

**CPAT Report No 966**

# **Defended Enclosures in Montgomeryshire**

**GEOPHYSICAL SURVEY**



**THE CLWYD-POWYS ARCHAEOLOGICAL TRUST**

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**GEOPHYSICAL SURVEY**

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December 2008

Report for Cadw

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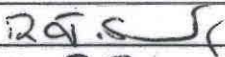
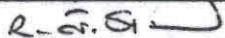
Cover photo: Surveying at Lletty-Meibion, near Berriew

## CPAT Report Record

### Report and status

CPAT Report Title	Defended Enclosures in Montgomeryshire: Geophysical Survey		
CPAT Project Name	Montgomeryshire Geophysics 2008		
Project No	1263	CPAT Report No	966
Confidential (yes/no)	No	draft/final	Final

### Internal control

	name	Signature	date
prepared by	R. Hankinson		7/1/09
checked by	R.J. Silvester		7/1/09
approved by	R.J. Silvester		7/1/09

### Revisions

no	Date	made by	checked by	approved by

### Internal memo


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## 1 Introduction

- 1.1 This report details a programme of geophysical survey carried out by the Clwyd-Powys Archaeological Trust on four potential defended enclosures in the historic county of Montgomeryshire, during 2008. The work represented a component of the Cadw-funded pan-Wales study of defended enclosures, and was intended to enhance the present state of knowledge of the sites examined, all of which had previously been identified solely from aerial photographs.
- 1.2 The survey used a fluxgate gradiometer and the methodology employed was that used in the 2006 and 2007 surveys of defended enclosures in Montgomeryshire (see Hankinson and Silvester 2006, Hankinson 2007) which in turn was developed from that used by the Gwynedd Archaeological Trust for their survey of Roman fort environs (Silvester, Hopewell and Grant 2005).
- 1.3 Geophysical survey was carried out at four locations (see Fig 1), all of which were in the eastern part of the old county. Three of the surveys were carried out at a higher resolution (see *Methodology* below) in a specific attempt to assess the efficacy of the survey methods for revealing details of internal features, previous surveys having concentrated more on determining the course of the defensive circuits of the enclosures examined. The higher resolution survey was first carried out by CPAT at the Meusydd henge complex in the Tanat Valley in 2007 (Jones 2008) and was successful in recording evidence for features which had not been evident at the standard resolution. The remaining site - Lletty-Meibion - was surveyed at the standard resolution, this work being carried out to provide a rapid assessment of the authenticity of the site, after some doubt had been expressed regarding the origin of the marks present on the vertical aerial photograph showing it.

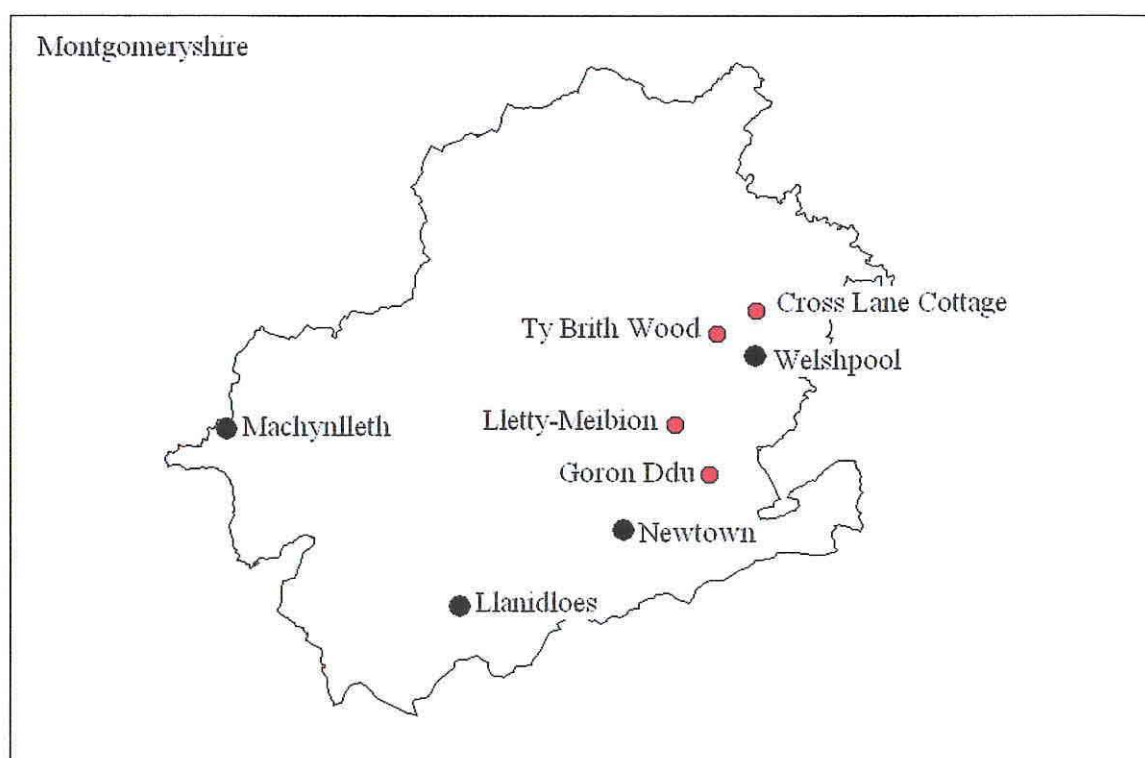


Fig 1 Outline of the old county of Montgomeryshire showing the location of the enclosures examined (in red)

## 2 Methodology

2.1 Fluxgate gradiometer survey provides a rapid, non-invasive, method of examining large areas for magnetic anomalies. It has proved to be particularly effective in the context of this study, having added new detail to known sites and resolved some issues regarding the relationship between the enclosures and other features visible on aerial photographs.

### 2.2 *Instrumentation and background*

2.2.1 The geophysical work was carried out using a Geoscan FM36 fluxgate gradiometer, which detects variations in the earth's magnetic field resulting from the presence of iron minerals in the soil. These minerals are generally the weakly magnetised iron oxides that are normally found in topsoil. Features cut into the subsoil can be detected by the instrument when topsoil has formed part of their fill, whether directly or by silting.

2.2.2 There are a variety of other processes which may result in detectable anomalies, such as the presence of iron objects in the soil, which yield high readings. The potential to detect areas of burning is possibly of more interest, as it can identify hearths and kilns where the fired clay has acquired a thermo-remnant magnetic field upon cooling.

2.2.3 Unfortunately, not all soils are conducive to the use of this method, particularly in cases where the topsoil and subsoil have similar magnetic properties. Occasionally, high or random levels of magnetic material within the soil can effectively mask the results and prevent detection of artificial features. The lack of detectable anomalies cannot be taken to mean conclusively that there is no surviving archaeology in a locality.

2.2.4 The Geoscan FM36 is a hand-held instrument which allows readings to be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically-aligned fluxgates, set 500mm apart, whose Mumetal cores are driven in and out of magnetic saturation by a 1,000Hz AC current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them, producing an electrical pulse proportional to the field strength in a sensor coil (Clark 1990, referred to in Hopewell 2004).

2.2.5 Magnetic fields and variations are measured in nanoTeslas (nT). The earth's magnetic field is approximately 48,000nT, but archaeological features generally produce instrument readings of less than 15nT. Areas of burning and iron objects produce higher readings, perhaps up to several hundred nT. The gradiometer can detect changes as low as 0.1nT.

### 2.3 *Data collection*

2.3.1 The gradiometer has an on-board data logging device which enables readings to be taken at specific time intervals. These readings are taken along parallel traverses within a grid of known size, which allows them to be correlated with geographical locations.

2.3.2 In the case of the standard resolution survey, the grids measured 20m by 20m, with intervals between the traverses of one metre. The speed of each traverse was controlled such that readings were taken every 0.5m, thereby giving a total number of 800 readings per 400m<sup>2</sup> grid.

2.3.3 The higher resolution surveys were carried out using 10m by 10m grids, with the interval between traverses reduced to 0.5m. The sampling rate was also increased, so that readings were taken every 0.25m. The result of halving the sample intervals in both directions was to provide a total of 800 readings per 100m<sup>2</sup>, four times the number of a standard resolution survey.



## **2.4 *Data processing and presentation***

- 2.4.1 The data was transferred from the data logger to a computer, where it was compiled and processed using Geoplot 3.0 software. A minimum of processing was carried out, although compensations were made for instrument drift caused by gradual changes in the earth's magnetic field, and inconsistencies in data collection. Typical processing functions utilised for these ends were *Zero Mean Grid*, *Zero Mean Traverse*, and *Destagger*. The *Clip* function allowed smaller variations in the readings to become visible by reducing the impact of very low and very high readings on the plot.
- 2.4.2 The results are presented in greyscale format, along with an interpretation drawing. The greyscale plot produces a plan view of the survey and allows subtle changes in the data to be displayed. Trace plots of the type produced in earlier reports (see for example those for Forden Gaer in Silvester and Hankinson 2006, figs 2-3) have been eschewed because they appeared to add little to the overall impression and understanding of the sites surveyed. It would, however, still be possible to produce such plots from the archived data if these were required at any stage in the future.

## **2.5 *Grid location and the plotting of the geophysical survey results***

- 2.5.1 Prior to the commencement of each geophysical survey, the survey grids were laid out and then located in relation to nearby field boundaries by topographic survey using an EDM and Penmap software. The EDM survey was then related to the Ordnance Survey base mapping by the use of the Mapinfo program, which enabled the National Grid co-ordinates of fixed points on the survey grid to be determined.
- 2.5.2 The greyscale plot of the geophysical survey results was produced using Geoplot 3.0 software and the plot was exported as a Windows Bitmap. This was then cleaned up and rotated to match grid north using Paint Shop Pro software, before being imported as a raster layer into GIS using Mapinfo. It was registered in relation to the Ordnance Survey grid using the co-ordinates derived from the topographical survey.
- 2.5.3 The GIS layer of the greyscale plot could then be contrasted with a variety of other sources, such as aerial photography, and this enabled a more analytical assessment of the results to be made. It also allows the results of the geophysical survey to be more easily archived and to be readily available in digital format for any future work at the site in question.

# **3 Geophysical Survey Results**

## **3.1 *Lletty-Meibion, Berriew, near Welshpool (NGR SJ 1547 0125)***

- 3.1.1 A series of marks which appeared to take the form of a substantial multivallate enclosure measuring approximately 100m east-west by 90m north-south, were observed on a vertical aerial photograph (Plate 1), some 100m north-east of Lletty-Meibion farm, which lies about 3km west of Berriew. The putative site was positioned on the south-east side of a low saddle, at an altitude of 230m OD, near the head of a small stream flowing east-north-east to the River Rhiw (Fig 2).
- 3.1.2 The area around Berriew is well-known for its concentration of settlement sites belonging to the late prehistoric and Roman periods, and it was therefore reasonable to anticipate that the marks represented an enclosure with complex defences, of a type known in the locality. The Pen-y-gelli enclosure (PRN 3649), a site of similar appearance some 10km to the south, was the subject of a successful magnetometer survey by CPAT in 2006.



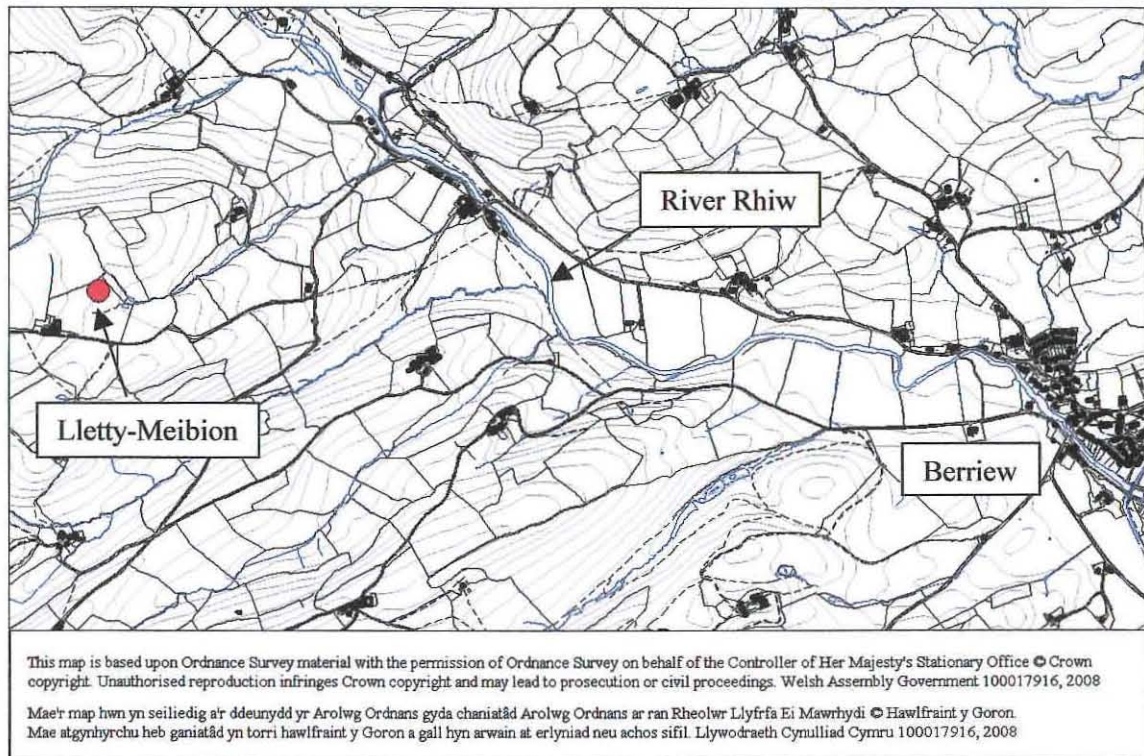


Fig 2 Location plan showing Berriew village (scale 1:25,000)



Plate 1 The aerial photograph of Lletty-Meibion which shows the marks

- 3.1.3 Doubts had been expressed regarding the authenticity of the marks, despite the above arguments. As can be seen on the preceding plate, they appeared, unusually, to be entirely confined to a single field and were quite closely contained by the surrounding field boundaries. This



highlighted the possibility that they might be a result of agricultural activity within the field, perhaps some type of spraying or spreading, so it was thought appropriate to use geophysics to see if sub-surface evidence of the putative enclosure could be found. One factor that made this a suitable method, bearing in mind the cautionary note in paragraph 2.2.3, was that CPAT have carried out a number of successful magnetometer surveys on sites with similar soil conditions and underlying geology in this locality. A lack of results could therefore be taken, with a reasonable degree of confidence, to mean that the site was not authentic. The site would obviously be confirmed if positive results which corresponded with the marks were gained.

- 3.1.4 A single area totalling approximately 0.6ha was examined during this survey, comprising fifteen complete grids, each 20m square. The area was examined at standard resolution (see para 2.3.2) and the survey encompassed approximately three-quarters of the area occupied by the marks recognised on the aerial photography. Plate 1 shows the outline of the area surveyed in relation to the marks while Fig 3 presents the greyscale plot of the results.

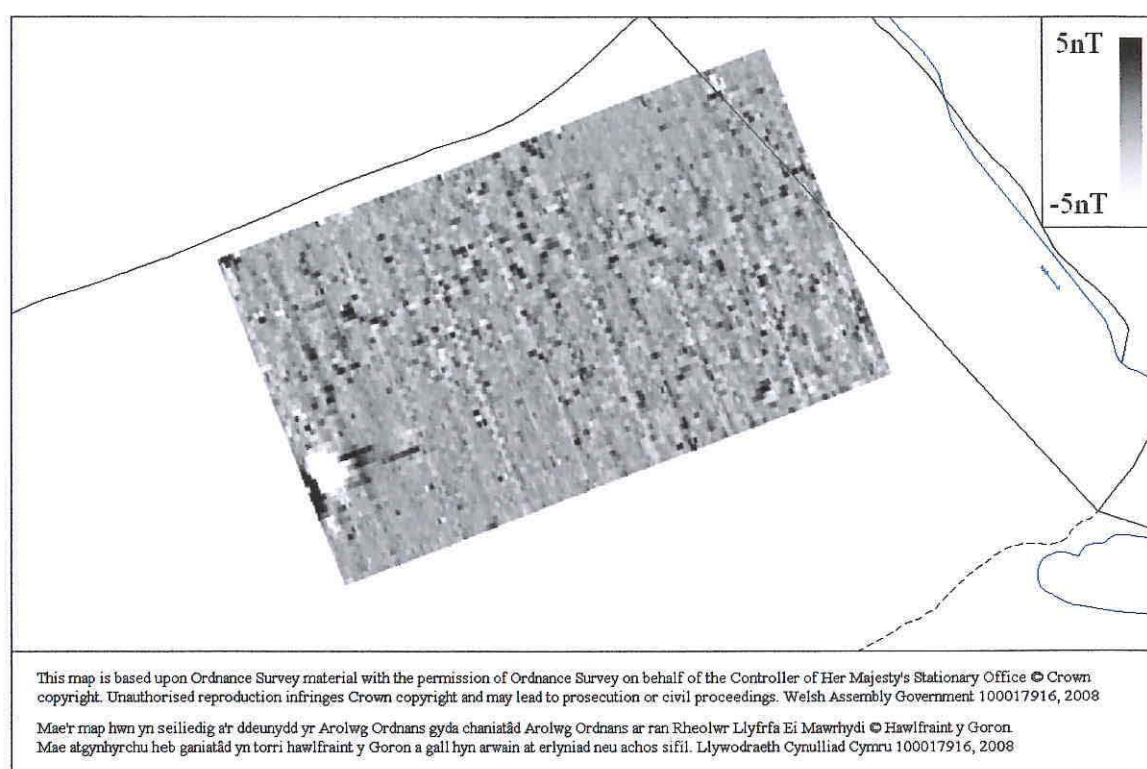


Fig 3 Greyscale plot showing the results of the geophysics at Lletty-Meibion (Scale 1:1,250)

- 3.1.5 It is evident from Fig 3 that no significant magnetic anomalies were revealed by the survey which corresponded with the marks on the aerial photograph. Proof that the survey was able to detect anomalies was provided by the series of parallel ploughmarks that are plainly evident on the survey results, and which were also just visible on the ground. The major anomaly at the south-west end of the area was due to the metal components of a telegraph pole and its associated stay.
- 3.1.6 The survey appears to have conclusively refuted the suggestion that the marks on the aerial photograph were related to a defended enclosure. It has to be assumed, therefore, that they are a result of agricultural activity which created temporary surface marks on the field, rather than any underlying archaeological features. If the photograph had been taken under conditions suitable for the production of cropmarks, it seems evident that traces of the parallel ploughmarks should also have been visible.



### 3.2 Goron Ddu Enclosure (PRN 155), near Abermule (NGR SO 1859 9657)

- 3.2.1 The site consists of a bivallate enclosure with widely spaced ditches. The inner ditch defines an approximately ovate enclosure measuring about 67m north-east/south-west and reducing in width from 62m at the south-west end to 40m at the north-east end. The outer ditch defines a sub-rectangular enclosure with rounded corners, measuring 131m north-east/south-west by about 95m overall. The site lies at an altitude of 200m OD and is situated just over 500m to the east-north-east of Upper Bryntalch farm, on the crest of a short ridge aligned north-east/south-west which overlooks the Severn Valley. The nearest settlements are the villages of Llandyssil and Abermule which lie respectively 1.5km to the south-east and 3km to the south-west.

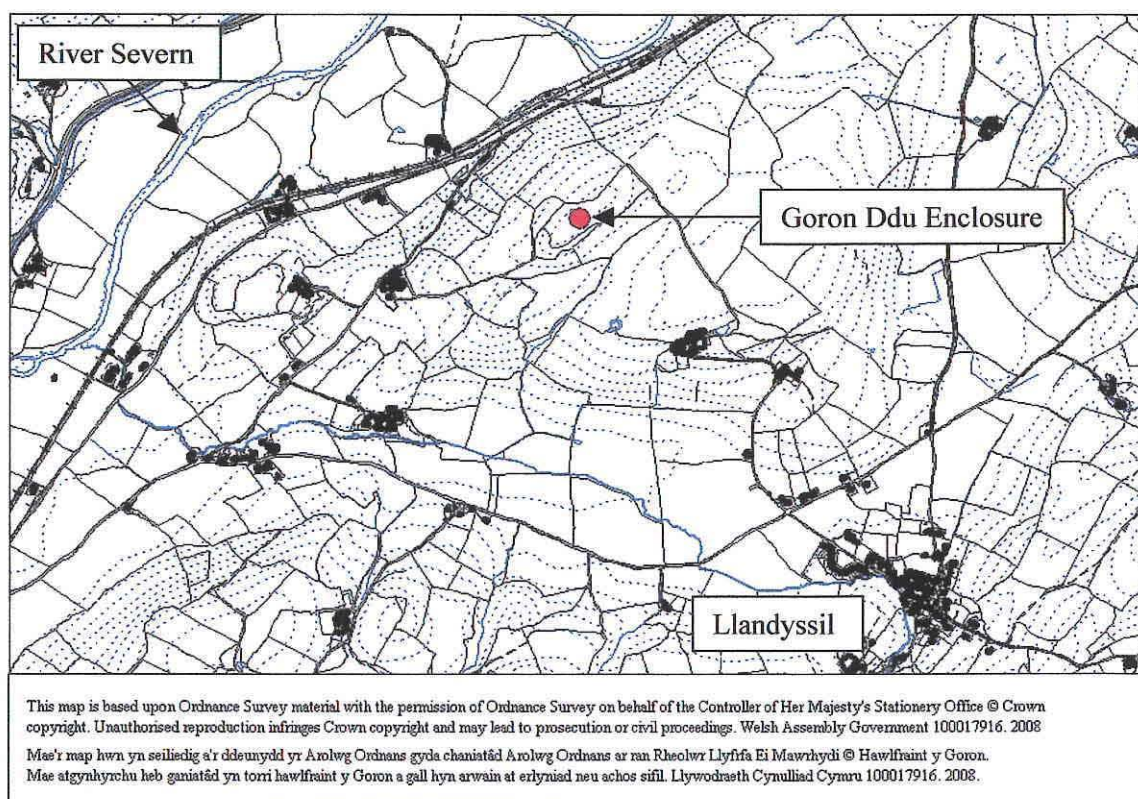


Fig 4 Location plan showing the site of Goron Ddu in relation to Llandyssil village  
(scale 1:25,000)

- 3.2.2 The site was first photographed from the air by Cambridge University in July 1953, and again by CPAT in 1984 and 1989, in each case during times of drought, where the ditches had become visible owing to parching of the adjoining ground. When the site was visited by CPAT in 1990, no convincing evidence of the enclosure could be traced, except perhaps a hint of the outer ditch on the north-east. The site was originally plotted by Rowan Whimster in 1982 who identified entrances on the east and south-west sides from the 1953 aerial photograph, although plotting from a number of sources by CPAT in 1998 suggested that only a single entrance - on the east - was present. Other differences between the plots by Whimster and CPAT confirmed that the shape and extent of the enclosure needed to be clarified.
- 3.2.3 A single area totalling approximately 1.17ha was examined during this survey, comprising 117 whole grids, each 10m square, which encompassed the majority of the area of the enclosure recognised on the aerial photography. In this case, the survey was carried out at a higher resolution (see para 2.3.3). Fig 5 presents the greyscale plot of the results, while a second (Fig 6) gives an interpretation of the results by depicting the individual and collective geophysical anomalies that were revealed. These anomalies have been given a sequence of numbers on Fig 6,



which for descriptive purposes are recorded in brackets in the text that follows. It is also worth stating that anomalies which are likely to have resulted from the presence of iron objects in the soil are not given numbers in the following description.



Fig 5 Greyscale plot showing the results of the geophysics at Goron Ddu (scale 1:1,250)

- 3.2.4 The magnetic anomalies revealed by the survey corresponded with the enclosure described in the initial paragraph; the outer enclosure covering an area of about 1.2ha, while the inner occupied an area of only 0.34ha. When the results were compared to the plot produced by CPAT in 1998, a discrepancy of up to 10m was found between the plotted features and their actual location, although this is not surprising when the rounded topography of the ridge on which the site is located is taken into account. The south-eastern side of the outer enclosure was not traced owing to the presence of fences and a tree plantation which rendered access impossible.

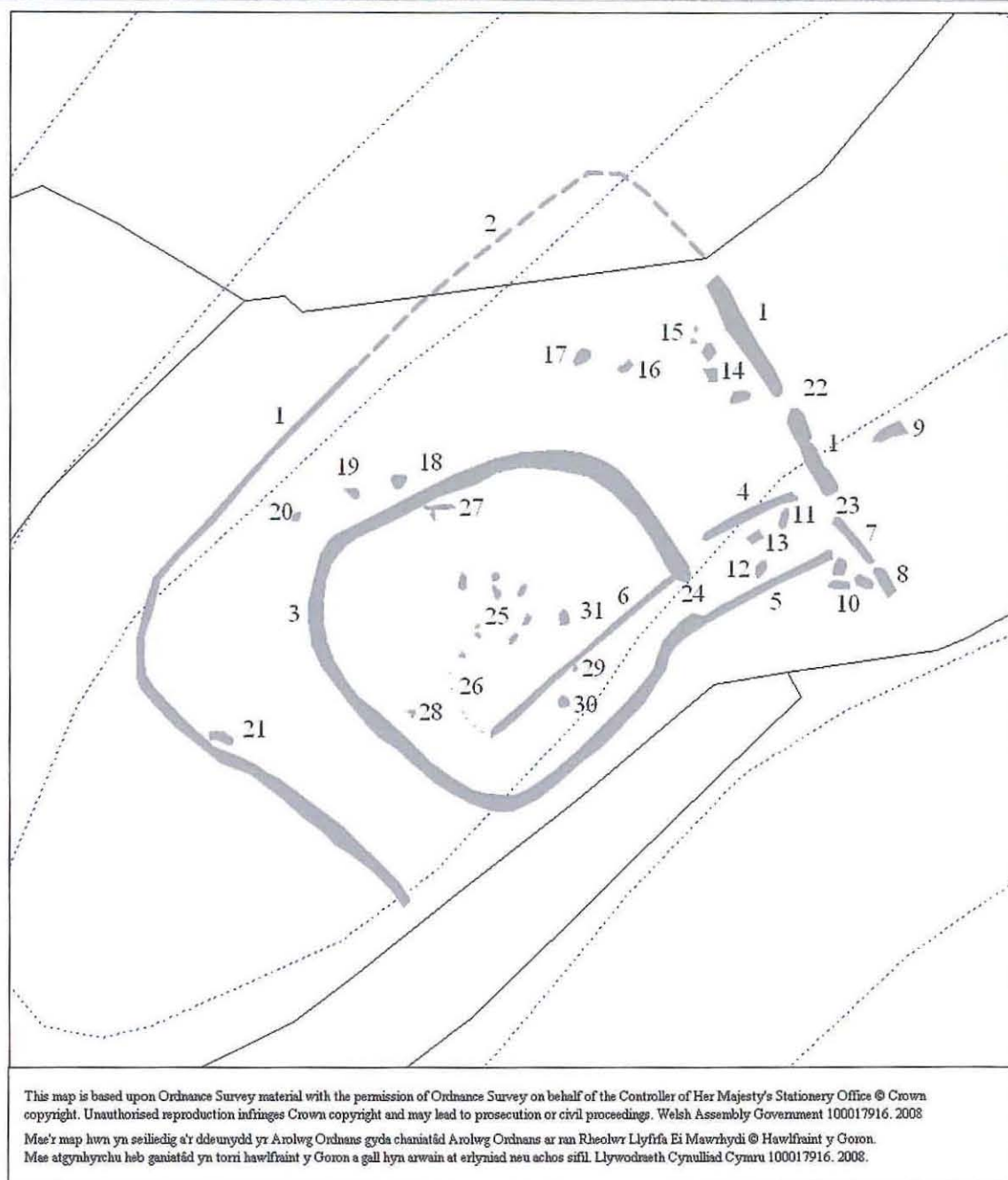


Fig 6 Interpretation plot of the geophysics results at Goron Ddu (scale 1:1,250)

- 3.2.5 The outer ditch (1) appeared to be up to 3.5m in width, although the response was fairly poor on the north-west side, where a width of nearer 1.5m was suggested by the results. The northern corner (2) of the ditch was not surveyed because of the presence of a metal fence; this section is depicted as a dotted line and is reasonably evident on the aerial photographic sources, so it was not thought to be worthwhile continuing the survey into the adjoining field. The inner ditch (3) appeared to be wider, measuring up to 4.5m across, and it produced a more consistent response than the outer. A gap (22), 3.3m wide, was noted in the outer enclosure ditch on the north-east, although this might have been due to a lack of response from the deposits at this point. The main entrance was identified on the east side of the enclosure, and the anomalies here displayed some complexity in the arrangement of the features from which it was formed. The gap (24) in the inner enclosure measured 6.0m in width, and an 'avenue' extended to the east-north-east from this for 25m towards the outer ditch. The ditches (4 & 5) which defined the avenue were



between 11m and 12m apart and were approximately 2m in width. On the inner side of entrance 24, a further ditch (6), 1.7m wide, extended to the south-west from the northern terminal of the inner enclosure ditch for 45m, perhaps some form of stock shedding arrangement in the interior, though it cannot be conclusively confirmed that this is a contemporary feature. Three large pits (11-13) were present within the avenue, individually measuring from 2.6m to 3.8m long and 1.6m to 1.9m wide; again these might have a stock control function.

- 3.2.6 At the outer end of the avenue, the ditch (4) defining the north side of the 'avenue' headed towards but did not meet the northern terminal of the outer ditch, from the end of which there was a gap (23) of about 4.5m to a smaller ditch (7), 1.6m wide, which extended south-eastwards for 11m. The continuation of the outer ditch was probably represented by ditch 8, 2.2m wide, which ran for 6m before exiting the geophysical survey area; this presumably curls around to the south-west and follows the line of a tree plantation to which access could not be gained. A group (10) of three oval pits, individually measuring 4m by 2m and collectively occupying an area of about 8m east-west by 6m north-south, were present between the end of the ditch (5) which formed the south side of the 'avenue' and ditch 8; the function of these features is unknown. A further short section of ditch (9), measuring at least 6.5m east-north-east/west-south-west by 2.2m wide, extended beyond the survey area to the north-east and could perhaps represent evidence of the beginnings of an external field system.
- 3.2.7 In the area between the inner and outer ditches, a group (14) of three pits was revealed, occupying an area measuring 13m north-west/south-east by 5m, to the west of the possible entrance (22). Further to the north-west were a pair of probable post-holes (15), each about 0.9m in diameter and 1.5m apart. Further pits were present in this area, namely (16), measuring 4.2m by 1.4m and (17), measuring 4.0m by 2.5m. A further three pits (18-20) were observed to the north-west of the inner enclosure, these measured up to 3.6m across and extended over a length of about 21m east-north-east/west-south-west. The only remaining feature identified in the ground between the inner and outer ditches was a short length of ditch (21), measuring 5.0m east-west by 2.0m, which lay immediately adjacent to the inner side of the outer ditch on the south-west side of the enclosure.
- 3.2.8 The remaining anomalies fell within the inner enclosure, including two pits (29 and 30), respectively 1.2m and 2.4m in diameter, which lay in the area bounded by ditch (6), mentioned above. In an approximately central position, there was a jumble of about nine probable pits (25) occupying an area about 16m in diameter. Some of these could represent features associated with a dwelling, although it is difficult to discern any coherent pattern. A curving line of about nine possible post-holes (26), each up to 0.5m in diameter, seemed to extend for 14m from near the south-west end of ditch 6 towards the group of pits (25). A larger pit (31), measuring 3.0m north-south by 1.8m lay to the east of the group, while another amorphous feature (28), measuring 2.0m east-west by 0.9m overall, lay to its south-west. A bifurcating linear feature (27), 1.1m wide, was recorded on the internal side of the inner ditch on its north-west side; this perhaps represents a drainage feature serving the interior which appears to have emptied into the inner ditch.
- 3.2.9 The survey was successful in determining the shape and precise position of the enclosure, thereby clarifying the picture that had been generated by the aerial photography. It has also added a significant amount of detail to both the interior of the enclosure and to the layout of features that constitute the main (eastern) entrance, where the gap between the inner and outer ditch is demarcated by subsidiary ditches which flank the entrance route. Features that could represent both domestic occupation and evidence of stock handling were also revealed, particularly where a group of ditches and smaller features were recorded in association with the main entrance of the enclosure



### 3.3 Ty Brith Wood enclosure (PRN 5263), Cloddiau, near Welshpool (SJ 1926 0957)

- 3.3.1 This univallate cropmark enclosure lies approximately 3km to the north-west of Welshpool in eastern Montgomeryshire. The site lies at the south-east end of a small plateau at an altitude of 225m OD, and overlooks the Trefnant Dingle to the south. The area as a whole can be described as a plateau which has been deeply dissected by small streams creating a profusion of local summits.

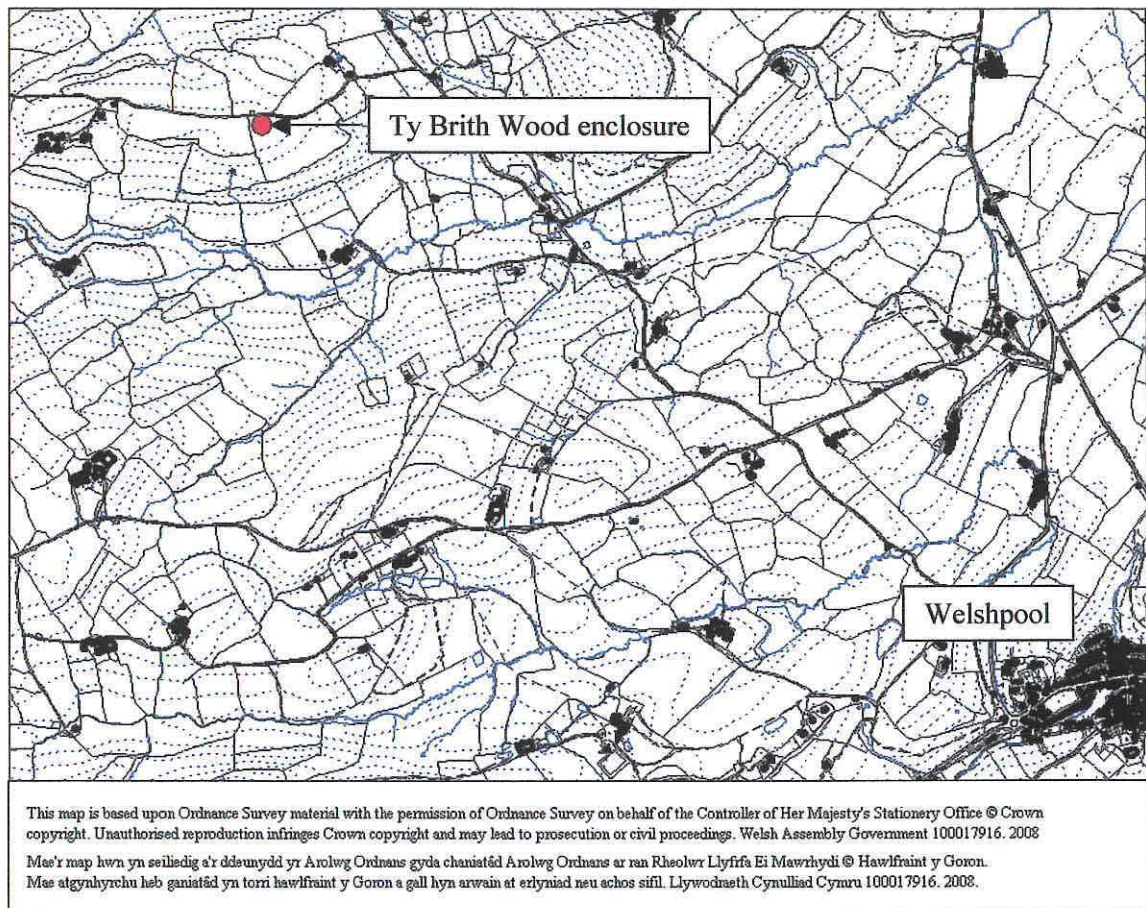


Fig 7 Location plan of the site in relation to Welshpool (scale 1:25,000)

- 3.3.2 The site was first recognised on a high level, vertical aerial photograph, from which it was plotted by Cambridge University in 1983. The plot shows a circular cropmark, 60m in diameter whose northern end appears to be truncated by the nearby road. The site was visited by CPAT in 1991, at which time no physical indications of the enclosure were apparent.
- 3.3.3 A single area totalling almost 0.37ha was examined during this survey, comprising 37 whole or partial grids, each 10m square, which encompassed the whole of the area occupied by the enclosure. In this case, the survey was carried out to the higher resolution (see para 2.3.3). Fig 8 presents the greyscale plot of the results, while a second (Fig 9) gives an interpretation of the results by depicting the individual and collective geophysical anomalies that were revealed. These anomalies have been given a sequence of numbers on Fig 9, which are mentioned in brackets in the text that follows for descriptive purposes. Anomalies which are likely to have resulted from the presence of iron objects in the soil are not given numbers in the following description.
- 3.3.4 The magnetic anomalies revealed by the survey showed that the enclosure was univallate but not circular, as had been posited by the 1983 aerial photographic plot, rather that the northern part of



the circuit was markedly flattened in contrast to the semi-circular southern part. The whole of the enclosure was revealed, covering an area of just over 0.24ha, a similar figure to that suggested by the earlier plot. The defensive ditch (1) was up to 3.5m in width, with an entrance (2), about 6m wide, on the western side of the enclosure. Two post-holes (3), respectively 1.6m and 1.9m long and both about 1.0m wide, were visible immediately to the east of the entrance, and it seems likely that the posts these would have held formed an integral part of an entrance structure.

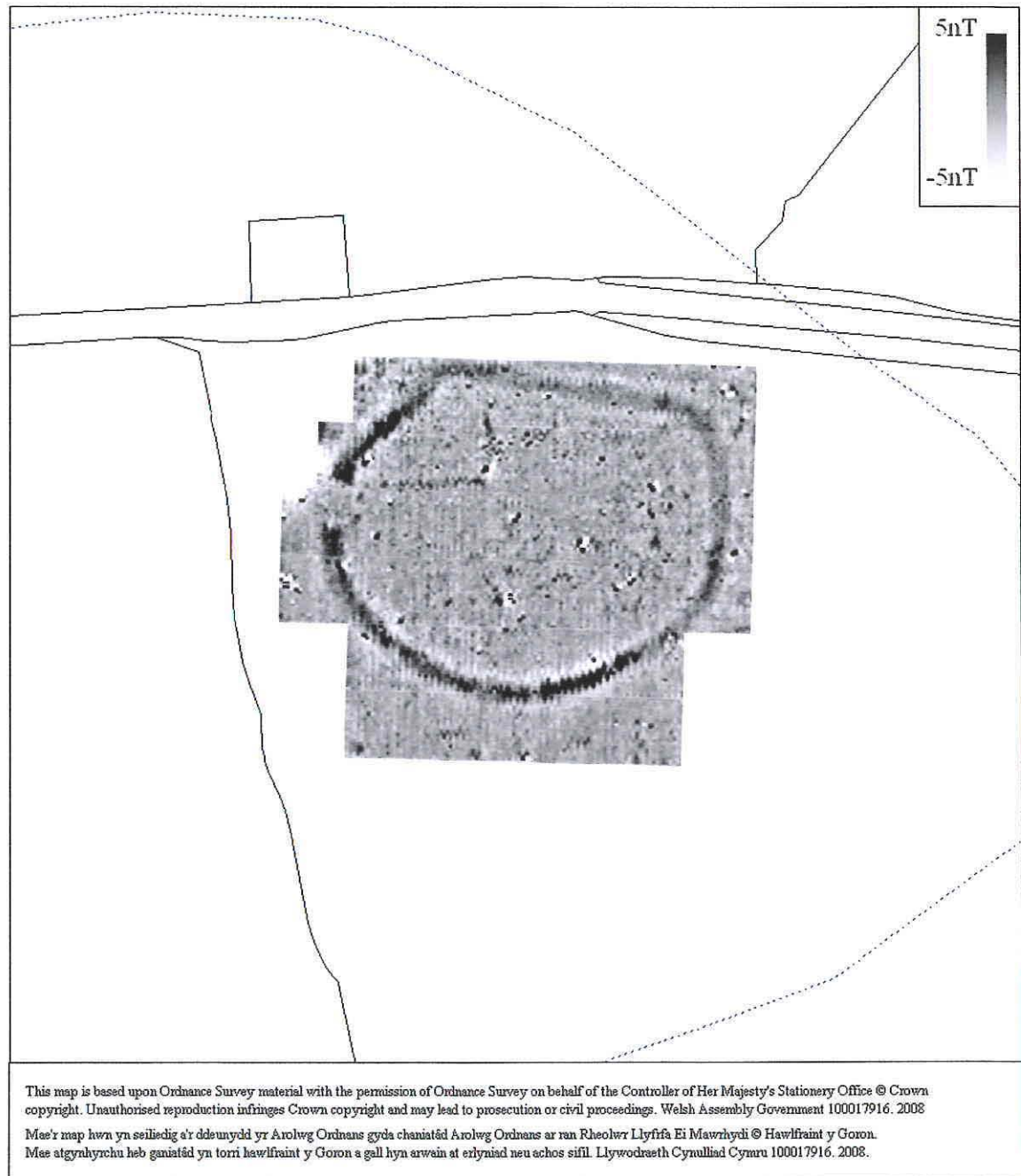


Fig 8 Greyscale plot showing the results of the geophysics at Ty Brith Wood (scale 1:1,000)

- 3.3.5 The north-western part of the interior appeared to have been divided off from the remainder by a ditch about 1.5m in width. This provided a variable magnetic response which has been plotted as a number of short lengths of ditch (Nos 5, 7, 10, 11). Further features related to the subdivision included a pit or post-hole (4), 1.3m in diameter, at the western end of ditch length (5) and a

further pit or post-hole (6), 1.6m north-east/south-west by 1.0m, set in the south-east angle next to ditch length (7). An anomaly (8) with a speckled appearance, 4.0m in diameter, appeared to overlie the subdividing ditch on the east, but the reason for this anomaly was not apparent, as was the case with a similar area (9), measuring 4.8m east-north-east/west-south-west by 2.4m, which lay some 2m to the east-north-east.

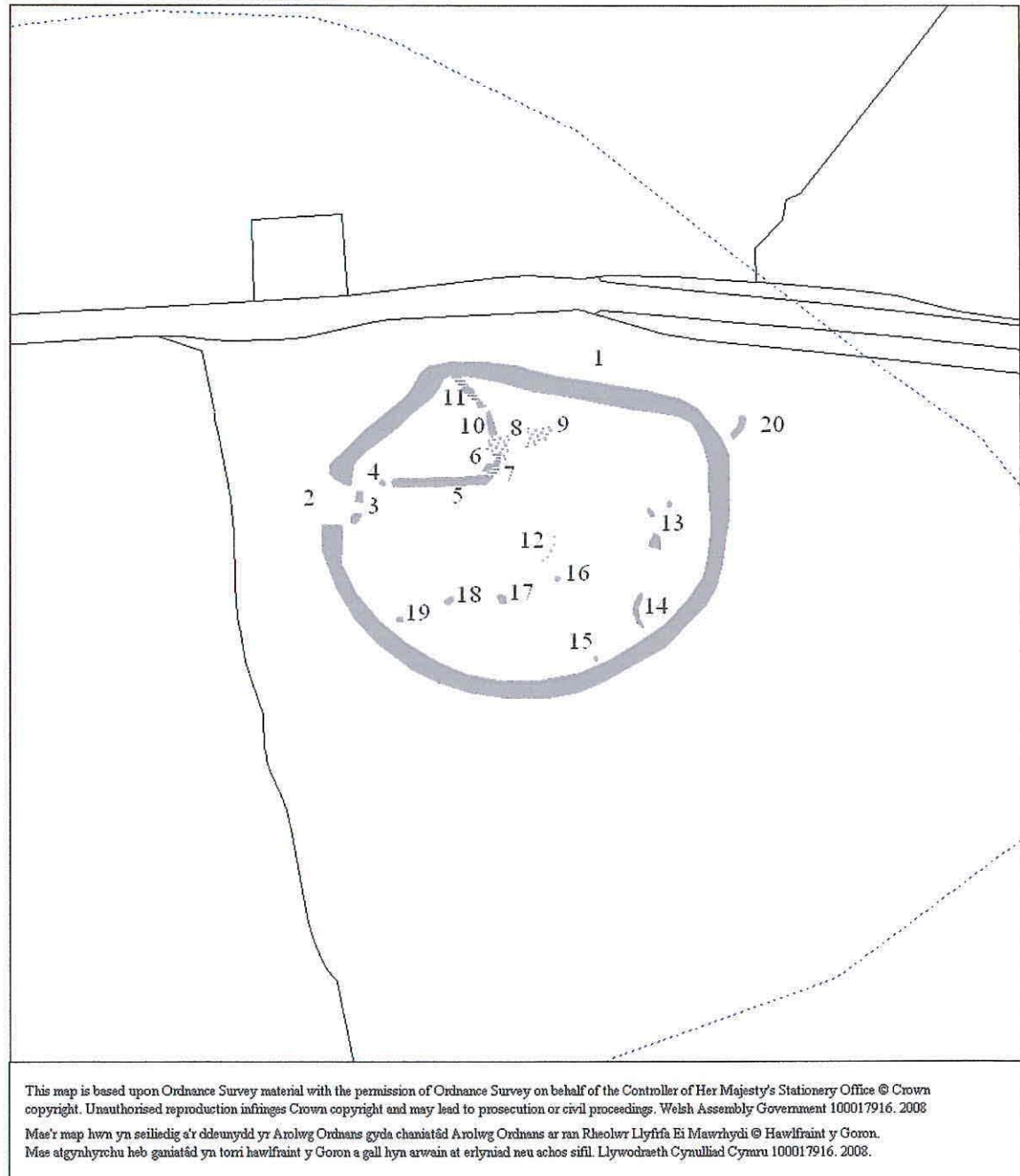


Fig 9 Interpretation plot of the geophysics results at Ty Brith Wood (scale 1:1,000)

- 3.3.6 A number of marks on the greyscale plot hint at the presence of settlement, but only two were reasonably convincing. These comprised a curving line of what appeared to be five small post-holes (12), individually up to 0.6m in diameter and collectively defining about a quarter of a circle 9.0m in diameter. There was also a curving length of ditch (14), about 6m long and 0.9m wide, which might form part of a circle 6.5m in diameter.



- 3.3.7 The remaining anomalies in the interior suggested the presence of a number of pits, all but one of which fell in a narrow zone running east-north-east/west-south-west across the southern part of the interior. At the east end of the zone there were a group of three pits (13), individually up to 2.4m across, occupying an area measuring 7.5m north/south by 5m. To the west-south-west from the group the pits were respectively 0.9m in diameter (16), 1.7m north/south by 1.5m (17), 1.8m north-east/south-west by 1.1m (18) and 1.3m in diameter (19). Two further anomalies were observed, corresponding to a small pit (15), 0.9m in diameter, which lay just inside the southern part of the enclosure and a short length of ditch, 4.1m north-east/south-west by 1.1m wide, just outside the enclosure on its north-east side.
- 3.3.8 The survey was successful in determining the shape and precise position of the enclosure, thereby clarifying the partial picture that had been provided by the aerial photography. It successfully demonstrated that the complete circuit of the defensive ditch had been preserved below ground level, something which had not been apparent on the aerial photographic sources, and it has also added some detail to the interior which might represent both domestic occupation and evidence of stock handling. The more interesting evidence relates to the west side of the enclosure, where two large post-holes appeared to be associated with the entrance, implying that this was occupied by some form of substantial timber structure.

#### 3.4 Cross Lane Cottage enclosure (PRN 7101), Guilsfield, near Welshpool (SJ 2275 1158)

- 3.4.1 This univallate cropmark enclosure is situated on the eastern outskirts of the village of Guilsfield and approximately 3km to the north of Welshpool in eastern Montgomeryshire. The site lies at an altitude of about 75m OD on the level floor of the vale which extends north-eastwards from the village towards the valley of the River Sever near Arddleen. The ground here is very slightly raised above the course and flood plain of the stream known as Nant Rhyd-y-moch, and appears to occupy one of a number of areas of fluvio-glacial gravel on the valley floor. The site is bisected by an old lane which originates at Cross Lane Cottage and forms a semi-abandoned extension to Celyn Lane.

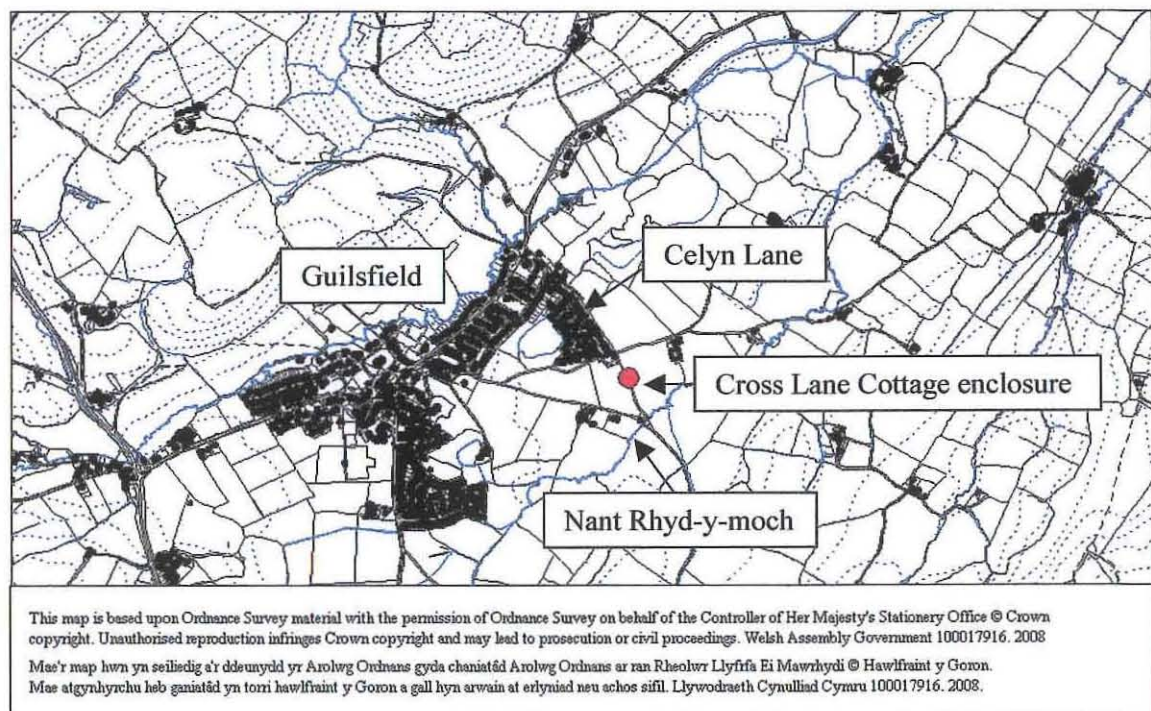


Fig 10 Location plan of the site in relation to Guilsfield village (scale 1:25,000)



- 3.4.2 The site was first recognised from the air by CPAT in July and August 1984, during a spell of dry weather. It was photographed again by CPAT in 1989, when favourable conditions prevailed, but was first plotted from the aerial photography by CPAT in 1993, with a more detailed plot being produced in 1997. The detailed plot shows only the eastern part of what appears to be a square or rectangular cropmark, although the exact shape is uncertain as neither the north or the south corners are evident in the photographs and the remainder of the enclosure lies on the other side of the lane in less intensive pasture, which has seemingly never revealed a cropmark. The site was visited by CPAT in 1991, at which time no physical evidence was apparent in either field.

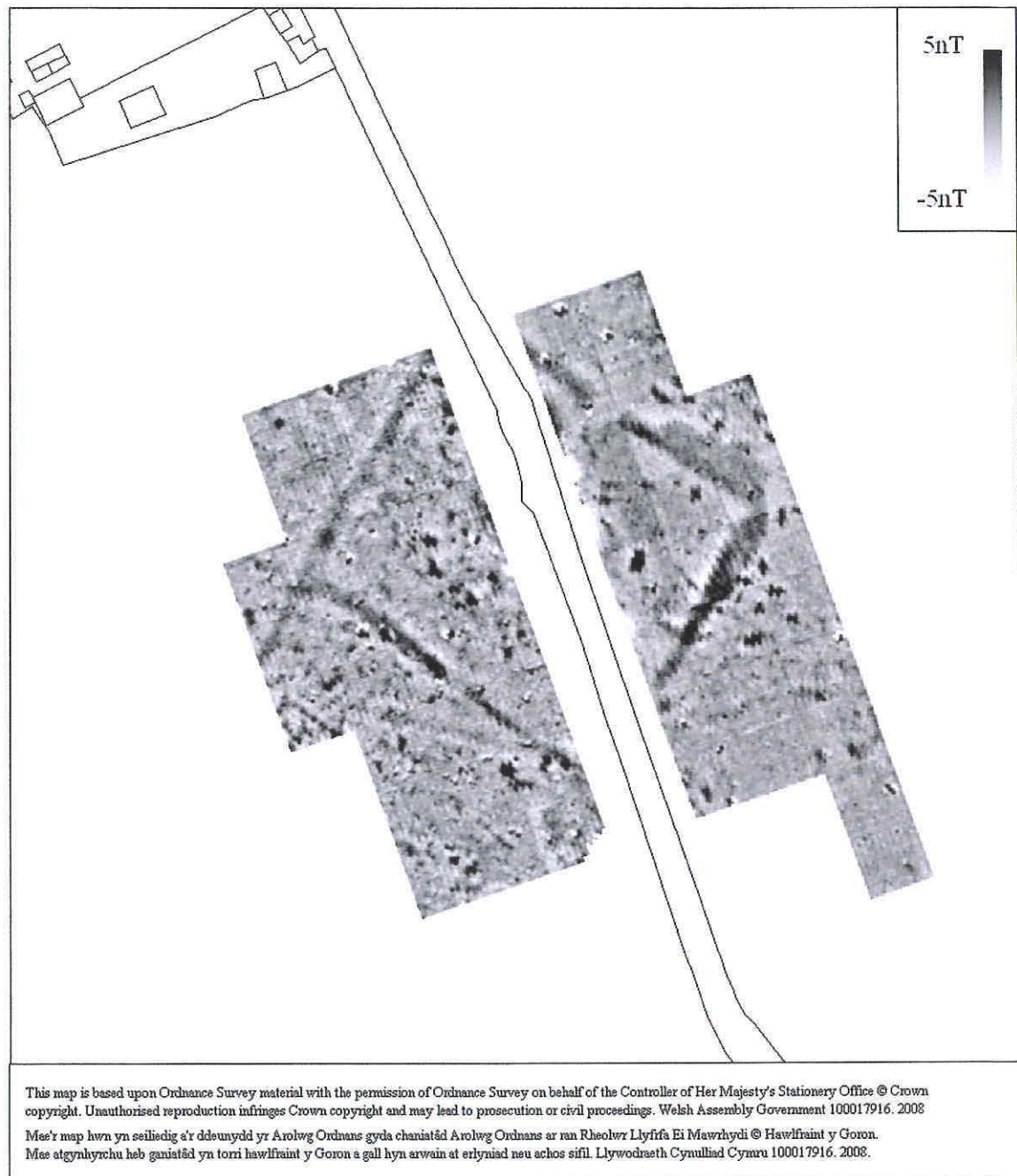


Fig 11 Greyscale plot of the geophysics results near Cross Lane Cottage (scale 1:1,000)

- 3.4.3 Two areas were examined by geophysics, lying on either side of the old lane. On the east side, a single area was surveyed, totalling 0.24ha and comprising 24 whole grids, each 10m square. On the west side of the track, some 0.27ha was surveyed, comprising 27 10m-square grids. In both



cases, the survey was carried out to the higher resolution (see para 2.3.3). Fig 11, above, presents the greyscale plot of the combined results, while Fig 12, below, gives an interpretation of the results by depicting the individual and collective geophysical anomalies that were revealed. These anomalies have been given a sequence of numbers on Fig 12, which are mentioned in brackets in the text that follows for descriptive purposes. As in previous sections, anomalies which are likely to have resulted from the presence of iron objects in the soil are not given numbers in the following description.

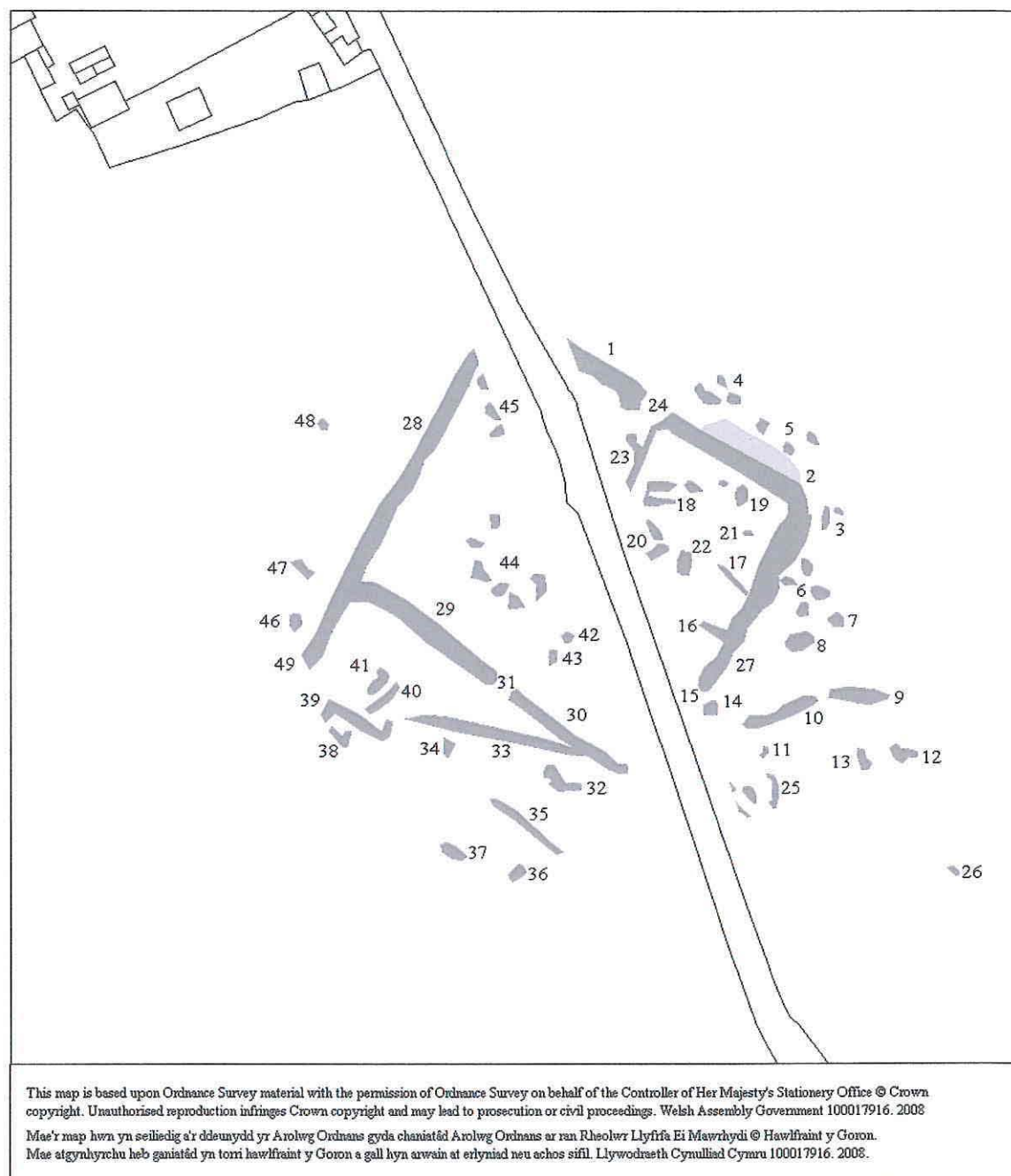


Fig 12 Interpretation of the results of the geophysics near Cross Lane Cottage (scale 1:1,000)

3.4.4 The magnetic anomalies revealed by the survey confirmed that the enclosure was univallate, measuring about 58m north-west/south-east by up to 52m north-east/south-west, an area of 0.28ha; the various sections of ditch (1, 27, 28, 29, 30) measured between about 2.0m and 4.5m in width. The wider sections were apparent near the eastern corner of the enclosure and might reveal evidence of ditch re-cuts, although one linear anomaly (2), 3.2m wide and running



alongside the ditch for 16.5m, would make the ditch a fairly improbable 6.0m wide and remains to be explained. It became apparent, however, that the enclosure was integral with a further ditch (49), about 2.0m wide, which extended for at least 12.0m to the south-west from its west corner. It seems possible from this that the enclosure is part of a field system and that it might be contemporary with the system of field enclosures (PRN 38188) about 50-100m to the east which is known from a series of cropmarks visible on aerial photography taken in 1984 and 1989.

- 3.4.5 There are two main entrances evident in the results, one on the north-east side (24), 4.1m wide, is interesting for the Y-shaped ditch or gully (23), 1.3m wide, which runs from it into the enclosure for nearly 12m, one arm of the Y being formed by a spur 2.9m long. The other entrance (31) is about 3.0m wide and lies on the south-west side. In addition, another possible entrance (15) was suggested by the results in the south-east side of the enclosure, where there appears to be a terminal to the enclosure ditch. The proximity of a wire fence in the field boundary meant that the nature of the possible gap could not be established, but it seems possible that it is at least 2.5m wide and may be associated with a pit (14), itself about 2.5m in diameter, which lies immediately to its south-east.
- 3.4.6 The survey revealed a significant number of anomalies in the interior, and it is certain that more would have existed prior to the creation of the semi-abandoned lane which bisects the site. Also some of the internal area was untested as it was not possible to approach the boundaries defining the lane too closely, owing to the presence of metal fencing wire in them. The ditch or gully (23) extending into the interior has already been noted, but two further ditches (16 and 17), respectively 4.5m and 6.7m long, were also seen to extend into the interior from the south-east part of the main ditch. Other internal features revealed included various pits (19, 21, 22, 42, 43, 45), up to 3.0m in diameter, which demonstrate activity but cannot be categorised at present. Three groups of features provide a more direct suggestion of settlement in the interior, especially features 18 and 20, which hint at rectangular areas defined by a ditch, measuring 9.1m east/west by 3.5m and 5.6m north-west/south-east by 3.6m, respectively. The remaining suggestion of settlement in the interior comprises a group of at least six pits (44), individually up to 4.0m across and occupying an area of 14.0m north-west/south-east by 10.0m, to the west of the old lane.
- 3.4.7 Further pits or post-holes were present outside the enclosure. On the east these comprised pit groups 3-6, and the individual pits 7, 8, 11-13 and 26, the largest of these being pit 8 which measures 4.5m by 2.5m. Of more interest were a pair of ditches (9 and 10), about 2.2m wide and about 22.5m long overall, perhaps combining to form a single sinuous feature that might provide a link to the field system on the east. The remaining feature of interest on the east side of the lane appears to be a faint sub-circular enclosure (25) about 8.2m in diameter and defined by a 1.0m wide ditch, which also has a pit in the interior measuring 2.9m north-north-west/south-south-east by 1.5m.
- 3.4.8 On the west side of the old lane and to the north-west of the enclosure, there are only three pits (46-48) whose maximum dimension is 3.7m, none of these appear to be of particular significance. The situation to the south-west of the enclosure is somewhat more complex, however, with a number of ditches and features perhaps supporting the previous suggestion that there is a field system in that direction. The largest of these features is a ditch (33), 27.6m long and up to 2.0m wide, which takes a slanting line to the west-north-west from near the south corner of the enclosure, although it seems to fade out just before reaching an area of ditches (38-41), with a maximum length 14.0m, whose characteristic feature seems to be that they exhibit dog-legged courses. Another ditch (35), 13.8m long and 1.5m wide, lies to the south of ditch 33. The remaining features in this area are three pits (34, 36 and 37), individually of maximum size 4.4m by 2.0m, and a rather more amorphous anomaly (32) which seems to represent a curving ditch or pit, 7.5m long.
- 3.4.9 The survey has added considerably to our knowledge regarding this site, which now appears to be an enclosure perhaps attached to some form of field system. Another field system is present



in the immediate vicinity and it appears certain that these sites represent evidence of past farming practices in the area around Guilsfield. The probable date of the enclosure and its associated features remains to be established, but the fact that it is bisected by an old lane, which is now largely abandoned and slightly sunken, provides some comparative evidence. The nature of the lane is interesting, in that it appears to form part of a slightly meandering route which continues for more than 6km to the north-north-west until it meets the River Vyrnwy, while in the other direction it seems to have been heading in the direction of Welshpool. It seems reasonable to assume that a route of this nature would perhaps be late medieval in date, but it must have been the case that little or no evidence of what would have been the fairly substantial earthworks of the enclosure survived when the lane was constructed, as the enclosure is not respected. When combined with other factors, such as its shape, this suggests that a possible origin in the Roman period can now be postulated.

## 4 Conclusions

### 4.1 Methodology

- 4.1.1 The programme described here was initiated as a test to compare the results of surveys recorded at different levels of detail. Generally, in the past, grids 20m square examined by sample intervals of 0.5m along traverses 1m apart have been the norm and these surveys have been successful in identifying the courses of main and subsidiary enclosure ditches. This method allows for fairly rapid identification of the main features present on a particular site, but in a quest for more detail, which could be used to assess the possibility of occupation and activity within the enclosures, it was decided both to halve the sample interval and to double the number of traverses over a given grid width, thereby giving a sample interval of 0.25m along traverses 0.5m apart. With this method it was more convenient to use grids 10m square in which the same number of readings (800) were taken as per the 20m square grids.
- 4.1.2 The results suggest that quadrupling the density of readings for a given area has been successful in revealing evidence of possible occupation, although many of the anomalies are equivocal in their nature and would need to be examined by excavation. Some caution always needs to be expressed with regard to any set of geophysics results as it is possible to read too much into anomalies which may have been caused by both natural and non-relevant artificial agencies.
- 4.1.3 Surveying at a greater resolution obviously has implications for the amount of time required to cover a given area, but, on balance, the greater detail in the results seems to justify the increased density of 800 readings per 100m<sup>2</sup> grid becoming the standard for surveys of this type. Over a number of enclosures, the time taken for each survey has approximately doubled in relation to what would be expected with the 800 readings per 400m<sup>2</sup> density that was used previously, which means that about twice as many readings can be taken in a given amount of time at the enhanced resolution. The final absolute time required to survey any given site will, as is already the case, depend on many factors, such as the ease of setting out site grids and surveying them in relation to mapped field boundaries, the equipment used, and even the nature of the on-site vegetation.

### 4.2 Results

- 4.2.1 One of the significant features of the increased resolution surveys is that it has proved possible to be more confident that any given anomaly is authentic, as it should now be defined by at least four times the number of readings in comparison to the previous methodology. This is a factor which is particularly important when looking at features around 1.0m or less in width or diameter (i.e. the size of a substantial post-hole), where the previous method would potentially only have given a single reading. Even then, it is unlikely that anywhere near all the features



present within an enclosure could be convincingly recognised against the background variations due to random levels of magnetism in the soil or the underlying rock.

4.2.2 The improvement in anomaly recognition and the increase in confidence regarding the authenticity of any anomalies is highlighted when the numbers of anomalies recorded in this year's survey are compared to those carried out previously on other sites. If the main ditches are disregarded, the average number of anomalies recorded in 2006 was about 4 per enclosure, in comparison to 26 per enclosure in 2008-9. This is not a function of variations in the size or type of the enclosures, as a range of sites was investigated in the programme for each year.

4.3 The above conclusions are more general points which have emerged during this year's survey programme, specific results relating to the individual sites examined are appended to the relevant sections above.

## 5 Acknowledgements

5.1 The writer would like to thank his colleagues, Wendy Owen and Eleri Farley for their assistance with individual surveys;

5.2 Thanks are also due to the various landowners and tenants for allowing access to the sites, and to the Gwynedd Archaeological Trust for the use of their geophysics equipment.

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