

**CRUGIAU CEMMAES
NEVERN
PEMBROKESHIRE**

**GEOPHYSICAL & TOPOGRAPHICAL
SURVEY
2010**



Prepared by Dyfed Archaeological Trust
For CADW and PCNRA



ymddiriedolaeth archaeolegol



archaeological trust

DYFED ARCHAEOLOGICAL TRUST

RHIF YR ADRODDIAD / REPORT NO. 2010/22
RHIF Y PROSIECT / PROJECT RECORD NO. 99149

Mawrth 2010
March 2010

CRUGIAU CEMMAS, NEVERN GEOPHYSICAL & TOPOGRAPHICAL SURVEY 2010

Gan / By

PHILIP POUCHER & MIKE INGS

Paratowyd yr adroddiad yma at ddefnydd y cwsmer yn unig. Ni dderbynnir cyfrifoldeb gan Ymddiriedolaeth Archaeolegol Dyfed Cyf am ei ddefnyddio gan unrhyw berson na phersonau eraill a fydd yn ei ddarllen neu ddibynnu ar y gwybodaeth y mae'n ei gynnwys

The report has been prepared for the specific use of the client. Dyfed Archaeological Trust Limited can accept no responsibility for its use by any other person or persons who may read it or rely on the information it contains.



Ymddiriedolaeth Archaeolegol Dyfed Cyf
Neuadd y Sir, Stryd Caerfyrddin, Llandeilo, Sir
Gaerfyrddin SA19 6AF
Ffon: Ymholiadau Cyffredinol 01558 823121
Adran Rheoli Treftadaeth 01558 823131
Ffacs: 01558 823133
Ebost: info@dyfedarchaeology.org.uk
Gwefan: www.archaeolegdyfed.org.uk

Dyfed Archaeological Trust Limited
The Shire Hall, Carmarthen Street, Llandeilo,
Carmarthenshire SA19 6AF
Tel: General Enquiries 01558 823121
Heritage Management Section 01558 823131
Fax: 01558 823133
Email: info@dyfedarchaeology.org.uk
Website: www.dyfedarchaeology.org.uk

Cwmni cyfyngedig (1198990) ynghyd ag elusen gofrestredig (504616) yw'r Ymddiriedolaeth. The Trust is both a Limited Company (No. 1198990) and a Registered Charity (No. 504616)

CADEIRYDD CHAIRMAN: C R MUSSON MBE B Arch FSA MIFA. CYFARWYDDWR DIRECTOR: K MURPHY BA MIFA

**CRUGIAU CEMMAES, NEVERN, PEMBROKESHIRE
GEOPHYSICAL & TOPOGRAPHICAL SURVEY 2010**

CONTENTS	PAGE
Summary	1
Introduction	2
- Project Commission	
- Scope of the Project	
- Report Outline	
- Abbreviations	
The site	3
- Location and archaeological potential	
METHODOLOGY	3
RESULTS	4
- Limitations	
- Processing and presentation	
- Geophysical interpretation	
CONCLUSIONS	9
Acknowledgements	10
Archive Deposition	10
Sources	10
ILLUSTRATIONS	11
Figure 1: Location map	12
Figure 2: Processed geophysical survey results from both 2009 and 2010	15
Figure 3: Processed geophysical survey results from 2009 including interpretation	16
Figure 4: Processed geophysical survey results from both 2009 and 2010, including interpretation of 2010 results	17
Figure 5: Simplified interpretation highlighting the main features identified by their PRNs	18
Figure 6: Contour survey overlaid with the main identified features. Contours at 0.25m intervals	19
Photo 1: Aerial view, 1981	13
Photo 2: Aerial view, 1981, with interpretation	13
Photo 3: Aerial view 2006	14
APPENDIX 1 – GEOPHYSICAL SURVEY REPORT 2009	
APPENDIX 2 – METHODOLOGY AND INSTRUMENTATION	

SUMMARY

In March 2009 Cadw and the Pembrokeshire Coast National Park Authority commissioned Dyfed Archaeological Trust to undertake a geophysical survey in two fields on either side of a Bronze Age barrow cemetery known as Cregiau Cemmaes, near Nevern, Pembrokeshire. This survey revealed the partial remains of a ditched enclosure and a 'banjo' enclosure. The following year Cadw and the Pembrokeshire Coast National Park Authority commissioned Dyfed Archaeological Trust to extend the geophysical survey into fields to the north and undertake a topographical survey of the whole site. This fieldwork was undertaken in March 2010.

The surveys revealed a complex arrangement of large banked- and ditched-enclosures around two neighbouring summits, with suggestions of smaller enclosures within surrounding clusters of Bronze Age round barrows.

The southern enclosure revealed during the 2009 survey encloses two round barrows and the 'banjo' enclosure. Several internal features are also visible both within the larger outer enclosure and the 'banjo' enclosure.

The northern enclosure surrounds one known round barrow and two further possible round barrows. These internal round barrows may also be surrounded by smaller enclosures. A series of internal features within the enclosure was also revealed.

A series of three further round barrows were recorded to the north, surrounded by an unusual complex of features.

INTRODUCTION

Project commission

Cadw, with assistance from Pembrokeshire Coast National Park Authority, commissioned Dyfed Archaeological Trust to undertake a geophysical survey on the fields to the north and east of part of the barrow cemetery known as Crugiau Cemmaes (SAM PE197, PRN 1141), near Nevern, Pembrokeshire (centred on SN 12504160) in 2010, following on from a geophysical survey undertaken in 2009 which revealed extensive and partially unknown archaeological features (DAT Report No 2009/36). A topographical survey was also undertaken across all fields during 2010. The fieldwork was undertaken in March 2010.

Scope of the project

The project was designed to detect archaeological features within the study area by geophysical survey, using a gradiometer, and record topographical features using a Trimble TST.

Report outline

Because of the limited nature of this project, together with the considerable archaeological evidence in the area, this report is restricted solely to the results of the geophysical survey.

Abbreviations

Sites recorded on the Regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). Gradiometer readings are measured in nanoTesla (nT). Some sites have also been registered as a Scheduled Ancient Monument (SAM).

THE SITE

Location and Archaeological Potential

Crugiau Cemmaes barrow cemetery (SAM PE197, PRN 1141) lies 4.5km northeast of Nevern just to the north of the B4582 and 7.0km southwest of Cardigan (SN 12534263). The barrow cemetery consists of several barrows clustered over two adjacent high points, with further barrows recorded in surrounding fields but no longer visible. The southern two barrows, between the two fields (Fields 1 & 2, see Fig. 5) surveyed in 2009, are on a prominent ridge, nearly 200m above sea level, with open views in all directions. The barrows are within a fenced-off corridor allowing public access. Between the two barrows there is a rectangular water reservoir. To the north two further barrows (PRNs 1143-44) are visible occupying an adjacent ridge with open panoramic views, one lying within a hedge-bank (between fields 4 & 5) with the denuded remains of the other lying within the field to the east (field 5).

The tithe map of c.1845 shows the field boundaries similar to those that exist today; no barrows are marked on the map. The Ordnance Survey map of 1891 illustrates the same boundaries but in more detail, plus the barrows. An aerial photograph taken in 1981 (Photos. 1 and 2) indicates a major ditch just to the west of barrows 1142, 1231, with a further ditch with an apparent in-turned entrance further westward, while around the steep slope in the corner of field 1 there appears to be part of a smaller double ditch enclosure. More recent aerial photographs by Toby Driver of the RCAHMW (Photo. 3) has shown a curving double-ditched boundary in a field to the north-west (field 4), with the distinctive curving hedgerow forming part of the outer line of this boundary. Further features are also suggested extending to the northwest of this double-ditch boundary.

The field to the west (field 1), now under pasture, has been cultivated for some time and has slightly encroached into the bases of the barrows where some stone from the edges of these have been disturbed. The All Wales Ploughing Championship was held in this field in 2007 (pers. comm. P Groom): this may explain the prominent plough marks recorded in this geophysical survey. As the land drops away to the east further plough marks are evident on the survey results, which may suggest why some barrows in this area are no longer visible.

The underlying geology is Ordovician sedimentary shale (British Geological Survey 1994) with dark brown humic topsoil.

METHODOLOGY

A fluxgate gradiometer was used for the survey, which detects variations in the earth's magnetic field (full specifications are in Appendix 2). In the central northern field readings were taken on traverses 0.5m wide and every 0.25m along within a 20m x 20m grid, in the remaining fields readings were taken on traverses 1m wide every 0.25m along. In total an area of c.15ha was surveyed. A Trimble TST was used for the topographical survey.

RESULTS

Limitations

The 2010 surveys were undertaken over a total of 5 days in March. Weather conditions were fine and generally dry with the occasional brief shower. The fields were low pasture bounded by post and wire fencing supplementing hedge banks; the wire may have obscured some of the readings taken in their immediate vicinity. A fallen post and wire fence lay across the site in the northern field, visible on the geophysical survey results. The sloping ground to the east may have caused some small variations in data collection. However, pacing lines were used throughout the survey and any variations in the data collections are likely to have been small.

Within the previous survey pipelines connected with the reservoir, wire fences and some ferrous detritus may have caused significant anomalies. Ploughing activity in the western field is also likely to have masked some features and this also appears to have been the case on lower ground to the east.

The underlying geology of Ordovician sedimentary shale (British Geological Survey 1994) with dark brown humic topsoil did not appear to cause any geological distortions of the geophysical survey results.

Processing and presentation

Processing was performed using *ArchaeoSurveyor 2*, detailed explanation of the processes involved are described in Appendix 2. The data is presented with a minimum of processing but the presence of high values caused by ferrous objects and wire fencing tends to hide fine details and obscure archaeological features, thus the values were 'clipped' to a range from 15nT to -15nT to remove the extreme values allowing the finer details to show through. During the survey various processes such as changes to instrument set-up, instrument drift, variations in orientation amongst others cause directional effects that are inherent to magnetometers that can produce 'striping' in the processed data, thus much of the survey was 'destriped'.

The processed data is presented as grey-scale plots overlaid on local topographical features (Fig.2). The main magnetic anomalies have been identified and plotted onto the grey-scale plots as a level of interpretation (Fig. 3 & 4). A simplified interpretation is also provided highlighting the main sites (Fig.5). The topographical survey is presented overlaid by the main archaeological features (Fig.6).

Field numbers refer to fields labelled in figure 5.

All measurements given are approximate as accurate measurements are difficult to determine from fluxgate gradiometer surveys. The width and length of identified feature can be affected by its relative depth and magnetic strength.

The previous geophysical survey results report (DAT Report No. 2009/36) is included to the rear, see Appendix 1, although the results of that survey are included in this report.

Geophysical interpretation

(Results Figs. 2 to 6)

The geophysical survey shows a complex range of archaeological activity throughout the surveyed area, therefore only the major features are discussed. Any interpretation from these geophysical results is by its nature speculative and precise details about the context, function, state of preservation and date of any archaeological features would require further intrusive investigation.

PRN 1237

This feature, visible in the 1981 aerial photograph, was clearly identified on the 2009 geophysical survey results (Fig. 3; features 4-6) within field 1. This consisted of a curving bank and external ditch running along the top of a break-of-slope, with an apparent in-turned entrance. There were vague suggestions of features within this enclosure, but they were obscured by the ploughing marks evident throughout this field. The line of this enclosure appears to fade to the north as it approaches a small blind valley and the enclosure ditch for feature PRN 99385, therefore the relationship between the two is not clear. At this point there is possibly a broader ditch (Fig. 3; 8) cutting north-south across the small valley and up either slope. However, this feature is not that distinct and could possibly be natural. Just to the east of this there is possibly a small ditch (Fig. 3; 9), running up the southern edge of this blind valley, but this alignment is the same as the plough-marks and therefore could be misleading.

There is no clear evidence of a continuation of this enclosure bank and ditch to the east as the line of the bank and ditch appears to either fade or become amalgamated with or obscured by that of feature PRN 99385, whilst to the south the line of the ditch extends beyond the area surveyed, possibly into fields to the south. It is however possible that some of the features visible in the easternmost field may be related such as the unusual arrangement of ditches (Fig. 4; 46) in the easternmost field (field 3).

PRNs 1142 & 1231

To the east of the bank and ditch forming the boundary of PRN 1237 lies a curving ditch clearly visible on the 1981 aerial photograph. The ditch lies just to the west of the barrows (PRNs 1142 & 1231) and reservoir, and is clearly visible on the 2009 geophysical survey. This ditch produced a strong response in a number of places especially near the southern barrow and it is therefore likely that the fill of this ditch contains heat-affected material. Adjacent to the east side there is a negative response (Fig. 3; 2), possibly the remains of a bank. Between this ditch (Fig. 3; 1) and bank (Fig. 3; 2) and the southern barrow there is a very strong response, possibly a hearth (Fig. 3; 3).

This ditch may be associated with the curving boundary ditch c.50m further west (PRN 1237) but it also appears to partially enclose the prominent ridge upon which the two barrows sit.

PRN 99386

Within the field immediately to the east of the barrows (field 2) the 2009 geophysical survey identified a ditched enclosure, also called a 'banjo' enclosure on account of its shape. The following description is taken from the 2009 report;

There is a ditch (21), possibly with an internal bank (22), forming an oval, with a ditched entranceway (23). It is likely that this is an Iron Age defended enclosure. It is positioned within the landscape, adjacent to the barrows, on fairly level ground except for the north-western part, which is much higher with a steep slope.

Running east-west and joining the west side of the enclosure ditch there is a linear feature (24); unfortunately this is on the same alignment as some plough marks but appears to consist of a ditch with at least part of a bank on its northern side. Adjacent to where this linear feature meets a modern pipeline (37) there is a negative, (bank?), rectangular or square anomaly (25). However, the shape of this may be influenced by the plough marks and the pipe trench and given the slope it may represent a natural outcrop. Close by this square anomaly (25), there is a small arc (26), but it is uncertain as to whether this is an archaeological feature.

Inside the enclosure ditch (21) there is a linear feature (27), possibly three sides of a square feature. In the centre of this there appears to be a pit (28). This is an unusual feature and could represent an Iron Age shrine, an early medieval special grave, or a building or ditch of earlier or later periods.

There may be a similar square feature (29) some 40m further west, although this is less well defined.

The features listed below are tentative at best due to the striping caused by ploughing: There are at least two circular ditches (30 and 31) and a possible third (32). Also within the enclosure (21) there are three apparent large arcs (33, 34, 35).

PRN 99385

To the north of barrows PRN 1142 & 1231 the 2009 geophysical survey identified a continuous outer ditch (Fig. 3; 10) around the slope, with a bank (Fig. 3; 11) along its straighter (southern) edge. There also appeared to be an inner ditch (Fig. 3; 12) on the west side of the slope. These features were visible on aerial photographs of 1981 within field 1.

In the field to the east of the barrows PRN 1142 & 1231 (field 2) the boundary ditch appears to continue (Fig. 3; 18) in a straight line throughout the length of the field. There is another linear ditch (Fig. 3; 19) adjoining the north site of the inner ditch (Fig. 3; 18), this may just be associated with an earlier roadside hedge bank, but is more likely to be contemporaneous with some of the other geophysical anomalies and may align with linear anomalies visible to the north (Fig. 4; 41). The geophysical survey also revealed a similar ditch and bank (Fig. 3; 16 and 17) to those in field 1; these could be a continuation of 10 and 11, although if so there must be a dogleg between the two lengths of bank and ditch around the location of the current hedge-bank. It would appear that the eastern terminal of the ditch (Fig. 3; 16) and bank (Fig. 3; 17) respects that of the inner ditch (18), and is therefore likely to be a later development.

To the north the double ditch (Fig. 3; 10 & 11) is shown to continue (Fig. 4; 50) into field 4 on recent aerial photographs (Photo 3). The double ditched boundary continues north for c.60m before turning to the east. The line of the outer ditch is preserved in the curving northern field boundary. As the ditches reach the field boundary to the east they meet a round barrow (PRN 1143) beyond which there is a complex of features within field 5. The outer ditch turns to the south, around the visible earthwork remains of the barrow, but stops short of the road that cuts through the larger feature. This line of ditch appears to be accompanied on its inner (south-western) side by a bank (Fig. 4; 36). At the point where the ditch turns south there is also a continuation of the ditch to the east (Fig. 4; 37). From here it runs in an ESE direction, with a slight kink as it appears to respect PRN 99278, and continues with a gradual southward curve running down the slope as

it approaches field 3. It extends for another *c.*23m into field 3 before appearing to terminate. Remnants of an internal bank appear at various points along this length. After a gap of a *c.*13m the ditch and internal bank appear to continue running south with a slight westward curve (Fig. 4; 45). This gap may serve as an entranceway, through which runs two negative linear features (Fig. 4; 47) that may represent evidence of a bank or trackway. The eastern arrangement of boundary ditches appears confused in this area. If the ditch and bank (Fig. 4; 45) to the south does represent a continuation than it does not readily appear to join up with the boundary ditch identified in the 2009 survey (Fig. 3; 18) in field 2. It may be possible that this line of ditch (Fig. 3; 18) curves around to meet up with the ditch and bank (Fig.3; 37) at this possible entranceway but that the relationship between the two is obscured by the modern road cutting and linear feature (Fig. 4; 47), however the similarity in appearance between 37 and 45 would suggest these two sections of ditch and bank are related and may form part of a complex entranceway arrangement.

At the southern end of ditch and bank 45 there is a continuation of a ditch running in a south-easterly direction, before turning sharply to the southwest (Fig. 4; 46), with suggestions of a slight inner bank in places. Its spatial relationship to 45 may suggest a connection although the alignment is unusual. This alignment does however appear similar to a section of ditch (Fig.3; 19) identified in the 2009 survey in field 2 although a relationship cannot be proved from the survey results. The general dimensions and magnetic response of this ditch (Fig. 4; 46) also appears similar to that of the boundary ditch (Fig. 3; 21) defining the nearby 'banjo' enclosure (PRN 99386) that may also suggest a relationship between these features.

Internally several features appear to be enclosed by this boundary ditch (10, 18 & 37). To the west the 2009 survey appeared to identify one definite curved gully (Fig. 3; 13) in field 1, possibly part of a ring ditch for a roundhouse or barrow and as previously mentioned a ditch section (Fig. 3; 19) in field 2 may also identify an internal feature. A pit is apparent close to the intersection of boundary ditches 36 & 37 in field 5. To the north of the road several linear features, possibly ditches (Fig. 4; 41), have been identified within the main boundary ditch (Fig. 4; 37) of PRN 99385 within field 5. Those aligned WNW – ESE run parallel to the road, and parallel to a 2nd ditch line *c.*30m to the north adjacent to the round barrow PRN 1144. There is a suggestion these features respect the line of a now abandoned field boundary (Fig. 4; 44) to the east and may represent a series of smaller field enclosures. To the west they intersect with a ditch running NE-SW alongside the current field boundary. A second short section of ditch also runs NE-SW close to the road. There is a suggestion of a slight curve to this ditch and therefore it is unclear if it is related to the possible field enclosures (Fig. 4; 41) or the outer ditch (Fig. 4; 37) of PRN 99385 as it kinks. In the southern corner of this field there appears to be evidence of a sub-circular feature (Fig. 4; 43) against the southern field boundary. A short distance to the east is possible evidence of a 2nd sub-circular feature (Fig. 4; 42) at the intersection of the field boundaries. This may represent further round barrows no longer visible above ground. If this feature at the intersection of the field boundaries does represent a round barrow then it may be possible to view the arrangement of ditches (37, 41, 19 & 18) around it as forming a possible internal enclosure at the eastern end of PRN 99385. This may be similar to the arrangement of enclosure ditches (PRN 1237) around the round barrows to the southwest (PRNs 1131 & 1142).

PRN 1143

Occupying high ground at the intersection of field boundaries (fields 4 & 5) are the visible earthwork remains of a round barrow amongst the hedgerows. This forms a sub-circular mound *c.*25m in diameter. Evidence of this feature is not

clearly visible on the geophysical survey results; possibly obscured by later hedge bank and ditch, but the outer ditch of PRN 99385 runs around the northern edge of the earthwork remains. There is also a prominent curve to this ditch (Fig. 4; 36) that may even suggest a separate enclosure around this barrow.

PRN1144

North of the boundary ditch for PRN 99385 (Fig. 4; 37), and sited on a prominent ridge, are the visible earthwork remains of a round barrow (PRN 1144). Evidence of this is clearly visible on the geophysical survey results within field 5. A negative linear anomaly, possibly a bank, forms a sub-circular feature c.20m across, with suggestions of an external ditch to the north.

On its north-western side further negative linear anomalies appear to suggest an adjoining sub-rectangular banked enclosure with an internal ditch along its northern edge and suggestions of internal pits or other cut-features. Such a feature is an unusual response associated with a round barrow, and may even relate to a separate feature.

PRN 99278

At the point where the northern boundary ditch (Fig. 4; 37) for PRN 99385 kinks a faint negative curvilinear anomaly appears to define a large sub-circular feature (Fig. 4; 48, PRN 99278). No surface remains are visible within field 5 at this point and the magnetic responses are relatively weak suggesting little may now remain but this may represent another denuded round barrow.

Extending to the north are two parallel negative linear features (Fig. 4; 49), possibly the remains of banks although they do appear to also line up with evidence of ploughing visible in fields to the east. If these features are real then, along with PRN 1144, it suggests an unusual complex of features associated with the round barrows. These linear features also appear to connect this possible barrow with both PRN 1144 and PRN 1234.

PRN 1234

A round barrow site has previously been recorded at this location but is no longer clearly definable at ground level. It is sited on the edge of the high ground and appears to be identifiable on the geophysical survey results as small mound with possible evidence of an accompanying ditch. However, this also lies close to the line of a possible bank extending from PRN 99278 and it is not clear if the two readings do in fact represent separate features.

PRN 48326

Previous records indicate a round barrow at this location but no clear evidence could be defined on the geophysical or topographical survey results. The survey results do appear to show evidence of ploughing in this field (field 5) that may have eroded any remains, whilst nearby blank areas may also suggest a thicker spread of material adjacent to this site.

PRN 1232

Previous records indicate a round barrow at this location but no clear evidence could be defined on the geophysical or topographical survey results. This site does however lie in an area of ditch and possible bank remains (Fig. 4; 46) associated with a larger enclosure within field 3.

PRN 1233

Previous records indicate a round barrow at this location within field 1 but no clear evidence could be defined on the geophysical or topographical survey

results. This is sited in a low-lying boggy area of the field that would appear to be an usual location for a round barrow.

Modern Features

Modern features consist of distinct parallel lines (Fig. 3; 14) representing a removed field boundary in field 1, two pipelines (Fig. 4; 36 and 37) in field 2 from a known reservoir and a fallen post and wire field boundary (Fig. 4; 44) in field 5. There is also a scatter of ferrous debris throughout the fields, characterized by small adjacent positive and negative responses. Most, if not all, of these are from modern detritus, but obviously there is a chance that they could be finds of archaeological significance.

CONCLUSIONS

The combined geophysical surveys, accompanied by a detailed topographic survey, have recorded a complex and extensive arrangement of prehistoric archaeological features occupying two adjacent summits with extensive panoramic views of northern Pembrokeshire.

Two Bronze Age round barrows (PRNs 1142 & 1231) occupy a prominent piece of high ground, with a further four identified round barrows (PRNs 1143, 1144, 1234 & 99278) occupying a neighbouring piece of high ground to the north. Further round barrows (PRNs 1232, 1233 & 48326) previously recorded on lower ground to the east and west were not detected.

The southern summit is enclosed to the west by a double bank and ditch arrangement (PRN 1237). The inner line of bank and ditch runs close to the round barrows, the outer line a further c.50m to the west, at the top of a significant break of slope with an in-turned entranceway visible. There is no clear relationship with features east of the round barrows so the full extent of this enclosure remains speculative. The inner line may enclose only the round barrows, whilst the outer line may extend as far as an unusual arrangement of ditches visible in the easternmost field, resulting in an enclosure c.320m across. The date of these enclosures also remains speculative as the clear outline of an oval enclosure (PRN 99386) with a ditched entranceway, typical of the Iron Age, lies within the enclosure to the east of the round barrows. This may indicate several phases of enclosure on this summit. Numerous internal features are also recorded both within the larger enclosure (PRN 1237) and within the Iron Age enclosure (99386).

A similar arrangement of enclosures is visible surrounding the northern summit. A large bank and ditch enclosure (PRN 99385) c.290m across surrounds some of the known round barrows and extends further west, incorporating a field boundary and becoming a double ditched enclosure on the edge of the high ground to the west. There is a suggestion of interior enclosures surrounding some of the round barrows, and an entranceway to the east fed by possible trackways. Here there is less to suggest later Iron Age activity, other than the clear spatial association with the activity on the southern summit, but a large area to the northwest remains to be surveyed within this enclosure.

To the north of this enclosure (PRN 99385) is an unusual arrangement of further Bronze Age round barrow remains (PRNs 1144, 1234 & 99278), still occupying high ground but apparently surrounded by a further complex of features.

Clearly significant archaeological remains still exist despite clear evidence of agricultural erosion. Although an indication of date and relationships may be suggested through geophysical survey precise details about the context, function, state of preservation and date of these features would require further intrusive investigation.

ACKNOWLEDGEMENTS

The geophysical survey was undertaken by Mike Ings, Gwilym Bere and Pete Crane. The topographical survey was undertaken by Hubert Wilson and Will Steele. I am indebted to landowners for allowing access to their land.

ARCHIVE DEPOSITION

The archive will initially be held by DAT, before being passed to the National Monument Record, Aberystwyth.

SOURCES

British Geological Survey, 1994, *The Rocks of Wales* 1:250,000.

Clark A J, 1996, *Seeing Beneath the Soil* (2nd edition). Batsford, London.

Anon c.1845 *Bayvil Parish Tithe Map*

Ordnance Survey 1891 *First Edition 25 inch PEMB VI.6*

ILLUSTRATIONS

Crugiau Cemmaes, Nevern, Pembrokeshire 2010
Geophysical & Topographical Survey

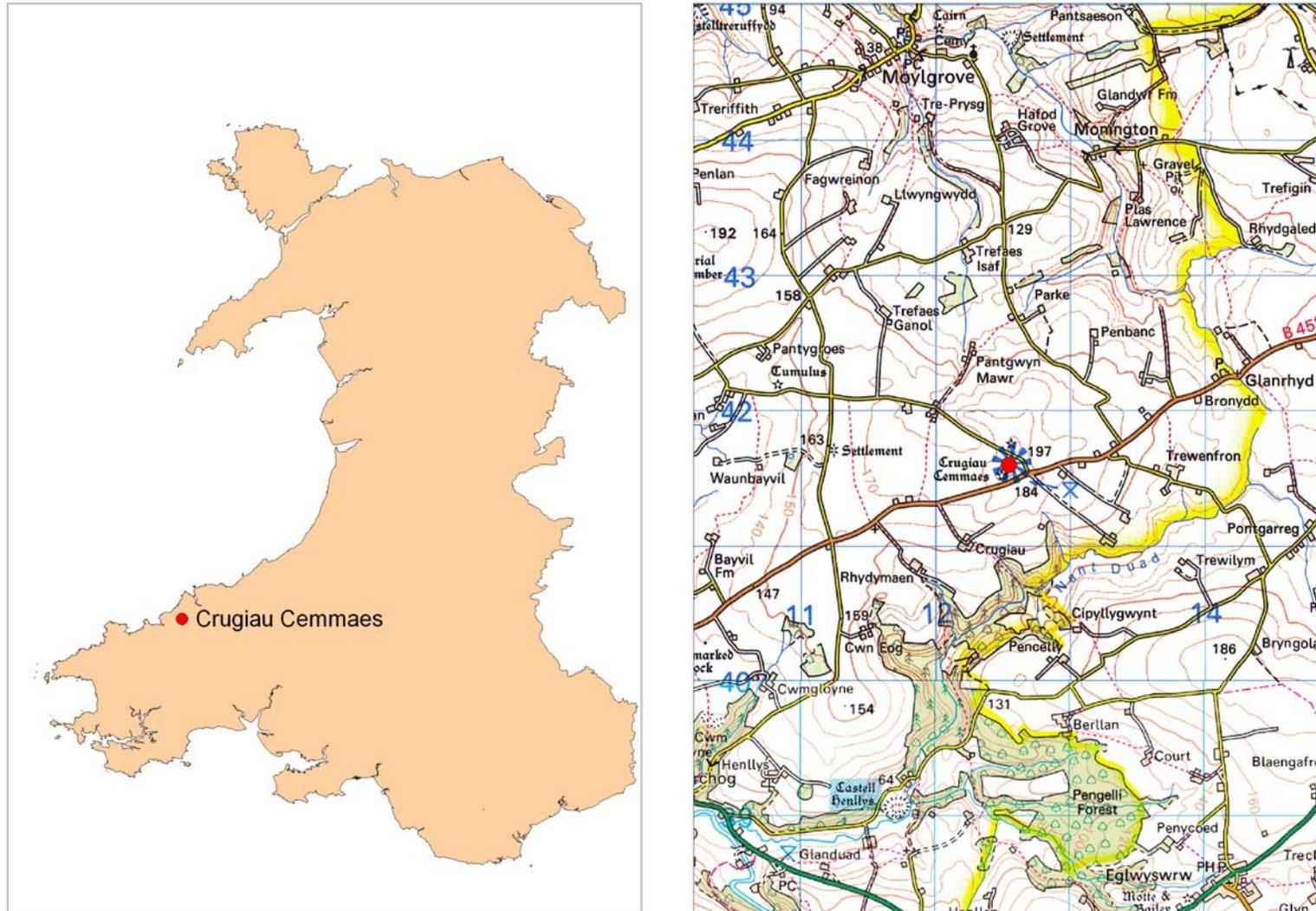


Figure 1: Location map, based on the Ordnance Survey.

Reproduced from the 1995 Ordnance Survey 1:50,000 scale Landranger Map with the permission of The Controller of Her Majesty's Stationery Office, © Crown Copyright Cambria Archaeology, The Shire Hall, Carmarthen Street, Llandeilo, Carmarthenshire SA19 6AF. Licence No AL51842

Crugiau Cemmaes, Nevern, Pembrokeshire 2010
Geophysical & Topographical Survey



Photo 1: Aerial view 1981, north toward top left



Photo 2: Aerial view 1981 with interpretation (T Driver), north toward top left



Photo 3: Aerial view from 2006 showing the double-ditched enclosure marking the northwest edge of PRN 99385. Also shows possible further features extending to the northwest. North is towards bottom left.

Photo Ref. AP_2006_3907.jpg, Crown Copyright RCAHMMW

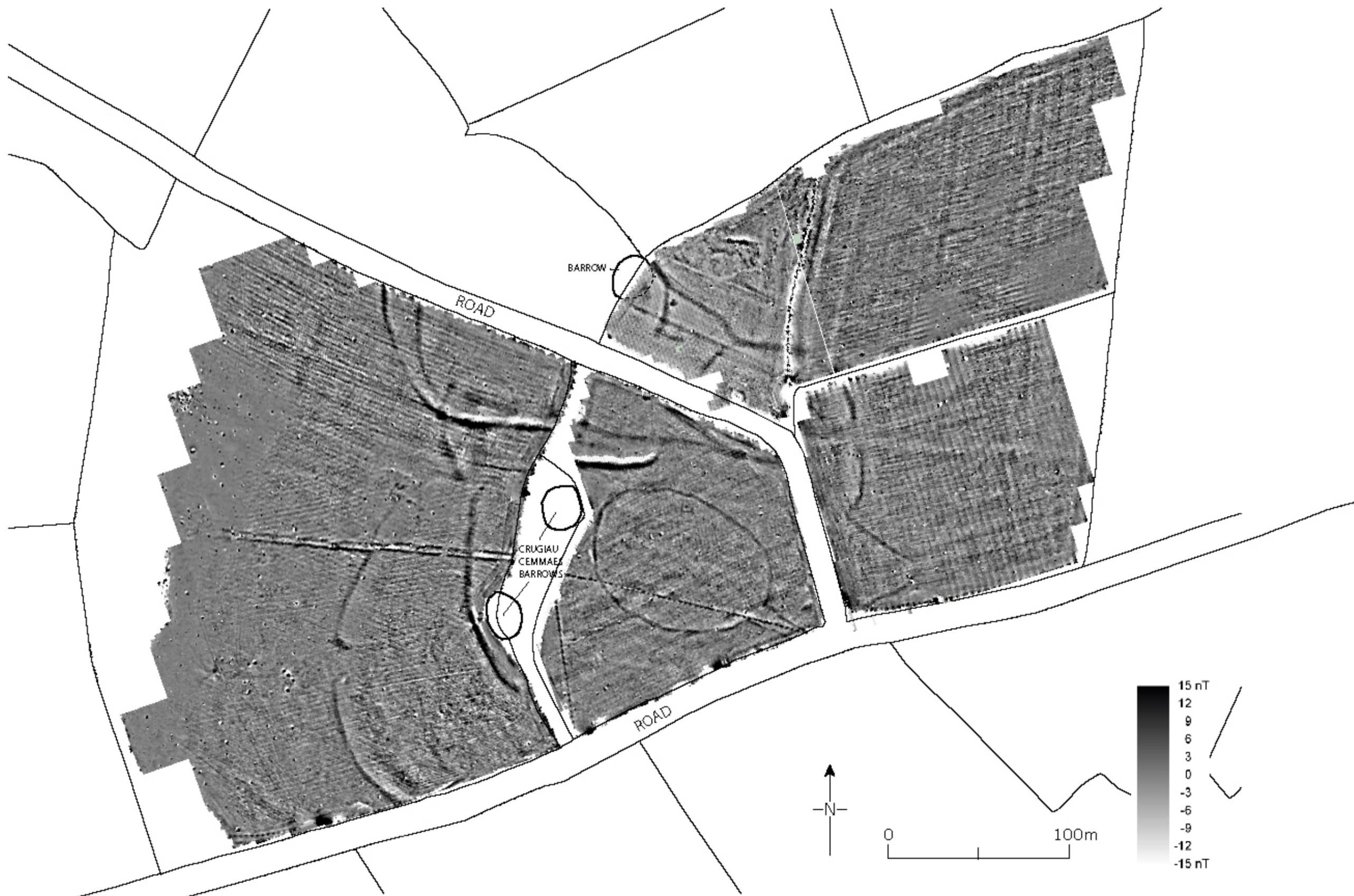


Fig 2: Processed geophysical survey results from both 2009 and 2010.



Fig 3: Processed geophysical survey results from 2009 including interpretation.

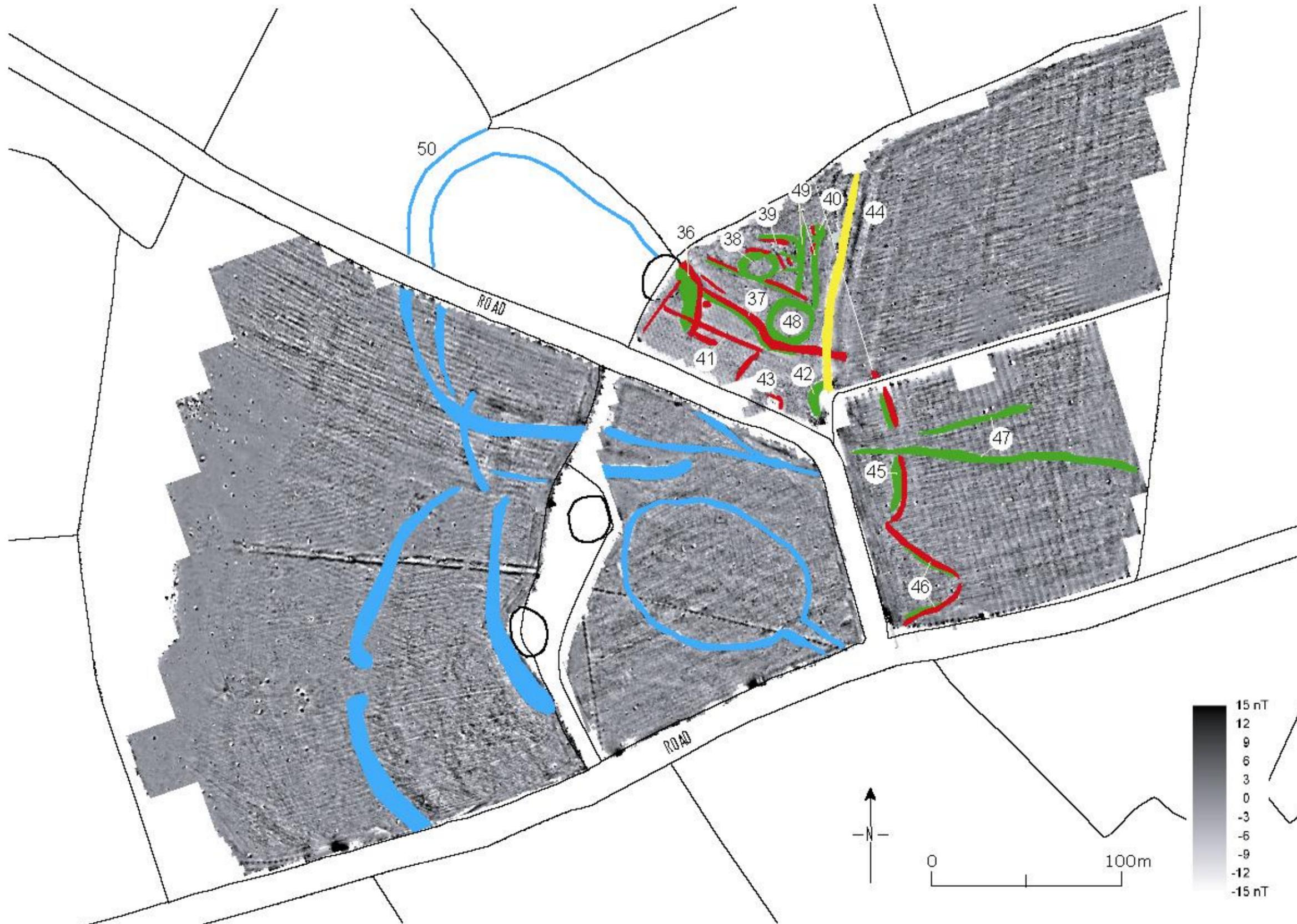


Fig 4: Processed geophysical survey results from both 2009 and 2010, including interpretation of 2010 results. Red highlights the main positive magnetic responses, green highlights the main negative magnetic responses and yellow highlights the main bipolar magnetic responses. Blue highlights the main features identified on the aerial photo of 2006 (Photo 3) and during the 2009 geophysical survey.

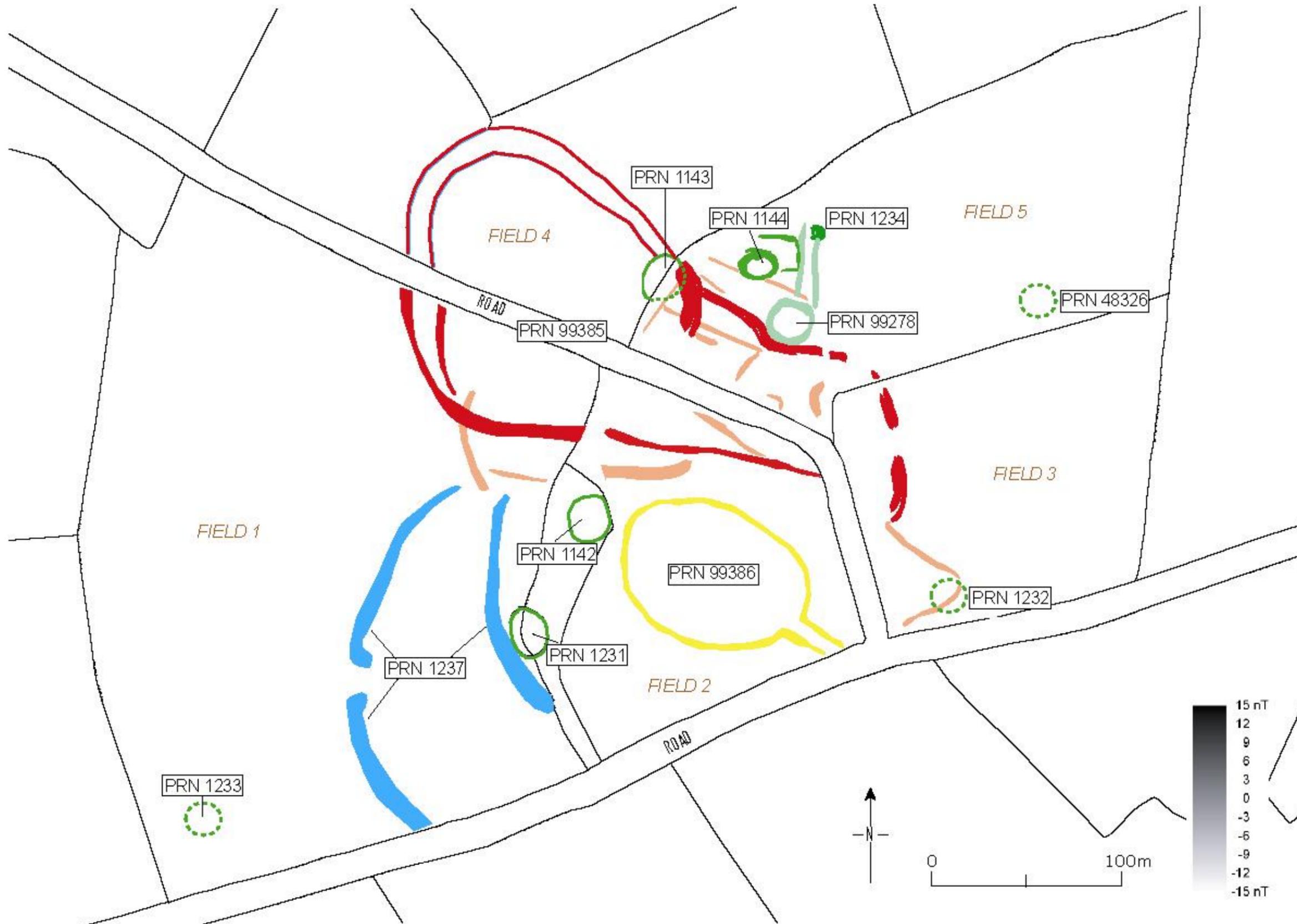


Fig 5: Simplified interpretation highlighting the main features identified by their PRNs.



Fig 6: Contour survey overlaid with the main identified features. Contours at 0.25m intervals, heights based on Ordnance Datum.

CRUGIAU CEMMAES, NEVERN, PEMPROKESHIRE GEOPHYSICAL & TOPOGRAPHICAL SURVEY

RHIF YR ADRODDIAD / REPORT NUMBER 2010/22

Mawrth 2010
March 2010

Paratowyd yr adroddiad hwn gan / This report has been prepared by

Philip Poucher

Swydd / Position: Archaeologist

Llofnod / Signature



Dyddiad / Date 30/03/2010

Mae'r adroddiad hwn wedi ei gael yn gywir a derbyn sêl bendith
This report has been checked and approved by

ar ran Ymddiriedolaeth Archaeolegol Dyfed Cyf.
on behalf of Dyfed Archaeological Trust Ltd.

Swydd / Position:

Llofnod / Signature

Dyddiad / Date

Yn unol â'n nôd i roddi gwasanaeth o ansawdd uchel, croesawn unrhyw sylwadau
sydd gennych ar gynnwys neu strwythur yr adroddiad hwn

As part of our desire to provide a quality service we would welcome any
comments you may have on the content or presentation of this report



INVESTOR IN PEOPLE
BUDDSODDWR MEWN POBL

APPENDIX 1

CRUGIAU CEMMAES NEVERN PEMBROKESHIRE 2009

GEOPHYSICAL SURVEY

REPORT No 2009/36



Prepared by Dyfed Archaeological Trust
For CADW and PCNRA



ymdiriedolaeth archaeolegol
DYFED
archaeological trust

DYFED ARCHAEOLOGICAL TRUST

RHIF YR ADRODDIAD / REPORT NO. 2009/36
RHIF Y PROSIECT / PROJECT RECORD NO. 94866

Mawrth 2009
March 2009

**Crugiau Cemmaes, Nevern, Pembrokeshire 2009
Geophysical Survey**

Gan / By

**Pete Crane BA Hons MIFA
and
Phil Poucher BA Hons PIFA**

Paratowyd yr adroddiad yma at ddefnydd y cwsmer yn unig. Ni dderbynnir cyfrifoldeb gan Ymddiriedolaeth Archaeolegol Dyfed Cyf am ei ddefnyddio gan unrhyw berson na phersonau eraill a fydd yn ei ddarllen neu ddibynnu ar y gwybodaeth y mae'n ei gynnwys

The report has been prepared for the specific use of the client. Dyfed Archaeological Trust Limited can accept no responsibility for its use by any other person or persons who may read it or rely on the information it contains.



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Ymddiriedolaeth Archaeolegol Dyfed Cyf
Neuadd y Sir, Stryd Caerfyrddin, Llandeilo, Sir
Gaerfyrddin SA19 6AF
Ffon: Ymholiadau Cyffredinol 01558 823121
Adran Rheoli Treftadaeth 01558 823131
Ffacs: 01558 823133
Ebost: info@dyfedarchaeology.org.uk
Gwefan: www.archaeolegdyfed.org.uk

Dyfed Archaeological Trust Limited
The Shire Hall, Carmarthen Street, Llandeilo,
Carmarthenshire SA19 6AF
Tel: General Enquiries 01558 823121
Heritage Management Section 01558 823131
Fax: 01558 823133
Email: info@dyfedarchaeology.org.uk
Website: www.dyfedarchaeology.org.uk

Cwmni cyfyngedig (1198990) ynghyd ag elusen gofrestredig (504616) yw'r Ymddiriedolaeth. The Trust is both a Limited Company (No. 1198990) and a Registered Charity (No. 504616)

CADEIRYDD CHAIRMAN: C R MUSSON MBE B Arch FSA MIFA. CYFARWYDDWR DIRECTOR: K MURPHY BA MIFA

CONTENTS

SUMMARY	1
INTRODUCTION	2
THE SITE	3
METHODOLOGY	3
RESULTS	3
DISCUSSION AND SUGGESTIONS FOR FURTHER WORK	5
CONCLUSION	6
ACKNOWLEDGEMENTS	6
ARCHIVE DEPOSITION	6
SOURCES	6
APPENDIX 1: METHODOLOGY AND INSTRUMENTATION	7
Photo 1: Aerial view 1981	9
Photo 2: Aerial view 1981 with interpretation	9
Figure 1: Location	10
Figure 2: Ordnance Survey First Edition with modern features	10
Figure 3: Gradiometer survey	11
Figure 4: Gradiometer survey interpretation	12

Cover: Geophysical surveying at Crugiau Cemmaes. View East

SUMMARY

A geophysical survey was undertaken around a part of a Bronze Age barrow cemetery known as Cregiau Cemmaes. To the west of the barrows large ditches were recorded, probably parts of large enclosures, adding to information visible on aerial photographs, along with one or two circular features that maybe roundhouses, rather than barrows. To the east a less substantial ditch formed complete, oval enclosure, with an entrance on the southeast side. Within this were one or two roundhouses and possibly two rectangular structures. It is likely that the oval enclosure is Iron Age, but the date of the other remains must remain speculative.

INTRODUCTION

Project commission

Cadw grant-aided, with assistance from Pembrokeshire Coast National Park Authority, and commissioned Dyfed Archaeological Trust to undertake a geophysical survey on the fields to east and west of part of the barrow cemetery known as Crugiau Cemmaes (SAM PE197), near Nevern, Pembrokeshire (centred on SN 1250041600)(Fig 1).

Scope of the project

The project was designed to establish whether a geophysical survey, using a gradiometer, could detect archaeological features on this site, in addition to those seen on aerial photographs.

Report outline

Because of the limited nature of this project, together with the considerable archaeological evidence in the area, this report is restricted solely to the results of the geophysical survey.

Abbreviations

Sites recorded on the Regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). Some sites have also been registered as a Scheduled Ancient Monument (SAM).

THE SITE

Location and Archaeological Potential

Crugiau Cemmaes barrow cemetery (SN 12534263) lies 4.5km northeast of Nevern just to the north of the B4582 and 7.0km southwest of Cardigan (Fig 1). The southern two barrows, between the two fields surveyed, are on a prominent ridge, nearly 200m above sea level, with open views in all directions. The barrows are within a fenced-off corridor allowing public access. Between the two barrows there is a rectangular water reservoir.

The tithe map (Bayvil, probably in 1845) only shows a boundary dividing the present fields, but no barrows. The Ordnance Survey illustrates the same boundary but in more detail, plus the barrows, but also an east-west division across the large field to the west (Fig 2). An aerial photograph taken in 1981 (Photos 1 and 2) indicates a major ditch just to the west of the barrows, with a further ditch with an apparent in-turned entrance further westward, while around the steep slope in the north-west corner of the field there appears to be part of a smaller double ditch enclosure.

The western field, now under pasture, has been cultivated for some time and has slightly encroached into the bases of the barrows where some stone from the edges of these have been disturbed.

The All Wales Ploughing Championship was held in 2007 in the western field (pers. comm. P Groom): this may explain the prominent plough marks recorded in this geophysical survey.

METHODOLOGY

A fluxgate gradiometer was used for the survey. This detects variations in the earth's magnetic field was used for this survey (full specifications are in appendix 1). Readings were taken on traverses 0.5m wide and every 0.25m along for the all of the east field and the southern part of the west field. The northern part of the west field was undertaken at a lower resolution with traverses 0.1m wide due to little detail showing in this field and budget constraints

RESULTS

Limitations

The survey was undertaken between 11th and 20th March 2009. The weather was generally fine, except for a few misty and cold early mornings. The fields were low pasture recently vacated by cattle. The lower western edge of the west field was quite poached, especially around the gateway into the next field and therefore little attempt was made to survey that part of this field. The unevenness due to poaching and some slopes in the field will have caused some small variations in data collection. However, pacing lines were used throughout the survey and any variations in the data collections are likely to have been small.

Potentially more of a problem was the adjacent roads that carry significant numbers of lorries, mostly from the nearby quarry, but survey work was paused when working near the roads whilst the majority of this traffic passed, although a

few artificial anomalies may have occurred. There are pipelines connected with the reservoir, wire fences and some ferrous detritus that have caused significant anomalies. There was evidence of some mole burrows in the western field; it has been suggested in the past that this activity can produce minor anomalies on magnetometer surveys, but in this instance any such features here are probably masked by the plough marks.

The underlying geology is Ordovician sedimentary shale (British Geological Survey 1994) with dark brown humic topsoil. This did not appear to cause any problems with the survey.

Geophysical interpretation

(Results Fig 4 and interpretation Fig 5)

Only the major features are discussed.

Western Field

The ditch just to the west of the barrows and reservoir, seen on the 1981 aerial photographs, is clearly visible on the survey (Fig 5, 1). This ditch produces a strong response in a number of places especially near the southern barrow and it is therefore likely that the fill of this ditch contains heat-affected material. Adjacent to the east side there is a negative response (2), possibly the remains of a bank. Between this ditch (1) and bank (2) and the southern barrow there is a very strong response, possibly a hearth (3).

About 80m further west there is a curvilinear ditch (4) and bank (5) with an apparent in-turned entrance (6). These features appear to be at the top of the break of slope. This would need to be confirmed by combining this geophysical survey with a topographic survey. Given the location of these features they would appear to be part of an Iron Age enclosure. There are vague suggestions of features (7) within this enclosure, but they are obscured to a great extent by the plough marks.

At the north end of the curvilinear ditch (4), there is possibly a broader ditch (8) cutting north-south across a small blind valley and up either slope. However, this feature is not that distinct and could possibly be natural. Just to the east of this there is possibly a small ditch (9), running up the southern edge of this blind valley, but this alignment is the same as the plough-marks and therefore could be misleading.

To the north there is a continuous outer ditch (10) around the slope, with a bank (11) along its straighter edge. There also appears to be an inner ditch (12) on the west side of the slope. Both of these ditches are visible on the aerial photographs, but this survey shows the outer ditch (10) continuing to the east. Within these ditches on the top of the slope there does appear to be one definite curved gully (13), possibly part of a ring ditch for a roundhouse or barrow.

Modern features consist of distinct parallel lines (14), a removed field boundary, and a clearer grey area (15) to the west, possibly spread soil dug from ponds lying to the west. There is also a lot of ferrous debris.

Eastern Field

The eastern field has similar ditch and bank (16 and 17) to those in the west field; these could be a continuation of 10 and 11, although if so there must be a dog leg between the two lengths of bank and ditch around the location of the current hedge-bank. It would appear that the eastern terminal of the ditch (16)

and bank (17) respects that of the inner ditch (18), and is therefore likely to be a later development. There is another linear ditch (19) adjoining the north site of the inner ditch (18), this may just be associated with an earlier roadside hedge bank, but is more likely to be contemporaneous with some of the other geophysical anomalies. A ditch (20) is almost certainly part of the roadside hedge-bank- it can still be seen as a slight surface feature.

Within this eastern field there is a ditch (21), possibly with an internal bank (22), forming an oval, with a ditched entranceway (23). It is likely that this is an Iron Age defended enclosure, many of which have been identified in southwest Wales. It is particularly interesting to note how this site is positioned within the landscape, adjacent to the barrows, on fairly level ground except for the northwestern part, which is much higher with a steep slope.

Running east-west and joining the west side of the enclosure ditch there is a linear feature (24); unfortunately this is on the same alignment as some plough marks but appears to consist of a ditch with at least part of a bank on its northern side. Adjacent to where this linear feature meets a modern pipeline (37) there is a negative, (bank?), rectangular or square anomaly (25). However, the shape of this may be influenced by the plough marks and the pipe trench and given the slope here (this would need confirmation by a topographic survey) it may represent a natural outcrop. It is possibly significant that nothing shows west of the pipe trench in this field. Close by this "square" anomaly (25), there is a small arc (26), but it is uncertain as to whether this is an archaeological feature.

Inside the enclosure ditch (21) there is a linear feature (27), possibly three sides of a square feature. In the centre of this there appears to be a pit (28). This is an usual feature and could represent an Iron Age shrine (no shrines or temples have, however, been identified in Wales), an early medieval special grave, of which some are known, of a building or ditch of earlier or later periods.

There may be a similar square feature (29) some 40m further east, although this is less well defined and may be on the edge of a steep slope, making it less likely to be a structure.

The features listed below are tentative at best due to the striping caused by ploughing: There are at least two likely ring ditches (30 and 31) and a possible third (32). These are more likely to be ring ditches for roundhouses rather than for round barrows. Also within the enclosure (21) there are three apparent large arcs (33, 34, 35). The last of these (35) is definitely too large to be a part of a roundhouse.

As in the west field there is a scatter of ferrous debris, characterized by small adjacent positive and negative responses. Most, if not all, of these are from modern detritus, but obviously there is a chance that they could be finds of archaeological significance. There are two pipelines (36 and 37) from the reservoir.

DISCUSSION AND SUGGESTIONS FOR FURTHER WORK

This survey has confirmed and enhanced the features seen in the western field on the 1981 aerial photographs. Significantly, it has also discovered an enclosure in the eastern field that appears to show evidence of internal settlement or other usage. Crugiau Cemmaes shows a sequence of activity. Remains in the eastern field indicate at least two phases of enclosure. It is uncertain how, if at all, the eastern field enclosures relates to the one in the western field. Crugiau Cemmais

barrows are clearly Bronze Age, but the date of the other remains is speculative. An Iron Age date for the enclosure in the eastern field is favoured, as is a similar date of those in the western field.

There were no obvious further major barrow-type features. It is likely that, if they existed, they would have had substantial ring ditches and would have been easily recognisable in the survey results.

When commissioning geophysical surveys where there are known archaeological features, significant earthworks or complex topography it is strongly advised that an archaeological topographical survey is undertaken at the same time. It is therefore recommended that a topographical survey be carried out on this site in the near future and combined with these geophysical results, which should provide enhanced interpretation of the archaeological features.

The dating and therefore the phasing of both the previously recognised and the newly discovered features are unknown. Targeted evaluation by small test trenches is considered likely to be cost effective on these sites. This would also give an opportunity to look at any plough damage and the implications of further deep plough damage especially in the eastern field.

CONCLUSION

This survey confirms the aerial photographic evidence that there are elements to this site which would appear to be a substantial, probably Iron Age enclosure, or enclosures. Significantly this survey has discovered a new enclosure, with evidence of interior settlement or other use. This is could be of Iron Age date, but may extend into later periods.

ACKNOWLEDGEMENTS

I would like to thank Phil Poucher from Dyfed Archaeological Trust for his assistance with this survey. Also Hubert Wilson from Dyfed Archaeological Trust for production of the base map.

ARCHIVE DEPOSITION

The archive will initially be held by DAT, before being passed to the National Monument Record, Aberystwyth.

SOURCES

Bayvil Tithe map 1845?

British Geological Survey 1994 The Rocks of Wales 1:250,000

Ordnance Survey 1891 First Edition 25 inch PEMB VI.6

APPENDIX 2: METHODOLOGY AND INSTRUMENTATION

Geophysical Survey Instrumentation

A fluxgate gradiometer survey provides a relatively swift and completely non-invasive method of surveying large areas.

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

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

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

The Bartington Grad601 is a hand-held instrument and readings can be taken automatically as the operator walks at a constant speed along a series of fixed length traverses. The sensor consists of two vertically aligned fluxgates set 1.0m apart. Their Mumetal cores are driven in and out of magnetic saturation by an alternating current passing through two opposing driver coils. As the cores come out of saturation, the external magnetic field can enter them producing an electrical pulse proportional to the field strength in a sensor coil. The high frequency of the detection cycle produces what is in effect a continuous output (Clark 1996).

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

Geophysical Survey Data Collection

The gradiometer includes an on-board data-logger. Readings in the surveys were taken along parallel traverses of one axis of a grid made up of 20m x 20m squares. The traverse intervals were either 0.5m or 1.0m apart. Readings were logged at intervals of 0.25m along each traverse giving 3200 readings per grid

square (medium resolution on 0.5m traverses), or 1600 readings per grid square (low resolution on 1.0m traverses).

Geophysical Survey Data presentation

The data was transferred from the data-logger to a computer where it was compiled and processed using ArchaeoSurveyor 2 software. The data is presented as grey-scale plot where data values are represented by modulation of the intensity of a grey scale within a rectangular area corresponding to the data collection point within the grid. This produces a plan view of the survey and allows subtle changes in the data to be displayed. A separate grey-scale plot with interpretation of the main features is also included as necessary.

Geophysical Survey Data Processing

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

Reliability

Geophysical survey is an immensely useful tool but it should be realised that while a survey will detect a wide range of features, it may not detect *all* buried features. A gradiometer survey detects changes in magnetic flux density and relies on there being a detectable difference between the archaeology and the substrate. This may not occur for many reasons (e.g. a cut feature being backfilled with subsoil). It must therefore be stressed that a lack of archaeological responses from a geophysical survey does not prove that there is no archaeology present.

Grid locations

The survey grids were located by measurements to fixed points such as field boundaries located during the survey.

Bibliography

Clark A J, 1996, *Seeing Beneath the Soil* (2nd edition). Batsford, London.