1108

Proposed Energy Generator, Peboc, Llangefni, Ynys Môn

Archaeological Evaluation

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

Proposed Energy Generator, Peboc, Llangefni, Ynys Môn

Archaeological Evaluation

Project No. G2207

Report No. 1108

Prepared for: Ecopellets Ltd

Date: January 2013

Written by: Jane Kenney and Rich Cooke

Illustration by: Jane Kenney and Macsen Flook

Cyhoeddwyd gan Ymddiriedolaeth Archaeolegol Gwynedd
Ymddiriedolaeth Archaeolegol Gwynedd
Craig Beuno, Ffordd y Garth,
Bangor, Gwynedd, LL57 2RT

Published by Gwynedd Archaeological Trust
Gwynedd Archaeological Trust
Craig Beuno, Garth Road,
Bangor, Gwynedd, LL57 2RT

PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, YNYS MÔN

ARCHAEOLOGICAL EVALUATION (G2207)

Prepared for *EcoPellets Ltd*, March 2013

Contents

Figures and Plates

Figures and Plates

Figures

Plates

PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, YNYS MÔN

ARCHAEOLOGICAL EVALUATION (G2207)

Prepared for *EcoPellets Ltd*, March 2013

Summary
A programme of archaeological evaluation work was carried out adjacent to the existing Peboc development on the outskirts of Llangefni, Ynys Môn. A geophysical survey carried out by Stratascan and evaluation trenching by Gwynedd Archaeological Trust identified the remains of an enclosed settlement (PRN 36390) that was used into the 2nd century AD. The settlement enclosure was probably pentagonal in shape and defined by a single, rather small ditch. There appears to have been at least one roundhouse inside as well as internal ditches, many small pits and other activity. The evaluation trenching also revealed a pit containing Neolithic artefacts (PRN 36389), with another adjacent, possibly contemporary pit. Documentary research supported the possibility that agricultural buildings (PRN 36388) within the development area are on the site of an earlier dwelling, possibly dating back to the 16th century.

Recommendations are proposed for archaeological mitigation involving the strip, map and sample evaluation of the whole development area leading where appropriate to full excavation of significant features and deposits.

1. INTRODUCTION

Gwynedd Archaeological Trust (GAT) was commissioned by *EcoPellets Ltd* to complete a programme of archaeological evaluation at the location of a proposed biomass energy generator, Llangefni, Ynys Môn.

The site of the proposed plant is a *c*.6.7ha L-shaped development area located on the edge of an industrial estate to the south-east of Llangefni, centred on **SH 4645874732** (figure 1). The site consists of three fields of improved grassland with hedged boundaries and smaller areas of waste and landscaped ground associated with the existing Peboc development. The site is situated between an industrial estate to the north and west, a sewage works to the south-east, and a fishery to the south, with various adjacent areas of grassland, and marshy grassland to the south.

2. SPECIFICATION AND PROJECT DESIGN

2.1 Introduction

The aim of the works was to evaluate and characterise the known, or potential, archaeological remains to provide sufficient background information on the historical development of the site, so as to inform appropriate mitigation decisions in view of a proposed application by *EcoPellets Ltd* to construct a biomass energy plant. An Archaeological Project Design (appendix III) was written by GAT and submitted to *EcoPellets Ltd* and the development control archaeologist at the Gwynedd Archaeological Planning Service (GAPS) in February 2012. This formed the basis of a method statement submitted for the work. The archaeological evaluation and recording was undertaken in accordance with this Project Design.

After completion of the initial five evaluation trenches, a second phase of trenching was deemed necessary by GAPS to meet the project requirements, and thus a second phase of trenching was undertaken. A second Archaeological Project Design was written by Gwynedd Archaeological Trust and submitted to *EcoPellets Ltd* and the development control archaeologist in March 2012.

On completion of the fieldwork the data collected was assessed for potential and a report produced (Cooke 2012, GAT report 1034). Post excavation analysis was carried out according to this report leading to the production of the current report and the long term archiving of finds and site records.

The management of this project has followed the procedures laid out in the standard professional guidance, *Management of Archaeological Projects* (English Heritage, 1991), *Management of Research Projects in the Historic Environment Project Manager's Guide* (English Heritage 2006) and in the Institute for Archaeologists Standards and Guidance: Excavation (IFA 1995 revised Oct 2008). Five stages are specified:

Phase 1: project planning
Phase 2: fieldwork
Phase 3: assessment of potential for analysis and revised project design
Phase 4: analysis and report preparation
Phase 5: dissemination

The current document reports on the phase 4 analysis and states the means to be used to disseminate the results. The purpose of this phase is to carry out the analysis identified in phase 3 (the assessment of potential phase), to amalgamate the results of the specialist studies with the detailed site narrative and provide both specific and overall interpretations. The site is to be set in its landscape context so that its full character and importance can be understood. All the information is to be presented in a report that will be held by Gwynedd Historic Environment Record so that it can be accessible to the public and future researchers. This phase of work also includes archiving the finds and paper and digital records from the project.

2.3 Evaluation Aims

The evaluation aimed to address the following:

- Verify the efficacy of the geophysical survey for identifying archaeological remains within the site
- Establish the extent to which archaeological remains survive at the site
- Establish the date and nature of archaeological remains at the site and assess their implications for understanding the historical development of the area
- Establish the depth of archaeological remains and the quality, value and level of preservation of any deposits
- Assess the level of risk any surviving remains may pose to development.

3. Project Background

3.1 Assessment

GAT completed an archaeological baseline assessment of the proposed biomass energy plant development area in September 2011 (Evans 2011, GAT Report **970**).

The report identified a landscape of improved fields and hedgerows of 19th century date; associated with these was a complex of agricultural buildings to the north of the study area. No other archaeological sites were identified, but it was noted that Tregarnedd, a Scheduled moated site (AN 047), lay to the east, and that evidence of prehistoric occupation was identified to both the south and the north of the development area.

The proposed development is not expected to have any significant impact on known or scheduled archaeological sites. The potential for the presence of buried archaeological remains was ranked moderate to high, and a programme of archaeological field evaluation prior to commencement of construction works was recommended, as well as basic record of the agricultural buildings prior to demolition.

3.2 Stratascan Ltd geophysical survey

The geophysical survey was completed by *Stratascan* in October 2011 (Smalley 2011, included as appendix IV). A magnetometer survey was completed using a Bartington Grad 601-2, which used two fluxgates mounted 1.0m vertically apart aligned to nullify the effects of the earth's magnetic field. Readings were taken at 0.25m centres along traverses 0.5m apart, which equated 7200 sampling points within a full 30m x 30m grid. A number of anomalies of probable archaeological origin were identified. Positive and negative linear and area anomalies, indicative of cut features such as pits and ditches were evident throughout the survey area with a particular concentration forming enclosures in the northern region. Many of these anomalies appear to cut each other which would suggest multiphase activity having occurred in the area.

4. METHODOLOGY

4.1 Trial Trenching

The trial trenches were located to target anomalies identified during the geophysical survey, carried out by *Stratascan Ltd* in October 2011. A total of 10 evaluation trenches were opened within the proposed development area. For ease of reference, the scheme has been broken down into plots, which refer to the fields within the proposed development area (see figure 2).

Twenty six trenches were initially proposed but the number was reduced after discussion with Ecopellets Ltd and Gwynedd Archaeological Planning Service. This explains the gaps in the trench numbering system.

The targeted anomalies are described below:

Field 1

- Trench 05(centred on SH 4644574765) – A 20.0m (l) x 2.0m (w) trench: investigating background evidence.

- Trench 06 – (centred on SH 4646974745) A 20.0m (l) x 10.0m (w) trench: investigating a negative anomaly (possible bank or earthwork and also a possible enclosure ditch.

- Trench 07 – (centred on SH 464634692) A 20.0m (l) x 2.0m (w) trench: investigating a *probable* enclosure ditch and possible pit features.

- Trench 08 – (centred on SH 46777687) A 30.0m (l) x 2.0m (w) trench: investigating the enclosure ditch and internal anomalies identified in the geophysical survey.

- Trench 09 – (centred on SH 464887469) A 20.0m (l) x 2.0m (w) trench: investigating the relationship between two linear anomalies identified in the geophysical survey.

- Trench 10 – (centred on SH 4649874720) A 20.0m (l) x 2.0m (w) trench: investigating linear and irregular anomalies.

- Trench 11 – (centred on SH 4650174741) A 20.0m (l) x 4.0m (w) trench: investigating a possible banked sub circular enclosure with internal features.

- Trench 27 – (centred on SH 4644474720) A 10.0m (l) x 4.0m (w) trench: investigating a possible gap/entrance in an enclosure ditch.

Field 2

- Trench 12 – (centred on SH 4654074714) A 20.0m (l) x 2.0m (w) trench: investigating a linear feature, possibly forming part of a field system.

- Trench 13 – (centred on SH 4659074682) A 20.0m (l) x 2.0m (w) trench: investigating a linear feature, possibly forming part of a field system and other cut anomalies.

A JCB with toothless ditching bucket was used to open the trenches under constant archaeological supervision. Topsoil and overburden were removed by machine in spits down to archaeological deposits or natural sub-soils. All subsequent features were excavated by hand.

A written record of the deposits and all identified features in each trench was completed via GAT pro-formas.

All subsurface remains were recorded photographically, with detailed notations and a measured survey. The photographic record was completed using a digital SLR camera set to maximum resolution.

4.2. Post excavation methodology

4.2.1. Data collection from site records
A database of the site photographs was produced to enable active long-term curation of the photographs and easy searching. The site records were checked and cross-referenced and photographs, plans, finds and samples were cross-referenced to contexts. These records were used to write the site narrative and the field drawings and survey data were used to produce both an outline plan of the site and detailed illustrations.

All paper field records were scanned to provide a backup digital copy. The photographs were organised and precisely cross-referenced to the digital photo record so that the Royal Commission of Ancient and Historical Monuments of Wales can curate them in their active digital storage facility.

4.2.2. Finds methodology
The finds were catalogued and grouped by material type; where appropriate finds were cleaned. All finds were packaged in suitable containers and conditions for long-term storage, and if necessary were conserved to ensure they are stable for storage. The finds were assessed by specialists to describe and catalogue the collections. Where recommended by the specialists further work was carried out and illustrations produced.

The specialists used are as below:

Prehistoric pottery: Frances Lynch, formerly of Bangor University
Roman pottery: Peter Webster, Honorary Research Fellow, National Museum Wales
Lithics: George Smith, Gwynedd Archaeological Trust
Roman glass: Hilary Cool, freelance glass specialist
Metal objects: Evan Chapman, National Museum Wales
Conservation: Phil Parkes, Cardiff Conservation Services, Cardiff University
Metallurgical residue: Tim Young, GeoArch
Animal Bones: Nora Bermingham, freelance bone specialist

4.2.3. Environmental samples
The sampling strategy for bulk soil samples was related to the perceived character, interpretational importance and chronological significance of the strata under investigation. This ensured that only significant features were sampled. The aim of the sampling strategy was to recover carbonised macroscopic plant remains, small artefacts particularly knapping debris and evidence for metalworking.

The bulk soil samples have been processed by flotation and wet sieving using a 300 micron mesh for flotation, and 1mm and 10mm sieves for wet sieving. The residues were sorted by hand to recover finds and non-floating ecofacts. All residues were tested for magnetic metalworking debris and this was collected where present. Once sorted the residues were discarded.

The flots were assessed by Rosalind McKenna, freelance palaeoenvironmental specialist, to establish their potential in relation to charcoal and other plant macrofossils. The presence of suitable dating material was recorded during the assessment and this information was used in conjunction with the site records to select appropriate samples for radiocarbon dating, carried out by SUERC Radiocarbon Dating Laboratory, East Kilbride.

4.2.4. Storage and curation
The finds are currently the property of the landowner but it is strongly recommended that these are donated to a museum for long term storage. However as there is still a likelihood that more archaeological work will be undertaken on the site it is proposed that GAT hold the finds for the present. If more work is carried out it is important that the finds from this phase are incorporated with the next phase of work. When all archaeological works related to this development are completed or when it is clear that no more work is to be undertaken it is recommended that the finds be deposited with Oriel Ynys Môn, Llangefni. The finds have been prepared for deposition according to Oriel Ynys Môn's established guidelines. A full inventory of the archive will be created to aid accession.

The paper and digital archive will also be held by GAT until it is appropriate to transfer the archive to permanent storage as discussed above. Then the paper archive will be transferred to Anglesey Archives, Llangefni and the digital archive will be deposited with the Royal Commission on the Ancient and Historical

Monuments of Wales. RCAHMW holds the national archive of digital site records for Wales and has facilities to actively curate the archive.

The digital archive will comprise digital site photographs, backup scans of the context sheets, and scans of all site drawings. The paper archive will include all significant site records, e.g. context sheets, site registers, site drawings, site diaries, level books. The paper element will be placed in archive stable boxes and the Permatrace drawings will be rolled and placed in cotton bags.

4.2.5. Report and dissemination

This report will be placed in the public domain by submitting it to the Gwynedd Historic Environment Record within 6 months of completion unless the client specifically requests the report to remain confidential for a longer period. The report will also be made available on the internet through the RCAHMW Coflein website. If no further work is to be carried out on the site a short report on the current work will be submitted to the journal Archaeology in Wales. If further archaeological work is to be carried out the present results will be included within the final report at the end of all the works.

5. RESULTS

5.1 Geophysical survey

The Stratscan geophysical survey revealed what appeared to be a large ditched enclosure within fields 1 and 2 (figure 2). This appears to have internal ditches sub-dividing it, especially in field 2, and numerous positive anomalies that may be pits are scattered throughout the interior of the enclosure. There are also two negative anomalies, one appearing to be a long bank and the other a sub-circular feature, about the correct size for a roundhouse. The enclosure would, therefore, appear to contain some settlement activity.

Other linear positive anomalies in fields 1 and 3 might indicate field boundaries contemporary with the enclosure, but some anomalies might be of natural origin representing changes in the glacial deposits. The geophysical survey also clearly defined the sewerage mains running through fields 2 and 3. It could be seen on the ground that the fields had been ploughed and the geophysical survey detected narrow parallel linear anomalies representing ploughing and suggesting that the archaeology might be significantly truncated.

5.2 Evaluation trenching

The evaluation trenching was designed to test and investigate the geophysical survey, especially in relation to the enclosure and the possible archaeology that it contains. Each trench is described and discussed separately; details of the contexts are included in appendix I. The location of the trenches can be found on figure 2 with plans and sections of the trenches in figures 3 to 10.

5.2.1 Trench 05

(Figure 2; plate 1)

This trench was excavated as a control trench, targeting an area depicted on the geophysical survey as devoid of anomalies, with the aim of verifying the geophysical survey results. No archaeological features were identified within the trench, confirming the negative geophysical results in this area.

5.2.2 Trench 06

(Figures 2 and 3; plates 2-4)

Description

Trench 06 was positioned across a negative anomaly (bank or earthwork) and also across the enclosure ditch. Four archaeological features were identified within the trench; two pits or postholes, a ditch and a shallow gully, all cut into the glacial deposit (013).

Feature [004] was a sub-circular pit or a large post-hole, measuring 0.82m in length, 0.7m in width, and 0.32m in depth. Its single fill (005), a grey-brown silty-clay, contained two fairly large stones, which may represent disturbed packing stones for a post. Near this was a similar pit or posthole [006], measuring 0.65m in length, 0.37m in width, and 0.2m deep. This also had a single fill (007) with a single flat stone in the base. The fill contained a broken stone axe (sf001), a piece of worked flint (sf002), and a sherd of probably late Neolithic pottery (sf009).

Running across the north-western end of the trench was a ditch [008], measuring 0.75m in width and 0.42m in depth, filled with dark grey-brown silt-clay (009), with little stone. Nearly parallel to it was another, slighter ditch or gully [010]. This measured 0.26m in width, and 0.12m in depth, and was filled with a similar dark grey-brown silt-clay (011).

Discussion
Ditch [008] can be seen on the geophysical survey (figure 2) to be part of the main enclosure, and is presumably the same as the ditches found in trenches 07, 08 and 27. It was unclear from the trench whether the nearly parallel gully [010] was related to the ditch or was a later agricultural furrow. The latter is possibly more likely.

The finds from pit [006] suggest a Neolithic date but no finds were recovered from feature [004], so it is not certain that they were contemporary. However their proximity at only 4m apart and their similarity suggests that they may have been part of the same activity. This was tested by radiocarbon dating as discussed in section 7 below.

No evidence was found for the suspected bank on the geophysical survey, so the nature of this anomaly has not been confirmed. It may be that this feature was too slight to see or that the geophysical survey detected a geological anomaly within the glacial substrata.

5.2.3 Trench 07
(Figures 2 and 4; plates 5 and 6)
Description
This trench was excavated to target a linear positive anomaly, interpreted as an enclosure ditch, which the geophysical survey showed as being the continuation of ditch [008] found in trench 06. The trench was also targeting two smaller positive anomalies, also interpreted as cut features.

A ditch [021], measuring 1.6m in width, and 0.7m in depth, was located towards the centre of the trench, running from NW to SE. The ditch had a rounded U-shaped profile and produced a sherd of black-burnished ware (sf024), along with half of a copper alloy, decorated bracelet (sf056) and two pieces of bone (sf025, sf027).

The ditch cut a broad, shallow feature [019], only part of which could be seen in the trench. Two metres to the SW was another similar feature [027]. Feature [019] measured 2.4m in width, and 0.35m in depth, and [027] measured 2.3m in width, and 0.35m in depth, and both had fairly steep sides and flat bases. Both were quite rich in finds. Feature [019] contained a piece of iron (sf010), five sherds of Roman samian-ware (sf011, 012, 013, 014, 017), two sherds of black-burnished ware (sf018, 021), and a piece of bone (sf020). Feature [027] produced fragments of a tooth (sf030), a sherd of Roman glass (sf032), a sherd of probably Roman pot (sf031), and a piece of slate broken in two (sf033, 034). Pieces of conglomerate sandstone (sf015, 016) from pit [019] proved not to have been worked although this stone is often used for querns.

Discussion
Ditch [021] was part of the main enclosure ditch seen on the geophysical plot, but the other two features were also visible as geophysical anomalies. Feature [019] relates to a discrete sub-circular anomaly and so was probably a broad, shallow pit. The anomaly coinciding with feature [027] appears to be more elongated but it may result from more than one of these pits with their geophysical signals merging together. The artefacts from features [019] and [027] show that they were Roman in date, but they appear to pre-date the ditch, which could be seen to cut pit [019].

Towards the north-eastern end of the trench the substrata becomes fragmented shale bedrock. This may explain the narrow linear anomalies shown on the geophysics in this area, as they could be reflecting the bedding plains of the bedrock. No archaeological features were identified to explain them.

5.2.4 Trench 08
(Figures 2 and 5; plate 7)
The trench was excavated to investigate a linear positive anomaly, interpreted as a possible enclosure ditch and some smaller linear anomalies interpreted as modern disturbance. A ditch [053], measuring 1.05m in width, and 0.22m in depth, was located towards the south-western end of the trench which was fairly shallow but with a neat profile. The fill (052) was a brown silty loam, from which no artefacts were recovered. This ditch is thought to be the same ditch [021] seen in trench 07 and forming part of a settlement enclosure boundary.

Much of the trench was covered by broken bedrock, with glacial or peri-glacial silts over the rest.

5.2.5 Trench 09
(Figures 2 and 6; plates 8-10)
Description
Trench 9 was positioned to investigate one of the amorphous positive anomalies scattered across the site, interpreted as possible pits. Although the geophysics in this area did not look particularly interesting the trench contained the most complex archaeology found in the evaluation trenches.

A stony deposit (054), measuring 1.4m in width, and 0.15m in height, ran across the south-eastern end of the trench. This was composed of a fairly loose scatter of medium sized stones, with no evidence of coursing or bonding. The stones appeared too irregular to be a stone surface, but did not include any larger stones as would be expected for the foundations of a wall. It is possible that this feature is the robbed or ploughed-out remains of a wall.

Further to the north-west the remains of the end of a second possible wall (055) was discovered. This was composed of a few medium sized stones that projected 0.8m from the trench baulk. A scatter of stones (066) seen in the section may have been tumble from this potential wall. Both these stone scatters overlaid areas of buried soil. That under (054) was more extensive and up to 0.15m deep. This deposit (056) was a brown loam containing pieces of red, burnt clay, occasional pieces of animal bone (sf044, 045), and flecks of charcoal. Layer (057), under the stones (055), was more fragmentary but as well as flecks of burnt clay it also had patches and lenses of yellowish silt. Immediately under this was a deposit of silty loam (074) containing more burnt clay, possibly indicating burning on this surface.

Sealed beneath (074) was a posthole [060] measuring 0.95m by 0.68m and 0.42m in depth. This contained substantial packing stones, including one large stone placed level and occupying most of the NE half of the cut. The other stones were wedged on edge around the side of the cut, leaving a space of a post barely 0.1m in diameter. While the burnt layer (074) sealed the post-packing stones it did not cover the space for the post, so the post could have been in place when burning occurred on (074). No artefacts were recovered from the posthole or the deposits around it.

In much of the north-western end of the trench broken and fissured bedrock was exposed about 0.7m below the surface, again possibly indicated by the narrow, straight anomalies on the geophysical plot.

Discussion
The deposit of stones (054) could be the remains of a rough wall and certainly seems to correspond to the amorphous anomaly on the plot, even though the geophysics suggested that this was a pit. The geophysics does not indicate any clear shape if this was a wall, so the nature of this feature, and (055), which was even less well understood in the trench, must remain uncertain until more excavation is carried out. However the fragments of burnt clay and bone are suggestive of settlement activity.

The post-hole [060] was a clear and well-defined feature and is unlikely to have existed alone, so more postholes might be expected in this area, although there is no hint from the geophysics of what form any structure may take. The burnt clay in several of the layers in this area suggests burning, with (074) being the possible origin of much of the burnt material, but the scarcity of charcoal seems to rule out a hearth or destruction of a building by fire.

It seems likely that while there were various layers over the posthole that these may have built up in a relatively short time and that all the deposits and features in this trench could have been roughly contemporary. The probability from other datable material in the area is that they were Roman period in date but there were no datable artefacts from this trench to prove this.

5.2.6 Trench 10
(Figures 2 and 7; plate 11)
The trench was excavated to target a linear positive anomaly, possibly a ditch. A feature [025], measuring 1.15m in width, and 0.47m in depth, was located towards the south-western end of the trench. This ran across the trench but was rather irregular in plan. It also had an irregular profile with undercutting sides, reminiscent of root activity, and stones had been concentrated within its fill. Feature [025] was seen to cut through the ploughsoil indicating a relatively late feature.

This feature was initially interpreted as a possible hedged boundary but a boundary is not indicated on any of the known historic maps. It does not correspond very well with the linear anomaly shown on the geophysics plot, which was not specifically identified in the trench but lay within and area where the bedrock was close to the surface. It is possible that the geophysical anomaly is geological and that feature [025] was part of an animal burrow. A badger set was noted in the existing hedge to the south, and badgers are large enough to account for the size of [025]. It may also be possible the geophysical anomaly is picking up badger tunnels not noticed in the trench.

5.2.7 Trench 11

(Figures 2 and 8; plates 12 and 13)

Description

The trench was excavated to target what appeared to be a banked sub-circular anomaly. Three rough stony deposits ((014), (015), (016)) were located within the trench. The deposits consisted of unsorted small and medium sized sub-angular stones, within dark grey-brown silty-clay with occasional flecks of charcoal. Deposits (015) and (016) filled hollows or broad ditches ([017] and [018]), up to 0.48m deep, while (014) was laid directly on the glacial deposits, but also overlay a group of larger stones (023), which may have originally been structural but appeared to have been disturbed.

The central deposit (014) produced a sherd of degraded probably Roman pottery (sf037) and a rim sherd of a mortarium (sf036), while an iron holdfast (sf022) and piece of bone (023) were found between the stones of (023). Deposit (016) produced a cow metatarsal (sf035) and deposit (015) produced a sherd of Roman samian ware (sf004), a nail (sf006), and many pieces of bone (sf005, 008, 028).

Discussion

The geophysical anomalies seem to correlate better with the gaps between the stony deposits, rather than the deposits themselves, although the pit-like signal in the middle of the sub-circular anomaly must be related in some way to (014). There was no evidence of banks in the ground, but it seems likely by comparison to the geophysics results that the archaeology does represent the remains, perhaps disturbed by ploughing, of a circular structure, probably a roundhouse. The finds recovered are certainly consistent with this. The possible ditches at either end of the trench may have been for external drainage gullies or areas of erosion around a house, filled with the stony deposits when the walls collapsed. In this case the nature of the deposits suggests clay walls containing some stone, rather than stone walls. The slightly higher areas of glacial deposits between the stone might have been the location of the walls, and ploughing could have removed the stony deposits from these areas to collect in the drainage gullies and slightly hollowed house floor. The mineralogical effect of the walls on the glacial deposits below may have caused the geophysical signal. The archaeology revealed in this trench can therefore be tentatively interpreted as indicating a clay-walled roundhouse used into the Roman period, although more excavation would be needed to confirm this interpretation.

5.2.8 Trench 12

(Figures 2 and 9; plate 14)

Description

The trench was positioned to target two linear positive anomalies, interpreted as possible ditches. Only the anomaly located towards the north-western end of the trench was seen as a feature in the ground. This proved to be a ditch [036], measuring 0.95m wide and up to 0.18m deep. It was filled with dark red-brown silty-clay with infrequent small angular stones (037), which contained fragments of bone (sf042) and one black-burnished ware sherd (sf043).

Towards the south-eastern end of the trench a natural variation in the geological substrata was located which it is suggested accounts for the geophysical anomaly in this area.

Discussion

This trench confirms that some of the linear anomalies detected within the main enclosures are genuine ditches, which others are probably geological features.

5.2.9 Trench 13

(Figures 2 and 10; plates 15 and 16)

Description

The trench was excavated to target two linear positive geophysical anomalies, interpreted as two ditches. A ditch [049], which had a smooth concaved profile, was located towards the western end of the trench running

from north-west to south-east. It measured 1.4m wide and up to 0.3m deep and had a fill of red-brown clayey-silt with occasional small angular stones (050). The ditch did not produce any artefactual evidence. The second positive geophysical anomaly was not detected, however close to its expected position was a line of three large, sub-angular stones (051). These may be the ploughed out remains of a boundary wall and could possibly be related to the geophysical signal. Several more loose stones were found further to the east within the trench, and it may be the case that these had either tumbled or been ploughed from the possible wall.

Discussion
The ditch found was part of the main enclosure ditch. The difficulty in finding the second geophysical anomaly suggests, with trench 12, that the two parallel linear anomalies (a and b on figure 2) are geological features and raises the possibility that other negative linear features on the geophysics plot are also geological.

5.2.10 Trench 27
(Figures 2 and 11; plates 17 and 18)
Description
The geophysical survey indicated a possible small gap in the western corner of the enclosure that could have been an entrance. Trench 27 was excavated to target this possible gap. Two ditches [033] and [038] were located, which terminated within the trench, and were separated by a gap of approximately 2m. Ditch [033] had a rounded terminus, fairly steep sides and measured 1.16m wide, and up to 0.46m deep, with a length of 1.7m is visible in the trench. This was aligned north-west to south-east, whereas ditch [038], of which only 0.9m was seen in the trench, was aligned south-west to north-east, forming the corner of the enclosure. Ditch [038] was about 0.6m wide and 0.21m deep, and its north-western side seemed to have been quite eroded as it was gently sloping compared to the south-east side. Both ditches had red-brown silty-clay fills. A single stake-hole [064] was located in the gap, mid-way between the terminus ends of both ditches. This stake-hole measured 0.18m diameter and 0.11m deep.

A small black-burnished ware sherd (sf046) was recovered from the fill of ditch [033].

Discussion
The excavation proved that there was a gap in the enclosure ditch in this corner, which was presumably an original entranceway into the enclosure. The stakehole suggests there may have been some kind of gate or blocking device across this gap, but it could have been little more than a movable wattle panel to keep livestock in.

6. ARTEFACTS AND ECOFACTS

See appendix II for full specialist reports.
Prehistoric finds were mostly restricted to trench 06. A single pot sherd (sf009) with a complex rim is probably Neolithic (figure 12), but despite having vesicular fabric Lynch (appendix II.1) considers it more likely to be later than earlier Neolithic in date.

A small eroded sherd (sf029) that appears to be later Neolithic pottery was also found in ditch [017] in trench 11. The feature also contained samian ware and other later finds, so the pot sherd must be residual but could indicate prehistoric activity beyond trench 06.

The worked flint was also restricted to trench 06 with 9 pieces from pit [06], along with a very small broken polished stone axe or chisel. The flint assemblage includes a narrow blade (Sf 49) with some microchipping and wear polish, demonstrating use; a core fragment (Sf51), and a broken fragment of a convex end scraper (Sf54). These, along with small debitage pieces, suggest flint knapping on site, and the production and use of tools appropriate to a domestic site.

The axe or chisel (sf001) is a typical of the Neolithic but cannot be more precisely dated within that period. It may have been more symbolic than practical as it seems too small and delicate to have been effectively used (figure 12). The fact that it seems to have been broken by a single blow to the side of the object could indicate its ritual destruction and deliberate burial.

The Roman pottery is much more widely spread with pieces recovered from trenches 07, 11, 12 and 27. The largest quantity came from the pit [019] in trench 07, which had 7 sherds. All the dateable sherds fall within the 2nd to early 3rd centuries AD, with the probability that most or all of the activity fell within the second half of the

second century (Webster appendix II.2) (figure 13). Several of the sherds come from the enclosure ditch, and sherds of the same date from the possible roundhouse in trench 11 suggest that this was contemporary activity inside the enclosure. A nail and a holdfast from trench 11 may suggest nails were used in the timber superstructure of the roundhouse.

The sherd of Roman glass from the fill (028) of the pit or ditch [027] in trench 07 generally supports the pottery dating, although it can only be approximately dated to the early-mid Roman period. It is possible that this piece was collected for reworking into glass beads as has been found elsewhere on Anglesey and in Gwynedd, but the sherd was not obviously prepared for melting down so this cannot be confirmed.

A broken slate from pit [027] in trench 07 could hint at slate roofed buildings but this seems unlikely on a native settlement. The slate is quite good quality and not local but is quite thick and irregular so it might have originated from a post-medieval slate fence, but there was no evidence of disturbance in this feature. The use of slate during the Roman period on this site for some purpose should be considered and further excavation may reveal what its function was.

The penannular stone object (sf056) recovered from pit [019] in the same trench is presumably Roman in date as it was associated with the largest collection of Roman pottery. It appears to be a decorative item, possibly but not certainly a brooch. It may have been an amulet or charm (figure 13).

Also from this trench, but from the enclosure ditch [021], was part of a decorated copper alloy bracelet (sf026) originally coated with a tin, lead and copper alloy presumably to give it a silver appearance (figure 13). It is of a style similar to ones found on Roman period sites (Evans appendix II.6). Presumably this was a broken item discarded as rubbish. A strip of iron was also deposited in the adjacent pit [019].

A piece of slag was recovered from trench 08, which, although it is glassy and non-metallic, could have been from a metal-working hearth. However this item was unstratified and could be of a much later date than most of the archaeology on the site. A small quantity of smithing waste and burnt clay consistent with metallurgical hearth-lining was found in soil samples from across field 1, but particularly in trenches 07 and 09. However the quantity was too small to indicate metal-working at the locations where it was found, just that there appeared to be metal-working somewhere on the site. Some of the geophysical anomalies not investigated by the evaluation trenching may therefore be Roman period smithing hearths, but it is not possible at this stage to say which those might be.

The bone assemblage seems small but for Anglesey it is quite significant. Many of the excavated Romano-British sites on Anglesey are on acid rocks and usually produce few bones. However Peboc is on limestone and the soil pH is obviously alkaline enough for bone to survive. Considering the small area excavated the assemblage is substantial and indicates that further excavation will produce more bone. The stony deposit (015) in trench 11, interpreted as part of the collapse of a roundhouse wall, contained 26 tooth and bone fragments totalling 231g. These include remains of both cow and sheep/goat. A fragment of bone was also recovered from deposit (016) and the stones (023) from the same trench. The quantity of bone from this trench supports the interpretation of this feature as a roundhouse where domestic activity took place.

Some bone also came from the enclosure ditch [021] in trench 07, including a horse tooth, and where the ditch was investigated in trenches 08 and 27. This was probably deposited as waste in the ditch and also suggests domestic activity inside the enclosure. It is difficult to extrapolate from a single tooth but the presence of horse could indicate a fairly high status settlement.

The charcoal remains show the exploitation of several species native to Britain, with the prevalence of oak, and willow/poplar being selected and used as fire wood. Identifiable charcoal was restricted to only four of the features sampled. The sample from the Neolithic pit [006] was dominated by oak, but also contained hazel charcoal. The other features were Roman period features from trench 07; pit [019] contained purely oak charcoal, and pit [027] and the enclosure [021] both contained purely willow/poplar charcoal. The species identified suggest a mixed oak woodland in the area in the Roman period with some fen carr. The information available is too slight to judge changes in the woodland between the Neolithic and Roman periods.

The Neolithic pit [006] produced 3 fragments of hazelnut shells but no other charred plant remains. The adjacent pit [004] did contain a cereal grain and some chaff. The difference in the charred plant remains assemblages could indicate that these two features were not contemporary.

The features in trench 07 all contained charred cereal grains, mostly unidentifiable but with some spelt wheat and barley present, as well as a small amount of oat chaff. The stony deposits in trench 11 related to the probable roundhouse also contained charred grain with spelt wheat identifiable. Deposits directly overlying the posthole [060] in trench 09 also contained oats, barley and spelt wheat as well as unidentifiable cereal grains and some chaff. Layer (074) contained some pot marigold seeds (*Calendula officinalis*). This species is not native to Britain, and is thought to have been introduced during the Roman period, but is rarely recorded before 15th century AD (McKenna appendix II.9).

The amount of chaff recorded was small, which may indicate the use of threshed and winnowed grain on the site. The weed seeds recovered are of a similar size to the cereal grains suggesting that the grain had been sieved through a fine sieve, which is likely to have occurred just before milling. The present evidence therefore suggests that winnowing and threshing were carried out elsewhere and that the grain recovered was waste from cooking. However only a small proportion of the site has been investigated, and other activities may have taken place on other parts of the site.

7. DATING

The enclosure shown on the geophysical plot is of a character typical of the late Iron Age or Roman periods. The recovery of Roman pottery supports that provisional dating. Where pottery was not recovered the presence of spelt wheat in deposits also supports the argument that most of the features excavated are roughly contemporary as spelt wheat becomes more important in Britain in the late Iron Age and Roman periods. The layout of the features inside the enclosure, the orientation of ditches at right angles to the enclosure ditch and presence of a probable roundhouse all suggest that most of the activity inside the enclosure is roughly contemporary and can be at least approximately dated by the finds recovered. This suggests that while the settlement may have originated earlier it was used into the 2nd century AD.

To confirm this possible date and to investigate the possibility of earlier or later activity would require more excavation across the site, and is therefore not possible at this stage. It is unlikely that radiocarbon dating of Roman period and probable Roman period features excavated so far would provide much more information than has been gained from the datable finds. If the site is fully excavated a comprehensive programme of radiocarbon dating combined with a much better understanding of the stratigraphy and layout of the site could be very important in establishing the development and phasing of the site. However, at this stage it is not proposed to obtain radiocarbon dates on features belonging to this period of activity.

The evaluation trenching has shown that there is some much earlier activity on the site. At the moment this is restricted to one pit with Neolithic artefacts and an adjacent pit, which lacks artefacts and so cannot be demonstrated to be contemporary. The artefacts roughly date pit [006] to the Neolithic period but stone axes are not precisely datable and the pot sherd found is rather atypical for this area. Establishing a more precise date for the pit may give some indication of other types of features that could potentially be associated with it. Dating would also indicate whether pit [006] is a single, isolated feature or whether pit [004] might be contemporary with it. Two samples were therefore submitted for dating from pit [006] to allow for an estimation of mixing or disturbance. These dates were on single items of short lived species (two pieces of hazelnut shell) and the dates were obtained by Accelerator Mass Spectrometry (AMS) by the SUERC Laboratory in East Kilbride. Unfortunately pit [004] contained only a small quantity of charred plant material. An attempt was made to date two samples from this pit but one was too small and failed to produce enough carbon for dating. Only a single date was therefore obtained from this feature.

The samples were pretreated following methods described in Stenhouse and Baxter (1983); they were then combusted as described in Vandeputte *et al* (1996) with the graphite targets prepared following Slota *et al* (1987). The graphite targets were measured by Accelerator Mass Spectrometry (AMS) as described by Xu *et al* (2004). The SUERC laboratory maintains rigorous internal quality assurance procedures, and participation in international inter-comparisons (Scott 2003) indicate no laboratory offsets; thus validating the measurement precision quoted for the radiocarbon ages.

The results are given in table 1 below. The calibrated age ranges are determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.1 (Bronk Ramsey 2009), and quoted in the form recommended by Mook (1986) with the endpoints rounded outward to 10 years when the errors are 25 years or greater, and to 5 years where they are less than 25.

Table 1: radiocarbon dating results

Lab number	Material dated	Context	Date BP (1 sd)	Calibrated date (95.4% probability)
GU29527	Charred Seed: Poaceae	Context 005: fill of pit [004]	Failed	
SUERC-44526 (GU29528)	Charred Nutshell : Hazel (Corylus avellana)	Context 007: fill of pit [006]	4252 ± 29	2920-2760 cal BC
SUERC-44527 (GU29529)	Charcoal : Hazel (Corylus avellana)	Context 007: fill of pit [006]	4171 ± 27	2880-2640 cal BC
SUERC-44828 (GU29871)	Grain : Indeterminate cereal	Context 005 fill of pit[004]	1816 ± 35	Cal AD 90-320

These results show that pit [006] was indeed Neolithic and fell within the late Neolithic period. The similarity of the dates suggests that the material within the pit was contemporary or deposited over a short period of time. Although only a single date was obtained from pit [004] and this must therefore be less reliable it does suggest that the pit was not related to pit [006] but to the main phase of occupation of the settlement enclosure. The difference in date explains the difference in charred plant remain assemblages from these features noted above in section 6.

8. GENERAL DISCUSSION

Primary Record Numbers (PRN) have been obtained from Gwynedd Historical Environment Record (HER) for the new sites found during this evaluation. These are the Neolithic pit (PRN 36389, SH 46464 74750) and the settlement enclosure (PRN 36390, SH 46508 74710). The agricultural buildings on the site have also been given a PRN number (PRN 36388, SH 46534 74755).

The Site

Figure 2

The geophysical survey revealed an enclosure that measures roughly 130m by 110m. The evaluation trenches showed that it was defined by a single ditch. This ditch was quite variable in width and depth, being between 0.75m and 1.6m in width and between 0.22m and 0.70m in depth. This variation can probably be largely explained by differential truncation by ploughing but the ditch did seem to be unusually deep in trench 07. Just south of the trench the geophysical plot suggests a possible entrance and the deeper ditch may be related to this. The ditch is generally a broad V-shape in profile and no evidence for an accompanying bank or palisade was found. The enclosure was probably pentagonal in plan. The northern part of the enclosure was outside the surveyed area, but a fifth side would both fit with the layout as known and would provide a similar plan to other enclosed Romano-British settlements known on Anglesey. It is even possible that part of the existing hedge follows the line of the enclosure ditch. This boundary is shown on the 1840 tithe map (figure 14)and it is possible that it is of considerable antiquity and could have been created when the enclosure was still visible as an earthwork.

The geophysics suggests at least one entrance in the eastern side, one or more in the south-western side and trench 27 demonstrated that there was a narrow entrance at the western corner. At least two linear anomalies inside the enclosure run perpendicularly from one side and this suggests that they are contemporary with the enclosure. Trench 12 showed that one of these anomalies was a genuine ditch and it is assume that the other is too and that they provided a sub-division within the enclosure. However excavation across some of the other linear anomalies suggested that they were of geological origin and in some cases possibly animal burrows. These anomalies, unlike the ditches mentioned above, were at a slightly different alignment to the sides of the enclosure, supporting the suggestion that they were not related.

There appears to have been settlement within the enclosure with most activity apparently in the western part. One probable roundhouse has been identified. The geophysical survey does not indicate other roundhouses but there are numerous pits and other features, some of which may be smithing hearths as some evidence for smithing somewhere on the site has been detected.

The geophysics shows ploughing furrows across the site so it is likely that the archaeology has been truncated and the evaluation trenches supported this. It is therefore possible that there are other roundhouses or structures that are too truncated to be detected by the geophysical survey but which may still survive as postholes or other traces in the ground.

The dating evidence found suggests that this is a Romano-British settlement, with the height of the activity in the second century AD, but the Iron Age in this area is acermaic so datable finds are rare. It is possible therefore that the settlement originated in the Iron Age and that only a programme of radiocarbon dating after further excavation would reveal that. Equally post-Roman activity is very difficult to detect without radiocarbon dating. The duration of use of the settlement is therefore still to be established.

The evaluation has however revealed that there was much earlier prehistoric activity on the site as well. One pit can be dated to the late Neolithic period from finds and radiocarbon dates. The presence of a polished stone axe, possibly deliberately broken, within a small pit suggests ritual deposition. Groups or clusters of small pits, rarely over 1m in diameter, are a relatively common Neolithic site-type across Britain (Thomas 1991, 1999). They often contain domestic waste, and sherds of pots, rarely whole vessels, however unusual and high value items can be included, and there is often a high tool to waste ratio in the lithic assemblages. The impression is of midden material buried with a small number of other items added. The pits are too small for this to be waste disposal and it is generally thought that the pits represent "structured deposition" (Gibson 2003, 141) or "purposive filling" (Edmonds 1999, 18), indicative of ritual activity, but a ritual closely bound with domestic activity. However the pits are often found in isolation with no other settlement evidence close by. This may partly be due to differential survival, with slighter traces of settlement being lost to ploughing. A group of pits containing grooved ware pottery found near Penmynydd, Anglesey was also associated with postholes and possible hearth pits, although no structure could be defined (Davidson *et al* 2010). This site also produced a stone axe, although in this case it had been reused to pack a posthole, and was dated by radiocarbon assay to about 3000 cal BC, only a little earlier than pit [006] on the present site.

If pit [006] indicates the presence of a typical pit cluster then it might be expected that another two or three pits may survive nearby. However it is also possible that other pit clusters exist elsewhere on the site, and there is a slighter possibility of more extensive settlement evidence surviving. The confirmation by radiocarbon dating that the pit belonged to the late Neolithic makes it very unlikely that it was associated with a large building, such as are occasionally found in the early Neolithic. Pits, especially those containing stone axes, can be associated with henges (large circular monuments) in the later Neolithic but if such a monument had been present on the site it is highly likely that it would have been revealed in the geophysical survey.

Neither the geophysics nor the evaluation trenching revealed much to contribute to the understanding of the later development of the study area. However further documentary research has raised the importance of the ruined agricultural buildings (PRN 36388) on the northern boundary of the site. Richards and Davidson (1998) record the suggestion that these buildings may have been the original site of a farm called Pen-yr-Orsedd. The house of Pen-yr-Orsedd was located on the southern edge of Llangefni (SH 4613 7553) and the farm extended south along the eastern bank of Afon Cefni, becoming wider as it approached the marsh. The land was owned in 1840 by John Hampton Lewis of Henllys (Llangefni tithe map) and was still owned by him in 1868 (parliamentary borough map for Llangefni). The buildings in the development area are not shown on the 1840 tithe map (figure 14), but are on the 1889 OS County Series map. In 1900 when the farm was sold (sale catalogue, Anglesey Archives WF65a) the buildings are described as cow sheds but called Pen-yr-Orsedd Bach as if this was a subsidiary house on the farm (figure 15). The suggestion that this site was once a dwelling is further supported by the field being called Cae Hen-dy (old house field) in the sale catalogue. A house built after 1840 is unlikely to have been considered as old in 1900, so this raises the possibility that there had been a house there before 1840, perhaps not in use when the tithe map was drawn up and so not shown.

Tyddyn Pen-yr-Orsedd is mentioned in documents from at least 1608 (Carr 1992, 42), and on a map of medieval farms in Tregarnedd township Carr (1992, 20) places the dot for Pen-yr-orsedd on the location of the agricultural buildings without discussing his reasons for identifying this site. It seems possible that this is indeed the site of the original farmhouse of Pen-yr-Orsedd and that remains dating back at least to the 16th century might be expected. The scarcity of excavated sites of this date on Anglesey make this an important suggestion to investigate. This certainly indicates that the buildings need closer inspection and recording, but traces of an earlier house are likely to be buried, and this part of the site may have considerable archaeological potential.

Landscape

The enclosure lies on the end of a slight spur of land at between about 14m and 20m OD. The bedrock is limestone, although there is a patch of sandstones and conglomerates to the north on the edge of Llangefni. The bedrock is covered by Devensian till (Geology of Britain Viewer). The development area slopes down from the enclosure on the north-east side to the south-west, where the southern boundary is on the edge of Malltraeth Marsh (Cors Ddyga). The marsh was formerly an estuary and was regularly flooded until the late 18th century when drainage for grazing land started after an act of 1788 for dividing and enclosing the Malltraeth and Corsddyga Marshes. The embankment of Malltraeth Cob was first built in 1789 but was destroyed by high tides and another Act was passed in 1790 for a more effective embankment and drainage. The works were finished by 1796, but a further Act was passed in 1811 for more work on the embankment and drainage (Ramage 1987, 307-8). The Afon Cefni was canalised as part of these works.

The site lies at the head of the former estuary near the mouth of the Afon Cefni (figure 16), a position both accessible from the sea but within the heart of the agricultural land of Anglesey. Carr (1992, 21) notes that this has always been good agricultural land and this is likely to have been an advantageous position in many periods.

The most significant feature recorded in the area was "an immense Carnedd, or heap of stone" (Pennant 1781, 271). The descriptions of this suggest a Neolithic chambered tomb, but the site was largely demolished in the 19th century, leaving only a slight mound that was planted with trees. Richards and Davidson (1998) have considered the location of this site and identified a "low mound with five trees growing upon it". The first, second and third County Series OS maps show a group of trees in this location and the Google Earth photograph of 01/06/2009 shows that some of the trees still survive in front of the Anglesey County Council Offices. The identification of this low mound as the remains of the probable chambered tomb is supported by the name of the field in which it was located. In 1889 this field was called Parc Garnedd (cairn park) (*Sale of Craig y Don Demesne and Farms, June 27th and 28th 1889* [Anglesey Archives WF/46]). If the field was called after the farm or township of Tregarnedd then it might be expected to be called 'Parc Tregarnedd', whereas the recorded name suggests that it was the actual location of the cairn that gave the farm its name.

The Royal Commission Inventory (RCAHMW 1937, xlii) identifies the site of the probable chambered tomb with a heap of blacked stones found during ploughing found 330 yards NW of Tregarnedd. Richards and Davidson (1998) point out that this is likely to have been a burnt mound not the tomb and in fact a burnt mound (PRN 16073) was found during the watching brief on the extension to the Bryn Cefni Industrial Estate. This burnt mound (Smith and Kenney 2002) was located about 300m north of Llwyn Ednyfed (Tregarnedd Farm) but seems likely to be the same one referred to by the RCAHMW.

The destroyed chambered tomb is recorded on the Gwynedd HER as PRN 2733 but is located close to Llwyn Ednyfed. If Richards and Davidson are correct about its location, which seems very likely, then the grid reference needs to be corrected to SH 46472 75030. This places it 150m north of the northern corner of the present development area. The presence of a chambered tomb so close to the development area raises the importance of the Neolithic pit found on the site. The relationship of settlement to chambered tombs has not been studied in north-west Wales, largely due to the scarcity of settlement evidence, but an Early Neolithic rectangular timber building was found at Parc Cybi near Holyhead within 90m of the Trefignath chambered tomb, with several middle and late Neolithic pits within 200m of the tomb (Kenney *et al* 2011). It therefore seems highly likely that further Neolithic archaeology is present within the development area, although the late Neolithic date from pit [006] rules out the possibility that this was associated with an Early Neolithic rectangular timber building, which date in this area to about 3800 to 3600 cal BC.

Burnt mounds, generally of Bronze Age date, are a common site type on Anglesey and the discovery of one (PRN 16073) in the Industrial Estate shows that this part of Anglesey is no exception. Burnt mounds are usually situated close to streams or in wet areas. Although there are no streams on the development site there could be a spring line or zone where the water table is normally close to the surface, especially towards the lower, southern part of the site. The geophysical survey shows anomalies (c on figure 2) south of the sewerage trench at the southern end of the site. The size and position of these anomalies suggests that they are the remains of burnt mounds.

Although it is possible that burnt mounds were used for cooking and perhaps processing leather or textiles they generally do not seem to have been located very close to settlement sites (Kenney 2012). However they must have been near the edge of settled areas and perhaps the burnt mound (PRN 16073) could indicate that some traces of settlement might be expected somewhere in the general area, possibly closer to the shore of the estuary in a position not dissimilar to the enclosure. There is a standing stone about 2km east of the development site

(PRN 2737) and another about 1km to the south-west (PRN 2738), although the latter is not certainly prehistoric, a Bronze Age palstave was found in the Llangefni area (PRN 2683), and a bronze axe near Lledwigan (PRN 2736), so there are other hints of Bronze Age activity in this area (figure 16).

Little is known about settlement in the immediate area in the Iron Age or Roman period. A settlement, possibly of the Iron Age or Roman period, is suspected on Ynys Cefni after a saddle quern and muller were found here in about 1863 during railway construction (PRN 2728) (figure 16). Elsewhere on Anglesey there are numerous settlements both enclosed and unenclosed, with probably a great many more still to find that have been levelled by agriculture and are not detectable without geophysics or excavation. The location at the head of the former estuary would appear to be ideal for access by sea, but the site is also within an area of good agricultural land.

The Peboc enclosure is somewhat similar in shape to Caer Leb, near Brynsiencyn (PRN 3137), which was occupied possibly in the 2nd to 4th centuries AD; although Caer Leb is smaller and has multiple ditches (RCAHMW 1937, 103-104). The settlement of Din Lligwy (PRN 2132) is also defined by a pentagonal enclosure, although this is much smaller and is formed by a stone wall (RCAHMW 1937, 133-135). Although it may have been constructed earlier Din Lligwy was used in the 4th century AD. The sub-rectangular enclosure at Bryn Eryr, Llansadwrn (PRN 401) seems to have been built in the Iron Age but the site was used into then Roman period, even though the defences went out of use (Longley 1998, Longley *et al* 1998). The dating evidence from the Peboc enclosure does seem to be consistent with it being a Romano-British enclosed settlement site, although its large size and simple defences makes it rather different in character to these other sites. The ditch certainly does not seem to have been defensive and it is more likely that it was used to keep livestock in rather than attackers out. The larger area and suggestions of internal sub-divisions might support the suggestion that it was used for livestock as much as human habitation.

Its situation would also have been ideal for involvement in trade and possibly production of goods for trade. Apart from slight traces of smithing somewhere on the site the evaluation has not revealed any suggestions of this but further work could reveal it. Coal outcrops along the Malltraeth Marsh and was used in the Roman period and iron ore would have been available so iron working for more than domestic use might have been a possibility.

The Llangefni tithe map shows that the recent field system was a development of the field layout in 1840 (figure 14), with fields merely sub-divided rather than remodelled. In 1840 the development site would have been on the northern edge of a large field numbered 172 on the tithe map. The traces of field boundaries detected by the geophysical survey therefore predate the early 19th century and most probably the 18th century. In the medieval period the area was dominated by the high status moated site of Tregarnedd (PRN 2727) and it is not unreasonable to suppose that some of the field boundaries were part of the field system contemporary with this site. However it is notable that the geophysical anomalies interpreted as field boundaries in the southern part of field 1 and in field 3 are approximately aligned on the enclosure. The possibility that these represent fields contemporary with the enclosure must be considered and tested by in future excavations. Perhaps the faint geophysical anomalies (d, e and f on figure 2) are the medieval field boundaries and the better defined ones (g, h and i on figure 2) are Romano-British.

The possibility of early medieval activity on the site must not be forgotten and there are two known early medieval cemeteries in the areas. About 780m north-east of the development site a small cemetery of long cist graves was excavated in 2009 (Davidson *et al* 2010) and around 30 long cist graves were found in *circa* 1829 about 600m north-west of the site (PRN 2680). Early medieval settlement sites are very rare in north Wales so it is not possible to predict where settlement may be in relation to the cemeteries.

If the agricultural buildings in the north of the development area are the site of an earlier farmhouse then there may be potential for the development site to contribute significantly to the understanding of the medieval landscape in this area. The proximity of the moated site at Tregarnedd, associated with the descendants of Ednyfed Fychan, Llywelyn ab Iowerth's seneschal (Carr 1992), could mean that Pen-yr-Orsedd was richer and had more cosmopolitan connections than most small Anglesey farms. Archaeological remains could survive indicating the social and economic structure of the medieval township, and providing information on daily life not found in the documentary records.

9. CONCLUSIONS AND RECOMMENDATIONS

The geophysical survey and evaluation trenching has demonstrated that there is extensive and complex buried archaeology on the site. The main phase of activity seems to date from the Roman period and is represented by a large settlement enclosure, but prehistoric archaeology was also detected and there may be remains of a late medieval farmhouse. The settlement enclosure, which was used into the 2nd century AD, was probably pentagonal in shape and appears to have contained at least one roundhouse as well as internal ditches, many small pits and other activity. A small pit is probably Neolithic in date, with another adjacent, possibly contemporary pit. Documentary research supported the possibility that agricultural buildings within the development area are on the site of an earlier dwelling, possibly dating back to the 16th century.

The Roman period settlement enclosure is of national importance and if it had survived as an upstanding earthwork it is likely that it would have been a Scheduled Ancient Monument. The evaluation demonstrated that although any bank has been levelled and the buried features truncated by ploughing to some extent complex archaeological deposits do still survive and have a very high potential to provide nationally important information on this type of site.

The full importance of the Neolithic pit and the possible 16th century farmhouse is not yet known, and further work would be required to establish this. There is also the possible suggestion on the geophysical survey of Bronze Age burnt mounds in the southern end of the site. These are a fairly common site type and would be considered to be of regional importance if found.

The number of evaluation trenches excavated was small considering the size of the site. Further trenching might be used to investigate other targeted areas especially the ditches in field 3, the possible burnt mounds and the site of the possible 16th century farmhouse. They could also be used to search more extensively for prehistoric activity and to test whether areas with few anomalies on the geophysical survey are genuinely lacking in archaeology.

However the results obtained so far indicate that the extent and importance of the archaeology requires a large scale mitigation response and it is unlikely that further trenching would alter that conclusion. Both geophysics and evaluation trenching are not particularly good at detecting small pits and postholes of the type that could make up much of the potential Neolithic activity on the site, so further work of this sort may not give an accurate impression of the amount of early archaeology present. It would therefore be recommended that a staged programme of archaeological mitigation is undertaken starting with a strip, map and sample investigation over all areas to be subjected to groundworks for the development. This would involve the removal of the ploughsoil with a mechanical excavator under constant archaeological control down to the natural glacial deposits or to the top of archaeological layers or features. Any features identified during this process would be evaluated. Simple, isolated features would be excavated and recorded as part of this initial investigation process but a further detailed mitigation strategy would have to be agreed for any complex or extensive archaeology to allow for its excavation and recording. It is likely that most, if not all, features inside the enclosure will require full excavation and at least 10% of the enclosure ditch should be excavated, resulting in a detailed excavation programme that might be expected to continue for several months.

It is also recommended that the upstanding buildings on the site are subjected to detailed recording including plans and elevation drawings to detect any earlier surviving building remains. If the buildings are to be removed a strip and map investigation should be undertaken on this area as well and any earlier remains found should be excavated and recorded.

It must be noted that agreeing to the fieldwork commits the developer to the full analysis, reporting and publication of any significant archaeology found. Depending on the nature of the archaeology this phase can be as expensive as the fieldwork. The exact nature and extent of the programme will have to be agreed with Gwynedd Archaeological Planning Service.

As the whole of the development area may be subjected to groundworks it is recommended that the whole area is investigated archaeologically as above. The importance of the archaeology requires that it is fully excavated to national standards, but there is no basis to argue for preservation *in situ*. Although several sites similar to the settlement enclosure are protected by scheduling these are sites with upstanding earthworks. Where sites of a similar importance have been found during development elsewhere on Anglesey, and the development could not be altered to avoid them, these have been recorded by excavation and no requirement has been imposed for them

to be preserved *in situ*. It is therefore assumed that mitigation by excavation and record, including full publication, is the appropriate approach for this project.

Summary of recommendations

Site	PRN	Evaluation	Further mitigation
Potential features associated with Neolithic pit	36389	Strip, map and sample investigation	Full excavation of significant archaeological features and deposits
Iron Age/Roman period settlement enclosure	36390	Strip, map and sample investigation	Full excavation of significant archaeological features and deposits
Agricultural buildings/possible site of 16th century farm	36388	Strip, map and sample investigation of any areas to be disturbed	Detailed recording of upstanding buildings, full excavation of significant archaeological features and deposits
Other potential features including possible burnt mounds		Strip, map and sample investigation	Full excavation of significant archaeological features and deposits

10. REFERENCES

Armit, I., Murphy, E., Nelis, E. and Simpson, D. (eds), 2003. *Neolithic settlement in Ireland and western Britain*, Oxford

Bronk Ramsey, C., 2009. 'Bayesian analysis of radiocarbon dates', *Radiocarbon*, **51**(1), 337–60

Carr, A.D., 1992. 'Tregarnedd', *Anglesey Antiquarian Society and Field Club Transactions*, 20-50

Davidson, A, Jones, M, Kenney, J, Rees, C, and Roberts, J, 2010. Gwalchmai Booster To Bodffordd Link Water Main and Llangefni to Penmynydd Replacement Main: Archaeological Mitigation Report, unpublished GAT report 885

Edmonds, M., 1999. *Ancestral Geographies of the Neolithic: landscapes, monuments and memory*. Routledge

Evans, R., 2011. *Peboc Biomass Energy Plant, Llangefni, Anglesey: archaeological assessment*, Unpublished Gwynedd Archaeological Trust Report **970**

Gibson, A., 2003. 'What do we mean by Neolithic settlement? Some approached 10 years on', in Armit *et al* (eds) 2003, 136-145

Kenney, J., 2012. 'Burnt mounds in north-west Wales: are these ubiquitous features really so dull?', in WJ Britnell and RJ Silvester (eds) *Reflections on the Past*, Cambrian Archaeological Association, Welshpool, 254-279

Kenney, J, McGuinness, N, Cooke, R, Rees, C, and Davidson, A, 2011. *Parc Cybi, Holyhead: post excavation assessment of potential report*. Unpublished Gwynedd Archaeological Trust Report **954**

Longley, D., 1998. Bryn Eryr: an enclosed settlement of the Iron Age on Anglesey, *PPS* 64, 225-273

Longley, D., Johnstone, N. and Evans, J., 1998. 'Excavations on two farms of the Romano-British period at Bryn Eryr and Bush Farm, Gwynedd', *Britannia* 29, 185-246

Mook, W. G., 1986. 'Business meeting: Recommendations/Resolutions adopted by the Twelfth International Radiocarbon Conference', *Radiocarbon*, **28**, 799

Pennant, T., 178. *Journey to Snowdonia*

Ramage, H, 1987. *Portraits of an Island: Eighteenth Century Anglesey*, Anglesey Antiquarian Society and Field Club, Llangefni

RCAHMW, 1937. *Inventory of Ancient and Historical Monuments on Anglesey*, HMO, London

Richards, A. and Davidson, A., 1998. *Bryn Cefni Industrial Park Extension: archaeological assessment and evaluation*, Unpublished Gwynedd Archaeological Trust Report 302

Stenhouse, M. J. and Baxter, M. S., 1983. '^{14}C reproducibility: evidence from routine dating of archaeological samples', *PACT*, **8**, 147–61

Thomas, J., 1991. *Rethinking the Neolithic*. Cambridge University Press

Thomas, J., 1999. *Understanding the Neolithic*, Routledge

Slota Jr., P. J., Jull, A. J. T., Linick, T. W. and Toolin, L. J., 1987. 'Preparation of small samples for ^{14}C accelerator targets by catalytic reduction of CO', *Radiocarbon*, **29**(2), 303–06

Smith, G. and Kenney, J., 2002. 'Excavation of a middle Bronze-Age burnt mound at Bryn Cefni, Llangefni, Anglesey'. *Archaeology in Wales* 42, 29-36.

Vandeputte, K., Moens, L. and Dams, R., 1996. 'Improved sealed-tube combustion of organic samples to CO_2 for stable isotope analysis, radiocarbon dating and percent carbon determinations', *Analytical Letters*, **29**(15), 2761–73

Xu, S., Anderson, R., Bryant, C., Cook, G. T., Dougans, A., Freeman, S., Naysmith, P., Schnabel, C. and Scott, E. M., 2004. 'Capabilities of the new SUERC 5MV AMS facility for ^{14}C dating', *Radiocarbon*, **46**(1), 59–64

Internet resources

Geology of Britain Viewer, British Geological Survey, http://mapapps.bgs.ac.uk/geologyofbritain/home.html, accessed 22/01/2013

Google Earth

Maps and documents

Gwynedd HER

Ordnance Survey County Series 25 inch maps Anglesey sheets XVIII.3 (1889, 1900, 1920) and XVIII.7 (1888, 1900, 1920)

Anglesey Archives

Tithe map and schedule for the parish of Llangefni (c.1840)

Parliamentary borough map for Llangefni (1868)

Particulars and plan of a sale of that exceedingly choice freehold farm known as Pen-yr-Orsedd (1900) [reference: WF65a]

Sale of Craig y Don Demesne and Farms, June 27th and 28th 1889 [reference: WF/46]

APPENDIX I. DETAILS OF EVALUATION TRENCHES

Trench 05
Grid reference: SH 4644 7476
Trench size: 20.0m x 2.00m
Max Depth: 0.6m
Orientation: ENE-WSW
Notes: The trench was excavated as a control trench, targeting an area depicted on the geophysical survey as being devoid of anomalies. No archaeological features were identified.

Context	Depth below surface (m)	Description
001	0m	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.38	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional small to medium sized sub-angular stone inclusions.
003	0.60	Natural – characterised as a yellow grey-brown, firm silt-clay with lenses of orange sand and frequent small to medium sized angular stone inclusions.

Trench 06
Grid reference: SH 4646 7475
Trench size: 20.0m x 2.00m
Max Depth: 0.84m
Orientation: ENE-WSW
Notes: Trench 06 was positioned across a negative anomaly (possible bank or earthwork) and also a possible enclosure ditch.

Context	Depth below surface (m)	Description
012	0m	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
011	0.3	Ploughsoil/lower topsoil – loose very dark grey-brown silty clay with frequent small and medium rounded stones.
013	0.44	Natural – a yellow grey-brown, firm silt-clay with lenses of orange sand and frequent small to medium sized angular stone inclusions.
004	0.4	Pit/posthole. Sub-circular in plan and measured 0.82m in length, 0.7m in width, and 0.32m in depth orientated NE-SW. The sides were concaved with a flat base.
005	0.4	Fill of [004]. A mid to dark grey-brown silt-clay with occasional pebbles. Two large sub-angular stones were located towards the south-western side of the fill.
006	0.4	Pit/posthole. The feature was sub-circular in plan and measured 0.65m in length, 0.37m in width, and 0.2m in depth orientated NE-SW. The sides were near vertical and slightly concaved with a flat to mildly undulating base.
007	0.4	Fill of [006]. Dark grey-brown, firm silt-clay with occasional small to medium sub-rounded stone inclusions and flecks of charcoal. A single flat stone was located in the base of the feature. The fill contained a broken stone axe (01), a piece of worked flint (02), and a sherd of Neolithic ceramic (09).
008	0.4	Ditch. Straight in plan and measured 0.75m in width, and 0.42m in depth orientated NE-SW. The sides were concaved on the west and convex on the east, with a flat base. The ditch continued beyond the confines of the trench.
009	0.4	Fill of [008]. Very dark grey-brown, firm silt-clay with occasional small to medium sub-rounded and sub-angular stone inclusions. No artefacts were found.
010	0.4	Ditch. Straight in plan and measuring 0.26m in width, and 0.12m in depth orientated NE-SW. The sides were concaved with a flat base cut. The gulley continued beyond the confines of the trench.
011	0.4	Fill of [010]. Very dark grey-brown, loose silt-clay with frequent small to medium rounded stone inclusions. No artefacts were found.

Trench 07
Grid reference: SH 4646 7469
Trench size: 20.0m x 2.0m
Max Depth: 0.8m
Orientation: NE-SW
Notes: Trench 07 was positioned across a probable enclosure ditch and possible pit features in the geophysics.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.1	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional small to medium sized sub-angular stone inclusions.
031	0.4	Natural – Loose at N end and soft at S end, mid to light red-brown silty clay with occasional stones. Merges into fragmented bedrock at N end of trench.
019	0.35	Pit - roughly circular in plan and measuring 2.4m in width, and 0.35m in depth orientated NW-SE. The sides were flat and straight with a flat base cut through the glacial substrata deposit (031). The feature continued beyond the confines of the trench.
020	0.35	Fill of [019]. Dark, slightly red grey-brown, moderate to soft silt-clay with infrequent medium sub-rounded stone and charcoal fleck inclusions. The fill produced a piece of iron, four sherds of Roman samian-ware, three fragments of a possible quern stone, a sherd of Romano-British orange-ware, a sherd of Romano-British black-burnished ware, two sherds of Romano-British grey-ware, and a piece of bone. The fill appeared to be cut by a later ditch [021].
021	0.3	Ditch – Cut the fill of pit [019]. Straight linear feature measuring 1.6m in width, and 0.7m in depth, orientated N-S. The sides were flat to slightly concaved, with a flat base cut through the glacial substrata deposit (031). The feature continued beyond the confines of the trench.
022	0.3	Fill of [021]. Dark grey-brown, moderate to soft silt-clay with occasional large angular stone and charcoal fleck inclusions. The fill produced a sherd of Romano-British grey-ware ceramic (sf?), along with half of a copper alloy decorated bracelet (sf56), and two pieces of bone (sf?).
027	0.35	Pit? - roughly circular in plan and measured 2.3m in width, and 0.35m in depth orientated N-S. The sides were concaved to the west and slightly undercut to the east, with a flat base cut through the glacial substrata deposit (031). The feature continued beyond the confines of the trench.
028	0.35	Fill of [027]. Dark red-brown, soft silt-clay with infrequent medium sub-rounded stone, slate, and charcoal fleck inclusions. The fill produced piece of bone, a sherd of probable Roman glass, a fragment of degraded probable Romano-British ceramic, and two pieces of slate.

Trench 08
Grid reference: SH 4647 7468
Trench size: 30.0m x 2.0m
Max Depth: 0.6m
Orientation: NE-SW
Notes: Trench 08 was positioned across a linear positive anomaly, interpreted as a possible enclosure ditch and some smaller linear anomalies interpreted as modern disturbance.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.15	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional

		small to medium sized sub-angular stone inclusions.
072	0.25	Glacial silt – mid red-brown, firm silt with occasional small sized angular stone inclusions. Restricted to SW end of trench
073	0.44	Bedrock - broken and fissured bedrock, with some gravel. Covers much of the trench.
053	0.3	Ditch - Straight linear feature measuring 1.05m in width, and 0.22m in depth orientated NW-SE. The sides were slightly concaved with a flat base cut through the glacial substrata deposit (072) to the south, and through the fragmented bedrock (073) to the north. The feature continued beyond the confines of the trench.
052	0.3	Fill of [052]. Mid-brown, firm silt-loam with occasional small and medium sized angular stone, and very occasional charcoal fleck inclusions. No finds

Trench 09
Grid reference: SH 4649 7469
Trench size: 20.0m x 2.0m
Max Depth: 0.7m
Orientation: NW-SE
Notes: Trench 09 was positioned across a positive geophysical anomaly, interpreted as a possible ditch or pit feature.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm loam with occasional small rounded pebble inclusions.
002	0.15	Ploughsoil – dark brown, firm silt-loam subsoil with occasional small to medium sized sub-angular stone inclusions
054	0.3	Possible wall – a linear deposit of stones measuring 1.4m in width, and 0.15m in height orientated NE-SW. The feature was made up from a deposit of stones up to 0.35m in length, mostly sub-angular and of various rock types. The stones were quite haphazardly placed and only one course thick. The stones were loosely bonded by a brown silt-loam, and laid upon a buried soil layer (056). The feature continued beyond the confines of the trench.
055	0.2	Possible wall – a linear deposit of stones measuring 0.6m in width, and 0.2m in height orientated NE-SW. Approximately 0.8m of the feature was exposed, with the rest continuing into the NE trench edge. The deposit was made up from stones up to 0.3m in length, mostly sub-angular and of various rock types. The stones were quite carefully laid and sorted. The stones were loosely bonded by a brown silt-loam, and laid on (057).
056	0.3	Buried soil - mid-brown, friable silt-loam with occasional small sized stone inclusions. This deposit appeared to be a buried soil horizon and contained pieces of red, burnt clay and occasional pieces of animal bone. Rare flecks of charcoal were also observed.
057	0.3	Buried soil - mid-brown, friable silt-loam with numerous flecks of burnt clay and lenses of yellow-brown silt. This deposit appeared to be a buried soil horizon and laid over the fill of an earlier post-hole [060].
058		Main fill of posthole [060] – friable brown silty loam, very similar to (057) but not as clayey. No artefacts were found.
059		Packing stones within posthole [060] - medium sized sub-angular stones, with one particularly large stone measuring 0.6m in length, 0.36m in width, and 0.25m in depth carefully placed level within the cut. This large stone had been wedged with the smaller angular stones, presumably as packing stones for a post. A brown silt-loam matrix was present between the stones.
060	0.3	Posthole - elongated sub-circular shape in plan and measuring 0.95m in

		length, 0.68m in width, and 0.42m in depth orientated NE-SW. The sides were near vertical with a flat base, cut through the buried soil (056).
066	0.3	Possible continuation of or tumble from wall (055) - thin layer of small stones at the interface between the ploughsoil and buried soil (057), seen only in section.
067	0.7	Boulder clay - red-brown, fairly malleable silt-clay with numerous small and medium sized angular stones
068		Bedrock – broken into fairly small fragments with fine very dark brown silt over and between the stones.
069		Bedrock – compact, hard bedrock, very fissured but not as broken up as (068).

Trench 10
Grid reference: SH 4649 7472
Trench size: 20.0m x 2.0m
Max Depth: 0.45m
Orientation: NE-SW
Notes: Trench 10 was positioned across a linear positive anomaly, possibly a ditch.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm loam with occasional small rounded pebble inclusions.
002	0.11	Ploughsoil – dark brown, firm silt-loam subsoil with occasional small to medium sized sub-angular stone inclusions
003	0.45	Glacial deposits - a red-brown, fairly malleable silt-clay with numerous small and medium sized angular stone inclusions
025	0.1	Possible hedge line or badger set – roughly linear in plan and measured 1.15m in width, and 0.47m in depth orientated NW-SE and continuing beyond the confines of the trench. The sides were slightly convex with an undulating base, cut through the ploughsoil horizon (002).
026	0.1	Fill of [025] - mid to dark red-brown, fairly firm clay-silt with fairly frequent medium sized sub-angular stone inclusions. No artefacts recovered.

Trench 11
Grid reference: SH 4650 7474
Trench size: 20.0m x 2.0m
Max Depth: 0.32m
Orientation: NW-SE
Notes: Trench 11 was positioned across a banked sub circular enclosure anomaly.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark red-brown, firm loam with occasional small rounded pebble inclusions.
002	0.10	Ploughsoil – mid orange-brown, firm clay-silt subsoil with occasional small to medium sized sub-angular stone inclusions
029	0.32	Glacial deposits - a mid-brown-yellow, firm clay with occasional small sized angular stone inclusions
014	0.3	A rubble deposit, located between ditches [018] and [017], measuring 6.84m in width and 0.24m in depth, continuing beyond the confines of the trench. The deposit contained a very frequent concentration of small and medium sized sub-angular stones, bonded by a dark grey-brown, moderately compacted silt-clay with occasional charcoal inclusions. The deposit produced a sherd of degraded Romano-British grey-ware and a rim sherd of Romano-British mortaria. Towards the centre of the trench

		and against the north-eastern trench edge, the deposit overlaid deposit (023) *see below*, and overlaid the glacial substrata (029) elsewhere.
015	0.2	Fill of [017] - dark brown-grey, moderate to loose silt-clay with frequent small sized, unsorted angular stone and charcoal fleck inclusions. The fill produced a sherd of Roman samian ware, a piece of iron, and many pieces of bone.
016	0.3	Fill of [018] - mid red-brown, moderate to loose silt-clay with frequent small and medium sized, unsorted sub-rounded stone inclusions. A single piece of bone was recovered from the fill.
017	0.2	Cut for stone deposit (015) - linear in plan within the confines of the trench, and measured 3.2m in width, and 0.48m in depth orientated NE-SW and continuing beyond the confines of the trench. The sides were slightly convex with a slightly undulating base, cut through the glacial horizon (029). Channel in base of [017] recorded as [024], but these are essentially the same feature, both filled by (015)
018	0.3	Cut for stone deposit (016) - linear in plan within the confines of the trench, and measured 0.7m in width, and 0.24m in depth orientated NE-SW and continuing beyond the confines of the trench. The sides were slightly convex with a slightly undulating base, cut through the glacial horizon (029).
023	0.35	A rubble deposit, located towards the centre of the trench and continuing into the north-eastern trench edge, measuring 1.7m in width and 0.25m in depth. The deposit contained a very frequent concentration of medium and large sized angular stones, bonded by a dark grey-brown, loose silt-clay. The deposit produced a robust iron nail and piece of bone. This deposit lay under stony deposit (014).
024		Part of [017] – deeper channel in base of [017]
030		Group number for circular geophysical anomaly – in the ground this feature seemed to be formed by cuts [017] and [018] filled with stone. The geophysics actually seems to have been detecting the areas between the stone as negative features, i.e. banks. The stone spread in the centre (014) seems to have been detected as a negative feature (pit).

Trench 12
Grid reference: SH 4654 7472
Trench size: 20.0m x 2.0m
Max Depth: 0.55m
Orientation: NW-SE
Notes: Trench 12 was positioned to target two linear positive anomalies, interpreted as possible ditches.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.21	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional small to medium sized sub-angular stone inclusions.
035	0.55	Natural – mid orange-brown, loamy silt with very infrequent small angular stone.
036	0.3	Ditch – straight ditch running NE-SW across trench, measuring 0.95m wide and up to 0.18m deep.
037	0.3	Fill of [036] – fairly soft dark red-brown silty-clay with infrequent small angular stones. Fragments of bone and one black-burnished ware fragment found.

Trench 13
Grid reference: SH 4659 7468
Trench size: 20.0m x 2.0m
Max Depth: 0.6m

Orientation: E-W
Notes: Trench 13 was positioned to target two linear positive geophysical anomalies, interpreted as two ditches.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.22	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional small to medium sized sub-angular stone inclusions.
048	0.60	Natural – soft mid orange-brown, loamy silt with occasional small and medium angular stones.
049	0.52	Ditch – straight ditch running NE-SW across trench, measuring 1.4m wide and up to 0.3m deep.
050	0.52	Fill of [049] – soft mid red-brown clayey-silt with occasional small angular stones. No finds or charcoal.
051	0.30	Remains of possible wall - Three large sub-angular stones in a line orientated N-S in N half of trench.

Trench 27
Grid reference: SH 4659 7468
Trench size: 20.0m x 2.0m
Max Depth: 0.6m
Orientation: E-W
Notes: Trench 27 was positioned to target a possible gap in the enclosure ditch identified in the geophysical survey.

Context	Depth below surface (m)	Description
001	0	Topsoil – dark grey-brown, firm silt-clay with occasional small rounded pebble inclusions.
002	0.2	Ploughsoil – a mid-yellow-brown, firm silt-clay subsoil with occasional small to medium sized sub-angular stone inclusions.
062	0.5	Natural – firm mixed yellow, orange, and light-brown, clay interspersed with solid bedrock. Occasional medium sub-rounded stones.
033	0.5	Ditch – straight ditch running SE-NW across trench, with a rounded terminus at the SE end. Measures 1.16m wide, up to 0.46m deep, and 1.7m is visible in the trench.
034	0.5	Primary fill of [033] – mid-light red-brown gritty silty-clay with frequent grit and small pebbles. Small fragment of black-burnished ware.
038	0.5	Terminus of probable ditch – slightly irregular rounded cut with a steep NW side and more gentle E side. 0.6m wide, 0.21m deep and 0.9m of length exposed in trench. Aligned SW-NE.
039	0.5	Primary fill of [038] –mid red-brown silty-clay with occasional small angular pebbles. No finds.
040		Natural feature, not a cut.
041		Collection of stones in the natural, originally recorded as fill of [040].
042		Natural feature, not a cut.
043		Collection of stones in the natural, originally recorded as fill of [042].
061		Secondary fill of [038] –mid orange-brown clayey-silt with no inclusions. No finds.
063		Secondary fill of [033] – dark red-brown clayey-silt with occasional medium sub-rounded stones. No finds.
064	0.5	Stakehole – small sub-circular cut with steep, tapering sides. 0.18m diameter and 0.11m deep.
065	0.5	Fill of [064] – mid-light orange-brown silty-clay with no inclusions. No finds.
070		Stony deposit only seen in section. Fairly firm medium grey gritty silty

		clay with frequent small angular stones.
071		Lower ploughsoil/relict soil – medium red-brown clayey-silt with occasional gravel. Cut through by ditch [033]

APPENDIX II: SPECIALIST REPORTS

Appendix II.1 Prehistoric Pottery
Frances Lynch

Find 009 from context 007, fill of pit [006], trench 06
This is a very unusual profile for a rim; the top is markedly concave and there is a sharply defined step below it which seems to be on the inside of the pot. The sherd is small (37 x 20 x 11mm) but the curvature is sufficient to be convincing and to suggest a pot of 240-280 mm diameter. The outside is plain and has a very slight inward curve at the top. The fabric has a slightly soapy feel and is uniformly brown throughout. It appears slightly vesicular but there are occasional stone grits.

This is a very puzzling pot. In spite of the apparent vesicularity I think it is later rather than earlier Neolithic. The complex rim is slightly reminiscent of those on the Grooved Ware bowls from the pipeline work at Penmynydd and the earlier excavations at Capel Eithin, not far distant from Llangefni.

Find 029 from context 015, fill of ditch [017], trench 11
A red-orange featureless sherd (26 x 24 x13mm) with angular grits giving a roughish inner surface. The outer surface is badly eroded. This is prehistoric rather than Roman, and could be later Neolithic but is not diagnostic.

Appendix II.2 Romano-British Pottery
Peter Webster

Catalogue by trench and context
Trench 07
Context 020, fill of pit [019]

SF 011	Samian bowl, form 31 or 31R in an orange fabric, probably an East Gaulish product. Mid-late 2nd century.
SF 012	Samian form 33 Central Gaulish. Does not join SF 013-4 but possibly part of same vessel.
SF 013	Samian, form 33 Central Gaulish. The form is current throughout the Central Gaulish exporting period but is most popular in the Antonine period. Joins SF 014
SF 014	Samian, form 33 Central Gaulish. Joins SF 013
SF 017	Samian, form 33, burnt, but probably Central Gaulish.
SF 018	Basal fragment from, a dish or bowl in Black-burnished Ware. The underside shows part of a curving line, suggesting that this is part of a dish.
SF 021	BB jar sherd probably from near the base. There is faint evidence for acute angled lattice suggesting a 2nd century date.

Context 022, fill of ditch [021]

SF 024	BB jar sherd, burnt orange buff in places.

Context 028, fill of pit/ditch terminus [027]

SF 031	A small fragment of orange pottery with greyish surfaces and plentiful sandy grits. Probably Roman.

Trench 11
Context 014, rubble deposit

SF 037	Abraded fragment of soft pottery in light grey. Probably from a jar and probably Roman.

SF 036 Rim fragment of mortarium in granular light buff with a slightly pink-grey core. The likely source is Verulamium. The bead has broken above the flanged rim. Trituration grits are missing. Cf. Frere 1972, no.1043 (mid-late 2nd century).

Context 015, fill of ditch [017]

SF 004 Samian dish, Central Gaulish form 18/31/ c.120-150

Trench 12

Context 037, fill of ditch [036]

SF 043 Bead rim dish in Black-burnished ware. Cf. Gillam 1976, no.68 (early-mid 2nd century)

Trench 27

Context 034, fill of ditch [033]

SF 046 Black-burnished Ware jar fragment

Unstratified

SF 040 Two fragments of fired clay; probably burnt daub.

General Comments

Despite its small size, this collection appears to be remarkably consistent. Where they can be dated, the pottery sherds all fall into a second to early third century bracket. Most contexts only produced single or a few sherds with only the ditch fill (020) yielding more. But all seem to fall within a fairly narrow date range. The presence of a single sherd of East Gaulish samian and Central Gaulish of a single form, the conical cup Dr.33 hints at a mid-2nd to early 3rd century date but is not definitive. Those Black-burnished Ware vessels which can be dated are again 2nd century and would not be out of place in the mid to late century. The fragmentary Verulamium mortarium is of similar date. The only other clue is in the proportions of Black-burnished ware to other kitchen wares. BB1 tends to increase in quantity on all Welsh sites across the second century. We would expect an occupation of the first half of the century to have more local kitchen wares and fewer Black-burnished wares than one occupied at the end of the century. The proportions here would be more suitable for the second half of the century, but, with such a small collection, these can be no more than indications. It seems safe to date the collection as a whole to the 2nd to early 3rd century and to suggest the probability that most or all of the activity fell within the second half of the second century.

Leaving aside two fragments of what is probably burnt daub, this small collection includes 5 sherds of Black burnished ware and 6 of samian, with only 3 in other fabrics of which one was the only mortarium fragment. The percentage of fineware as compared to kitchenware seems unusually high, particularly for a rural site, but this may be due to the fact that at least 3 of the samian fragments probably belong to the same vessel. Nevertheless we may suggest a rural site of moderate rather than subsistence status.

Appendix II.3 Lithics
George Smith

Summary
The objects come from three contexts; several pieces of worked flint and a stone axe from context (07), a flint flake from context (14) and a worked stone object from context (20). These are summarised in Table 1 and described below.

Table 1 Summary of objects

Find No.	Context	Cut number and feature type	Trench	Material	General type
01	07	Pit [06]	06	stone	Polished axe fragment
02	07	Pit [06]	06	flint	Waste flake/Utilised piece
03	07	Pit [06]	06	stone	Natural stone
07	14	Rubble deposit	11	chert	Waste flake (edge chip)
15	20	Pit [019]	07	stone	Natural boulder fragment
16	20	Pit [019]	07	stone	Natural boulder fragment
33	28	Pit [027]	07	slate	split slate fragment
34	28	Pit [027]	07	slate	split slate fragment
49	07	Pit [06]	06	flint	utilised piece fragment
50-1	07	Pit [06]	06	flint	flake fragment
50-2	07	Pit [06]	06	flint	micro flake
50-3	07	Pit [06]	06	flint	micro chip
51	07	Pit [06]	06	flint	core fragment/reject
52	07	Pit [06]	06	flint	utilised piece
53	07	Pit [06]	06	flint	irregular piece
54	07	Pit [06]	06	flint	utilised retouched piece fragment
56	20	Pit [019]	07	stone	crescentic object

Description
Dimensions are given in the order Length; Breadth; Depth. For flints this is in the normal order of length perpendicular to the platform, width parallel to the platform etc. A number in brackets denotes an incomplete dimension, i.e. a broken piece.

Find no. 01. Polished axe fragment. Probably Graig Lwyd rock. A well-preserved and sharp blade fragment of a very thin and narrow all-over ground and polished Neolithic axe. The sides are separately ground with slight facets. It has broken across the mid-part with a simple straight snap break. The edge is sharp and almost undamaged, despite being thin and delicate, suggesting that it has lain undisturbed in its context since burial. Such narrow axes are usually classified as chisels, although in this case it is too thin and delicate to have been used as a chisel. It is unusually small with an original length of *c*. 100mm, possibly a votive item. 47mm long (incomplete), 41mm wide and 12mm deep.

Find no. 02. Waste flake/Utilised piece. Mid-grey slightly mottled flint. Tertiary waste flake with a pronounced, hammer-struck bulb and a plain platform. The distal end has a sharp, narrow point but this is accidental, not produced by secondary working, although it may have been used as an ad hoc awl and there is some possible slight polish on the tip. 37mm long, 16mm wide and 4mm deep.

Find no. 03. Natural stone, possible manuport. An unusual natural stone with cavities caused by selective weathering. As it derives from a context containing prehistoric objects including a Neolithic axe it is likely to have been collected anciently as a curiosity.

Find no. 07. Waste flake (edge chip). Blue-black chert, very fresh. A secondary flake with some smooth cortex. 9mm long, 16mm wide and 3mm deep.

Find no. 015. Natural boulder fragment. Two recently broken joining fragments from a split boulder of conglomerate, retaining part of the sub-rounded boulder surface. Pieces of such conglomerate are found widely across Anglesey as erratics.

Find no. 016. Natural boulder fragment. A smaller fragment of boulder of the same conglomerate as 015 and probably part of the same boulder.

Find nos 033 and 034. Two split slate fragments. Both probably originally part of one larger slab. Both *c*. 19mm thick and with one naturally split bevelled edge. Quite good quality slate and not belonging to the local geology so must be imported. Not obviously medieval or post-medieval roofing slate because these belong to a thick and irregular slab so probably part of a post-medieval slate fence or wall.

Find no. 49. Mid grey flint. A narrow primary blade mid-piece with fine alternate side microchipping and possibly some wear polish. (20); 7; 3.

Find no. 50-1. Mid-grey-brown flint. A primary flake or chip fragment with concave thin unrolled creamy cortex. 17; 10; 3.

Find no. 50-2. Mid-grey-brown flint. A tertiary micro flake. 6; 4; 1.

Find no. 50-3. Mid-grey-brown flint. A tertiary microchip. 3; 5; 2.

Find no. 51. Grey-brown flint. A core fragment or reject with partially rolled thin creamy cortex as in no. 50-1. 38; 34; 18.

Find no. 52. Mid-grey flint with light grey mottles. The snapped-off tip edge of a larger tertiary flake, possibly snapped as a result of utilisation of that flake. (10); 17; 4.

Find no. 53. Grey-brown flint. An irregular tertiary piece, probably just an abnormal flake due to impurities in the flint. Fresh and sharp. 13; 18; 3.

Find no. 54. Mid-grey flint with light grey mottles. Probably part of the snapped-off edge of a convex end scraper. It also has micro flaking along one of the snapped edges showing that the piece was re-utilised. 23; 12; 5.

Find no. 56. A thin crescentic, ground and polished shape made on a hard igneous stone, for which geological identification is need, but possibly blue spotted dolerite. The object is penannular, approximately circular, 36.5mm by 32.5mm with a central perforation that is oval, 16mm by 14mm. It has been carefully ground to shape and polished. The greatest thickness at the base of the crescent is 7mm, then tapers down towards the tips of the crescent, which are slightly damaged by light chipping. The main body of the crescent is rounded to the outside but has a neat facet line around the inside. Together with the deliberate tapering this indicates that the object is not just a perforated disc that has worn through, for example by long suspension.

Comments

Flint: The raw material is almost certainly all derived from fluvio-glacial rolled pebbles that could be sourced on Anglesey, although originating from geological beds much further away. It is of rather poor quality, limiting the quality of workmanship. There only one fragment of an actual tool, a convex end scraper. This has been utilised after breaking and one other piece shows similar utilisation. The type of utilisation is fine, even, abrupt microchipping and probably derives from scraping of a soft to medium material such as wood or bone. There are no pieces that are diagnostic of date but the lack of imported material and utilisation of quite small irregular pieces suggests an Early Neolithic date, comparable to the first phase at Trefignath (Healey 1987). The occurrence of several pieces, some clearly fresh, some utilised, in one pit indicates the presence of activity, and probably settlement on the site that may be more extensive.

Stone: No direct parallels have so far been found for the crescentic object. Its closest parallels in form and size are with Roman crescentic brooches of 1st to 3rd century AD, made of bronze, often with inlaid enamel decoration (Bayley and Butcher 2004; Wheeler 1930. They usually have a clip pin and often a small ring on the base of the crescent for a suspended chain, perhaps a safety chain, showing that they were worn with the tips of the crescent upwards. The tips of the crescent usually have small knob terminals. This form of brooch is one of several common types and can be considered at least partly a votive object, if only as a good luck charm, the moon symbol being related to the cult of Mithras and the upturned tips of the crescent related the horns of the bull cult.

That the object here was created as part of a brooch is uncertain. If it had been made to be mounted it would have had a flat back surface, not convex. If it was designed as a symbol to be worn it could have been attached to a leather strap or backing, although it shows no signs of any attachment or of wear. The rock type used is unusual and could have been chosen for some special attribute, for instance sourced from an area of special significance. Whatever the object is, it is deserves further study, as well as consideration of any associated features.

See below for further discussion on the polished axe.

References

Bayley, J. and Butcher, S. 2004. *Roman brooches in Britain: A technological and typological study based on the Richborough Collection*. London: Soc. Antiqs., No. 68.
Healey, E. 1987. Lithic Technology. In Smith, C.A. and Lynch, F.M., *Trefignath and Din Dryfol*, Cambrian Arch. Monographs 3.
Wheeler, R.E.M. 1930. *London in Roman times.* London Museum Catalogues No. 3.

Appendix II.4 Polished stone axe

Frances Lynch

Axe Blade (find 001 from context 007)

This is the blade end of a small chisel rather than an axe. It is 47mm long, 40-43mm wide and 11mm thick at the thickest part. The cross section is not symmetrical, but plano-convex and the sides are slightly flattened but rounded. The flatter face is smooth but not obviously polished except at the blade edge, which is still sharp though slightly damaged by use. The curved face is polished all over; this polish covers some minor flake scars but is cut by later damage at both sides. It has been broken by a single blow, creating a smooth concoidal fracture.

The stone is black, very fine-grained but feels slightly shaley. However the concoidal fractures demonstrate that it has the qualities necessary for good axe material. The stone is probably not from the Graig Lwyd source (John Ll Williams, pers. comm.). The black colour might suggest Tievebulliagh stone from Northern Ireland but these axes are normally bigger and fatter. The chisel dimensions with polishing concentrated on the blade are comparable to those of an unprovenanced Mynydd Rhiw chisel from Anglesey (*Prehistoric Anglesey* Fig 30.11). The interior of Mynydd Rhiw axes can be very black but the stone normally weathers almost white on the outside. Perhaps the chemistry of this pit inhibited patination.

Appendix II.5 Roman glass

Hilary E.M. Cool

Sf 32 can confidently be identified as a piece of Roman vessel glass. The colour is the typical one of vessels of the first to third centuries and so the piece could be contemporary with the pottery found on the site. Unfortunately it is not possible to positively identify the form. The double curve could be found on either a closed vessel where the side curves into the neck or from a concave base beginning to curve to the side. The thickness might suggest the latter. Interestingly the shape does rule out the possibility that it could have come from a cylindrical or prismatic bottle which were the commonest forms used on rural sites in the early to mid-Roman period.

The native inhabitants of Anglesey and the adjacent areas of the mainland did not appear to have much use for glass vessels as vessels. Where fragments have been found it is clear that they were often present as raw

materials. At Cefn Cwmwd, Anglesey (Cuttler *et al* 2012). Blue/green fragments were used for bead-making and re-use as raw material may also have accounted for the fragments found associated with Roundhouse H at Park Bryn Cegin Llandygai (Kenney 2008, 92). At Parc Cybi, Holyhead (Kenney *et al* 2011) fragments of a bottle and a vessel with a folded rim and had been cold worked to form a tool with a sharp cutting edge and a small bead respectively. By contrast no evidence of re-use was recorded on the small number of bottle fragments recovered from Bryn Eryr, Llansadwrn, Anglesey and Bush Farm, Llanfairisgaer, Gwynedd (Longley *et al* 1998). The former site had a large assemblage, relatively speaking, of five fragments. It is of some interest that the pottery from that site had a relatively high proportion of fine wares suggesting that it had been of high status (Longley *et al* 1998, 217). It may well be that there was some use of glass in vessel form on high status native sites in the area in the second and third centuries.

Sf 32 has a small conchoidal fracture of the type that does result from deliberate re-working but on the whole appears not to have been subject to re-use. There is the possibility, therefore, that it had been on the site as a vessel and does not just represent cullet.

References

Cuttler, R., Davidson, A., and Hughes, G., 2012. *A Corridor Through Time: the archaeology of the A55 Anglesey Road Scheme*, (Oxbow Books: Oxford).

Kenney, J., 2008. 'Recent excavations at Parc Bryn Cegin Llandygai near Bangor, North Wales', *Archaeol. Cambrensis* 157, 9–142.

Kenney J., McGuinness, N., Cooke, R., Rees, C. and Davidson, A., 2011. *Parc Cybi, Holyhead: post excavation assessment of potential report* (Unpublished GAT Report No. 954).

Longley, D., Johnstone, N., and Evans, J., 1998. 'Excavations on two farms of the Romano-British period at Bryn Eryr and Bush Farm, Gwynedd', *Britannia* 29, 185-246.

Appendix II.6 Metal objects

Description and assessment

Evan Chapman

Four metal objects were found; 3 of iron and one of copper alloy.

SF 006, from (015), a stony deposit probably related to a roundhouse: Shaft of an iron handmade nail

SF010, from (020), fill of pit [019]: Short strip of iron, expanding at one end, which is broken off. It appears that the remains of a second piece of iron may be riveted to it at this point.

SF 022, from (023), a group of stones possibly related to a roundhouse: Iron holdfast: nail with a hollow domed head and rectangular rove. Holdfasts are used to join two pieces of wood, giving a firmer join than simply a nail on its own. In effect they rivet the pieces together and are particularly used by shipbuilders. Although Roman examples are known, they cannot be identified on typological grounds alone (Manning 1985, 132-4). Length 53mm, diameter of head 23mm, rove 25 by 17 mm.

SF 026, from (022), fill of ditch [021]: Fragment of a copper alloy bracelet of D-shaped profile. Slanted transverse grooves on the curved outer surface give it almost the appearance of a twisted wire bracelet made of flat strands (cf. Wilson 1968, 98 no.153). It originally had a white metal (tin/lead/copper alloy) surface coating. The current curvature would give a diameter of *c.*100mm, width 4mm, thickness 2mm. Similar to bracelets from Caerleon (Lloyd-Morgan, G. 2000, 339 no.52); Richborough (Bushe-Fox 1928, 49 no.59; Wilson 1968, 98 no.155); and Lankhills cemetery, Winchester (Clarke 1979, 304 C2a, fig.75 no.142).

Bibliography

Bushe-Fox, J.P. 1928 *Second Report on the Excavation of the Roman Fort at Richborough, Kent*, Soc. Antiq. Res. Rep. 7 (Oxford)

Clarke, G. 1979 *Pre-Roman and Roman Winchester, Part II: The Roman Cemetery at Lankhills*, Winchester Studies 3 (Oxford: Oxford University Press)

Lloyd-Morgan, G. 2000 'Other Objects of Copper Alloy', in Evans, E 2000 *The Caerleon* Canabae*: Excavations in the Civil Settlement 1984-90*, Britannia Monograph Series No.16 (London: Society of the Promotion of Roman Studies), p.344-86.

Manning, W.H. 1985 *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum* (London: British Museum)

Wheeler, R.E.M. & Wheeler, T.V. 1932 *Report on the Excavation of the Prehistoric, Roman, and Post-Roman Site in Lydney Park, Gloucestershire*, Soc. Antiq. Res. Rep. 9 (Oxford)

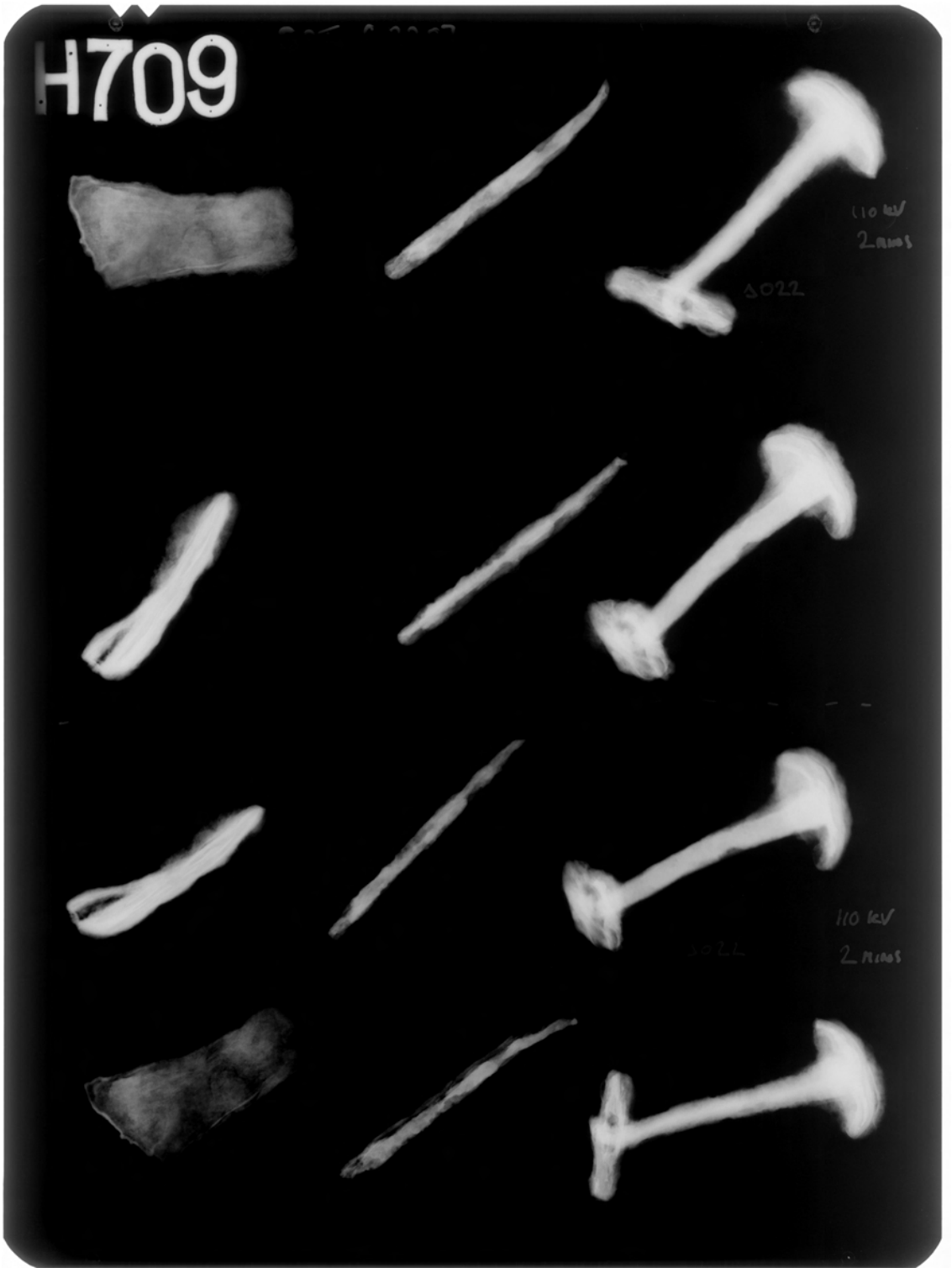
Wilson, M.G. 1968 'Other Objects of Bronze, Silver Lead, Iron, Bone and Stone', in Cunliffe, B.W. 1968 *Fifth Report on the Excavations of the Roman Fort at Richborough, Kent*, Soc. Antiq. Res. Rep. 23 (Oxford), p.93-110

Conservation and x-rays
Phil Parkes

Objects from excavations at GAT Site G2207, Peboc, Llangefni, were received for x-raying and assessment. The finds are in a sound condition with no visible signs of post-excavation corrosion. The three iron objects were x-rayed using a Faxitron 43805 cabinet system. X-ray films were digitised using an Array Corporation 2905 Laser Film Digitiser. Below are comments on information provided by the x-rays.

All the finds were then cleaned and conserved. Analysis was undertaken of the bright metal remains on the copper alloy bracelet (Sf026), indicating tin/lead/copper alloy applied as a decorative surface.

Find / context number	**X-ray number**	**Notes**
006	H709	Object cleaned to reveal a tapering edged end, with the other end being wider and broader and appearing to be broken. May be the tip of an edged tool.
010	H709	Nail fragment? Cleaned to reveal square cross section tapering to a pointed end which has been damaged by a corrosion blister, leaving the tip missing. No noticeable head to the nail, this end appears to be broken / damaged.
022	H709	Nail and rove, cleaned to reveal smooth magnetite surface.



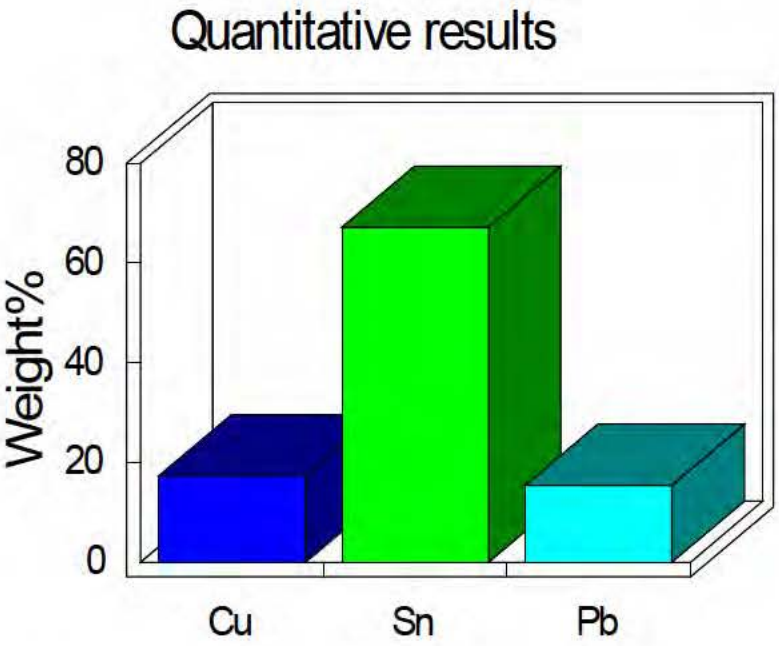
X-ray of iron finds

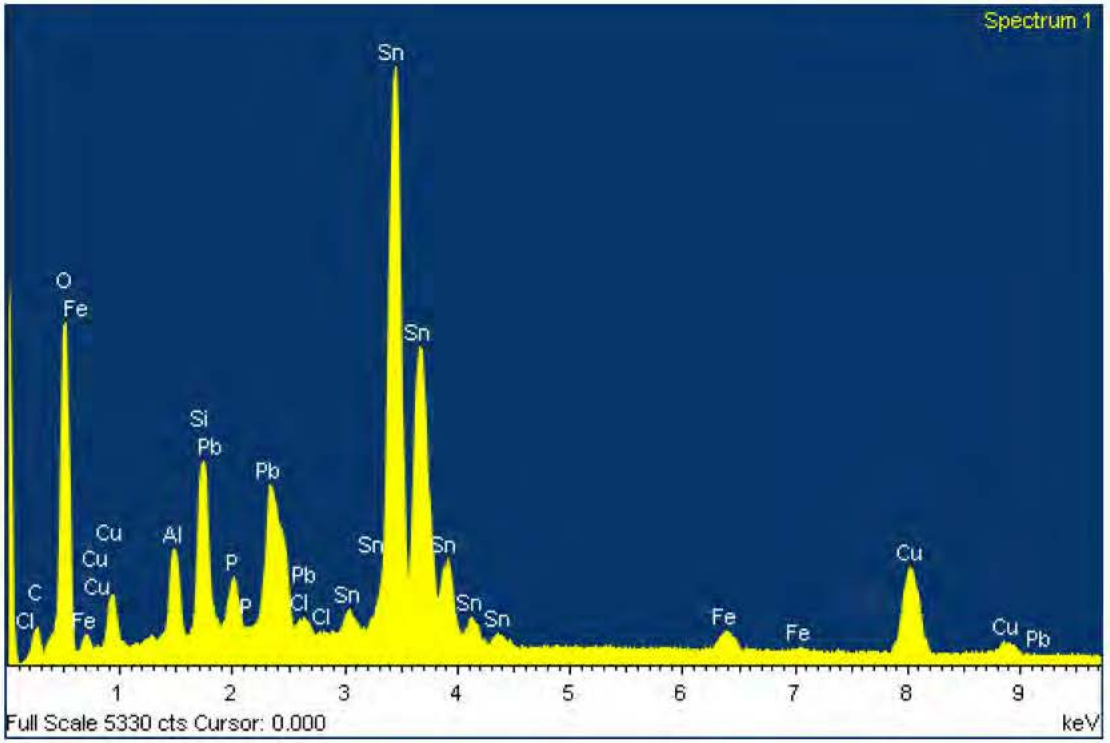
Conservation of metal objects

Cardiff Conservation Services Cardiff University	**Treatment Record**	Page No. 1	Lab No. 6227
Lab No.		Conservator	Date
6227	Three iron objects and one copper alloy were received for conservation. The objects were packaged with silica gel and showed no signs of active corrosion.	P. Parkes	24/5/12
/01	The bracelet was cleaned using cotton wool swabs of industrial methylated spirits and a scalpel to reveal a worn, patinated surface with some small remains of a bright dissimilar metal in areas. The bracelet was degreased and coated with a 10% solution of incralac in toluene applied by brush. The dissimilar metal was analysed by SEM/ EDX and found to be a tin/lead alloy, presumably the remains of a decorative coating.		
/02	The object was cleaned using an airabrasive machine with aluminium oxide powder to reveal a smooth magnetite surface. The object is a dome-headed nail with a rove attached at the other end.		
/03	The object was cleaned using an airabrasive machine with aluminium oxide powder to reveal a smooth magnetite surface. The object is tapered, with the narrow end appearing to come to an edge. The object is broken at the wider, thicker end.		
/04	The object was cleaned using an airabrasive machine with aluminium oxide powder to reveal a smooth magnetite surface. The object has a square cross-section and is gradually tapered towards what would have been a point but is damaged by a corrosion blister. The object may have been a nail but has both the head and the tip missing.		

Spectrum processing :
Peaks possibly omitted : 1.265, 1.490, 6.400, 7.050 keV

Processing option : All elements analyzed (Normalised)
Number of iterations = 3





Standard :
Cu Cu 4629 17-Jun-2010 09:42 AM
Sn Sn 4629 17-Jun-2010 10:11 AM
Pb Benitoite CGS 18-Jun-2010 04:20 PM

Element	Weight%	Atomic%
Cu K	17.37	29.91
Sn L	67.17	61.92
Pb M	15.47	8.17
Totals	100.00	

Processing option : All elements analysed (Normalised)

Spectrum	In stats.	Cu	Sn	Pb	Total
Spectrum 1	Yes	17.37	67.17	15.47	100.00
Mean		17.37	67.17	15.47	100.00
Std. deviation		0.00	0.00	0.00	
Max.		17.37	67.17	15.47	
Min.		17.37	67.17	15.47	

All results in weight%

Comment: G2207, Peboc, Llangefni, find number 026.

Analysis of bright metal remains on copper alloy bracelet, indicating tin/lead/copper alloy applied as a decorative surface.

Appendix II.7 Metallurgical Residue
Tim P Young

Slag (Sf038)
Summary
This site produced a single item of probable archaeometallurgical residue. The piece has a crudely planar upper surface, one approximately vertical end and a lower convex face. The slag is a highly vesicular slag, similar to a fuel ash slag (FAS), with a high concentration of sand and some gravel-grade particles, all bound by a dark, almost black, glass.

Such slags are difficult to interpret because they were formed mainly of material derived from the hearth and had little input from the materials being processed. FAS can be formed where the combination of hearth ceramic and fuel ash permits the generation of partial melting at hearth temperatures. This can occur in some cases in situations such as domestic hearths and corn driers. This piece, however, has an overall form suggesting a concentration of the hotzone in the fire in a similar pattern to that in a metallurgical hearth or furnace, where the hotzone location is produced by a single directed air blast. The most likely interpretation of this piece, therefore, is that it represents residue from metalworking in which little metal entered the hearth, so that the slag remains dominated by input from the hearth substrate/ceramic. Such types of metalworking might include the casting of non-ferrous alloys by melting in crucibles, heating non-ferrous metals for working/annealing or ironworking that did not involve welding. In summary a metallurgical origin is likely, but the precise process cannot be determined.

Methods
The materials was examined visually, with a low-powered binocular microscope where required. As an evaluation, the material was not subjected to any high-magnification optical inspection, nor to any form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Results
The material (unstratified find <038>) constitutes a single block of low density, porous slag, of a type commonly referred to as fuel ash slag, although the fuel ash probably only contributes a minor component of the slag (albeit an important fluxing role).

The slag block is 115mm wide, 60mm high and 75mm deep and weighs 224g. The upper surface is triangular in plan, broadly horizontal and formed of various wispy lobes of rather viscous appearance. The surface is of a lilac-grey glass, with streaks of darker pink. The reddish surface continues onto the vertical face, where it appears in areas to have been in contact with oxidised fired ceramic (presumably the hearth wall. Other areas of the vertical (proximal?) face appear fractured and reveal coarse porosity within the cake.

The lower surface is evenly rounded, with suggestions of sub-horizontal layers of lobes of slag. This face is surfaced with a mid- to dark- grey glassy slag, which is a pale khaki on fracture. There are abundant inclusions of sand and granule grade. The larger inclusions mainly appear to be polycrystalline quartz.

Interpretation
The slag is clearly dominated by grains (mainly quartz) inherited from the substrate, bound by a dark glass resulting from partial melting to form an overall highly porous structure. Such slags are generally known as fuel ash slags (FAS). In fact they probably differ little in origin to the 'lining slags' of metallurgical hearths, but have a lower degree of contamination from the process in the hearth and have a typically porous, bloated, texture.

Various forms of FAS have been described recently. FAS in small particles (from sub-mm spheroids up to accumulations a few 10s of mm across) have been recorded from corn drying kilns (Young 2005, 2010). FAS in larger sheets is common on some Iron Age sites (e.g. Young 2011; Young & Bowstead Stallybrass 2003) and has earned the informal term 'Iron Age grey slag'. These larger sheets have been examined in detail for some Norse hearths at Bornais, S. Uist (Young in press) where it appears the hearths slagged rapidly from the calcareous sand into which they were dug.

In none of the above non-metallurgical occurrences of FAS, however, does the slag mass take on a planoconvex form, approaching that of a smithing hearth cake (SHC) as it does in this instance. The form of this cake suggests it was a discrete mass, attached to or adjacent to the hearth wall, just below the zone of incoming air, where the localised hot zone promoted the formation of a plano-convex slag cake. Rather than the non-

directional form of the FAS from domestic hearths, this example seems to indicate presence of a blast, as in a metallurgical hearth.

Two factors might promote the generation of a FAS mass in the form of an SHC:
1. the hearth might have been formed of reactive, wet and/or unstable material which would readily fall into the hearth and react
2. the metalworking process did not involve any significant amount of metal actually entering the hearth (and thereby being able to react with the developing slag).

Factor (1) might be appropriate to a metalworking hearth or furnace of many different kinds, but perhaps particularly to temporary hearths, or hearths simply cut into the ground; factor (2) would be most appropriate for situations when non-ferrous metal melting was undertaken in a crucible (although even then spills are common), a non-ferrous process in which the hearth was employed at fairly low temperature for heating/annealing or when ferrous materials were worked at fairly low temperature (thereby reducing the rate of iron oxidation and hence loss to the hearth).

In summary, the precise origin of the piece is uncertain. Although broadly a fuel ash slag (and hence not necessarily metallurgical), the form of the slag cake suggests it formed against the wall of a hearth with a single air supply (as in most metallurgical hearths/furnaces). The lack of obvious contamination by any metal suggests that if from a metallurgical operation, the slag was either from a non-ferrous metal process in which the metal was contained in a crucible, or from a process with either a ferrous or non-ferrous material being heated to only a fairly low temperature (as in annealing copper alloy between episodes of working, or heating iron for a low-temperature activity involving some simple forming).

Evaluation of potential
The sample is of rather ambiguous origin and further detailed analysis would be unlikely to provide suitable additional information to clarify that. Such pieces are sometimes interpretable through understanding of their context, but unfortunately this piece was unstratified.

References
YOUNG, T. 2005. Site Activities: slag and related materials. pp. 174-176. In: Sharples, N (ed.), A Norse Farmstead in the Outer Hebrides. Excavations at Mound 3, Bornais, South Uist. Cardiff Studies in Archaeology, Oxbow Books, Oxford.

YOUNG, T.P. 2010. Fuel ash slags. P. 163 in: Crane, P & Murphy K., Early medieval settlement, iron smelting and crop processing at South Hook, Herbranston, Pembrokeshire, 2004–05. Archaeologia Cambrensis, **159,** 117-196 .

YOUNG, T.P. 2011. Possible archaeometallurgical residues pp. 89-90 in : M. Collard & T. Havard. The prehistoric and medieval defences of Malmesbury: archaeological investigations at Holloway, 2005-2006. Wiltshire Archaeological & Natural History Magazine, **104**, 79-94.

YOUNG, T.P. in press . The slag. pp. 289-295 in: Niall Sharples (ed.) A Late Iron Age farmstead in the Outer Hebrides Excavations at Mound 1, Bornais, South Uist. Oxbow Books.

YOUNG, T & BOWSTEAD STALLYBRASS, H.S. 2003. Metallurgical residues and related materials. In: Thomas, A, Holbrook, N and Bateman, C. Later Prehistoric and Romano-British burial and Settlement at Hucclecote, Gloucestershire: Excavations in advance of the Gloucester Business Park Link Road, 1988. Bristol and Gloucestershire Archaeological

Metal-working residue and burnt clay

Summary
The samples contained a minute quantity of residue from iron-working (smithing), but insufficient to indicate that the activity was conducted in proximity to the point of sampling. Possible clinker was present in two of the contexts, suggesting the use of coal as a fuel. This has been recorded on other sites in the area in the Roman period. The 'burnt clay' samples were mostly fired clay, compatible with an origin in a metallurgical process, but not certainly so.

Methods
All materials were examined visually with a low- powered binocular microscope where required. As an evaluation, the materials were not subjected to any high-magnification optical inspection, not to any form of

instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional. The summary catalogue of examined material is given in Table 1.

Results
The assemblage included residues picked as 'metalworking debris' and some picked as 'burnt clay'.

The 'metalworking debris' included indeterminate slag fragments, slag droplets (just possibly including a single piece of spheroidal hammerscale), a possible slag flat and a total of approximately 19 pieces of flake hammerscale. These were accompanied by a variety of natural materials, charcoal, indeterminate burnt organic matter, and a possible concretion formed on a rusted iron particle. Some of the slaggy materials from contexts 15 and 57 resembled clinker (the residue from the burning of coal), although a certain identification was not possible.

The 'burnt clay' pieces were mainly no-diagnostic. They true fired clay fragments were mainly oxidised fired, with a temper of quartz grains. Some of the material was compatible in degree of processing and firing with being fired clay from a metallurgical hearth, but none of the material was definitely metallurgical in origin. No material showed any vitrification. Some of the material was definitely natural siltstone and sandstone; other pieces were indeterminate.

Interpretation
The materials from contexts 20, 57 and 74 included flake hammerscale. This provides good evidence for iron working somewhere in the vicinity. The total amount of metallurgical residue is very small and such small particles are very easily transported. The location of the activity is not necessarily particularly close to the point of origin of the samples. The presence of possible clinker, suggests that coal was being burnt (as it was at the Tai Cochion /Trefarthen site in the Roman period; Young 2012b). The slag materials from contexts 15, 20, 57 and 74 are not necessarily from iron-working, although given the presence of flake hammerscale, they are very likely to be (as with the previous slag find from the site; Young 2012a).

None of the fired clay samples was conclusively of metallurgical origin, although many of the oxidised – fired particles could have been derived from a metallurgical hearth-lining.

Evaluation of potential
The assemblage has little potential for producing useful information from further investigation.

References
YOUNG, T.P. 2012a. Evaluation of metallurgical residue from the Peboc Site, Llangefni (G2207). GeoArch Report 2012/14, 2pp.

YOUNG, T.P. 2012b. Evaluation of archaeometallurgical residues and associated material from Tai Cochion & Trefarthen Roman settlement, Anglesey (G1632-T, G1632). GeoArch Report
2012/20, 12pp.

Context	Find No	Trench	Material	Description
15	73	11	mwd	1 maroon slag sheet; 19 probable stones; c.13 slag pieces; 2 clinker fragments
20	71	07	mwd	4 particles of slag, 2 scale-like and 2 true FHS; 17 probably natural; 1 possible concretion on iron? 1 large pyrite tube
57	72	09	mwd	8 pieces of FHS; c. 6 slag pieces; 1 piece BOM; 1 piece of charcoal; c.13 stones; 1 slag/clinker droplet; 1 hollow sphere - droplet or SHS, poorly preserved
74	74	09	mwd	9 pieces of good FHS; 11 pieces of platy slag (1 possible slag flat); 1 slag droplet; 3 pieces possible fuel ash slag; c.11 pieces of stone
07	59	06	burnt clay	1 large rounded grain with very poorly sorted quartz some several mm, in buff matrix; 1 piece mainly grey silt with large voids - could be natural
20	60	07	burnt clay	2 pieces bright orange fired clay with even sorted quartz temper, looks well prepared; 1 dark dull browner piece, also rich in quartz, possibly similar; 1 greyer, harder fired, less well sorted - possibly natural even, but could be a metallurgical clay or concretion?
28	61	07	burnt clay	1 extremely poorly sorted piece, has very little matrix – possibly natural or a concretion; 2 pieces red, moderately poorly sorted; 1 piece orange, finer but with re-entrant faces suggesting loss of large grains.
57	62	09	burnt clay	8 pieces poorly sorted temper; 1 piece fine red siltstone - natural

Table 1: residues by context. FHS = flake hammerscale; SHS = spheroidal hammerscale; BOM = burnt organic material

Appendix II.8 The animal bones
Nora Bermingham

Introduction
Archaeological test trenching at Llangefni, Isle of Anglesey (G2207) resulted in the hand collection of a small assemblage of animal bones. The assemblage derives from ten individual contexts with 51 fragments or 421 g of bone and tooth retrieved (Table 3). The material derives from Romano-British and as yet undated contexts. A small amount of unstratified material was also submitted for analysis.

Methods
Identification
Identifications were made with reference to Schmid (1972), Hillson (1992) and the author's comparative collection. All specimens were identified to species or taxonomic group where possible. Ribs and vertebrae (excluding the axis and atlas) and unidentifiable specimens were assigned to size class (large/medium/small). For the purposes of this report, the classification large mammal includes cattle and horse and large deer such as red deer.

Quantification
A simple fragment count was used to quantify the assemblage with every identifiable and unidentifiable fragment counted. Where multiple fragments were evidently derived from the same bone the fragments were combined and counted once. In addition each fragment was weighed and the total weight per category (identifiable and unidentifiable) and per species was calculated. Unidentifiable fragments were subdivided into two categories, cranial (i.e. skull and teeth) and post-cranial fragments (e.g. rib, vertebra and limb).

Preservation
An array of taphonomic factors can affect the preservation of an assemblage. These include both pre- and post-depositional impacts such as butchery, canid gnawing, burning and edaphic factors. Analysis included the recording the presence or absence of such impacts on the assemblage. Records of fragmentation were largely confined to long bones with particularly fragile elements such as pelvis, scapula and robust short bones such as phalanx recorded as "Fragmentation Irrelevant".

Age estimates and measurements
Where preservation allowed, standard age estimates were applied based on epiphyseal fusion (Silver 1969). Measurements were not recorded because of the level of fragmentation.

Results
Quantification
The overall assemblage size curtails analysis of the material. The assemblage is small comprising 51 individual pieces weighing 421 g in total (Table 1). Of this 13 pieces or 274 g of bone were identified to species. The majority of the unidentifiable fragments derive from post-cranial skeletal elements of large mammals. Fragments of ribs, vertebrae and long bones were present.

Species/element representation
Three taxa occur within the assemblage all of which represent animals common to the Romano-British period and probably also to as yet undated contexts. Domestic mammals are represented by horse, cow and sheep/goat. Cow is the most common taxa represented followed by sheep/goat. Horse is represented by a single tooth. The range of skeletal elements represented including unidentifiable fragments of rib and vertebrae suggests the presence of meat and non-meat bearing bones. Species/element representation per context is provided in table 1.

Element	Horse	Cow	Sheep/goat
Scapula	–	1	–
Humerus	–	1	–
Radius	–	1	–
Metacarpal	–	–	1
Tibia	–	1	–
Metatarsal	–	1	–
Ulna	–	1	–
Mandibular tooth	1	1	1
Maxillary tooth	–	2	1
Total #	1	9	3

Total weight	42 g	221 g	11 g

Table 1 Species/element representation

Preservation
The level of fragmentation is high with no complete bones or intact ends occurring. Loose teeth account for six of the 13 identifiable fragments. There was no evidence for burning or canid gnawing on any of the elements analysed. Direct evidence for butchery, in the form or chop or cut marks was also absent.

Ageing
A small number of cow bones provided age fusion data and demonstrate the presence of animals older than 10 months, 18 months and 2-2.5 years in the assemblage. The data cannot be used however to suggest animal husbandry preferences.

Skeletal element	Fused by ...	Quantity
Metatarsal proximal	Before birth	1
Scapula distal	7-10 mths	1
Radius proximal	12-18 mths	1
Tibia distal	12-18 mths	1
Humerus distal	2-2.5 yrs	1

Table 2: Age fusion data on cattle bones from Llangefni. Age estimates after Silver (1969).

Conclusion
The assemblage is small and representative of the major domesticates, horse, cattle, and sheep/goat. The overall size of the assemblage means little information can be gleaned with regard to animal husbandry or dietary preferences. The combination of species represented and the overall character and composition of the assemblage suggests it probably represents general domestic butchery and/or food waste.

References
Hillson, S. 1992 *Mammal Bones and Teeth. An introductory Guide to Methods of Identification.* University College London, Institute of Archaeology, London.
Schmid, E. 1972 *Atlas of Animal Bones*. Elsevier, Amsterdam, London, New York.
Silver, IA 1969 The Ageing of Domestic Animals. In Brothwell, DR and Higgs, ES (eds.), *Science in Archaeology: A Comprehensive Survey of Progress and Research*, London, 283−302.

Table 3: Species/element representation per context

Find No	Context	Cut number and feature type	Trench	Quantity	Weight (G)	Element	Species	Side	Fragmentation	Preservation	Butchery	Pathology	Measured	Toothwear
005	015	Stony deposit	11	1	2	Tooth Root	Unidentified large mammal	False	False	False	False	False	False	False
008	015	Stony deposit	11	2	2	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
008	015	Stony deposit	11	1	2	Mandibular Tooth	Sheep/Goat	False	False	False	False	False	False	False
028	015	Stony deposit	11	13	66	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	4	Post-Cranial	Unidentified medium mammal	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	20	Maxillary Tooth	Cow	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	18	Maxillary Tooth	Cow	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	2	Mandibular Tooth	Cow	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	5	Maxillary Tooth	Sheep/Goat	False	False	False	False	False	False	False
028	015	Stony deposit	11	1	19	Tibia D	Cow	Right	End & Shaft Splinter	False	False	False	False	False
028	015	Stony deposit	11	1	16	Ulna	Cow	Right	False	False	False	False	False	False
028	015	Stony deposit	11	1	22	Radius Px	Cow	Right	End & Shaft splinter	False	False	False	False	False

Find No	Context	Cut number and feature type	Trench	Quantity	Weight (G)	Element	Species	Side	Fragmentation	Preservation	Butchery	Pathology	Measured	Toothwear
028	015	Stony deposit	11	1	53	Humerus D	Cow	Right	End & Shaft Splinter	False	False	False	False	False
035	016	Stony deposit	11	1	20	Metatarsal Px	Cow	Left	End & Shaft Splinter	False	False	False	False	False
020	020	Pit [019]	07	1	4	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
025	022	Ditch [021]	07	1	42	Mandibular Tooth	Horse	False	False	False	False	False	False	False
027	022	Ditch [021]	07	1	3	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
027	022	Ditch [021]	07	1	51	Scapula D	Cow	Left	Indet.	False	False	False	False	False
023	023	Stones	11	1	4	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
030	028	Pit [027]	07	1	7	Tooth Fragments	Unidentified large mammal	False	False	False	False	False	False	False
042	037	Ditch [036]	27	3	3	Tooth Fragments	Unidentified large mammal	False	False	False	False	False	False	False
047	052	Ditch [053]	08	2	2	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
044	056	Buried soil	09	2	19	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
045	056	Buried soil	09	4	9	Rib	Unidentified large	False	False	False	False	False	False	False

Find No	Context	Cut number and feature type	Trench	Quantity	Weight (G)	Element	Species	Side	Fragmentation	Preservation	Butchery	Pathology	Measured	Toothwear
							mammal							
048	056	Buried soil	09	2	1	Post-Cranial	Unidentified medium mammal	False	False	False	False	False	False	False
039	Unstrat		08	4	21	Post-Cranial	Unidentified large mammal	False	False	False	False	False	False	False
041	Unstrat		09	1	4	Metacarpal Px	Sheep/Goat	Indet	End & Shaft Splinter	False	False	False	False	False

Appendix II.9 Assessment of the palaeoenvironmental potential of deposits
Rosalind McKenna

Introduction
A series of ten samples from the site were submitted for an evaluation of their environmental potential. The samples came from features including pits, ditches, enclosure ditches, rubble deposits within a roundhouse, ditch/terrace cuts, burnt deposits and a buried soil horizon. The samples range in date from the Neolithic to the Romano British period, as well as some samples which originate in undated features.

A programme of soil sampling from sealed contexts was implemented during the excavation. The aim of the sampling was to:
assess the type of preservation and the potential of the biological remains
identify suitable samples for possible radiocarbon dating
identify if any human activities were undertaken on the site
reconstruct the environment of the surrounding area

Methods
The initial material was submitted to the author in a processed state. It was processed by staff at Gwynedd Archaeological Trust using their standard water flotation methods. The flot (the sum of the material from each sample that floats) was sieved to 0.3mm and air dried. The heavy residue (the material which does not float) was not examined, and therefore the results presented here are based entirely on the material from the flot. The flot was examined under a low-power binocular microscope at magnifications between x12 and x40.

A four point semi quantative scale was used, from '1' – one or a few specimens (less than an estimated six per kg of raw sediment) to '4' – abundant remains (many specimens per kg or a major component of the matrix). Data were recorded on paper and subsequently on a personal computer using a Microsoft Access database.

Identification was carried out using published keys (Jacomet 2006, Biejerinkc 1976, Jones – unpublished and Zohary & Hopf 2000), online resources (http://www.plantatlas.eu/za.php), the authors own specimens and the reference collection housed at Birmingham Archaeology's laboratory. The full species list appears in Table 2 at the end of this report. Taxonomy and nomenclature follow Stace (1997).

The flot was then sieved into convenient fractions (4, 2, 1 and 0.3mm) for sorting and identification of charcoal fragments. Identifiable material was only present within the 4 and 2mm fractions. The number of charcoal fragments to be identified is dependent on the diversity of the flora. A study by Keepax (1988, 120-124) has indicated that depending on the location of the archaeology site, 100-400 fragments of charcoal would need to be identified in order to obtain a full range of species. A random selection of ideally 100 fragments of charcoal of varying sizes was made, which were then identified. Where samples did not contain 100 identifiable fragments, all fragments were studied and recorded. This information is recorded with the results of the assessment in Table 3 below. Identification was made using the wood identification guides of Schweingruber (1978) and Hather (2000).

Taxa identified only to genus cannot be identified more closely due to a lack of defining characteristics in charcoal material.

Results
Table 1 below shows the components recorded from each of the samples.

Of the ten samples submitted, charred plant macrofossils were present in all ten of the samples, and scored between a '1' and '2' on the abundance scale, with identifiable remains being present in all samples. They were generally poorly preserved, and were lacking in most identifying morphological characteristics. Where remains could be identified, oat, barley, wheat and spelt wheat were recorded in small numbers. The results of this analysis can be seen in Table 2 below. The samples generally produced small assemblages of plant remains both in volume and diversity.

The most abundant remain was indeterminate cereal grains, which were present in nine of the samples. These grains, which lacked identifying morphological characteristics, were therefore recorded as 'indeterminate cereal'. Where it was possible to ascertain identifications, spelt wheat was the most abundant remain being present in four samples, wheat was present in two samples, possible oat was present in two samples, and barley was also present in three samples. The presence of cereal chaff may also indicate the use of cereals at the site,

and this was present in small numbers in seven of the samples. Another, more indirect, indicator of cereals being used on site is the remains of arable weeds that were found in weed seeds of the samples. Charred hazel nut shell fragments were also present in four samples.

Charcoal remains were present in all ten of the samples and scored between '1' and '4' on the abundance scale. There were identifiable remains in four of the samples. The preservation of the charcoal fragments was relatively variable even within the samples. Some of the charcoal was firm and crisp and allowed for clean breaks to the material permitting clean surfaces where identifiable characteristics were visible. However, most of the fragments were very brittle, and the material tended to crumble or break in uneven patterns making the identifying characteristics harder to distinguish and interpret. Table 3 below shows the results of the charcoal assessment.

Two of the samples that produced identifiable remains were dominated by oak (with one sample containing purely oak). The remaining two samples were dominated by willow/poplar (both of the samples being composed purely of this species). Hazel was also was present in a single sample.

The total range of taxa comprises oak (Quercus), willow/poplar (Salix/Populus), and hazel (Corylus). These taxa belong to the groups of species represented in the native British flora. A local environment with a range of trees and shrub is indicated from the charcoal of the site. As seen in Table 3, oak is the most numerous of the identified charcoal fragments, and it is possible that this was the preferred fuel wood obtained from a local environment containing a broader choice of species.

Root / rootlet fragments were also present within all ten of the samples. This indicates disturbance of the archaeological features, and this may be due to the nature of some features being relatively close to the surface, as well as deep root action from vegetation that covered the site. The presence of earthworm egg capsules in all ten of the samples further confirms this disturbance.

Discussion

The charcoal remains showed the exploitation of several species native to Britain, with the prevalence of oak, and willow/poplar being selected and used as fire wood. Oak has good burning properties and would have made a fire suitable for most purposes (Edlin 1949). Oak is a particularly useful fire fuel as well as being a commonly used structural/artefactual wood that may have had subsequent use as a fire fuel (Rossen and Olsen 1985). Willow/Poplar was present in smaller numbers. These are species that are ideal to use for kindling. They are anatomically less dense than for example, oak and ash and burn quickly at relatively high temperatures (Gale and Cutler 2000, 34, 236, Grogan *et al.* 2007, 29-31). This property makes them good to use as kindling, as the high temperatures produced would encourage the oak to ignite and start to burn. Hazel is recorded as a good fuel wood and was widely available within oak woodlands, particularly on the fringes of cleared areas (Grogan *et al.* 2007, 30).

The charcoal assemblages from the features are similar. Sample 001, from Neolithic pit [006], was dominated by oak, but also contained hazel charcoal. Sample 003, from pit [019], contained purely oak charcoal. Samples 004, from ditch [021], and 005, from pit [027] both contained purely willow/poplar charcoal.

Dryland wood species indicates the presence of an oak woodland close to the site. This would have consisted of oak which would be the dominant large tree species (Gale & Cutler 2000, 120, 205) together with a range of shrubs, and at the extents of this type of woodland, hazel thrives. The evidence of carr fen woodland indicates a damp environment close to the site. This type of woodland would have consisted of alder, willow and poplar which are all trees that thrive in waterlogged and damp soils, particularly in areas close to streams or with a high water table (Stuits 2005, 143 and Gale & Cutler 2000).

As asserted by Scholtz (1986) cited in Prins and Shackleton (1992:632), the "Principle of Least Effort" suggests that communities of the past collected firewood from the closest possible available wooded area, and in particular the collection of economically less important kindling fuel wood (which was most likely obtained from the area close to the site), the charcoal assemblage does suggest that the local vegetation would have consisted of an oak woodland close to the site.

Generally, there are various, largely unquantifiable, factors that effect the representation of species in charcoal samples including bias in contemporary collection, inclusive of social and economic factors, and various factors of taphonomy and conservation (Thery-Parisot 2002). On account of these considerations, the identified taxa are not considered to be proportionately representative of the availability of wood resources in the environment in a

definitive sense, and are possibly reflective of particular choice of fire making fuel from these resources. Bark was also present on some of the charcoal fragments, and this indicates that the material is more likely to have been firewood, or the result of a natural fire.

The archaeobotanical evidence found in the samples was all very similar in the various features studied. One of the samples (001) dates to the Neolithic period, five of the samples (003, 004, 005, 006, and 007) originate from features that date to the Romano - British period, and three samples are from features which were undated.

Four samples produced a small number of hazel nut shell fragments. Hazel-nuts are valuable nutritionally, as well as being readily available. In addition, the nut shell is hard and resistant to decay ensuring its survival in some quantities. Together with the hazel charcoal also recorded from sample 001, it may indicate that they are merely representative of hazel wood trees being burnt, which could be either a natural or a man-made process.

The samples all produced small assemblages of plant macrofossils both in terms of abundance and diversity. Eight of the samples contained indeterminate cereal grains; four contained spelt wheat grains, two contained wheat grains, three contained barley grains and two contained oat grains. These were all however in small numbers, and so little interpretation can be made other than to state their presence.

If cereal processing were occurring at the site, it would be expected that some remains (most probably in high numbers) of cereal chaff – a by-product of the crop processing sequence as stated in Hillman (1981; 1984) would be found. There was chaff present but only in small amounts. However, the rarity of chaff is a phenomenon repeatedly reported from archaeological deposits, and although this may suggest that the grain was already threshed and winnowed, if not also milled, by the time it reached the site, it may also show that any chaff was burnt up completely in the fires in which it was deposited. The former of these two theories is however the more plausible.

The deposits contain a mixture of grain and similarly sized weed seeds, such as grasses (POACEAE), which most likely represent the fine sieve product (i.e. the cereal grain and larger sized weed seeds retained by a fine sieve) in the crop processing sequence (Hillman 1981; 1984; and Jones 1984). Fine sieving was most likely performed just before milling (Jones 1984, 46) or some other use, such as malting or parching (Hillman 1981, 137). Large seeded weeds of crops were most likely removed by hand prior to preparing the grain for use in milling, parching, malting, cooking etc. (Jones 1984, 46). There was no sign of sprouting on the grains, so it does not seem to have been charred during roasting of the malt. It is therefore probable that the plant macrofossils represent the waste from a cooking accident.

Another, more indirect, indicator of cereals being used on site is the remains of arable weeds that were found in three of the samples. Among these weeds, some of which are characteristic of cereal fields and rarely found elsewhere, are sedge (CYPERACEAE), and seeds from the cabbage family (BRASSICACEAE).

Charred seeds of pot marigold (*Calendula officinalis*) were present in small numbers (5 seeds) in Sample 010 (from layer (074) over posthole [060]). This species is not native to Britain, and is thought to have been introduced during the Roman period. The archaeobotanical computer database (ABCD) states this as the earliest recorded date. Greig (1996) states the earliest recordings of the species in England date to the 15th century and later. This may therefore indicate that if the seeds are not a contaminant (which is a small possibility) then the presence of them within this sample from a buried soil horizon, may be one of the earliest records from an archaeological site.

Overall, the low numbers of grains and weed seeds in the samples indicates the accidental burning of cleaned grain and its subsequent disposal.

Conclusion

The samples produced some environmental material, with the charcoal from four of the samples and the plant macrofossils from nine of the samples. The deposits from which the samples derive, probably represent the domestic waste associated with fires.

The archaeobotanical evidence found in the samples shows hazelnut shell, oat, spelt wheat, wheat, and barley, were present, possibly indicating an exploitation of cereals. The hazelnut shell fragments show no marks typically associated with processed shells. Together with the high portion of hazel charcoal, this may indicate that they are merely representative of hazel wood trees being burnt, which could be either a natural or a man-made process. However, with the remains of several cereal grains throughout the samples it is more likely that

the samples represent occupation build-up of domestic waste. Due to the small numbers of cereal grains and associated weed seeds in the samples, there is limited interpretative information. Where identifications could be made, it is possible to ascertain that spelt wheat was the most utilised grain, with barley, oat and wheat either used on a smaller scale, or merely incorporated into the record as weeds of the spelt wheat crop.

In terms of taphonomy, it is likely that these samples all represent secondary deposition of charred plant remains. This probably occurred through intentional dumping. The use of cereal processing waste as fuel is well attested (Hillman 1981; 1984) and disposal of spent fuel either into features such as pits or ditches/gullies or directly dumped onto the site seems a likely explanation for the arrival of this material on site. As the majority of the plant remains were found together with charcoal remains, it may suggest that waste or spilt grain were put on the fire with other rubbish and a small fraction became charred without burning up, and joined the domestic ash on the rubbish heap. Intentional dumping of charred debris (such as spent fuel, charred debris from parched crops etc.) seems the most likely explanation for the formation of the deposits encountered here.

There are several variables that affect the reconstruction of local woodland using charcoal assemblages, however if the charcoal were to be used as a 'presence' indicator it can be assumed that as the fuel wood (in particular kindling material) is usually selected from local woodlands these charcoal remains have also made it possible to suggest that the woodland in the close vicinity to the site would have consisted of an oak dominant woodland.

The fuel used appears to have been exploited mainly from an oak dominant woodland. The oak would most likely have provided the main fuel for the fire as it provides long lasting heat at relatively high temperatures. A fen carr woodland would also have been located within the wider environment. Willow and poplar, are trees that thrive in waterlogged and damp soils, particularly in areas close to streams or with a high water table (Stuijts 2005, 143 and Gale & Cutler 2000) and hint at a damp/wet area within close proximity to the site.

It is thought to be problematic using charcoal and plant macrofossil records from archaeological sites, as they do not accurately reflect the surrounding environment. Wood was gathered before burning or was used for building which introduces an element of bias. Plant remains were also gathered foods, and were generally only burnt by accident. Despite this, plant and charcoal remains can provide good information about the landscapes surrounding the sites presuming that people did not travel too far to gather food and fuel.

Recommendations

The samples have been assessed, and any interpretable data has been retrieved. No further work is required on the samples. A thorough research into comparable sites must also be made at this stage. A list of samples containing material viable for the radiocarbon dating process has been forwarded to GAT, and a decision will be made as to which samples are to undergo this process.

References

Biejerinck, W, 1976, *Zadenatlas der Nederlandsche Flora: Ten Behoeve van de Botanie, Palaeontology, Bodemcultuur en Warenkennis.* Backhuys and Meesters. Amsterdam.

English Heritage (2002) *Environmental Archaeology: A guide to the theory and practise of methods, from sampling and recovery to post-excavation.* English Heritage Publications. Swindon.

Edlin, H L, 1949. *Woodland crafts in Britain: an account of the traditional uses of trees and timbers in the British countryside*, London, Batsford

Gale, R, & Cutler, D F, 2000, *Plants in Archaeology – Identification Manual of Artefacts of plant origin from Europe and the Mediterranean*, Westbury Scientific Publishing and Royal Botanic Gardens, Kew

Greig, , J, 1996, Archaeobotanical and historical records compared – a new look at the taphonomy of edible and other useful plants from the 11th to 18th centuries. *Ciracea, The Journal of the Association for Environmental Archaeology* ***12 (2)***. P.211-247

Grogan, E, Johnston, P, O'Donnell, L, 2007, *The Bronze Age Landscapes of the Pipeline to the West: An Integrated Archaeological and Environmental Assessment*, Wordwell Ltd, Bray, Co Wicklow.

Hather, J G. 2000 *The identification of Northern European woods; a guide for archaeologists and conservators*, London. Archetype Press.

Hillman, G. 1981, *Reconstructing crop husbandry practises from the charred remains of crops.* In Mercer, R.J. *Farming practise in British prehistory.*

Hillman, G. 1984, *Traditional husbandry and processing of archaic cereals in recent times: the operations, products and equipment which might feature in Sumerian texts. Part 1: the glume wheats.* Bulletin on Sumerian Agriculture 1, 114-152.

Hillman, G. 1984 *Traditional husbandry and processing of archaic cereals in recent times: the operations, products and equipment which might feature in Sumerian texts. Part 2: the free-threshing cereals.* Bulletin on Sumerian Agriculture 2, 1-31.

Jacomet, S, 2006, *Identification of cereal remains from archaeological sites.* IPAS. Basel.

Jones, G (1984) *Interpretation of Archaeological Plant Remains: Ethnographic Models from Greece.* In *Plants and Ancient Man.* Balkema. Rotterdam.

Jones, G, *Teaching Notes for Archaeobotany*. Unpublished.

Keepax, C. A., 1988, *Charcoal analysis with particular reference to archaeological sites in Britain*. Unpublished PhD thesis, University of London

Prins, F and Shackleton, CM 1992 Charcoal analysis and the "Principle of Least Effort" - A conceptual Model. *Journal of Archaeological Science*, 19, 631-637.

Rossen, J, and Olson, J, 1985 *The controlled carbonisation and archaeological analysis of SE US wood charcoals*, Journal of Field Archaeology **12**, 445-456

Scholtz, A, 1986, *Palynological and Palaeobotanical Studies in the Southern Cape*, MA Thesis of Stellenbosch, Stellenbosch, South Africa

Schweingruber, F H, 1978 *Microscopic wood anatomy.* Birmensdorf. Swiss Federal Institute of Forestry Research

Stace, C, 1997, *New flora of the British Isles*, Cambridge University Press, Cambridge

Stuijts, I, 2005, 'Wood and Charcoal Identification' in Gowen, M., O'Néill, J. and Phillips, M., *The Lisheen Mine Archaeological Project 1996-1998*, Wordwell Ltd, Bray, Co Wicklow

Théry-Parisot, I, 2002, 'Gathering of firewood during the Palaeolithic' in S Thiébault (ed), *Charcoal Analysis, Methodological Approaches, Palaeoecological Results and Wood Uses*, BAR International Series 1063

Zohary, D, & Hopf, M, 2000, *Domestication of Plants on the Old World.* Oxford University Press Ltd. Oxford.

http://intarch.ac.uk/journal/issue1/tomlinson/scripts/index-latin.html - Archaeobotanical Computer Database (ABCD)

http://www.plantatlas.eu/za.php - Online Digital Plant Atlas

Table 1. Components of the subsamples from deposits recovered at Peboc site, Llangefni (G2207).
Semi quantitative score of the components of the samples is based on a four point scale, from '1' – one or a few remains (less than an estimated six per kg of raw sediment) to '4' – abundant remains (many per kg or a major component of the matrix).

Sample	**001**	**002**	**003**	**004**	**005**	**006**
Cut	**006**	**004**	**019**	**021**	**027**	
Deposit	**007**	**005**	**020**	**022**	**028**	**014**
Feature type	**Pit**	**Pit**	**Ditch/Pit**	**Enclosure ditch**	**Ditch/Pit**	**Rubble deposit in roundhouse**
Period	**Neolithic**	**-**	**RB**	**RB**	**RB**	**RB**
Bone fgts.				1		
Charcoal fgts.	4	1	3	2	4	1
Earthworm egg capsules	1	1	1	1	1	1
Plant macros. (ch.)	1	1	1	1	2	2
Root/rootlet fgts.	3	3	1	3	3	3
Sand	3	4	4	4	2	4
? Slag fgts.	1	1	1			

Sample	**007**	**008**	**009 (1)**	**009 (2)**	**010**
Cut	**017**	**018**			
Deposit	**015**	**016**	**057**	**057**	**074**
Feature type	**Roundhouse gully?**	**Roundhouse gully?**	**Burnt deposit**	**Burnt deposit**	**Layer sealing posthole [060]**
Period	**RB**	**RB**	**-**	**-**	**-**
Bone fgts.				1	1
Charcoal fgts.	1	1	1	1	1
? Coal fgts.				2	
Earthworm egg capsules	1	1	1	1	1
Plant macros. (ch.)	1		1	1	1
Root/rootlet fgts.	4	4	4	3	3
Sand	3	3	3	4	4

Table 2: Complete list of taxa recovered from deposits recovered at Peboc Site, Llangefni (G2207).
Taxa and nomenclature follow Stace (1997)

Sample	**001**	**002**	**003**	**004**	**005**	**006**	
Cut	**006**	**004**	**019**	**021**	**027**		
Deposit	**007**	**005**	**020**	**022**	**028**	**014**	
Feature type	**Pit**	**Pit**	**Ditch/Pit**	**Ditch**	**Ditch/Pit**	**Rubble deposit in roundhouse**	
Sample volume (ml)	**50**	**20**	**120**	**15**	**50**	**25**	
Period	**Neolithic**	**-**	**RB**	**RB**	**RB**	**RB**	
LATIN BINOMIAL							**COMMON NAME**
Corylus avellana (fgts.)	3			1		1	Hazelnut shell fgts.
BRASSICACEAE			1		2		Cabbage family
CYPERACEAE					2		Sedge family
POACEAE		1	4				Grass Family
Avena awn fragment				1	2		Oat awn fragment
Hordeum spp.					3		Barley
Triticum spp.			1		7		Wheat
Triticum spelta			4		1	14	Spelt Wheat
Indeterminate cereal		1	19	17	63	27	Indeterminate cereal
Indeterminate cereal glume base		1		1			Indeterminate glume base
Indeterminate cereal spikelet fork		4	2	6	7		Indeterminate cereal spikelet fork
Indeterminate cereal chaff fragments		3	3	2	2		Indeterminate cereal chaff fragments
Indeterminate		1					Indeterminate

Sample	**007**	**009 (1)**	**009 (2)**	**010**	
Cut	**017**				
Deposit	**015**	**057**	**057**	**074**	
Feature type	**Roundhouse gully?**	**Burnt deposit**	**Burnt deposit**	**Layer sealing posthole [060]**	
Sample volume (ml)	**10**	**30**	**40**	**35**	
Period	**RB**	**-**	**-**	**-**	
LATIN BINOMIAL					**COMMON NAME**
Corylus avellana (fgts.)	1				Hazelnut shell fgts.
Calendula officinalis L.				5	Pot marigold

CYPERACEAE				1	Sedge family
Avena cf. *sativa*		2	6	6	Oat (possible cultivated)
Hordeum spp.		4	3	1	Barley
Triticum spelta				11	Spelt Wheat
Indeterminate cereal	4	27	15	53	Indeterminate cereal
Indeterminate cereal spikelet fork	1	1	1		Indeterminate cereal spikelet fork
Indeterminate cereal chaff fragments				1	Indeterminate cereal chaff fragments
Indeterminate				2	Indeterminate

Table 3. Complete list of taxa recovered from deposits at deposits recovered at Peboc Site, Llangefni (G2207). Taxonomy and nomenclature follow Schweingruber (1978). Numbers are identified charcoal fragment for each sample.

Sample		**001**	**003**	**004**	**005**
Cut		**006**	**019**	**021**	**027**
Deposit		**007**	**020**	**022**	**028**
Feature type		**Pit**	**Ditch / Pit**	**Ditch**	**Ditch / Pit**
Period		**Neolithic**	**RB**	**RB**	**RB**
No fragments		**150+**	**500+**	**50+**	**200+**
Max size (mm)		**18**	**18**	**9**	**17**
Name	**Vernacular**				
Corylus avellana	Hazel	30			
Salix / Populus	Willow / Poplar			17	100
Quercus	Oak	46	100		
	Indeterminate	24		33	

Appendix II.10 Radiocarbon dating certificates
SUERC

Scottish Universities Environmental Research Centre
Director: Professor R M Ellam
Rankine Avenue, Scottish Enterprise Technology Park,
East Kilbride, Glasgow G75 0QF, Scotland, UK
Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

19 February 2013

Laboratory Code	GU29527
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	Peboc, Llangefni, Anglesey, North Wales
Context Reference	005: fill of pit [004]
Sample Reference	G2207.01
Material	Charred Seed : Indeterminate cereal and Poaceae
$\delta^{13}C$ relative to VPDB	-
Result	Failed on AMS.

N.B. Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Signed :- Date :-

Scottish Universities Environmental Research Centre

Director: Professor R M Ellam

Rankine Avenue, Scottish Enterprise Technology Park,
East Kilbride, Glasgow G75 0QF, Scotland, UK
Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

19 February 2013

Laboratory Code	SUERC-44526 (GU29528)
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	Peboc, Llangefni, Anglesey, North Wales
Context Reference	007: fill of pit [006]
Sample Reference	G2207.02
Material	Charred Nutshell : Hazel (Corylus avellana)
$\delta^{13}C$ relative to VPDB	-28.5 ‰
Radiocarbon Age BP	4252 ± 29

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standards, background standards and the random machine error.

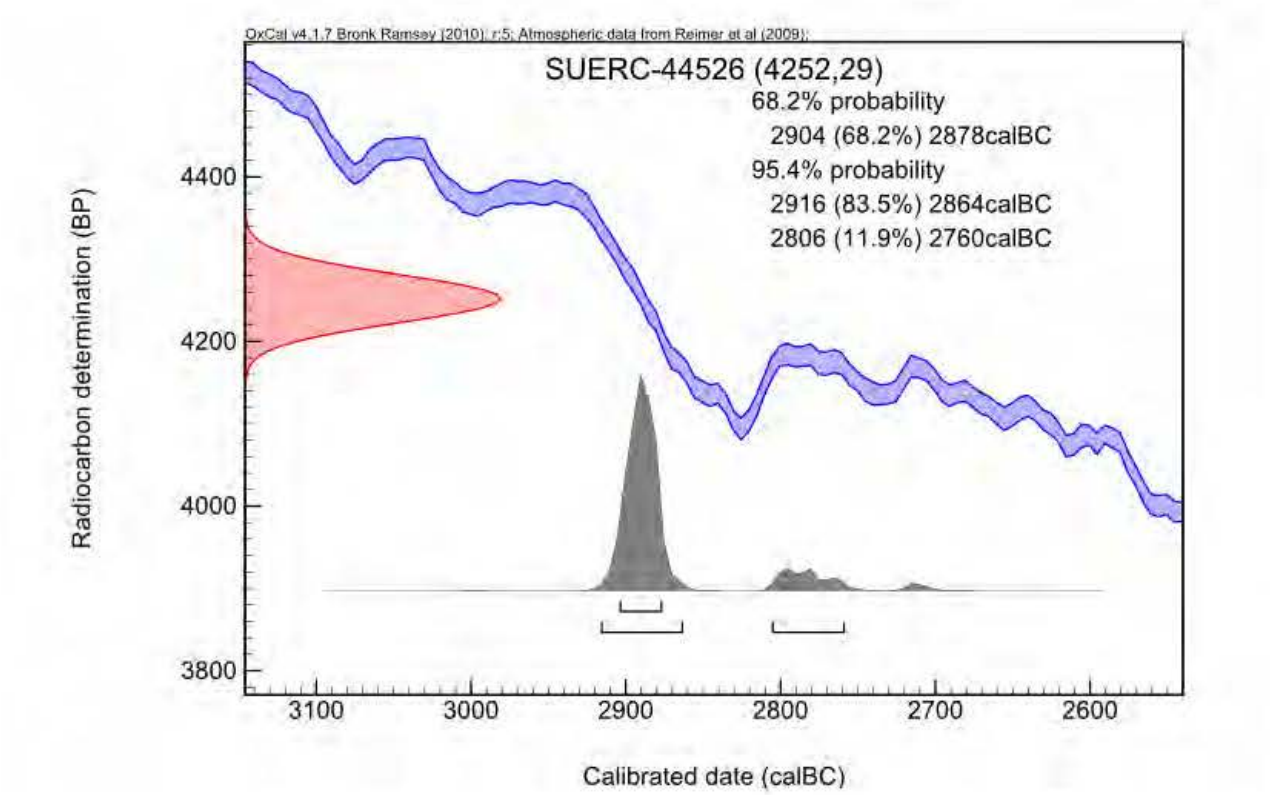
The calibrated age ranges are determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.1 (Bronk Ramsey 2009). Terrestrial samples are calibrated using the IntCal09 curve while marine samples are calibrated using the Marine09 curve.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- Date :-

Checked and signed off by :- Date :-

Calibration Plot



Scottish Universities Environmental Research Centre

Director: Professor R M Ellam

Rankine Avenue, Scottish Enterprise Technology Park,
East Kilbride, Glasgow G75 0QF, Scotland, UK
Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

19 February 2013

Laboratory Code	SUERC-44527 (GU29529)
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	Peboc, Llangefni, Anglesey, North Wales
Context Reference	007: fill of pit [006]
Sample Reference	G2207.03
Material	Charcoal : Hazel (Corylus avellana)
$\delta^{13}C$ relative to VPDB	-27.4 ‰
Radiocarbon Age BP	4171 ± 27

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standards, background standards and the random machine error.

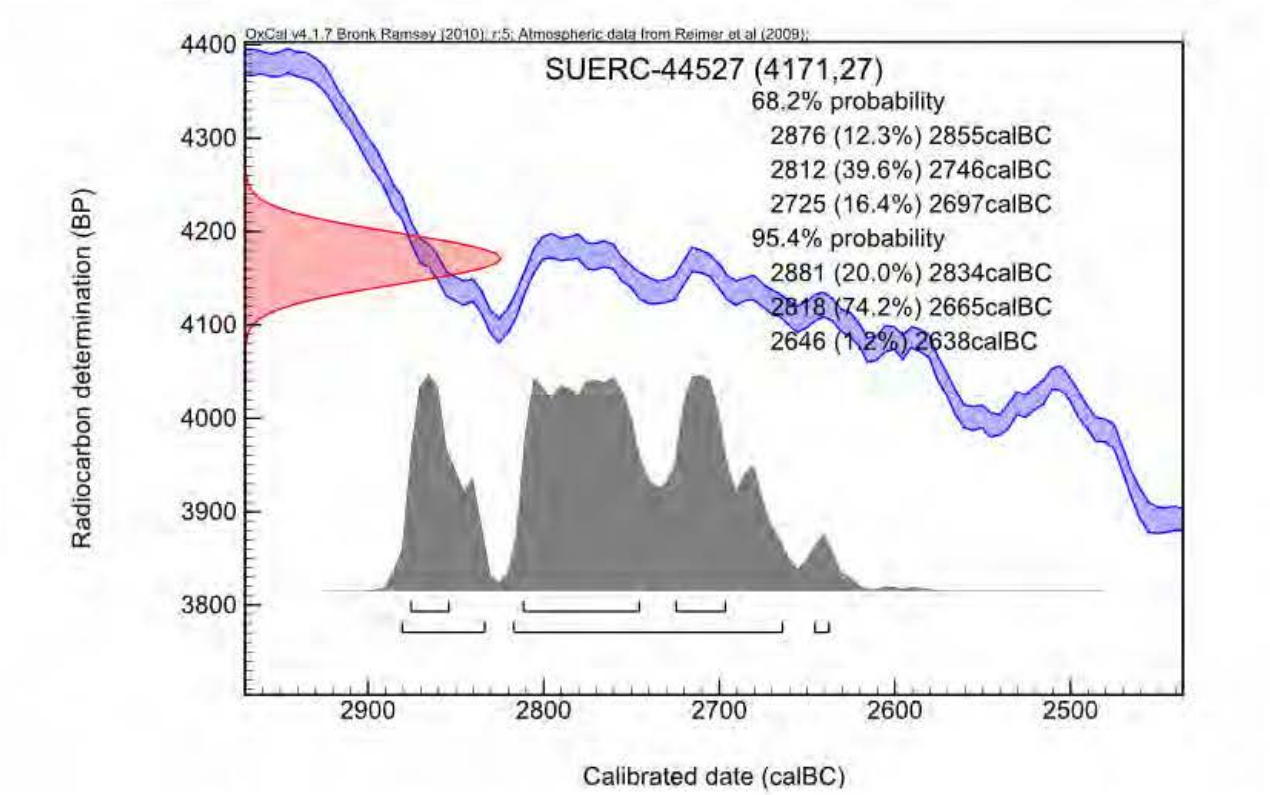
The calibrated age ranges are determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.1 (Bronk Ramsey 2009). Terrestrial samples are calibrated using the IntCal09 curve while marine samples are calibrated using the Marine09 curve.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- Date :-

Checked and signed off by :- Date :-

Calibration Plot



Scottish Universities Environmental Research Centre

Director: Professor R M Ellam

Rankine Avenue, Scottish Enterprise Technology Park,
East Kilbride, Glasgow G75 0QF, Scotland, UK
Tel: +44 (0)1355 223332 Fax: +44 (0)1355 229898 www.glasgow.ac.uk/suerc

RADIOCARBON DATING CERTIFICATE

11 March 2013

Laboratory Code	SUERC-44828 (GU29871)
Submitter	Jane Kenney Gwynedd Archaeological Trust Craig Beuno, Ffordd y Garth Bangor Gwynedd LL57 2RT
Site Reference	Peboc, Llangefni, Anglesey, North Wales
Context Reference	005 fill of pit[004]
Sample Reference	G2207.01
Material	Grain : Indeterminate cereal
$\delta^{13}C$ relative to VPDB	-23.2 ‰
Radiocarbon Age BP	1816 ± 35

N.B. The above ^{14}C age is quoted in conventional years BP (before 1950 AD). The error, which is expressed at the one sigma level of confidence, includes components from the counting statistics on the sample, modern reference standards, background standards and the random machine error.

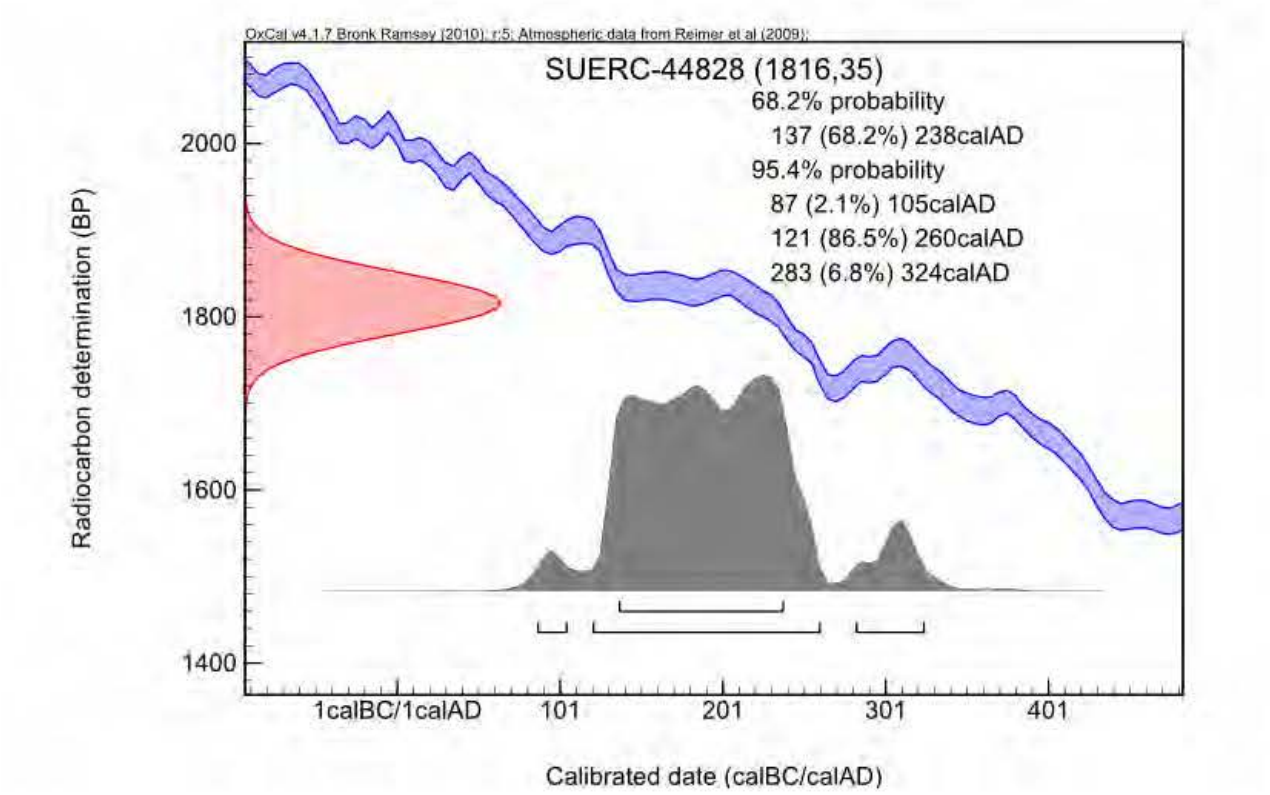
The calibrated age ranges are determined using the University of Oxford Radiocarbon Accelerator Unit calibration program OxCal 4.1 (Bronk Ramsey 2009). Terrestrial samples are calibrated using the IntCal09 curve while marine samples are calibrated using the Marine09 curve.

Samples with a SUERC coding are measured at the Scottish Universities Environmental Research Centre AMS Facility and should be quoted as such in any reports within the scientific literature. Any questions directed to the Radiocarbon Laboratory should also quote the GU coding given in parentheses after the SUERC code. The contact details for the laboratory are email g.cook@suerc.gla.ac.uk or Telephone 01355 270136 direct line.

Conventional age and calibration age ranges calculated by :- Date :-

Checked and signed off by :- Date :-

Calibration Plot



APPENDIX III: PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION

PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

PROJECT DESIGN FOR ARCHAEOLOGICAL EVALUATION – TARGETED TRENCHING (G2207)

Prepared for Ecopellets Ltd., November 2011

1.0 INTRODUCTION

Gwynedd Archaeological Trust has been asked by Ecopellets Ltd to provide a cost and project design for carrying out an archaeological evaluation of a *c.*6.7ha L-shaped development area located within an industrial estate to the south-east of Llangefni, Ynys Môn (centred on NGR **SH46147495**). The evaluation will consist of the archaeological excavation of 26 trenches, mainly 20m by 2m on to the natural subsoils to ensure that all possible archaeological features have been excavated. The topsoil and any overburden will be removed by mechanical excavator, and any archaeological features encountered will be sample excavated by hand in order to determine their character and date. The location of the trenches is shown on Figure 1.

The site consists of three fields of improved grassland with hedged boundaries and smaller areas of waste and landscaped ground associated with existing development. The site is situated between an industrial estate to the north and west, a sewage works to the south-east, and a fishery to the south, with various adjacent areas of grassland, and marshy grassland to the south. Although surrounded by industrial development, the site is identified as greenfield.

Ground investigations undertaken in connection with the present and previous proposals for the site indicate that the soils and geology of the site comprise a shallow topsoil of 20-30cm,overlying sandy clay glacial deposits, overlying weathered limestone bedrock.
The ground investigations identified various possible natural solution features within the bedrock.

This phase is to be regarded as the **third phase** of a staged programme of archaeological works (the first being the assessment and the second the geophysical survey); the aim of this phase is to establish the archaeological significance of the site, to assess the impact of the development proposals on surviving monuments or remains and to help inform future decision making, design solutions and potential mitigation strategies. The subsequent report will include an assessment of the potential for further investigative work and where relevant give recommendations for an appropriate mitigation strategy.

A geophysical survey, comprising detailed gradiometer survey, was completed at the site by *Stratascan* in October 2011 (Smalley 2011). The survey identified a number of anomalies which may represent archaeological features. These include possible cut features of archaeological origin. The current design has been completed in response to the geophysical survey results.

The current planning application (**34C40Z/EIA/ECON**) pertains to the proposed development of the site for a biomass energy plant, including administrative accommodation, associated infrastructure, landscaping and storage/processing areas. The development includes three separate purpose designed buildings of maximum 35.5m height, a sub-station and two chimneys of 30m and 40m.

The archaeological evaluation will be completed as part of this planning application.

Gwynedd Archaeological Planning Service (GAPS) has not prepared a mitigation brief for this phase but have been informed of the results of the assessment, geophysical survey and the proposed trial trenching strategy.

The current design conforms to the guidelines specified in the *IFA Standard and Guidance for Archaeological Evaluation* (Institute of Field Archaeologists, 1994, rev. 2001 & 2008).

2.0 BACKGROUND

GAT completed an archaeological assessment of the proposed development area in September 2011 (Evans, 2011. GAT Report **970**). The report identified a landscape of improved fields and hedgerows of

19th century date; associated with these was a complex of agricultural buildings to the north of the study area. No other archaeological sites were identified, but it was noted that Tregarnedd, a Scheduled moated site, lay to the east, and that evidence of prehistoric occupation was identified to both the south and the north of the development area. The potential for the presence of buried archaeological remains was ranked moderate to high, and a programme of archaeological field evaluation, including geophysical survey and trial excavation based on the survey results prior to commencement of construction works was recommended, as well as basic record of the agricultural buildings prior to demolition.
The geophysical survey was completed by *Stratascan* in October 2011 (Smalley 2011). A magnetometer survey was completed using a Bartington Grad 601-2, which used two fluxgates mounted 1.0m vertically apart aligned to nullify the effects of the earth's magnetic field. Readings were taken at 0.25m centres along traverses 0.5m apart, which equated 7200 sampling points within a full 30m x 30m grid. A number of anomalies of probable archaeological origin were identified. Positive and negative linear and area anomalies, indicative of cut features such as pits and ditches were evident throughout the survey area with a particular concentration forming enclosures in the northern region. Many of these anomalies appear to cut each other which would suggest multiphase activity having occurred in the area.

3.0 METHOD STATEMENT

3.1 Trial Trenching/Targeted Excavation

Before trial trenching commences an agreed programme of excavation timing, siting, duration, surface re-instatement and health and safety protection measures will be agreed with the Client (Ecopellets Ltd.) and Gwynedd Archaeological Planning Services (GAPS).

The trench locations are based on information received from the preliminary *Stratascan* survey results (Smalley, October 2011: Issue 01); see Figure 1, along with some blank areas to allow the efficacy of the geophysical survey for identifying archaeological remains within the site to be tested.

Trench 01 – 20.0m (l) x 2.0m (w): investigating background evidence, including ridge and furrow ploughing.

Trench 02 – 20.0m (l) x 2.0m (w): investigating a linear anomalies running north-west south-east.

Trench 03 – 20.0m (l) x 2.0m (w): investigating a c.100m linear feature of *probable* archaeological origin;

Trench 04 – 20.0m (l) x 2.0m (w): investigating a 50.0m long linear feature of *probable* archaeological origin;

Trench 05 – 20.0m (l) x 2.0m (w): investigating background evidence.

Trench 06 – 20.0m (l) x 10.0m (w): investigating a negative anomaly (possible bank or earthwork and also a possible enclosure ditch

Trench 07 - 20.0m (l) x 2.0m (w): investigating a *probable* enclosure ditch and possible pit features

Trench 08 – **30.0m (l) x 2.0m** (w): investigating the enclosure ditch and *probable* internal features

Trench 09 – 20.0m (l) x 2.0m (w): investigating *possible* internal features within enclosure ditch

Trench 10 – 20.0m (l) x 2.0m (w): investigating linear and irregular anomalies;

Trench 11 – 20.0m (l) x 4.0m (w): investigating a possible banked sub circular enclosure with internal features

Trench 12 – 20.0m (l) x 2.0m (w): investigating a two linear features, possibly forming part of a field system

Trench 13 – 20.0m (l) x 2.0m (w): investigating a two linear features, possibly forming part of a field system

Trench 14 – 20.0m (l) x 2.0m (w): investigating a linear feature, possibly forming part of a field system and other cut anomalies

Trench 15 – 20.0m (l) x 2.0m (w): investigating a linear feature, possibly forming part of a field system

Trench 16 – 20.0m (l) x 2.0m (w): investigating linear features, possibly forming part of a field system

Trench 17 – 20.0m (l) x 2.0m (w): investigating a linear feature, possibly forming part of a field system

Trench 18 – 20.0m (l) x 2.0m (w): investigating a linear feature

Trench 19 – 20.0m (l) x 2.0m (w): investigating a negative linear anomaly,

Trench 20 – 20.0m (l) x 2.0m (w): investigating background evidence and possible linear anomaly

Trench 21 – 20.0m (l) x 2.0m (w): investigating a linear feature

Trench 22 – 20.0m (l) x 2.0m (w): investigating the *probable* enclosure

Trench 23 – 20.0m (l) x 2.0m (w): investigating background evidence

Trench 24 – 20.0m (l) x 2.0m (w): investigating a positive anomaly

Trench 25 – 20.0m (l) x 2.0m (w): investigating background evidence and *possible* cut features

Trench 26 – 20.0m (l) x 2.0m (w): investigating a *possible* linear and cut features

NB. All trenches will also target "blank" areas, where no geophysical anomaly was identified. This will allow an evaluation of the efficacy of the geophysical survey for identifying archaeological remains within the site.

3.1.1 Specific Methodology

If significant archaeological deposits are identified they will be manually cleaned, excavated and recorded to determine extent, function, date and relationship to adjacent features.

The site will be planned to scale and trenches located via digital survey.

A written record of the trench content and all identified features will be completed via GAT pro-formas

Any subsurface remains will be recorded photographically, with detailed notations and a measured survey. The photographic record will be maintained, using a digital SLR camera set to maximum resolution. Photographic identification boards should also be used.

All trenches will be opened with a tracked excavator fitted with a toothless bucket

Any identified features will be temporarily cordoned with road pins/orange mesh fencing, for protection and to allow opportunity for Client/GAPS to attend/inspect.

If any trenches are to remain open overnight and/or weekends; provision for fencing off using road pins/orange mesh will be sought

3.1.2 Evaluation Aims

The evaluation will aim to address the following:

Verify the efficacy of the geophysical survey for identifying archaeological remains within the site

Establish the extent to which archaeological remains survive at the site

Establish the date and nature of archaeological remains at the site and assess their implications for understanding the historical development of the area

Establish the depth of archaeological remains and the quality, value and level of preservation of any deposits

Assess the level of risk any surviving remains may pose to development.

NB. No specific reinstatement instructions have been supplied by client.

NB. If significant archaeological activity is identified within any trench (e.g. extensive and/or complex features/artefacts/deposits), cf. para. 4.0.

3.2 Report

Following completion of the stages outlined above, a report will be produced that will include:

Introduction
Project Design
Methods and techniques
Archaeological Background
Results
Proposals for further mitigation
Summary and conclusions
List of sources consulted.

The report will include the following:

a) a copy of the agreed specification
b) a site location plan based on current OS mapping
c) a trench location plan indicating trench positions relative to the development site and fixed manmade or topographic features
d) all identified features plotted on an appropriately scaled plan of the development site
e) appropriately scaled trench plans and sections showing identified features and significant finds
f) full dimensional and descriptive detail of all identified features

Provision should also be made for all archaeological work on site, including the post-excavation analysis, conservation of artefacts, any supplementary scientific analysis and for the subsequent publication of results in an appropriate journal.

3.3 Archive

A full archive including plans, photographs, written material and any other material resulting from the project will be prepared. All plans, photographs and descriptions will be labelled and cross-referenced, and lodged in an appropriate place (to be decided in consultation with the regional Historic Environment Record) within six months of the completion of the project.

4.0 FURTHER ARCHAEOLOGICAL WORKS

The identification of significant archaeological features during the evaluation stage may necessitate further archaeological works. This will require the submission of new cost estimates to the contractor and may be subject to a separate project design, to be agreed by the GAPS prior to implementation.
This design does not include a methodology or cost for examination of, conservation of, or archiving of finds discovered during the evaluation, nor of any radiocarbon dates required, nor of examination of palaeoenvironmental samples associated with any peat deposits. The need for these will be identified in the post-fieldwork programme (if required), and a new design will be issued for approval by the GAPS Archaeologist.

5.0 ENVIRONMENTAL SAMPLES

If necessary, relevant archaeological deposits will be sampled by taking bulk samples (a minimum of 10.0 litres and maximum of 30.0 litres) for flotation of charred plant remains. Bulk samples will be taken from waterlogged deposits for macroscopic plant remains. Other bulk samples, for example from middens, may be taken for small animal bones and small artefacts.

6.0 HUMAN REMAINS

Any finds of human remains will be left *in-situ*, covered and protected, and both the coroner and the GAPS Archaeologist informed. If removal is necessary it will take place under appropriate regulations and with due regard for health and safety issues. In order to excavate human remains, a licence is required under Section *25* of the Burials Act 1857 for the removal of any body or remains of any body from any place of burial. This will be applied for should human remains need to be investigated or moved.

7.0 SMALL FINDS

The vast majority of finds recovered from archaeological excavations comprise pottery fragments, bone, environmental and charcoal samples, and non-valuable metal items such as nails. Often many of these finds become unstable (i.e. they begin to disintegrate) when removed from the ground. All finds are the property of the landowner, however, it is Trust policy to recommend that all finds are donated to an appropriate museum where they can receive specialist treatment and study. Access to finds must be granted to the Trust for a reasonable period to allow for analysis and for study and publication as necessary. All finds would be treated according to advice provided within *First Aid for Finds* (Rescue 1999). Trust staff will undertake initial identification, but any additional advice would be sought from a wide range of consultants used by the Trust, including National Museums and Galleries of Wales at Cardiff, ARCUS at Sheffield and BAE at Birmingham.

7.1 Unexpected Discoveries: Treasure Trove

Treasure Trove law has been amended by the Treasure Act 1996. The following are Treasure under the Act:

Objects other than coins any object other than a coin provided that it contains at least 10% gold or silver and is at least 300 years old when found.

Coins all coins from the same find provided they are at least 300 years old when found (if the coins contain less than 10% gold or silver there must be at least 10. Any object or coin is part of the same find as another object or coin, if it is found in the same place as, or had previously been left together with, the other object. Finds may have become scattered since they were originally deposited in the ground. Single coin finds of gold or silver are not classed as treasure under the 1996 Treasure Act.

Associated objects any object whatever it is made of, that is found in the same place as, or that had previously been together with, another object that is treasure.

Objects that would have been treasure trove any object that would previously have been treasure trove, but does not fall within the specific categories given above. These objects have to be made substantially of gold or silver, they have to be buried with the intention of recovery and their owner or his heirs cannot be traced.

The following types of finds are not treasure:

Objects whose owners can be traced.

Unworked natural objects, including human and animal remains, even if they are found in association with treasure.

Objects from the foreshore which are not wreck.

All finds of treasure must be reported to the coroner for the district within fourteen days of discovery or identification of the items. Items declared Treasure Trove become the property of the Crown, on whose behalf the National Museums and Galleries of Wales acts as advisor on technical matters, and may be the recipient body for the objects.

The National Museums and Galleries of Wales will decide whether they or any other museum may wish to acquire the object. If no museum wishes to acquire the object, then the Secretary of State will be able to disclaim it. When this happens, the coroner will notify the occupier and landowner that he intends to return the object to the finder after 28 days unless he receives no objection. If the coroner receives an objection, the find will be retained until the dispute has been settled.

8.0 STAFF & TIMETABLE

8.1 Staff

The project will be supervised by John Roberts, Acting Head of GAT: Contracts. The work will be carried out by fully trained Project Archaeologists who are experienced in conducting project work and working with contractors and earth moving machinery. (Full CV's are available upon request).

8.2 Timetable

It is expected that the trial will be undertaken in November and early December 2011.

9.0 HEALTH AND SAFETY

The Trust subscribes to the SCAUM (Standing Conference of Archaeological Unit Managers) Health and Safety Policy as defined in **Health and Safety in Field Archaeology** (1999).

10.0 INSURANCE

Liability Insurance - Aviva Policy 24765101CHC/00045

Employers' Liability: Limit of Indemnity £10m in any one occurrence
Public Liability: Limit of Indemnity £5m in any one occurrence
Hire-in Plant Insurance: £50,000.00 any one item;
£250,000.00 any one claim

The current period expires 21/06/12

Professional Indemnity Insurance – RSA Insurance Plc P8531NAECE/1028

Limit of Indemnity £5,000,000 any one claim

The current period expires 22/07/12

11.0 BIBLIOGRAPHY

Evans, R. 2011GAT Report **970**: PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY – Archaeological Assessment

IFA Standard and Guidance for Archaeological Evaluation (Institute of Field Archaeologists, 1994, rev. 2001 & 2008).

Smalley, R. 2011. Stratascan Report (J2980) PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, – Geophysical Survey Report

STRATASCAN

Geophysical Survey Report

Peboc Biomass Energy Plant, Llangefni

for

Gwynedd Archaeological Trust

October 2011

Job ref. J2980

Richard Smalley BA (Hons) AIFA

Document Title: **Geophysical Survey Report**
Peboc Biomass Energy Plant

Client: **Gwynedd Archaeological Trust**

Stratascan Job No: **J2980**

Techniques: **Detailed magnetic survey (gradiometry)**

National Grid Ref: **SH 465 746**

Field Team: **Richard Fleming and Tim Lewis BA (Hons)**

Project Manager: **Simon Haddrell B.Eng (Hons) AMBCS PIFA**

Report written by: **Richard Smalley BA (Hons) AIFA**

CAD illustration by: **Richard Smalley BA (Hons) AIFA**

Checked by: **Peter Barker C.Eng MICE MCIWEM MIFA FCInstCES**

Stratascan Ltd.
Vineyard House
Upper Hook Road
Upton upon Severn
WR8 0SA

Tel: 01684 592266
Fax: 01684 594142
Email: ppb@stratascan.co.uk
www.stratascan.co.uk

LIST OF FIGURES

1 SUMMARY OF RESULTS

The geophysical survey undertaken over 6.7ha of agricultural land near Llangefni, Anglesey has identified a number of anomalies of a probable archaeological origin. Positive linear and area anomalies, indicative of cut features such as pits and ditches are evident throughout the survey area with a particular concentration forming enclosures in the northern region. Negative anomalies likely to be related to ploughed out earthworks can also be noted within the survey area.

2 INTRODUCTION

2.1 Background synopsis

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development as a biomass plant near Llangefni. This survey forms part of an archaeological investigation being undertaken by Gwynedd Archaeological Trust.

2.2 Site location

The site is located south of Llangefni, Anglesey, Wales at OS ref. SH 465 746.

2.3 Description of site

The survey area comprises approximately 6.7ha of sloping agricultural land. The southern boundary of the site is formed by marshland and sewage works. Local industrial parks form the northern boundary.

2.4 Geology and soils

The underlying geology is carboniferous limestone (British Geological Survey South Sheet, Fifth Edition Solid, 2007). The drift geology is boulder clay (British Geological Survey South Sheet, First Edition Quaternary, 1977).

The overlying soils are known as East Keswick 3 which are typical brown earths. These consist of well drained fine loamy soils (Soil Survey of England and Wales, Sheet 2 Wales).

2.5 Site history and archaeological potential (Evans, 2011)

The archaeological assessment provided by the client indicates that the survey area is located in close proximity to a number of sites of archaeological interest. The Scheduled moated site of Tregarnedd is located to the east and prehistoric activity is known to the north and south of the survey area. Structures related to an 18th or 19th century farm complex are located within the survey area itself.

The archaeological assessment concludes that the potential for the presence of archaeological remains is thought to be moderate to high.

2.6 Survey objectives

The objective of the survey was to locate any features of a possible archaeological origin in order that they may be assessed prior to development.

2.7 Survey methods

Detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomalies. More information regarding this technique is included in the Methodology section below.

3 METHODOLOGY

3.1 Date of fieldwork

The fieldwork was carried out over three days from 17th October 2011. Weather conditions during the survey were wet and windy.

3.2 Grid locations

The location of the survey grids has been plotted in Figure 2 together with the referencing information. Grids were set out using a Leica 705auto Total Station and referenced to suitable topographic features around the perimeter of the site.

3.3 Survey equipment and gradiometer configuration

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

3.4 Sampling interval, depth of scan, resolution and data capture

3.4.1 Sampling interval

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid.

3.4.2 Depth of scan and resolution

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m, though strongly magnetic objects may be visible at greater depths. The collection of data at 0.25m centres provides an optimum methodology for the task balancing cost and time with resolution.

3.4.3 Data capture

The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

3.5 Processing, presentation of results and interpretation

3.5.1 Processing

Processing is performed using specialist software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following schedule shows the basic processing carried out on all processed gradiometer data used in this report:

1. *Despike* (Locates and removes random “iron spikes” often present in gradiometer data)
2. *Destripe* (Removes striping effects caused by zero-point discrepancies between different sensors and walking directions)
3. *Destagger* (Removes zigzag effects caused by inconsistent walking speeds on sloping, uneven or overgrown terrain)
4. *Deslope* (Used to correct for drift in gradiometer data where the use of the Destripe is inappropriate)

3.5.2 Presentation of results and interpretation

The presentation of the data for each site involves a print-out of the minimally processed data both as a greyscale plot (Figure 3) and a colour plot showing extreme magnetic values (Figure 4), together with a greyscale plot of the processed data (Figure 5). Magnetic anomalies have been identified and plotted onto the 'Abstraction and Interpretation of Anomalies' drawing for the site (Figure 6).

4 RESULTS

The following list of numbered anomalies refers to numerical labels on the interpretation plot (Figure 6).

Probable Archaeology

1. A large number of positive linear and area anomalies have been identified with a particular concentration in the north eastern region of the site. These anomalies are likely to be related to cut features such as pits and ditches and form a number of rectilinear enclosures including internal features within the survey area.

2. A circular and a linear negative anomaly are evident in the northern region of the survey area. Negative anomalies are often suggestive of ploughed out earthworks such as banks of an archaeological origin. It is interesting to note that a number of pit-like anomalies are located within the circular feature.

Possible Archaeology

3. A large number of amorphous positive linear and area anomalies can be noted within the survey area. These features do not conform to any recognisable patterns and as such have been classified as being of a possible, as opposed to probable, archaeological origin. Further investigation would need to be undertaken to ascertain the origin of these features.

4. Weak negative anomalies may suggest the presence of former banks which have been interpreted as being of a possible archaeological origin.

5. A number of magnetic ‘spikes’ (strong focussed values with associated antipolar response) indicate ferrous metal objects. Although most of these are likely to be modern debris, some may be of archaeological interest. Particular attention may be paid to those found in association with other potentially archaeological anomalies.

Other Anomalies

6. Areas of magnetic disturbance are the result of substantial nearby ferrous metal objects such as fences and underground services. These effects can mask weaker archaeological anomalies, but on this site have not affected a significant proportion of the area.

5 CONCLUSION

The detailed magnetic gradiometer survey undertaken south of Llangefni, Anglesey has identified a number of anomalies likely to be of an archaeological origin. A large number of positive linear anomalies indicative of cut features have been located forming a number of enclosures in the northern limits of the survey area. Many of these anomalies seem to cut each other which would suggest multiphase activity having occurred in this area.

A circular ploughed out earthwork is evident within the large enclosure; however further investigation would be necessary in order to ascertain any relationships between the features identified in the geophysical survey.

6 REFERENCES

British Geological Survey South Sheet, 1977. *Geological Survey Ten Mile Map, South Sheet First Edition* (*Quaternary).* Institute of Geological Sciences.

British Geological Survey, 2007. *Geological Survey Ten Mile Map, South Sheet, Fifth Edition (Solid).* British Geological Society.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 2, Wales*.

Evans, R (2011) *Peboc Biomass Energy Plant, Llangefni, Anglesey: Archaeological Assessment*. GAT Report 970.

APPENDIX A – Basic principles of magnetic survey

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

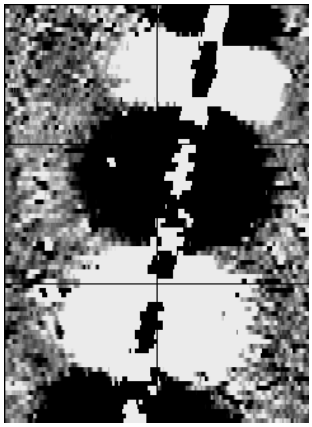
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically either 0.5 or 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

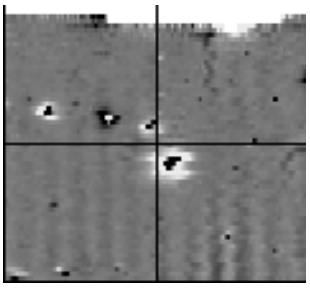
APPENDIX B – Glossary of magnetic anomalies

Bipolar



A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

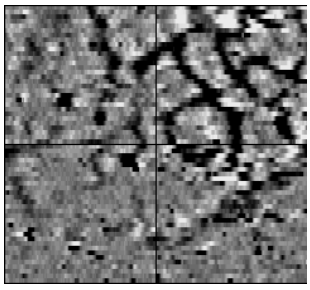


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

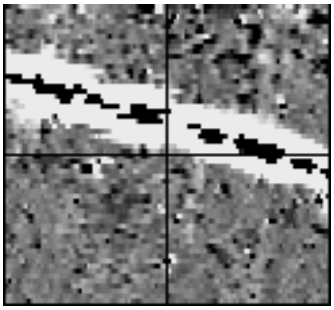
See bipolar and dipolar.

Positive linear



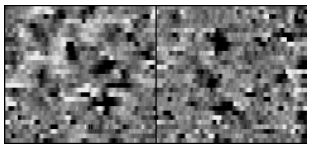
A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.

Positive linear anomaly with associated negative response



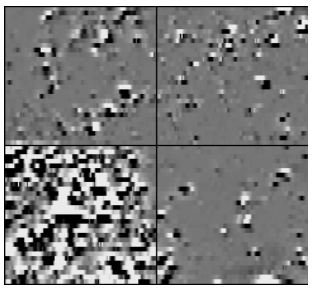
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

Positive point/area



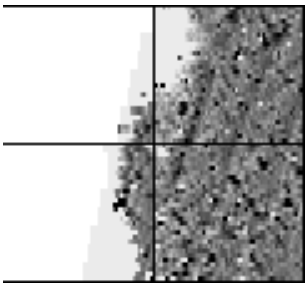
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring depressions in the ground.

Magnetic debris



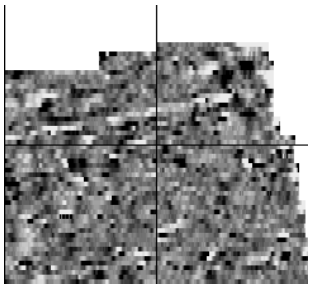
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly (+/-250nT) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremanent material such as bricks or ash.

Magnetic disturbance



Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.

Negative linear

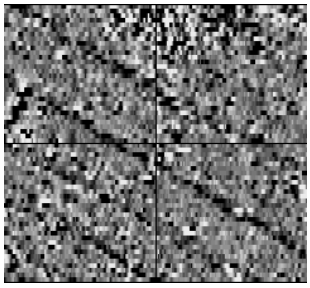


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity



Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing, clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

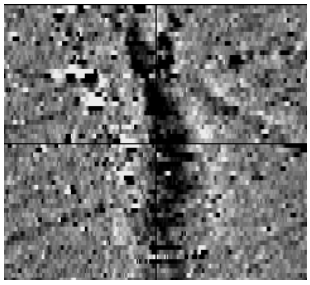
Strength of response

The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a $10m^2$ area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Colour plots are used to show the amplitude of response.

Thermoremanent response

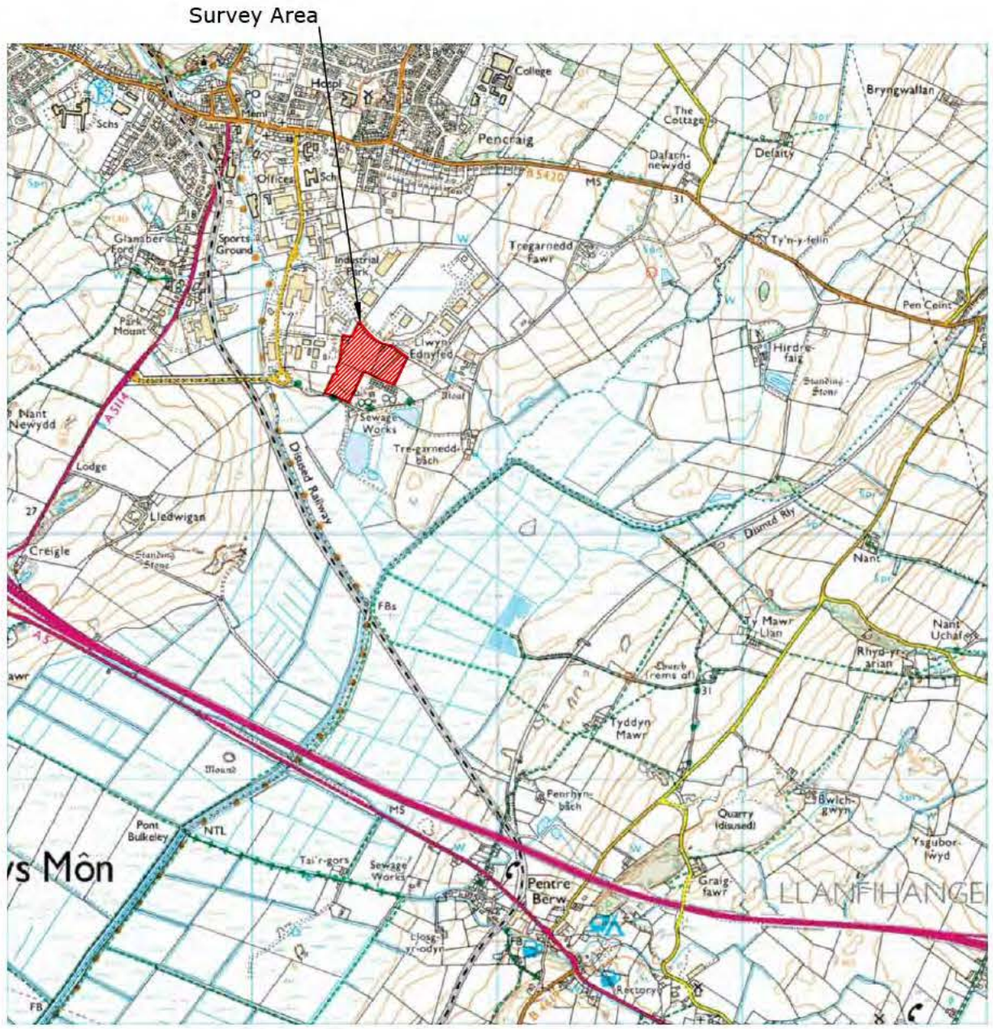
A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately +/-100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred in situ (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations



Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.

OS 100km square = SH



N

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Site centred on NGR SH 465 746

Client
GWYNEDD ARCHAEOLOGICAL TRUST

Project Title Job No. 2980
GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject
LOCATION PLAN OF SURVEY AREA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:25000 (0m 500 1000m)

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
OCT 2011	RAJS	01

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

REFERENCING INFORMATION

A-B	120m	A-C	127.45m	A-D	90.96m
A-E	124.45m	B-C	28.36m	B-D	171.37m
B-E	109.13m				

A-B	Base line
C,D, E	Referencing points
2	Grid number
	Survey area
	Obstruction- unable to survey

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title — Job No. 2980

GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject

LOCATION OF SURVEY GRIDS AND REFERENCING

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:1500 — 0m 10 20 30 40 50m

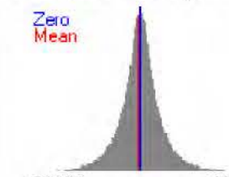
Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
OCT 2011	RAJS	02

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +20nT (black)
Minimum -20nT (white)



Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title — Job No. 2980

GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject

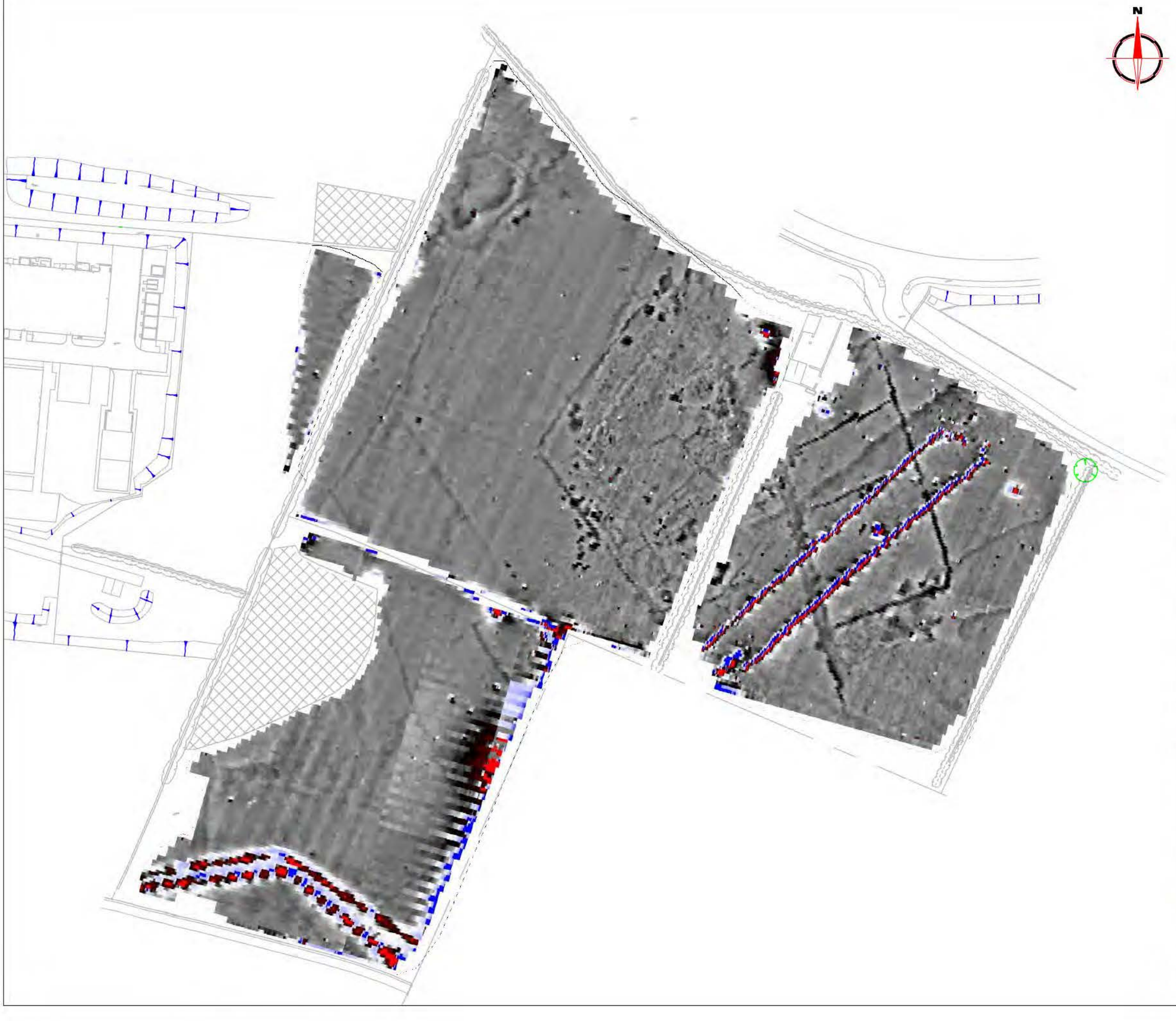
PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:1250 — 0m 10 20 30 40 50m

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	**Drawn by**	**Figure No.**
OCT 2011	RAJS	03



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +250nT (red)
Minimum -250nT (blue)

+250nT

-250nT

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title — Job No. 2980

GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES

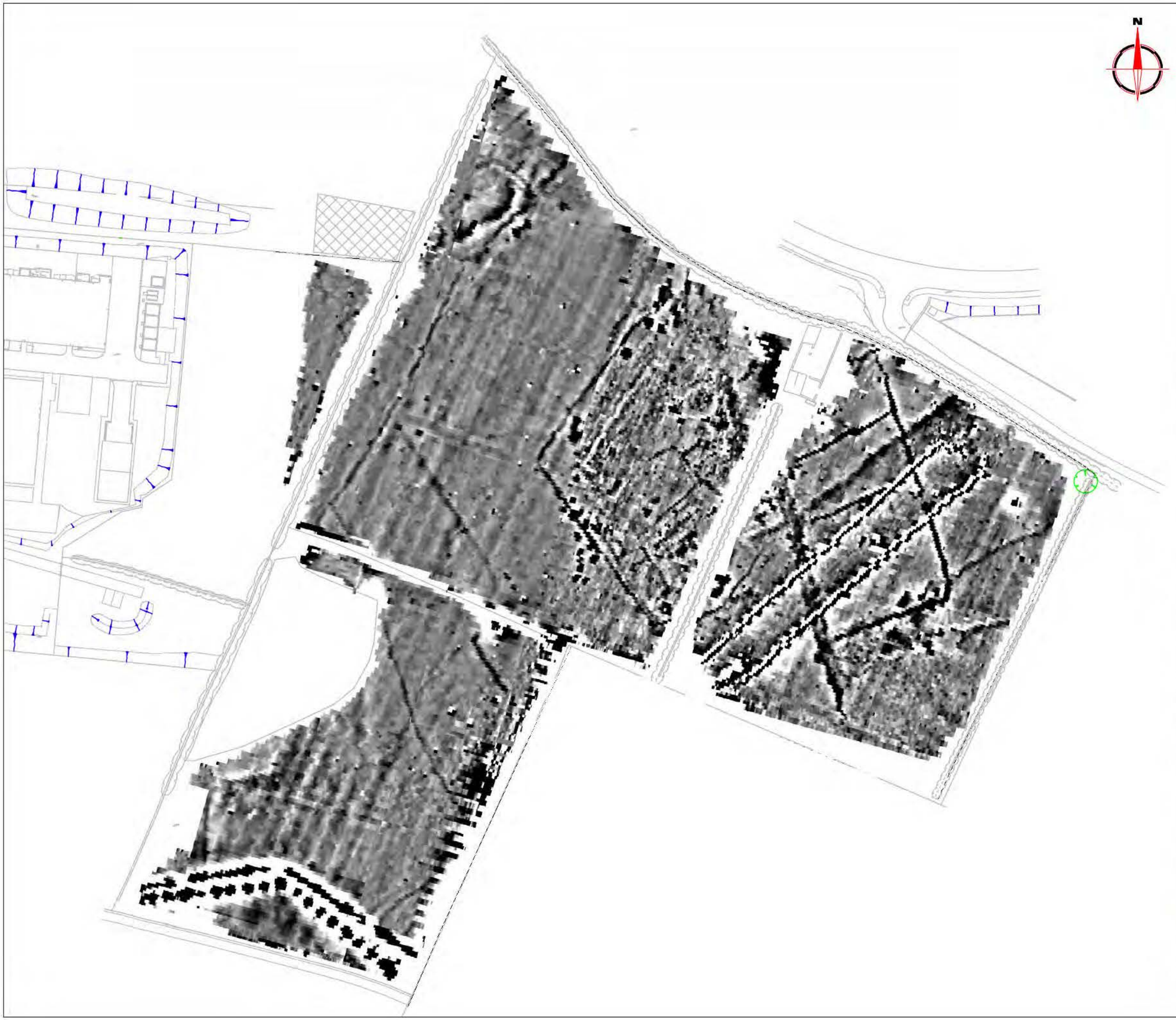
STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:1250

0m 10 20 30 40 50m

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	**Drawn by**	**Figure No.**
OCT 2011	RAJS	04

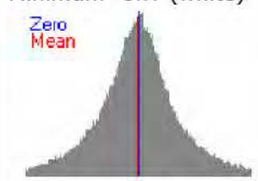


Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

Maximum +8nT (black)
Minimum -8nT (white)



Client
GWYNEDD ARCHAEOLOGICAL TRUST

Project Title — Job No. 2980
GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject
PLOT OF PROCESSED GRADIOMETER DATA

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:1250 — 0m 10 20 30 40 50m

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
OCT 2011	RAJS	05

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

KEY

PROBABLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
- Moderate strength discrete anomaly - probable thermoremanent feature
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin
- Moderate strength discrete anomaly - possible thermoremanent feature
- Magnetic spike - probable ferrous object

OTHER ANOMALIES

- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Strong magnetic debris - possible disturbed or made ground
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin

Client

GWYNEDD ARCHAEOLOGICAL TRUST

Project Title — Job No. 2980

GEOPHYSICAL SURVEY - PEBOC BIOMASS ENERGY PLANT, LLANGEFNI, ANGLESEY

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

SUMO GROUP MEMBER

Scale 1:1250 — 0m 10 20 30 40 50m

Plot	Checked by	Issue No.
A3	PPB	01
Survey date	Drawn by	Figure No.
OCT 2011	RAJS	06

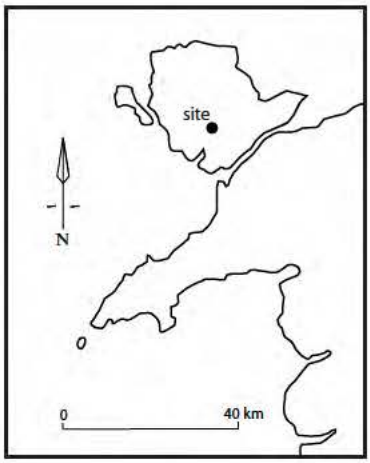
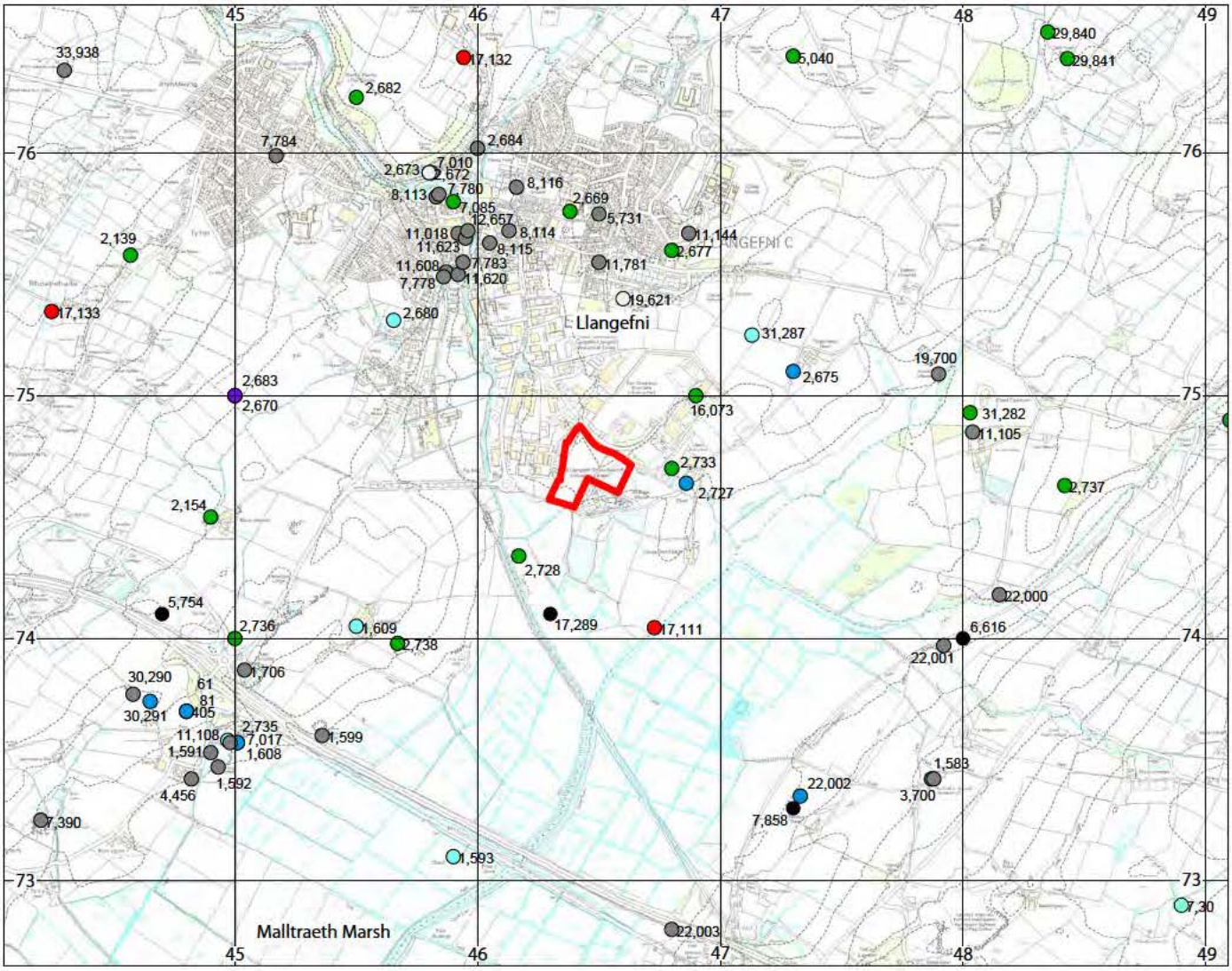


Figure 1. Location of the site (shown in red) with HER sites in the area
Based on OS 1:10,000 scale maps. © Crown copyright. All rights reserved. Licence number AL 100020895.



Key
HER sites
- Prehistoric
- Roman
- Early medieval
- Medieval
- Post-medieval
- Modern
- Unknown
- Multi period

Contours

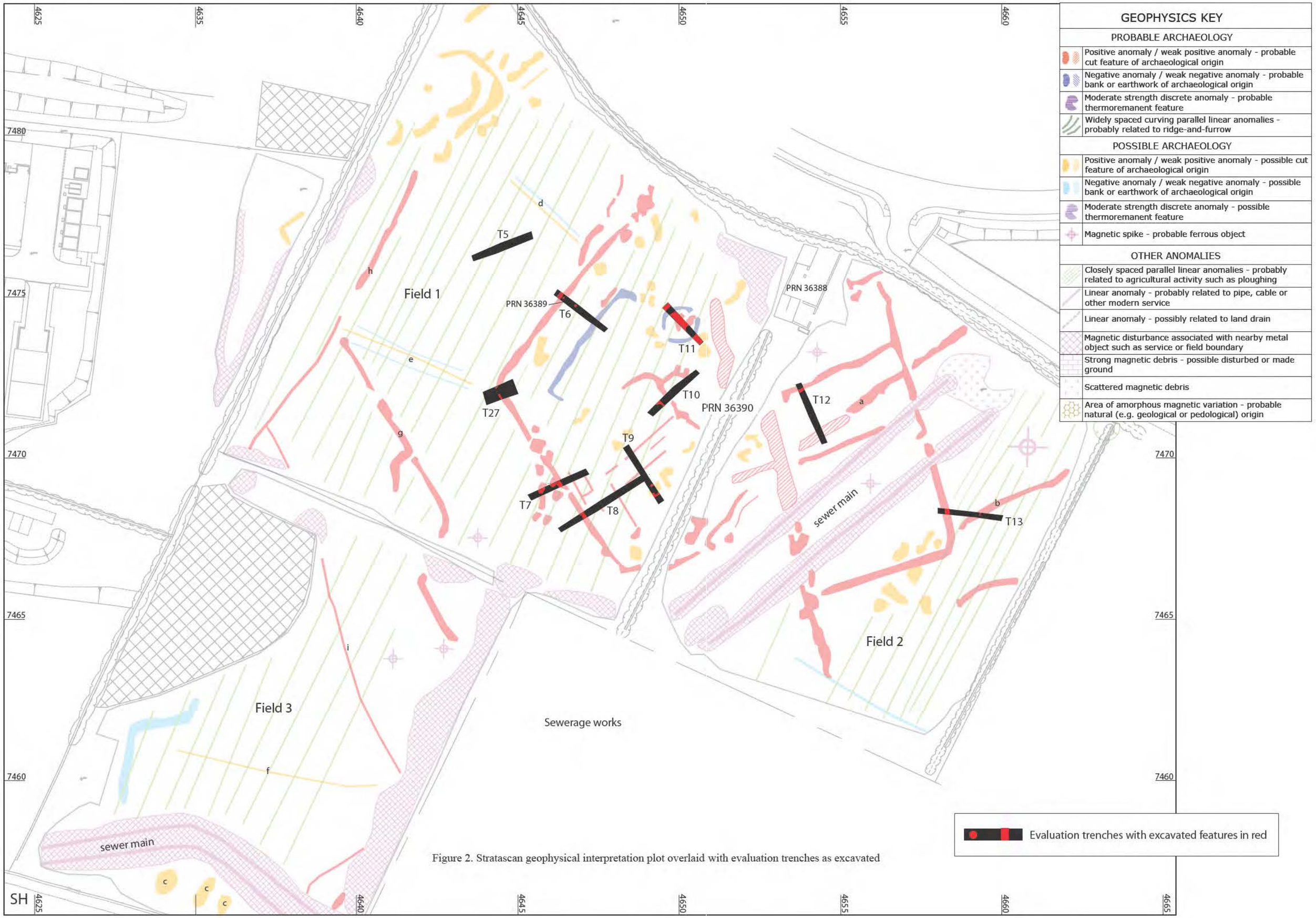


Figure 2. Stratascan geophysical interpretation plot overlaid with evaluation trenches as excavated

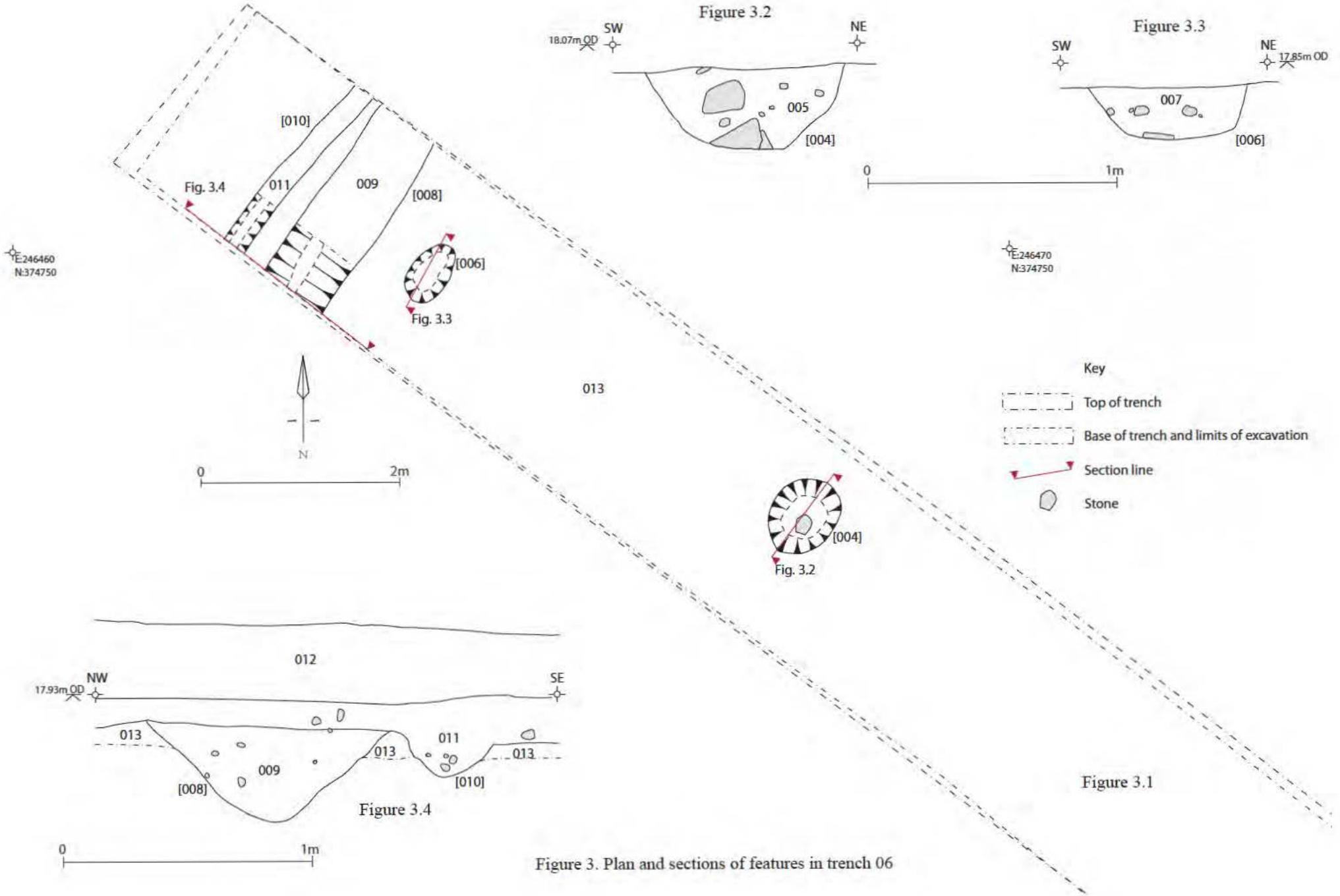


Figure 3. Plan and sections of features in trench 06

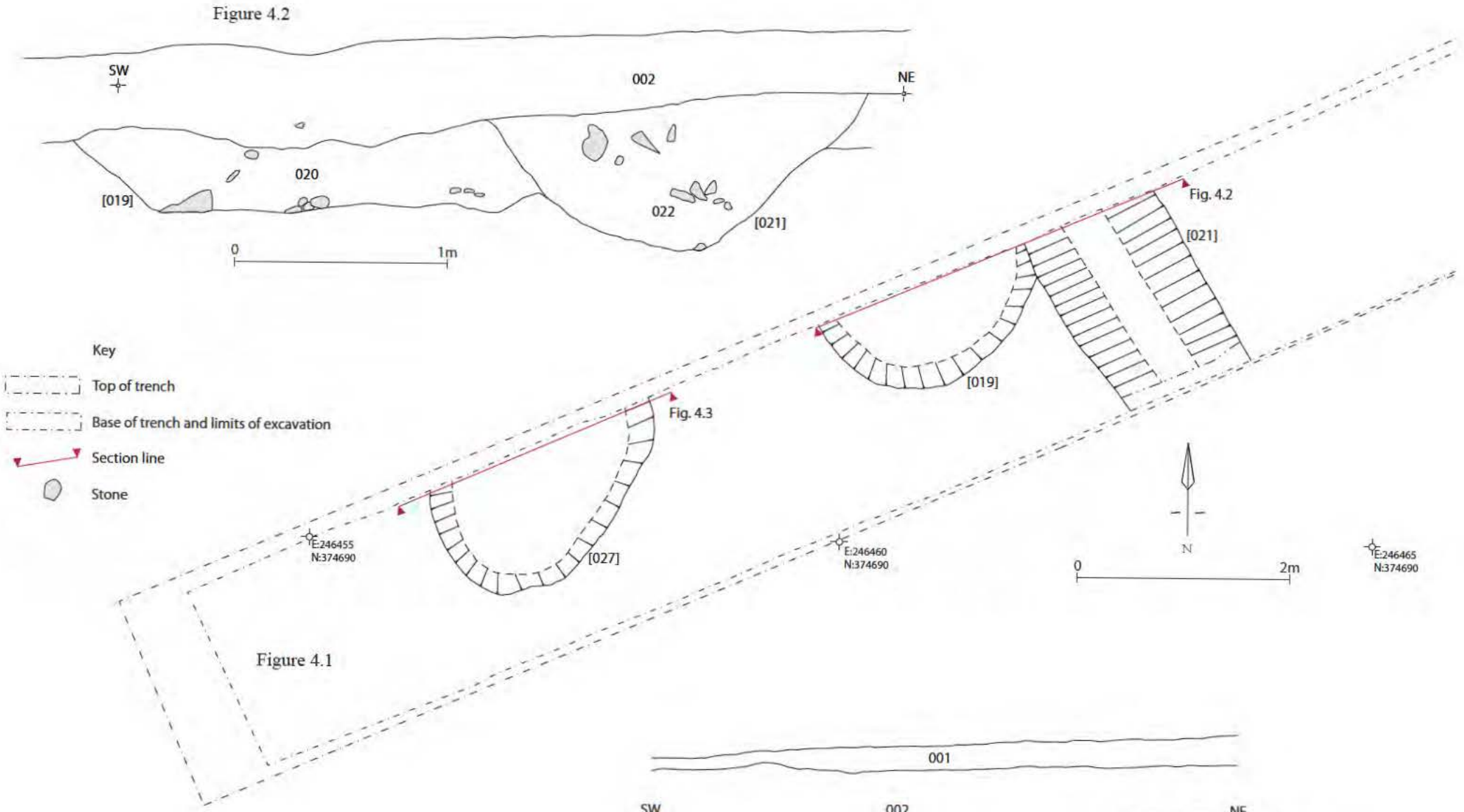


Figure 4. Plan and sections of features in trench 07

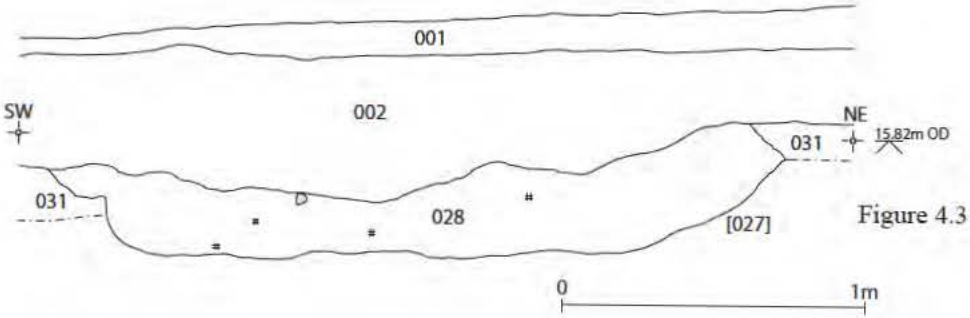


Figure 4.3

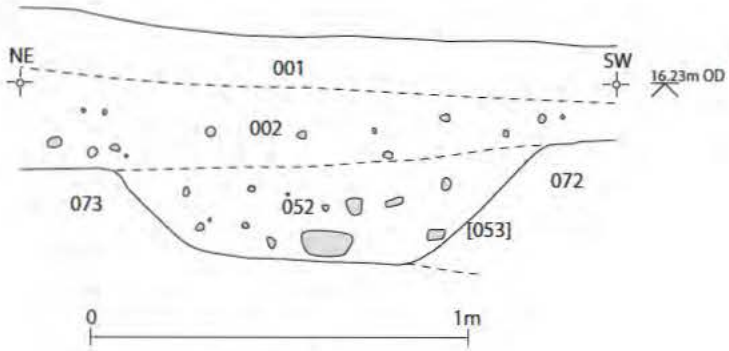


Figure 5.2

Figure 5.1

Figure 5. Plan and sections of features in trench 08

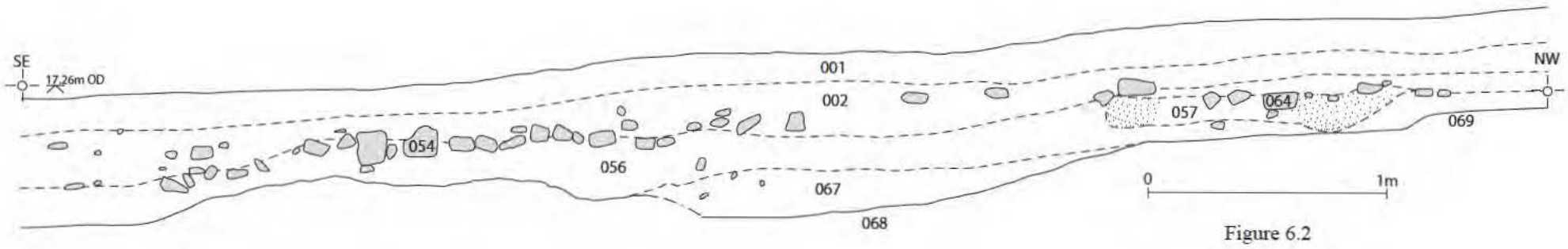


Figure 6.2

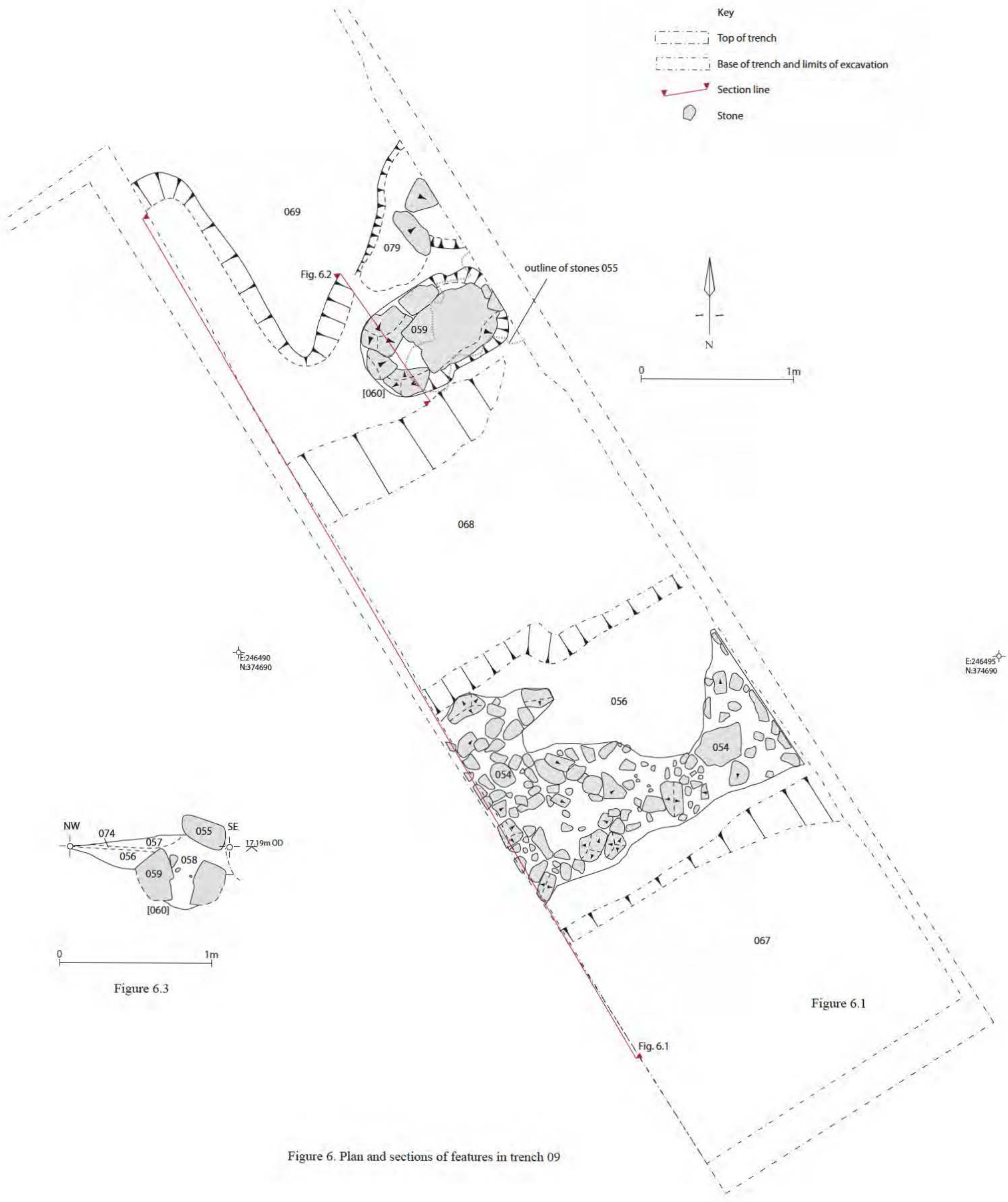


Figure 6.1

Figure 6.3

Figure 6. Plan and sections of features in trench 09

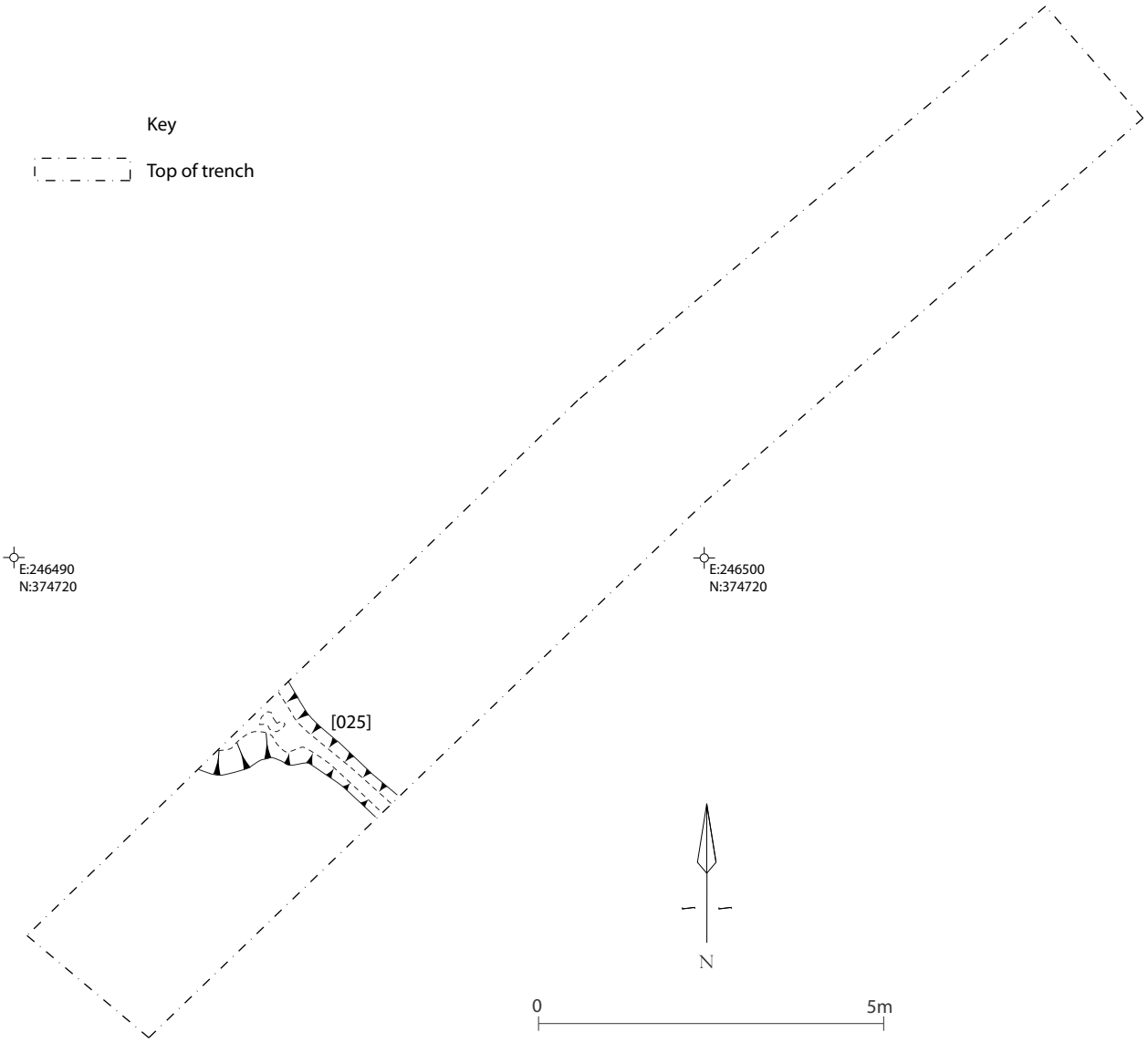


Figure 7. Plan of feature [025] in trench 10

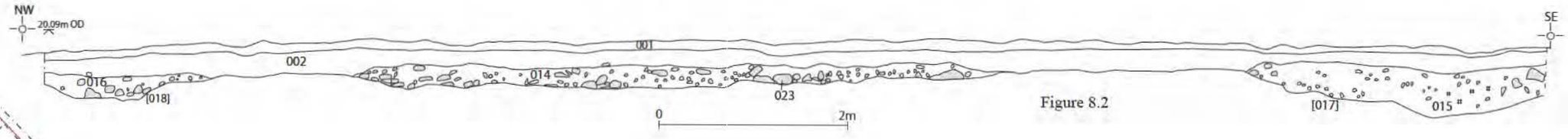


Figure 8.2

Figure 8.1

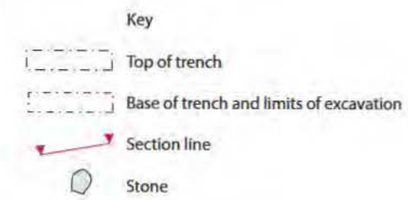


Figure 8. Plan and section of features in trench 11

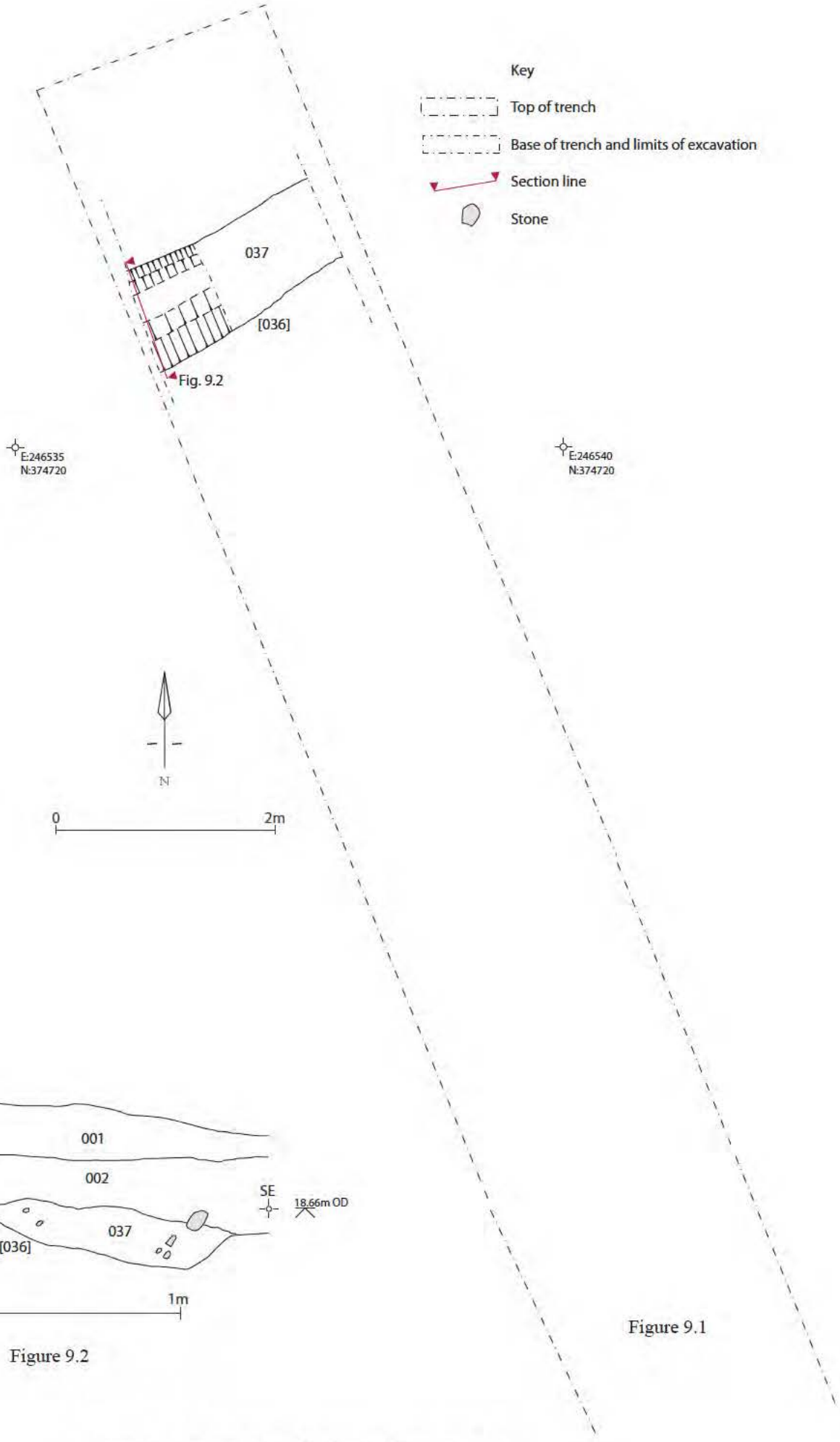


Figure 9.1

Figure 9.2

Figure 9. Plan and section of feature [036] in trench 12

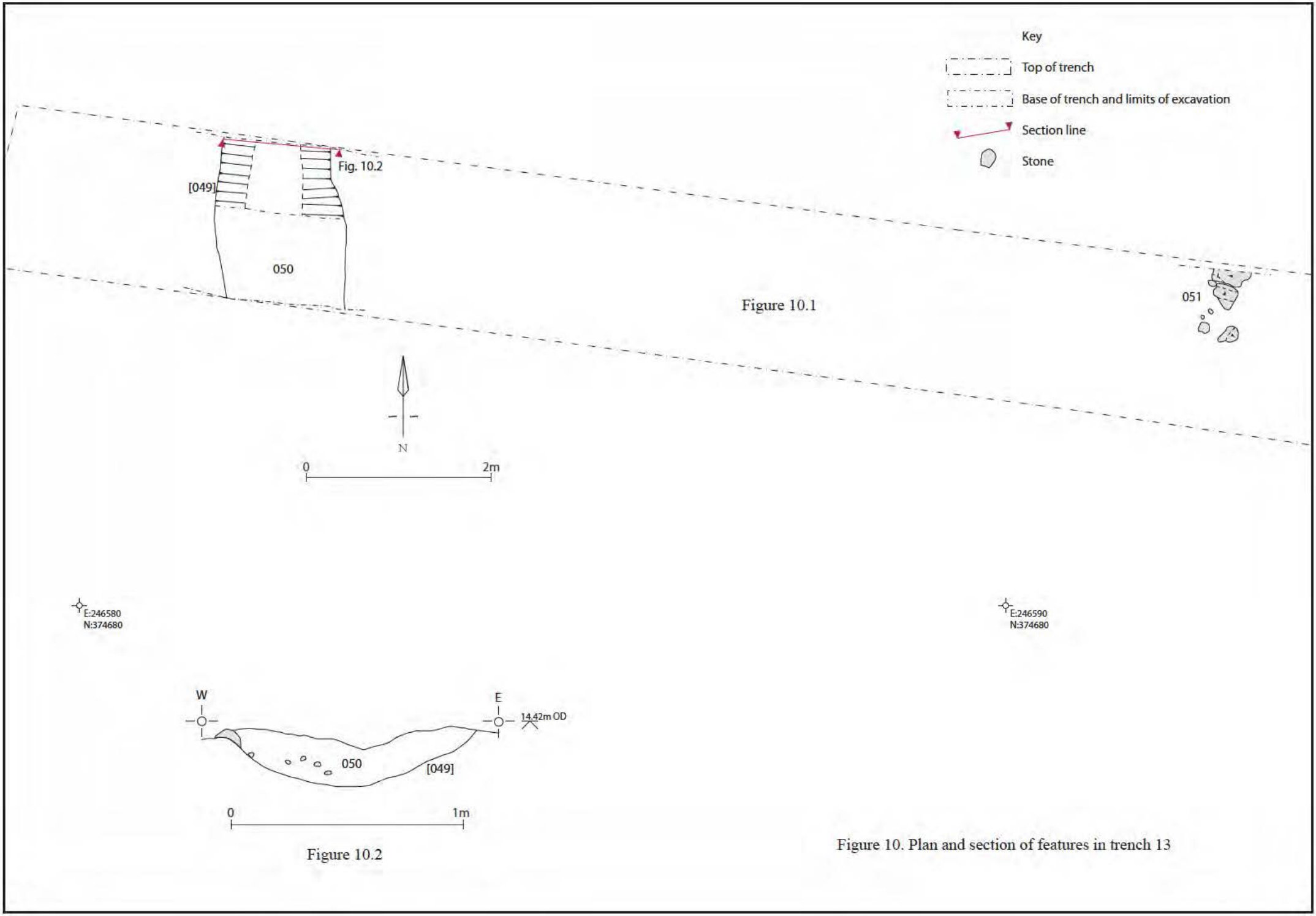
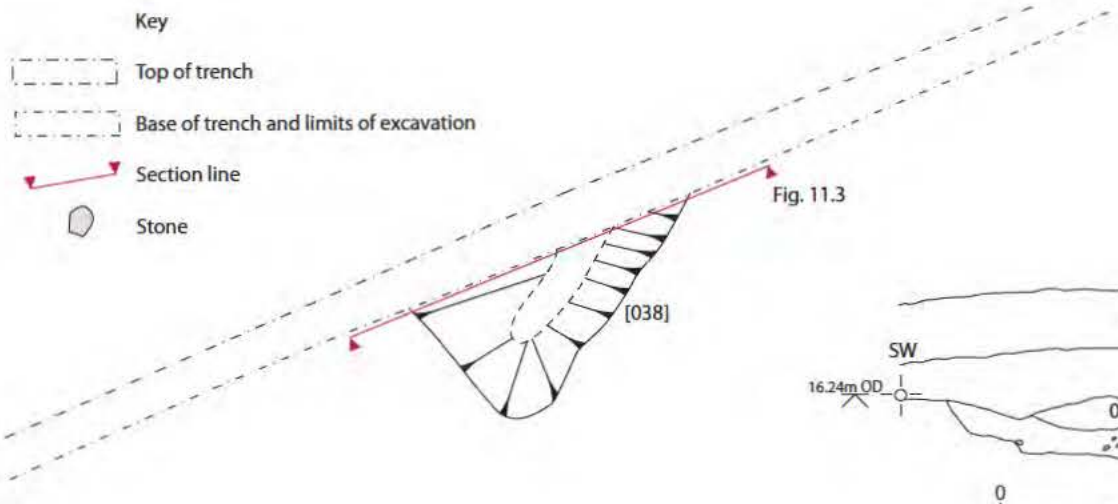


Figure 10.1

Figure 10.2

Figure 10. Plan and section of features in trench 13



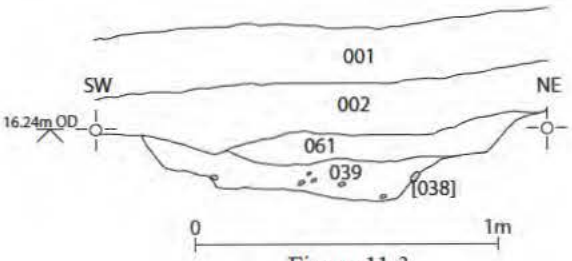


Figure 11.3

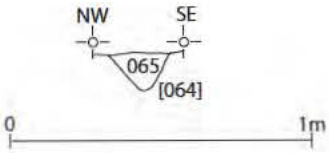
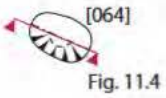


Figure 11.4



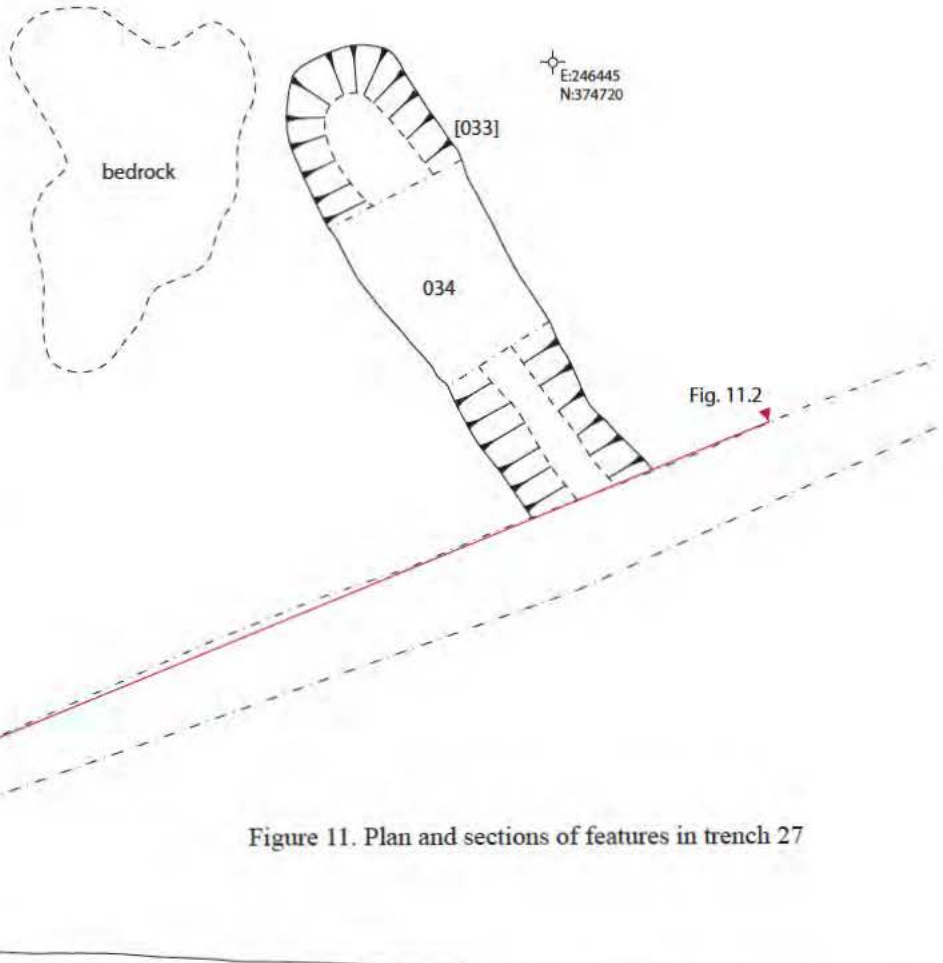


Figure 11.1

Figure 11. Plan and sections of features in trench 27

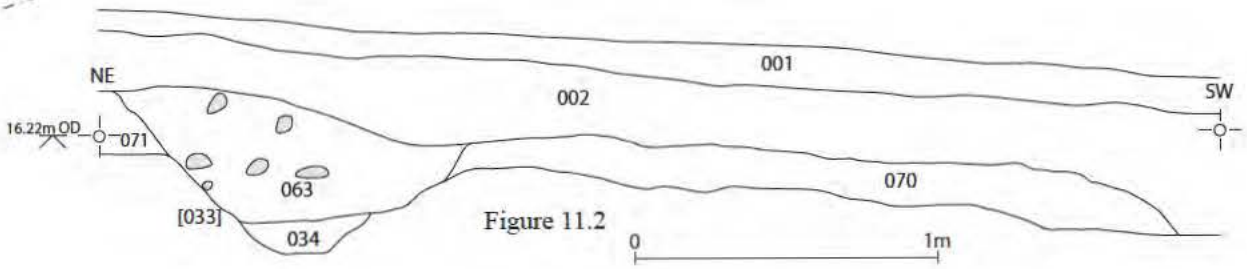
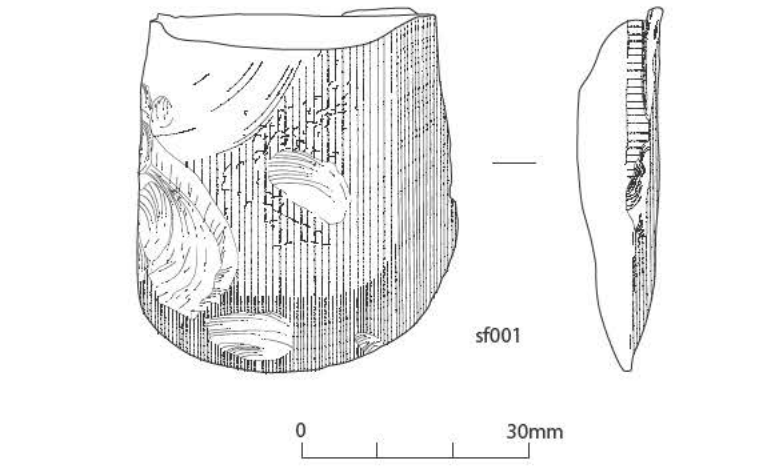


Figure 11.2

Figure 12. Examples of Roman pottery and other Roman finds
sf026: copper alloy bracelet; sf056: stone penannular object (scale 2:1)
sf 014: samian ware sherd; sf036: profile of mortarium rim; sf034: Black-burnished Ware rim sherd



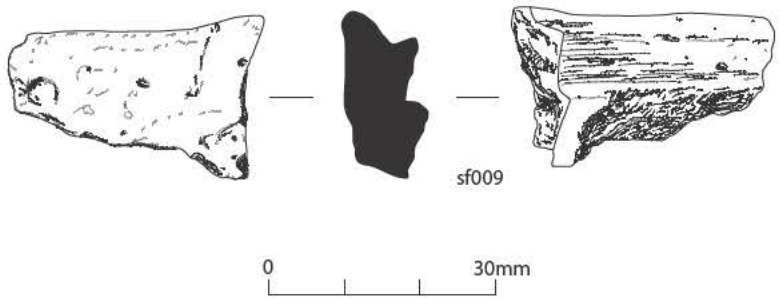


Figure 12. Prehistoric finds (sf001: polished stone axe/chisel; sf009: sherd of Neolithic pot)

Figure 13. Examples of Roman pottery and other Roman finds
sf026: copper alloy bracelet; sf056: stone penannular object (scale 2:1)
sf 014: samian ware sherd; sf036: profile of mortarium rim; sf034: Black-burnished Ware rim sherd

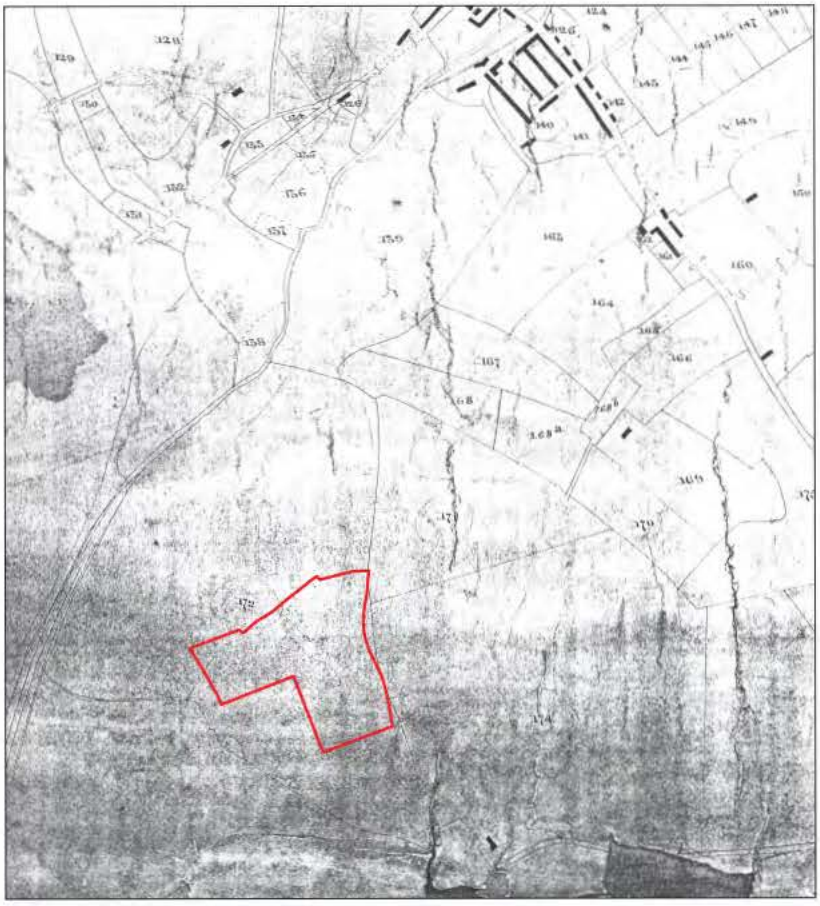


Figure 14. Part of tithe map for Llangefni parish (1840) (approximate position of development site in red)

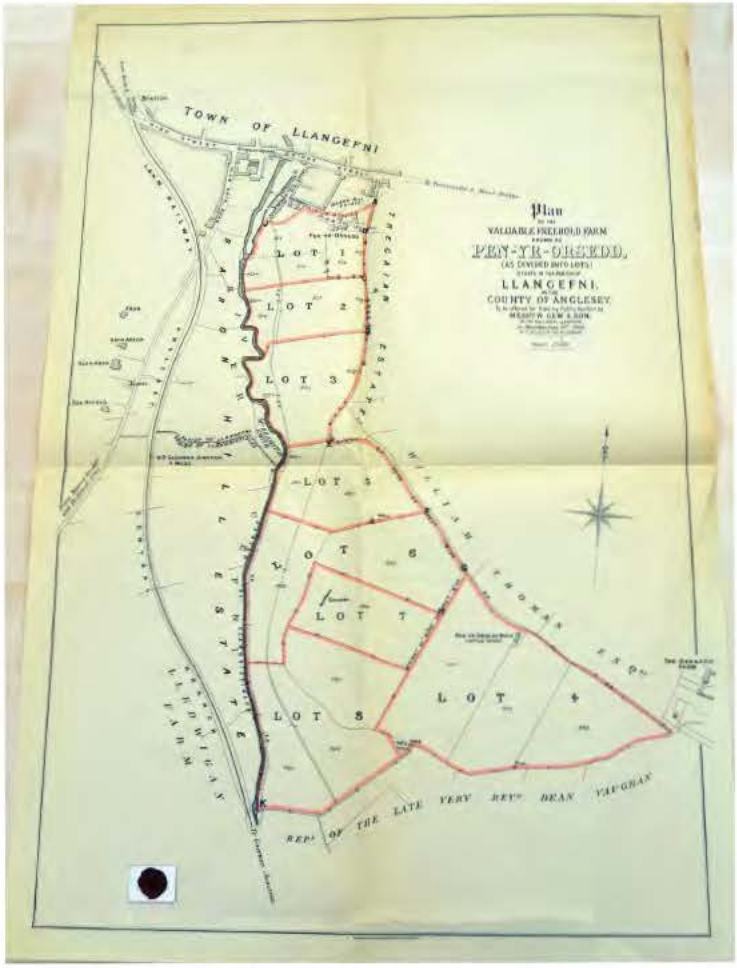


Figure 15. Map for sale catalogue (1900); development site falls within lot 4

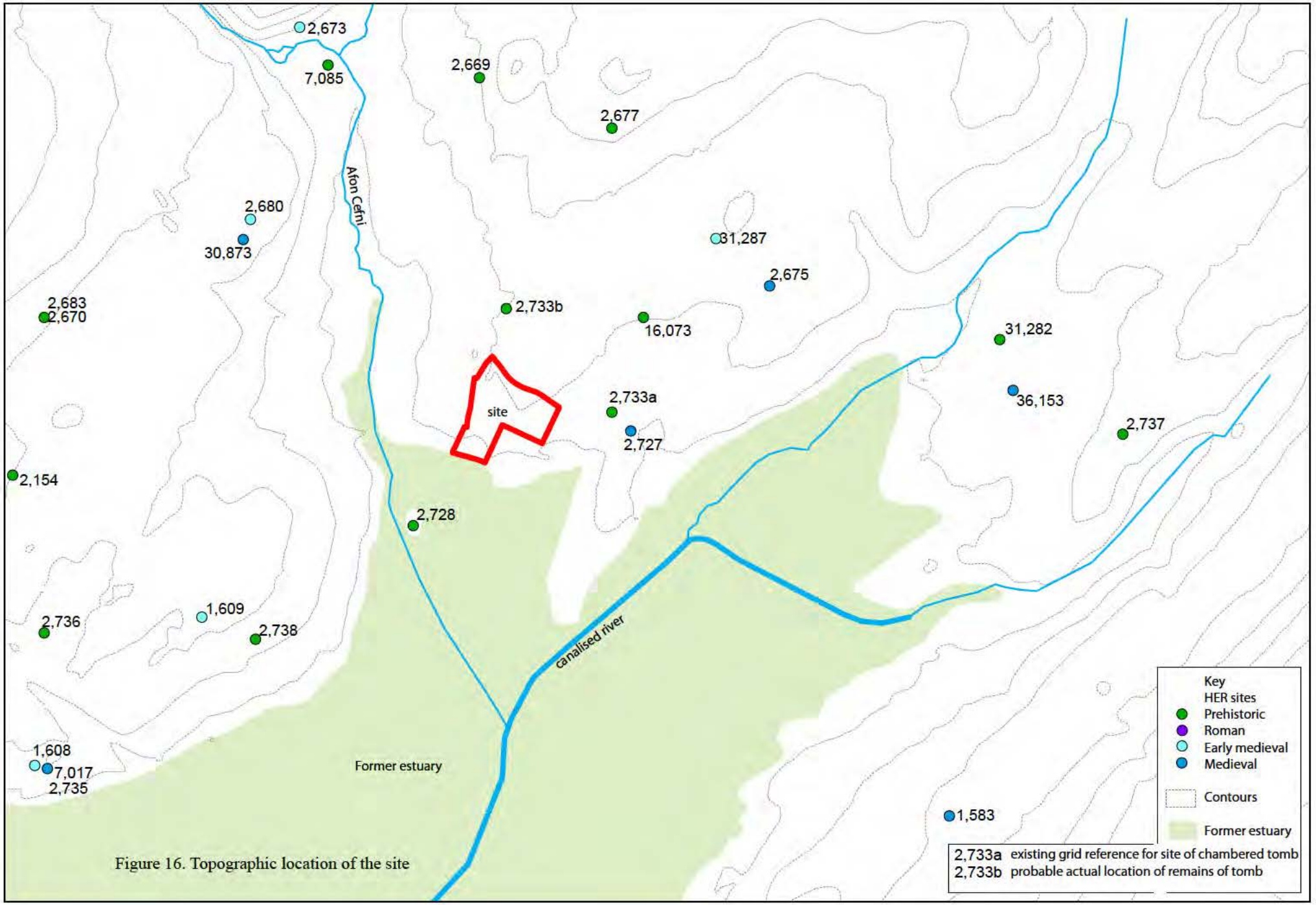


Figure 16. Topographic location of the site

Plate 1. Trench 05 from west-south-west

Plate 2. Pit [004] fully excavated

Plate 3. Pit [006] fully excavated

Plate 4. NE facing section across ditch [008] and gully [010]

Plate 5. Pit [019] and ditch [021]

Plate 6. Pit [027] with section in baulk

Plate 7. Ditch [053] in trench 08 from NW

Plate 8. Spread of stones/wall (054) from SW

Plate 9. Possible wall (055) from NE

Plate 10. Posthole [060] from NE

Plate 11. Feature [025] from SE

Plate 12. Stony deposit (014) from SE

Plate 13. Possible wall remains (023) from NW

Plate 14. Trench 12 from NW showing ditch [036]

Plate 15. Ditch [049] from SE

Plate 16. Possible wall remains (051) from west

Plate 17. NW facing section of ditch [033]

Plate 18. SE facing section of ditch [038]