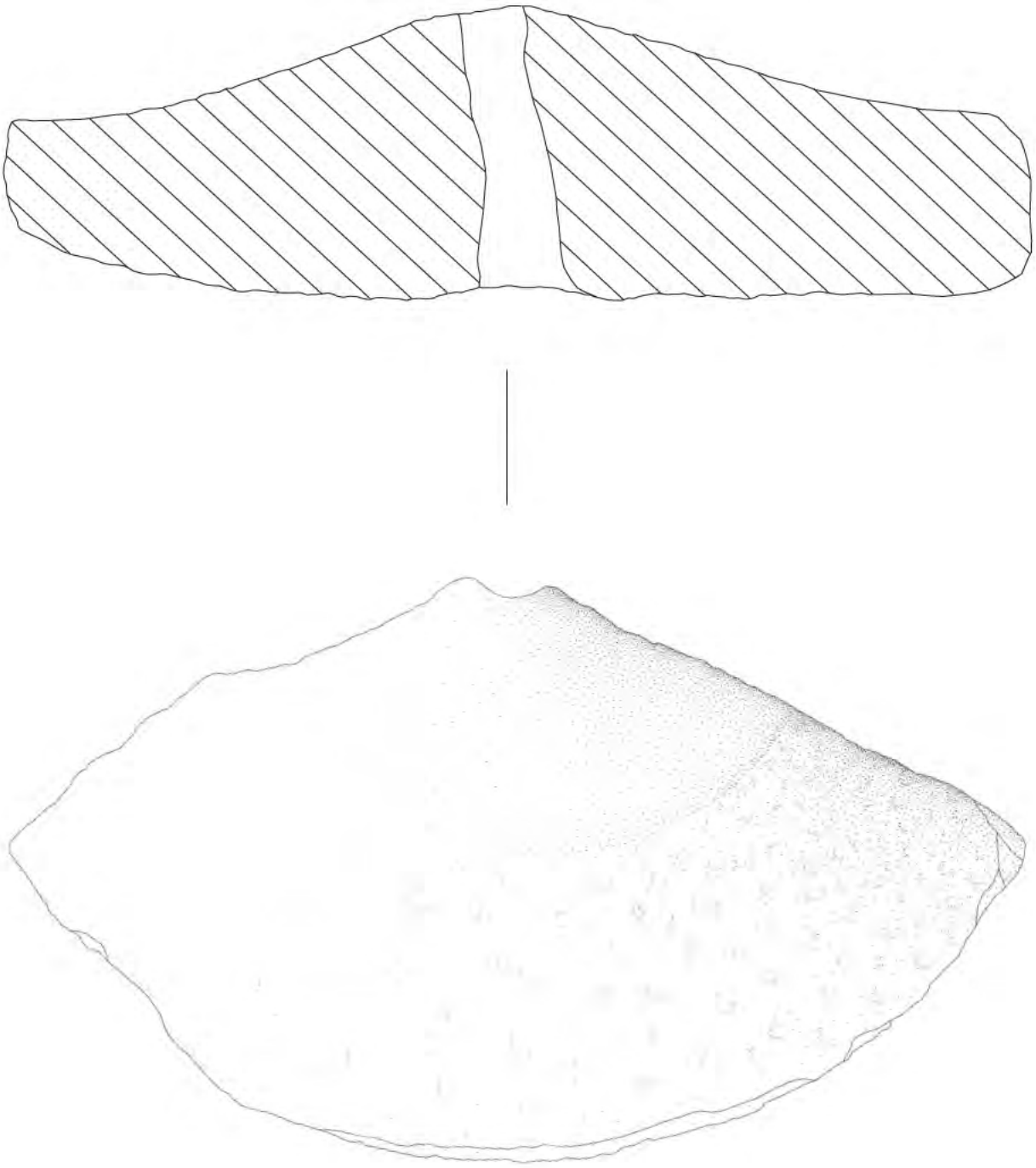
Petrology
The rock is a uniform pale brown in colour (Munsell 10YR6/3), probably due to staining by burial in soil, although no fresh fractures surfaces are present to check this. It is a very well sorted fine grained quartz sandstone with most grains falling within the 0.2-0.6mm range, rarely reaching 1mm. The grains are predominantly sub-rounded quartz, but with common sub-angular black grains (magnetite/ilmenite) and rare white grains showing cleavage (weathered feldspars?). The rock is moderately porous with a fine grained white/brown powdery matrix.

The rock is also uniformly massive in nature, showing only weak evidence of any bedding or jointing, and displaying no other obvious structural features.

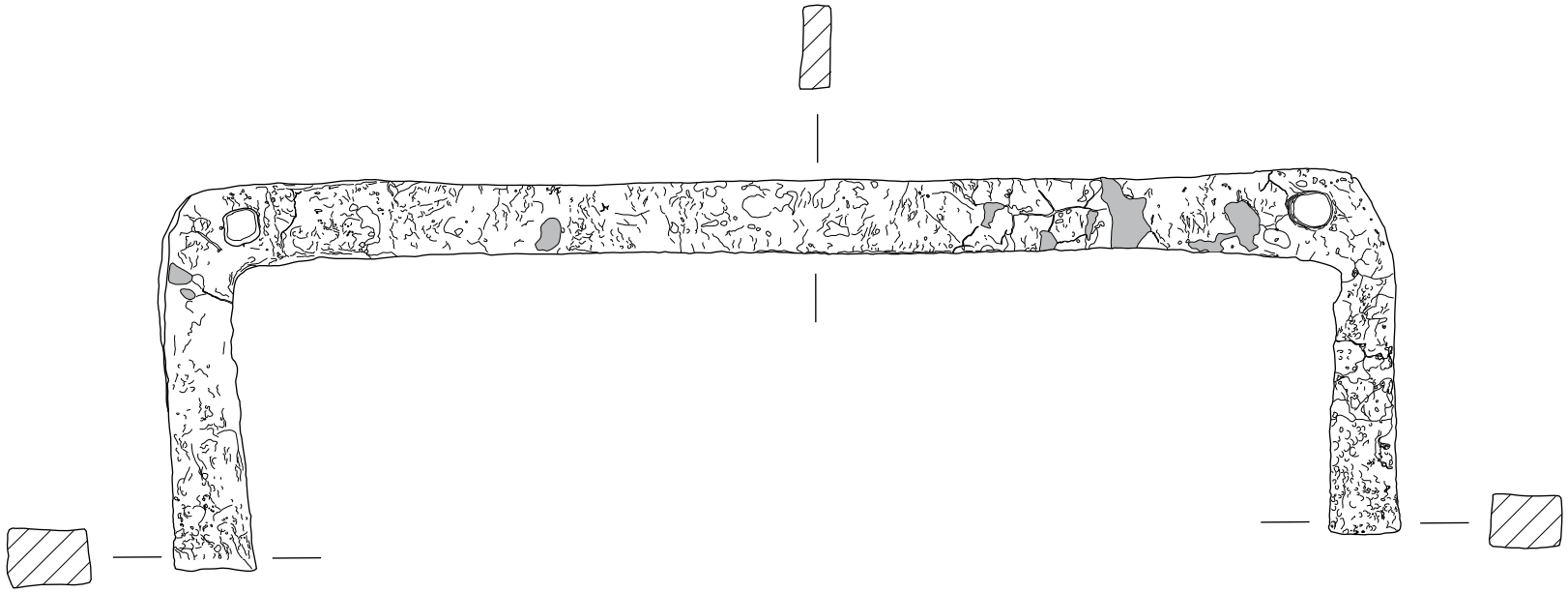
Conclusion
The nature of this fine-grained **quartz sandstone** suggests an origin from **Upper Carboniferous** outcrops, for example those of the Namurian/Westphalian (Millstone Grit/Coal Measures) of North East Wales and South Wales. It is not familiar amongst the limited outcrops of the Namurian down-faulted at Malltraeth on Anglesey ("Bodorgan grit"), where the Westphalian is also only available in spoil from the 19th century coal mines in that area.

Appendix IIf
Roman Iron bar

Six pieces of heavily corroded iron were recovered from contexts (318) and (322) within the flue of the corn-drier. These were sent to Phil Parkes of the Conservation Laboratory, Cardiff School of History and Archaeology. An X-ray revealed these to be parts of a single object, which were readhered and then conserved. The object is a U-shaped bar with a rectangular cross section and two right angled bends. There is a square shaped hole at each of these bends (see figure II.1 in appendix II). The function of this object is not yet known but it came from within the fill of the corn-drier and probably relates to its use.



Appendix II figure II.1: Fragment of rotary quern



Repair

0 100mm

1:2

Appendix II figure II.2: Roman iron bar

APPENDIX III

Palaeoenvirnomental evidence

Appendix IIIa
Summary of soil samples

All samples were subjected to flotation using a 0.5mm sieve and the residue was wet sieved through a 1mm sieve. The charred remains from all these samples were studied by a specialist to identify the species of timber used and any other plant remains surviving. The residue from samples 2-9 was checked for the presence of hammer scale and other potential industrial residues. All ceramic fragments and other artefacts were removed from the residues and sent for study. After thorough checking the residues were discarded. The charred macro fossils are to be kept with the artefacts assemblage to be held at Gwynedd Archaeological Trust pending transferral to an appropriate museum.

Sample No.	Context	Description of context	Original Volume (litres)	Flot Weight (g)
1	504	Fill of small pit or root hollow	2	10
2	318	Upper SE part of deposit representing firing of corn drying kiln.	10	110
3	321	Upper NW part of deposit representing firing of corn drying kiln.	6	35
4	322	Lower part of deposit representing firing of corn drying kiln.	28	370
5	324	Deposit representing use of oven (330).	28	290
6	326	Charcoal rich deposit around and over oven (359)	9	140
7	332	Charcoal rich deposit within area of timber structure (362)	13	100
8	335	Fill of drain (336)	12.5	80
9	358	Lens of charcoal from base of wall core (358)	2	40

Potential of samples

Sample No.	Context	Potential for analysis
1	504	Very low potential
2	318	Possible charred remains of fuel used for firing and possible charred grains and other macro fossils.
3	321	Possible charred remains of fuel used for firing and possible charred grains and other macro fossils.
4	322	Possible charred remains of fuel used for firing and possible charred grains and other macro fossils. Well sealed and good sample for radiocarbon dating.
5	324	Possible charred remains of fuel used for firing other macro fossils. Well sealed and good sample for radiocarbon dating.
6	326	Possible charred macro fossils, deposit mixed during excavation and upper part disturbed by roots so not ideal for radiocarbon dating.
7	332	Charred macro fossils, fragments of ceramics and possibly other traces of use of structure (366). Deposit close to ground surface and therefore potentially contaminated and poor for dating.
8	335	Well sealed, could date use of drain but exact origin or charcoal unknown so not ideal for dating.
9	358	Terminus *ante quem* date for extension of corn drying kiln

Appendix IIIb

Palaeoecology Research Services Report PRS 2005/23
Assessment of biological remains from Llidiart Yspytty, Tremadog, Gwynedd, Wales (site code: G1736)

By Örni Akeret

Summary

Archaeological excavations were undertaken by Gwynedd Archaeological Trust at Llidiart Yspytty, Tremadog, Gwynedd, Wales, in advance of development. Biological (mostly charred plant) remains recovered from samples from eight deposits associated with several features including a corn drying kiln and two ovens (thought to be of Roman date) were submitted for an assessment of their interpretative potential, as well as their suitability for radiocarbon dating. In addition, two timber fragments from a 19th century tramway sleeper were submitted for wood species identification.

Three of the samples, from fills of the corn drying kiln, each gave appreciable quantities of charred remains of cereals and some wood charcoal (presumably representing fuel for the kiln). Further analysis of these remains could contribute to the understanding of the function of this feature, past human activity at this site (specifically crop production) and possibly also allow some reconstruction of the local ecology. Ancient plant macrofossils from the remaining contexts were largely restricted to fragments of charcoal which, again, almost certainly represent fuel waste. The two timber pieces from the tramway sleeper were both of larch or spruce.

Two burnt bone fragments recovered from Context 332 were too poorly preserved to be identified and of no interpretative value.

Most contexts provided sufficient suitable material for radiocarbon dating to be attempted (at least via AMS).

KEYWORDS: LLIDIART YSPYTTY; TREMADOG; GWYNEDD; WALES; ASSESSMENT; ?ROMAN; 19TH CENTURY; PLANT REMAINS; CHARRED PLANT REMAINS; CHARCOAL; CHARRED GRAIN; VERTEBRATE REMAINS; BURNT BONE

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Assessment of biological remains from Llidiart Yspytty, Tremadog, Gwynedd, Wales (site code: G1736)

Introduction

Archaeological excavations were undertaken by Gwynedd Archaeological Trust at Llidiart Yspytty, Tremadog, Gwynedd, Wales (centred on NGR SH 557 402), between the 4th January and the 1st February 2005, in advance of development.

The development area contains remains relating to 19th century ironstone mining (including associated tramways and a toll road) and falls within a designated Landscape of Historic Interest (HLW (Gw) 7 Aberglaslyn). The sampled deposits included fills of a corn drying kiln and two ovens, thought to be of Roman date, a burnt area within a possible small timber structure (362) defined by a group of postholes and a drain fill from an earlier phase of activity, and a charcoal lens from the core of a later wall.

Charred plant remains and a few bone fragments, recovered from sediment samples processed by the excavator, were submitted to Palaeoecology Research Services Limited (PRS), County Durham, UK, for assessment. In addition, two timber fragments representing the remains of a sleeper from a light tramway related to the 19th century works were submitted for wood species identification.

Methods

The sediment samples were processed by Gwynedd Archaeological Trust prior to delivery to PRS, and the remains recovered submitted for assessment. All samples were processed using bucket flotation with a 0.5 mm sieve and the residue was then wet sieved through a 1 mm sieve. The wet residues were sorted and any charred material dried and added to the flot fraction.

The remains (i.e. the 'augmented' flots) were submitted for identification and for consideration as the basis for radiocarbon dating by standard radiometric technique or accelerator mass spectrometry (AMS).

Plant remains were identified by using a reference collection of modern seeds and fruits; cereals were identified according to Jacomet (1987). Nomenclature for plant species follows Stace (1997), whilst the identification of charcoal follows Schweingruber (1978).

Results

All plant remains listed below were charred unless noted otherwise.

Context 318 [deposit containing material from flue use during firing of the corn drying kiln 366 – ?Roman]
Sample 2 (original sample volume 10 litres, weight of flot 110 g)

The sample contained considerable quantities of cereal grains and chaff. The dominant species were emmer wheat (*Triticum dicoccum* Schübl.) and spelt wheat (*T. spelta* L.), but a few rye (*Secale cereale* L.) grains were also present. The brome (*Bromus*) and knotgrass (*Polygonum*) remains present probably represent weeds harvested accidentally along with the cereals.

Charcoal fragments represented at least six different taxa: hazel (*Corylus avellana* L. – stem wood), ash (*Fraxinus excelsior* L. – stem wood), apple subfamily (Maloideae – stem wood and twigs), cherry/plum (*Prunus* – twigs), oak (*Quercus* – stem wood) and elm (*Ulmus* – stem wood).

Context 321 [deposit in the west end of the flue of corn drying kiln 366, representing a mix of charcoal from firing and collapse of the kiln's superstructure (Context 303) – ?Roman]
Sample 3 (original sample volume 6 litres, weight of flot 35 g)

Remains of cereals were quite numerous from this deposit. There were grains and chaff of oat (*Avena*), grains of hulled barley (*Hordeum distichon* L./*H. vulgare* L.), chaff of emmer and grains of spelt wheat. Fruits of fat-hen (*Chenopodium album* L.) were also identified.

The charcoal was all of stem wood and mostly of hazel, with a small quantity of oak.

Context 322 [lower part of deposit representing firing of the corn drying kiln 366 – ?Roman]
Sample 4 (original sample volume 28 litres, weight of flot 370 g)

Most of the plant remains were fragments of charcoal representing the following taxa: hazel (stem wood), ash (stem wood), cherry/plum (stem wood and twigs), oak (stem wood) and elm (stem wood and twigs). In addition, there were a few grains of barley (*Hordeum distichon/vulgare*) and emmer or spelt wheat (*Triticum dicoccum/spelta*).

A rather large number of uncharred plant remains were also found including rootlets, twigs, germinating seeds and conifer needles (a part of them still green). Some at least of these were clearly modern contaminants.

Context 324 [deposit representing use of oven 330 – ?Roman]
Sample 5 (original sample volume 28 litres, weight of flot 290 g)

The submitted material contained no seeds or fruits; all the remains were charcoal of hazel (stem wood), ash (stem wood), apple subfamily (Maloideae – twigs), cherry/plum (stem wood and twigs) and oak (stem wood).

Context 326 [charcoal rich layer deposited after oven 359 went out of use – date unknown but post-dates the use phase of the ?Roman oven]
Sample 6 (original sample volume 9 litres, weight of flot 140 g)

Apart from obviously modern contaminants (uncharred rootlets and conifer needles), the remains recovered from this sample were exclusively of charcoal. At least four taxa were represented including hazel (stem wood and twigs), ash (stem wood), cherry/plum (stem wood), elm (twigs) and viburnum (*Viburnum* – stem wood).

Context 332 [charcoal rich deposit within area of possible small timber structure 362 – date unknown but pre-dates the ?Roman kiln and ovens]
Sample 7 (original sample volume 13 litres, weight of flot 100 g)

This sample gave a small number of poorly preserved cereal grains. These could not be identified more precisely, but the presence of spelt wheat was indicated by a glume base.

Some uncharred ‘seeds’ present, including those of knotweed (*Persicaria*), knotgrass (*Polygonum*) and blackberry (*Rubus fruticosus* L. agg.), were possibly modern contaminants.

The charcoal was all of stem wood, with most being hazel, however, there was also some charcoal of a second diffuse-porous taxon which could not be identified more closely.

Also present within the flot were two rather eroded fragments of burnt bone. These could not be identified.

Context 335 [fill of drain 336 – date unknown but pre-dates the ?Roman kiln and ovens]
Sample 8 (original sample volume 12.5 litres, weight of flot 80 g)

A small amount of cereal grains were found, but they were too fragmented and distorted to be identified. No other ‘seeds’ were seen.

Charcoal fragments of hazel (stem wood), ash (stem wood), apple subfamily (Maloideae – stem wood), cherry/plum (stem wood), oak (stem wood) and elm (stem wood and twigs), were recorded.

Context 358 [lens of charcoal from the base of the core of wall with face 357 – date unknown but post-dates Context 326]
Sample 9 (original sample volume 2 litres, weight of flot 40 g)

The flot consisted exclusively of hazel stem wood charcoal. No seeds or fruits were found.

Context 912 [remains of a light tramway sleeper associated with the 19th century works]
Sample 2 (small find)

The two uncharred timbers were both of either larch (*Larix*) or spruce (*Picea*). The structure of the interior of the wood was very well preserved, but the outer surfaces had started to decompose.

Discussion and statement of potential

Charred remains of cereals were quite numerous from the fills of the structure interpreted as a corn drying kiln (Contexts 318, 321 and 322). Interpretatively useful assemblages of grains and chaff were noted during this assessment, as well as a few weeds. These remains show some potential for the interpretation of the feature, past human activity at this site (specifically crop production) and possibly also for some reconstruction of the local ecology based on the wild (arable weed) taxa present.

The other samples gave few or no 'seeds' and show little potential for site interpretation.

The charcoal present was, in most cases, from a variety of taxa, and, in particular, it seems that any available wood was used as fuel for the ovens and the corn drying kiln. Charcoal from two of the other sampled deposits (Contexts 332 and 358) was, where identifiable, largely restricted to hazel, however, perhaps suggesting a rather different composition to the local woodland (and so a different date?) or a different pattern of exploitation.

In most samples sufficient suitable material was present for AMS dating to be attempted. Where present, cereal grains are most appropriate for this purpose, because they are short-lived plant structures that are unlikely to have been stored for more than a few years, so that the date returned is likely to be close to that of the charring event. If charcoal is used for dating there are two possible sources of error. Firstly, the piece of wood may be from the centre of the trunk or a large branch of the tree ('stem wood'), and the time span between the growth of this wood (its carbon content being fixed at the point of cell formation) and the death of the tree may be several tens (sometimes hundreds) of years. Secondly, prior to becoming burnt the wood may have been stored or formed part of a structure, also perhaps for many years. Both of these 'old wood' problems may result in a radiocarbon date significantly earlier than the charring event being returned. If charcoal is used for dating, then pieces with the waney edge (i.e. where the terminal annual ring is preserved) should be selected – this is most likely on fragments of relatively young wood such as twigs or small branches.

The two timber pieces from the 19th century tramway sleeper were both of larch or spruce, these genera being almost indistinguishable. Neither of these taxa is native to the British Isles, but both are widely planted in forestry.

The two burnt bone fragments from Context 332 were too poorly preserved to be identified and of no interpretative value.

Recommendations

The 'seeds' and fruits recovered from the three fill of the corn drying kiln (Contexts 318, 321 and 322) should be fully recorded. The concentration of remains was lower from Context 322, but, nevertheless, it should be included in any further study to provide information on the spatial distribution of the plant remains within the feature, and how it functioned.

The remaining contexts gave few or no plant remains other than charcoal, presumably all from fuel for the ovens, corn drying kiln and other fires, and warrant no further investigation.

If material is required for radiocarbon dating of the deposits to be attempted then it is recommended that the following be submitted for AMS:

Context 318: grains of emmer or spelt wheat
Context 321: grains of barley
Context 322: charcoal of twigs of elm
Context 324: charcoal of twigs of cherry/plum
Context 326: charcoal of twigs of elm
Context 332: charcoal of stem wood of hazel*
Context 335: charcoal of twigs of elm
Context 358: charcoal of stem wood of oak*

* – see the *caveats* expressed above regarding 'old wood', especially with regard to long-lived tree species such as oak.

Material for submission would need to be carefully selected and prepared to avoid the inclusion of modern remains and to remove adhering sediment which was present on most of the plant remains seen in this assessment.

Only two unidentifiable fragments of burnt bone were recovered from the samples and no further study of these remains is recommended.

The remains reported here clearly show the potential for survival of charred plant remains within at least some of the deposits at this site. Any future excavation should allow for the systematic collection of samples from deposits with concentrations of charred plant remains, and, in particular, any of similar composition to the fills of the corn drying kiln (Contexts 318, 321 and 322), where interpretatively valuable charred plant remains were present.

Retention and disposal

All of the recovered remains should be retained as part of the physical archive for the site.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 8, Dabble Duck Industrial Estate, Shildon, County Durham), along with paper and electronic records pertaining to the work described here.

Acknowledgements

The author is grateful to Jane Kenney, of Gwynedd Archaeological Trust, for providing the material and the archaeological information. Vertebrate remains were examined by Deborah Jaques (PRS).

References

Jacomet, S. (1987). *Prähistorische Getreidefunde. Eine Anleitung zur Bestimmung Prähistorischer Gersten- und Weizenfunde*. Basel: Eigenverlag.

Schweingruber, F. H. (1978). *Mikroskopische Holzanatomie*. Zug: Kommissionsverlag Zürcher.

Stace, C. (1997). *New Flora of the British Isles: second edition*. Cambridge: Cambridge University Press.

Appendix IIIc
Palaeoecology Research Services Report PRS 2005/91
Technical report: Charred plant remains from a corn drying kiln from Llidiart Yspytty, Tremadog, Gwynedd, Wales (site code: G1736)

By Örni Akeret

Summary

Archaeological excavations at Llidiart Yspytty, Tremadog, Gwynedd, Wales, revealed a corn drying kiln of Roman date (confirmed via AMS dating), as well as other features. An earlier assessment had shown that sediment taken from layers associated with the firing of the structure produced an appreciable number of cereal remains and it was therefore decided to carry out a full analysis.

Amongst the cereal species identified, spelt wheat was the most frequently recorded. Rather unusually for this type of structure a relatively large number of oat grains were present. Other cereal taxa identified included barley, emmer wheat, naked wheat and rye. It appeared that the cereal crops had been cleaned prior to processing in the kiln as only a few remains of weeds were found.

The presence of sprouted grains indicated that malting was one possible function of the kiln. It may also have been used for the parching of hulled cereals.

KEYWORDS: LLIDIART YSPYTTY; TREMADOG; GWYNEDD; WALES; TECHNICAL REPORT; ROMAN; CORN DRYING KILN; PLANT REMAINS; CHARRED PLANT REMAINS; CHARCOAL; CHARRED GRAIN; ?MALTING; ?PARCHING

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Technical report: Charred plant remains from a corn drying kiln from Llidiart Yspytty, Tremadog, Gwynedd, Wales (site code: G1736)

Introduction

Archaeological excavations were undertaken by Gwynedd Archaeological Trust at Llidiart Yspytty, Tremadog, Gwynedd, Wales (centred on NGR SH 557 402), between the 4th January and the 1st February 2005, in advance of development.

The development area contained remains relating to 19th century ironstone mining (including associated tramways and a toll road) and falls within a designated Landscape of Historic Interest (HLW (Gw) 7 Aberglaslyn). The sampled deposits included fills of a corn drying kiln and two ovens, thought to be of Roman date, a burnt area within a possible small timber structure defined by a group of postholes, a drain fill from an earlier phase of activity, and a charcoal lens from the core of a later wall.

An earlier assessment (Akeret 2005) had shown that the samples from the corn drying kiln gave appreciable quantities of charred cereal remains, but that the other contexts contained no or very few seeds or fruits. It was therefore decided to carry out a full analysis of the plant macrofossils from the kiln.

All three samples analysed came from a deposit representing the firing of the T-shaped corn-drying kiln. Context 318 formed the upper south-eastern part, 321 the upper north-western part, and 322 the lower part of the deposit.

Methods

The sediment samples were processed by Gwynedd Archaeological Trust prior to delivery to PRS, and the remains recovered submitted for identification. All samples were processed using bucket flotation with a 0.5 mm sieve and the residue was then wet sieved through a 1 mm sieve. The wet residues were sorted and any charred material dried and added to the flot fraction.

Plant remains were identified by using a reference collection of modern seeds and fruits; cereals were identified according to Jacomet (1987). Context 318 produced a very large number of cereal grains. One quarter (randomised) of them were identified and the result then extrapolated. All other contexts and types of remains were fully identified and counted. Nomenclature for plant species follows Stace (1997), whilst the identification of charcoal follows Schweingruber (1978).

Remains selected from two of the fills (Contexts 318 and 321) of the corn drying kiln were submitted for radiocarbon dating. Material from two further deposits (Context 324 – use deposit from an oven, and Context 332 – charcoal rich deposit within Structure 362) was also submitted, but no further study of the plant macrofossils from these contexts was undertaken. All of the material was submitted to Beta Analytic Inc. (Miami, Florida) for radiocarbon dating via accelerator mass spectrometry (AMS).

Results

Table 1 lists the plant remains other than charcoal recovered from the three samples. All of the recorded remains were charred. Table 2 summarises the submitted material and the results obtained from radiocarbon dating – all gave 'Roman' dates between the 1st and 4th centuries AD.

Cereals were the most frequent archaeobotanical finds. However, the preservation of the remains was rather poor and a relatively large proportion (56%) of the cereal grains could not be identified to genus or species level. More delicate remains, such as chaff, seemed to be absent or under-represented.

The range of cereal taxa was similar between samples, but their concentrations varied widely. The number of cereal remains per litre of sediment was highest in Context 318 at 198; in Context 321 there were 50, and in Context 322 only three cereal remains per litre. A proportion of the cereal grains seem to have sprouted prior to becoming charred as indicated by the presence of coleoptiles (the protective sheath that surrounds the young shoot tip of grasses).

There were few wild plant remains, and all that could be identified sufficiently precisely represented weeds, mostly those of arable fields.

During the assessment, charcoal of the following taxa was identified: hazel (*Corylus avellana* L.), ash (*Fraxinus excelsior* L.), apple subfamily (Maloideae), cherry/plum (*Prunus*), oak (*Quercus*), and elm (*Ulmus*). All of these taxa were represented in the charcoal recovered from Context 318, all but apple subfamily from Context 322 and just hazel and oak from Context 321. *Viburnum* charcoal was also recorded from some of the contexts assessed, but not from the fills considered in this report. It seems that any available wood was used as fuel for the corn drying kiln (and the ovens), and no further study of this material was undertaken.

Discussion

That the structure was used for the processing of cereals was clearly indicated by the frequency of these remains. At least six cereal species were present, suggesting that the finds were probably a mixture of remains from more than one usage.
Charred cereals had accumulated mainly in the later phase of use of the kiln, the lower fill (Context 322) containing only few plant remains other than charcoal.

Among the cereals, spelt wheat (*Triticum spelta*) was the most frequently recorded species. Emmer (*T. dicoccum*), the second glume wheat species present, having a more minor role. For this investigation the identification of the glume wheats was based exclusively on chaff (spikelet forks and glume bases), because the separation of the grains of the two species is often problematic (e. g. Hillman *et al*. 1995). Glume wheats are generally stored in their glumes and separated from them only in the last stages of processing; therefore, the proportion of chaff gives a good indication of the proportion of grains. On this basis, most of the grains classified as *Triticum dicoccum/spelta* were of spelt wheat.

The frequency of spelt accords well with the data from 21 corn driers of the Roman period compiled by Van der Veen (1989); in most of these spelt was also the most frequent cereal. More surprising was the relatively large number of oat grains. This cereal was rarely found in the sites alluded to above. The finds could theoretically be largely of weeds, as cultivated oat (*Avena sativa* L.) and wild-oat (*A. fatua* L.) cannot be separated on the basis of the morphology of grains. The presence of a floret base of *A. sativa* shows that at least some of the oats were of the crop species, however.

Barley, the second most frequently occurring cereal found in fills of other Roman-period corn driers, occurred in only small numbers at Llidiart Yspytty. There were also a very few remains of rye and naked wheat, probably representing accidental admixtures to the other cereals processed in the kiln.

For the glume wheats almost twice as many grains as glume bases were counted, though in theory the proportion should be close to 1:1. This could imply that some of the spelt and emmer wheat had been dehusked prior to becoming charred. However, given the relatively poor state of preservation, it seems more likely that the relative rarity of chaff indicates differential survival as, under certain charring conditions, the more robust grains are more likely to survive (see, for example, Boardman and Jones 1990).

The scarcity of weeds cannot be explained by differential survival alone as many weed species have resistant seeds or fruits. For this reason it seems probable that the cereals were cleaned prior to being processed in the kiln.

More than one hundred ‘corn driers’ have been found in Britain and many of them have been the subject of archaeobotanical investigations. Although these archaeological structures are easily identifiable, their function is still uncertain. The presence of charred cereals in many of them originally led to their interpretation as corn driers. However, this was called into question after research carried out using experimentally reconstructed kilns (Reynolds 1981, Reynolds and Langley 1979). These tests showed that the structures cannot be considered to be effective for the purpose assigned to them, unless the grain is spread so thinly on the floor as to be uneconomic of time and effort. Reynolds and Langley (1979) proposed an alternative hypothesis that they might have been used for the roasting of sprouted grain for malting. The malt produced in the experiments mentioned above was regarded as quite suitable, if a little smoky, for the manufacture of ale. In several of the ‘corn drying kilns’ analysed to date malting seems very likely to have taken place, for example in the case of Catsgore (Hillman 1982) where a large proportion of the spelt grains recovered had sprouted. Some sprouting was observed in the cereal remains from the corn drying kiln at Llidiart Yspytty, but only in a small fraction of the grain. Fourteen isolated coleoptiles and a single sprouting grain were counted, but these numbers are almost certainly an under-representation—as previously stated, the preservation was rather poor and surviving delicate remains, such as coleoptiles, were rare. Malting is certainly a possible function of the kiln investigated.

Malting should not be regarded as the only possible function of these structures. Van der Veen's (1989) archaeobotanical evidence indicated they were probably multi-functional, and that, aside from the roasting of germinated grains for the production of malt, another important role was the parching of ripe grain in preparation for consumption and storage. Parching renders spikelets of hulled wheats and barleys brittle so that the grain could then be released from the hulls by pounding in some sort of mortar. In addition to various ways of crop processing, some of the structures could also have served to smoke meat or fish (Dreisbusch 1994). Drying of cereals was perhaps the exception rather than the rule in most parts of Britain, as most summers were sufficiently warm and dry for this to be unnecessary. It is probable that only in some of the most northerly islands (e.g. in the Faroes, Orkney and Shetland) was drying practiced as a matter of course (Hillman 1982).

Overall, it seems most likely that that this 'corn drying kiln' was used for both the malting and parching of cereals. Malting of cereals other than barley may seem unusual today, but was a common practice of former times. Parching is also a likely function of the kiln here, as most of the cereals identified belonged to hulled species or varieties.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 8, Dabble Duck Industrial Estate, Shildon, County Durham), along with paper and electronic records pertaining to the work described here.

Acknowledgements

The author is grateful to Jane Kenney, of Gwynedd Archaeological Trust, for providing the material and the archaeological information and to Deborah Jaques and John Carrott for discussion on the subject and improvement of the English text.

References

Akeret, Ö. (2005). Assessment of biological remains from Llidiart Yspytty, Tremadog, Gwynedd, Wales (site code: G1736). *PRS* **2005/23**.

Boardman, S. and Jones, G. (1990). Experiments on the effects of charring on cereal plant components. *Journal of Archaeological Science* **17**, 1-11.

Dreisbusch, G. (1994). Darre oder Räucherkammer? Zu römischen Heizanlagen in Westdeutschland. *Fundberichte aus Baden-Württemberg* **19**, 181-205.

Hillman, G. (1982). *Evidence for spelt malting at Catsgore*, pp. 137-40 in Leech, R. (ed.), Excavations at Catsgore 1970-1973. A Romano-British village. *Western Archaeological Trust Excavation Monograph Series Report* **2**. Bristol: Western Archaeological Trust.

Hillman, G. C., Mason, S., de Moulins, D. and Nesbitt, M. (1995). Identification of archaeological remains of wheat: the 1992 London workshop. *Circaea* **12**, 195-209.

Jacomet, S. (1987). *Prähistorische Getreidefunde. Eine Anleitung zur Bestimmung Prähistorischer Gersten- und Weizenfunde*. Basel: Eigenverlag.

Reynolds, P. J. (1981). *New approaches to familiar problems*, pp. 19-49 in Jones, M. and Dimbleby, G. (eds), The environment of man: the Iron Age to the Anglo-Saxon Period. *British Archaeological Reports British Series* **87**. Oxford.

Reynolds, P. J. and Langley, J. K. (1979). Romano-British corn-drying oven: an experiment. *The Archaeological Journal* **136**, 27-42.

Schweingruber, F. H. (1978). *Mikroskopische Holzanatomie*. Zug: Kommissionsverlag Zürcher.

Stace, C. (1997). *New Flora of the British Isles: second edition*. Cambridge: Cambridge University Press.

Van der Veen, M. (1989). Charred grain assemblages from Roman-period corn driers in Britain. *The Archaeological Journal* **146**, 302-19.

Table 1. Charred plant remains other than charcoal from three fills of a corn drying kiln from Llidiart Yspytty, Tremadog, Gwynedd, Wales.

Context			**318**	**321**	**322**
Sample			2	3	4
Sample volume (litres)			10	6	28
Weight of flot (g)			110	35	370
Cereals					
Avena	oat	grain	172	22	9
Avena	oat	awn	4	2	
Avena sativa L.	oat	floret base		1	
Cerealia sp. indet.	cereals	grain	976	119	51
		coleoptile	10	4	
Hordeum distichon L./*H. vulgare* L.	hulled barley	grain	32	6	1
Secale cereale L.	rye	grain	4		
Triticum sp. indet.	wheat	grain	112	6	1
		rachis segment		3	
Triticum aestivum L//*T. durum* Desf./*T. turgidum* L.	naked wheat	grain	4		
		rachis segment	5		
Triticum dicoccum Schübl.	emmer wheat	spikelet fork	7	2	
		glume base	14	8	
Triticum dicoccum/spelta	emmer/spelt wheat	grain	460	54	21
		glume base	23	11	
Triticum spelta L.	spelt wheat	spikelet fork	18	7	1
		glume base	136	56	10
Other plants					
Bromus	brome	caryopsis	29	1	2
Carex	sedge	nut	1		
Chenopodium album L.	fat-hen	seed	3	5	6
Galium aparine L.	cleavers	nutlet	1		
Persicaria	knotweed	achene	6	1	
Plantago lanceolata L.	ribwort plantain	seed		1	
Poa annua L.	annual meadow-grass	caryopsis		2	
Polygonum	knotgrass	achene	6		
Rumex	dock	achene	2		
Tripleurospermum inodorum (L.) Sch. Bip.	scentless mayweed	achene	1		

Table 2. Summary of the submitted material and results from radiocarbon dating of material from two fills of a corn drying kiln and two other deposits (one from the use phase of an oven and the other a charcoal rich deposit within Structure 362) from Llidiart Yspytty, Tremadog, Gwynedd, Wales.

Context	Sample	Beta Number	Submitted material	Dating by	Conventional radiocarbon age	Calibration of radiocarbon age to calendar years @ 2-sigma (95% probability)
318	2	Beta-205125	8 charred emmer/spelt wheat grains: ~190 mg	AMS	1840+/-40 BP	Cal AD 80 to 250
321	3	Beta-205126	4 charred barley grains: ~100 mg	AMS	1820+/-40 BP	Cal AD 100 to 260 AND Cal AD 290 to 320
324	5	Beta-205127	cherry/plum twig charcoal: ~2 g	AMS	1830+/-40 BP	Cal AD 90 to 260
332	7	Beta-205128	hazel stem wood charcoal: ~1 g	AMS	1770+/-40 BP	Cal AD 140 to 380

APPENDIX IV

Radiocarbon dates

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-23.9:lab. mult=1)

Laboratory number: **Beta-205125**

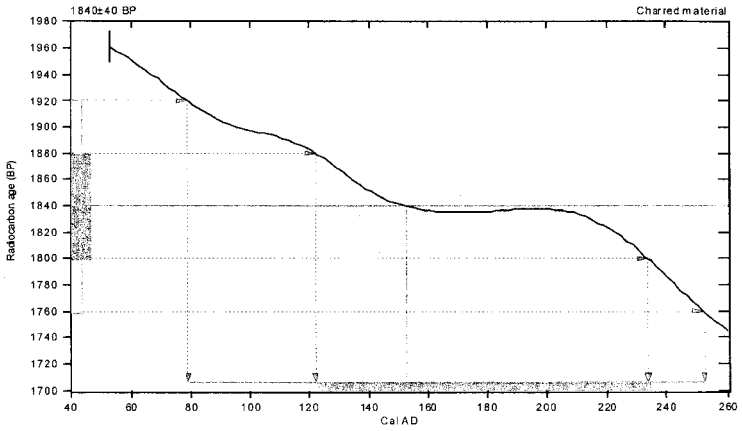
Conventional radiocarbon age: **1840±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 80 to 250 (Cal BP 1870 to 1700)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 150 (Cal BP 1800)

1 Sigma calibrated result: (68% probability) Cal AD 120 to 230 (Cal BP 1830 to 1720)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.2:lab. mult=1)

Laboratory number: **Beta-205126**

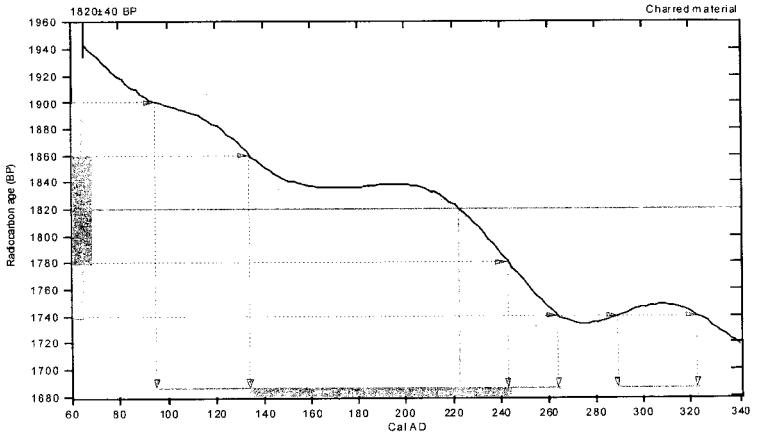
Conventional radiocarbon age: **1820±40 BP**

2 Sigma calibrated results: (95% probability) **Cal AD 100 to 260 (Cal BP 1860 to 1690) and Cal AD 290 to 320 (Cal BP 1660 to 1630)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 220 (Cal BP 1730)

1 Sigma calibrated result: (68% probability) Cal AD 130 to 240 (Cal BP 1820 to 1710)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.4:lab. mult=1)

Laboratory number: **Beta-205127**

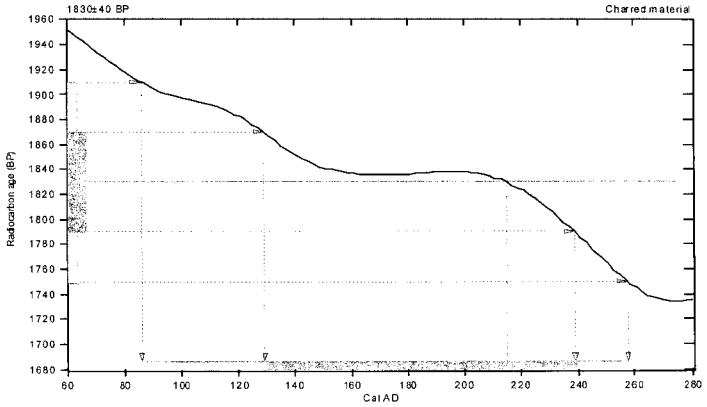
Conventional radiocarbon age: **1830±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 90 to 260 (Cal BP 1860 to 1690)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 220 (Cal BP 1740)

1 Sigma calibrated result: (68% probability) Cal AD 130 to 240 (Cal BP 1820 to 1710)



References:

Database used
INTCAL98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.6:lab. mult=1)

Laboratory number: **Beta-205128**

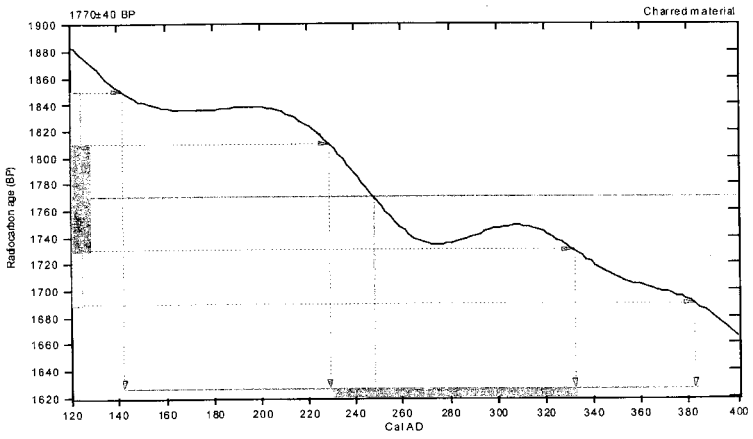
Conventional radiocarbon age: **1770±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 140 to 380 (Cal BP 1810 to 1570)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 250 (Cal BP 1700)

1 Sigma calibrated result: (68% probability) Cal AD 230 to 330 (Cal BP 1720 to 1620)



References:

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Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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APPENDIX V

Reconstruction of corn-drier

There was a suggestion from the Hospital Trust that the corn-drier could be reconstructed as a feature within a garden area in the new hospital. At the end of the excavation the decision had not been finalised as the corn-drier appaered too large to easily fit into the existing plan. Also many of the stones to be moved are quite small and reconstruction might be difficult. The stone of the ovens have been too badly heat cracked for successful lifting and reconstruction. When the corn-drier is moved the area underneath it will require archaeological inspection to complete our understanding of the strucutre.

In case reconstruction will be carried out the stones have been numbered with white paint and these numbers are shown on the accompanying plan.

Numbered stones for use in re-construction of the corn-dryer

FIGURES AND PLATES

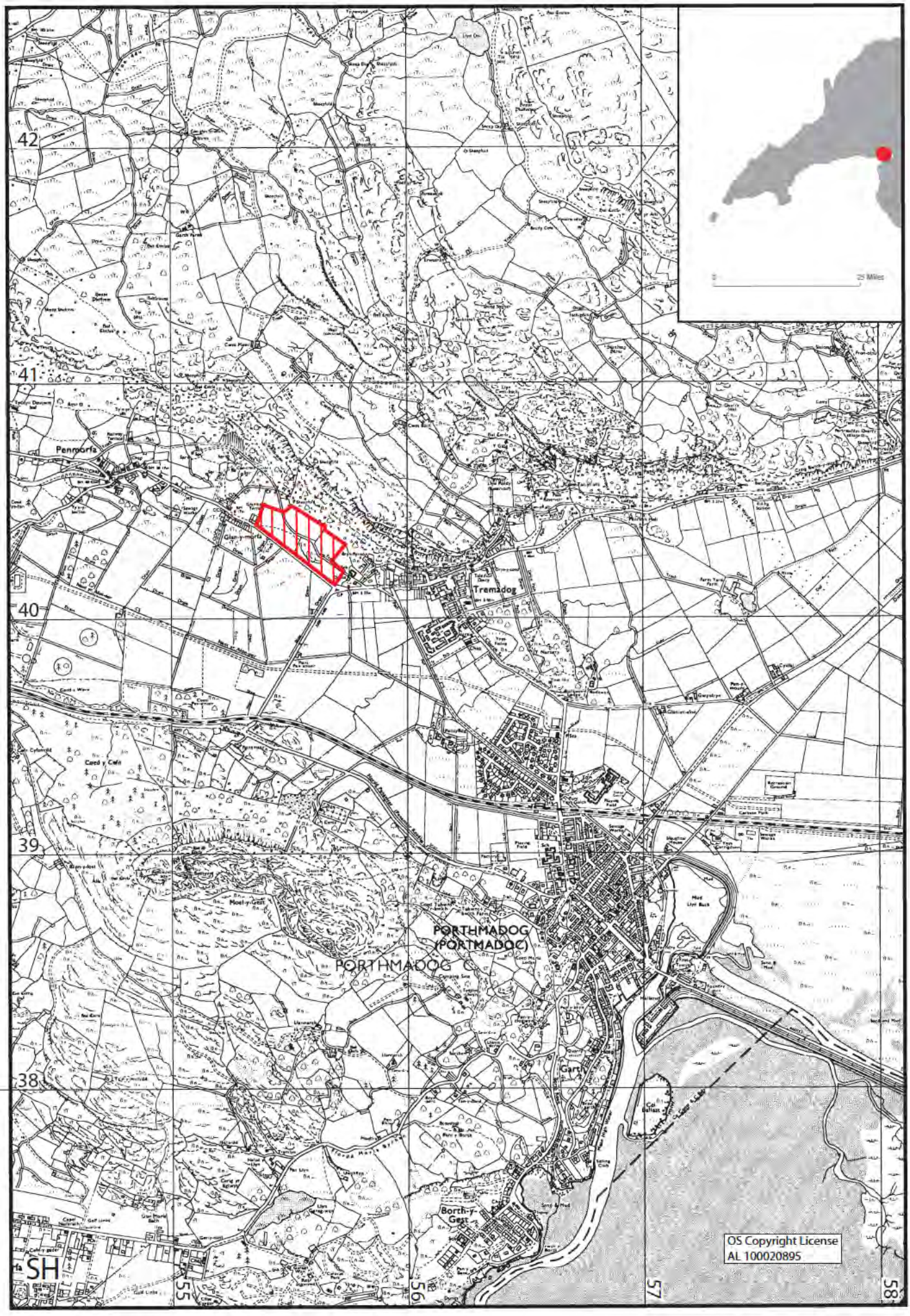

Figure 1. Site Location

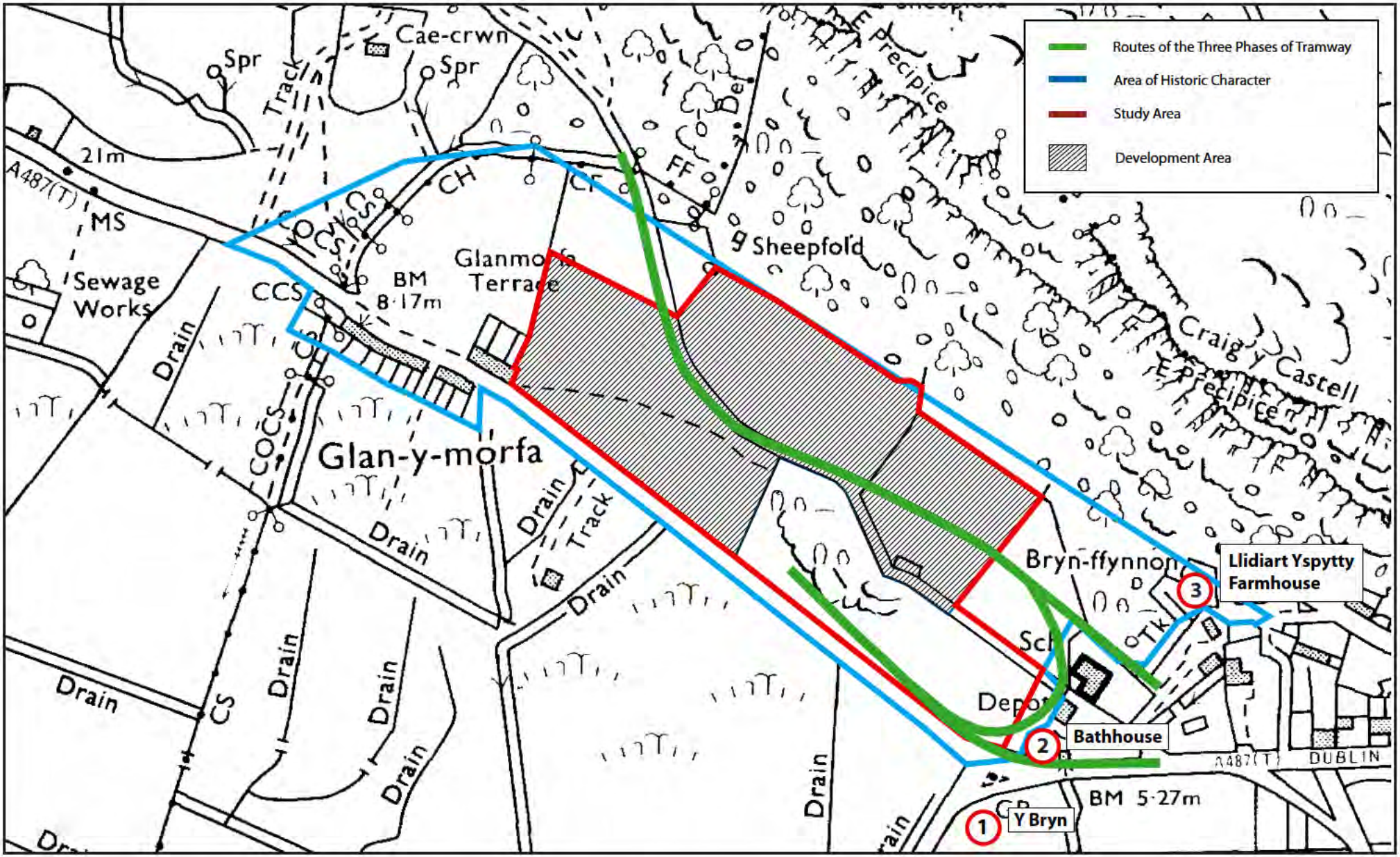

Figure 2. Development Area, Area of Historic Character, Study Area and the routes of the three phases of tramway. (1:2500)

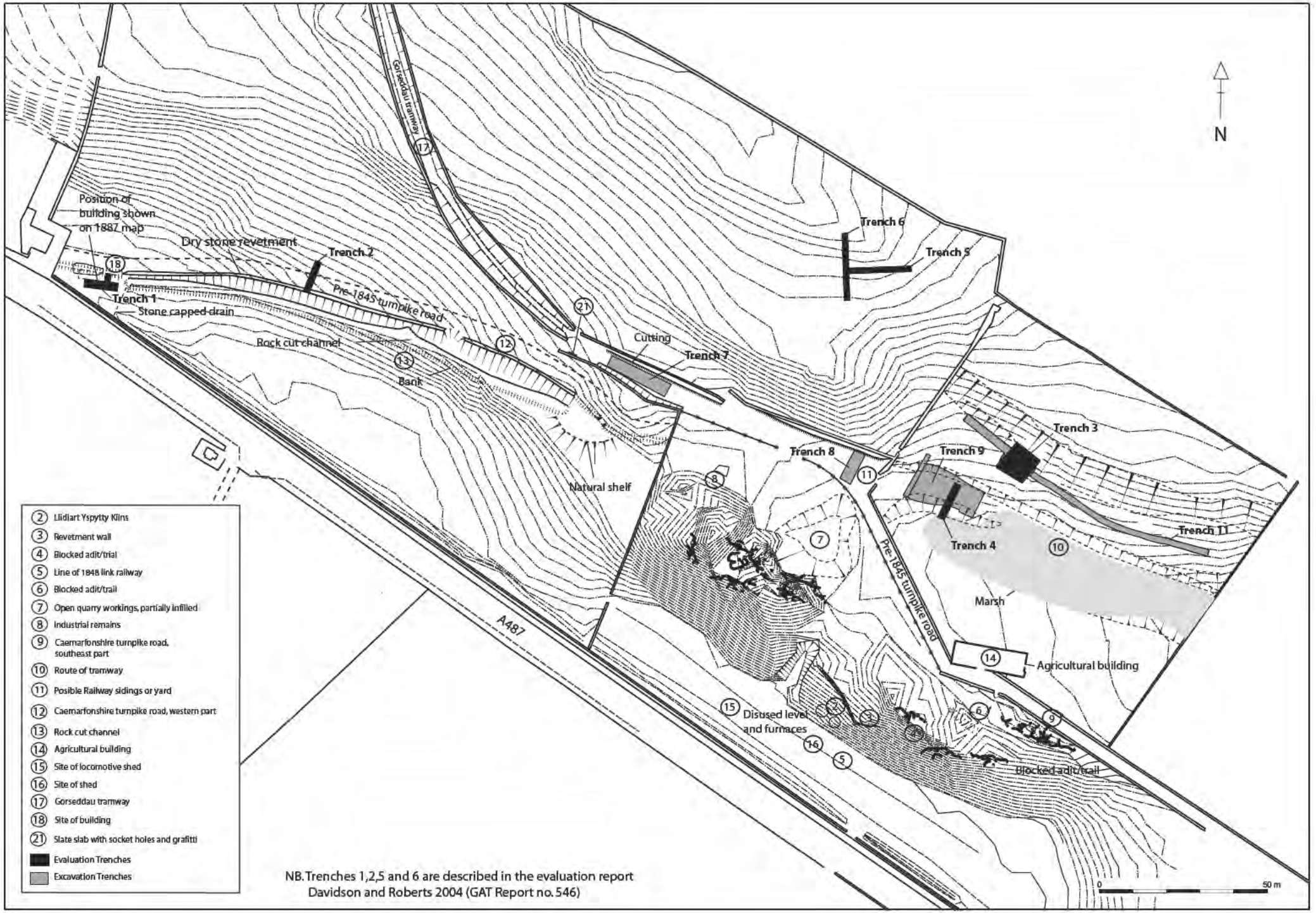

Figure 3. Site plan

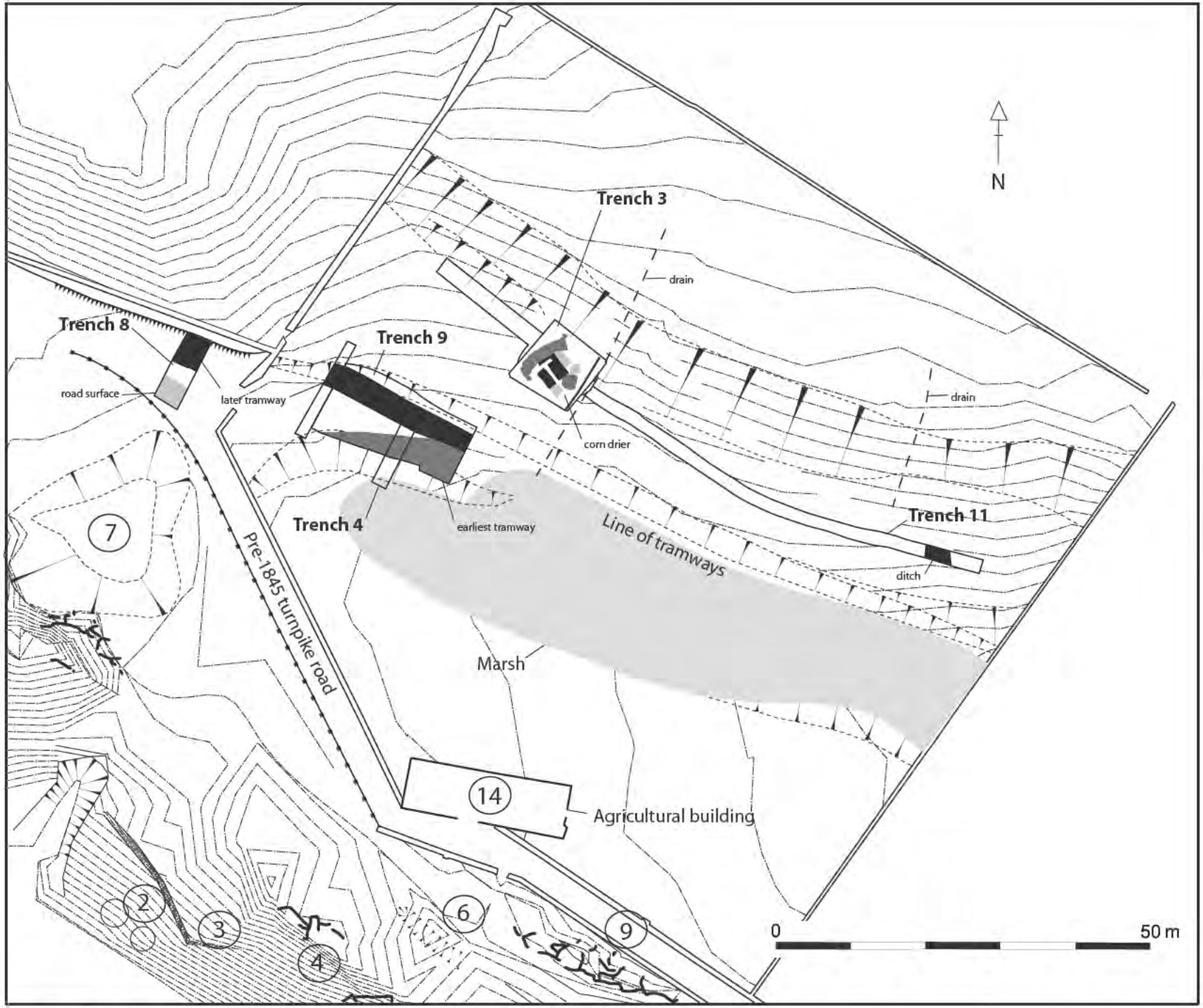

Figure 4. General location of features in trenches 3, 8 and 9

Figure 5. Plan of trench 3

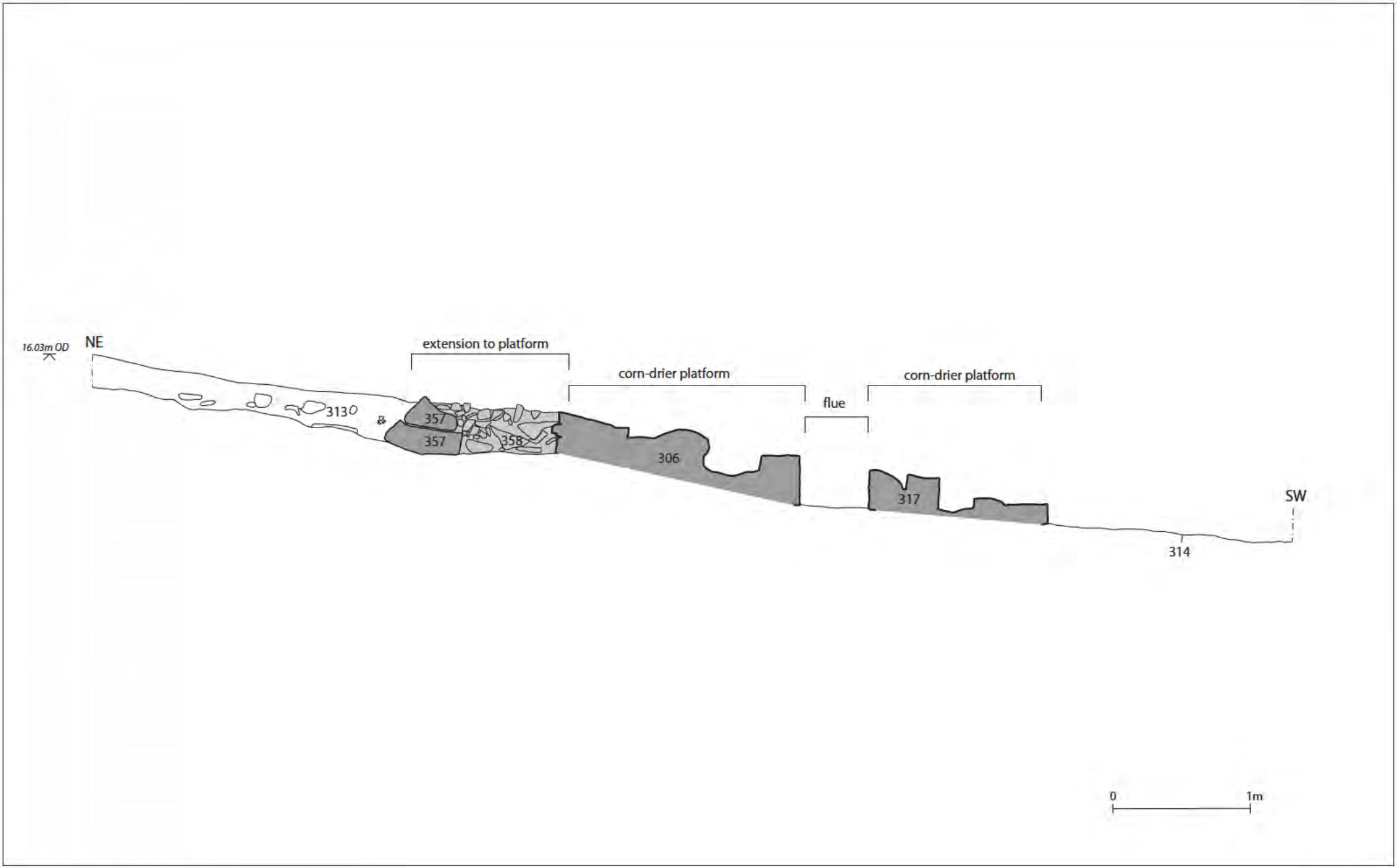

Figure 6. North-west facing section across trench 3

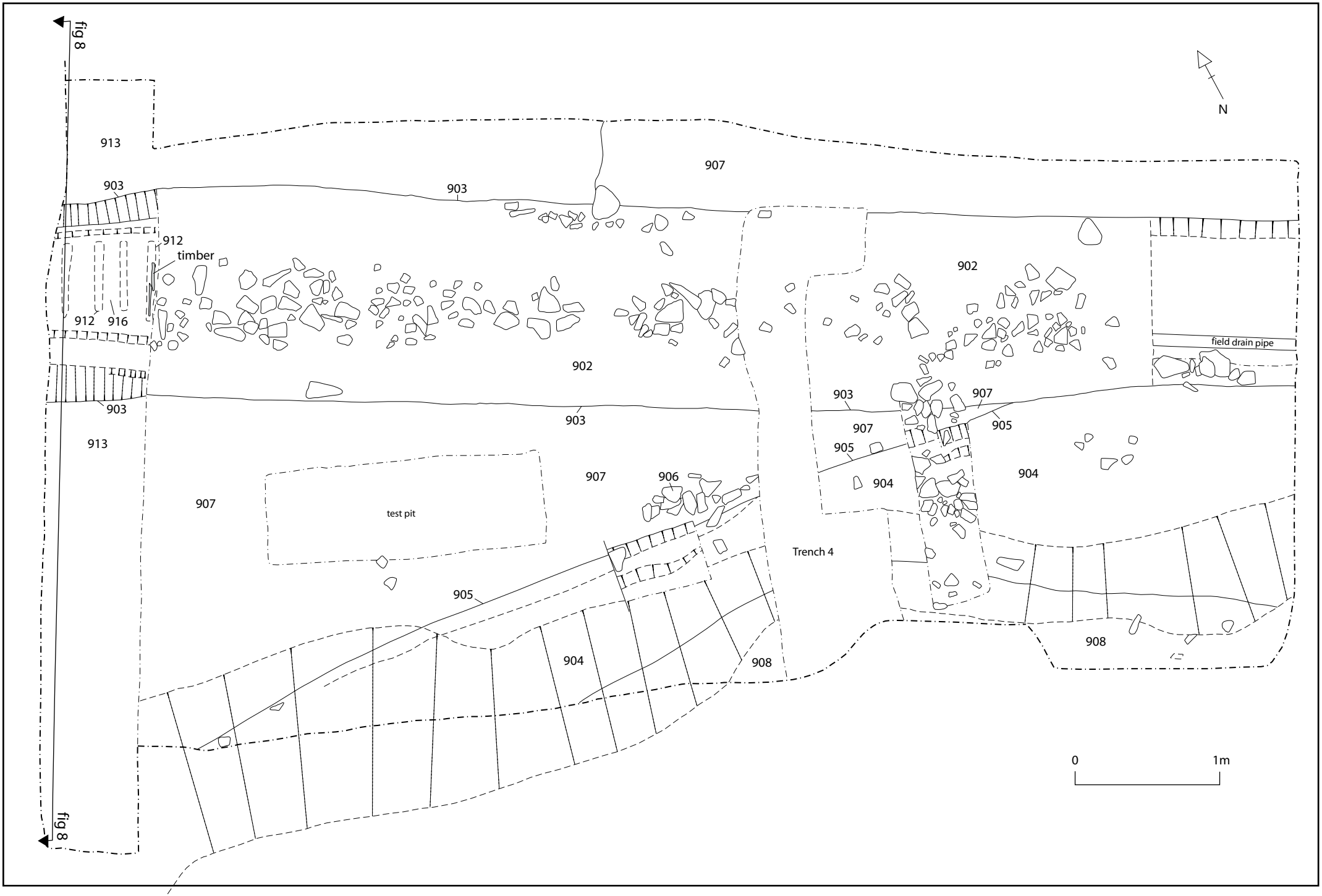

Figure 7. Plan of the trench 9

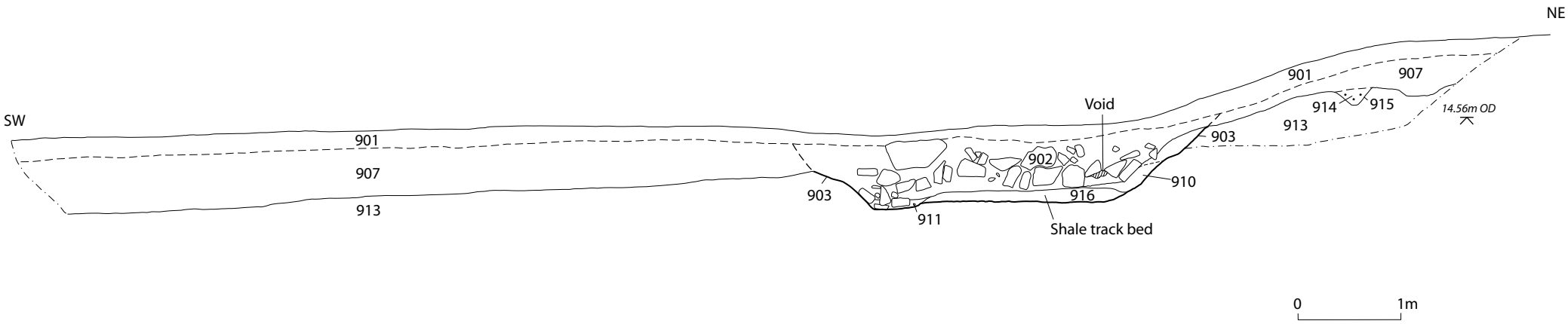

Figure 8. North-east facing section across tramway in trench 9

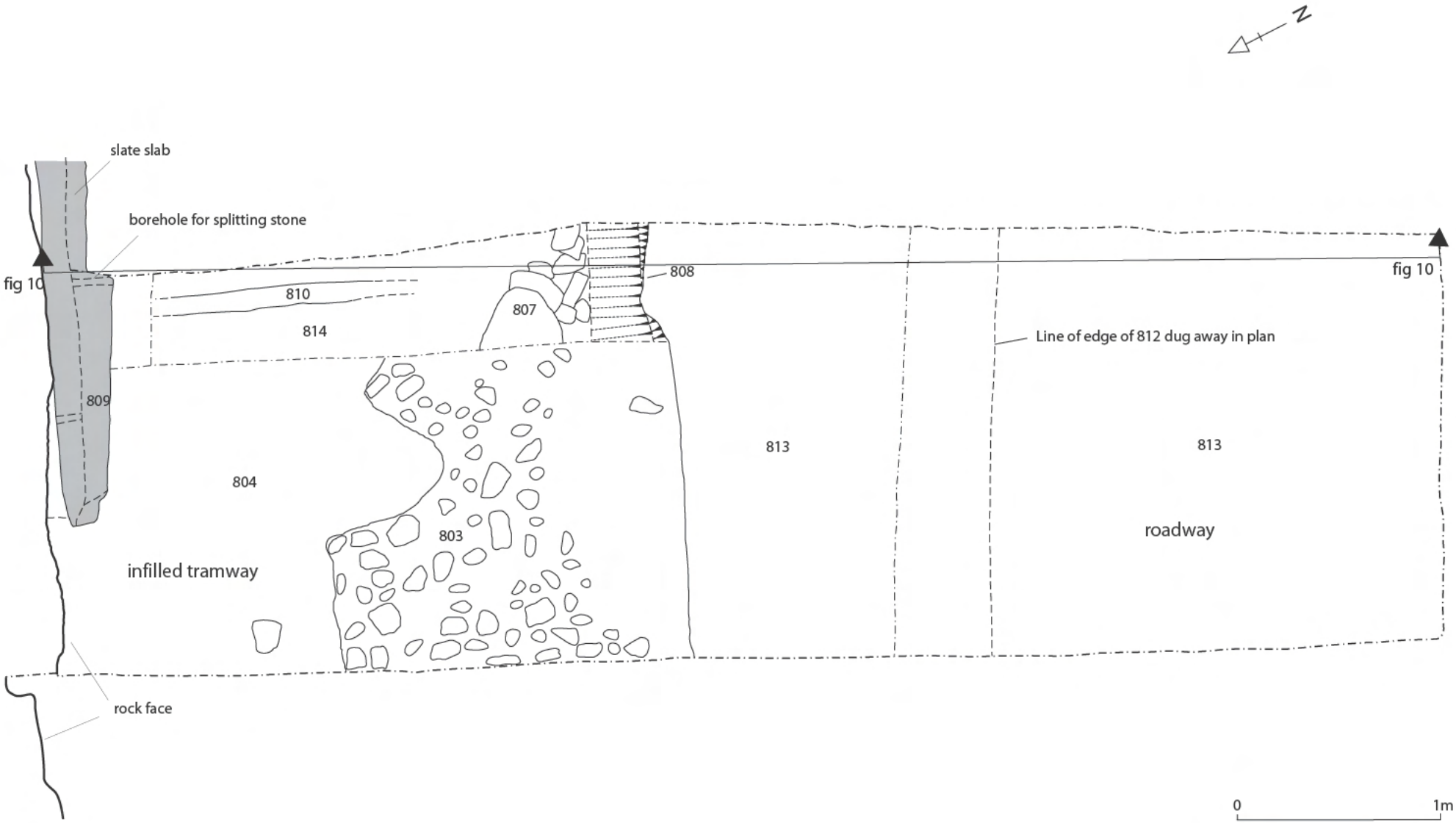

Figure 9. Plan of trench 8

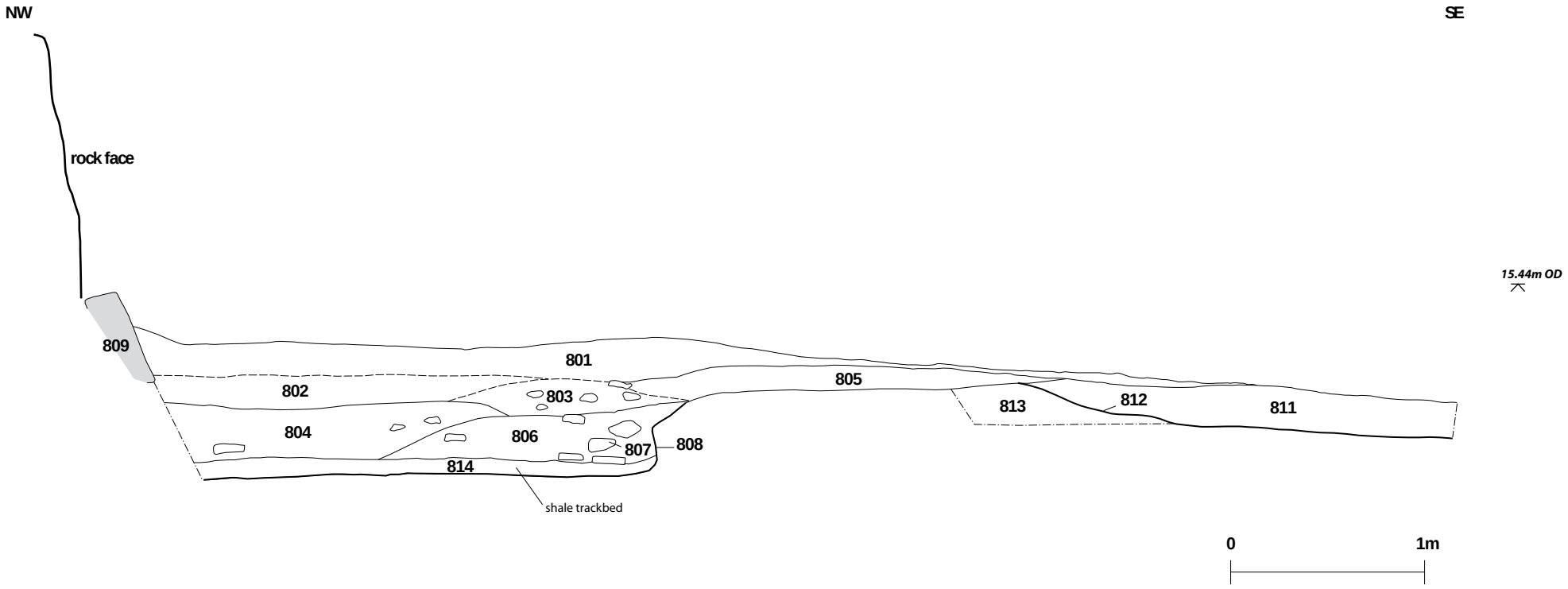

Figure 10. South-east facing section of trench 8

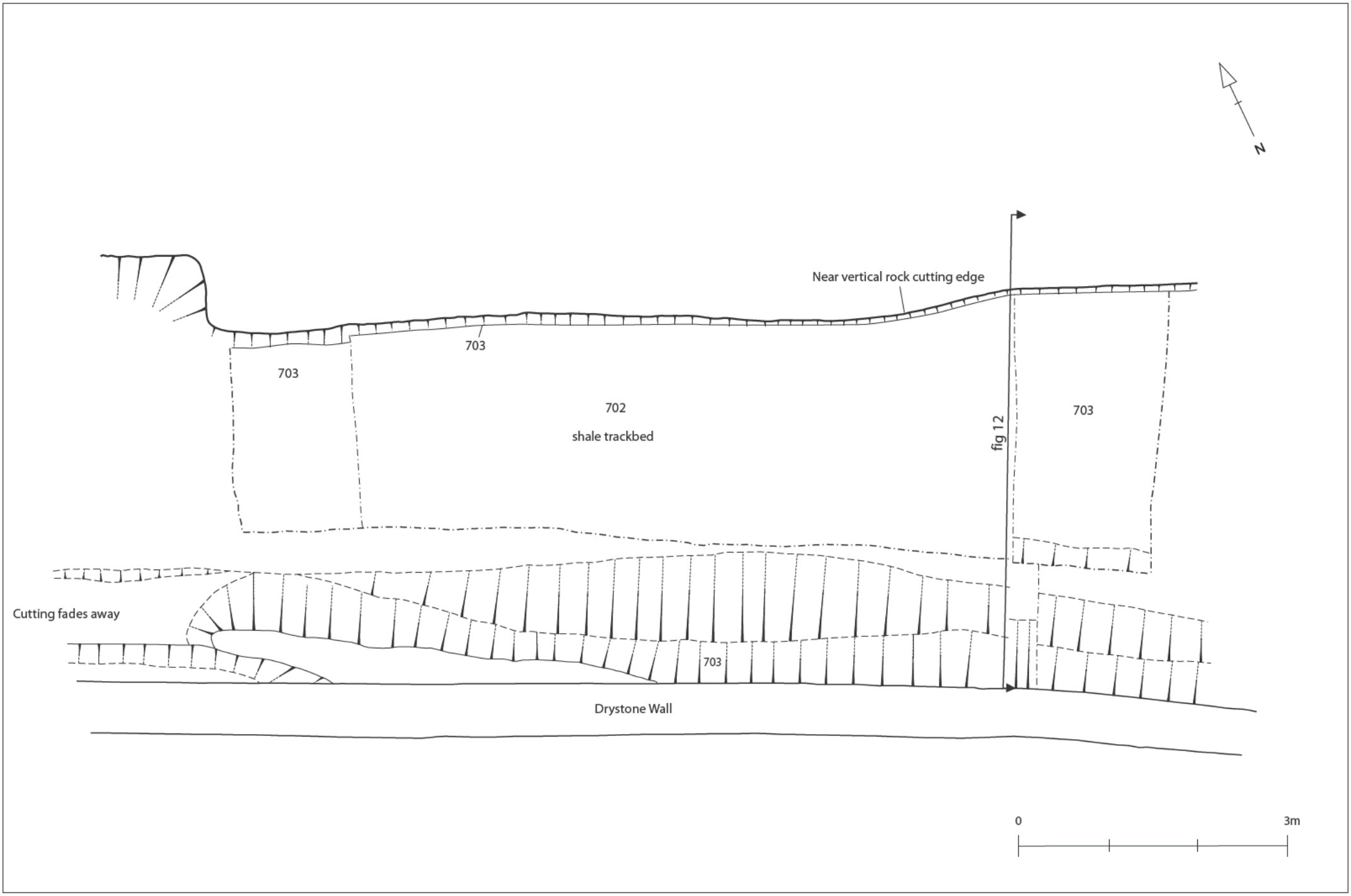

Figure 11. Plan of trench 7.

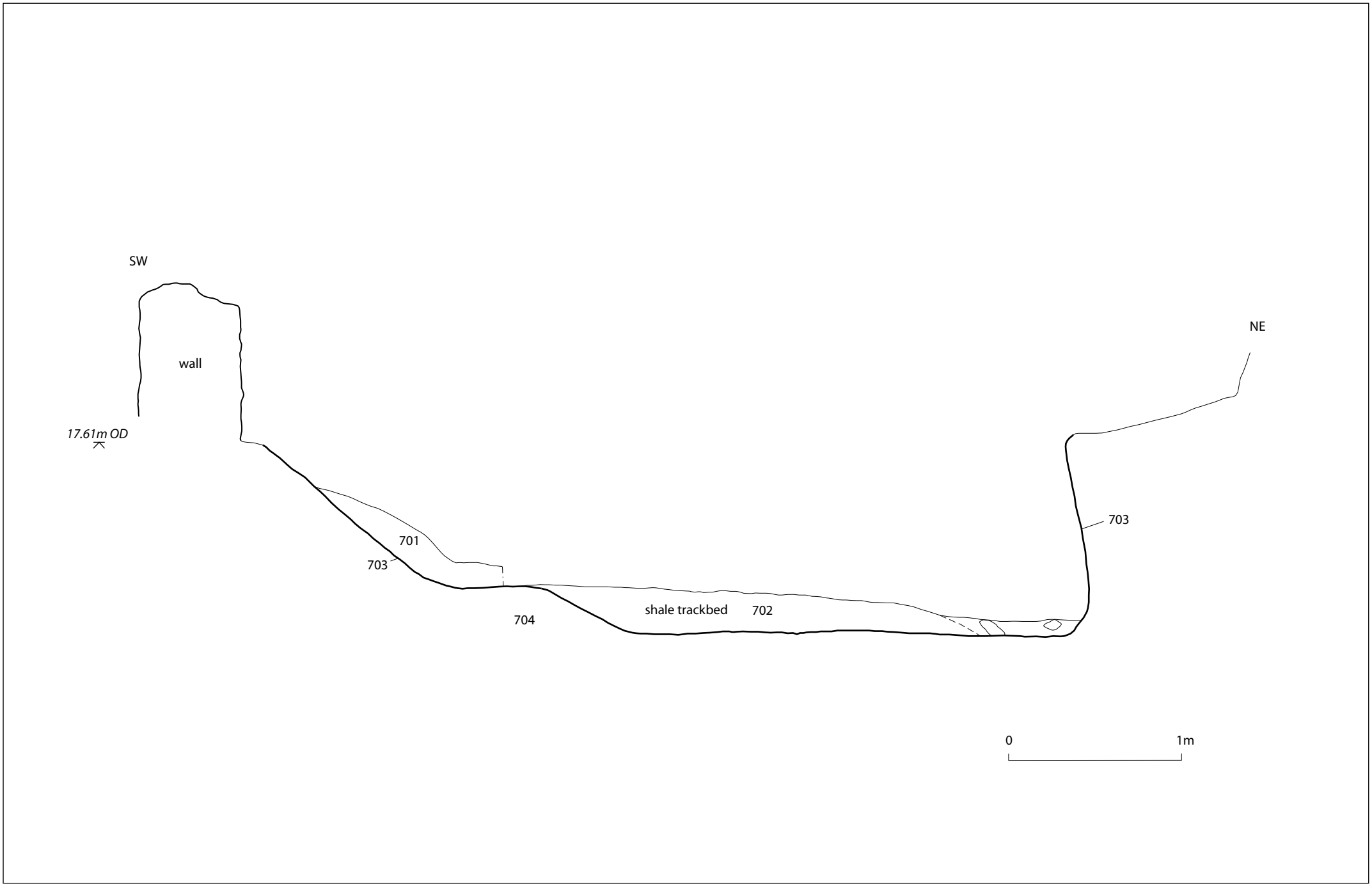

Figure 12. South-east facing section of trench 7

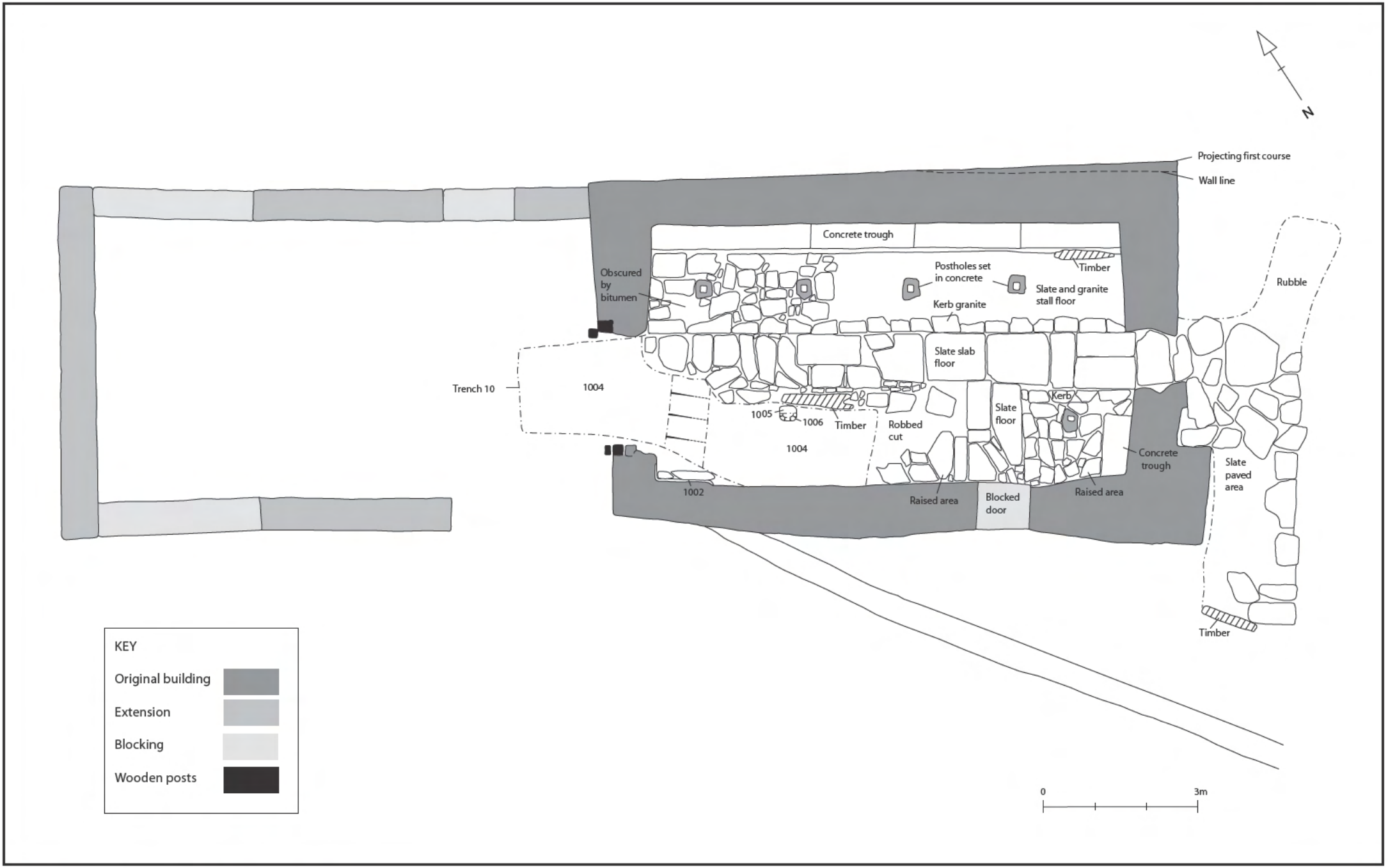

Figure 13. Plan of feature 14 and trench 10

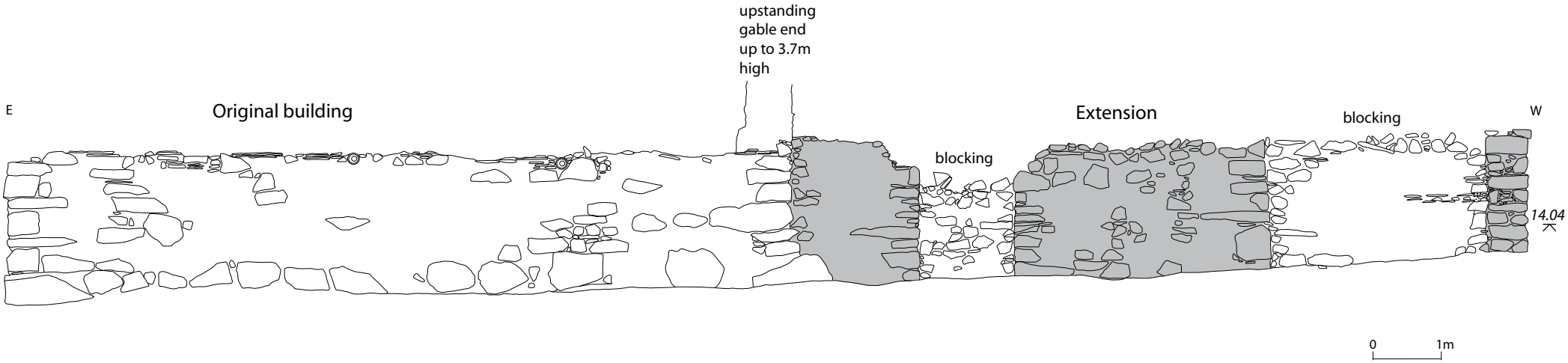

Figure 14. Elevation of the north side of feature 14

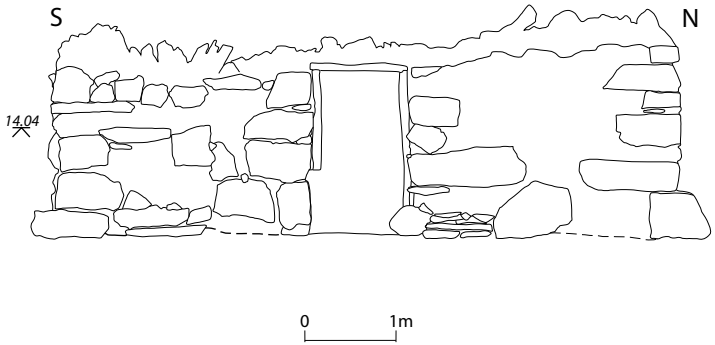

Figure 15. Elevation of east end of feature 14

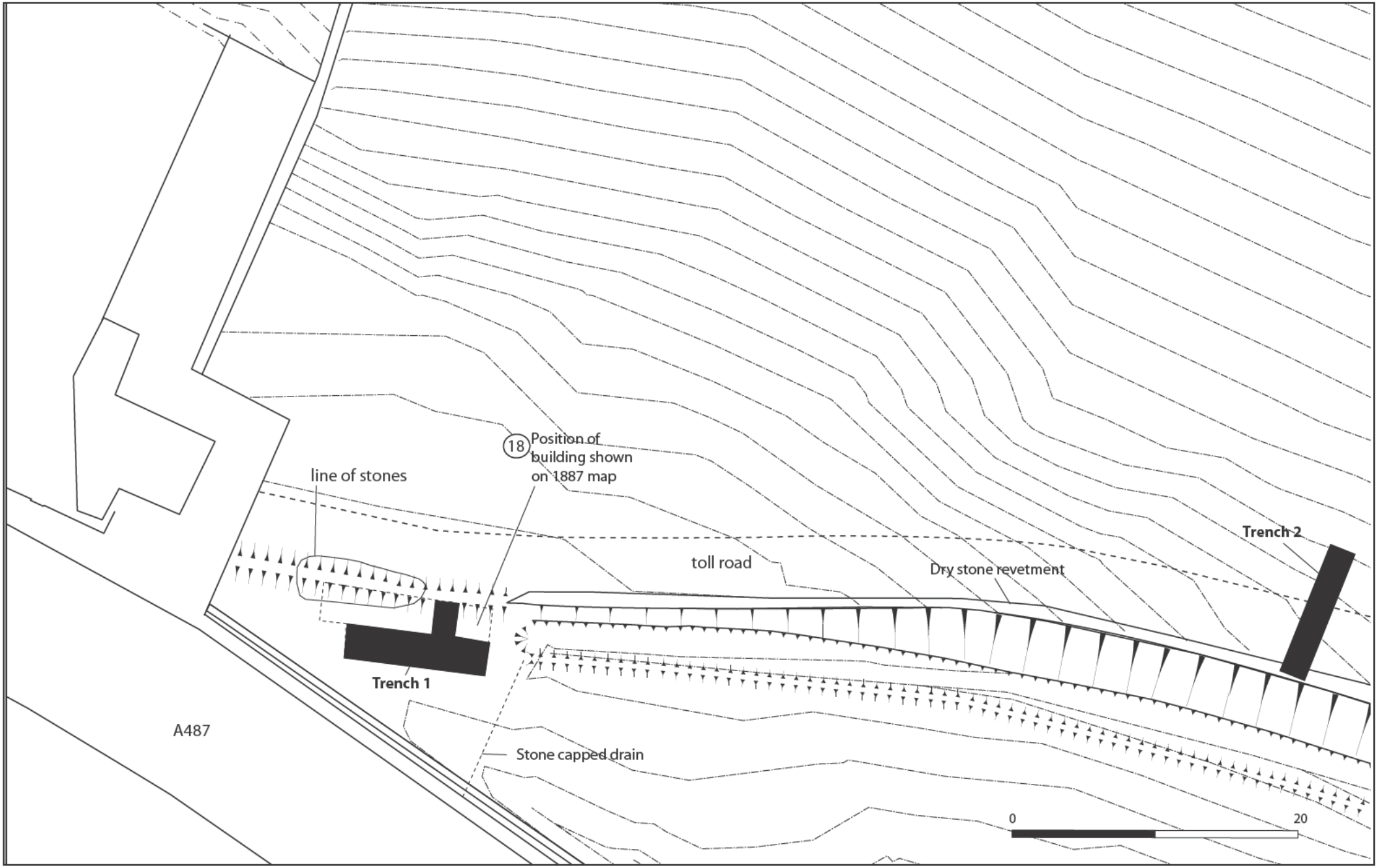

Figure 16. Detail of the west end of the site showing the location of Feature 18 with Trench 1

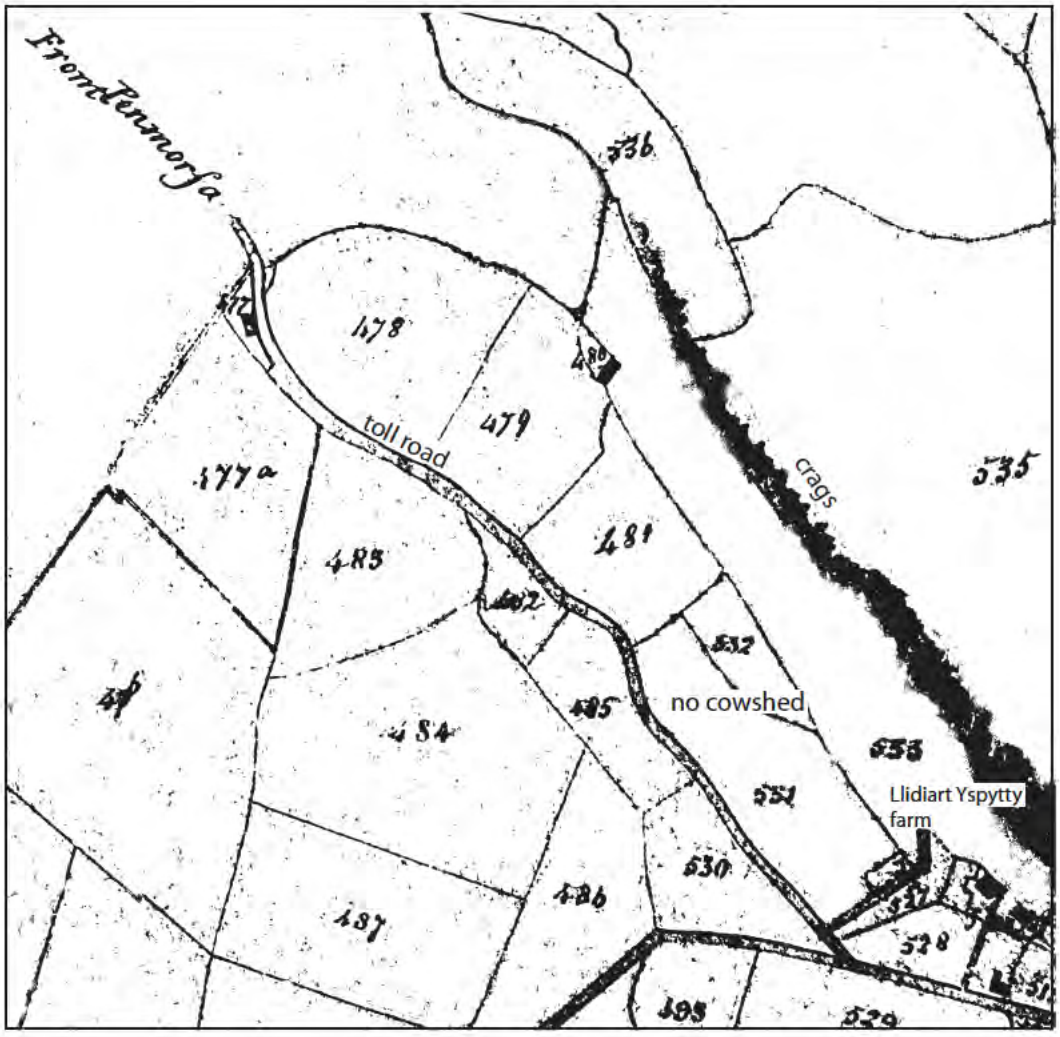

Figure 17: Ynyscynhaiarn tithe map (date unknown)

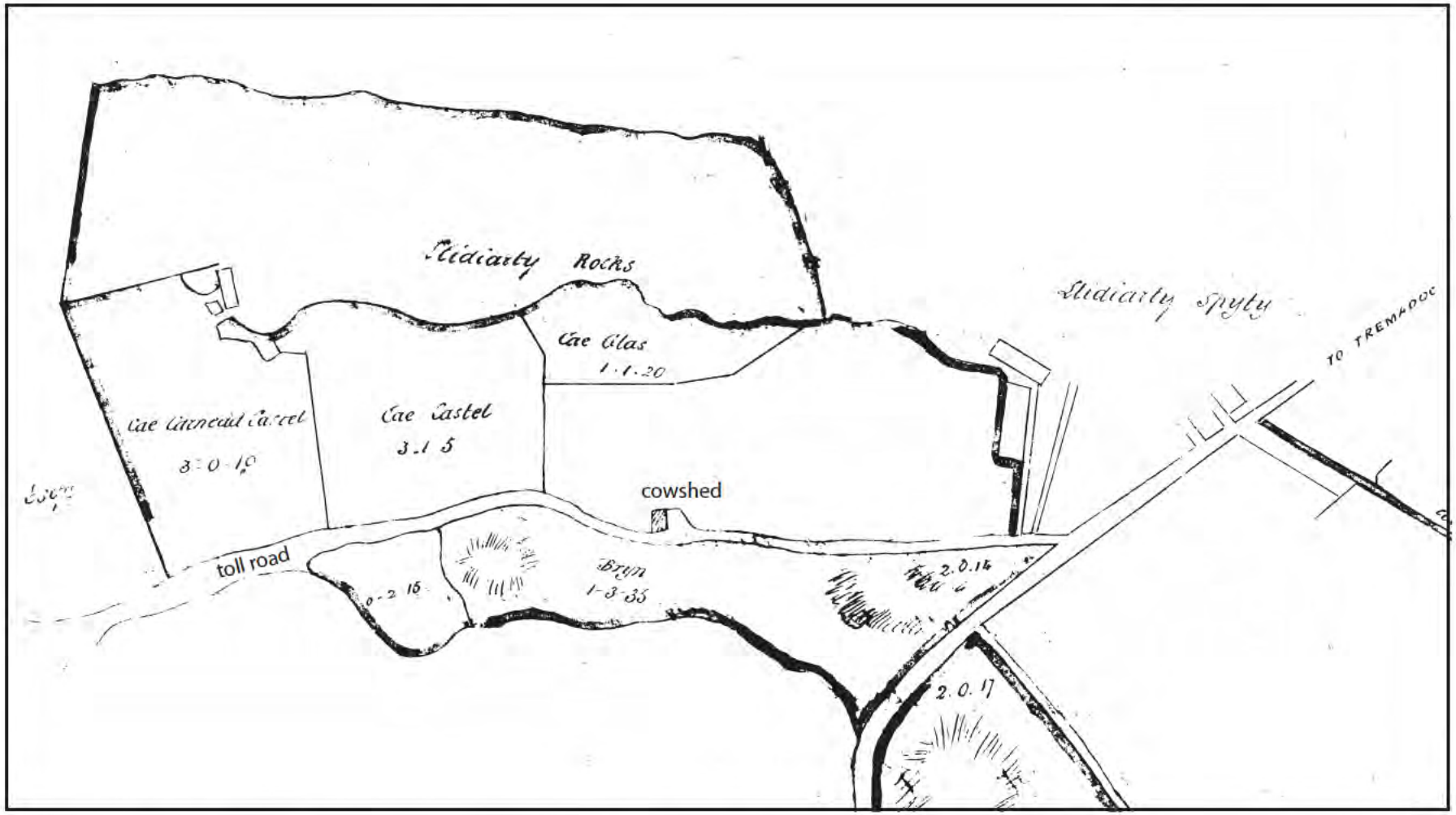

Figure 18: Plan of Llidiarty Spyty farm from 1841 lease map (NLW, Harrison Deeds Box 65 parcel 4)

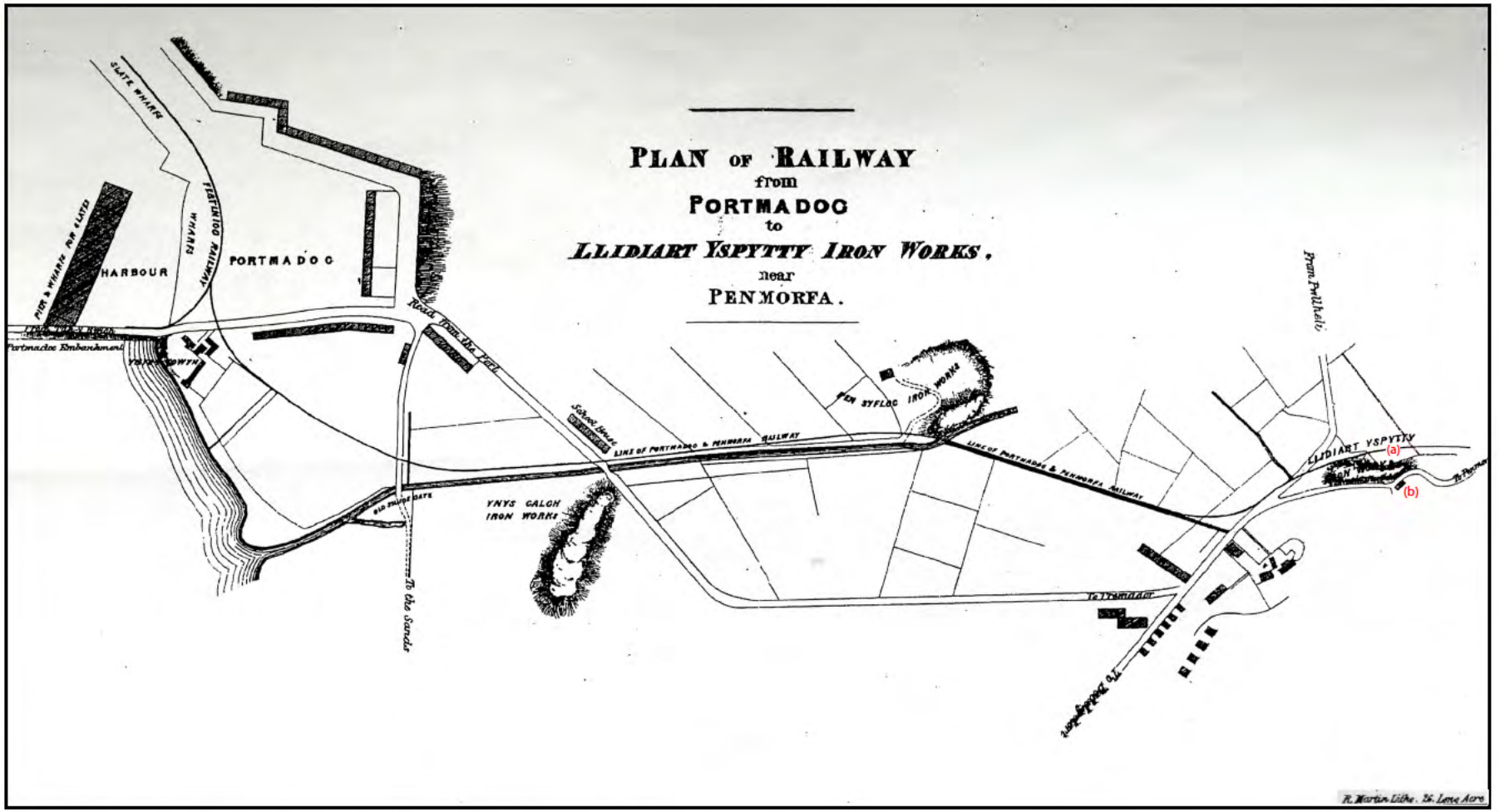

Figure 19. Plan of railway from Porthmadog c. 1848 (NLW, MAP 5753)

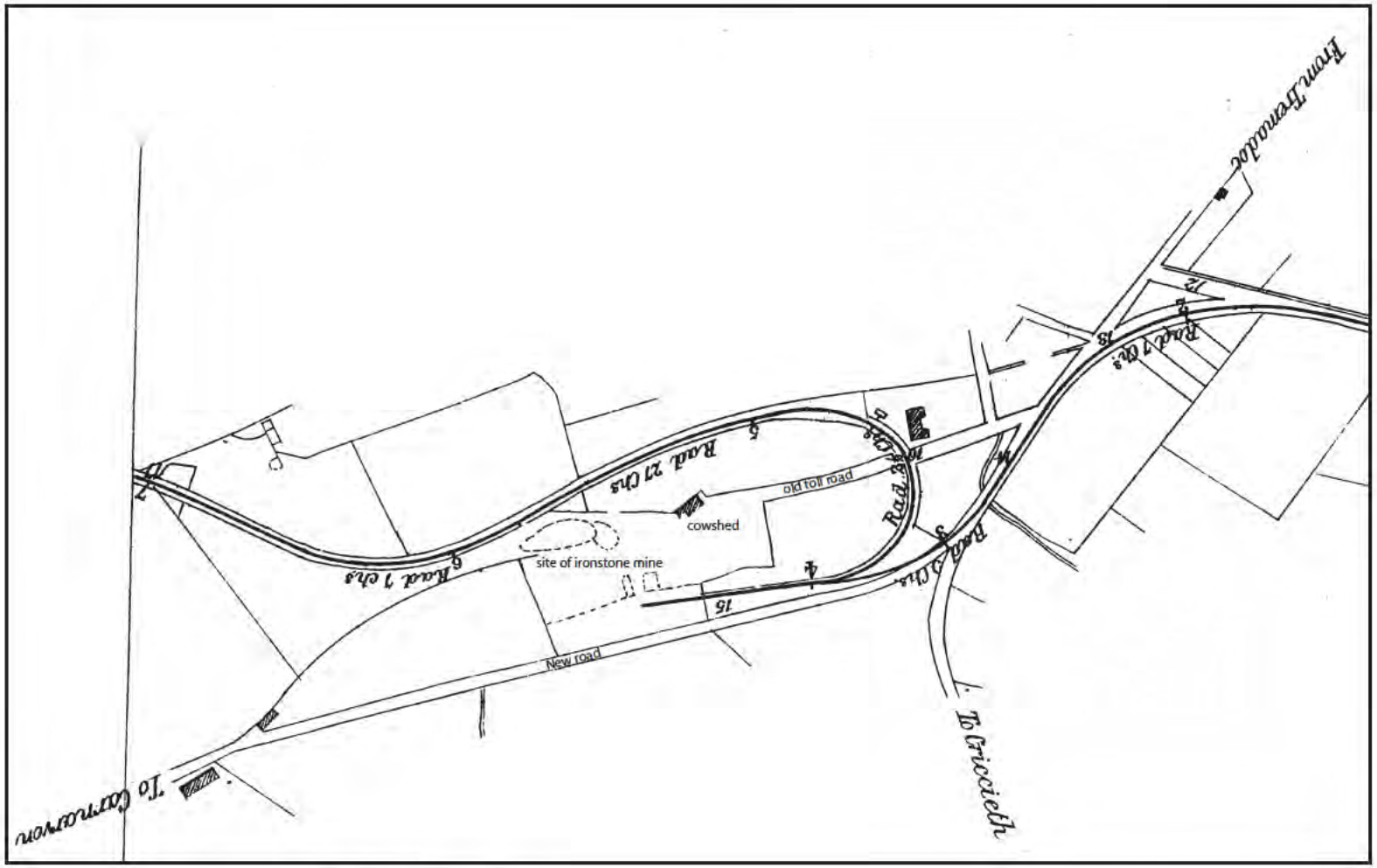

Figure 20. Plan of tramways in 1871 (CRO, X/Plans/R/69)

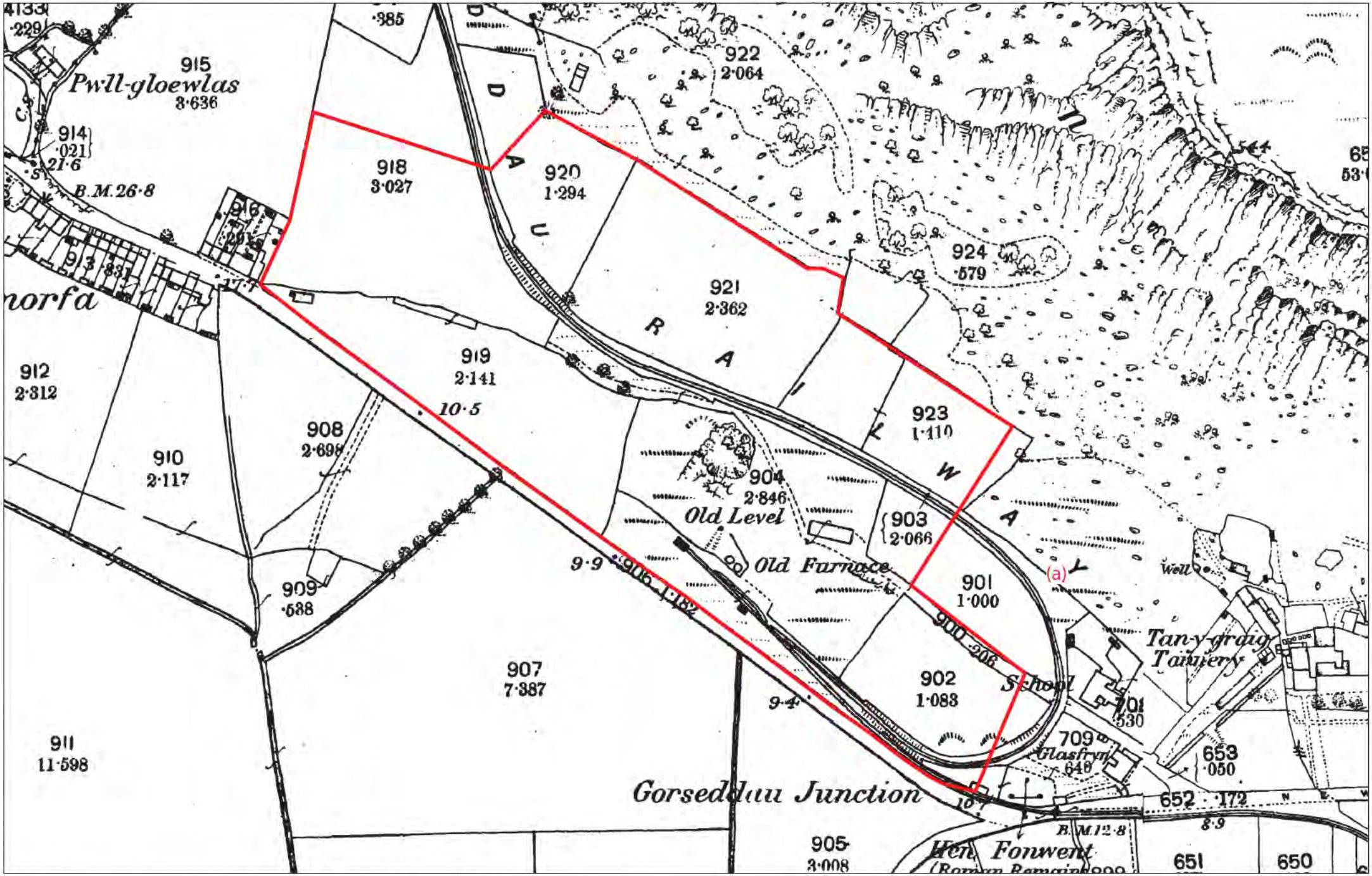

Figure 21. 1889 Caernarvonshire XXXIV.11 and XXXIV.12. Ordnance Survey. (1:2500)

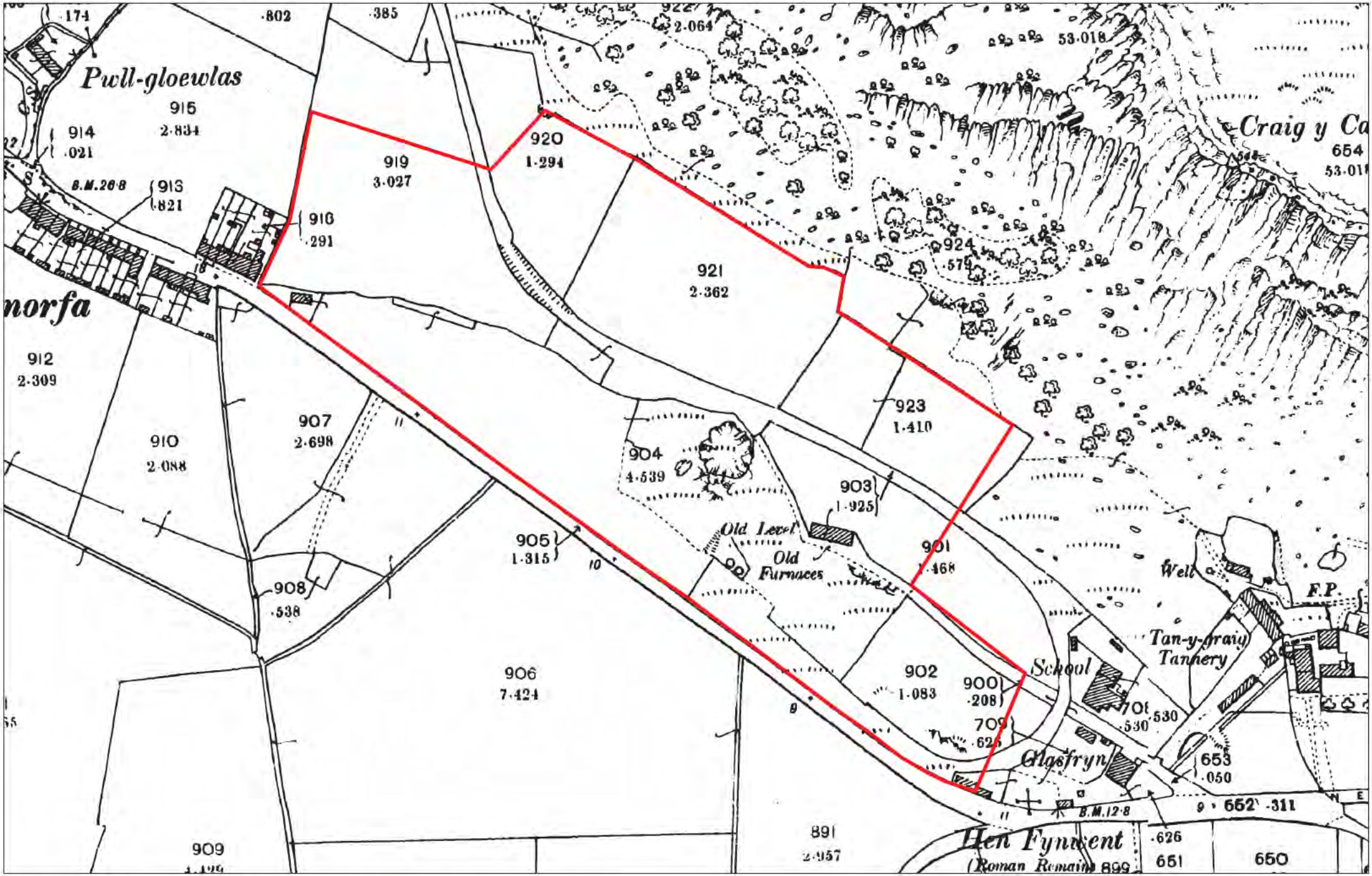

Figure 22. 1900 Caernarvonshire XXXIV.11 and XXXIV.12. Ordnance Survey. (1:2500)

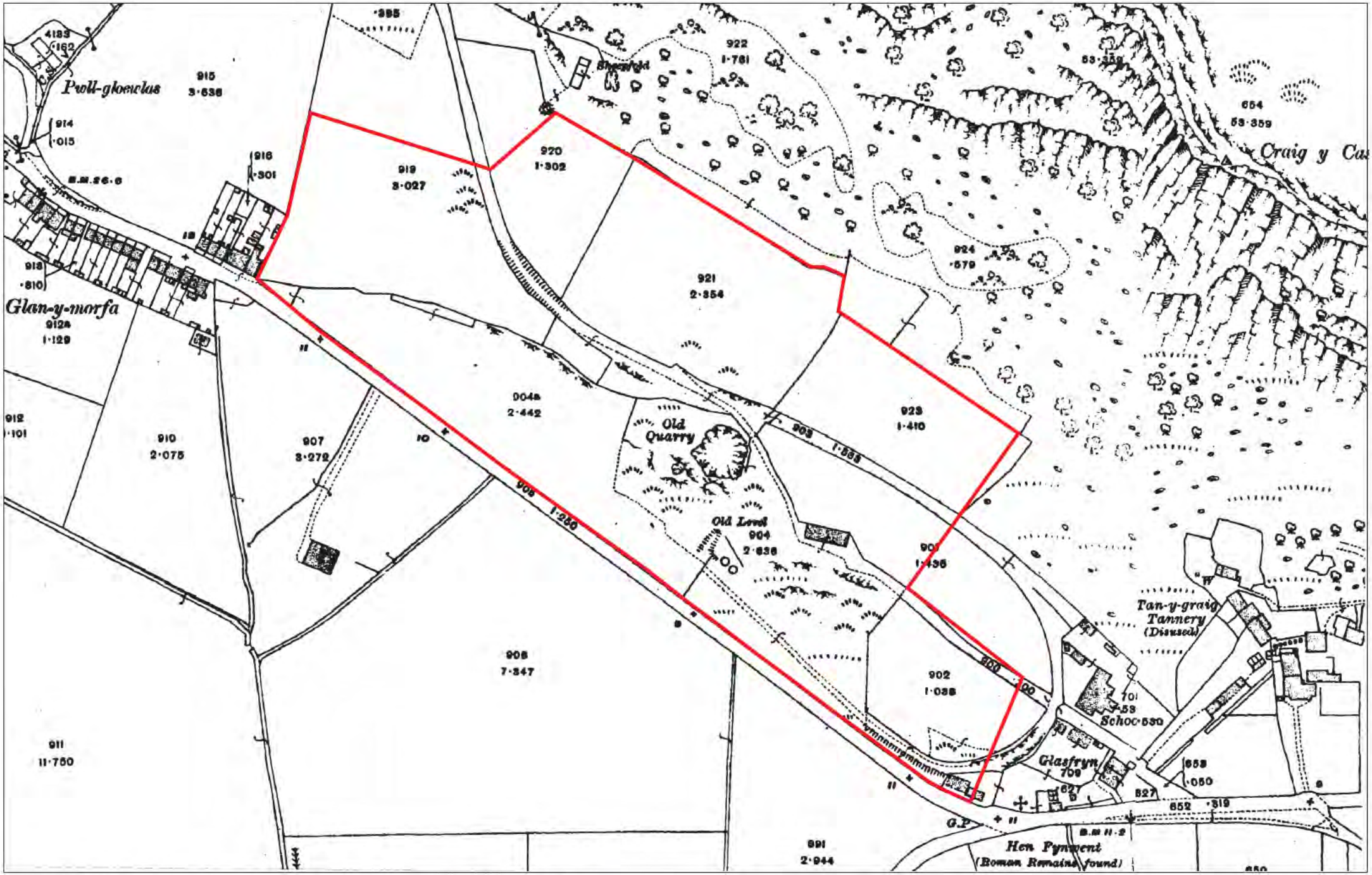

Figure 23. 1915 Caernarvonshire XXXXIV.11 and XXXIV.12. Ordnance Survey. (1:2500)

Plate 1: View of site from south-east

Plate 2: View over iron mine from north-west

Plate 3: Posthole [340] from south-west

Plate 4: Pathway (323) and drain (336) from south-west

Plate 5: Drain (325) from east

Plate 6: Structures in trench 3 from east

Plate 7: Structures in trench 3 from west

Plate 8: View up main flue from south-east

Plate 9: Oven (359) from north-east

Plate 10: Oven (330/331) from east

Plate 11: Collapsed rubble (320) from south-west

Plate 12: Section showing northern side of tramway cut [905]

Plate 13: Tramway [905] from east

Plate 14: Tramway [903] from north-west

Plate 15: South-east facing section across tramway [903]

Plate 16: Trench 8 from south-west

Plate 17: Trench 7 from north-west

Plate 18: Feature 14 from south-east

Plate 19: Feature 14 from north-west

Plate 20: Interior of north wall from south-east

Plate 21: Trench 10 from west

Plate 22: Possible wall along the north side of feature 18, from west

Plate 23: Feature 21 from south-east

Plate 24: Detail of feature 21 from north-east

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