THE CLWYD-POWYS ARCHAEOLOGICAL TRUST

Geophysical surveys of Defended Enclosures in Montgomeryshire

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Project Report

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Report for Cadw: Welsh Historic Monuments

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Cover photo: Partial cropmark evidence for the Lane House enclosure, Llandyssil (CPAT AP 79-CS-0011)

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1 Introduction

1.1 This report details a programme of geophysical survey carried out on defended enclosures in the historic county of Montgomeryshire by the Clwyd-Powys Archaeological Trust during 2007. 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 those sites examined, which in most instances had previously been identified only from various aerial photographic sources.

1.2 The survey used a fluxgate gradiometer and the methodology employed was that used in the 2006 survey of a small collection of defended enclosures in Montgomeryshire (see Hankinson and Silvester 2006) 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 on eight sites (see Fig 1), all of which were located in the eastern part of the old county. Of the sites examined, six can be generally described as having positions either in or overlooking the valley of the River Severn, with the two remaining sites overlooking the river valleys of the Camlad and Banwy, respectively.

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 potentially 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 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 can then be correlated with geographical locations. Readings in these surveys were taken along parallel traverses on a 20m by 20m grid, 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 full grid.

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, gradual changes in the earth's magnetic field, and inconsistencies in data collection.

2.4.2 The results are here 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.

2.4.3 Some processing was also carried out to reduce the effect on the grey-scale plot of very high readings caused by iron objects in the soil, although care was taken to examine the results for burnt features which might produce similar results. Other processing which was variably employed included smoothing to help with very noisy or complex sites, interpolation to help reduce the amount of pixellation in the greyscale plot, and low pass filtering to reduce background noise and make anomalies easier to see.

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. These results were then related to the Ordnance Survey base mapping using the AutoCAD and Mapinfo programs, which enabled the National Grid co-ordinates of 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 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 Fron Eithin enclosure, Cyfronydd, near Welshpool (PRN 7100; Figs 2-3)

3.1.1 This enclosure, which lies approximately 3km north-east of the hamlet of Cyfronydd (at SJ 16410911), takes the form of an irregular quadrilateral, sited on the eastern slope of a local summit at about 270m OD. The site lies in an east-facing hollow, with good views in that direction, encompassing the Breiddin Hills.

3.1.2 The site was photographed from the air in 1984, but only the south-east and part of the north-east sides were evident as cropmarks, together with a short section of ditch which suggested the presence of an internal enclosure on the north-east. When the site was visited by CPAT in 1991, no visible remains of the enclosure were observed. Unfortunately, the aerial photographs taken in 1984 had insufficient control points, so the site was not plotted in relation to the Ordnance Survey mapping during the Montgomeryshire Small Enclosures Project (Silvester and Britnell 1993).

3.1.3 A single area totalling approximately 0.48ha was examined during this survey, comprising twelve complete grids, which encompassed the whole area of the enclosure recognised on the aerial photography. One figure (Fig 2) is used to present the greyscale plot of the results, while a second (Fig 3) 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 3, which are mentioned in brackets in the text that follows for descriptive purposes.

3.1.4 The magnetic anomalies revealed by the survey corresponded with an enclosure of at least 0.24ha with an outer ditch (1) forming an irregular quadrilateral and an inner ditch (2) which seems to form a D-shaped enclosure, despite being poorly defined on its eastern side. The ditches measure up to 3m in width, but there appears to be no direct correlation between them, except that the inner is centrally placed within the outer. It is not impossible therefore, although it seems unlikely, that the two ditches relate to different features.

3.1.5 On the east side of the enclosure, an entrance (3), some 4.0m wide, was revealed, which was slightly offset to the north. Unfortunately, this side of the inner enclosure is only faintly visible and it was uncertain whether the entrance was mirrored in the inner enclosure. Two other anomalies, external to the enclosure, were recorded, including an oval 'ring-like' ditch (4) occupying an area of some 4.5m north-south by 3.5m east-west. A short, angled section of ditch (5) was observed at the north-east corner of the enclosure, which may represent some form of drainage, but its nature is uncertain.

3.1.6 The survey has allowed the main ditch of the enclosure to be rationalised into a more accurate shape than had been provided by the fragmentary evidence on the aerial photographs and confirms the original but tentative suggestion that an internal ditch was present. The evidence also points to an entrance on the east side of the enclosure and the presence of some additional features in the surrounding area.

3.2 Pen-y-lan Farm enclosure, Forden (PRN 3598; Figs 4-5)

3.2.1 This sub-rectangular cropmark enclosure lies at NGR SJ 22590205, which is near the village of Forden, the site being identified by the name of the nearby farm. The site occupies a local summit at an elevation of 150m OD, which overlooks the Severn Valley and forms part of the dissected triangular terrace defined by the valleys of the River Severn on the west, and the River Camlad on the south. On the north-east, the ground rises up to the ridge of the Long Mountain.

3.2.2 The site was photographed from the air in 1979 and again in 1984 and 1989, but when visited by the Ordnance Survey in 1981, no visible remains of the enclosure were observed. Slight traces of an earthwork scarp were recognised on the north-west and north-east sides, however, when the site was visited by CPAT in 1990. The site was first recorded as a sub-rectangular single-ditched enclosure, with internal measurements of 60m by 50m. Possible internal divisions and a second ditch to the north-east were noted from the aerial photographs. The south-east side of the enclosure was not apparent on any of the aerial photographs, perhaps due to unfavourable ground or a conjunction with the hedge which defines this side of the field.

3.2.3 Subsequent plotting of the site from aerial photographs by CPAT in 1998 (Thomas, 1998) recorded the site as a sub-rectangular enclosure, *c.*76m north-east/south-west, with a possible entrance on the north-east side. Other cropmarks were said to indicate an internal enclosure to the south-east of the entrance and another possible enclosure overlying it. There seemed to be no visible cropmarks to the south-east of the enclosure.

3.2.4 Three areas totalling approximately 0.82ha were examined during this survey, comprising a total of twenty-one whole or partial grids, which encompassed the known area of the enclosure seen on the aerial photography and examined the field to the south-east where it was thought that further evidence of the enclosure might be forthcoming. One figure (Fig 4) is used to present the greyscale plot of the results, while a second (Fig 5) 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 5, which are mentioned in brackets in the text that follows for descriptive purposes.

3.2.5 The magnetic anomalies revealed by the survey corresponded with a single-ditched enclosure of at least 0.35ha and probably of sub-rectangular shape, although, as with the aerial photography, no conclusive evidence of its south-east side was revealed. The main ditch (1) was approximately 2m in width, and unusually an inner ditch (2) was present only on the south-west side, some 5m distant from the main ditch. The two ditches ran approximately parallel for a length of at least 45m. Difficulties were experienced with a large area of iron reflecting one or more objects, and the line of a water pipe in this part of the enclosure, but the remaining features appear to be authentic.

3.2.6 On the north-east side of the enclosure, an entrance (3), some 4.2m wide, was revealed. Although the length of the main ditch is uncertain on this side, it can be confirmed that the entrance is not centrally placed, being offset to the north-west. A second entrance (4) was found, in a central position on the north-western side, although this was only 1.5m wide.

3.2.7 The marked linear anomalies (5) visible on the results of the survey correspond with a series of underground water pipes, centred on a tank which is sited on the highest point in the immediate locality. These pipes undoubtedly form part of the farm water supply.

3.2.8 The fact that the enclosure lies next to a field boundary imposed limitations on the geophysics because of the interference from wire fences on the magnetic readings, and this led to difficulties in trying to locate the south-eastern side of the enclosure. The intermittent evidence of the south-western side of the enclosure, which demonstrates that this part was double-ditched, also hints at the possibility at a southern corner, due to a slight curve at the south-east end of the outer ditch. If this is the case, an overall area of approximately 80m north-east/south-west by 45m is indicated for the enclosure.

3.2.9 The survey has also determined the shape of the enclosure, creating a more accurate picture than had been provided by the aerial photography and seems to have disproved the theory that there might have been on overlying enclosure and internal divisions. The evidence relating to these alleged features was probably a combination of plough marks, slight

vegetation changes and the misinterpretation of the inner ditch at the south-west end of the enclosure.

3.3 Gwyn's Barn enclosure, Leighton, near Welshpool (PRN 7502; Figs 6-7)

3.3.1 This enclosure, which lies 300m to the north-west of Gwyn's Barn farm (at SJ 23240528), takes the form of an irregular hexagon with a slightly flattened west side. It lies on the western edge of a gravel terrace immediately to the east of the flood plain of the River Severn at an elevation of 70m OD.

3.3.2 The site was originally recorded from aerial photographic sources as a roughly D-shaped single-ditched enclosure with possible entrances on the north-west and south-east sides, although this is obviously an error as the aerial photographic plot shows entrances on the north-east and south-west sides. A circular feature was noted inside the south-west entrance. The site was visited by CPAT in 1990, but no evidence of earthworks was recorded. A subsequent aerial photographic plot of the site by CPAT in 1998 records a D-shaped enclosure, *c*.66m north-south and 53m east-west, but with no evidence of the circular feature inside the south-west entrance.

3.3.3 Two areas totalling approximately 0.47ha were examined during this survey, comprising a total of twelve whole or partial grids, which encompassed the known area of the enclosure seen on the aerial photography. One figure (Fig 6) is used to present the greyscale plot of the results, while a second (Fig 7) 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 7, which are mentioned in brackets in the text that follows for descriptive purposes.

3.3.4 The magnetic anomalies revealed by the survey corresponded with a single-ditched enclosure of 0.23ha which was only roughly hexagonal, having rounded corners and curving sides. The enclosure measured 60m north-east/south-west by 50m, and the ditch (1) was up to 2.5m in width. It seemed to be continuous on the north-east side, where an entrance had been suggested from aerial photography, and only the south-western entrance (7) was confirme, this measuring some 1.0m in width. Immediately to the south of the entrance, a ditch (2), 2m wide, extended for at least 10m in a south-westerly direction, continuing beyond the geophysical survey area, and probably representing an attached field boundary or shedding feature used for stock control.

3.3.5 Immediately to the north-west of the entrance, the enclosure ditch bulges out to the south-west and this may represent a small enclosure, measuring 15.5m north-west/south-east by 5.5m internally, within the main enclosure. A faint ditch (3) appears to extend across the base of the enclosure, separating it from the main enclosure, although this could also represent an earlier alignment of the main enclosure ditch, as it seems to match the ditch alignments on either side of the 'bulge'.

3.3.6 On the northern side of the modern fence which sub-divides the enclosure, three anomalies were identified which may relate to features contemporary with the enclosure. Immediately to the north of the fence on the west side, a ditch (6) appears to run towards the interior for approximately 5.5m before turning sharply north-west and terminating after a further 3m. A second anomaly (4) on the internal face of the ditch on the north-west side of the enclosure appeared to be rectangular, measuring 7.5m north-east/south-west by 4.5m, and this may represent some form of associated dwelling. Slight hints of a sub-circular feature (5), some 6m across, were seen in the north-eastern part of the enclosure, and again this may perhaps denote the location of a dwelling,

3.3.7 The overall shape and size of the enclosure recorded from aerial photographic sources was largely confirmed by the geophysical survey, although a slightly more rounded appearance was suggested. The results also revealed part of what could be an associated field, as well as evidence for an internal division within the enclosure, perhaps utilising a former alignment of the enclosure ditch. Internal features were also suggested by the results; two of them could represent settlement evidence, although one seems rectangular and the other sub-circular. It is likely that the true nature of the internal features will only be resolved by excavation.

3.4 Cefnybryn enclosure, near Bettws Cedewain (PRN 7533; Figs 8-9)

3.4.1 This enclosure lies approximately 3km east of the village of Bettws Cedewain (at SO 15289700) and appears to be oval in overall shape. It lies at approximately 270m OD on a narrow spur ridge projecting in an east-north-east direction from an area of high ground on the north-west side of the Severn valley opposite the village of Abermule.

3.4.2 Fragmentary evidence of the site was revealed on aerial photographs taken by CPAT in 1989, with only parts of the south and west sides being recorded as cropmarks. However, when the site was visited by CPAT in 1992, it was apparent that there were faint earthworks of at least two, and possibly three, ditches surviving on the south-west side, together with a possible scarp on the east.

3.4.3 A single area totalling approximately 0.56ha was examined during this survey, comprising sixteen whole or partial grids, which encompassed the northern part of the enclosure seen on the aerial photography. One figure (Fig 8) is used to present 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.

3.4.4 The magnetic anomalies revealed by the survey corresponded with a double-ditched sub-circular enclosure of approximately 0.68ha with an additional external ditch (6), some 3.5m wide and 8m distant from the outer ditch, presumably constructed to strengthen the defences on the south-west side. Geophysical survey was not carried out in the south-eastern part of the enclosure as these parts of the inner and outer ditches (respectively, 1 and 2) were readily apparent on the aerial photographs. Where the ditches have been revealed by the geophysical survey, the inner is given number 4 and the outer number 3, each being commonly 3m in width up to a maximum of 4m and with a general separation between ditches of 10m.

3.4.5 On the north-east side of the enclosure, an entrance (5), some 6m wide, was revealed in both the inner and outer ditches. Unfortunately, the north-west side of the enclosure lies on a steep slope which has a thick grass cover, and this area proved impossible to survey. The extent and nature of the defences on this side remains uncertain, but both ditches seem likely to cross the slope. Slight traces of anomalies were noted in the interior, but none of these could be resolved into discrete features.

3.4.6 The survey has been successful in identifying more of the course of the defences of the enclosure and in discovering the position of the entrance. This has confirmed the likely shape of the enclosure, but difficulties with the terrain on the north-west side of the enclosure meant that the geophysical survey could not be carried out and the alignment of the ditches on this side awaits clarification. No certain evidence of internal features was recognised in the results.

3.5 **Lane House enclosure, near Llandyssil** (PRN 5122; Figs 10-11)

3.5.1 This enclosure lies 1km south-west of the village of Llandyssil (at SO 19009493) and is approximately ovate in overall shape. It lies on a local summit overlooking Llandyssil, at approximately 185m OD, with higher ground overlooking the site on its south side, although there is a good view of the Breiddin Hills to the north-north-east.

3.5.2 Sections of the single ditch which defines the enclosure were revealed as cropmarks on aerial photographs taken by CPAT in 1979, although much of the circuit was not evident. To the north-west, the ditch was particularly well-defined, with slightly more faint traces on the north-east which perhaps retained evidence of an entrance. The overall area of the enclosure was estimated at approximately 100m east-west by more than 45m. No earthworks were apparent when the site was visited by CPAT in 1991

3.5.3 A single area totalling approximately 1.05ha was examined during this survey, comprising twenty-eight whole or partial grids, which encompassed the main part of the enclosure seen on the aerial photography. The north-western part of the defences was not surveyed due to its clarity on the photographs. One figure (Fig 10) is used to present the greyscale plot of the results, while a second (Fig 11) 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 11, which are mentioned in brackets in the text that follows for descriptive purposes.

3.5.4 The magnetic anomalies revealed most of the circuit of the ditch, which corresponds to sub-ovate enclosure of approximately 0.94ha, measuring 115m north-west/south-east by 100m. The ditch (1) was some 3.5m wide and an internal division was identified on the west side, comprising a single curving ditch (3), 40m long and 2m wide, which faded out to the north. The north-western part of the ditch circuit (8) was not surveyed and has only been identified from aerial photographs.

3.5.5 Four possible entrances were identified, on the north-east, south-east, south, and south-west sides of the enclosure. That to the north-east (2) was approximately 8m wide and corresponded to the evidence from the aerial photography. The magnetic response provided by the south-eastern part of the main ditch (7), where it neared the south corner of the enclosure, was fairly poor, but a possible entrance (6) was identified at the south corner. A further entrance (5), perhaps 15m wide, seemed to be present in an approximately central position in the south-east side, and the suggestion of the alignments recorded is that, if authentic, this may have been slightly inturned. On the south-west side, the remaining entrance (4) appeared to be of an unusual form, consisting of a gap 3.5m wide, protected by a ditch 1m wide and at least 5m long which ran parallel and approximately 1m to the west of the main ditch.

3.5.6 The survey has successfully identified most of the circuit of the enclosure, and has revealed four possible entrances, only one of which was evident on the aerial photographs. A curving ditch in the interior of the enclosure suggests that it was subdivided, and this may have been to aid stock handling, as no evidence which might relate to settlement activity was recorded in the interior.

3.6 **Bagbury enclosure II, Snead, near Churchstoke** (PRN 4036; Figs 12-13)

3.6.1 The site lies in the upper reaches of the Camlad valley at SO 31649278, approximately 0.5km north of the small hamlet of Snead and some 4km east-south-east of Churchstoke. It is a single-ditched, sub-square cropmark enclosure which is sited on a slight south-west facing promontory overlooking the valley, at an elevation of 210m OD.

3.6.2 The site was recorded from aerial photographs taken in 1976 and 1979, and has been described by previous sources as a trapezoidal enclosure measuring some 75m by 70m. The cropmarks are fairly clear, but the photographs lack sufficient control points to permit accurate rectification. Entrances have been suggested on both the north-east and south-east sides. The site was visited by CPAT in 1991, but no evidence of surviving earthworks was found.

3.6.3 A single area totalling approximately 0.65ha was examined during this survey, comprising seventeen whole or partial grids, which encompassed most of the enclosure and its immediate surroundings. One figure (Fig 12) is used to present the greyscale plot of the results, while a second (Fig 13) 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 13, which are mentioned in brackets in the text that follows for descriptive purposes.

3.6.4 The magnetic response obtained during the survey was relatively poor, although most of main ditch is just traceable. The extreme southern corner (5) was just missed by the survey, but this is easily visible on the aerial photographs and is not seen as being a significant omission. The main ditch (1) is some 2.5m wide and forms a sub-square enclosure of approximately 0.46ha, measuring 71m north-east/south-west by 67m. A further, curving, ditch (4) was identified in the western part of the interior, measuring 30m long and 2m wide. The area bounded by ditch (4) is a little 'noisy' in terms of its magnetic response, but it is not possible to resolve this into specific features.

3.6.5 The alleged north-eastern entrance was not revealed by the geophysics, the only entrance apparent being that on the south-east (3), which is perhaps 10m in width. A probable ditch (2) approximately 2m wide, seems to be extend outwards from the entrance, and perhaps this was utilised in the gathering and penning of stock.

3.6.6 The survey has successfully located and identified the course of the enclosure ditch, whose alignment was uncertain due to the lack of control points on the aerial photographs. It has also resolved the uncertainty regarding the location of the entrance, which is confirmed to lie on the south-east side of the enclosure. As with the previous site, a curving ditch in the interior of the enclosure suggests that it was subdivided, and this may have been used to aid stock handling or to act as a partition between stock and a domestic area.

3.7 Little Garth enclosure, Guilsfield (PRN 67485; Figs 14-15)

3.7.1 This enclosure is set on low-lying ground, at about 90m OD, on the southern bank of the small stream known as Nant Rhyd-y-moch, some 1km south of the village of Guilsfield at NGR SJ 22001011. The locality lies towards the south-western end of a broad valley which runs north-eastward from Guilsfield to the valley of the River Severn, some 7km distant.

3.7.2 The site was first recorded from aerial photographs taken by RCAHMW in 1996. In early 2007, the site was visited by CPAT and recorded as a bivallate, sub-circular earthwork enclosure with a possible entrance on the north side. Some potential was thought to exist for internal, domestic, features but could not be quantified from the visible evidence. Accordingly, a single area totalling approximately 0.24ha, comprising six whole grids, was examined by geophysical survey, encompassing the interior of the enclosure. The results are depicted as a greyscale plot on Fig 14. No attempt was made to carry out geophysics over the defences as these were readily visible at the time of the survey, and therefore a topographical survey of these is presented as Fig 15.

3.7.3 The topographical survey of the enclosure was carried out electronically using an EDM with Penmap software, final manipulation of the data being carried out using Autocad and

the results presented using Mapinfo software. The results show the enclosure encompassing a total area of 0.67ha, measuring 97m north-south by 90m east-west, overall. The interior was some 0.20ha in area, and the defences totalled approximately 20m in overall width. A possible entrance, perhaps up to 8m wide, was identified on the north-east side of the enclosure.

3.7.4 The defences are relatively well-preserved, with only intermittent breaks in the inner bank of the enclosure and some smoothing of the earthworks. Exceptions to this occur on the west and south-east sides, where later influence has affected their preservation. On the west, the defences seem to have been cut through by a small stream which joins Nant Rhyd-y-moch in the immediate vicinity, whereas on the south-east the defences seem to have been covered by a lynchet associated with the boundary between the site area and the adjoining field, whose surface is at a slightly higher level. It seems likely that much of this side of the defences could be preserved beneath the lynchet.

3.7.5 The geophysics has not been particularly informative in the case of this enclosure, only demonstrating negative evidence, but the compilation of a topographical survey has been of value in comprehending the nature and preservation of the site.

3.8 Berriew enclosure (PRN 7056; Figs 16-17)

3.8.1 This univallate enclosure lies on the local summit of a spur ridge (at SJ 18480069) which overlooks the village of Berriew from its south-west side, at an elevation of approximately 120m OD. The spur runs down towards the River Rhiw, from which the name of the village is derived and is connected to higher ground to the west-south-west by a slight col, formed where the level of the ridge drops by about 5m. Berriew itself lies on the edge of the flood plain of the River Severn.

3.8.2 The site was recorded from aerial photographs taken by CPAT in late July and early August 1983, although it proved impossible to plot accurately, and therefore measure, the site from the photographs due to the lack of nearby control points. Little evidence of any earthworks was observed when the site was visited by CPAT in 1991, although the location was considered to be suitable for a defended enclosure. The visit also recorded the presence of a group of 'Gorsedd stones' in the interior, these presumably relating to an eisteddfod held in Berriew perhaps in the 19th century, although its exact date is unknown.

3.8.3 A single area totalling approximately 0.4ha, comprising ten whole grids, was examined by geophysical survey, encompassing the likely location of the enclosure. The results are depicted as a greyscale plot on Fig 16. A second plan (Fig 17) 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 17, which are mentioned in brackets in the text that follows for descriptive purposes. The geophysics results were also used to help manipulate a plot of the enclosure taken from the 1983 aerial photographs, which provided some additional detail.

3.8.4 The magnetic response obtained during the survey was relatively faint, with only the northern part of the ditch (1), some 2.5m to 3m in width, being traceable. Additional sections of ditch (2) were visible on the aerial photographs to both the west and east of the geophysics evidence, and these suggest that the enclosure was probably oval in overall shape, measuring 65m east-north-east/west-south-west by 28m, an area of approximately 0.14ha. No evidence has been found of a continuation of the ditch on the south and south-east sides, perhaps it was not required there due to the steepness of the slope.

3.8.5 A number of other features are visible in the geophysics results, which can be divided into two distinct classes. Anomalies 3 to 6 represent circular, metal, tree protection fences,

while anomalies 7 to 9 seem to relate to areas where the underlying rock of the ridge approaches the surface. None of these anomalies is likely to be directly related to the enclosure.

3.8.6 Although the results of the survey only revealed part of the enclosure, they have provided useful corroboration of the evidence from the 1983 aerial photographs. The results have also been used to adjust a plot of the aerial photographs, which, at present, provides the most complete evidence for the course of the enclosure ditch. No evidence of internal features or an entrance has been revealed from either source.

4 Discussion

4.1 The programme of geophysics carried out on defended enclosures in Montgomeryshire during 2007 has provided a useful addition to our knowledge of the sites in question and demonstrates that magnetometer survey is a worthwhile method for the rapid, non-invasive assessment of sites of this type. The soils in this part of the county seem to be generally suited to the method.

4.2 A brief synopsis of the results of the programme of geophysics is provided in the table below. Sites are listed in primary record number (PRN) order.

PRN	NGR	Shape	No of ditches	No of entrances	Area (ha)
3598	SJ 22590205	Sub-rectangular	1-2 for part of circuit	2	0.35
4036	SO 31649278	Sub-square	1	1	0.46
5122	SO 19009493	Sub-ovate	1	4?	0.94
7056	SJ 18480069	Oval	1	?	0.14
7100	SJ 16410911	Quadrilateral	2	1	0.24
7502	SJ 23240528	Hexagonal ?	1	1	0.23
7533	SO 15289700	Sub-circular	2-3 for part of circuit	1	0.68
67485	SJ 22001011	Sub-circular	2	1?	0.67

4.3 Unfortunately, little evidence of settlement has been revealed in the interior of the sites examined, which tends to suggest they had a more pastoral function. This may be due to the rather more slight nature of any possible remains of settlement activity, but it would seem surprising that evidence of thermo-remnant magnetism from fires is effectively lacking.

4.4 The possible pastoral nature of the enclosures is perhaps supported in three cases (PRNs 4036, 5122 and 7502), where ditches appear to have been used to sub-divide the interior. Two of these also have evidence of an external ditch projecting from one side of the single entrance, a feature which would potentially have aided in the collection of stock.

4.5 Most of the sites examined have fairly weak defences, whether due to their poor siting, or as a result of the main defence comprising a single, fairly narrow, ditch. The only cases where the defences are more substantial are PRNs 7533 and 67485. PRN 7533 is set in an upland location and its appearance is rather more suggestive of a site in the hillfort tradition than a defended enclosure. It has fairly wide ditches and is bivallate, with a third ditch acting as an additional defence on its south-west side where the spur on which it has been sited joins a larger area of high ground. On the other hand, PRN 67485 is set in a valley floor location, but its bivallate defences consist of relatively well-preserved banks and ditches, demonstrating that it would have been a significant earthwork when constructed.

5 Overview

5.1 We can now take a broader perspective on what has been achieved in the two seasons of geophysics work in the Severn Valley. Well before Rowan Whimster focussed his aerial photographic research on the upper Severn Valley, which appeared in printed form as *The Emerging Past* in 1989, the region was recognised for the quality and significance of its cropmark enclosures. And it hardly needs to be stressed that the available data has greatly expanded in the two decades that have followed its publication, as became readily apparent in the Trust's survey in 1993 with its report on the *Montgomeryshire Small Enclosures Project*. At the same time it has to be appreciated that quality and quantity do not necessarily run on parallel tracks. For every cropmark site which has been regularly recognised and photographed from the air because the soil and the crop coincide to generate conditions that are consistently sympathetic to the creation of cropmarks, there is probably another site which has been photographed only once or twice, or where only a portion of that site is regularly visible. Whimster (1989, 12) made the point that nearly 60% of the plough-levelled sites that he studied had only been photographed in one season. Short of excavation, geophysical survey is the only other technique which is likely to produce comparable data that will aid the recognition and interpretation of cropmark sites here and elsewhere.

5.2 The adoption of geophysics in 2006/7 was in part, it has to be admitted, a response to the excellent results being obtained on defended enclosures in other parts of the country, but coincided, too, with the Trust's own successful experiment in conducting geophysical surveys on civilian settlements associated with Roman military sites in Powys. It is fair to claim that the transition from Roman forts to native farmsteads has been achieved seamlessly and proved to be a considerable success.

5.3 Twelve sites have now been examined, four in 2006/7 and eight during the current year; a further site, Dol-las, was also surveyed last year but this was by accident rather than design. With the exception of the Little Garth enclosure where no positive results were encountered, the geophysics plots are laid out, though not to a common scale, in Fig 18. As some 235 sites were included in the Montgomeryshire Small Enclosures Project (Silvester and Britnell 1993, 6), this means that around 5% of that total has been examined by geophysics, a small percentage, but nevertheless not insignificant. Collectively certain points emerge.

5.4 Geophysics allows greater precision in the location of cropmarks in the agrarian landscape than can be achieved consistently from aerial plotting, subject of course to the careful establishment of the surveying grid in relation to existing boundaries and other features. Thus the Boxtree Farm enclosure in Guilsfield (PRN 5261) was found, perhaps not surprisingly in view of the fact that Whimster had to plot it from high-level vertical aerial photographs (Hankinson and Silvester 2006, 6), to be mislocated by around 10m.

5.5 Another benefit of the geophysics process is that it permits greater accuracy in determining the line of any ditches, specifically in the more accurate depiction of the morphology. It is the nature of aerial photograph transcription that the transcriber will tend to rationalise the lines of enclosures, smoothing out irregularities and ignoring minor anomalies. Cwm Bach in Berriew (PRN 7057) is certainly more irregular in its outline than the plot allowed.

5.6 In several cases the geophysics has added substantively to the data available for a particular site, and a number of known sites were selected specifically because it had not been possible in the past to create a plan from aerial photographic sources. Tyn-y-coed had a plan of sorts but was targeted because the available aerial photography shows only the ditch terminals of the entrance on one side and a corresponding length of ditch on the other, both of these on the spine of a ridge where the thinner soils had generated parchmarks. The geophysics produced virtually the complete circuit of the enclosure and demonstrated

incidentally and, from our point of view unexpectedly, how the builders had constructed their enclosure on an extremely sharp slope. For Lane House (PRN 5122) the geophysics and aerial photography complement each other, and in combination virtually the whole circuit of this oval enclosure can be determined.

5.7 Perhaps of more importance are Fron Eithin enclosure (PRN 7100) and the Berriew Village enclosure (PRN 7056), for neither of which there were plans. The last of these had been photographed only once as a parchmark in pasture and could not be plotted from the photos because of a lack of control points. It was selected for geophysics for this reason and while it appears that no complete circuit has survived (or perhaps may never have been completed) we now have overall dimensions for the enclosure, an approximate size and, as importantly, a fix in the landscape. Likewise the Fron Eithin enclosure can now be recognised as a small but quite neat double-ditched enclosure where previously it was simply classed as a rectilinear feature. Even more spectacular was Dol-las in Berriew where geophysics converted what had been thought of as a possible cursus, on the basis of the only aerial photography available which had been taken in 2005, into a double-ditched enclosure complete with numerous internal features.

5.8 Not all the outstanding issues have been resolved. Originally Pen-y-lan in Forden (PRN 3598) had not been plotted from aerial photographs because of a lack of control points, but this was rectified in 1998. The missing return of the enclosure ditch on the south-east has not been clarified by the geophysics, although some of the anomalies appear to indicate that the original hypothesis in 1993, that it was marked by a hollow beside the field boundary, is incorrect. New information was gleaned for the layout of Cefnybryn (PRN 7533) but the problematic absence of evidence for the northern defences proved intractable because of heavy vegetation on the steep slope.

5.9 Where geophysics has not been particularly successful is in distinguishing clear evidence of the internal structures that must have occupied many of these enclosures. Even in the single earthwork that was surveyed where better preservation might be anticipated – Little Garth at Guisfield – there was no trace of any internal activity, while the Bagbury II enclosure (PRN 4036) which was selected in anticipation of recovering the internal plan of a small, unsophisticated enclosure, failed to yield convincing results. Where traces do appear to have registered such as the rectangular structure within the Boxtree Farm enclosure, or something similar within the Pen-y-gelli enclosure in Kerry (PRN 3649) these are not particularly distinctive. Dol-las remains the exception, but this is mainly due to the fact that the internal features recorded at that site comprise a series of linear gullies, which are more readily identified by this type of survey.

5.10 The lack of detailed evidence regarding internal features, such as hearths, is likely to be a function of the intervals used between readings being too great. Judgements had to be made during any survey of the length of time available for its completion and the potential returns that might be forthcoming. Generally, the emphasis of the survey work to date has been on defining and amplifying the outlines of the enclosures and positioning them in their landscapes. The area covered by a single reading is 1m by 0.5m, and the evidence for small features, such as post-holes, is unlikely to be recovered or recognised. Greater definition would require four times as many readings for a given area, with obvious implications on the time-span of the survey. Building on this it would arguably be a better use of resources to target areas of obvious potential that have been signalled in surveys of a lower resolution.

5.11 Overall, geophysics has proved to be an extremely useful tool in the assessment of later Iron Age and Romano-British cropmark enclosures in the Severn Valley region. While the cost of examining all known enclosures in this way would be prohibitive, its value for answering specific questions cannot be questioned.

6 Acknowledgements

6.1 The writer would like to thank his colleagues, Ian Grant, Wendy Owen, Jeff Spencer and David Bull for their assistance with individual surveys; to Bob Silvester who contributed the overview; and also local high school students Adelaide Edwards, Elizabeth Richardson and Sian Spears, for their help with the survey at Guilsfield and Claudia Whitby-Tillott for her help with the survey at Cyfronydd.

6.2 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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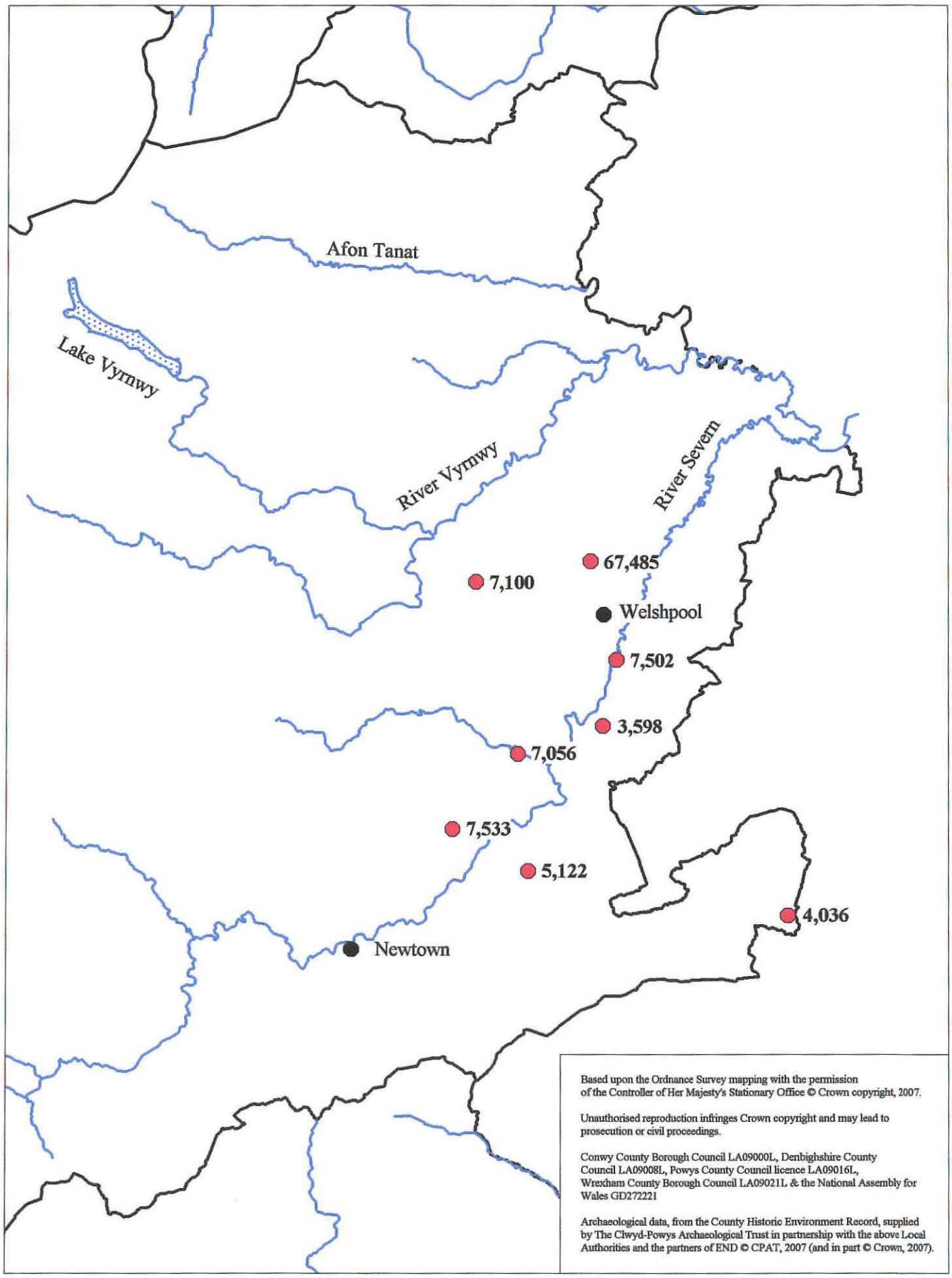


Fig 1 Distribution of sites examined by geophysics in eastern Montgomeryshire in 2007 Scale 1:250,000

Fig 2 Geophysics results at the Fron Eithin Enclosure (PRN 7100) Scale 1:1,000

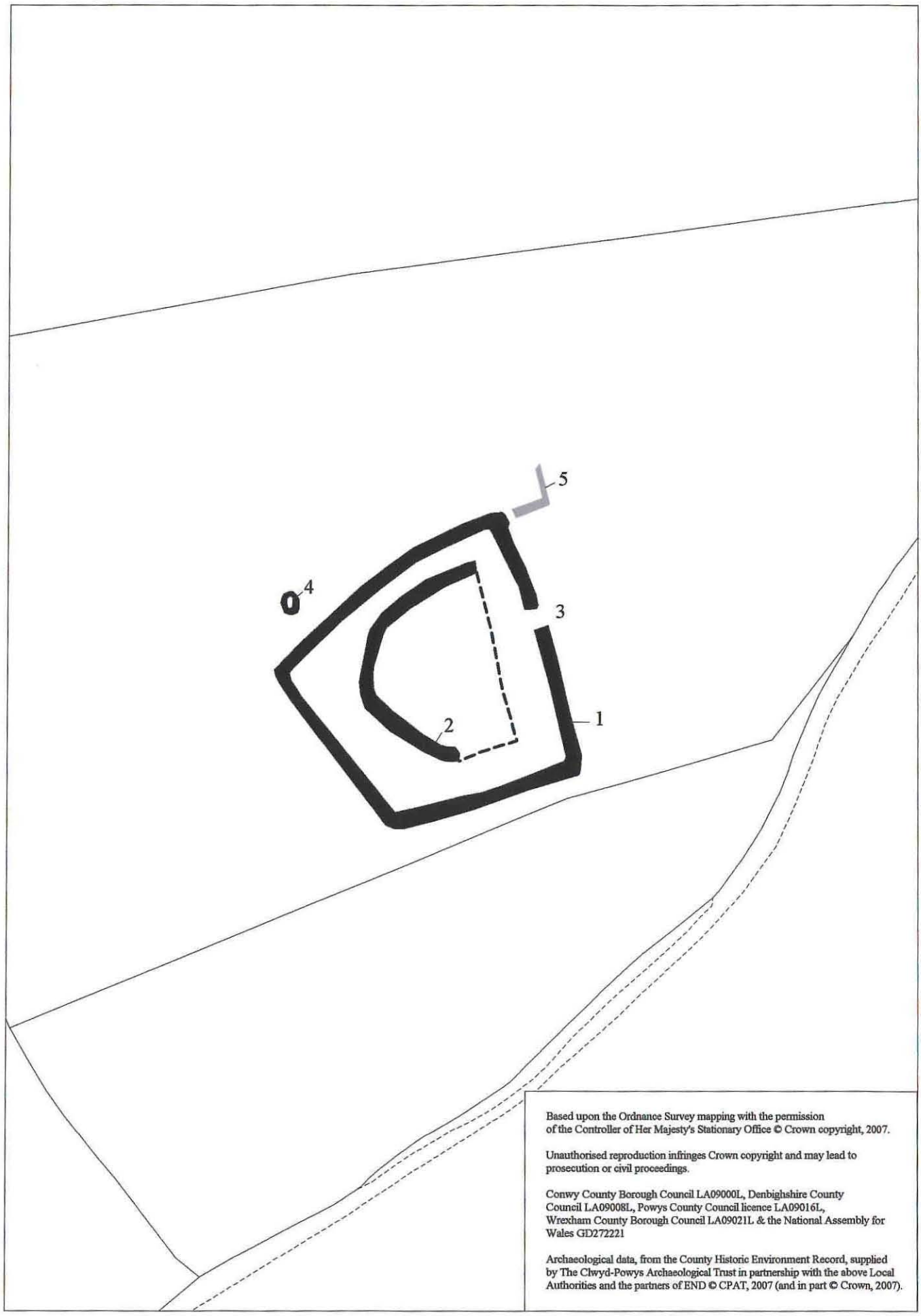


Fig 3 Interpretation of the geophysics results at the Fron Eithin Enclosure (PRN 7100) Scale 1:1,000

Fig 4 Geophysics results at the Pen-y-lan Enclosure (PRN 3598) Scale 1:1,000

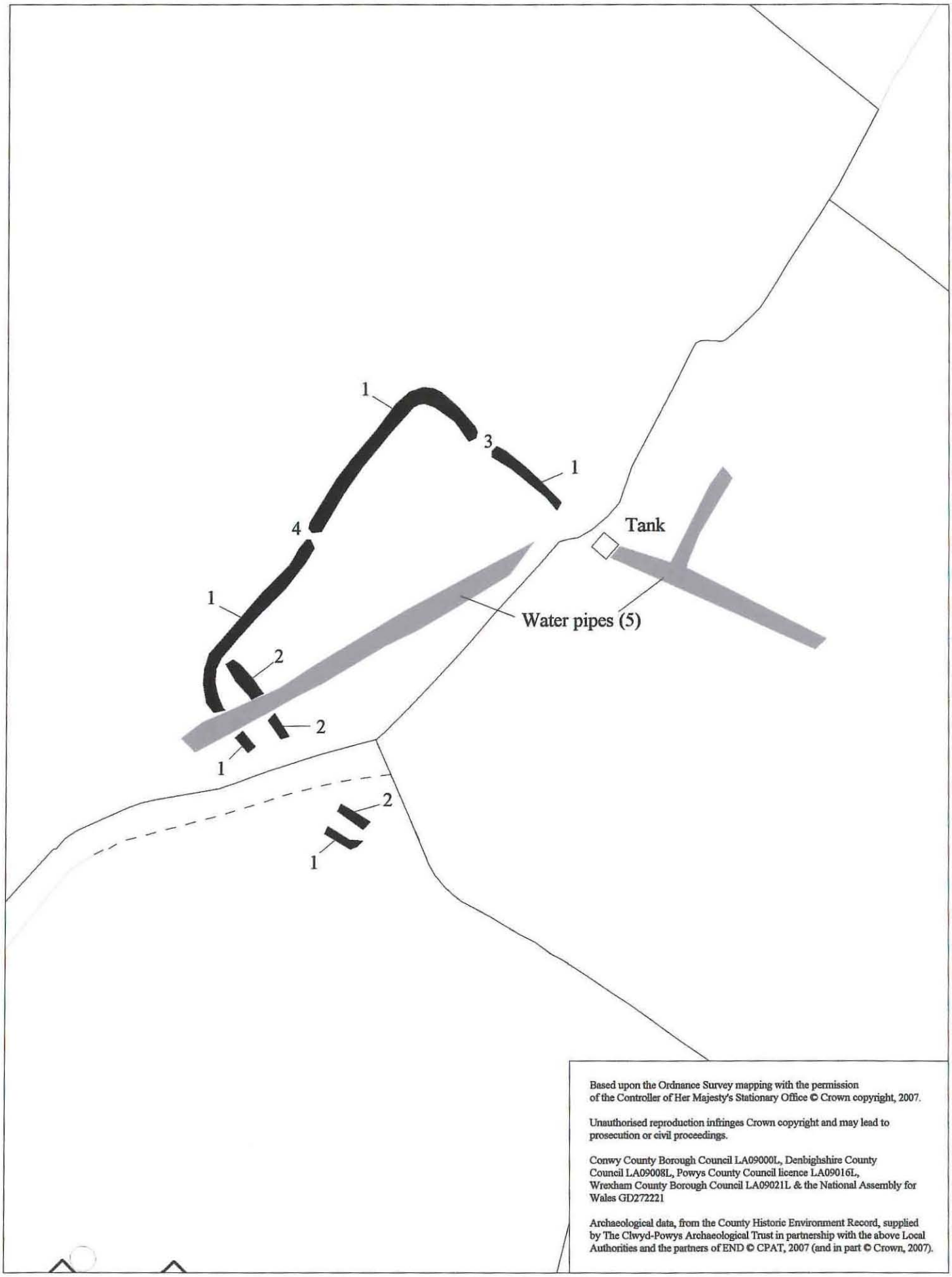


Fig 5 Interpretation of the geophysics results at the Pen-y-lan Enclosure (PRN 3598) Scale 1:1,000

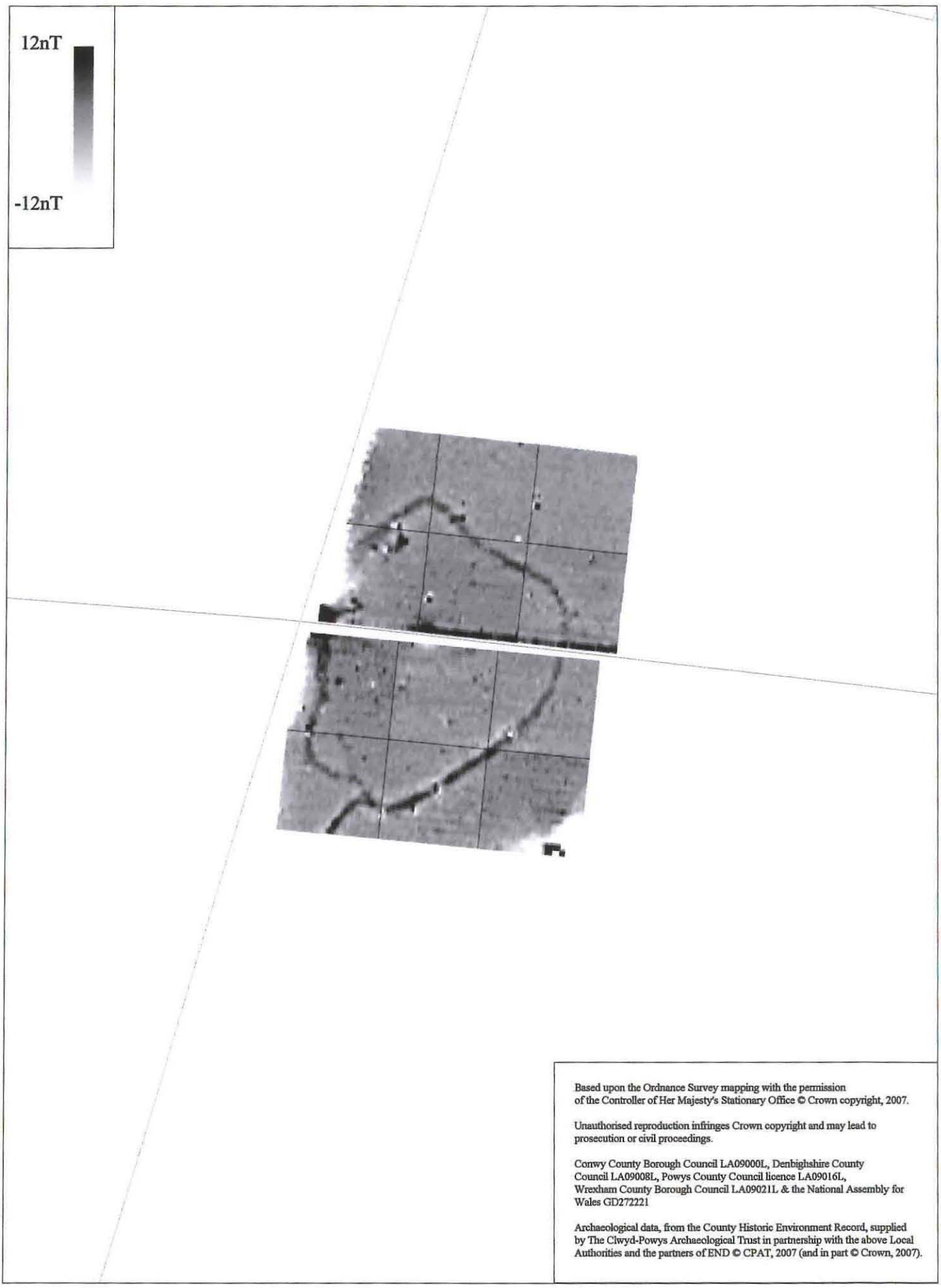


Fig 6 Geophysics results at the Gwyn's Barn enclosure (PRN 7502) Scale 1:1,000

Fig 7 Interpretation of the geophysics results at the Gwyn's Barn enclosure (PRN 7502) Scale 1:1,000

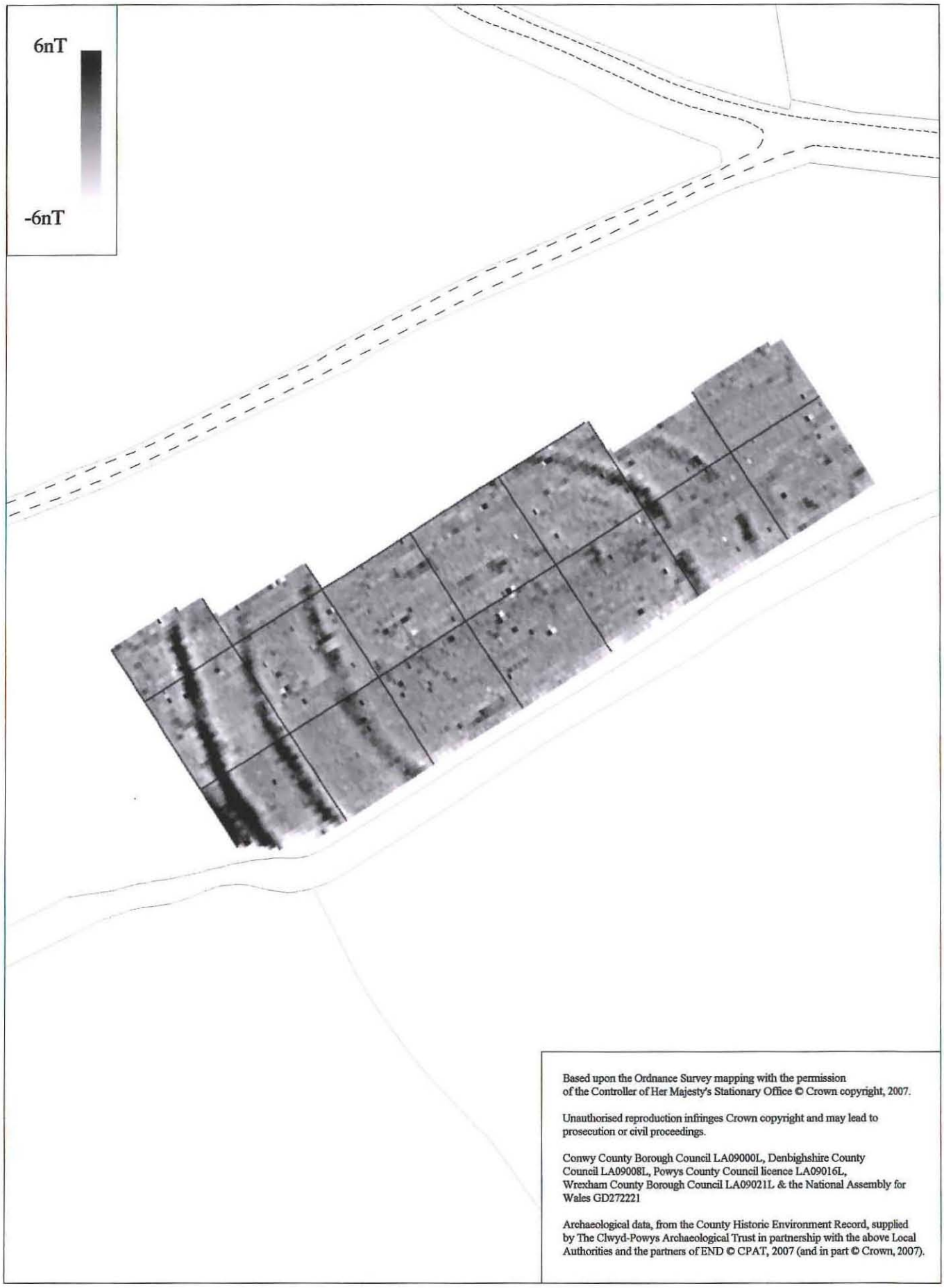


Fig 8 Geophysics results at the Cefnybryn Enclosure (PRN 7533) Scale 1:1,000

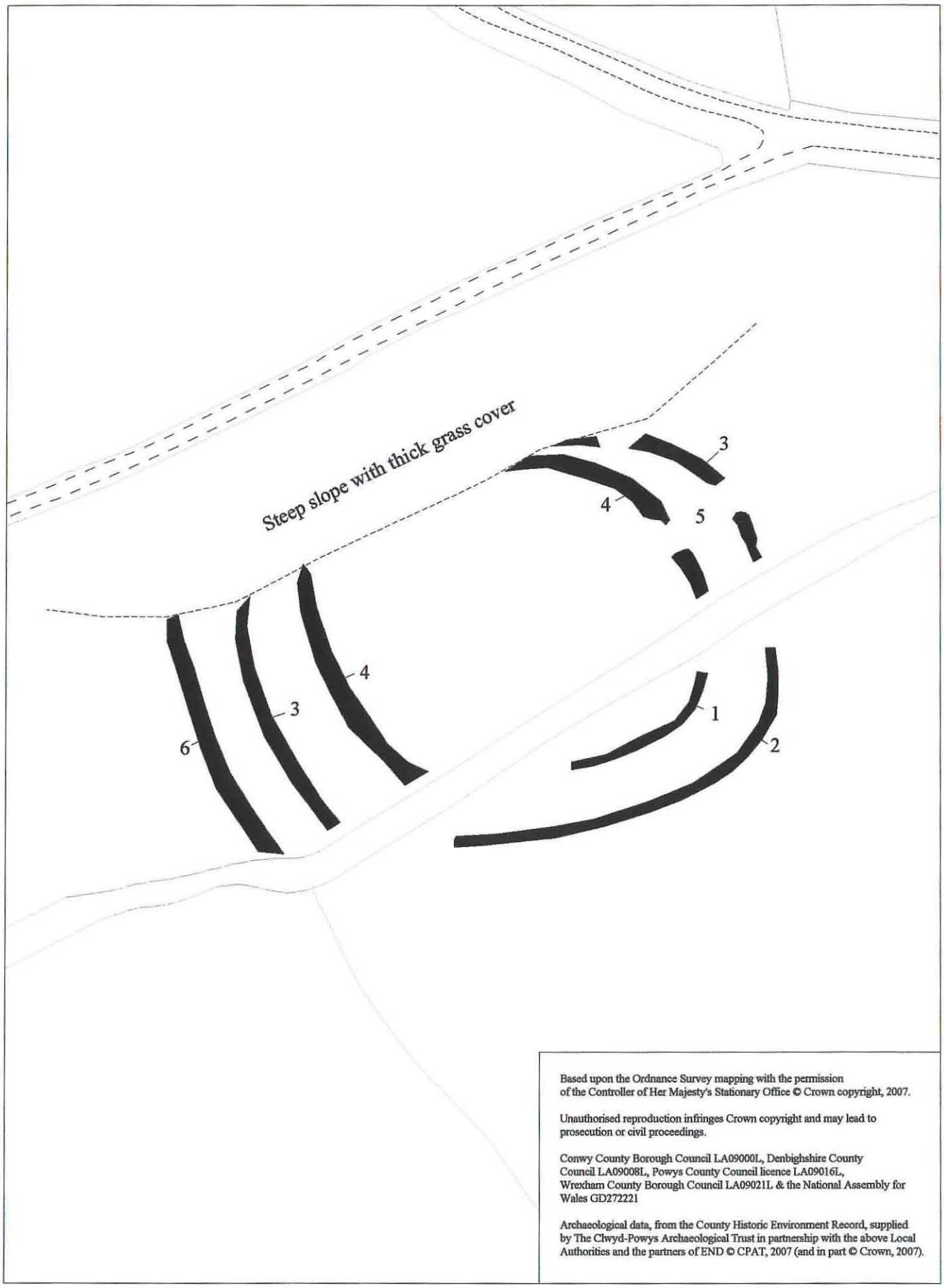


Fig 9 Interpretation of the geophysics results at the Cefnybryn Enclosure (PRN 7533) Scale 1:1,000

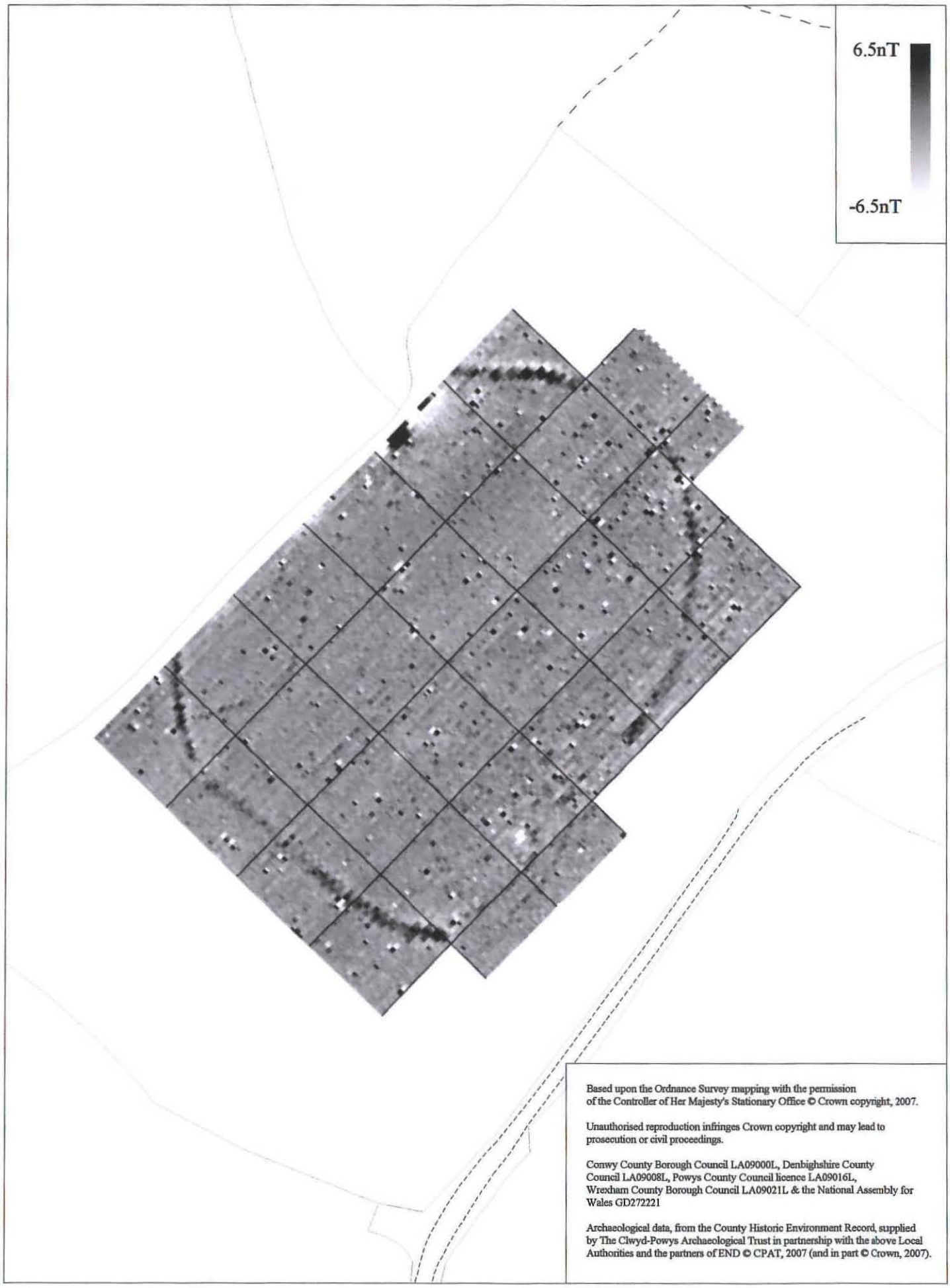


Fig 10 Geophysics results at the Lane House enclosure (PRN 5122) Scale 1:1,000

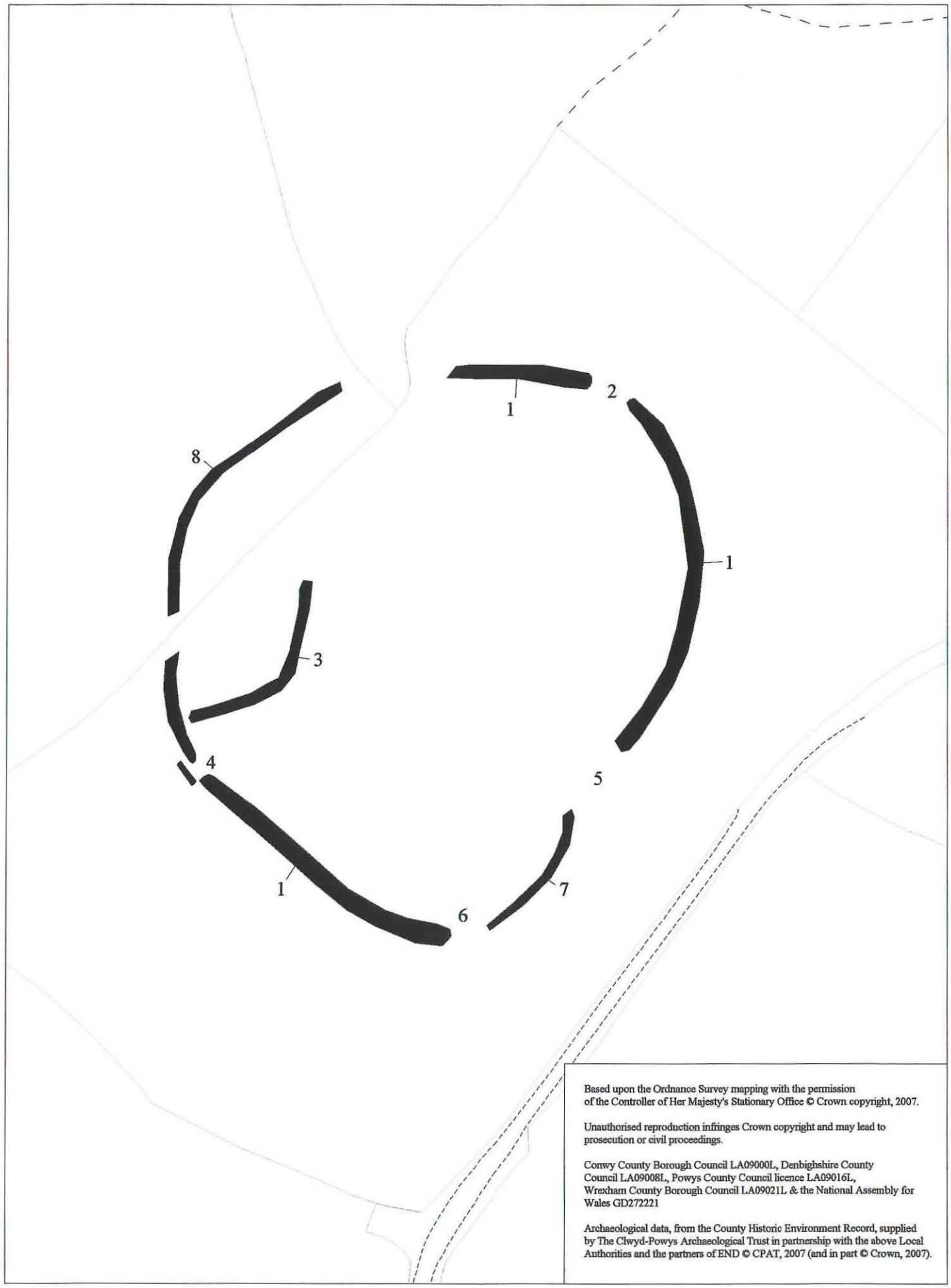


Fig 11 Interpretation of the geophysics results at the Lane House enclosure (PRN 5122) Scale 1:1,000

Fig 12 Geophysics results at the Bagbury enclosure II (PRN 4036) Scale 1:1,000

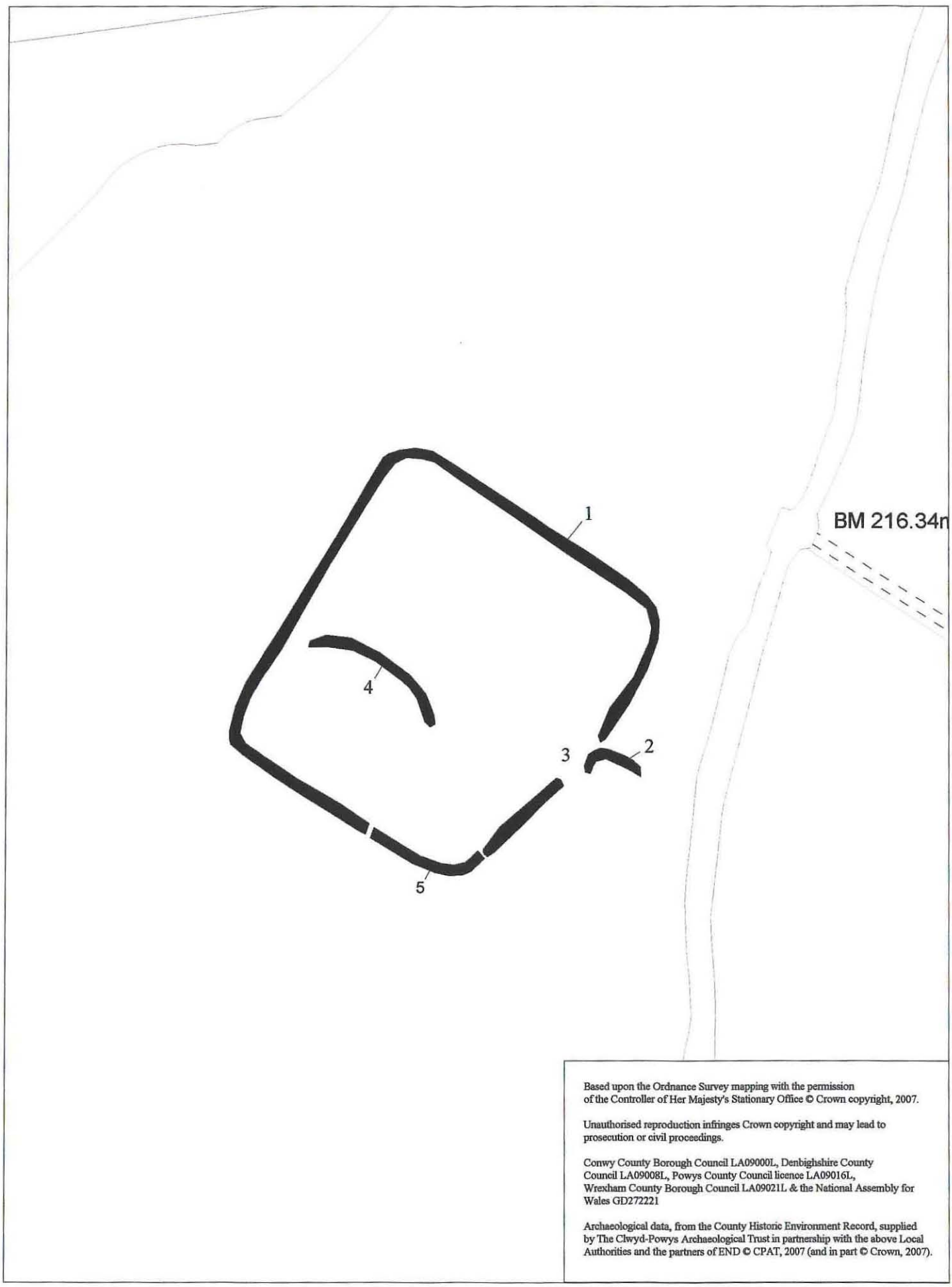


Fig 13 Interpretation of the geophysics results at the Bagbury enclosure II (PRN 4036) Scale 1:1,000

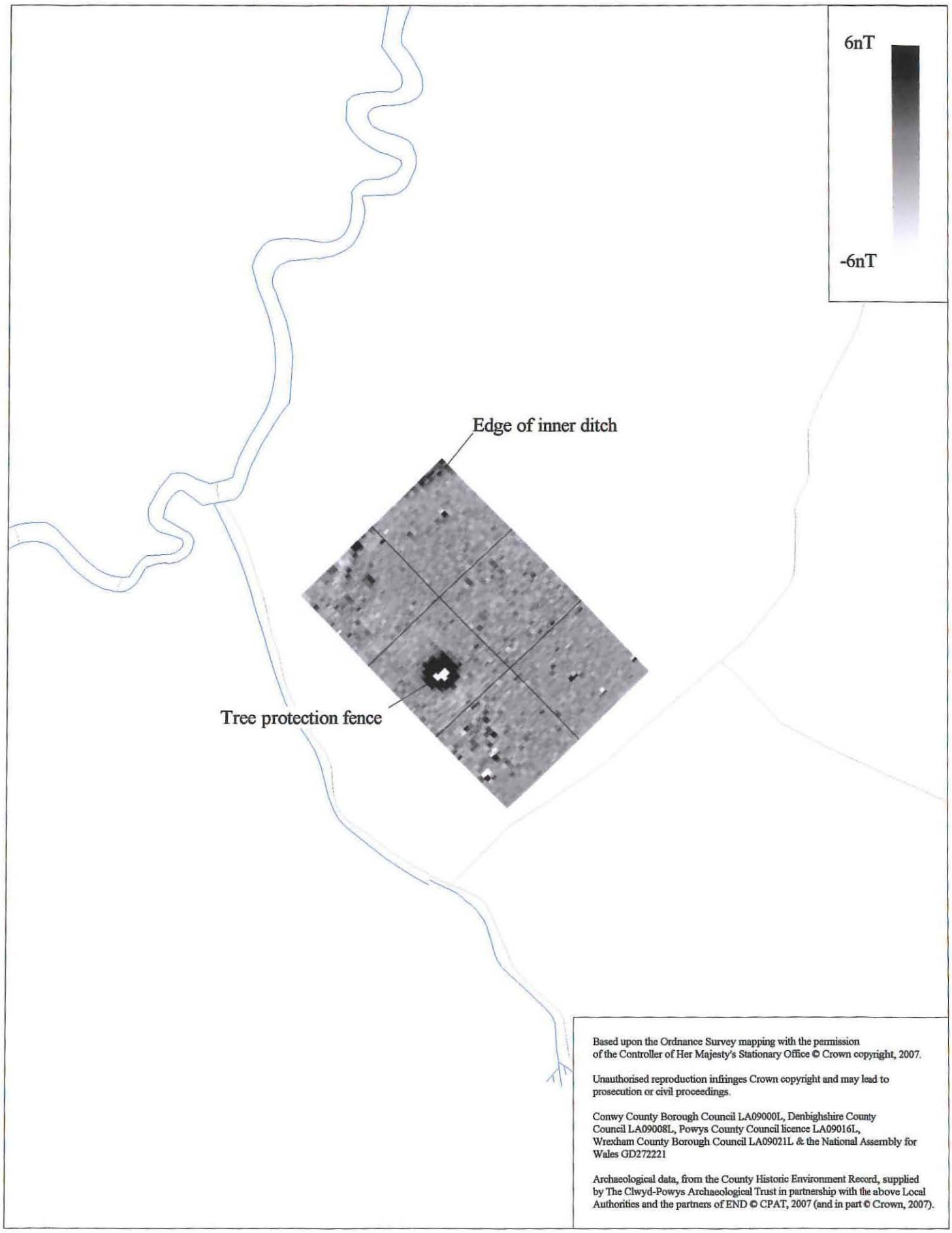


Fig 14 Geophysics results at the Little Garth enclosure (PRN 67485) Scale 1:1,000

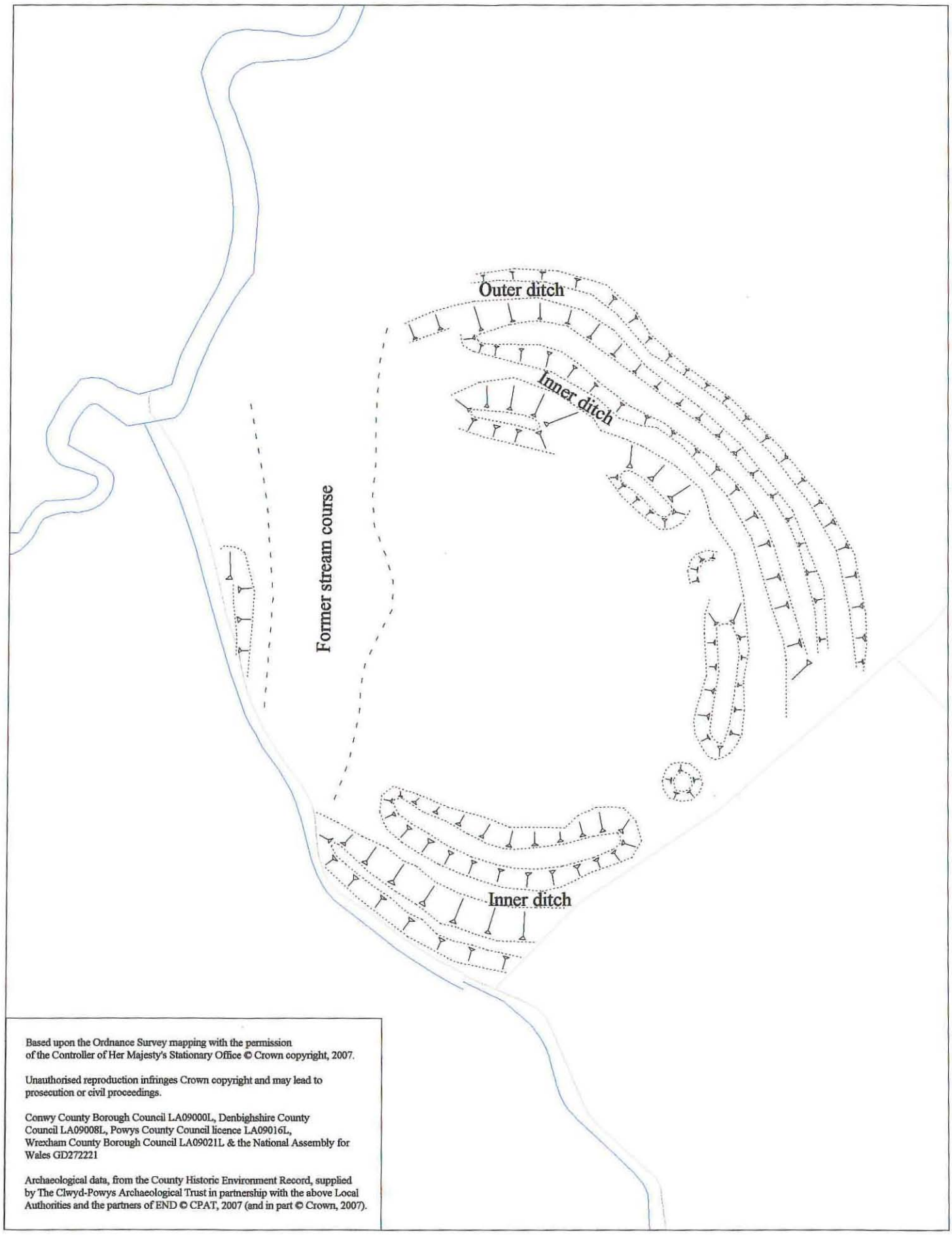
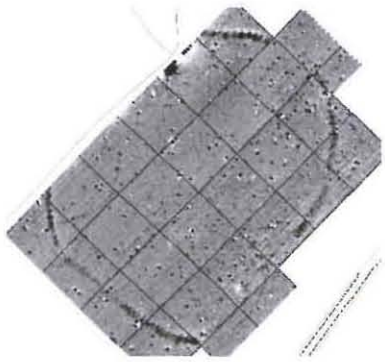


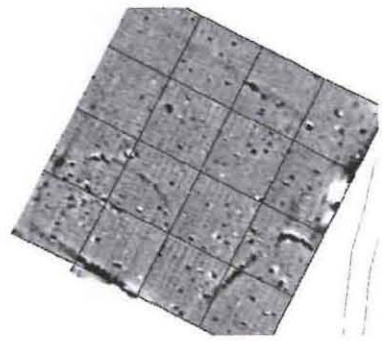
Fig 15 Topographic survey of the Little Garth enclosure (PRN 67485) Scale 1:500

Fig 16 Geophysics results at the Berriew Enclosure (PRN 7056) Scale 1:1,000

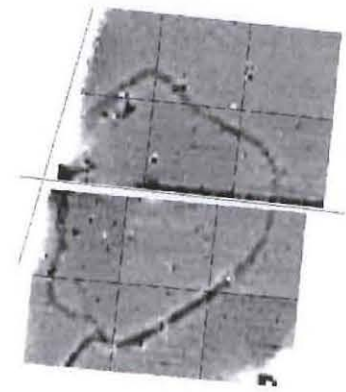
Fig 17 Interpretation of the geophysics results at the Berriew Enclosure (PRN 7056) Scale 1:1,000



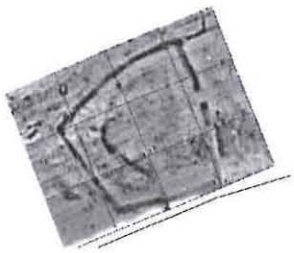
Lane House, Llandyssil



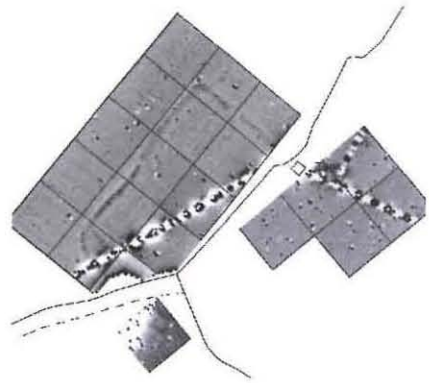
Bagbury II, Churchstoke



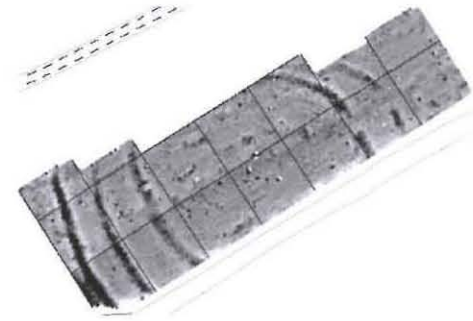
Gwyn's Barn, Leighton



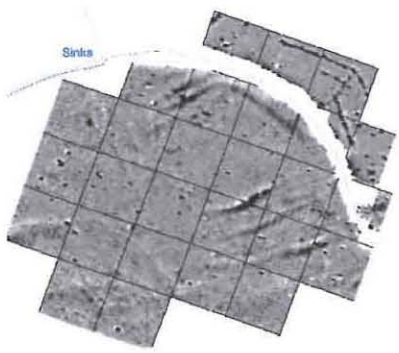
Fron Eithin, , Cyffronydd



Pen-y-lan, Forden

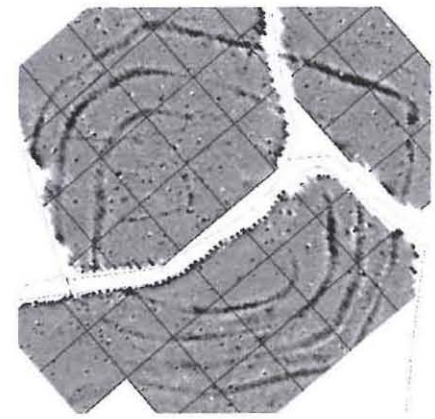


Cefnybryn, Bettws Cedewain

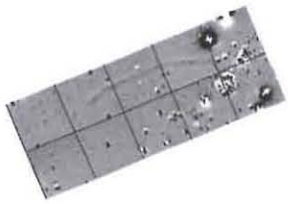


Boxtree Farm, Guisfield

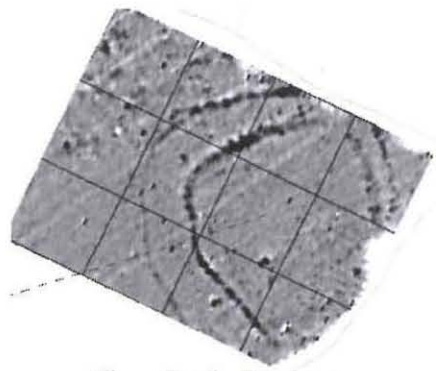
Tyn-y-coed, Berriew



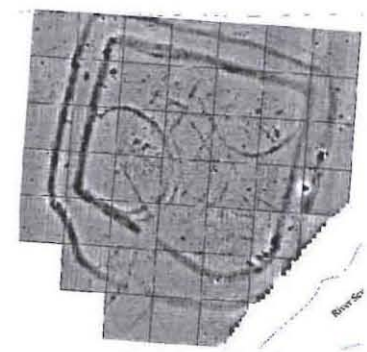
Pen-y-gelli, Kerry



Berriew village, Berriew



Cwm Bach, Berriew



Dol-las, Berriew

Fig 18 Surveyed enclosures in 2006 and 2007, except for Little Garth, Guilsfield. Not to a common scale, but each is defined by its 20m survey grids