

Geophysical surveys at defended enclosures in the neighbourhood of Castell Henllys, Pembrokeshire.



By Harold Mytum and Chris Webster

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Introduction

The geophysical surveys reported here were undertaken as part of a project of survey and excavation around the extensively excavated site of Castell Henllys (Mytum 1999). The programme comprised: survey and excavation at Berry Hill Camp (Mytum and Webster 1993), field survey at Carnalw (Mytum and Webster 1989), surveys at Castell Mawr, Caer (Bayvil), and Caerau (Moylegrove) (reported here), survey and partial excavation at Henllys Top Field and Cwm Gloyne (Mytum and Webster 2001).

Berry Hill Camp (1985)

A resistivity survey was undertaken in advance of the excavation at Berry Hill (SN06364022) and was used to guide the locations of the sample trenches. The survey results are incorporated in the excavation report (Mytum and Webster 1993).

Castell Mawr (1988)

Castell Mawr (SN118377) has long been known as one of the largest examples of defended enclosures in the area (RCAHMW 1925, 225; Crossley 1968,189). The site was surveyed in March 1988, as a result of which, it can be reinterpreted as a Late Neolithic or Early Bronze Age hengiform enclosure, partially re-used in the Iron Age or Romano-British period by an enclosed farmstead in the eastern part of the interior. Traces of medieval and later field systems were also identified.

Location

Castell Mawr lies at 140m above sea level on a gently-rounded summit above the Avon Nyfer which flows in a steep-sided valley to the south. To the north the land slopes more gently into the valley of the Nant Duad about 1km away. The site is well drained, with underlying bedrock of Ordovician shale; it is at present used for pasture, periodically ploughed and re-seeded. Prior to enclosure in the 19th century the land both inside and outside the fort was divided into small units; one survived as a narrow field running radially from the outer earthwork of the site until earlier this decade and another, not located more closely than within the Castell, is recorded on the land register map at the Pembrokeshire Records Office.

The site lies 1200m to the south of Castell Henllys and three further inland promontory forts lie to the south and east: Castell Llwyd, Castell Bach and Pen-y-Benglog. Unlike these, Castell Mawr does not enjoy a particularly defensive location, although there are distant views in all directions. To the south the view encompasses the Mynydd Preseli and includes the hillforts of Foel Trigarn (Baring Gould et al 1900) and Carn Alw (Mytum and Webster 1989) together with the outcrops at Carn Menyn from which the Stonehenge bluestones came.

Description

Castell Mawr is not truly circular but sub-triangular with vertices to the north, south-east and south-west. The interior is divided by a cross-bank in two straight into two

unequal areas. A large bank marks the boundary of the site, in places rising 2m above the ground surface outside the Castell; there is no surface evidence of an external ditch, but in contrast there is a massive internal one concentric with the bank. This ditch is between 10 and 15m wide and still up to 3 m deep on the south side. Along some stretches of the inner edge of the ditch there are traces of another bank. This survives best on either side of the northern entrance where it is 3 m wide and 0.75m high but in other places it is very low and gives the appearance of a plough headland. Even at its best the inner bank is no larger than a field bank, and its antiquity is far from certain.

There are at present three entrances, and of these, the one at the southern end of the crossbank is almost certainly modern. The other southern entrance appears to be original with a well-made causeway across the ditch, although the ditch terminals are rectangular, which may indicate that the causeway was built across the ditch rather than being left undug. The situation at the northern entrance is unclear because of erosion but there is little sign of a causeway. The northern entrance is used as the present gateway to the field and may have been adapted and widened.

The cross-bank runs, in two straight sections, from the north-east to the south side of the Castell. The northern and southern sections are well preserved but the central part is denuded. There is evidence for an external ditch 5m wide and up to 1.5m deep on the west, well preserved except at the southern end where it appears to have suffered from later quarrying. To the north the external ditch is more silted but still visible. The junctions of the cross-bank and its ditch with the main enclosure suggest that they are later features. At the south the ditch of the cross-bank does not join the main ditch and the bank stops on the lip, whilst at the north end the relationship between the ditches is unclear because of erosion but again the cross-bank seems to stop on the lip of the main ditch.

Geophysical Survey

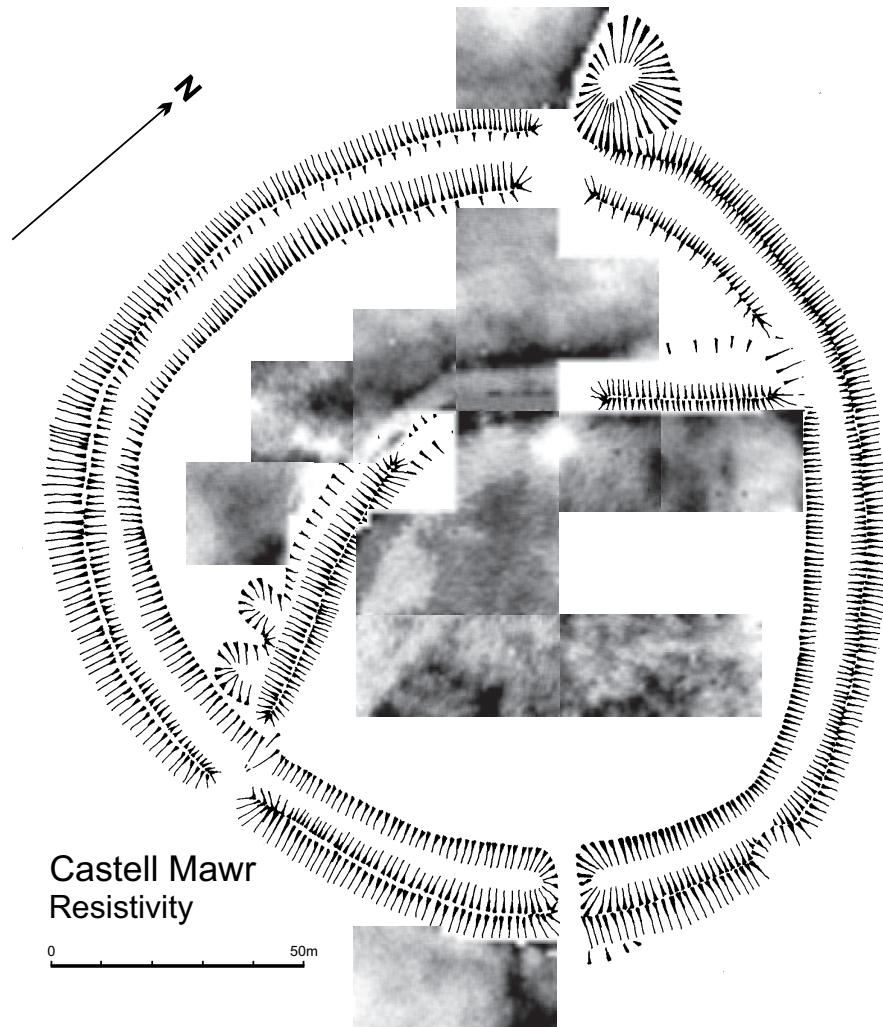
Three types of survey were carried out; soil resistivity, magnetic gradiometry and soil magnetic susceptibility. The survey was concentrated in the northern half of the site, on either side of the cross-bank. Two areas were surveyed outside the Castell to test for an outer ditch.

Resistivity Survey

This was carried out using a BradPhys twin probe meter over a one metre grid. Each 20m square was surveyed as a unit and these have been combined to produce the figures. Over 8000 sq. m were surveyed with three aims: to test whether the modern breach was on the site of an original entrance through the cross-bank and ditch, discover any chronological relationship between the cross-bank and ditch with the main enclosure, and to locate any external ditch to the main enclosure. The resistivity survey results were sufficiently clear for all these questions to be answered.

The partially ploughed-out cross-bank can be seen clearly in the survey results and continues across the modern gap. Beyond the cross-bank the ditch visible on the surface showed as a narrow line of low readings 2-3 m wide. Although there is some geophysical evidence of a causeway across the ditch in the area where the bank has been flattened, this anomaly was probably formed by the cross-bank material pushed into the ditch when the bank breach was made. The resistivity survey also shows a

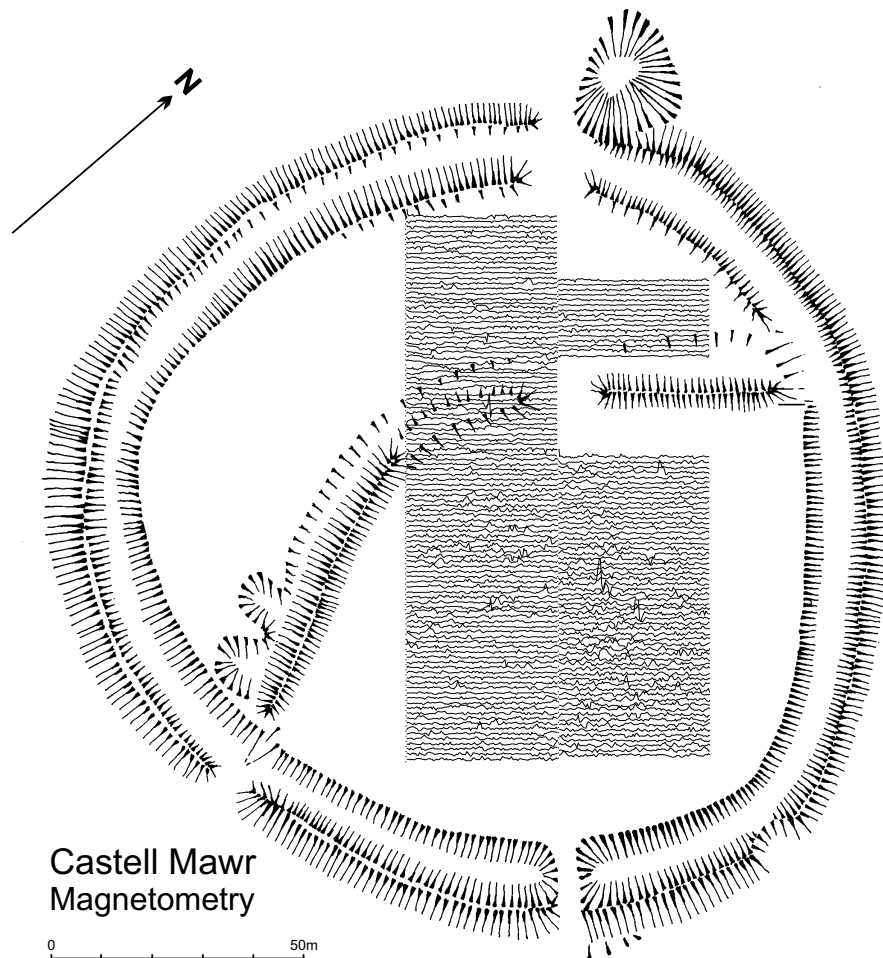
ploughed-out counter-scarp bank beyond the ditch, a feature not at all visible on the surface.



At the cross-bank's north-eastern end it can be seen to turn and join the small bank which follows the edge of the main enclosure ditch southwards which may suggest that this bank is contemporary with the cross-bank. Behind the cross-bank are several joining features that appear to suggest a quarry ditch for the bank. No other obvious features are visible within the enclosure. Two areas were surveyed outside the entrances to the enclosure, in an attempt to locate an external ditch for the main enclosure bank. However, neither showed any evidence of for such a ditch and it can be confidently assumed that no such feature existed.

Magnetometer Survey

This was conducted using a Philpot fluxgate gradiometer, running traverses 1m apart over 30m squares with readings taken at 0.25m intervals. It was hoped that this survey would locate subsurface features such as hearths, as well as areas of occupation material containing much burnt debris. In the event the survey showed very few anomalies with the exception of the cross bank. Those that were apparent might indicate hearths and occupation areas but it is likely that the instrument was not recording very sensitively.

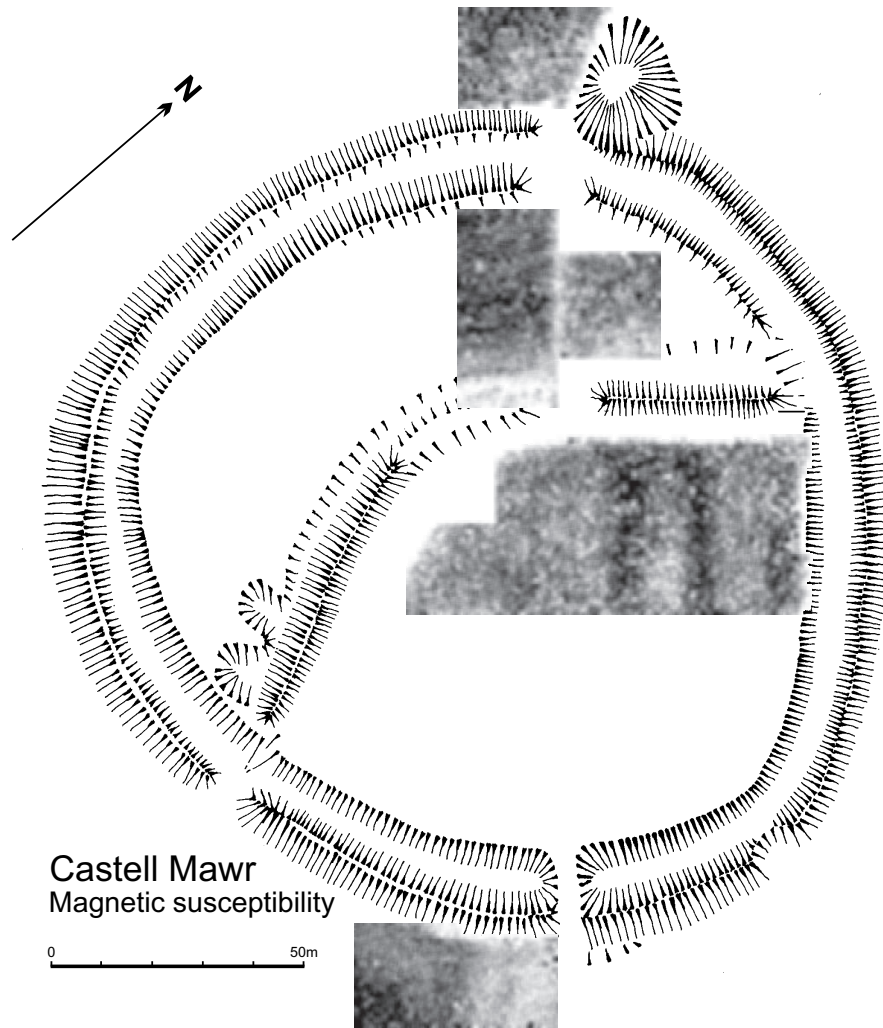


Soil Susceptibility

This was conducted using a Bartington Instruments susceptibility meter, taking readings at 1m intervals over a 20m square with a MS2 field coil. It was anticipated that the instrument would indicate general areas of human activity, though the recognition of particular features was not anticipated. The results reflect material near the surface in the topsoil and so would provide information based on deposits that had been disturbed during periodic ploughing. Partly because of surface vegetation (which prevents uniform contact with the soil) the results showed a great deal of “noise”.

Examining the average susceptibility showed interesting variations across the site. The lowest susceptibilities were found outside the enclosure (average 72), the area outside the cross-bank showed higher susceptibility (average 124), and the area within the cross-bank showed the highest (average 178). These figures correspond well with presumed density of occupation in the three areas. Moreover, when the readings within each area are examined it is possible to recognise some more specific features.

The area outside the cross-bank showed little of interest except the line of the track running from the northern entrance, although this was not detected by any of the other surveys. The cross-bank shows clearly as a region of low susceptibility as does the ditch, presumably as it is filled with material (originally subsoil) from the bank.



Within the cross-bank several linear features run at right angles to the cross-bank. These do not seem to relate to prehistoric activity but are more likely to be associated with more recent agricultural practice and may show strip fields. One such field survived until recently next to the Castell, near the southern entrance. This field was c20m wide compared to the anomaly separation of c15m. The Meline Tithe apportionment of 1837 indicates that the main enclosure (called "Park Castell") contained a small area ("Piece") in different ownership and occupation. Unfortunately the location and shape of Piece is not marked on the Tithe Map itself but its presence indicates a subdivision which may be a survivor from the more extensive system suggested by the geophysics.

The two areas outside the Castell again yielded no sign of an external ditch and, as the cross-bank ditch showed clearly, this again suggests that there is none.

Discussion

Castell Mawr is anomalous in several respects when compared to the other later prehistoric sites in south-west Wales. As its name suggests, it is one of the largest at 1.52ha, compared to an average size of 0.44 ha. using the figures provided by Hogg (1979) for sites west of easting 240km. Other large sites are, for the most part, coastal headlands cut off by cross ditches and their large size determined by topography. The situation of Castell Mawr is also anomalous. As Crossley (1964) noticed most of the

circular enclosures lie just below the summit of the hill rather than on them. Castell Mawr does lie on a domed hilltop but its banks do not follow the contours of the hilltop and its defensive potential is hardly enhanced over that of a hill-slope site because the convex slope creates large areas of “dead” ground. For example, the site of Pen-y-Benglog, only 500m to the south, is quite invisible from Castell Mawr.

The defences of Castell Mawr are also unusual for Iron Age sites in the region in that the main bank seems to lie outside the ditch. It is not certain whether there was ever a substantial bank on the inside of the ditch but it seems unlikely that it would have been ploughed away completely when the other banks such as the cross-bank are largely undamaged. No indication of a bank was found by the geophysics and the condition of the main ditch does not suggest that a bank has been ploughed into it, again contrasting with the ditch of the cross-bank. The small fragments of a bank that do survive on the inner lip of the ditch are more like a field bank in size and may be unrelated to any major defensive phase of the site.

It would seem, therefore, that the main enclosure at Castell Mawr does not sit comfortably within the spectrum of known Iron Age settlement forms in south-west Wales which suggests that it is of a different date. The site can be interpreted as an earthwork of two phases. The first phase consists of the large enclosure defined by the large ditch and external bank. The second phase includes the construction of the cross-bank and possibly the small inner bank of the main enclosure.

The first phase would appear to have similarities with a henge monument, particularly its size, situation and the external bank. The classic henges form a group of prehistoric monuments that have proved extremely difficult to define rigorously (Clark 1936, Atkinson 1951, Wainwright 1969, Burl 1969, Catherall 1971) and the most recent survey, incorporating much aerial photographic data, has suggested that many do not belong to the “classic” henge series, but may be considered related (Harding and Lee 1987). The terms henge-related or hengiform have been applied to such sites, and this would seem to be the appropriate label for the Castell Mawr phase one enclosure. Such sites are rare in south Wales; partial excavation of the probable henge at Ffynnon Newydd, Dyfed prompted a wider survey of possible sites, and in an appendix to the excavation report a total of 5 other “possible” and 3 “acceptable” sites was identified (Williams 1984). However, Harding and Lee (1987) consider that the only probable henge in Dyfed (and indeed the whole of south Wales) is that of Ffynnon Newydd, and all the other sites listed by Williams are at best unlikely. The reinterpretation of Castell Mawr as a hengiform site is therefore of considerable importance.

Castell Mawr appears to fit well the criteria used to assess henges by Harding and Lee (1987). It has two opposed entrances aligned to the north and south which are amongst the most popular orientations. The internal diameter is about 120m which is at the top of the range for most sites, but the average ditch width of 10m is appropriate for the size of the enclosure. The internal diameter of Castell Mawr is 79% of the external diameter, the average for “classic” sites being about 75%. Its altitude is higher than many, but this may be because there is little flat lowland in the region, and the plateau situation was the most appropriate in giving it an open aspect. Overall, the evidence points to the site falling within the broad family of henge-related and hengiform sites, although it cannot be considered a “classic” henge (Harding, pers comm.)

One interesting feature of some henges is the presence of arrangements of uprights, whether timbers or standing stones (Harding & Lee 1987, 42). If any such arrangement of stones were originally present at Castell Mawr no sign was found on the ground or by the geophysics. The site lies under 6km from the source of the Preseli bluestones used at Stonehenge and might even have been the prototype for the bluestone phase there.

In the second phase of the site, the cross-bank was built with its ditch and counterscarp bank to delineate a small settlement. On analogy of its size and the nature of the defences, this was probably in the late Iron Age or early Romano-British period. The high magnetic susceptibility readings suggest greatest human activity within this smaller enclosure, and the magnetometer survey suggests several possible areas that may have had structures and hearths. The entrance to the enclosure seems to have been via the southern entrance of phase one, the geophysics shows no break in the cross bank.

Long after the abandonment of the site, in medieval or later times, a series of strip fields were laid out within Castell Mawr, only to be removed, probably gradually, during piecemeal enclosure.

Caer, Bayvil (1989)

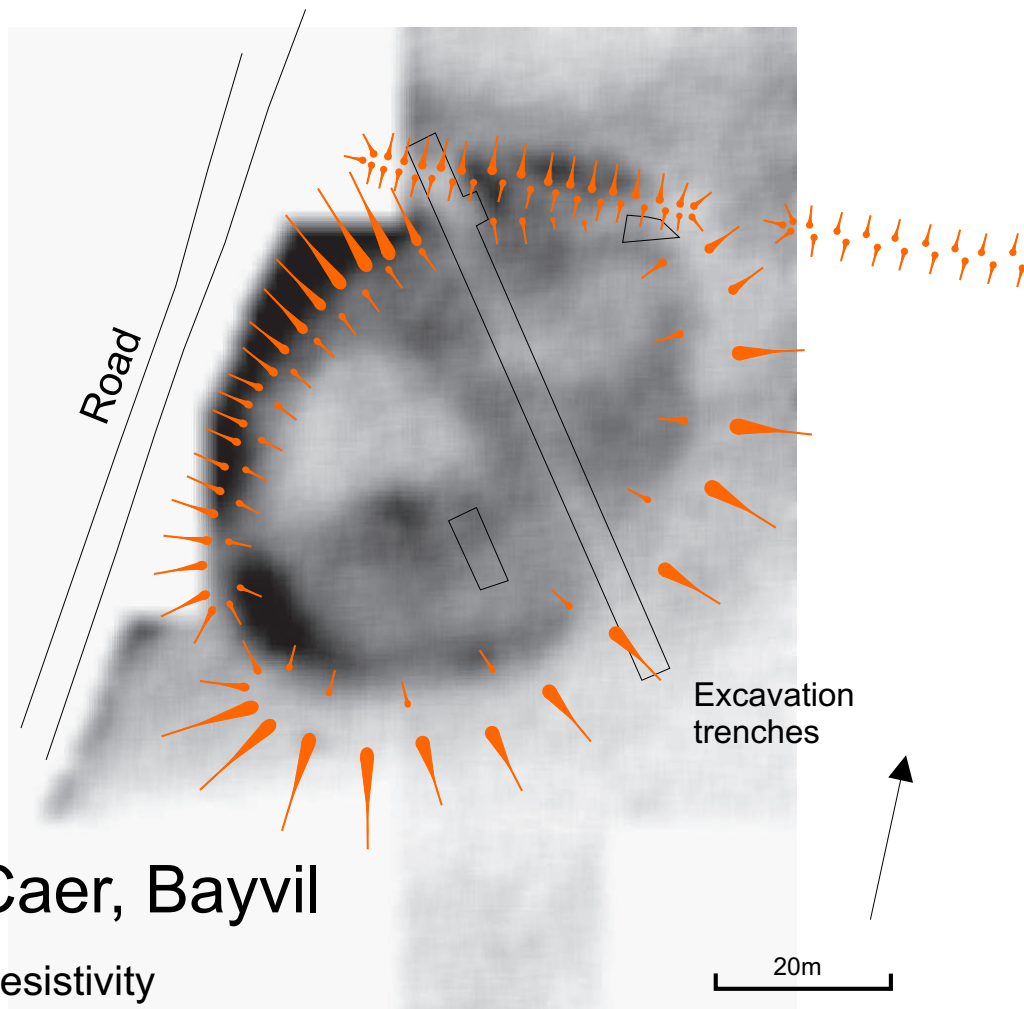
Caer lies at the end of a ridge of the high ground to the north of Castell Henllys (SN 11244171). It was partly excavated in 1979 by the Dyfed Archaeological Trust and more details of the site can be found in the report of that work (James 1987). The excavations showed that a late prehistoric defended enclosure had been reused in the post-Roman period as a cemetery. Over 50 graves were recorded (though not all were excavated) and a radiocarbon date of 650-890 cal AD (2 sigma) obtained from the only bone recovered. Most of the graves were simple dug graves but there were also stone-lined cist graves and a few "lintel graves" with stone capping as well.

The objective of the present survey was to assess whether geophysical techniques could define the limits of the cemetery, which was known to be more extensive than the earthwork. Three techniques were tried, although it was apparent subsequently that the fluxgate gradiometer was not functioning correctly and its results are not reported here.

Resistivity survey

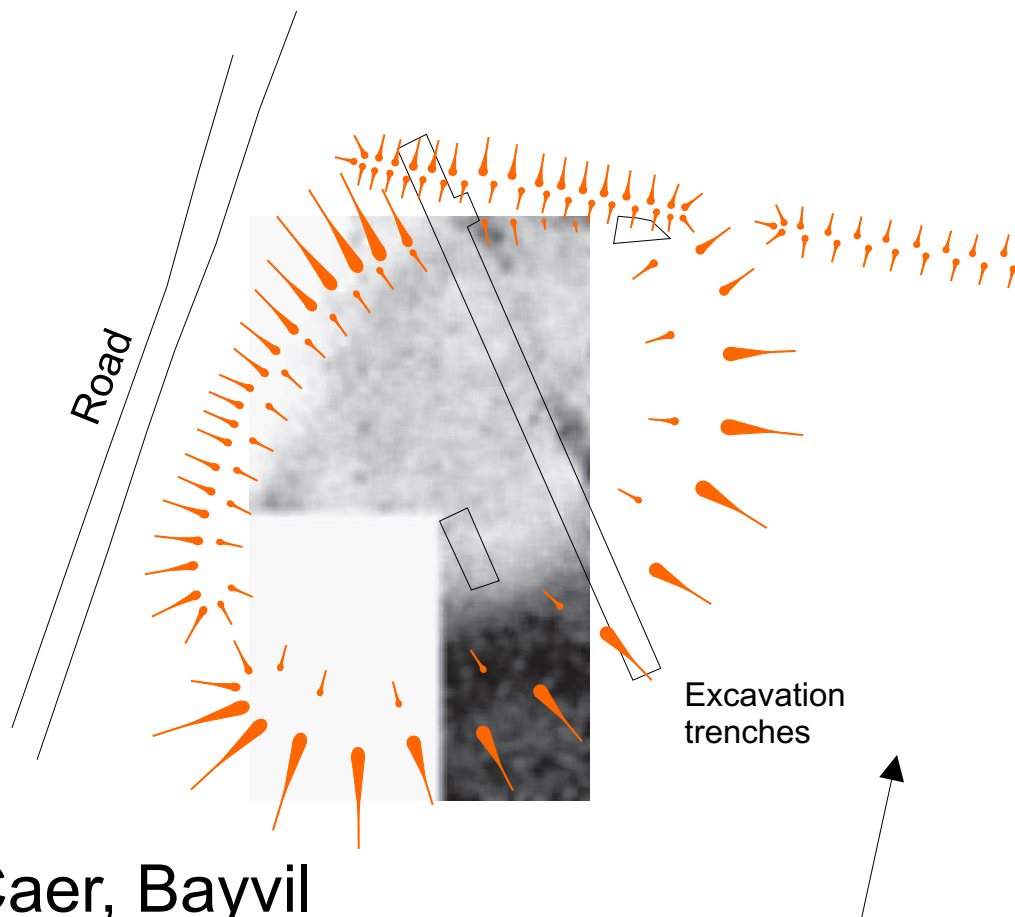
The whole of the enclosure was surveyed together with an area to the south to check for the presence of a ditch. Where the bank survived best, on the west and north sides, it showed clearly as a band of high resistance but to the south and east appeared as an area of low resistance with a higher band behind. It may be that this indicates that the bank has been spread over the ditch by recent agriculture and thus the present earthwork does not follow the correct line. This interpretation does not appear to be supported by the excavated evidence, however, as the edge of the ditch was tentatively identified at the extreme end of the trench and a line of stones about 5m behind this was interpreted as a revetment to the bank.

The interior of the enclosure was characterised by higher readings than those outside with two areas of lower readings apparent. The line of the main excavation trench was visible as low readings but the two smaller trenches were less clear. Comparison of the geophysical data with the density of excavated graves suggests that areas of high grave density may be showing as higher resistance areas. This would suggest that the graves would seem to be concentrated in the southern part of the enclosure with an “empty” quadrant in the NW. Further burials were found along the northern bank of the enclosure on a different alignment. A small area of high readings to the south of the “empty” quadrant may represent an area of stones, possibly from a structure.



Magnetic susceptibility

The magnetic susceptibility survey was more limited and less revealing. Again clear differences could be seen between the enclosure bank to the north (low susceptibility) and that to the south (high). The interior was very uniform even in the areas of the excavation, although a line of high readings followed the east side of the trench and may have been caused by the spoil heaps. There are very slight hints of a pattern similar to that seen by the resistivity survey but the limited area surveyed makes comparison difficult.



Caer, Bayvil

Magnetic susceptibility

20m

Conclusion

Cemeteries are notoriously difficult to detect by geophysical techniques as they are characterised by either holes backfilled almost immediately with their excavated contents or, in the case of long-lived cemeteries, repeated churning of the earth by multiple burials. The results seen here are therefore not surprising, although the possibility that the resistivity is picking up areas of higher grave density needs to be explored. This is the type of result that had been hoped of the magnetic susceptibility survey but which was not clearly evident in the results.

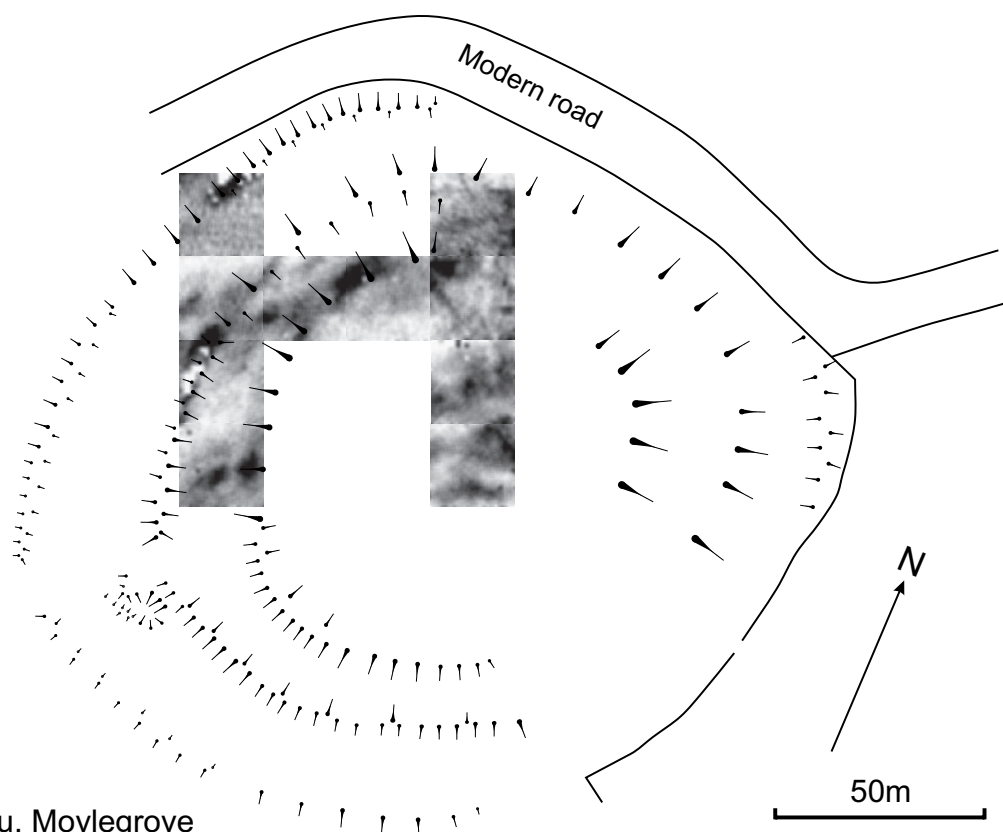
Caerau (1989)

Caerau lies to the north of the small village of Moylegrove, close to the coast (SN 125455). It is different from the majority of defended enclosures in the area as it is multivallate with widely spaced ramparts, a type of enclosure known better from Devon and Cornwall. There are early records of burials at this site and the surveys attempted to define areas where burials may be likely, to record the degraded earthworks and add ploughed-out features to the plan.

Following the instrument failure of the fluxgate gradiometer at Caer, Bayvil only resistivity and magnetic susceptibility were attempted at Caerau. One of the two resistivity instruments also failed during the work and thus the area surveyed was not coherent which precludes much interpretation. The earthworks were surveyed by theodolite and tape.

Earthwork survey

The survey confirmed the existence of three widely spaced ramparts surviving for the most part as ploughed down scarps. There were no signs of ditches outside the banks and the banks themselves were missing in several areas, notably to the south east. The only gaps in the ramparts were observed to the south west, but these did not have the character of entrances and only breached the outer two ramparts. It would appear that the entrance lay, therefore in the south east where the ramparts are no longer evident. It is possible that a gate in the field wall, which here follows the outer rampart, preserves the line of this access. The inner enclosure was about 80m across with the next rampart c20m away and the third 25-30m beyond that.



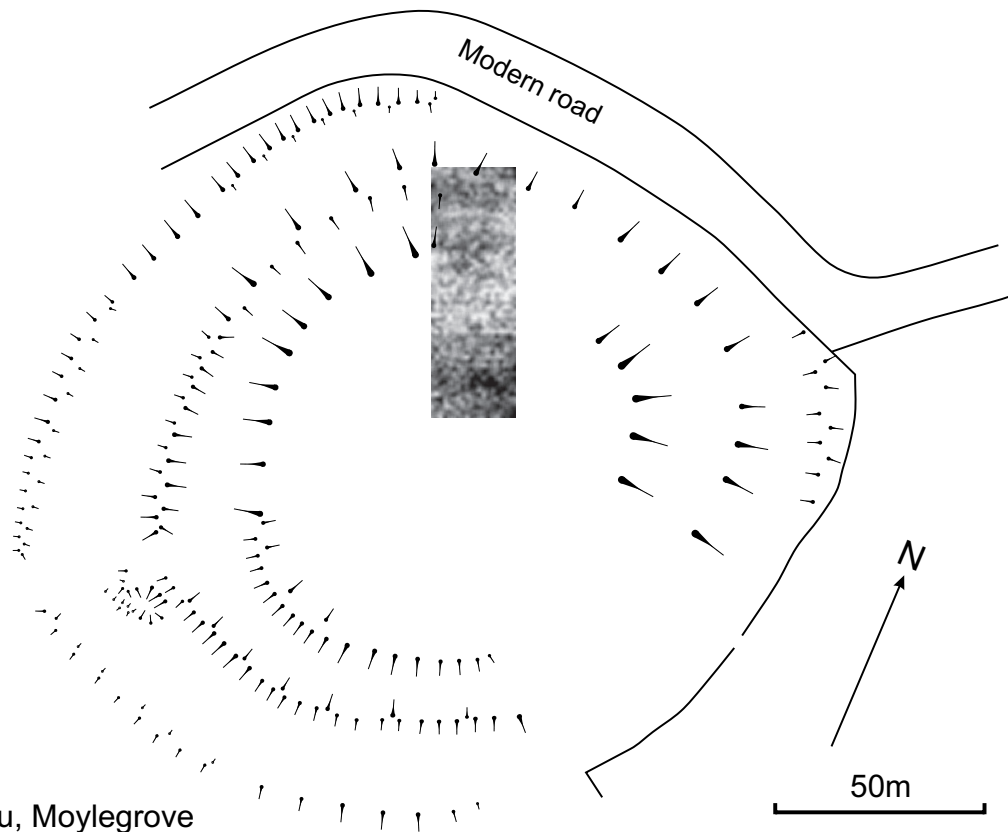
Caerau, Moylegrove
Resistivity

Resistivity survey

Ten 20x20m squares were surveyed with functioning equipment and, as the failure of one machine was not noticed until the results were processed, a further 5 were surveyed with unreliable results. As a result the plot shows the survey shows an H pattern that makes interpretation difficult as no large areas were covered. The banks of the enclosure show clearly with a ditch visible in the one area covered. There are evidently features in the interior of the central enclosure, but not enough of them is visible in the survey to attempt an interpretation.

Magnetic susceptibility

Only three 20m squares were surveyed with poor results. There appears to be a great deal of “noise” in the data which may be due to tussocky vegetation or problems with the instrument. There appear to be areas of higher susceptibility to the north west and, particularly, to the south east. Those at the north east may correlate with the positions of the ramparts and ditches but this is not clear.



Caerau, Moylegrove

Magnetic susceptibility

Conclusions

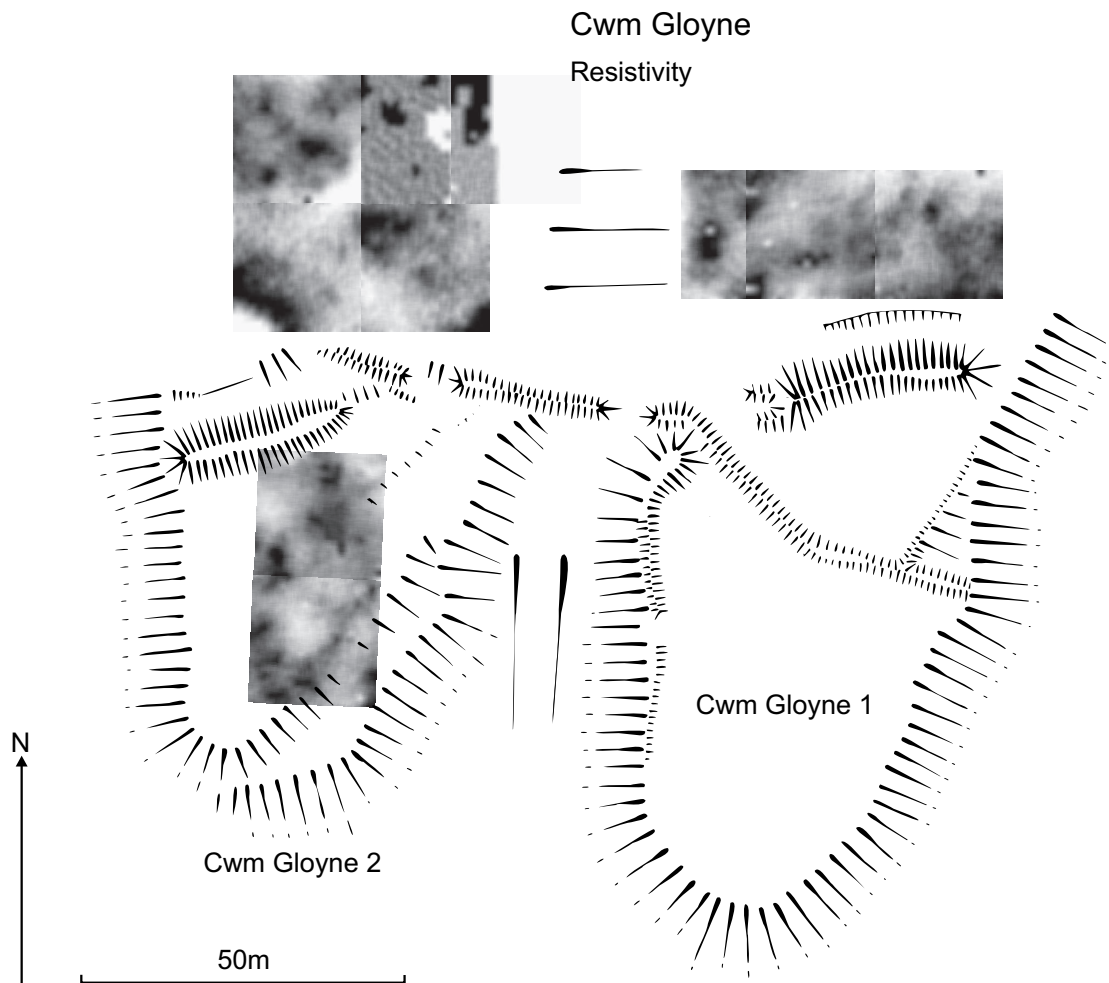
Instrument problems meant that the survey of Caerau was not as successful as had been hoped but the partial results from the resistivity survey appear to show that the interior contains features that are detectable with this technique and further work may be profitable.

Cwm Gloyne (1989 and 1990)

Cwm Gloyne consists of enclosures on the ends of adjacent spurs which were selected for excavation due to their proximity to Castell Henllys. A report on the excavation has been published (Mytum and Webster 2001) but small areas were surveyed with resistivity and magnetic susceptibility. An area outside the enclosures was examined and the interior of the western enclosure was surveyed to assess areas for sample excavation.

Resistivity survey

An area of 2600m² was surveyed outside the enclosures in 1989 with the aim of locating any possible outworks. These are known from Castell Henllys and also from sites to the south of the Preseli mountains (Williams and Mytum 1998). Neither of the two areas revealed evidence for outwork ditches and although some clear anomalies are visible they are not clearly anthropogenic. Conditions were not good for resistivity surveying as the soil was extremely wet and resurvey in optimum conditions may be productive. It should also be noted that the north eastern quadrant of the square surveyed to the north of Cwm Gloyne 2 was recorded using an experimental data recorder which, it was subsequently discovered, was not recording to sufficient accuracy. The results for this section are therefore much cruder than other areas.

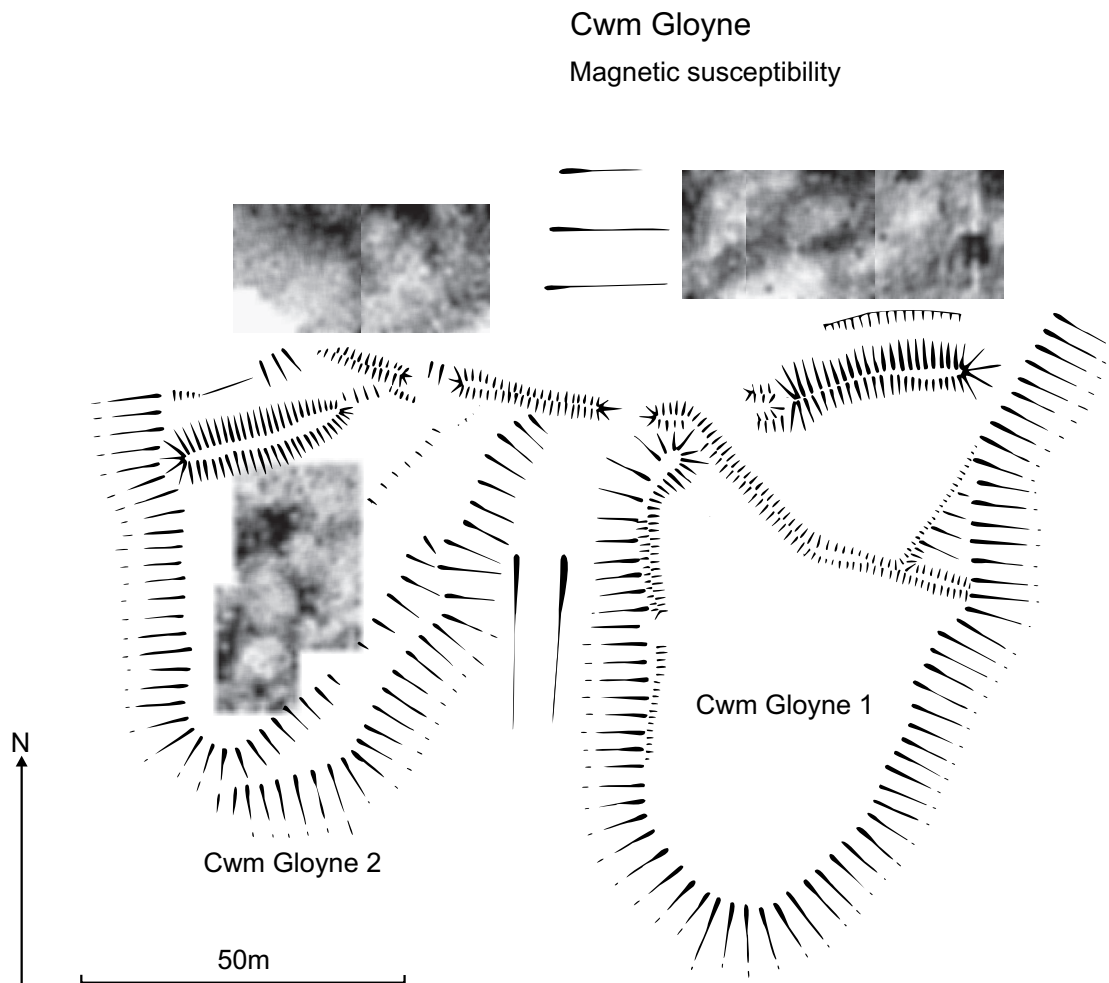


In 1990 an area was surveyed within Cwm Gloyne 2 prior to excavation, to complement the magnetic susceptibility survey (below). It was hoped that the survey would identify areas of deeper soils and also areas of badger disturbance. No obviously anthropogenic anomalies were detected, unless the area of high resistance along the south east side represents a bank rather than rock outcropping along the scarp edge. The patches of high resistance to the north and west were found on excavation to represent areas reworked by badgers, which produced a deep uniform sandy soil.

Magnetic susceptibility

Conditions for the magnetic susceptibility survey in 1989 were good, in contrast to resistivity, as the soft bare earth in the field outside the enclosures allowed good contact. All the readings were high, especially in the western area (average 88 in SI units). Patterns are visible in the readings but it is not clear what has caused these areas of high susceptibility.

The results from inside the enclosure were complementary to those from the following year's resistivity survey; showing the areas of badger activity as low susceptibility.



Conclusions

Although the surveys at Cwm Gloyne located very little of archaeological interest they suggest that the sites were not associated with other ditched outworks and were extremely useful for locating trenches in areas where all the archaeological deposits had not been homogenised by badgers.

Acknowledgements

We would like to thank the owners and occupiers of all the sites for permission to carry out the survey and the students of the Universities of Southampton and York who helped carry them out. The same universities also provided the equipment. Parts of the project were carried out with funding from the Society of Antiquaries of London, the British Academy and Texodus Ltd.

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