THE NORTH WEST WALES EARLY FIELDS PROJECT

GAT Project No. G2077
Report No. 933

Prepared for Cadw
March 2011

By George Smith, Astrid Caseldine, David Hopewell and Richard Macphail

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust
☎ 01248 352535 ✉ 01248 370925 email : gat@heneb.co.uk

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Cover picture:

Cwm Cilio field system, settlement and Penygaer hillfort, from the south-west.
Photograph by Dr Toby Driver, copyright RCAHMW

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George Smith (GAT), David Hopewell (GAT), Astrid Caseldine (University of Wales, Lampeter), Richard Macphail (Institute of Archaeology, University College, London) and Robert Johnston (University of Sheffield)

SUMMARY

This study was designed as a scoping project to begin a long-overdue investigation of the date and nature of prehistoric fields in North West Wales... The project studies the general background to early fields and field systems, their possible settlement associations, form and distribution. It also considers their survival, archaeological value and how their remains have been affected by modern land use. It produces evidence from three case studies of protected areas of field system derived from ground survey, geophysical survey, excavation and environmental investigation. Recommendations are made for further research and for methods of land management that will ensure the survival of the extensive and sometimes fragile fields balancing the restraints of continuing agricultural land use, maintenance of biologically sensitive habitats and invasive vegetation.

CONTENTS

ILLUSTRATIONS

1. INTRODUCTION

This study aimed to provide new understanding about the numerous and extensive early field systems that exist in north-west Wales and to explore methods of investigation. The distribution of the known examples of early fields is biased towards the fringes of the uplands where preservation is better, while very few are known in the areas most suitable for agriculture, such as Anglesey, where continuous agriculture has removed them (Fig. 1). Many of the known early fields have been surveyed by the Royal Commission on Ancient and Historic Monuments in Wales (RCAHMW) but none have been the subject of modern excavation and research. Their origins, date and methods of use have not been the subject of archaeological investigation. On the other hand a number of the settlements associated with these field systems have been excavated, some of them more recently with the advantage of radiocarbon dating. These mostly demonstrate occupation in the late first millennium BC or during the Roman period although agriculture and settlement clearly started much earlier, at least in the lowlands. Settlement was dependent on an economic base and in most cases this was agriculture in its general sense. This in turn was dependent on the natural resources of the environment and land suitable for cultivation depended on the presence of suitable soils, fertile, tillable and with good drainage. Some work on this environmental determinism has been carried out in Gwynedd, indicating an avenue for research that has not subsequently been pursued (Johnson 1981). Another question is the mechanism which created the upland transition from forest soils to podsols, particularly lacking information for the Neolithic period. The function of field boundaries needs investigation, whether as simple clearance dumps, cultivation limits or as constructed walls, banks or hedges, designed for stock inclusion or exclusion. The identification of physical or environmental evidence of hedges would make a big difference to understanding of agricultural methods, as would the identification and sampling of buried soils and obtaining dating evidence resulting from primary clearance episodes. In some cases boundaries may have been simply linear clearance dumps, in others carefully revetted banks may have been created. Excavation of upland or valley blanket peat may show that below-ground survival of early fields is greater than appreciated by the unsubstantial 'wandering' walls that are seen on the surface today, just as extensive Neolithic field systems have been found buried by peat in Ireland (Caulfield 1978). Some field systems are massively terraced but it is not known whether these are simple lynchets, developed over long-continued use, or were created deliberately to improve the ground. Many areas of fields associated with round houses also have medieval long huts or platform huts and in some cases may have been modified from rectangular fields to create\strip terraces to suit changing cultivation techniques (Taylor 1966).

The RCAHMW recognized two main types of prehistoric field systems, those with small sub-rectangular, terraced fields and those of curvilinear design with no obvious terracing. A few areas of field systems have been protected as Scheduled Ancient Monuments but the extent of them and their often fragmented survival makes protection problematic and inevitably many are still unprotected and at risk. Some extensive areas of fields have also been planned as part of the RCAHMW aerial mapping programme. No field systems in north-west Wales have been the subject of archaeological research and the date and method of use of such fields is vague and unsubstantiated. Small sub-rectangular fields are generally dated by association with nearby roundhouse settlements known to have been occupied in the Romano-British period but likely to have originated much earlier. In parts of Cornwall, areas of exceptional preservation suggest that field patterns actually originated in the second millennium BC and gradually evolved over subsequent centuries. Traces of Neolithic and Bronze Age farming are known from Southern England, South Wales and Ireland but have yet to be identified in North Wales.

Field systems differ from settlements in that they cover much larger areas, so are difficult to study and have generally been neglected by research. Such extensive areas of features are also

vulnerable to environmental changes. These changes can be traumatic by direct clearance and cultivation or quite gradual as a result of changes in grazing pressure or drainage. Some of the best preserved ancient fields are those sealed beneath blanket peat and these can be at risk from drying out after drainage or even just from climate change. Protection of peat deposits will therefore often be advantageous to archaeological remains. Management of extensive archaeological remains therefore needs to go hand in hand with general management of the landscape, whether through agricultural grant schemes or through management of drainage schemes.

Study of the present landscape to assess such factors as soil carbon conservation or water catchment sensitive farming needs to have a long timescale for analysis of changes. This is something that archaeology can provide, particularly where it comes to study of the wider rural landscape, through identification of buried soils that can be dated and be used for environmental pollen analysis.

Direct pressure, such as by clearance and cultivation, on the unimproved areas of landscape have generally declined as schemes such as Tir Gofal have been applied and stocking densities have often been deliberately decreased. The subsequent effect on the flora can improve biodiversity but can then threaten archaeological remains due to growth of bracken and scrub. Some marginal areas of partially improved upland often contain remnants of early fields and these can be subject to occasional cultivation for re-seeding. The ready availability of excavation machinery also makes drainage works increasingly easy.

Acknowledgements

Many thanks must go to the farmers that allowed access and hospitality for the survey and fieldwork - the late Mr John Rowlands of Cwm Cilio. Mr Thomas Jones, Braich y Gornel of Goetre, Pwllheli. Mr Dafydd Owen, Brwyn Llynnau. Mr Gwion Davies, Mr E. Jones and Mr Hywel Pugh. Thanks also go to people who assisted in setting up the project or providing useful discussion - Dr Mike Yates (Cadw), Astrid Caseldine (University College, Lampeter), Rhodri Dafydd (Countryside Council for Wales), Dr Toby Driver (RCAHMW), Dr Richard Macphail (Institute of Archaeology, London), John G. Roberts (Snowdonia National Park Authority) and Emyr Wyn Jones (SNPA), and to those who helped with the excavation - Matthew Jones and Neil McGuinness (GAT) and Dr Kate Waddington (University of Bangor).

2. PROJECT OBJECTIVES

The project is concerned with study of the field systems and their features, with evaluating these features and the threats to their survival and with understanding the effects on them of different agricultural regimes. These can be addressed at the individual feature level by archaeological investigation and scientific analysis to provide dating evidence and to show how well features survive or have been degraded by past and present land use. At a more general level the project looks at the effects of differences in land use over a wider area and assesses the future situation, how it bears on land-use and how early landscape features might be managed.

Recommendations are produced to encourage awareness of the meaning and value of early field remains and their incorporation in agri-environmental schemes such as Glastir and other agricultural initiatives such as Water catchment areas and Carbon capture.

Early fields have been the subject of a current Cadw Pan-Wales monument protection project, which has included assessment of all known early field systems (GAT Rep. No. 912, 2010). It has identified areas of special value that could be considered for protection and provides suggestions about the period and function of the fields and their research potential. The extensive record of fields provided by aerial survey work and the Cadw Monument protection programme is followed up here by investigation of three case studies.

3. PROJECT DESIGN

The work was based on study of three contrasting field systems, all of which are protected in whole or in part as Scheduled Ancient Monuments.

The work at each involved four stages.

1. Background study of early maps, aerial photographs and soil maps. Identification of landowners, request for permission and discussion about land-use.

2. Walkover to identify the quality of previous records and the possibility of adding new information and the identification of areas of potential for study. Application to Cadw for Scheduled Monument Consent were needed at two of the sites. Discussion with CCW for consent to work on land under an agri-environment scheme (Tir Gofal) in the case of part of one site, Muriau Gwyddelod.

3. Geophysical survey by fluxgate gradiometer, plotting of features from aerial photographs and adding of detail to plots and existing plans by ground survey, by tape or GPS total station.

4. Excavation of one boundary and lynchet at each of the three case studies. This aimed to understand the construction and function of each boundary. It also hoped to retrieve dating evidence for the initiation of the boundaries as well as palaeo-environmental evidence as pollen from any buried soil and micromorphological evidence for land use of the buried soils and adjoining field soils.

In addition, at Muriau Gwyddelod, there was no existing measured survey apart from a plan of part of the area by Gresham (Fig. 17). A new survey was carried out of the whole area by Dr R. Johnston, using a GPS total station (Fig. 18). This was added to with detail by tape and from Ordnance Survey aerial photographs taken before the present vegetation cover obscured the ground (Fig. 26a).

4. GEOPHYSICS SURVEY METHODOLOGY

Fluxgate gradiometer survey provides a relatively swift and non-invasive method of surveying large areas. The current surveys were designed to assess the effectiveness of gradiometer survey on prehistoric field systems.

Instrumentation

The survey was carried out using a Bartington Grad601-2 dual Fluxgate Gradiometer. This uses a pair of Grad-01-100 sensors. These are high stability fluxgate gradient sensors with a 1.0m separation between the sensing elements, giving a strong response to deeper anomalies.

The instrument detects variations in the earth's magnetic field caused by the presence of iron in the soil. This is usually in the form of weakly magnetized iron oxides which tend to be concentrated in the topsoil. Features cut into the subsoil and backfilled or silted with topsoil therefore contain greater amounts of iron and can therefore be detected with the gradiometer. This is a simplified description as there are other processes and materials which can produce detectable anomalies. The most obvious is the presence of pieces of iron in the soil or immediate environs which usually produce very high readings and can mask the relatively weak readings produced by variations in the soil. Strong readings are also produced by archaeological features such as hearths or kilns because fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalized magnetic enhancement around settlement sites.

Not all surveys can produce good results as anomalies can be masked by large magnetic variations in the bedrock or soil or high levels of natural background "noise" (interference consisting of random signals produced by material within the soil). In some cases, there may be little variation between the topsoil and subsoil resulting in undetectable features. It must therefore be stressed that a lack of detectable anomalies cannot be taken to mean that that there is no extant archaeology.

The Bartington Grad601 is a hand held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 1.0m apart. Their Mumetal cores are driven in and out of magnetic saturation by an alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output.

The gradiometer can detect anomalies down to a depth of approximately one metre. The magnetic variations are measured in nanoTeslas (nT). The earth's magnetic field strength is about 48,000 nT, typical archaeological features produce readings of below 15nT although burnt features and iron objects can result in changes of several hundred nT. The instrument is capable of detecting changes as low as 0.1nT.

Data Collection

The gradiometer includes an on-board data-logger. Readings in the surveys were taken along parallel traverses of one axis of a 20m x 20m grid. Two resolutions are commonly used in the majority of surveys. Guide lines showing the exact position of each reading along a traverse are used where necessary.

1. Standard resolution, with a traverse interval of 1.0m and a sample interval of 0.25m is used where the priority is surveying large areas. Guide lines are not used; an experienced operator can walk at a constant pace and produce accurate surveys. This method depends on the survey area being relatively free of obstacles. This is the method used by most commercial surveyors and is ideal for archaeological prospection and large area surveys.
2. High resolution, with a traverse interval of 0.5m and a sample interval of 0.25m is used where the priority is producing very accurate high resolution surveys. Guide lines are used in order to ensure very precise data collection. This survey method is more time consuming than standard resolution and is generally used in research surveys where specific smaller archaeological features are being surveyed. It is also useful for surveying very uneven sites or areas containing a

lot of obstacles where the guide lines allow accurate survey and allow variable survey rates to be used.

Data presentation

The data was transferred from the data-logger to a computer where it was compiled and processed using ArchaeoSurveyor 2 software. The data is presented as grey-scale plots (Figs. 5, 12, 19 and 21) where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. This is supplemented by interpretation diagrams (Figs 6, 13, 20 and 22) showing the main features of the surveys with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomalies and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. Weak and poorly defined anomalies are susceptible to misinterpretation due to the propensity for the human brain to define shapes and patterns in random background noise. An assessment of the confidence of the interpretation is given in the text. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them.

Data Processing

The data is presented with a minimum of processing although corrections were made to compensate for instrument drift and other data collection inconsistencies. High readings caused by stray pieces of iron, fences, etc are usually modified on the grey scale plot as they have a tendency to compress the rest of the data. The data is however carefully examined before this procedure is carried out as kilns and other burnt features can produce similar readings. Grey-scale plots are always somewhat pixellated due to the resolution of the survey. This at times makes it difficult to see less obvious anomalies. The readings in the plots are usually smoothed thus producing more but smaller pixels. This reduces the perceived effects of background noise thus making anomalies easier to see. Any further processing is noted in relation to the individual plot.

5. STUDY AREA SELECTION

The areas selected were relatively discrete and continuous field systems that were not fragmented by more recent improvements or field pattern changes. They were also field systems that had immediate and obvious settlement associations. All therefore had good archaeological potential and two of them had good environmental potential. All three were at least partially protected as Scheduled Ancient Monuments and one of them had major management problems which needed to be addressed.

The first area is a fairly discrete group of terraced fields in Cwm Cilio just below the upland on the south side of Moel Bronmiod and Gyrn Ddu, Llanaelhaearn. This contains a well-preserved settlement including a compact enclosed settlement and outlying roundhouses. It is also situated immediately below the hillfort of Pen-y-gaer, to which it is likely to have a relationship. It has survived well because it occupies a small topographic area of better land between stony hillside and marshy valley floor and has escaped intensive modern use. Although the settlement and the early fields survive it has been subject to some post-medieval boundary changes. The fields and

settlement were planned by the RCAHMW (1960) but there has been no excavation and there have been no chance finds. The enclosed settlement is likely to have been occupied during the Roman period but the probable association with the hillfort suggests earlier origins. The valley nearby has deep peat deposits so there is good palaeo-environmental potential. The central part of the field system around the enclosed settlement is a Scheduled Ancient Monument.

The second area lies in lower upland on the lower hillside of Braich y Gornel on the west side of Cwm Ystradllyn, north of Penmorfa, near Porthmadog. It is a discrete area of small field enclosures with no obvious lynchetting and focused on a small unenclosed settlement of two round-houses and with one outlying roundhouse. Its value lies in the fact that because it is a marginal area it appears to have totally escaped subsequent improvement or changes and so has good archaeological potential. In addition the field system has been surveyed and some archaeological excavation carried out by Dr Gerhard Bersu in 1950 and 1954, the plan published by the RCAHMW (1960) and the excavation results by Gresham (1972). The excavation produced no diagnostic finds and was carried out before the introduction of radiocarbon dating. There have been no chance finds from the area. The whole of the area is a Scheduled Ancient Monument. There are some peat deposits in the area so there is some palaeo-environmental potential.

The third and largest area is that commonly known as Muriau Gwyddelod, on a low hillside, not upland, east of Harlech. It consists of a three areas belonging to a wider prehistoric landscape that has been disjointed by 19th century improvements. The main area contains three roundhouse settlements, two long huts and a field system. The two smaller, outlying areas each have a probable enclosed roundhouse settlement set within fragments of the wider field system. Each of the three areas is protected as a Scheduled Ancient Monument. The area as a whole was chosen specifically because it is within several different ownerships, lies partly within an agri-environmental scheme and has some biodiversity status. The area has not previously been surveyed, probably because it is so extensive, although the main settlement itself has been planned in detail by Dr Gresham (Bowen, E.G. and Gresham, C.A. 1967). It is just part of a much wider surviving although somewhat fragmented prehistoric landscape, which was recognized by Richard Kelly (1982) who carried out excavation at two settlement sites of Moel y Gerddi and Erw-wen (1988), about 3km to the north-east, supported by a palaeo-environmental study (Chambers, F.M. and Price, S.M. 1988).

6. FIELDWORK AT CWM CILIO, LLANAELHAEARN

SH 42604520 PRN 12941 SAM Cn112

Introduction

This group of small sub-rectangular terraced fields was described by the RCAHMW (1960, 106), and named ‘Hut-Groups and Huts near Tyddyn-mawr’ although in fact it lies on land belonging to the farm Cwm Cilio as does the hill and hillfort just to the east (Fig. 2). Within the fields lie a nucleated enclosed roundhouse settlement and an enclosed rectangular platform house settlement. The terraced fields are overlaid by a series of larger post-medieval fields but these have not been intensively improved and there are small areas that have not been improved at all so the earlier fields still survive well.

The complexity of settlement features suggests occupation from some time in the Iron Age into the Roman period and then perhaps abandonment and re-occupation in the Medieval period until

the farm moved to its present location on the opposite side of the valley (Fig. 2). The main interest in this area is the presence of the terracing and of some areas of good survival as well as the environmental potential provided by peat deposits in the valley nearby.

Topographic and Historic background

The fields lie between 220 and 270m OD and therefore are on the upland margins. They lie on a narrow band of slightly better land between the steep stony slopes of the hill behind and the partly boulder-field and partly marshy valley floor. Another band of slightly improved fields lie in the same topographic location on the opposite side of the valley, where there is another roundhouse settlement and traces of terraced fields. This location is probably repeated elsewhere around the hills here and probably derives from the periglacial accumulation of drift colluvium at the bottom of the hill slope, which also benefits from reasonable drainage. The south-west facing position also has local temperature benefits for crop growing.

The hills here are igneous intrusions surrounded by Ordovician slates and shales. However, there is a cover of drift including many areas of boulder field and drainage is poor. The land here is all classified as *Grade 5* land (MAFF 1977, 1988), suitable only for non-intensive sheep pasture, and in the area in general this equates broadly with what we define as the uplands i.e. over about 250m OD. However, as described above there are localized exceptions to this rule and even though all the land is currently used for permanent pasture, the presence of the terraced fields shows that arable cultivation was once possible.

The farm has not been much modernised and the field pattern is the same as that shown on the first edition Ordnance Survey 1:2500 map of 1889. However, its name was then not Cwm Cilio but Cwm-ceiliog which is a little different so seems to be a deliberate change. Cwm Cilio means ‘Hollow of retreat’, while Cwm-ceiliog means ‘Hollow of folding or penning’. None of the earlier features were named or indicated on the 1889 map, apart from the hill fort.

The present better fields of improved grassland form the ‘infields’ although they are actually spread out, not all immediately around the farmhouse. The greater part of the farm land consists of rough pasture and mountain and the farm relies on a mixture of cattle and sheep raising with additional fodder crops brought in from elsewhere.

Description and survey

The field system was described by the RCAHMW (1960) as covering approximately 14 acres (2.3ha) and was planned in outline (Fig. 3). In 2007 a series of fine oblique photographs were taken by Toby Driver of the RCAHMW. These used low light to show up new details (Fig. 4). Study of these photographs and of vertical air cover as well as of ground walk-over and geophysical survey has allowed refining of the original plans and recognition of new features which shows that some early boundaries extend into the unimproved land around. The early fields are laid out with contour and cross-contour boundaries, retaining approximately rectangular outlines but also with some gently curving boundaries and rounded field corners. The terraces are in places up to 3m high and are even formed in places where the boundaries are partly cross- contour. In other places there are cross-contour boundaries that are little more than lines of stony banks. Most of the early fields exist now as terraces with gently rounded edges within the present stone-walled fields which partly followed the earlier terraces for lay-out. In a few places, the post-medieval boundaries cross over and therefore preserve the earlier boundaries and at these points it can be seen that the earlier boundaries were once upstanding banks, not just terraces (Fig. 9a). Close to one of the early boundaries the post-medieval boundary does not follow the

edge of the earlier terrace but runs below it. As a result two short lengths of early boundary have been preserved as upstanding features and a narrow fragment of earlier field below the terrace has also been preserved in such a way that subsequent disturbance by cultivation is unlikely. This area was chosen to investigate one of the lengths of preserved early boundary and the adjoining fragment of early field by excavation. A trench was excavated across the boundary and two soil pits were excavated in the early field fragment (Fig. 7).

The main feature within the field system is a compact sub-rectangular enclosed settlement containing three roundhouses and two sub-rectangular buildings (Fig. 4). These survive as stone-built features. To the east is another somewhat larger sub-rectangular enclosure with a possible rectangular platform house and there is another outlying rectangular probable platform house further to the east. Within the fields are some unenclosed roundhouses remaining as substantial platforms terraced into the hillside, suggesting timber-walled structures. Additional features have been recognised since the RCAHMW survey, including a line of three small stony platforms that lie alongside a boundary wall south-west of the rectangular settlement. These are much smaller than the roundhouses but seem to be huts of some sort and may represent a post-Roman re-use phase. Other features recognised from ground survey, from aerial photographs and from geophysical survey are added to the RCAHMW plan (Fig. 3).

Geophysical Survey by David Hopewell

Three areas with dimensions of 120m x 60m, 70m x 80m and 80m x 90m were surveyed at a resolution of 1.0m x 0.25m in an area of improved pasture (Fig. 5). Survey conditions were generally good with sloping fields of short grass and low banks. Background noise levels were low with no obvious interference from the underlying geology.

Interpretation (Fig. 6): A series of lynchets were visible as fairly substantial rounded earthworks (1 to 6). These produced very clear anomalies with strong positive readings on their up-hill sides perhaps indicating an accumulation of organic soil or iron panning. Further areas of noise behind the lynchets (8 to 10) could be interpreted as being deliberately deposited material, suggesting that the earthworks were deliberately constructed as opposed to having been largely formed as by-products of cultivation. The noise behind lynchet 3 (10) supports this hypothesis as it has particularly clear boundaries that do not indicate that it is the result of a gradual accumulation of soil. Lower banks (11, 12, 13 and 14) also produced clear anomalies with bank 11 showing signs of realignment on a slightly different orientation. Other areas of noise occurred in several places within the survey and usually indicated a specific area of activity. Most obvious is a rectangular enclosure (15) in the fork between two lynchets that appears to contain an 8m diameter roundhouse. There may also be further activity immediately to the east. Another, slightly less well-defined, anomaly (16) may correspond to a second roundhouse. An area of noise (17) in a rectangular enclosure formed by field banks could indicate magnetic enhancement from further settlement although no obvious buildings are visible. Two small earthworks in this area, of unknown function also produced clear anomalies (18 and 19). Two faint roughly rectangular anomalies (20) in the northernmost field could indicate structures or other activity but are too indistinct for definite interpretation.

Most of the fields show signs of ploughing. In some cases this is regular with a spacing of about 3m and crosses the early field boundaries (e.g. 21 and 22) indicating that it is relatively modern. In two areas (23 and 24) however, there are phases of ploughing on different alignments, some of which appear to be somewhat irregular suggesting an early date. Their relationship to the boundaries is not entirely clear although in area 24 the south-west to north-east ploughing appears to be confined to one field suggesting it predates the field improvements.

Discussion: The survey succeeded in recovering information about both the presently visible earthworks and features where most surface indications have been removed by field improvements. The fields were shown to have contained areas of settlement and there may be indications of early cultivation. The lynchets appear to be constructed terracing as opposed to simple accumulations of plough soil against a boundary.

Trial excavation

A trench 6m long and 1.4m wide was excavated across one of the early boundaries preserved in the space between a substantial early field terrace, c. 2m high and a post-medieval wall (Fig. 7. plan). This lay just below a field terrace, which was about 2m high at this point (Fig. 7 Terrace profiles).

The bank proved to be a solid mass of stone about 3.4m wide with a spread of tumble extending some way beyond (Fig. 8, 1).

Careful removal of the spread and surface stones left a core bank 2.6m wide. This had no deliberate laid facing although a number of slightly larger stones had been placed unsystematically to provide rough external edges on both sides (Fig. 8, 2). Beneath the spread of 'tumble' (14) and (15) on the west side of the bank was a fairly deep, humic stony loam (16), which was the probably the ploughsoil contemporary with the boundary (Fig. 8, section 4).

Gradual dismantling of the stony bank showed no evidence of any original design to the bank or original larger clearance stones for instance. It appeared that the bank had simply accreted as clearance stones were added to it over time.

After removal of the stony bank a slightly raised area of orange silt (10) was exposed, which looked like sterile subsoil and this was at first thought to be a 'ghost' feature of subsoil preserved beneath the bank whereas the subsoil level on either side had been reduced by cultivation. However, further excavation and removal of the buried soil on each side of the former bank showed that the orange silt was a re-deposited layer which overlay a buried soil (11). The layer (10) was therefore a low primary bank, perhaps no more than a marking out bank (Fig. 9b).

The buried soil (11), which must be a relict topsoil pre-dating the field system was a grey-brown friable silt with only a few stones and occasional flecks of charcoal. The soil spread a little way under the soil and tumble at the south-east (uphill) side but not at the north-west (downhill) side and had probably been removed by cultivation beyond the boundary. The charcoal could be derived from primary clearance.

The subsoil exposed beneath the buried soil and old cultivation soil was light to mid-grey silt with occasional angular rock fragments and this was interrupted in places by irregular gravel-filled linear features, probably periglacial stone stripes or ice wedges (Fig. 8, section).

The primary bank material was different from the exposed subsoil and there was no ditch from which it could have been derived. Its sterile, mineral nature means it was not cast up from the pre-existing topsoil. It is similar to the subsoil exposed in the soil test pits 2 and 3 so the grey colour of the subsoil beneath the bank is probably just a result of gleying (reduction of iron due to lack of oxygen).

Although there were flecks of charcoal in the buried soil (11) only one piece that might be suitable for radiocarbon dating was collected sample <101>, identified as corylus (Caseldine). A bulk soil sample was also taken from the same layer for flotation, sample <102> and this produced another piece of charcoal suitable for radiocarbon dating, identified as oak (*Quercus*) (Caseldine). The buried soil was too stony to insert a normal, (100mm wide) soil pollen column tin so a small (50mm wide) tin was taken and another similar for micromorphological analysis (Fig. 8, samples <103> and <104>).

Soil test-pitting

Two soil test pits, each 1m by 0.6m (Trenches 2 and 3), were excavated to the north-west of the main trench in an area that was within a negative lynchet below a field terrace but protected from post-medieval cultivation between the terrace and a wall. The pits were intended to test the nature of the soil, which was expected to be an undisturbed remnant of the soil associated with the terraced fields. However, there was little depth of soil, so little reliability could be placed on there being useful preservation (Fig. 7).

Trench 2 was 0.25m deep with c. 10cm of turf over a mid-brown silty soil mixed with scattered small sub-angular stones and 15cm deep. The mixed nature of the soil and its abrupt junction with the underlying orange silty subsoil indicates that it was an old ploughsoil.

In Trench 3 the soil type and depth was very similar to that in Trench 2 and a small box sample was taken for micromorphological analysis (Fig. 7, sample 105).

Dating and Discussion

The ground walk-over, vertical and oblique aerial photographs and geophysical survey have shown that some changes and additions need to be made to the plan made by the RCAHMW. A far as the fields system itself goes, these are mainly addition of details and of extensions into the surrounding area. The field pattern gives the impression of having expanded in an informal manner rather than following an initial overall plan. It is characterised by terraces up to 3m high with gently curving boundaries, generally following contours or cross contours. The plots have rounded downslope corners and angular upslope corners. Some of the major boundaries cross the contour at an angle perhaps deliberately east-west, so that field are oriented towards the sun. This means that terraces are developed on both contour and cross- contour boundaries.

In a few places there are secondary subdivision boundaries that seem to have been just simple banks without terracing (e.g. Fig. 3 B and C). There are also some boundaries extending into the steeper, stonier hillside (Fig. 3, D) which are just lines of stones. Otherwise the system is notably devoid of clearance cairns, suggesting that all stones were incorporated into boundaries.

The indications are that this area had relatively good soil in agricultural terms, compared to the moorland and bogs around, but was stony. The excavation of the bank in Trench 1, which was quite small in comparison to the height of the terraces around, shows that this strip, 1.4m wide, with a stone bank that was originally *c*. 2.4m wide and 1m high contained an estimated 4.3 metric tonnes of stone (based on the weight of gravel less an expansion factor). The field system as a whole then, even if the terraces do not consist of stone dumps, contains many thousands of tonnes of stone. The stony bank in Trench 1 continued some way to the south where it was preserved under a post-medieval wall (Fig. 9a) showing that the terraces that are visible now are banked boundaries that have been levelled or cleared for post-medieval cultivation.

The excavation revealed a good buried soil (11) beneath the bank and micromorphological study identified this as cultivated colluvial soil with remains of a plough-eroded brown earth subsoil (Appendix 1). It was suggested that the location of the field system was carefully chosen as an area of slightly better-drained soils that were less acid than the typical local soils. Comparison of the buried soil with the micromorphology of a sample from trial pit 3, to the west, which was not a buried soil, but which might have been protected from Post-medieval cultivation indicates that at some point cultivation ceased and the soils acidified.

Two charcoal samples from the buried soil (11) were submitted for AMS radiocarbon dating at Glasgow (Appendix 4). Sample <101>, corylus (hazel) produced a date of 1910 to 1740 cal BC at 95% probability (SUERC-33062). Sample <102>, oak (*Quercus*) produced a date of 5210 to 4990 cal BC at 95% probability (SUERC-33063). These dates are confusing and difficult to explain. If the buried soil had been a natural soil then the charcoal might have derived from the primary clearance. However, the presence of a cultivated soil prior to the construction of the field bank shows that the bank was not itself a primary element of cultivation at that location. The radiocarbon dates, moreover, indicate that there was more than one phase of earlier clearance. Sample <102> gave a date in the later 5th millennium BC, the later Mesolithic. Sample <101> gave a date in the first half of the second millennium BC, the Early Bronze Age.

A general woodland cover would be expected here as a natural climax vegetation, and burning to open up the woodland in the later Mesolithic has been identified elsewhere. The question is whether the Early Bronze Age date refers to the cultivation of the buried soil prior to the construction of the field bank. At present there is little comparable evidence of the nature of Bronze Age cultivation in this area, where it took place or how it was carried out, or even of what the settlement might have consisted of. There is probable evidence of Bronze Age activity in the area, in the from of burnt mounds and burial cairns higher up the slopes (Fig. 2) and a standing stone lower down the valley, but no indication of permanent settlement. Gradual clearance of the upland forests, probably for grazing, has been well-documented as a major impact on the landscape through the second and first millennia BC (Chambers and Price, 1988, 99). The charcoal of sample <101> could be a relic from such clearance, while actual cultivation commenced some time later. Clearly, however, the nature of the buried soil does show good potential for arable cultivation and that cultivation probably began before the establishment of the stone-banked field system. The layout of that field system may not have been rigidly defined until continuing cultivation began to deplete the soil and bring quantities of stone to the surface that needed to be cleared. That might have been brought on by an intensification of cultivation impact from the introduction of by improved ploughing methods.

The origin, creation and constituents of the terraces cannot be understood until one of them is excavated. This is made difficult because of the size of the terraces, so that the amount of excavation needed is considerable. The height of them suggests that they did not derive simply from lynchetting, that is, gradual accretion of soil by plough action, as is generally supposed. However, the present recording shows that the apparent height is misleading, because of the development on a pre-existing slope. That is, the apparent height when seen from below the terrace is a combination of the height of the terrace and of the slope. When measured the 2m high terrace above trenches 1, 2 and 3 actually approximates to only about 1m added height (Fig. 7 a-a1 and b-b1) and it would be reasonable for his amount of material to accumulate as a lynchet. The theory that negative lynchets develop at the top of the slope while soil moves downslope, and accumulates against a lower boundary is still difficult to validate. Here, the trenches were excavated within what should be a 'negative lynchet' below a terrace. However, the excavated bank and the level of its buried soil show little reduction of the original ground level. In other words there may be positive lynchets, but there is little evidence of negative lynchets. The face of

the terrace immediately above the excavated trenches is stony, so this would be termed a stone-faced lynchet, but may in fact be a stony bank that gradually accreted as soil built up behind it. The question must be where the material came from that the makes up the terraces? If soil was moved naturally or deliberately then the upslope half of the field would be denuded into the subsoil and become rockier, but there is no visible sign today that this has happened. However, it could be that this did happen and that topsoil has built up again after a long period of abandonment, so more extensive soil studies are needed.

There are several hollows within the field system as well as terraced areas that seem too small to be fields. The geophysical survey has shown that one of the hollows is a round-house 8-10m overall diameter, and probably surprisingly well-preserved, considering that it is now only a hollow in the present field and has been ploughed over (Fig. 7). The sites of several other possible houses have been identified scattered within the field system (Fig. 3). If it is presumed that the scattered houses constitute a separate, earlier phase than the enclosed settlement then the amount of cultivable land per house was relatively small. If these house were all abandoned by the time of the enclosed settlement, with its three or four houses then agricultural production would have been much greater per household, probably producing a sizeable surplus.

One small platform-like area that seemed too small to have been a field was investigated by the geophysical survey (feature 16). This was thought to be another possible house site, but this did not appear so from the survey and so perhaps was a stack-stand area and there were probably others within the area.

Features that are missing from the survey are trackways and entrances. Double walled trackways, notably absent here, are generally recognised as drove-ways and a feature of a stock raising or perhaps dairying economy. Nor are there any obvious track routes within the field system. The longest and most distinct linear feature is the terrace (3) that continues right across the hillside just below the enclosed settlement. This long terrace is partly used by a modern track which leads out into the unenclosed heath grazing land to the north. However, this cuts across several cross-contour boundaries with no indication that there were earlier gaps. The Medieval type ‘strip-lynchetted’ fields known elsewhere have recognisable ramps between them to allow access by plough teams. The RCAHMW plan does not show anything of that nature here, but this may be because such features have been obscured by later land use. The geophysical survey provides much more detail and in the case of the terrace junction at (1) (Fig. 6), there is a gap in the boundary at the field corner, which is too clear to be just later erosion, so may be an access ramp.

Overall, the limited amount of fieldwork has shown that there is considerable potential for further work both archaeological and environmental. It has shown that geophysical survey is very valuable. Although it did not provide more than slight indications of earlier cultivation marks it did show many new features within such a field system, both settlement remains and, most importantly, new information about the field boundaries themselves. The results show that the whole of an area like this needs to be surveyed in order to get an over view and more complete understanding but this would need a much larger project than the present one.

A column was taken for pollen analysis from valley peat just to the south of the field system and the results of this analysis should allow a broader view of landscape changes and possibly evidence and dating of periods of cultivation. Further understanding and interpretation will then be possible.

7. FIELDWORK AT BRAICH Y GORNEL, CWM YSTRADLLYN

SH 5525 4457 PRN 214 SAM Cn274

Introduction

This field system consists of an isolated group of small sub-rectangular fields focussed around a compact settlement of two small stone-built roundhouses. Outlying to the east of the fields is a single large stone-built roundhouse and within one of the fields is a small rectangular stone-built hut of medieval or post-medieval date.

The interest of these features lies in their isolation beyond the area of Post-medieval improved land. They therefore seem to represent a small settlement, with its complete surviving field system, which has not been modified or damaged by any later clearance or cultivation.

An added advantage is that some excavations have previously been carried out at the settlement there in 1950 and 1953 by Dr Gerhard Bersu, the results published by Gresham (1972) after Bersu's death. This was an exemplary excavation, Bersu being best known for his excavations at the classic Iron Age settlement of Little Woodbury, Wiltshire, before the 2nd World War.

Topographic and Historic background

The field system lies on a south-east facing medium sloping hillside at a height of between 270 to 290m OD (Fig. 10). The hillside lies below the imposing summit of Moel Hebog (782m), with a view down the valley of Cwm Ystradllyn towards the coast. The underlying geology of the hills is of igneous intrusions surrounded by Ordovician shales and conglomerates. The soil is a brown earth developed over glacial drift. The soil was derived from earlier deciduous forest cover that had probably largely been cleared by the 2nd millennium BC by comparison with evidence from similar areas in Meirionnydd (Chambers and Price 1988). The current vegetation is grass and bracken on the better-drained slopes with areas of reed and moor grass on the wetter areas at the foot of the slopes. The agricultural potential of the soil on the better-drained slopes may have once have been quite good, but was sensitive to erosion and deterioration and this may be crucial to understanding the field system.

There are ten early fields here, lying on lower upland at the margins of possible cultivation and just above the present limit of enclosed, improved fields (Fig. 11). The early fields lie in a distinct topographic zone at the foot of steeper upland slopes and just above a natural terrace of more level marshy ground. The area of the fields therefore benefits from good natural drainage and possibly from a depth of colluvium from the hillside above, providing a zone of slightly better soils and greater agricultural potential. The modern improved fields below are all improved pasture although some fodder and arable crops are grown a little further down the valley. All the hills here, above the modern improved fields, have been enclosed but they are still basically moorland, including that where the early field system lies, and are classified as only of *Grade 5* agricultural potential, suitable only for non-intensive sheep pasture (MAFF 1977, 1988). However, the presence of early fields suggests that there was once more potential in some localised areas.

The zone of marginal upland around the valleys of Cwm Ystradllyn to the south and Cwm Pennant to the north contains numerous remains of settlement, both prehistoric and Medieval and is in fact the highest recorded concentration of such settlement in north-west Wales. The distribution is partly a survey bias because this area was the subject of intensive survey by Dr

Colin Gresham in 1938 and 1939 (Gresham 1941), later published in more detail by the RCAHMW (1960). The prehistoric settlement consists of both scattered huts and groups of huts, some with small enclosures, but none with terraced fields. A substantial area of early fields also survives on the ridge to the north where scattered stone-built round-houses lie within a series of curvilinear enclosures (PRN 790 SAM Cn 241) of unknown date. On the hillside to the north-east of the present field systems is a large, well-preserved burnt mound and there is another just over the ridge to the north. On the ridge above the field system is a small cairn of presumed Bronze Age date, and there is another further to the east (Fig. 10). There is another cairn on the summit of Moel Hebog, from which a Beaker pot was taken in the 19th century (RCAHMW 1960, xlvi).

The potential of the Braich y Gornel settlement and field system was recognised after its initial survey by Gresham in 1938 and it was chosen for excavation as part of an ongoing project investigating the different types of hut circle settlement by the Excavation Committee of the Caernarvonshire Historical Society. This one was chosen as an example of a type called the Unenclosed Group. Dr Gerhard Bersu was asked to carry out the work as he had already successfully carried out another excavation for the committee at the concentric circle settlement of Llwyn-du Bach, near Caernarfon (Bersu and Griffiths 1949). Two seasons of work were carried out at Cwm Ystradllyn in 1950 and 1953.

The focus of Bersu's excavation was to be the unenclosed group of two closely adjoining round houses but a trial excavation was first carried out at the outlying roundhouse A. This was intended to provide some background information to understand the soils of the area before tackling the more complex structures of the main settlement. The excavation showed that the floor of the house was terraced into the hill slope with a stone-faced earth wall with an inner diameter of 9m. The internal floor had a slab-covered drain but no post holes or other internal features were identified. A trench was also opened outside the north-east side of the house. This showed that the adjacent early field boundary did not join to the house wall, perhaps indicating that the field system was later than the house. There were no finds from the excavation. The work here is relevant because the site chosen for the present excavation of a field boundary was immediately adjacent to roundhouse A.

Bersu then moved on to excavate most of the nucleated settlement, recording this in his usual detail. Although the above ground remains before excavation were quite vague the settlement structures proved to survive very well, with substantial walls. They consisted of two small stone-walled round houses, each about 5m internal diameter, conjoined by a small rectangular hut, 3.5 by 2m internally, with an unusually narrow entrance. The entrances of the houses face onto a common small 'courtyard' on a terrace, on which were traces of a rectangular structure (Fig. 11). The houses were built into the hillside so that the upslope sides were entirely cut in and survived to over 1m in height, probably close to their original height. One of the houses proved to have had two lines of secondary walling inserted across the interior. The only likely explanation for these was to create a raised timber floor, allowing drainage from the hillside above. The small rectangular hut seems likely to have been a store-house, the narrow entrance ensuring that stock could not enter.

However, although the details of the structures were revealed there were no diagnostic finds to help date the huts or to help with their interpretation. The excavation was left incomplete, probably when Bersu accepted the post of Director of the German Archaeological Institute, which he took up in 1950, but he returned to Braich y Gornel to complete the work in 1953. The excavated area has remained open and the neat stone spoil-heaps can still be seen. Bersu retired in 1956 and did not complete the report before his death in 1964. His widow donated the surviving site records to the RCAHMW and the report was written and published by Dr Gresham to include

some of his own observations and a partial new survey of the settlement and field system (Gresham 1972).

Geophysical survey, by David Hopewell

The excavation was preceded by a geophysical survey aimed at identifying any traces of cultivation. The survey focused on one notably rectangular field (*F3*, Fig. 11). An area consisting of two overlapping rectangles each with dimensions of 80m x 40m was surveyed at a resolution of 1.0m x 0.25m. The ground was stony with a few low walls that provided little impediment to survey (Figs 11 and 12).

Interpretation (Fig. 12)**:** The survey was dominated by large areas of noise probably caused by the large quantities of stone in the soil. Two quieter areas (1 and 2) may have been partly cleared of stone or may be natural variations in the soil.

Two conjoining rectangular enclosures (3 and 4) were detected with dimensions of 29m x 32m and 21m x 30m. These partly correspond to an enclosure with dimensions of 50m x 33m that survives as a low upstanding wall (see Fig. 11, *F3*). The wall corresponds to all but the south-eastern side of enclosures 3 and 4. The southern boundary of enclosure 3 is about 4m to the south-east of the upstanding wall and is discontinuous with the south-eastern boundary of enclosure 4. This suggests that the enclosures have been modified and that the south eastern side and the division belong to an earlier phase. Two faint anomalies 5 and 6 may also correspond to earlier phases. Elsewhere anomalies 7 and 8 correspond to upstanding walls. A faint linear anomaly (9) may indicate another boundary that is not visible on the ground. The noise within enclosure three appears to contain a faint north-east to south-west linear features that respect its boundary. This could tentatively be interpreted as evidence of contemporary cultivation.

Discussion: The survey detected both upstanding walls and buried features, and suggests that the enclosures had been modified or rebuilt. Possible faint cultivation marks survive in one enclosure. The rebuilding and possible cultivation indicate a fairly active use of the enclosures, as opposed to the walls being fixed boundaries or merely a repository for cleared stone.

Trial Excavation

One trench, 6m by 1.6m, was excavated perpendicularly across a field boundary north of the outlying roundhouse A at the lower edge of a large field enclosure, which continues to the north-east (Trench 1, Fig. 11). This was chosen because the boundary was in relatively good condition and showed more terracing than other boundaries closer to the unenclosed hut group. It therefore had more potential for stratigraphy and environmental information. Its proximity to roundhouse A also gave it some potential for artefactual or industrial evidence even though Bersu's excavation of the house, described above, produced nothing useful.

Two small trial pits, TP1 and TP2 were excavated upslope and downslope from Trench 1 to test the stratigraphy further away from the boundary (Fig. 14). Another two trial pits, TP3 and TP4 were also excavated, one above and one below another field boundary at the lower edge of a sub-rectangular field further to the west (Fig. 11). This was the most regular shaped of the fields, suggesting a planned design that would be appropriate for a cultivated area although there was no indication of terracing at the lower edge of the field. This lower edge lay at the bottom of the hill slope with more level, marshy land below, and so was carefully positioned. The trenches were designed to test the depth and type of soil within the field with that immediately outside it.

Excavation results (Fig. 14)

The boundary here ran approximately along the contour. It terminated a little way before the wall of roundhouse A but ran approximately towards the back edge of the house wall. Another boundary of the same field approached the house from the opposite side, again fading out before reaching the house. The angle that these two boundaries made was obviously associated with the position of the house. It seems possible that the absence of a joining length of boundary was the result of later cattle trampling around the remains of the house although Bersu had considered, from his excavation, that the boundary had never joined the house wall.

The boundary was visible as a line of large irregular glacial boulders with a slight terracing effect on their up slope side. In places some of the boulders seemed to have slipped down the slope and fallen out of the boundary. Others, still in situ, showed possible evidence of original deliberate alignment of faces.

In the area upslope from the boundary removal of the thin layer of turf and of a thin layer of stony topsoil exposed a fairly continuous layer (3) of small stones, mainly between 100-200mm in length. These stones lay approximately horizontal in a layer one stone deep, giving the appearance of a surface (Fig. 15a).

Below the boundary the surface was quite different. A thin scatter of slightly larger stones (5) than in (3) lay on top of a yellowish brown clayey soil (10). The distribution of the stones (5) suggested that they were tumble from the boundary.

The boundary itself consisted of a line of large boulders with a number of smaller stones (7) on its uphill side. The stony layer (3) was stratigraphically later than or contemporary with the stones of the boundary, which were slightly larger than most of those making up layer (3).

It at first appeared as if the stony layer (3) showed that there was no more depth of soil, and therefore little potential or likelihood that the field area had ever been cultivated. Removal of (3) however, showed that it lay on top of a deeper soil (4). This was a friable, mid-dark brown mixed stony layer about 200mm deep. Removal of (4) exposed the natural subsoil of slightly compact orange-brown silt with *c.* 10% small angular and sub-angular stones (9) and this left the stones (7) of the boundary *in situ*. There was more soil ((26) underneath the stones (7), which was very similar to (4) and could be a continuation of it, except for being protected by the stones of the bank. It therefore was likely to be at least a remnant of soil contemporary with the boundary construction. One piece of charcoal (Sample <5>) was collected from (26) at its interface with the subsoil.

Downslope from the boundary, removal of the 'tumble' (5) and of layer (10) showed (10) to be rather different in character to (4) and was a fairly compact mid-brown silt mottled with patches of yellow-brown with but scattered small stones as in (4). The layer contained two pieces of charcoal (Samples <3 >and <4>). Sample <4> was identified as oak (*Quercus*) and was submitted for radiocarbon dating.

Stratigraphically (4) and (10) were equivalent but were not continuous underneath the 'facing' stones of the boundary, the only *in situ* example of which lay directly on the subsoil (Fig. 14C). Removal of layer (10) revealed a similar subsoil to (9) upslope from the boundary.

Two of the 'facing' stones of the boundary had slipped downslope, out of position. One was embedded in the top of layer (10). The other, midway across the trench overlay a mid-brown pure

humic layer and it seemed to have slipped down onto a former turf surface, which had thus been protected. A small block sample was taken from this for possible pollen analysis there was no truly buried soil underneath the boundary. Other small block samples for micromorphological analysis were taken from layers (4) and (10) (Fig. 14, samples <6 >and <8>).

At the lowermost, south-east corner of the trench the edge of a probably linear feature [23] was found which lay at an angle across the corner of the trench. This was filled with a dark brown gritty silt with small stones and little different from the subsoil except darker. At a depth of 200mm below the level of the top of the subsoil a layer of small flat stones was found lying horizontally and these lay over a fine grey-brown silt. These looked like naturally deposited layers and the feature was regarded as possibly of natural periglacial origin.

Soil Test pitting

Four small soil test pits, each *c.* 0.30m square, were excavated to extend the information acquired from the main excavation trench.

Two silt test pits, TP1 and TP2, 300mm x 300mm square were excavated close to Trench 1 in Filed 2. TP1 was 1m upslope from the upper end of Trench 1 and TP 2 was 1.5m down slope from the lower end of Trench 1 (Fig. 14. These were designed to test the continuity of the soil and confirm the identification of the general subsoil further away from the boundary.

TP1 showed a similar stratigraphy to that in the upper end of Trench 1 with 100mm of turf over 200mm of mixed stony soil over stony subsoil. The stony horizon (3) could not be recognised, perhaps because of the small horizontal area exposed.

TP2, below the turf-line, showed a stone-free orange-brown silt (18), 80mm deep above 200mm of stony, orange-brown silt (19) which in turn overlay a shallow horizontal layer of flat stones (21), which then overlay stone-free yellowish grey silt (22). The stratigraphy therefore was very similar to that in feature [23] in Trench 1. The difference was that here a scatter of charcoal was found on the interface between layers (19) and (21) although none was found in feature [23]. There was a possibility then that this was part of a wider artificial feature or deposit resulting from human activity, perhaps associated with the nearby roundhouse. The charcoal was collected for identification and possible dating (Samples 1 and 2).

The pits did not throw any light on the possible agricultural use of Field 2 but TP2 helped confirm the presence of occupation activity associated with roundhouse A.

Two other test pits, TP3 and TP4, were excavated in Field 3. These were, respectively, 3m above and 3m below the lowermost field boundary, which consisted here of a low terrace.

TP3 was above, and therefore within, the early field an area of short grazed grass. It was 0.38m deep and had the following stratigraphy, measured from the surface:

	Context	
0-10cm	27	Turf
10-13cm	28	Small flat sub-angular stones, up to 0.20m long.
13-120cm	29	Grey-brown silty loam with occasional small sub-angular stones.
20-38cm+	30	Orange-brown silt with numerous small sub-angular stones

TP4 was down slope from the early field boundary, outside the early field, where the slope decreased, in an area that was dominated by reeds. It was 0.47m deep with the following stratigraphy.

	Context	
0-23cm	31	Turf, becoming darker and more humic with depth.
23-32cm	32	Flat sub-angular stones up to 0.30m long, lying at various angles.
32-47cm+	33	Orange-brown silt with scattered sub-angular slabs, smaller than those above.

TP3 was of interest because there were hints from the geophysical survey that field F3 had some features deriving from cultivation (Fig. 13). TP3, however, had showed that the soil within in Field 3 was not observably different from that in Field 2 and so was probably associated with similar soil history and land-use.

TP4 showed that the soil was more humic and peaty in the more level area outside the field, as suggested by the vegetation. It also showed that flat stones were a natural part of the subsoil, although distributed more irregularly than in the soil within the field.

Dating and Discussion

The excavation showed that the very slight terracing visible on the surface was a result of a build-up of stony material behind the line of boulders making up the boundary, rather than a build-up of soil from cultivation (Fig.15b). The geophysical survey suggested that there might have been a phase of cultivation within the fields, shown by faint linear anomalies parallel to the contours in field F3. The soil upslope from the boundary in Trench 1 was thin and stony and characterised by an even spread of small stones on top of the soil, beneath the modern turf. These seem likely to be a remnant of weathering of the soil on the slope, which must have been exposed at some point, either as a result of cultivation or trampling due to intensive cattle pasture. There were no cultivation features, such as plough marks.

The soil downslope from the boundary was quite different, more mixed and without the spread of stones, suggesting some difference in land use from that upslope from the boundary. As the trench was close to a round house, it might be expected that there would have been domestic activity around it, downslope from the adjoining field, and that this would have been reflected in the soil. The micromorphological evidence however did not identify such activity but did suggest that there had been some build-up of soil from an erosion phase further upslope, that is from the area of the early field. This soil downslope from the boundary was clearly of mixed origin. A radiocarbon date was produced from sample <4> from layer (10) and this was 1310 to 1050 Cal BC at 95% probability (SUERC-33059), the Middle Bronze Age, and this seems likely to derive from an earlier clearance phase, unconnected with the use of field system itself, but this cannot be proven. The evidence from the soil upslope did not identify any direct micromorphological evidence of cultivation although it was suggested that this might be because of later re-working by mesofauna (e.g. earthworms). It did show that the soil was not peaty or podzolic, like the typical soils of this area, although now acidifying, showing that it may have been carefully selected for cultivation.

Overall, the evidence suggests that the hillside had been cultivated at some point, but was abandoned again when the thin soil proved to be insufficient to be sustainable. It then reverted to pasture and there was micromorphological evidence of possible sheep pasture at over 900 years before present. This could belong to the Medieval ‘warm period’ and be associated with the small rectangular building further up slope (Fig. 11, C).

There was no true buried soil present that could be used for possible pollen analysis but there is a possibility that radiocarbon dating will throw some light on the date of the boundary. Peat deposits were identified 200m to the north-east of the field system (Fig. 10) and a column was taken for pollen analysis. The results may allow further interpretation of the agricultural use of the fields and the environment associated with them.

8. FIELDWORK AT MURIAU GWYDDELOD, HARLECH

SH 506383. SAM Me10 and Me158

Introduction

The settlements known as Muriau Gwyddelod (the Irishmen's Walls) lie on the summit of a scarp overlooking Cardigan Bay above Harlech. They consist of the extensive remains of walls of stone-built roundhouses, enclosures and fields. The area under study comprises a block between two roads that run up and down the slope and another that runs along the top of the slope, as well as continuation of the features immediately to the east of the upper road. A large part of this block is a protected area, as scheduled ancient monument Me10, with two outlying scheduled areas to the south west, the Groes Las settlement and field system, SAM Me95 and a circular enclosure Fronhill SAM Me158. The area, both within and outside the protected area, is all pasture but in varying states of improvement and management. The main settlement itself was planned by Gresham and Bowen (Fig. 17) but the other settlement enclosures and the field system within the area as a whole have never been planned.

Location

On the western flanks of the Rhinog Mountains in the district know historically as Ardudwy, an early Medieval territory its name interpreted as meaning simply 'The place of the tribe' Richards in Bowen, 1971, 36). It consists of an extensive area of upland plateau, above a quite steep slope down to a narrow, more fertile coastal plain. The plateau lies around about the 200m contour and on the lower slopes are many well-preserved remains of early settlement, both prehistoric and medieval. The subject of the present study is an area of particularly well preserved ancient fields on the slopes immediately above Harlech, continuing onto the plateau above (Fig. 16). Geologically this is part of the Harlech Dome of Cambrian rocks, here consisting of grits and shales. The soils are thin over the highest area and deeper on the slopes. They consist of brown earths but are classified as Grade 5 (unsuitable for agriculture) with some Grade 4 land (suitable for pasture) further down the slope towards the coastal plain. Despite this the better drained slopes have been enclosed and fairly intensively used for agriculture since prehistoric times. Environmental study in this area as part of a previous archaeological project has shown that the area was once covered in woodland that was gradually cleared by human activity starting in the Mesolithic period, only reaching its present appearance in the Medieval period (Chambers and Price 1988). The soil developed beneath the woodland would have been of good quality and more favourable to agriculture, but gradually decreased in quality over a long period due to depletion of humus. What was once a well-settled area with an extensive pattern of homesteads and fields, dating at least from the middle of the first millennium BC gradually became suitable only for pasture. As a result a large part of the features of the earlier land use still survive. However, grants for clearance in the 1970s led to efforts to clear and improve large areas of pasture, threatening to remove many features. A general survey of Ardudwy was carried out by GAT at that time (Kelly 1982) and excavations were carried out at three sites threatened by

agricultural land improvement. These were a Bronze Age cairn on the western side of Moel Goedog (Lynch 1987) and two settlements of the mid-first millennium BC at Moel y Gerddi and Erw-wen (Kelly 1988). Kelly produced a plot of prehistoric settlements and fields in his area of study, which lay just to the north of the Muriau Gwyddelod settlements. The site of Erw-wen, a circular enclosed single hut settlement lies on the slopes above Harlech about 3km to the north-east of, and in a very similar topographic position to the Muriau Gwyddelod settlements. The results of the Erw-wen excavation therefore provide a close analogy for interpretation of the Muriau Gwyddelod area.

Project Design

The objectives of the study were firstly to provide a detailed survey record and assessment of this area; secondly to assess its condition and current land use and to produce recommendations for future management; thirdly to carry out some detailed investigations to understand its archaeology and environment.

1. Survey. Much of the area, particularly around the main settlement is now overgrown with bracken and gorse, making survey difficult. However, Ordnance Survey vertical air photographs from *c.* 1970 show that much of this vegetation has developed since that time due to a decline in grazing intensity and to a cessation in vegetation control. The survey was therefore carried out by a combination of plotting features from the vertical air cover and ground survey to check the plotted features and to add detail.

2. Management assessment. A detailed ground check was made of the whole area to record the features recorded on the survey, to provide better understanding of them and to provide an assessment of their condition, vulnerability and vegetation.

3. Detailed study. The object was to investigate some early fields to try to understand their use and environmental background. The questions to be answered include how and over what period the fields were used, what the form of the boundaries was originally, how early cultivation changed the nature of the soils and how modern land use is affecting the archaeological features and soils.

The detailed study included geophysical survey by fluxgate magnetometer and excavation of one boundary.

The geophysical survey was carried out to look for sub-surface features and to try to identify any early cultivation features, which would be expected to spatially relate to the early field pattern, rather than that of the present day. The aim of the excavation was to identify areas of soils that had not been changed by modern cultivation, suitable for micromorphological study and to identify buried soil for possible pollen analysis.

Topography and land use

The area of fields and settlement lies at a height of between 130 to 200m OD on the north-west facing slope of the hills of western Meirionnydd which form an undulating plateau before dropping steeply to the coastal plain. The plateau and the coastal slopes are marginal agricultural land, generally unsuitable for modern arable cultivation. However, they show considerable evidence for earlier agriculture and settlement in the form of Neolithic chambered tombs, Bronze Age burial monuments and standing stones and quite numerous settlements of probable Iron Age/Romano-British date, some with associated fragments of field systems. At Muriau

Gwyddelod is an unusually extensive and complete example of one of these. It owes its survival to the stony nature and thin soils of this particular area, which, as a result, has been largely avoided by Post-medieval clearance and cultivation. There is little visible evidence here of lynchetting from prolonged cultivation, the boundaries being visible as quite low rubble banks and it is possible that these seal evidence of the soil that existed at the outset of farming here. Although the soils are thin and poor now it could be that they were once deeper and were degraded by cultivation. More developed field terracing, presumably lynchetting is visible further to the north-east along the coastal slopes and to the south above Dyffryn Ardudwy.

The present land use of most of the area consists of rough pasture, used for both sheep and cattle, and within which there are well-preserved remains of earlier fields. However, the fields have been modified at some point prior to 1889 with earlier irregular fields replaced in some parts to form large rectangular fields. The latter fields have been more thoroughly cleared, with the stone incorporated into massive field walls and the pasture improved. Almost all archaeological traces have been lost within these later fields.

The present land use of the area can be described in six blocks (Fig. 27).

A. The largest block of land contains the archaeological settlement features commonly known as the Muriau Gwyddelod (Irishmen's Walls) but which also contains two other settlement enclosures as well as a system of small irregular fields. The whole area is protected as a Scheduled Ancient Monument (Me10). It is grazed by cattle and is currently within the Tir Gofal agri-environment scheme. The vegetation growth here has been uncontrolled and the area is now heavily overgrown with bracken, brambles, gorse and some blackthorn, with only a few remaining areas of open grass.

B. The area further east lies on the plateau, rather than the slope, and is in a different ownership. It has been partly cleared in modern times. There are several clearance cairns and extensive bracken growth has been controlled by cutting.

C. At the north, on the hill slope, is another area of partly cleared pasture that is more intensively grazed and where bracken is not prolific although there area patches of gorse scrub. There are some early lynchet terraces but otherwise there are few visible features.

D. At the foot of the slope is a natural terrace, much of which has become badly over-run with bracken. There are two settlement enclosures within this area and a well-preserved series of terraced early field boundaries. Part of this area, around the lowermost settlement, is very stony and this has become overgrown with scrub.

E. The area immediately west of Me10 consists largely of rectangular enclosed and totally cleared and improved fields but there are two outlying areas of survival. Lower down the slope is another well-preserved settlement enclosure, Groes Las, also a Scheduled Ancient Monument (Me95). This has been successfully kept clear by bracken cutting between the banks of the settlement (Fig. 28a) and was not included in the present survey.

F. Further up slope, north of Fronhill is another outlying area with a sub-circular enclosure, possibly a settlement attached to a series of small irregular fields, protected as a Scheduled Ancient Monument (Me158). This area of good survival was more accessible because it is not overgrown and so was chosen for more detailed study. A geophysical survey was carried out of the area and a trial trench was excavated through one of the boundaries.

General survey

The whole field system has never been surveyed before, although the central settlement of Me10 was planned in detail by Bowen and Gresham (Fig. 17). As part of the project a new survey was carried out by Robert Johnston of Sheffield University, using a GPS total station. A few areas were inaccessible because of continuous gorse cover. The resulting survey provides an essential record of the archaeology for future research and management (Fig. 18).

The individual fields were numbered (F1 to F12) and then walked over closely. Features were numbered and described individually within each field. The feature record forms part of the project archive.

After the ground survey the dominant vegetation was plotted onto the plan from the most recent vertical aerial photographs for consideration of management needs (Fig. 27).

Some parts of the area have been the subject of intensive clearance within rectangular fields, the cleared stone placed into the field walls, which are sometime massive. The largest part of the area, however, has an irregular pattern of small fields often with wandering or curvilinear outline, suggesting that the pattern evolved from a more ancient landscape. Even where some of the smaller fields have been combined to create larger enclosures, the earlier boundaries still survive within them. Within this pattern of irregular fields are several small sub-circular enclosures that may be small settlements or homesteads of Iron Age type, similar to those excavated at Erw-wen and Moel y Gerddi (Kelly 1988). There are three on the lower slopes, two of which are single banked enclosures, one of which contains visible roundhouses the other being just a substantial walled enclosure, perhaps because the internal features have been cleared away. The third, to the south-west, at Groes las, is a small circular enclosure, possibly a single large round house within a larger concentric enclosure. This is closely similar to the site type exemplified by the Erw-wen and Moel y Gerddi settlements.

The location chosen for detailed study by excavation was one of the outlying areas at Muriau Gwyddelod. This was a circular, possible settlement enclosure and adjoining fields north of Fronhill (Me158) where, because of the greater size of the boundary banks, there appeared to be more environmental potential than in the central Muriau Gwyddelod area.

Geophysical Survey Results, by David Hopewell

Area 1, Fronhill (Figs 19 and 20)

A roughly rectangular area with dimensions of 100m x 160m was surveyed. Most of the survey was surveyed at standard resolution (1.0m x 0.25m). An enclosure in the centre of the field system that may have been a settlement site was surveyed at high resolution (an area of 40m x 40m at a resolution of 0.5m x 0.25m). The two surveys were combined and are shown on Fig. 19. Survey conditions were generally good. Low walls across the standard resolution areas could be traversed without causing significant inaccuracy. The larger stone banks around the enclosure were surveyed using a very slow traverse speed at high resolution.

The central enclosure (1) was shown to be roughly oval with internal dimensions of 25m x 28m. It is surrounded by a stony bank and there appears to be an entrance on the south-eastern side. A line of fairly evenly spaced anomalies along the western bank may indicate post-holes or a line of large stones. Similar anomalies can be seen elsewhere on the banks but these seem to be too regularly placed to be a random occurrence. The interior of the enclosure shows no clear signs of

habitation. A faint, roughly circular negative anomaly (2), *c*. 11m diameter, could indicate the remains of a roundhouse but it is too indistinct to allow definite interpretation.

The stone banks and walls elsewhere on the survey produced very clear anomalies with stronger positive anomalies on the uphill side, perhaps as a result of deposition of more magnetic soil or iron panning. The banks (3-6) delineate fields radiating from the central enclosure. The anomalies produced by these earthworks are generally well-defined, indicating good sub-surface preservation although the south-eastern side of the southern enclosure seems to be spread, perhaps as a result of ploughing or later stone dumping. Three clearance cairns produced slight anomalies (7-9), a similar anomaly (10) could indicate further stone dumping. Two linear anomalies (11-12) indicate trackways. Both appear to be relatively modern; the northernmost is still visible as a farm track. A linear anomaly (13), well defined at its eastern side, is difficult to interpret with certainty. It crosses the early field system and is probably relatively recent and is most likely to be the result of a trench containing an alkathene water pipe. Clear plough scarring with a 2.5m spacing can be seen across the western side of the site (14). The eastern limit of the ploughing is defined by the edges of the fields to the north-east and south-west of the enclosure. The western side clearly runs under the current (probably 19th century) field wall. The ploughing appears to cross the banks and continue across the enclosure suggesting it was associated with clearance and land improvement prior to the construction of the present field system. Part of the survey is masked by large ferrous anomalies produced by an electricity pole and its steel stay (15).

Discussion

The survey produced very clear results, showing the stone banks, cairns and trackways very clearly. There are only hints of activity inside the central enclosure with little of the magnetic enhancement often produced by the hearths and other activities associated with settlement sites. This could either indicate that it is either not a settlement site or that any settlement features have been cleared prior to Post-medieval ploughing.

Area 2, Muriau Gwyddelod (Figs 21 and 22)

An irregular area with maximum dimensions of 100m x 40m was surveyed. The area was crossed by low walls and was overgrown with small patches of gorse and brambles. The survey was carried out at high resolution (0.5m x 0.25m) using guide lines and a very slow traverse speed. Most of the obstacles could be climbed over and traverses could be stopped and restarted in order to survey up to both sides of gorse bushes. There are a few random readings where areas in the middle of bushes could not be accessed but these are small enough to be insignificant. The ground was stony and there appeared to be fairly shallow topsoil.

A large stony bank produced a clear anomaly (1) that was quieter than its surroundings, perhaps because it contained a higher proportion of earth, rather than stone. Two other anomalies corresponded to lower walls (2 and 3). The north-western half of a roundhouse also produced a clear anomaly with the spread wall showing as an area of increased noise (4) and the interior as a negative anomaly. Two very narrow linear and curvilinear anomalies (5 and 6) were detected at the south-western side of the survey. Unfortunately only a small part of the anomalies was detected because of the small survey area and interpretation would only be possible if the survey area was extended to allow the features to be seen in the context of the wider site.

The interior of the larger sub-circular enclosure produced no results (9), providing no support for the idea that this was originally a settlement area. However, there are later clearance cairns within the enclosure (Fig. 17) indicating that there were once other features there.

Elsewhere the survey was dominated by fairly high levels of noise (7 and 8) probably caused by high levels of stone in the topsoil. A quiet strip (10) between walls 2 and 3 could have been cleared of stones.

Discussion

The survey detected the features that are visible as upstanding earthworks and walls but provided little additional information. No further features were detected inside the circular enclosure. The survey detected other features well and there has been only limited clearance so it suggests that there are no features inside the enclosure and that it should be interpreted as a pen or yard.

TRIAL EXCAVATION

Fronhill field system

The area chosen for trial excavation was an area of fields attached to a possible settlement enclosure at Fronhill at the west side of the Muriau Gwyddelod. The main area of Muriau Gwyddelod, on the summit of the hill, has thin stony soils and no lynchetting, so seemed to have little environmental potential. It is also overgrown with scrub so was less suitable for geophysical survey, although one trial area was surveyed with great difficulty. The Fronhill enclosure, although still having well-preserved early boundaries, consists of open pasture so that geophysical survey could be carried out. The boundaries are also fairly substantial with some apparent lynchet development suggesting that they could preserve buried soils. Around the margins of the modern field there area also fragments of the early fields that are unlikely to have been affected by Post-medieval cultivation. The location chosen for the trial excavation was a boundary attached to and about 12m south-west of the central possible settlement enclosure (Fig. 23). This was a substantial stony boundary visible on the surface as a terrace over a metre in height with boulders protruding from its down slope face and topped by a distinct line of larger boulders with no obvious facing.

Excavation results

A trench 6m by 1.5m was excavated across the boundary. Removal of the overlying topsoil, which included a few loose small boulders, exposed a stony bank [4] (Figs 24a and 25a). This had a fairly distinct edge on the uphill side, a line of boulders (12) along its crest and a vague edge along its downhill side.

Excavation of the bank showed it to consist of a core of small angular and sub-angular stones lying on a fairly level surface and spreading down a slightly steeper slope that dipped to the west (Fig. 24, c-d). Larger sub-angular boulders had been added to the original core at a later stage in its existence. Some of the original smaller stones had been laid horizontally at the west, suggesting that the bank had originally been faced or at least deliberately edged on its west, downhill side.

Removal of the stony bank exposed a buried soil (14), *c*. 0.20m deep, of friable, mid-brown silt with a scatter of small stones. This buried soil extended down the slope beneath the stones of the bank but thinning out and ending at the foot of the slope. An equivalent horizon also extended to

the east into the field area beyond the bank, but was different in character, being much stonier, perhaps as a result of cultivation. However, this seemed surprising because a large ground-fast boulder protruded from the ground there (Fig. 24, a and b).

Removal of the buried soil (14) revealed a lower stratum of almost stone-free, buff-brown sub-soil (15) which contained a few pieces of charcoal. This layer was only present in the centre of the trench beneath the original part of the stony bank (Fig. 24b) suggesting that it once extended further and had only survived where it had been preserved by the bank. A piece of charcoal sample <3> from layer (15) was submitted for AMS radiocarbon dating, Cut into this layer was a small sub-circular pit [16] 0.40m dia. and 0.16m deep, the fill of which was dark and humic and contained a few pieces of charcoal. One of these, sample <11> was submitted for AMS radiocarbon dating. Lying on the base of the pit was a thin flat stone, possibly a pad-stone for a post. Although the pit was shallow for a post-hole it would have also been cut through the upper buried soil (14), where it would have been difficult to identify, making a total depth of at least 0.35m. Elsewhere, in the surface of the layer, were two other areas of darker soil, both quite shallow, and one linear [18], suggesting animal or root action.

A column sample for possible pollen analysis was taken from the buried soils (14) and (15) (Fig. 24 section, Sample <8>) and two smaller blocks for possible soil micromorphological analysis from (14) (Sample <7>) and from the junction of (14) and the cultivated soil at the foot of the bank at the west (Sample <10>).

Dating and Discussion

The excavation showed that the boundary consisted mainly of a bank of stones, to which, later in its life, larger boulders had been added, the latest and largest being those forming a line along the crest of the bank. Boulders had also been added to the forward slope of the bank. The original bank was fairly neatly constructed of smaller stones with rough facing and may have been supplemented or preceded by a line of timber posts. This parallels the results of the geophysical survey, which suggested that the central enclosure bank may also have been supplemented by a line of posts.

The bank overlay a buried soil that was dark and humic intermixed with a scatter of stones, suggesting that it may have been cultivated before the boundary was built.

The apparently distinct terrace of the boundary proved on excavation to be mainly illusory and made up largely of the difference in natural slope on either side of the boundary. However, it appeared that cultivation had cut into the slope a little at the down hill side of the bank, and the soil was thinner there, at 0.22m compared to 0.35m depth at the uphill side of the bank but there was no actual lynchet build-up of soil (Fig. 24 section d and 25b).

The buried soil showed that the soil cover in the area was once deeper, less stony and had developed over fine light brown silt, perhaps being a former cover of loessic silt. This soil profile was only preserved beneath the bank indicating that it had been destroyed by cultivation elsewhere within the fields.

The overall interpretation is that the fields were once cultivated, benefiting from an original soil of reasonable quality but that long term cultivation had reduced the soil quality bringing to the surface more and larger stones from the underlying glacial drift. The area is now used for permanent pasture.

The geophysical survey did not identify any cultivation features that respected the early fields and which might, therefore also be of the same early period. However, the geophysical survey did identify a major phase of Post-medieval cultivation represented by a series of furrows running across all the fields and enclosure and pre-dating the existing, probably early 19th century, field walls (Figs 19 and 20). This later Post-medieval cultivation phase would have erased any earlier cultivation evidence. Similarly the geophysical survey also suggested that settlement features within the central enclosure had been cleared or erased by this phase of agriculture.

The soil micromorphological analysis, by Dr Richard Macphail (Appendix 1), studied samples from the buried soil (14) Sample <7> and from the junction of the eroded buried soil (14) and lower topsoil (3) Sample <10>.

Sample <7> showed the buried soil to be a brown earth typical of the Post-glacial woodland soil and that it had not been cultivated. It was a good quality pasture/grassland soil but had been in the process of increasing soil acidity. Charcoal pieces in it were coarse rather than finely comminuted, which indicated that they derived from original clearance rather than subsequent manuring for instance.

Sample <10> came from the downhill side of the boundary, in the slight negative lynchet. It was hoped that this might show evidence of cultivation but in fact showed that the lower soil here had been subject to considerable animal trampling. The area is currently cattle pasture and this could have destroyed any evidence of earlier cultivation.

If the buried soil contains preserved pollen then analysis may provide information about the types of vegetation in the area at the time in which the boundary was built, and whether there were any agricultural activities nearby. The evidence that the buried soil had not been cultivated is itself significant.

It was hoped that the charcoal from beneath the boundary bank might derive from clearance at the time that the field system was created and so provide a date for its establishment. However, the dates proved to be much older and to derive from human activity in the area long before the fields began to be cultivated. The charcoal from the lower buried soil (15), sample <3> was identified as alder (*Alnus*) and produced a date of 3250 to 3100 Cal BC or 3360 to 3260 Cal BC at 95% probability (SUERC-33060). The charcoal from pit or post-hole [16] was identified as hazel (*Corylus*) and produced a date of 7190 to 7060 or 7300 to 7220 Cal BC at 95% probability (SUERC-33061).

The date from pit [16] is in the Early Mesolithic period, from which there is some sparse evidence of activity in that period in North Wales, but not locally (Jacobi 1980) although charcoal has been noted in sediments of that period (Chambers and Price 1988, 98). The presence of several pieces of charcoal in a probably artificially cut feature means that it may be a chance discovery of occupation, with no relevance to land use or the landscape, except to show the presence of hazel woodland. However, that date is much older than that from the buried soil (15) into which the feature was cut, so its interpretation is in doubt.

The date from the buried soil (15) falls in the Middle Neolithic, when chambered tombs were being built. There is a concentration of these tombs along the coastal slopes south of Harlech, indicating that this area was attractive for early agriculture and became a focus of settlement in that period. Excavation of the Iron Age settlement at Moel y Gerddi, in the uplands nearby identified some pits that showed evidence of Neolithic activity at about the same time as the date from the buried soil at the field system here (Kelly, 1988, 107 and 137-8). However, the buried

soil (15) was uncultivated and the wood of the charcoal from it was alder, which was unlikely to have been a part of the natural woodland on the stony and well-drained slopes here so is unlikely to have derived simply from burning for clearance to improve pasture, and its presence is open to interpretation.

9. ARCHAEOLOGICAL EVALUATION AND RESEARCH PRIORITIES

Introduction

Of the three field systems investigated, Braich y gornel was the most isolated and appeared to have the most potential for research in that it seems to consist of the complete 'infields' of a single farmstead. The farmstead would certainly have also used the adjoining hillsides for grazing as they are today. Although the complete fields survive because they lie beyond the modern fields the soils are very thin and the geophysical survey showed only tentative evidence of cultivation (Fig. 13). The poverty of the soils may explain why the area was never re-used. The other two areas on the other hand have clearly had some re-use in Medieval and Post-medieval times, with evidence of both settlement and boundary construction.

Methods

The project used a variety of techniques since simple excavation and observation is unlikely to further understanding of early agricultural features. Geophysical survey can detect sub-surface features, such as walls, ditches or pits. It can also detect faint but widespread features within the soil itself, deriving from cultivation. Such features are unlikely to be detected by excavation. Detailed study of soil micromorphology can give information about soil structure and past land-use, not observable by normal excavation recording. The greatest problem is in locating soils that have been preserved and that are dateable, in themselves or by context. At the three field systems studied it was possible to find soils that had been buried by early boundary construction, but not soils that were contemporary with the early fields themselves. High resolution gridded soil sampling within early fields for analysis of phosphates and magnetic susceptibility has been shown to be successful in distinguishing differences between fields, probably resulting from different levels of maddening, or differences in land use, e.g. at the Iron Age field system at Dainton, Devon (Clarke 1990, 112-14). This technique was not used for the present project because the results are only useful when applied on a large scale and analysis is expensive.

The primary aims here were to look at the physical form of the boundaries and soils and to investigate the date and environmental background to the formation of the fields. This used a multi-facetted approach with a variety of techniques comprising ground survey, geophysical survey, excavation, soil micromorphology and pollen analysis. Ideally this should also be accompanied by study and dating of the actual settlement associated with the field system. Unfortunately the work must rely on typological comparison of the settlement features but this may be backed up by radiocarbon dates from the field boundaries and of the background environmental sequence shown by pollen from peat cores.

Geophysical survey general discussion, by David Hopewell

This programme of geophysical survey was designed to investigate the usefulness of fluxgate gradiometer survey in assessing prehistoric field systems. In most cases features visible as earthworks or walls produced clear anomalies that sometimes revealed additional structural information. The survey also revealed buried features such as earlier phases of boundaries,

settlement sites and various phases of ploughing. Surveys covering larger areas were shown to be particularly effective. Large surveys tend to reveal a larger range of features and also reveal complete features. This allows better interpretation and provides a well integrated survey including all the elements of a field system including associated settlement. This approach proved to be very effective in the Roman Fort Environs Project (Hopewell 2005) where surveys including the forts and all associated extra-mural features provided a great deal of new information about all the sites examined. Small targeted surveys tended to miss features that were not in easily predictable positions and did not produce a clear picture of the wider military landscape.

A recommended outline methodology for gradiometer survey of prehistoric field systems can be proposed as a result of this project. It is usually advisable to survey a small test area in order to assess the quality of results that can be expected from a larger survey. Results can be very variable and depend on many factors including the local geology and levels of magnetic material in the soil. If the test area produces acceptable results, the entire field system, or at least a significant sample in the case of very extensive sites, should be surveyed. This should include, where possible, associated settlement, and a wide range of features in order to provide comparative and contextual information. The initial survey should be carried out at standard resolution i.e. at traverse interval of 1.0m and a sample interval of 0.5 or 0.25m. This can be followed by targeted high resolution survey at 0.5 x 0.25m, in areas such as settlements, where more detail is required. High resolution survey could also provide more information about areas of possible early cultivation marks.

Dating of the field systems

There have been no excavations at the settlement associated with the field system at Cwm Cilio. The settlement features include a number of scattered round houses, a sub-rectangular enclosed settlement with round-houses and a larger sub-rectangular enclosure containing a probable rectangular platform house. The field system lies at the foot of a hill on which is a hillfort (Pen-y-gaer). These settlement features suggest a sequence of possibly Middle Iron Age Hillfort with outlying scattered settlement followed by a Late Iron Age-Romano-British nucleated enclosed settlement, followed by a Medieval platform house settlement. The radiocarbon dates from the soil buried beneath excavated field boundary were from the later Mesolithic and the Early Bronze Age periods and so believed to derive from much earlier episodes of woodland clearance, so have no bearing on the dating or interpretation of the field system.

Although a good part of the central settlement at Braich y Gornel has been excavated, it produced no artefactual dating evidence and was carried out before radiocarbon dating was available (Gresham 1972). The lack of Romano-British material from the nucleated part of the settlement suggests a pre-Roman date and by type it should be Late Iron Age. The larger outlying round-house would be expected to precede the nucleated settlement and perhaps be of Middle Iron Age date. The only radiocarbon date obtained as part of the current project came from a soil that must belong with the use of the fields but was of the Middle Bronze Age and interpreted as a relic of earlier activity on the hillside.

There have been no excavations at Muriau Gwyddelod, apart from the present work, and no chance finds, so interpretation and dating must rely on comparative evidence. The extensive relict landscape is typified by sub-circular enclosed hut circle settlement and two of these within 5km have previously been excavated (Kelly 1988). Both began as timber-walled houses, later replaced in stone and both were occupied around the middle of the first millennium BC. The one closest to Muriau Gwyddelod, called Erw-wen began somewhat earlier and occupation ceased by the

middle of the first millennium BC. The other, Moel y Gerddi, at a slightly higher altitude, continued until about the 4th century BC. The two sub-circular enclosures at Muriau Gwyddelod, together with those at Fronhill and Groes Las are similar in form to Erw-wen and Moel y Gerddi. The closest in form are the northern enclosure at Muriau Gwyddelod and that at Groes Las, which have central roundhouses with concentric enclosures. The two enclosures without visible roundhouses, at Muriau Gwyddelod and Fronhill could have been concentric enclosures that had only a central timber roundhouse, which would not be easily detectable by geophysical survey. However, the evidence is that these enclosures were later cleared and re-used. At Fronhill, there is ground evidence of terracing into the slope within the enclosure and slight geophysical evidence suggests at least one off-centre round house (Fig. 20). The two radiocarbon dates from the excavation of the boundary at Fronhill were from the earlier Mesolithic and the Middle Neolithic periods and so derived from earlier activity unrelated to the field system and of no assistance in interpretation.

The main, central settlement at Muriau Gwyddelod consists of two small nucleated settlements or homesteads attached to a larger sub-circular enclosure. On comparative evidence it is likely that the larger enclosure, the interior of which is terraced level, was an original concentric enclosure with a central roundhouse and that this was later replaced by the two smaller courtyard house- type homesteads. This would fit with the general lay-out of the surrounding fields/paddocks, the pattern of which is focussed on the larger enclosure, being concentric to it and radiating from it. Some features have been cleared from the interior of the large enclosure, shown by the presence there of several clearance cairns. This may explain why the geophysical survey did not provide any evidence of internal features (Figs 21 and 22).

Cultivation methods

The influence of different cultivation methods, whether hoe, ard or mouldboard plough is generally regarded as reflected in the size and shape of early fields. The project hoped to find some evidence of early cultivation features by geophysical survey or by excavation but such features proved elusive. No early cultivation features were identified by geophysical survey at Cwm Cilio or Muriau Gwyddelod, probably because of Post-medieval re-use, and only very tentative ones at Braich y Gornel, where there had probably been no subsequent cultivation but where later stock trampling appears to have disaggregated soils. It also proved difficult to find any areas of undisturbed relict cultivated soil and future work might target excavation of clearance cairns for buried soils.

Boundaries and lynchets

The study has highlighted the insubstantiality of early boundaries and the fact that they are not in any way ‘walls’ like modern field boundaries, designed to enclose or exclude stock. At Braich y Gornel the boundaries were very insubstantial lines of boulders, too slight to seal any buried soil horizon. At Muriau Gwyddelod and Cwm Cilio they were more substantial and deliberate stony banks that sealed earlier buried soils of quite good quality. At Fronhill Muriau Gwyddelod, the boundary was possibly preceded by or enhanced by timber posts. Both the latter boundaries could have supported hedgerows that could have made them stock-proof but this is difficult to prove by excavation and deserves targeted research (Robinson 1978).

At Cwm Cilio, the excavated boundary line appears to have been created initially by dumping of subsoil, perhaps by excavation of a quarry ditch, although no ditch was found in the area excavated. This indicates that the boundary had been deliberately laid out, rather than being simply a dumping area for clearance stones. At Fronhill Muriau Gwyddelod the initial boundary

was a built stony bank, not just a stone dump. At Fronhill Muriau Gwyddelod and Cwm Cilio the banks later grew considerably by addition of more clearance stone. At Cwm Cilio this was fairly continuous and done in a fairly structured way, although not properly faced. At Fronhill Muriau Gwyddelod there was a phase of addition of larger stones, probably from a period of later re-use, when the soils had been depleted and perhaps associated with the large clearance cairns within the fields. This phase is likely to be Post-medieval. The geophysical survey at Cwm Cilio indicated that all the early boundaries had considerable stone banks within them, even where they are now only visible as grassed-over terraces (Fig. 5). The quantity of stone in the narrow trench excavated at Cwm Cilio was considerable. The trench was 1.4m wide, the bank 2.4m wide and estimated to originally have been c. 1m high, from the amount of collapsed stone. Using the standard constructional weight for granite gravel, less an expansion factor of 0.6 gives a weight of 4.3 metric tonnes. This shows how many thousands of tons of stone there were present in the early field boundaries, representing material cleared from the fields and comprising considerably more than would be present if the boundaries were relatively narrow walls as those today.

Field terracing is present to some extent in all three field systems but it is unclear from the evidence whether any should be classed as 'lynchets', which assumes that they were created by movement of plough soil during long cultivation. The origin and interpretation of lynchets is not yet understood (Fowler 2002). Traces of terracing often survive within modern fields, providing a record of an earlier field pattern, as is the case at Cwm Cilio (Fig. 3). At Braich y Gornel the fields lie on a substantial slope and have not been affected by later cultivation but there is only very slight terracing. At both Muriau Gwyddelod and Cwm Cilio terracing behind boundaries could be seen but survey and excavation showed it to be actually quite minimal. At Cwm Cilio the contour terrace above the excavation trench is 2m high when seen from below, but this is mainly a result of the natural slope (Fig. 8). The terrace was not excavated because it seemed too large a feature to investigate in the time available, but that might have been a wrong estimation.

Soil study

The micromorphological analysis of the soils provided new information about the history of land-use and interpretation of the features (Macphail, Appendix 1). At Cwm Cilio the soil profile in Trench 3, where it was protected from modern cultivation in a negative lynchet, lay over a truncated subsoil, indicating cultivation before the construction of the adjacent Post-medieval wall. This latest 'pre-modern' cultivation was probably of medieval or early post-medieval date, associated with the platform house enclosure. The soil profile in this trench contrasts sharply with the soil buried by the nearby early boundary bank in Trench 1. This buried soil was identified as a cultivated soil including plough-eroded colluvium. The soil included some fine charcoal, possibly a relic of primary clearance. Although this cross-contour boundary can be considered one of the primary elements of the field system the radiocarbon dates from the soil buried beneath it indicate probable clearance during both the later Mesolithic period and the Early Bronze Age. It seems most likely that these dates refer to opening up of the woodland cover just to improve grazing potential for wild herds in the Mesolithic period and for domestic stock in the Bronze Age. The date of the initial cultivation beneath the boundary is not, therefore, established. A date in the middle of the first millennium seems likely, associated with scattered unenclosed settlement. It is suggested that the stone-banked boundaries were not laid out until later, when increasing intensity of cultivation began to expose greater quantities of stones that needed to be disposed of. The geophysical survey showed clearly that this boundary continued further upslope within the field defined chiefly by the contour terrace above. This suggested that the contour terrace developed as an even later element of the field system, perhaps a result of medieval ploughing (Fig. 5). Overall the micromorphology report concluded that the location of the field system at Cwm Cilio was

carefully chosen as an area of better-drained and less acid soils than the predominant local soils but that they had deteriorated under later pasture use.

At Braich y Gornel the micromorphological study showed that soils both upslope and downslope from the excavated boundary were thin, stony and acidic with some manganese and iron panning (Fig. 14). The upslope soil within the field was well-mixed by microfauna which might have masked the evidence but the excavation showed no physical evidence of cultivation in the form of plough furrows or lynchet development. It is difficult to see why such regular fields should have been laid out if not for cultivation and the geophysical survey did show hints of possible cultivation parallel to the contours (Fig. 13). The occupation here was not short lived if the interpretation of the settlement is correct, as discussed above.

The fields at Fronhill Muriau Gwyddelod are different from those at the other two field systems in that they are partly curvilinear in shape. They also occupy a slighter slope although some terracing is present. The stony bank in the terrace investigated covered a substantial early soil of good agricultural quality that showed evidence of being pasture grassland and with charcoal fragments possibly derived from primary clearance. The lack of evidence of cultivation before the boundary was built suggests that the field system belonged to primary occupation here and so, perhaps of an early date, a question that might be answered by the radiocarbon dating. Sampling in the negative lynchet below the boundary showed that the relatively shallow soil there had been modified by cattle trampling, likely to of recent or at least modern date. Similarly the geophysical survey showed a major phase of ploughing over the whole area that preceded the walls of the rectilinear element of the existing fields and which could have removed any earlier cultivation traces (Fig. 19). This phase of ploughing was perhaps one of general breaking of the ground prior to stone clearance and new wall building in the early 19th century. It was confined to the areas where the strictly rectangular fields were created, leaving other areas, including the fields and central Muriau Gwyddelod settlement intact, as shown by the geophysical survey there (Fig. 21).

The 19th C phase of clearance and ploughing at Fronhill Muriau Gwyddelod meant that much of the archaeological potential of the fields had been destroyed except for any areas that might have been protected beneath earthworks, such as the boundary banks. The identification of such buried soils is essential to future investigation and should form part of any evaluation where an earthwork is present. If these three of the best preserved field systems of Iron Age type are difficult to investigate then it will be much more difficult to locate and study any fields of Bronze Age or Neolithic date.

Environmental study

A longer timescale view of environmental changes and possibly of human influences can be obtained by means of pollen analysis of peat cores, presuming significant peat deposits can be found close to any particular area of interest. Cores have been taken close to Braich y Gornel and Cwm Cilio and the information will be discussed when analysis is complete. For Fronhill, at lower altitude, there is no peat close by, but a column from 4km to the north-east has been studied as part of the previous excavations at the settlements of Erw-wen and Moel y Gerddi, described above. The core was taken from peat close to Moel y Gerddi, the higher of the two settlements, with no associated fields, and thought to have an economy based on stock raising. The core then cannot be expected to throw any light on nearby cultivation, but does give an overview of the general environment from the Mesolithic period (*c*. 8700bp) onwards and shows the widespread clearance of the early, dominant woodland by the 2nd millennium BC, suggesting that there was extensive stock grazing and depletion of wood resources (Chambers and Price 1988). Some localised environmental information was also obtained from pollen from buried soils at both

settlements. That from Erw-wen is most relevant to Muriau Gwyddelod because it is at a lower altitude, *c*. 265m OD, than Moel y Gerddi, although still higher than Muriau Gwyddelod, but in a similar topographic position on the west-facing coastal slopes and within a similar terraced field system.

A sample from the soil beneath the Erw-wen enclosure bank (and therefore pre- *c*. 614BC) indicated a well-wooded environment. A sample from colluvium within the enclosure (and therefore centred on *c*. 614BC) produced macrofossils of the cereals wheat and barley, as well as corn spurrey, a weed of cultivation as well as cereal pollen. Occupation at Erw-wen did not continue into the second half of the first millennium BC, although it seems likely that Muriau Gwyddelod was occupied at that time. Erw-wen lies on a steeper slope than Muriau Gwyddelod and perhaps its arable potential had declined leading to abandonment. The soil beneath the bank at Fronhill, like that at Erw-wen showed a wooded environment and the lack of evidence of cultivation could mean that the bank was created as early as the Erw-wen enclosure. It can be suggested that the larger enclosure at Muriau Gwyddelod and the possible settlement enclosure at Fronhill were both originally settlements of similar type to Erw-wen, with single large roundhouses, later replaced by smaller houses of courtyard type. This could be investigated by excavation of one of the walls of the Muriau Gwyddelod courtyard houses to see if there is a buried soil and if so if it indicates an earlier phase of occupation.

10. ARCHAEOLOGICAL SURVIVAL, LAND USE AND MANAGEMENT

Monument value

All three of these areas are protected as Scheduled Ancient Monuments although at Cwm Cilio, the protected area only covers the settlement and the immediately adjoining part of the field system. There is also some continuation of field boundaries beyond the protected areas at Braich y Gornel and Muriau Gwyddelod. The reason that these areas are recognised as important and are protected is that they are extensive and complete examples with good survival. The reason they survive well is because they lie in marginal areas and have escaped modern clearance, improvement and cultivation. In that respect they comprise some of the best examples of prehistoric fields systems in north-west Wales and it is worth considering their condition and future management, given that present agricultural land use will continue.

The fieldwork showed that, while extensive features survive in the form of boundaries and terraces, the fields themselves have been affected by Post-medieval land-use, reducing their potential for research. The greatest potential lies in areas where soils and land surfaces survive, mainly beneath boundaries. Elsewhere, then, in terms of research value even quite small areas of survival might be vital and need to be identified, for instance where soils or features have been buried by later earthworks, colluvium or sand-blows.

In terms of public value the main asset of these field systems is the visible evidence, as examples that can be seen by a visit or on aerial photographs. Unlike monuments that comprise distinct individual features, such as burial mounds or buildings, fields are extensive and can only be properly appreciated if demonstrated on a plan or an aerial photograph provided on a leaflet, guide book or interpretation panel.

Land use

All three of these areas survive in areas presently used for solely for pasture, including sheep and cattle at Cwm Cilio and Muriau Gwyddelod and sheep only at Braich y Gornel.

The Braich y Gornel fields lie in unimproved but well-grazed grassland with no scrub growth although some drainage ditching has taken place just below the hillside on which the field system lies. The stability of the site is attested by the survival of the hut walls excavated by Bersu, 60 years ago, and even of the spoil heaps from the excavation. Future changes could occur if cattle or ponies were allowed to graze the open land, which would undoubtedly cause damage. On the other hand if sheep stocking density falls then gorse and other scrub could spread and that would first develop around the settlement features, which form the most sensitive part of the site.

Cwm Cilio is one of the most isolated farms in its area, occupying the head of a small valley on the edge of upland, with a quite small area of enclosed pasture and dependent on a large area of mountain pasture. The early fields survive because the farm has not been modernised and the land has not been improved by, for instance clearance of boundaries to enlarge fields or by new cultivation and re-seeding, as has happened on the nearby farm of Cwm Coryn. Cwm Cilio is essentially the same as it has been since before the introduction of mechanised farming, with a system of infield and outfield, the field walls maintained and the infield pasture fertilised by muck-spreading from winter cattle yards. Sadly the farmer has recently died and it is possible that land use might change in future. The scheduled area contains only a small part of the early field system, along with the main settlement areas, but the geophysical survey, and field survey has shown that there are a number of other scattered roundhouse sites outside the protected area that could be vulnerable if new ploughing is carried out. The scheduled area itself has no management issues and is fairly stable with little development of scrub because of intensive sheep grazing during winter pasture.

The field system at Muriau Gwyddelod (Me10) is quite different in nature and has different problems from the other two areas. It is in a different topographic position, covers a much larger area and includes several prehistoric settlements. It is also in four ownerships and so has areas of different types of land use. Generally all of it is pasture, some used for sheep and some for cattle, but the condition of the pasture and the type of vegetation varies considerably (Fig. 27). The largest ownership block (A) includes the main Muriau Gwyddelod settlement with a complex of small fields with boulder-walled boundaries that have prevented modern mechanised grassland management. It has been grazed lightly by cattle and this has led to extensive scrub growth over the last forty years. Early aerial photographs compared to more recent (Fig. 26 a and b) show that the area was once more open, probably because of more intensive sheep grazing and use of traditional scrub management by seasonal burning. This ownership block includes the area to the south of the road, which has become covered by almost impenetrable gorse scrub, with very little grass pasture left. It also includes the fields to the west, within which is the Fronhill possible settlement and field system (Me158). This consists of partially improved grassland with some scrub growth in areas of boulder field and clearance stone dumping. The latter, and the presence of clearance cairns, shows that the area has been ploughed in the past.

The second largest ownership area (B) includes several early fields and boundaries and two settlement enclosures. This area is used for non-intensive sheep pasture and has become gradually over-run by bracken with some areas of scrub growth over more stony areas that include the settlement sites and areas of uncleared boulder-field.

The other two ownership areas are smaller (C and D). Area D contains a number of early boulder-walled fields but the ground is open and has been well-cleared in the past, apart from the early boundaries and has quite good pasture. This area belongs to a farm that for many years was run with minimal modern improvements, allowing the survival of many early features, but is now in new ownership and likely to see extensive changes in management. The area of early fields was becoming over-run by bracken but this is beginning to be controlled by tractor-mounted pasture-topping. If this is carried out with respect for the early boundaries it will improve their visibility and prevent bracken and scrub growth that could otherwise threaten their long term survival.

The final area, E, to the north-east consist largely of land that has been well-cleared in the past, with very few early features surviving. The land is used for quite intensive cattle pasture with on-site supplementary winter feeding. Management is made difficult because part of the fields lie within the scheduled area and part outside it. The archaeological potential and the presentation value of this area are both low.

There is another scheduled area of archaeological interest that is part of the same relict landscape but is not physically connected to the Muriau Gwyddelod field system. This is at Groes Las, to the north-west, where there is an Iron Age type settlement enclosure, with some associated field boundaries (Me95). This has become over-run with bracken, which is being controlled by tractor-mounted pasture-topping, respecting the early features (Fig. 28a).

Conservation Management

Where there is no current deterioration of archaeological features, as at Cwm Cilio and Braich y Gornel, then the areas are stable unless there is a change of use and only monitoring is needed. Braich y Gornel lies in open pasture but not crossed by any PROW and is not in Access land, so public visiting and appreciation is not possible. Provision of a permissive path might be agreed if the land became part of an agri-environment scheme.

The Cwm Clio field system lies in enclosed pasture but a public footpath crosses its southern edge. Just beyond the field system is upland, which is Access land, which contains the hillfort of Pen-y-gaer to which the settlement and field system must be related. It would be highly desirable to try to create a permissive path connecting the public footpath to the Access land, allowing appreciation of the field system and its settlements.

At Muriau Gwyddelod, there is deterioration, although at present this is mainly in the form of reduction of visibility through dense bracken and scrub growth. However, eventually the scrub will cause physical damage through root growth and the denser it gets the harder it will be to remove without damaging the archaeological remains. The dense scrub also forces the cattle to follow ever narrower paths through the area, causing localised trample damage to features crossed. Also, the archaeological features are gradually becoming masked by vegetation making any public appreciation difficult. The ground survey was not as complete as it should have been because of the scrub cover and only a small area could be found that was open enough for the geophysical survey and that with great difficulty (Figs 21 and 22). In fields 2-5 and 7-8 of Me10 and in field 12 (Me158) it is possible to control bracken and scrub growth by tractor-drawn pasture topping and that should be a normal part of pasture management. The two areas of the settlements in field 9 however, need more time-consuming and expensive cutting by hand and this would need some financial support. In fields 1, 6, 10 and 11 the scrub growth is extensive and need a major programme of clearance and continuing maintenance. Most of these areas cannot be easily accessed by tractor without damaging archaeological features but some could be cleared using a quad-bike towed pasture-topper, a newly available machine that is light and can

move over early banks without causing damage (Fig. 28b). Growth over complex areas of structures, like the medieval long-huts and the prehistoric settlement would need cutting by hand. A programme of maintenance of scrub and bracken growth is needed. This could be done in phases, staring with the central area of prehistoric settlement, where blackthorn is also starting to take hold, causing even greater problems. Other methods of control, such as burning or herbicide spraying are not acceptable archaeologically or environmentally. Machine pulling of scrub roots is not acceptable archaeologically because it would damage the early features. Cutting, followed by pin-point application of non-residual herbicide to cut stems to prevent re-growth might be acceptable. However, areas of rare grassland plants have been identified by CCW so long term maintenance of the grass pasture is therefore needed without chemical use and this could be best maintained by grazing sheep, rather than cattle.

Management at Muriau Gwyddelod could also try to make provision for public access and appreciation. The site lies in a wider area of visitor attraction, especially for walking and with historic and prehistoric interest, including the castle at Harlech and a hillfort, standing stones and burial cairns at Moel Goedog, to the north-east. The Muriau Gwyddelod area is crossed by two PROWs and is bisected by a small road. The two lower settlements are passed closely by a PROW that connects through to Harlech and is part of a publicised circular walk route. If the appearance of the settlements was improved they could become recognised features on the walk itinerary. Similarly the central settlement area and fields could be a feature of significant visitor interest if access could be agreed from the PROW that starts at the minor road on its south side. The features are so complex that it would be suitable to provide an interpretation panel. The provision of a panel might also include information about the nature conservation and the wider area and so might be supported by CCW or the SNPA.

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APPENDIX 1

SOIL MICROMORPHOLOGY
by Dr Richard Macphail

APPENDIX 2

Preliminary Palaeo-environmental results

By Astrid Caseldine

The North West Wales Early Fields Project: Preliminary Palaeo-environmental Results

Astrid Caseldine

Preliminary pollen analysis has been undertaken on buried soil samples from Cwm Cilio, Braich y Gornel and Muriau Gwyddelod. In addition preliminary work has been undertaken on pollen samples from peat cores taken at Cwm Cilio and Braich y Gornel. Charcoal has been identified from all three sites and bulk samples from Cwm Cilio and Muriau Gwyddelod have been processed and sorted for plant macrofossil remains but, unfortunately, failed to produce anything identifiable apart from wood charcoal.

Cwm Cilio

Pollen from the buried soil was scarce with *Quercus* and *Corylus* pollen dominating, suggesting oak and hazel woodland in the area. There is also some evidence for alder and birch woodland. Poaceae pollen was quite frequent, reflecting grassland. Heather pollen was noted in the top sample, indicating heathland, but was rare. Charcoal was present in the samples.

Alnus pollen was much more strongly represented in the pollen record from the peat cores, particularly in the lowest levels, indicating local alder woodland. Birch, oak and hazel woodland was also suggested. The absence of *Ulmus* pollen in the basal levels suggests the cores from Cwm Cilio post date the 'elm decline' and the presence of weed taxa, notably *Plantago lanceolata*, appears to confirm this. Higher up the profile Poaceae and other herbaceous taxa increase while arboreal pollen decreases, reflecting increased clearance. It is intended that radiocarbon dates will be obtained to date the commencement of peat growth and later vegetation changes.

A fragment of *Corylus* charcoal was identified from the old topsoil buried by the early field bank and gave a date of 3505±30 BP (SUERC-33062). *Quercus* charcoal identified from a similar context gave a date of 6135±30 BP (SUERC-33063).

Braich y Gornel

Pollen was more plentiful in the soil sample from Braich y Gornel. The pollen record was dominated by Poaceae pollen and other herbaceous taxa, indicating an open grassland environment. Charcoal was present.

The pollen record from a peat core at Braich y Gornel again suggests that the pollen record commenced after the 'elm decline'. *Ulmus* pollen is absent and *Plantago lanceolata* pollen is present in the basal level. *Alnus* and *Corylus* pollen is quite frequent, reflecting alder woodland growing on wetter ground in the area and hazel woodland on the drier slopes. Noticeable amounts of Poaceae pollen and the presence of *Plantago lanceolata* indicate that some clearance has already taken place in the area and grassland established. An increase in Poaceae pollen and other herb taxa and decline in arboreal pollen indicates extensive clearance. Again, radiocarbon dates will be obtained to date the beginning of peat growth and later vegetation changes.

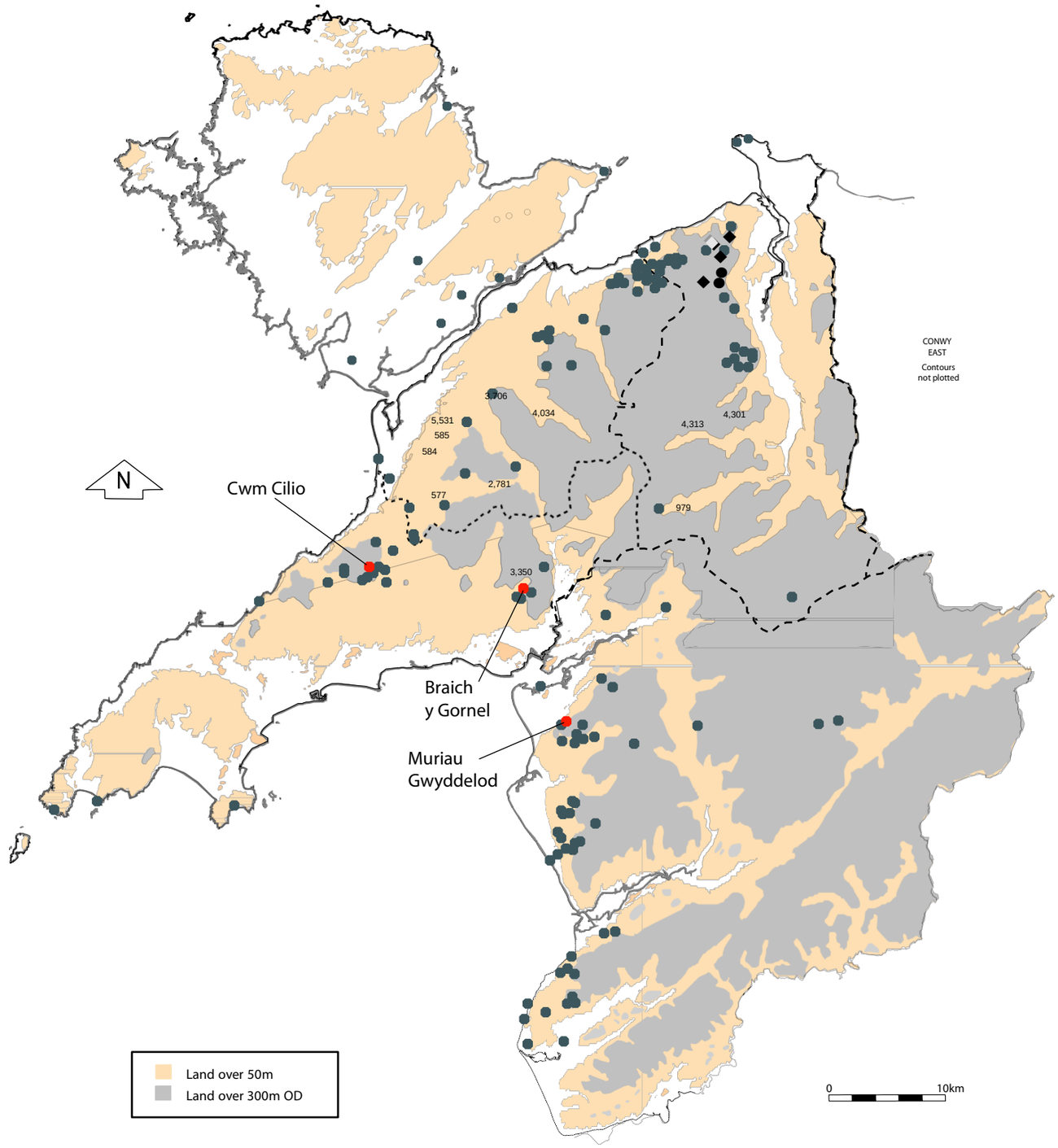
A piece of *Quercus* charcoal was identified from the old land surface and gave a date of 2970±30 BP (SUERC-33059).

Muriau Gwyddelod

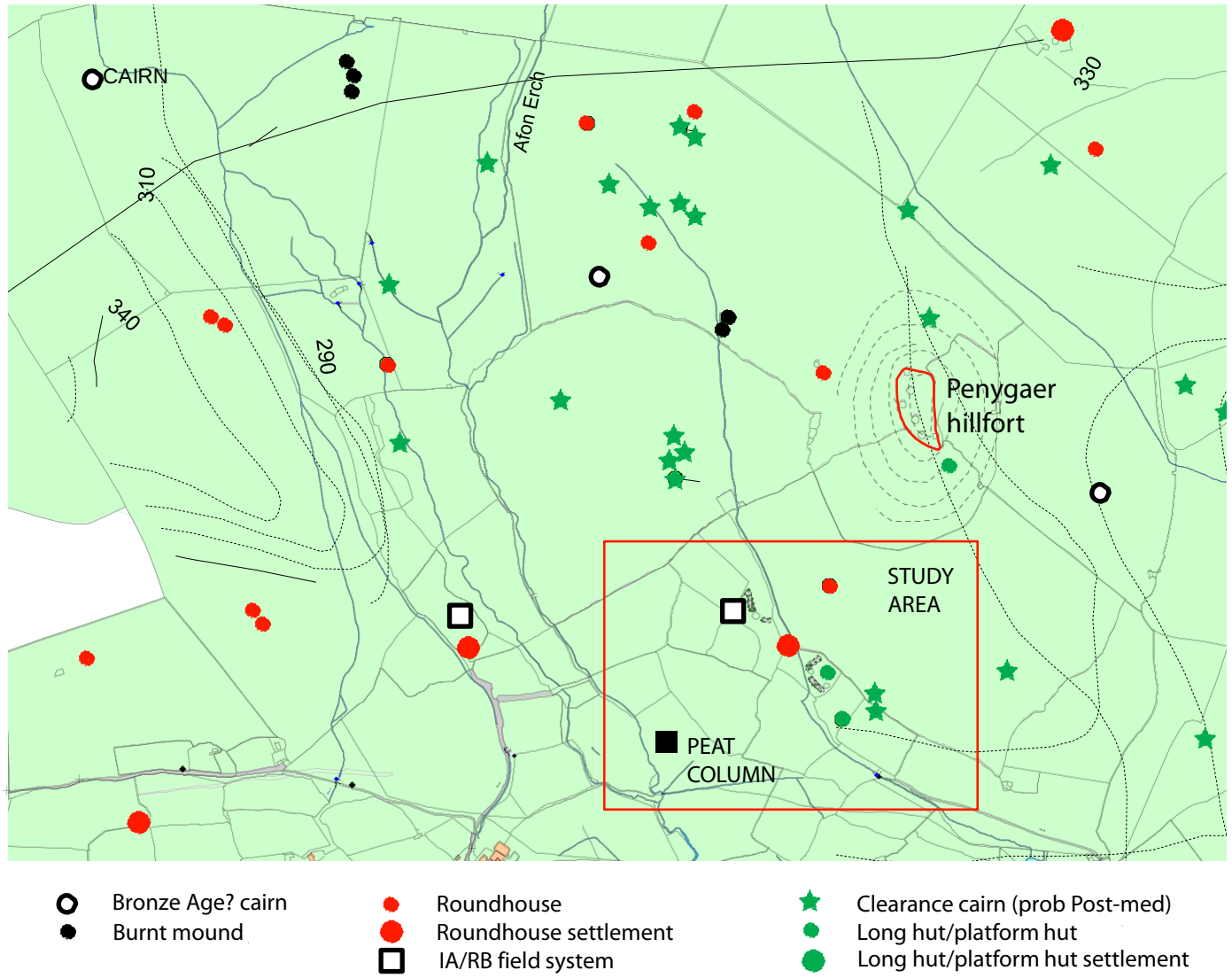
Pollen was quite scarce in the buried soil with *Quercus*, Poaceae and *Corylus* pollen dominating the determinable pollen, suggesting oak and hazel woodland with grassland in the area. Charcoal was present.

Alnus charcoal was identified from the probable old topsoil buried by the early field bank and gave a date of 4525±30 BP (SUERC-33060), while *Corylus* charcoal identified from the fill of a possible post-hole buried beneath the early field bank gave a date of 8155±30 BP (SUERC-33061). In addition a fragment of *Quercus* was identified from the buried soil and a fragment of *Alnus*, 4 very small fragments of *Corylus* and 3 fragments possibly of *Quercus* were identified from the possible post-hole fill.

APPENDIX 4 RADIOCARBON DATING

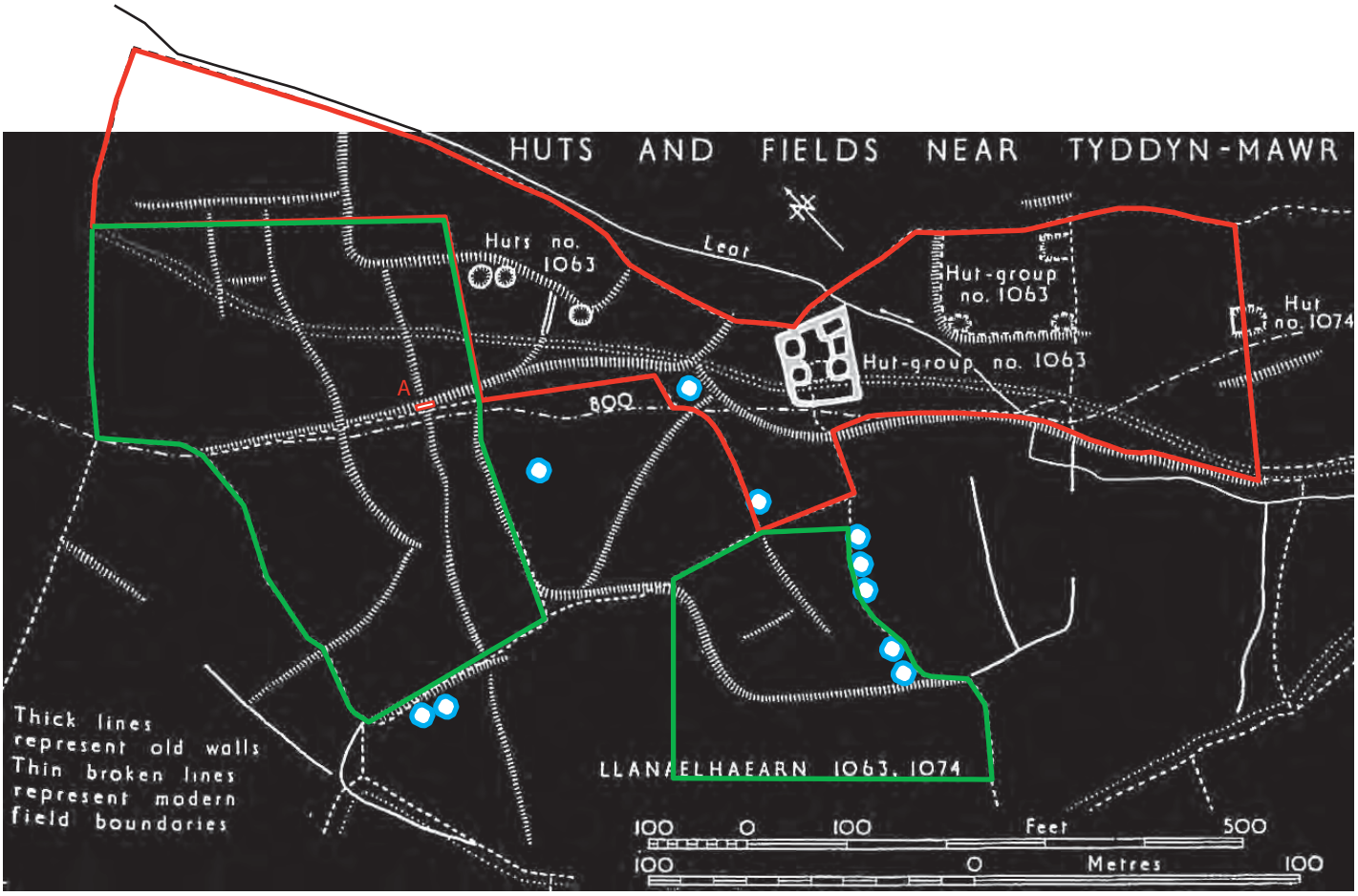


G2077 Fig. 1 The location of the study areas and the distribution of field systems recorded on the Gwynedd HER



G2077 Fig. 2 Cwm Cilio: Location of the study area and of peat sampling

G2077 Fig. 3 Cwm Cilio: Settlement and field system, from the north-west.
Aerial phorograph by Toby Driver. Copyright RCAHMW

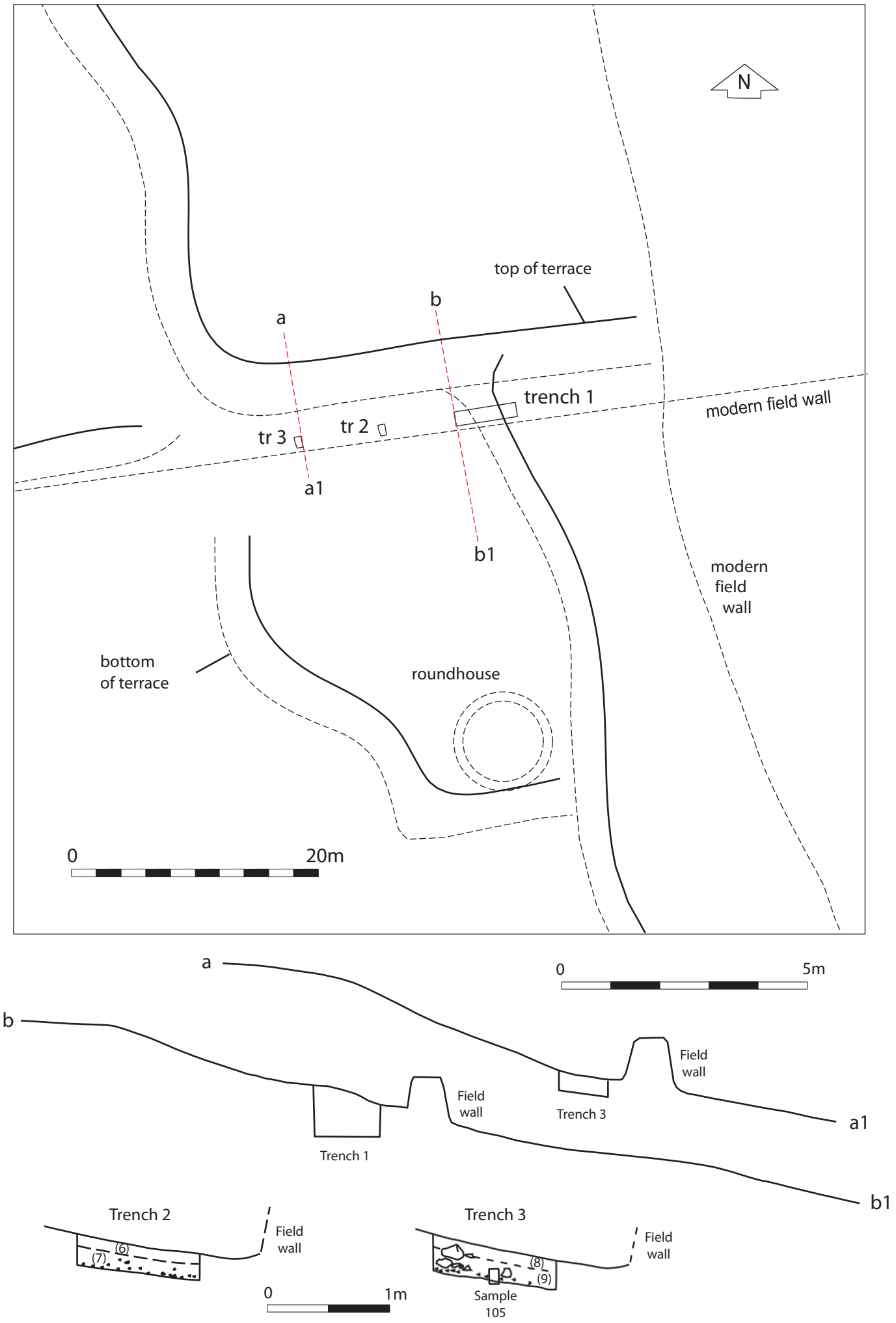


G2077 Fig. 4 Cwm Cilio, Llanaelhaearn, SAM Cn112, PRN 12941
Plan of the field system by RCAHMW (1960),
showing the location of the excavation (A), outline of the geophysical survey areas (Green), probable new roundhouse sites from walkover survey (Blue) and outline of the scheduled area (Red)

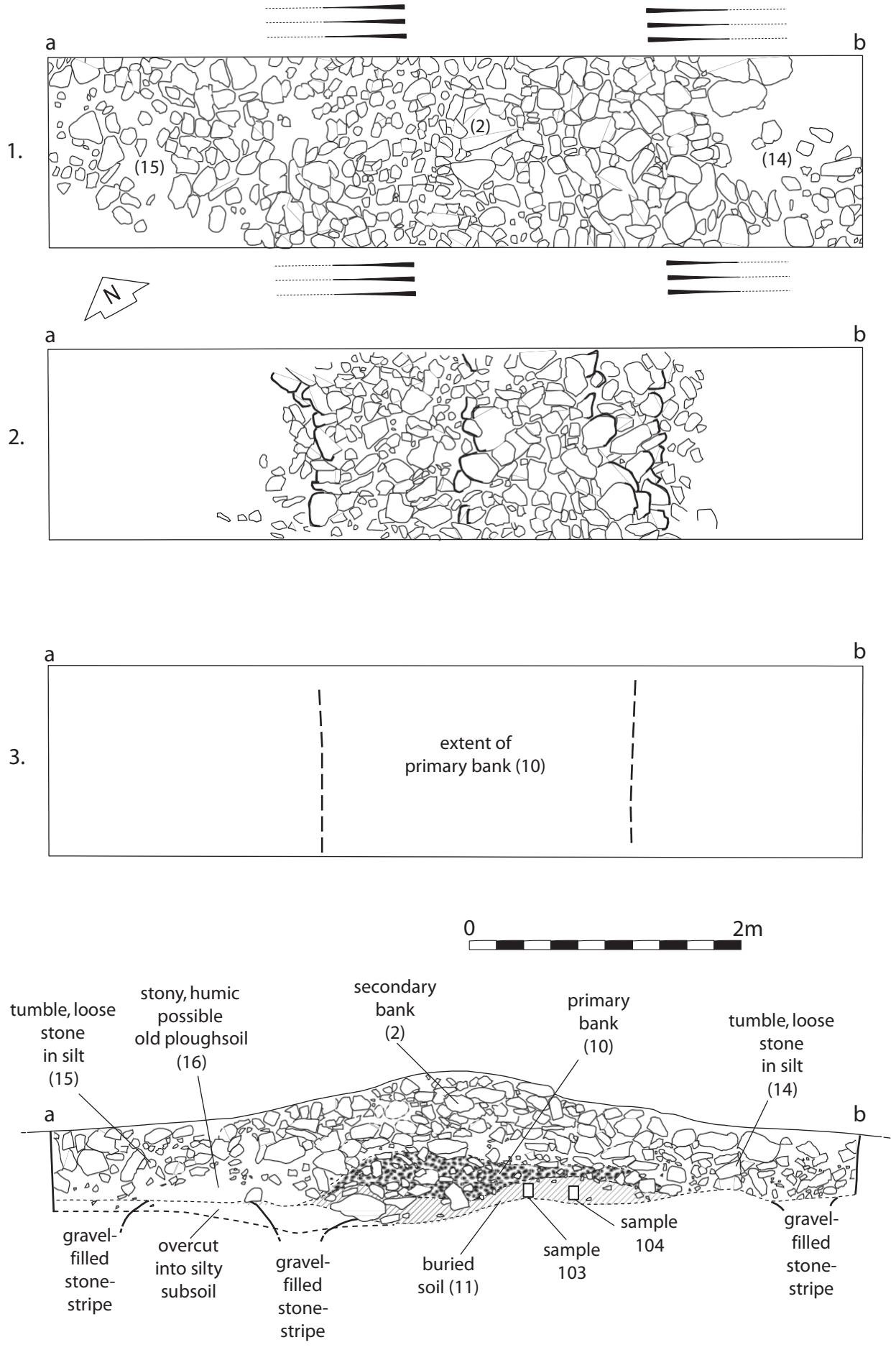
G2077 Fig. 5 Cwm Cilio: Gradiometer survey - Grey-scale plot

Fig. 6 Cwm Cilio Fluxgate gradiometer survey Interpretation

G2077 Fig. 6 Cwm Cilio: Fluxgate gradiometer survey, Interpretation



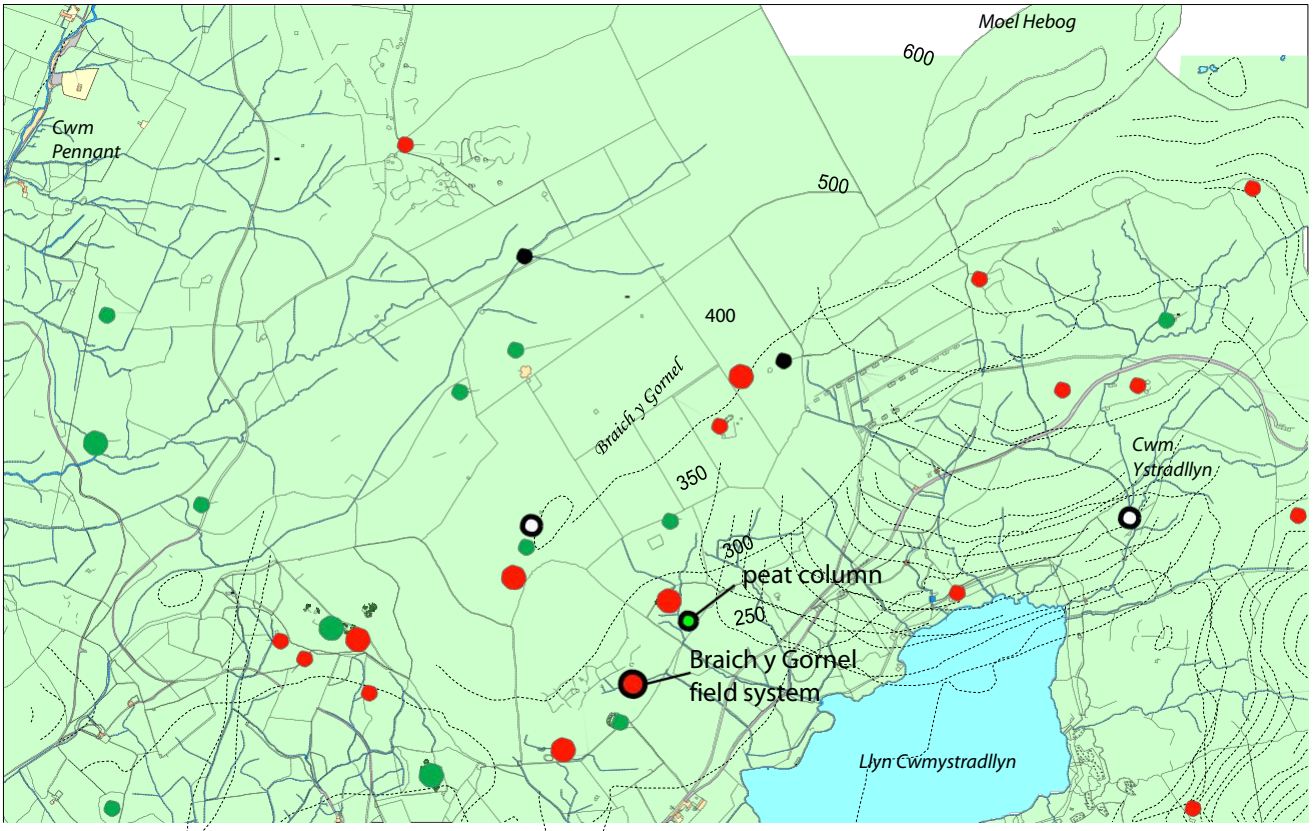
G2077 Fig. 7 Cwm Cilio: Location of excavated area, field terrace profiles and trial pit sections



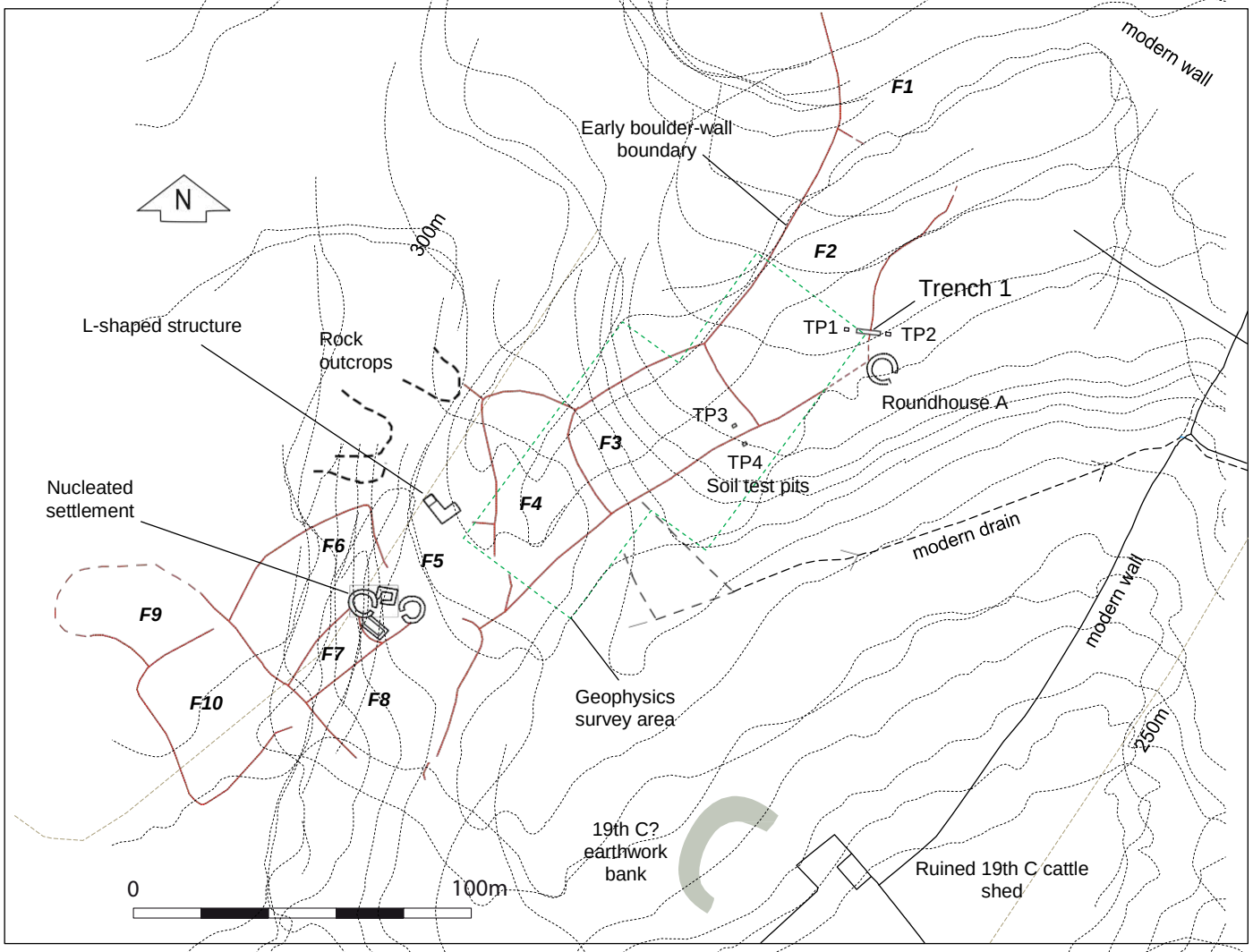
G2077 Fig. 8 Cwm Cilio: Trench 1, plans and section
1. plan after removal of topsoil
2. plan of core bank after removal of tumble
3. plan of primary bank
4. south-west facing section of trench

G2077 Fig. 9a Cwm Cilio: early bank built over by Post-medieval wall and contour terrace beyond. From south. Trench 1 was excavated between the wall and the terrace. 1m scale

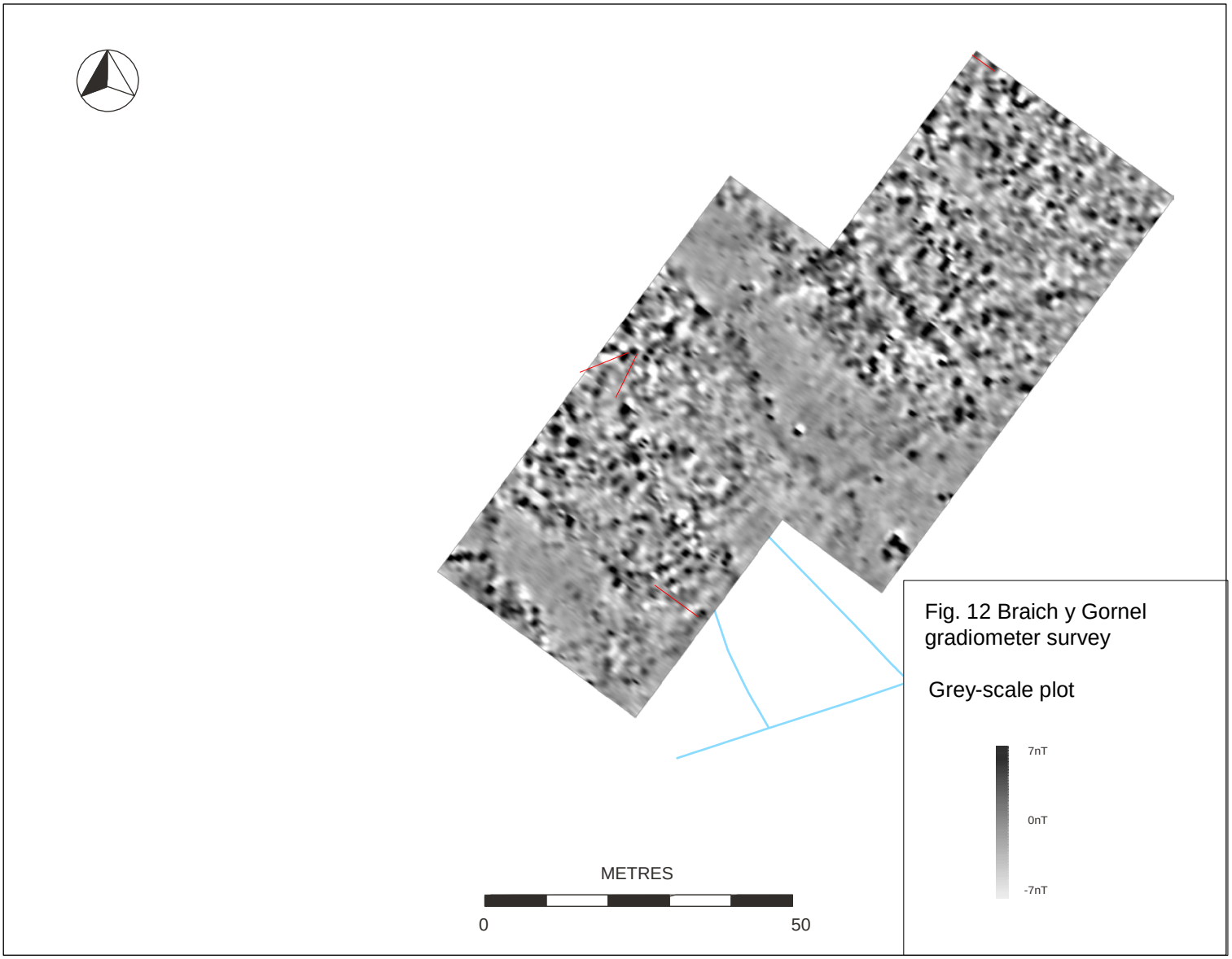
G2077 Fig. 9b Cwm Cilio: Trench 1 completed showing section, from south-east. 1m scales



G2077 Fig. 10 Braich y Gornel: location map. Scale 1:20000



G2077 Fig. 11 Braich y Gornel: Plan of field system, from RCAHMW survey (1960) showing the location of the geophysical survey and of the excavated trenches

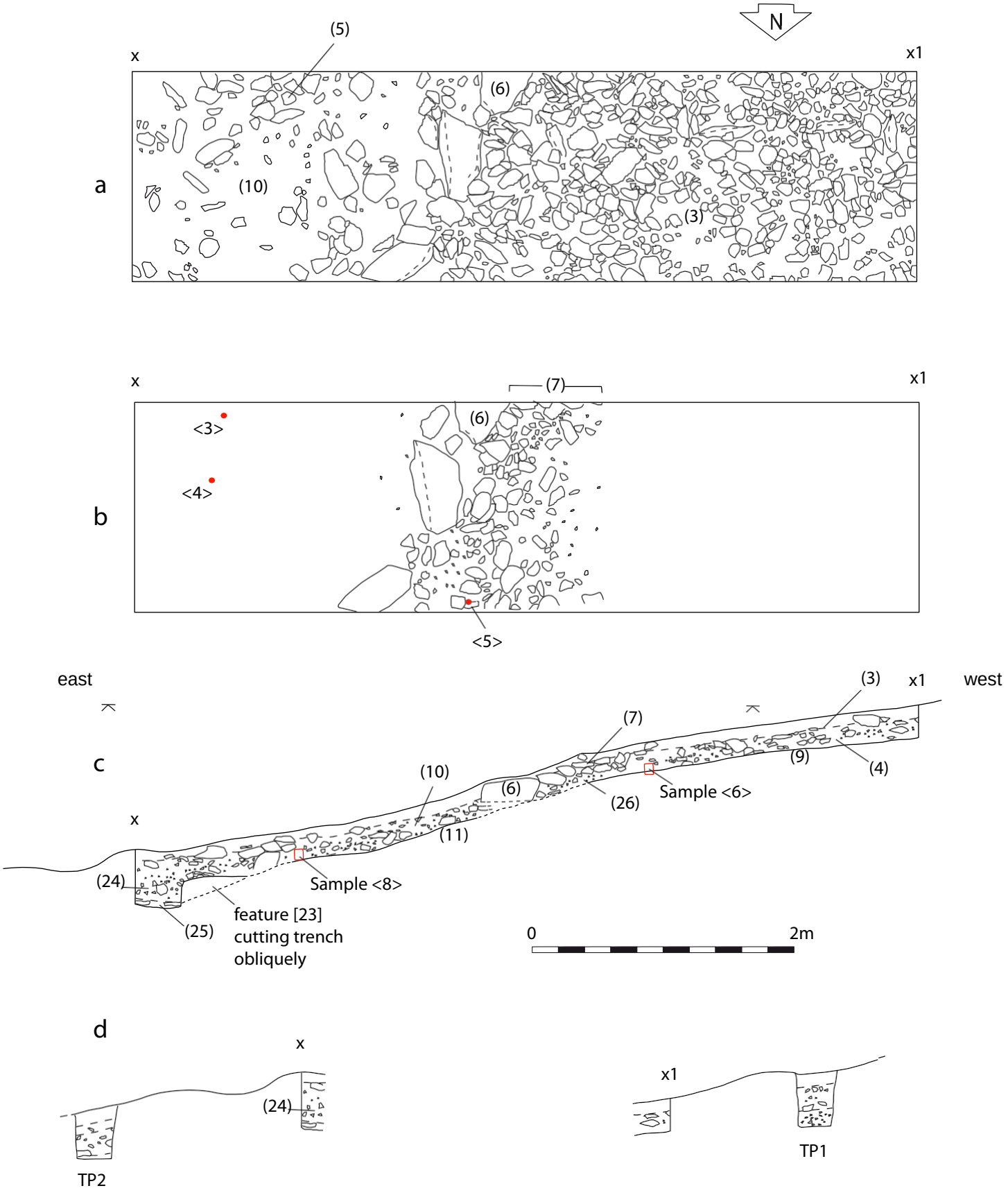


G2077 Fig. 12 Braich y Gornel: Gradiometer survey, grey-scale plot

Fig. 13 Braich y Gornel gradiometer survey

Interpretation

G2077 Fig. 13 Braich y Gornel: Gradiometer survey, interpretation



G2077 Fig. 14 Braich y Gornel, Cwm Ystradllyn, Plans and sections

a Plan after removal of topsoil

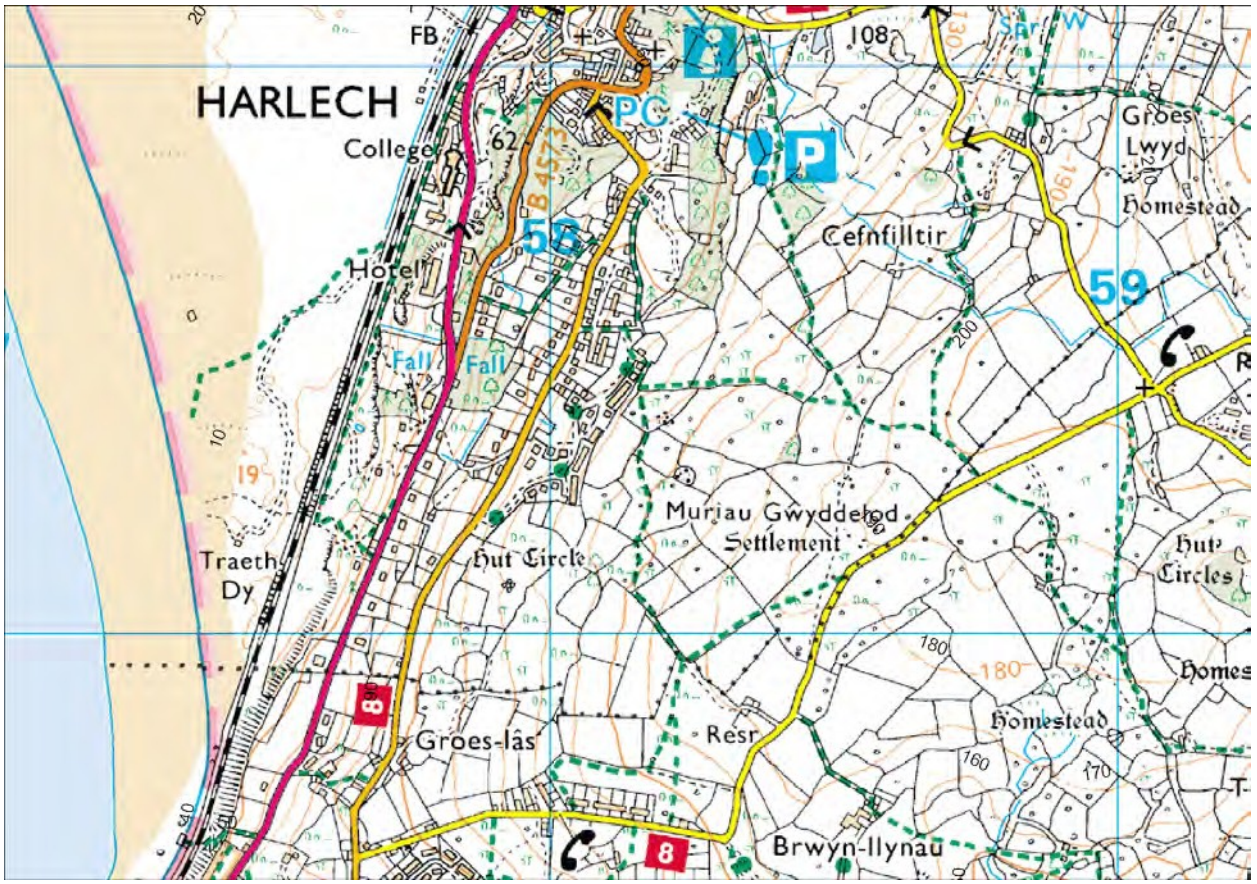
b Plan after removal of stone spread (3)

c North-facing section of trench

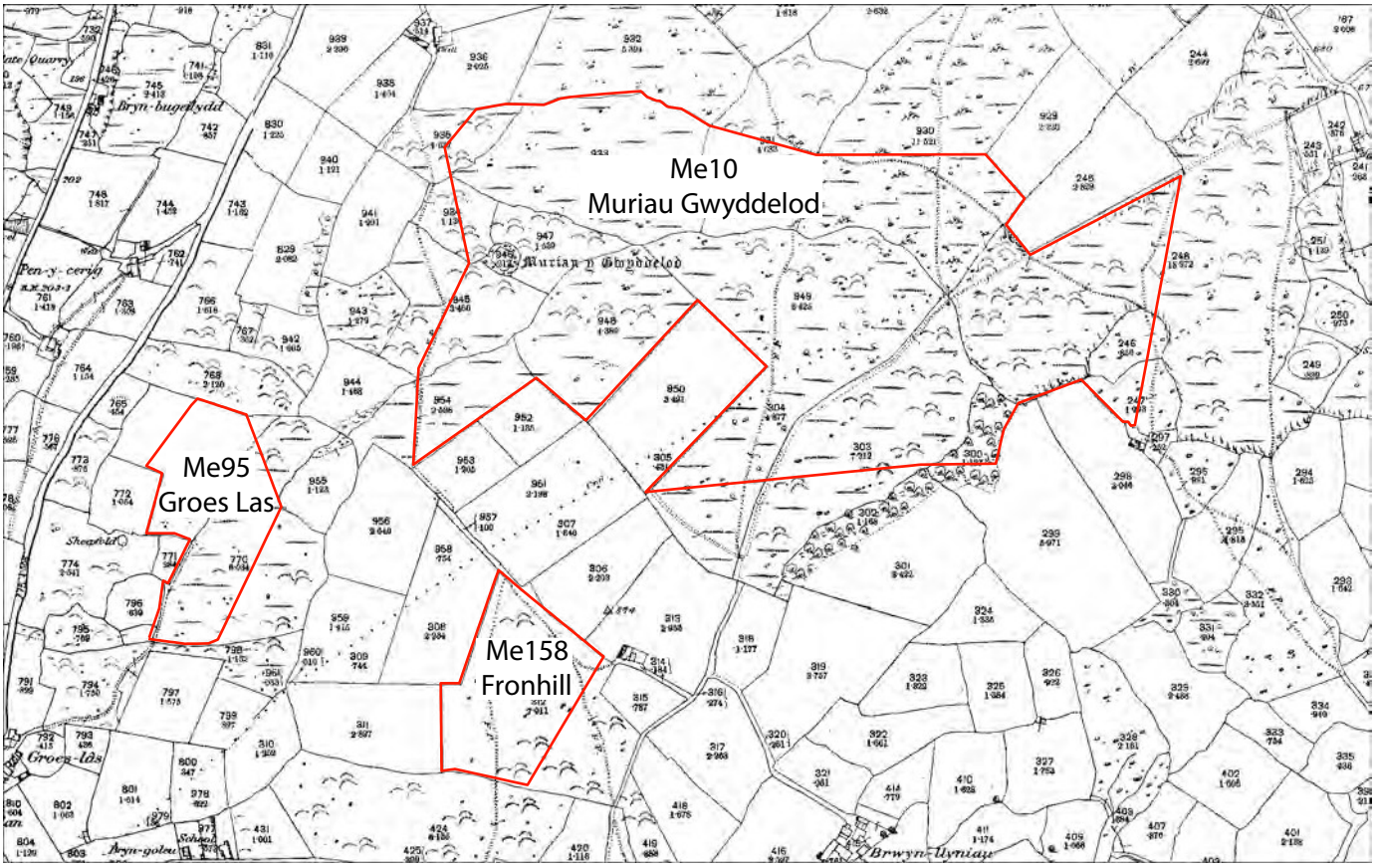
d Test pits 1 and 2

G2077 Fig. 15a Braich y Gornel: Trench after removal of topsoil showing boundary and stony layer (3) beyond. From the east. 1m scale

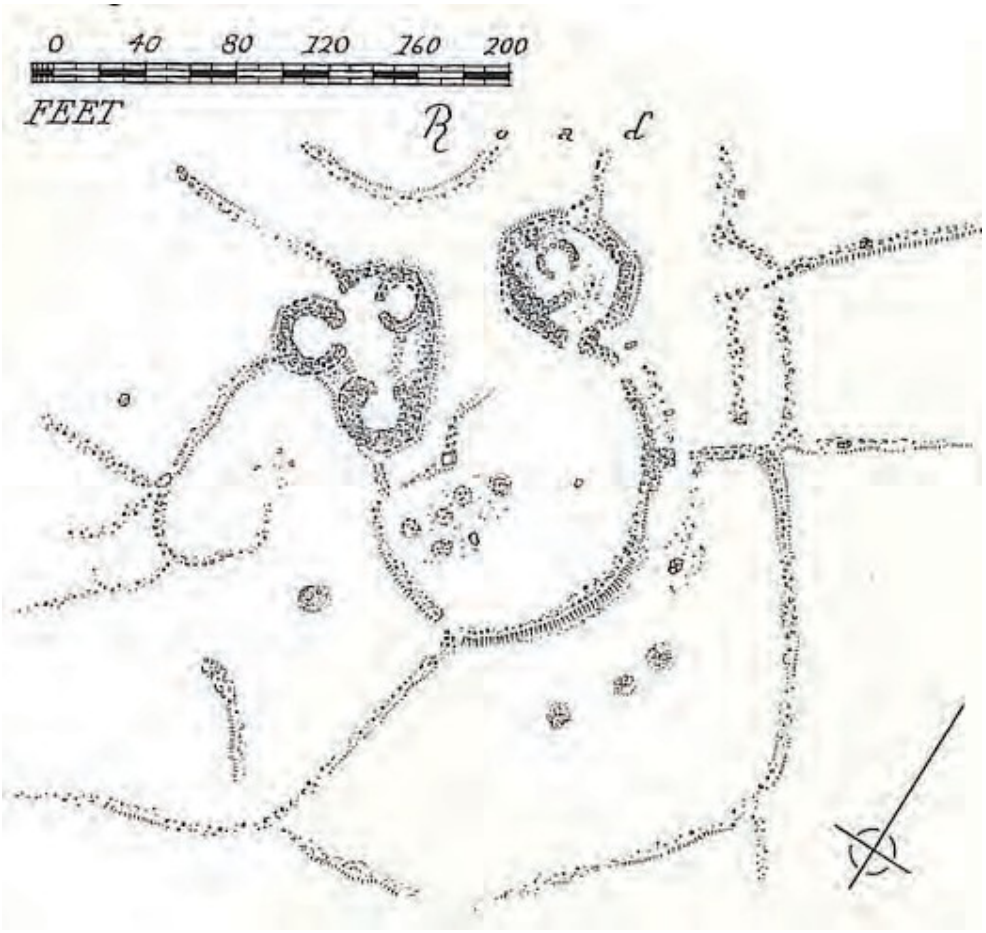
G2077 Fig. 15b Braich y Gornel: Trench showing boundary facing and cut through stony layer (3) From the south. 1m scale



G2077 Fig. 16a Muriau Gwyddelod: Location map.
From Ordnance Survey 1:25000, Not to scale



G2077 Fig. 16b Muriau Gwyddelod: From Ordnance Survey 1:2500 map 1889, not to scale, showing scheduled areas (Red outline)



G2077 Fig 17 Muriau Gwyddelod, SAM Me 10. Survey of the main settlement area showing the two courtyard houses , yard and attached boundaries (Bowen and Gresham 1967)

258384 690969

258884 690969

330310 651692

329810 651692

settlement

F8

F7

F9

settlement

medieval
long huts

F6b

F2a

post-med
fold

F5

F10

settlement

F2

F3

post-med
hut

F11

F4

F6a

F1

Trial
excavation
trench

probable
settlement

F12

F1-12 Survey Field nos.

Stony bank Clearance

cairn Geophysical survey

area SAM boundary

Stone Bank / Cairn

Top of Bank

Btm of Bank

Other

Muriau Gwyddelod, Gwynedd
Scale 1:3000
15 March 2010

G2077 Fig. 18 Survey plan

0 50 100 200 Metres

The University Of Sheffield.

Fig. 19 Muriau Gwyddelod area 1
Fronhill fluxgate gradiometer survey

Grey-scale plot

G2077 Fig. 19 Muriau Gwyddelod Area 1, Fronhill Me158,
fluxgate gradiometer survey, grey-scale plot

G2077 Fig. 21 Muriau Gwyddelod Area 2, fluxgate gradiometer survey, grey-scale plot

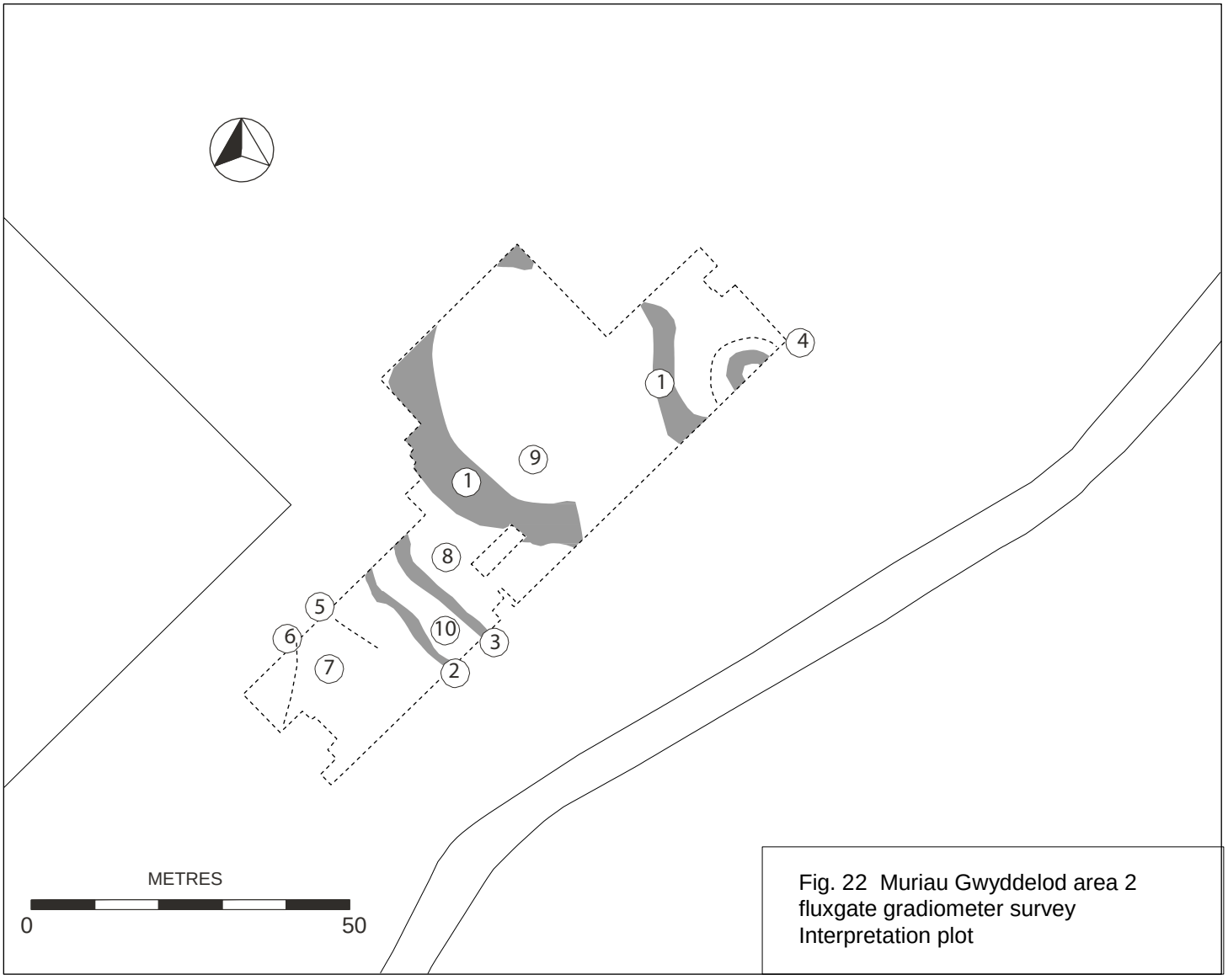
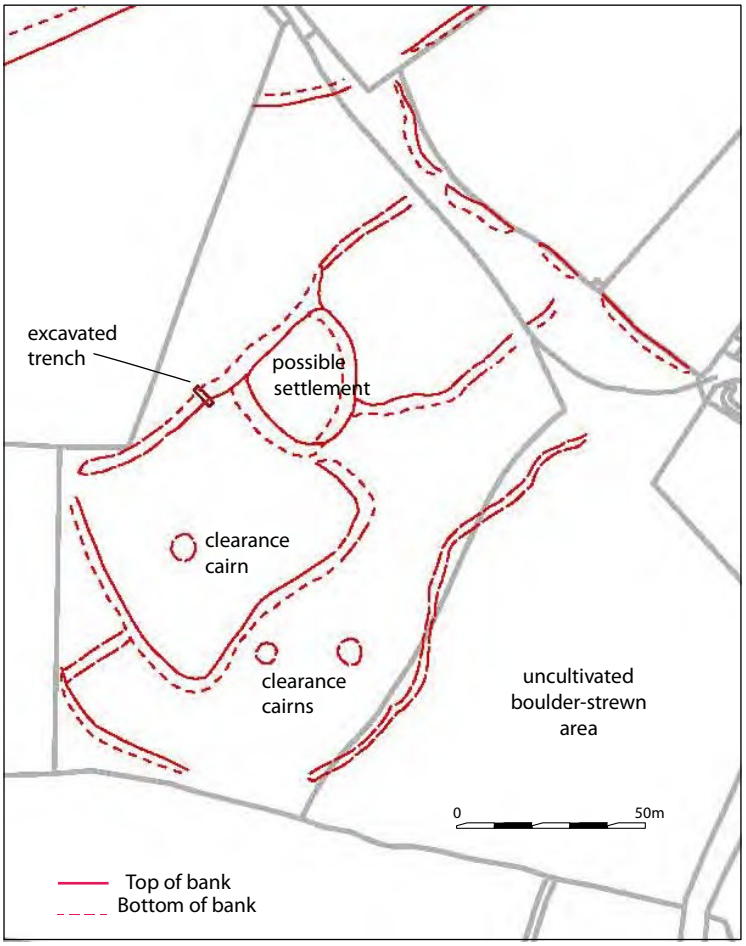
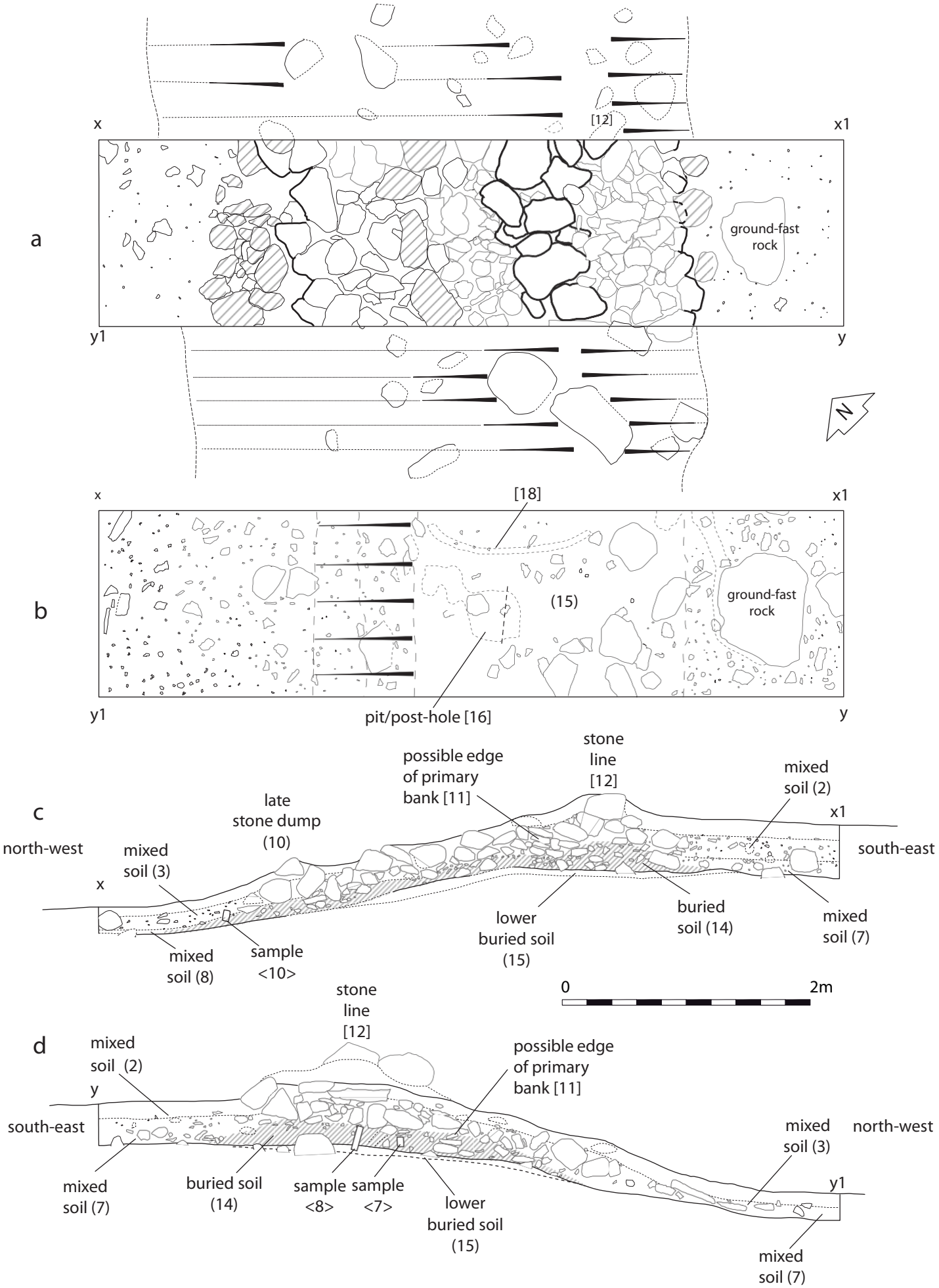


Fig. 22 Muriau Gwyddelod area 2
fluxgate gradiometer survey
Interpretation plot

G2077 Fig. 22 Muriau Gwyddelod, Area 2, fluxgate gradiometer survey, interpretation



G2077 Fig. 23 Muriau Gwyddelod, Fronhill, Me 158, plan enlarged from new survey, showing location of excavated trench. Scale 1:1000



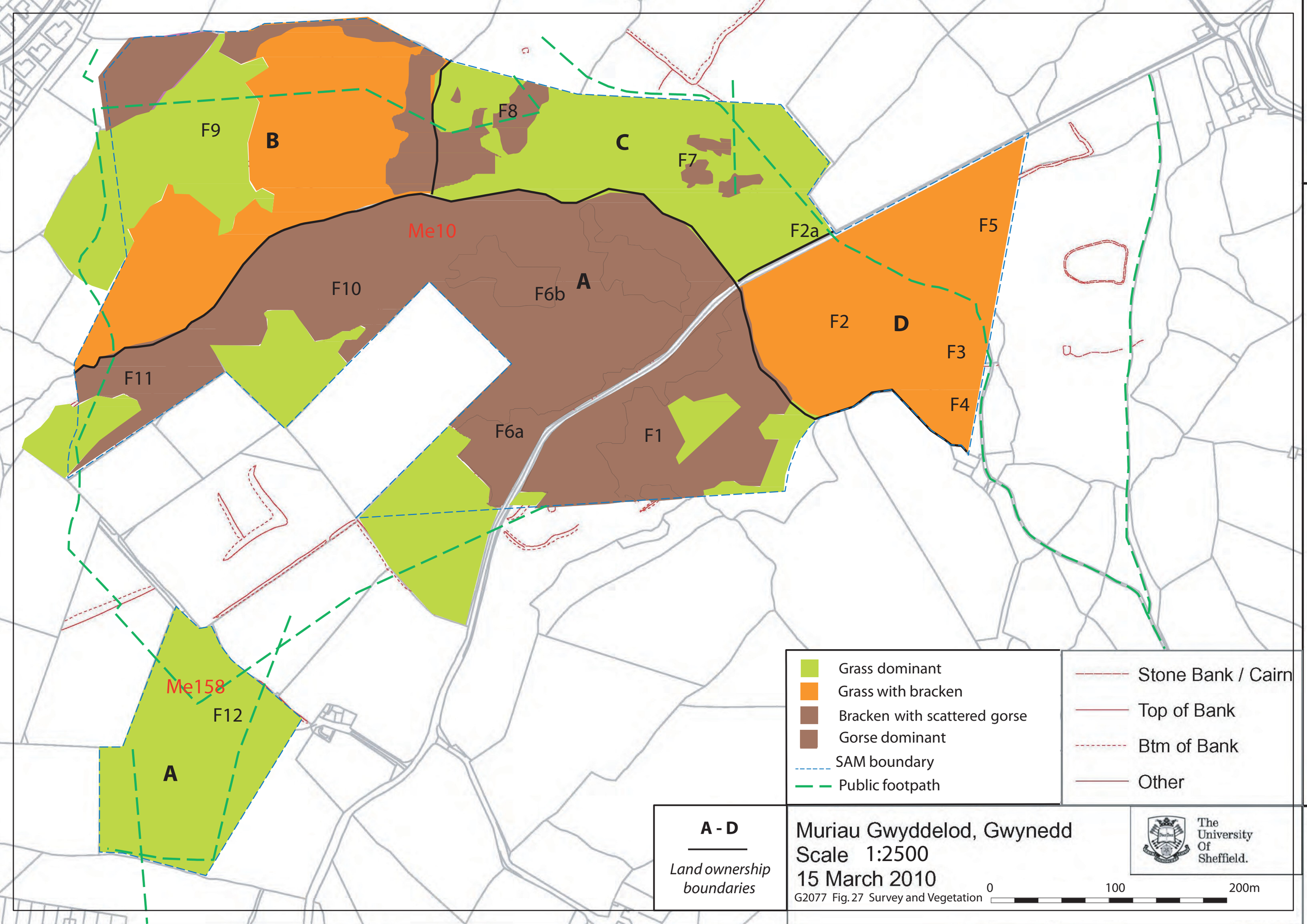
G2077 Fig. 24 Muriau Gwyddelod, Fronhill: plans and sections
a. Plan of bank after removal of turf and topsoil, tumble hatched
b. Plan after removal of bank, showing buried soil (14) and pit/post-hole [16]
c. south-west facing section d. north-east facing section

G2077 Fig. 25a Muriau Gwyddelod, Fronhill: downslope face of stony bank after removal of topsoil. From north-west. 1m scale

G2077 Fig. 25b Muriau Gwyddelod, Fronhill: trench section after excavation to subsoil surface. From north-east. 1m scale

G2077 Fig. 26a Muriau Gwyddelod, SAM Me 10 Aerial photograph circa 1970 (Ordnance Survey) showing area as open pasture

G2077 Fig. 26b Muriau Gwyddelod, SAM Me 10, Aerial photograph circa 2006 (Ordnance Survey) showing extensive scrub cover


F9
B
F8
C
F7
F2a
F5
Me10
F10
F6b
A
F2
D
F3
F4
F11
F6a
F1
Me158
F12
A
Grass dominant
Grass with bracken
Bracken with scattered gorse
Gorse dominant
SAM boundary
Public footpath
Stone Bank / Cairn
Top of Bank
Btm of Bank
Other
A - D
Land ownership boundaries
Muriau Gwyddelod, Gwynedd
Scale 1:2500
15 March 2010
G2077 Fig. 27 Survey and Vegetation
0
100
200m
The University Of Sheffield.

G2077 Fig. 28a Pasture topping of bracken at Groes Las prehistoric settlement, Me 95

G2077 Fig. 28b Pasture topping with ATV towed brush cutter, Emyr Price, Conwy

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ARCHAEOLEGOL
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Craig Beuno, Ffordd y Garth, Bangor, Gwynedd LL57 2RT Ffon/Tel 01248 352535 Ffacs/Fax 01248 370925
e-mail: gat@heneb.co.uk web
site: www.heneb.co.uk