Geophysical Survey at Tyn y Coed Enclosure, Dinas Powys, South Glamorgan

By
Andy Seaman

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Summary

Resistivity and gradiometer surveys were undertaken on ground within and to the south of Tyn y Coed enclosure near Dinas Powys in January 2011. A total of 0.64 hectares were surveyed. The data showed a series of anomalies both within and outside the partial enclosure. Important features include two possible structures and strong linear anomalies. Traces of activity within the enclosure were also identified. A topographic survey revealed evidence of a hollow way and continuation of the inner enclosure bank and ditch.

1 Introduction

The survey was undertaken between January 3rd and 7th 2011. The conditions were cold and wet and the ground was water logging in places. The project was conducted by author with the assistance of students from Cardiff University.

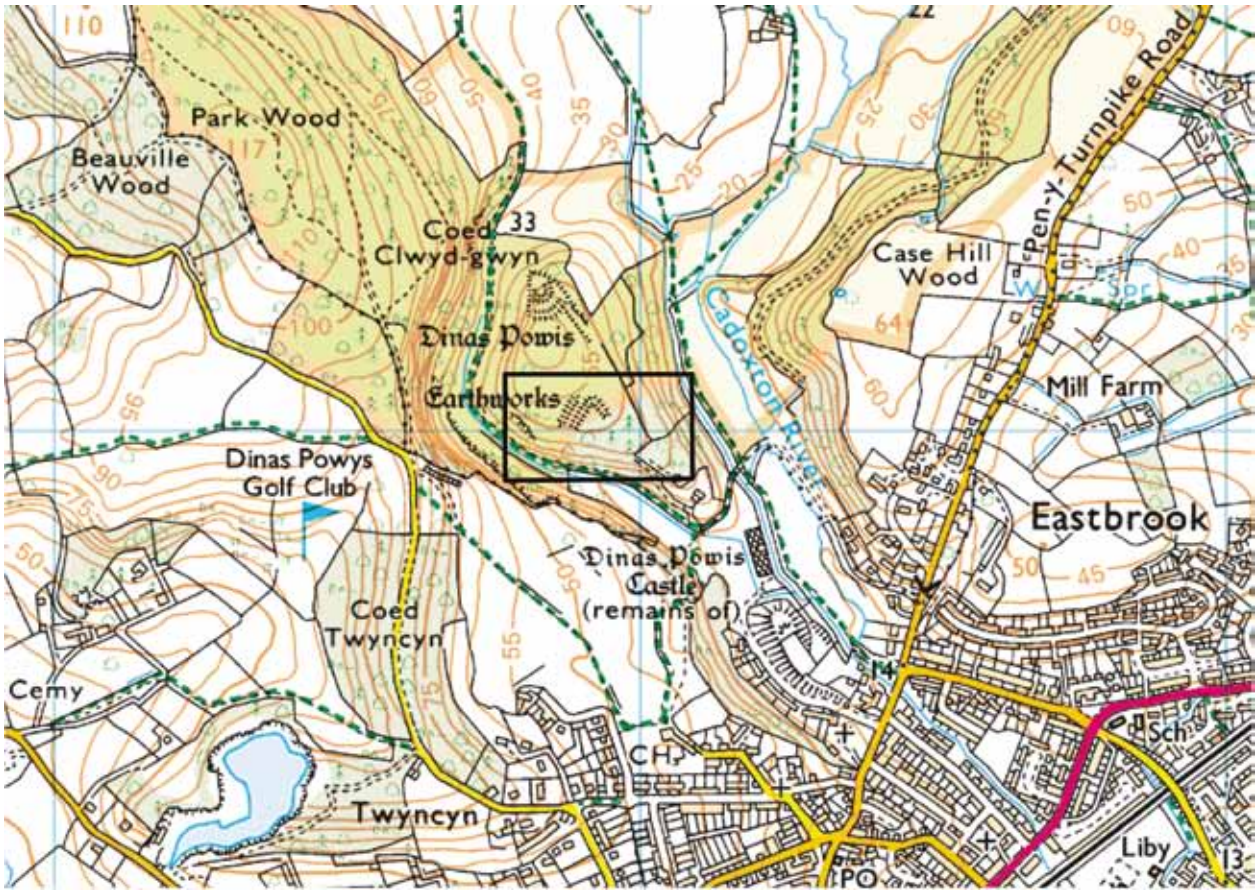

Figure 1 Location map (© Crown Copyright/database right 2011. An Ordnance Survey/EDINA supplied service).

1.1 *Site Location*

Tyn y Coed enclosure (ST1491772024), also known as the 'Southern Banks' is an incomplete bi-vallate enclosure located a short distance from Dinas Powys village in the parish of the Michaelston le Pit (see Figure 1). The enclosure, a scheduled ancient monument (GM024), lies at *c.* 40 metres OD at the southern end of a Carboniferous limestone whale back ridge, overlain by thin soils of the Malham 2 association. There are patches of exposed bedrock in places. The enclosure is 200 metres south of a small multivallate hillfort known as Cwm Goerge Camp or Dinas Powys (ST1483072245, GM023) (see fig 2).

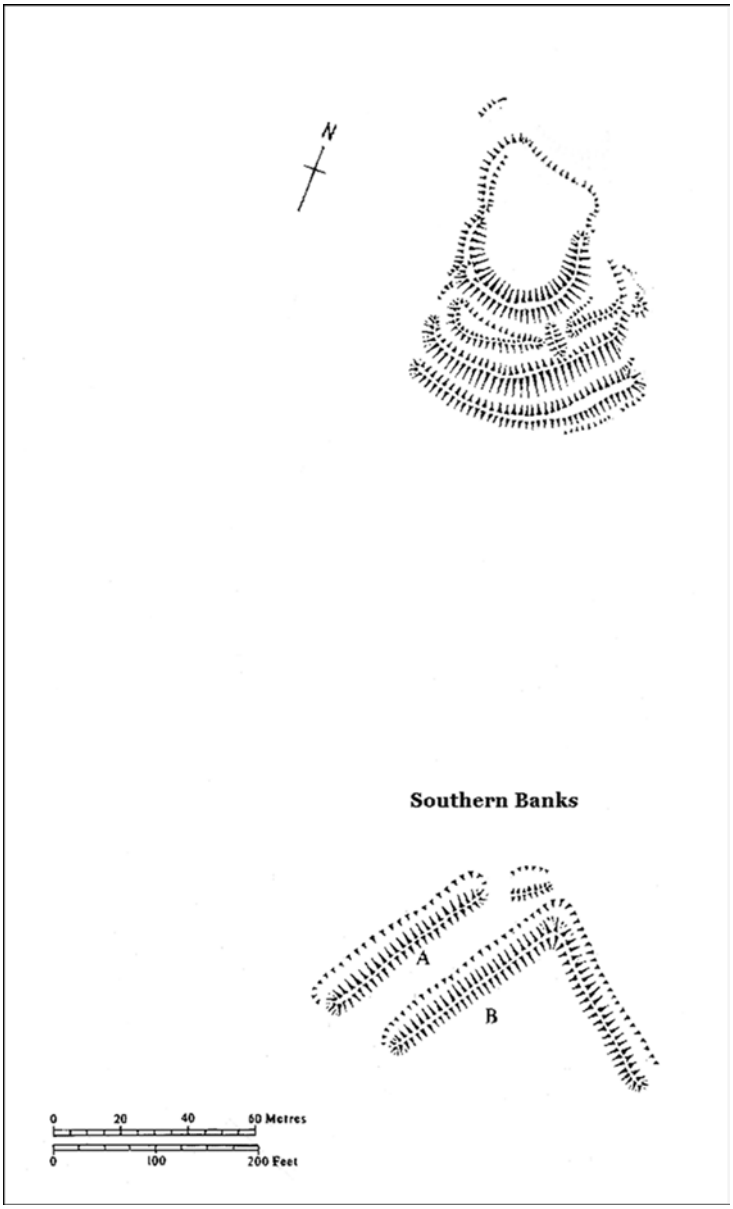

Figure 2 Dinas Powys hillfort and the southern banks (Tyn y Coed enclosure) (after RCAHMW 1991).

1.2 *Site Description and History*

The earthworks consist of the north-west and north-east sides of a sharp angled enclosure at least 60m north-east to south-west by 50m. It was enclosed by a stone revetted bank (known as Bank B) fronted by a ditch with a second rampart and ditch on the north-west side, with an entrance at its north-east end (known as Bank A) (see Figure 2). The earthworks were surveyed by the Royal Commission (RCHAMW 1991: 60) but appear to extend further south beyond the scheduled area (see below 3.3). The earthworks lie within wooded area which is owned and managed by the Woodland Trust. The land immediately to the south is in private ownership and has far lighter tree cover; it was this area which was targeted for survey.

The survey area is relatively flat to the north and west, but falls away to the south and east (see Figure 3). Although the area is currently under grass and has been so for some time, the 1842 Tithe map (Glamorgan Records Office P43/1 & 2), an estate map of the 1750s (Glamorgan Records Office DF/26) and early editions of Ordnance Survey show that the area has been cultivated as recently as the 1880s.

Limited trenching undertaken by Leslie Alcock in 1958 recovered prehistoric pottery from the make-up of southern bank A which he interpreted as an incomplete prehistoric enclosure. Southern bank B produced no dating evidence but was interpreted as late-eleventh/twelfth century siege work associated with the hillfort

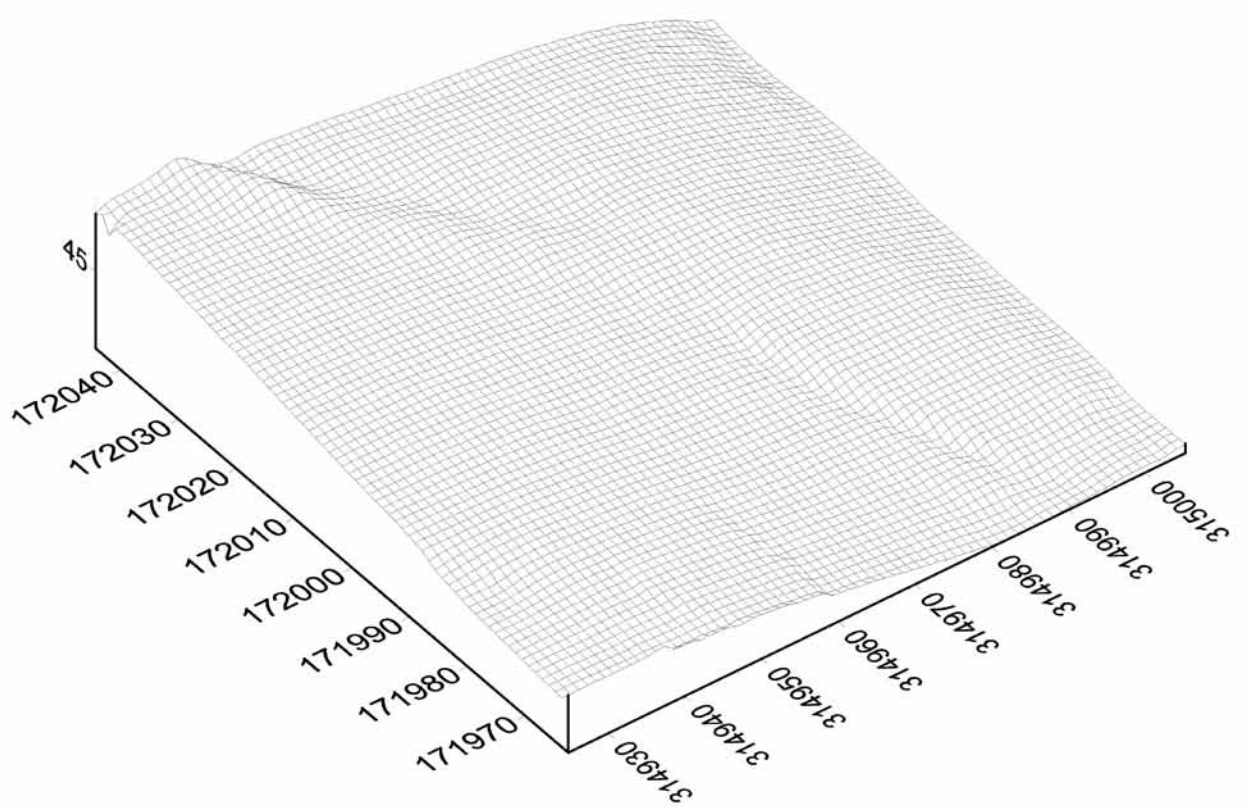

Figure 3 Wire frame digital elevation model of the survey area.

200 metres to the north which he interpreted as a native Welsh ringwork (Alcock 1963; 1987; RCAHMW 1991: 95-100). More recently Alcock's 'ringwork' has been re-interpreted as a fifth to seventh multivallate hillfort, and Tyn y Coed enclosure, largely on the basis of its physical association with the hillfort, has been also assigned to this period, although its function remains unclear (Edwards and Lane 1988; Campbell 1991; 2007).

1.3 *Survey Objectives*

The present survey was undertaken in order to collect data to help ascertain: the 1) form and extent, and 2) function and date of the Tyn y Coed earthworks. The work forms part of a wider research project focusing on early medieval occupation at Dinas Powys which has evolved out of the author's Phd research (Seaman 2010; *Forthcoming*).

2 Methodology

2.1 *Survey Grid*

Given the time constraints of the project it was not feasible to survey the densely wooded area directly within the Tyn y Coed earthworks. Instead the more open ground to the south into which the earthworks appear to extend was targeted (the extent of this field is not marked on the current OS maps, which in fact show boundaries which were removed in the 1980s). The survey grid of sixteen 20x20m squares (see Figure 4) was staked out with a Leica TCR805 total station. It was tied to within the accepted (English Heritage 2008) standards of the OS national grid by establishing fixed points within the grid with a Trimble 4700 GPS system via Trimble *Geomatics Office* baseline processing. The exact coordinates of the grid points are listed in table 1.

2.2 *Resistivity Survey*

The extent of the resistivity survey is shown in Figure 5. The survey was undertaken using a Geoscan RM15 resistivity meter operating two pairs of mobile electrodes on a PA5 frame via an MPX15 multiplexer. The mobile electrode pairs had a 0.5m spacing with 1m between centres, to give a 1.0m effective traverse

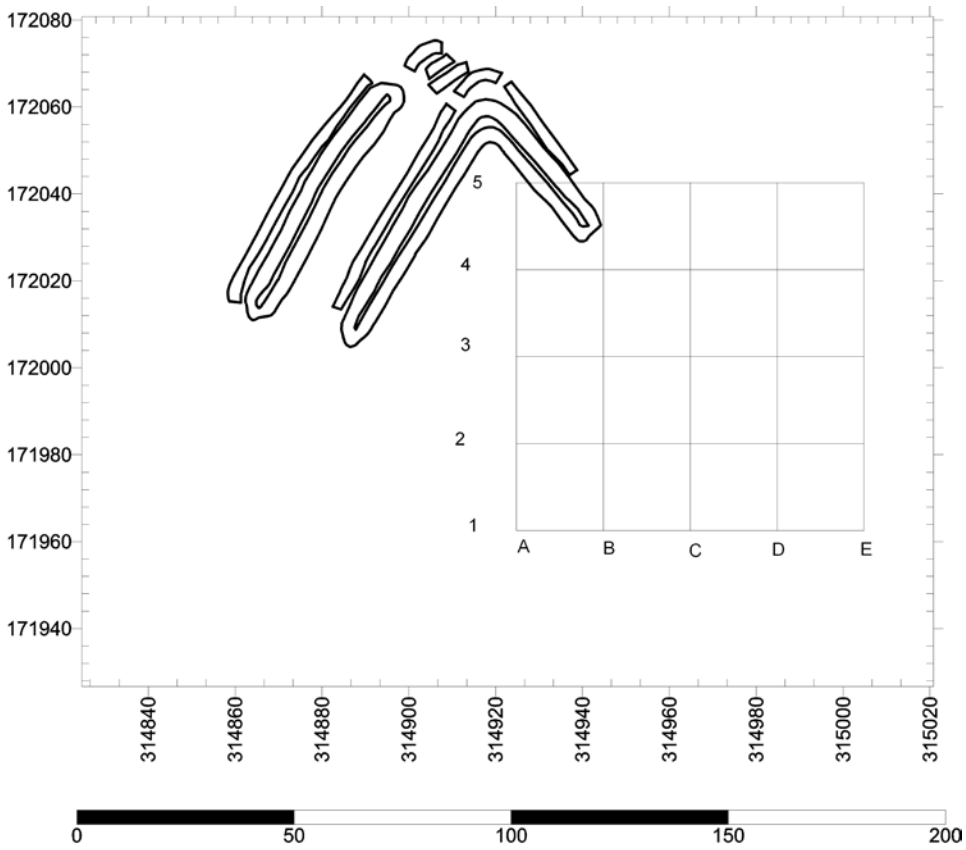

Figure 4 Survey grid.

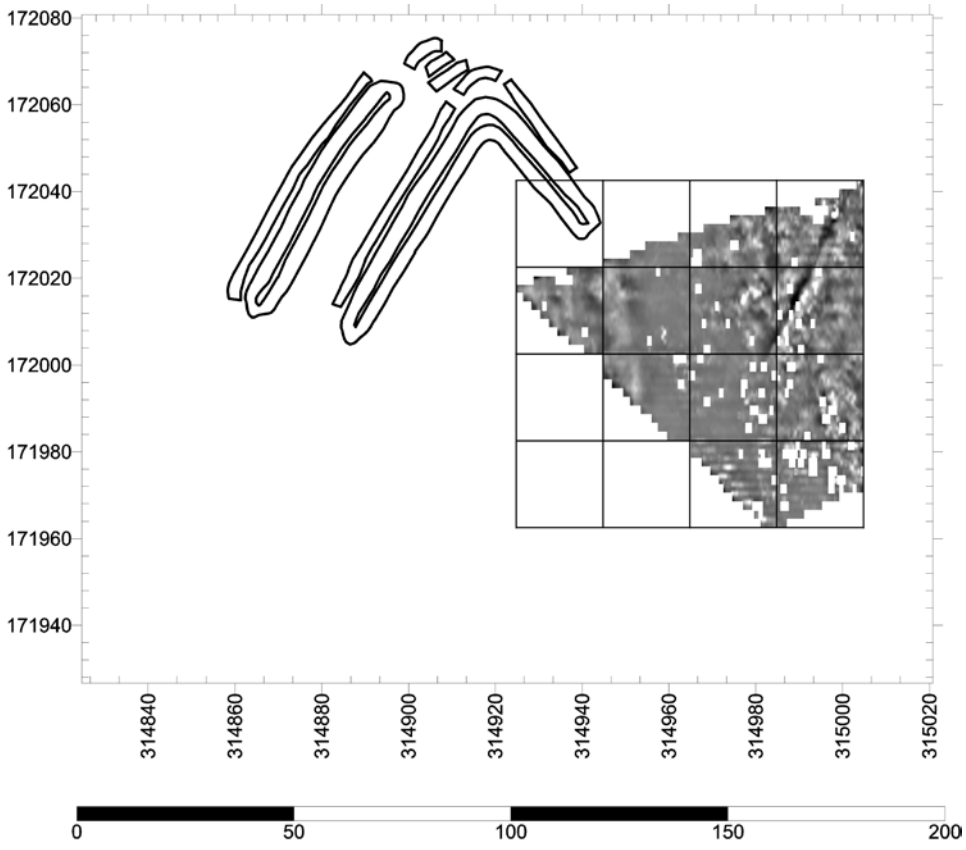

Figure 5 Plan of resistivity survey.

interval. The sample interval was 0.5m. Due to the nature of the terrain and location of fence lines the data for complete grids was collected in a zigzag walking pattern, starting in the south-east corner and traversing east. Obstacles, such as trees, were avoided using dummy log, end line and mirror line functions. Where it was only possible to survey partial grids data was collected in a parallel walking pattern, but again starting in the south-east corner and traversing east.

The data was downloaded into *Geoplot 3,* assembled into composites and clipped to three standard deviations around the mean. Despike, edge match, high pass filter and interpolate functions were applied to the data set before it was exported into Golden Software's *Surfer 7* where it was georeferenced and presented for publication (see Figure 6).

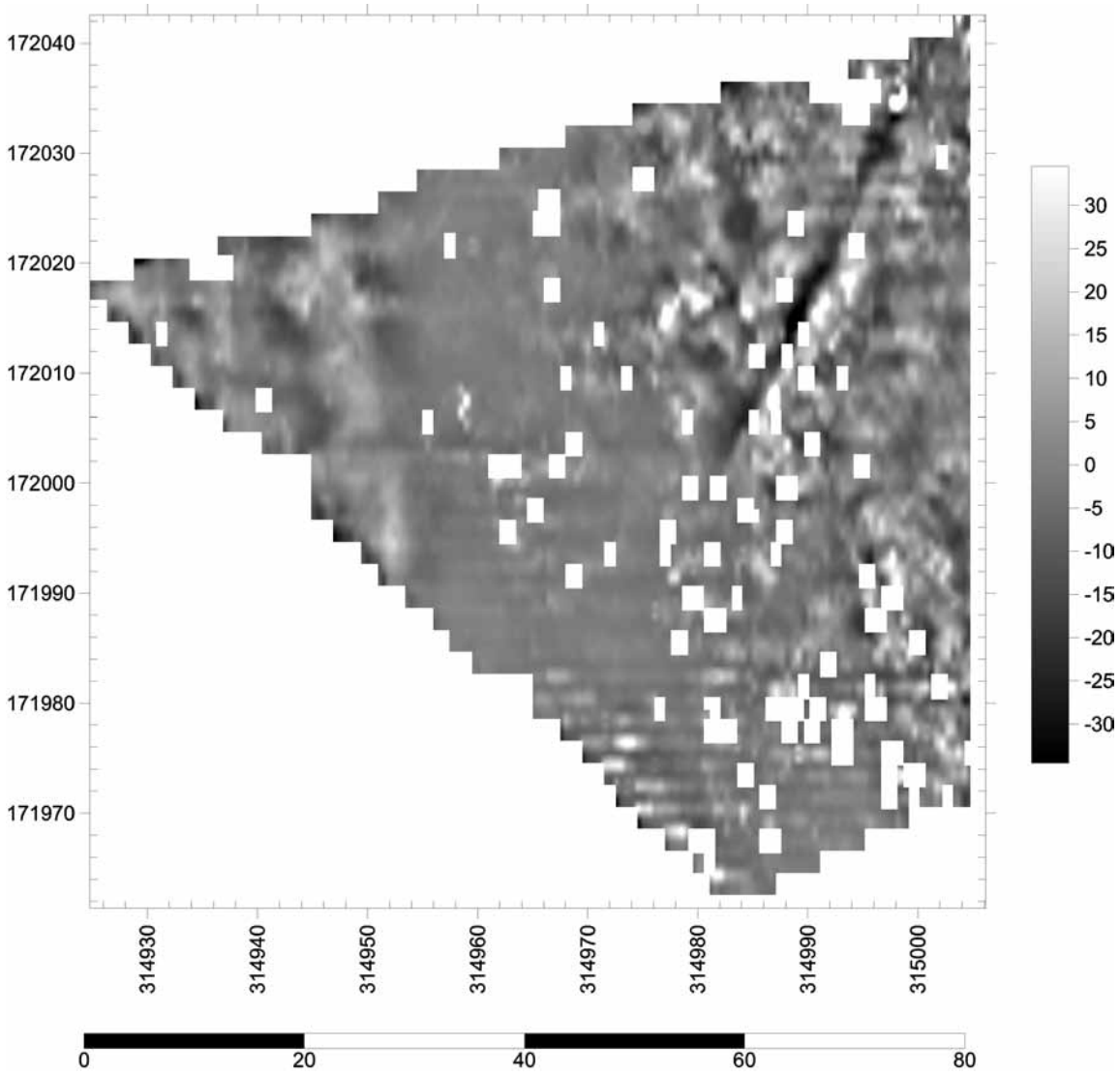

Figure 6 Resistivity plot, scale in ohms.

2.3 *Gradiometer Survey*

The extent of the gradiometer survey is shown in Figure 7. The survey was undertaken using a single Geoscan RM35 operated manually through an external trigger. The data was collected at a 0.25m sample internal with a 1.0m traverse internal. The data was collected in a parallel walking pattern starting in the south-east corner and traversing east. Obstacles, such as trees and fence lines, were avoided using the dummy log and end line functions.

The data was downloaded into *Geoplot 3,* assembled into composites and clipped at +/- 3nT. Despike, zero mean grid, zero mean traverse and interpolate functions were applied to the data set before it was exported into Golden Software's *Surfer 7* where it was georeferenced and presented for publication (see Figure 8).

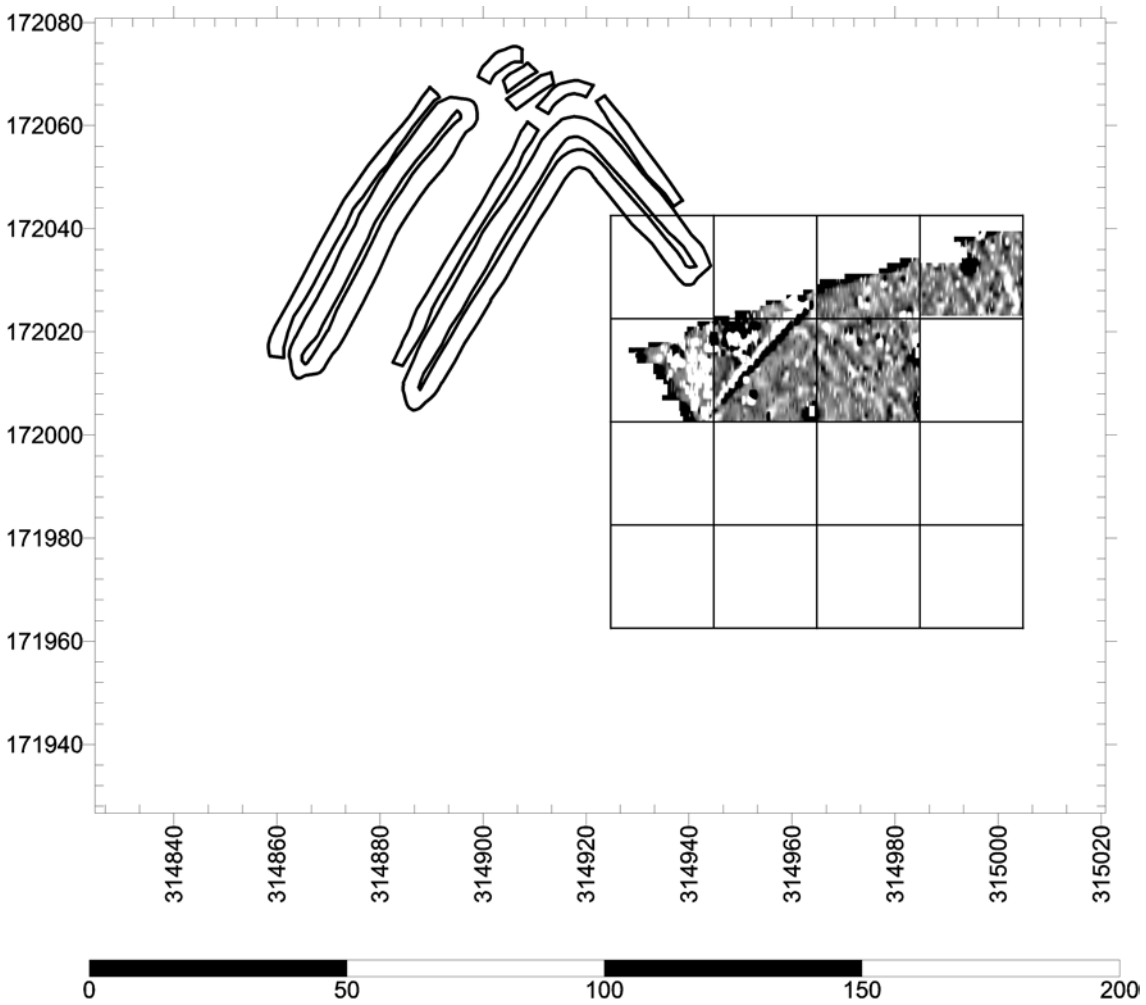

Figure 7 Plan of the gradiometer survey.

2.4 *Topographic Survey*

The topographic survey was undertaken using a Leica TCR805 total station. The data was collected by taking readings at 2.0 metre transverse and sample intervals across the entire extent of the survey grid. The X, Y and Z data was transposed into OS national grid coordinates and absolute metres OD within Microsoft *Excel* by offsetting it against fixed points which had established with the GPS. The data was then exported into Golden Software's *Surfer 7* (see Figures 3 and 9).

3 Results

3.1 *Resistivity* (see Figures 6 and 10)

Due to the thin depth of the topsoil which lies directly over bedrock the resistivity plot is strongly influenced by the underlying geology (see Figure 6). Nevertheless a series of anomalies can be identified which are likely to reflect archaeological features (see Figure 10). These consist of predominately low resistance anomalies which most likely reflect negative features cut into the shallow bedrock which have therefore accumulated a higher water content. Most prominent amongst the features identified is a strong north-east – south-west aligned linear which runs from the northern edge of the survey for around 40m before terminating within the survey area. This may be interpreted as a ditch, *c.* 1.0 – 2.0m wide. A much more defuse and inconsistent high resistance anomaly running parallel to the south could be evidence of a bank, but this is more speculative, particularly as it would be down slope. Breaks in the anomaly towards the north-east of the survey may have been produced by a field boundary (extant until the 1980s and still visible on Figure 1) which crossed the feature in this area and which has been identified on the gradiometer survey

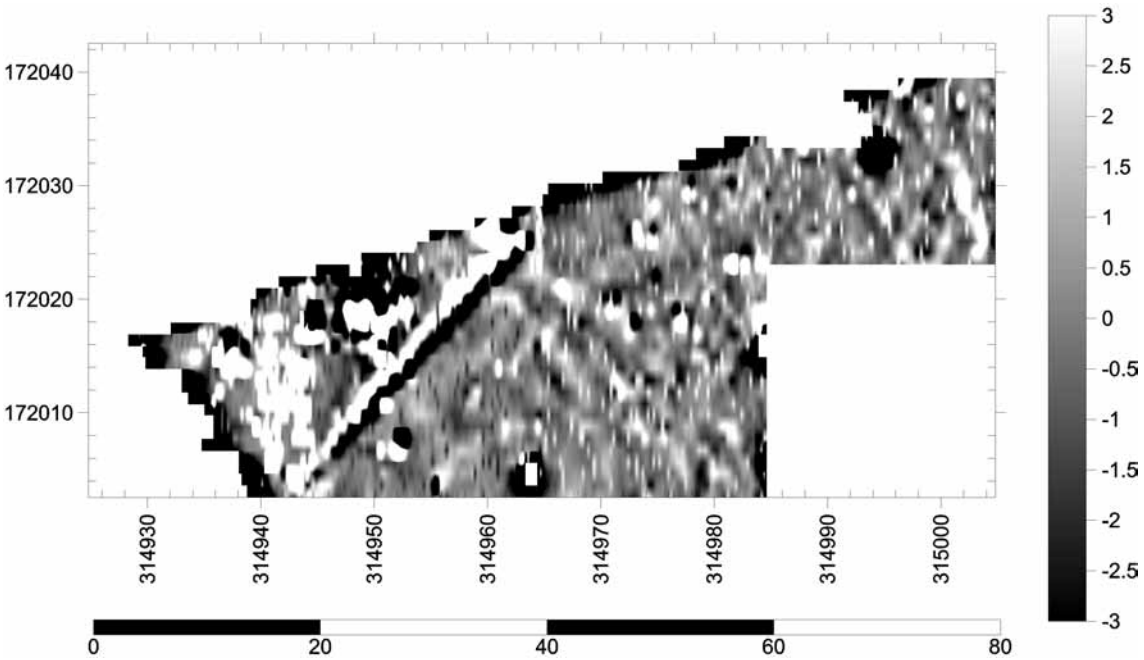

Figure 8 Gradiometer plot, scale in nT.

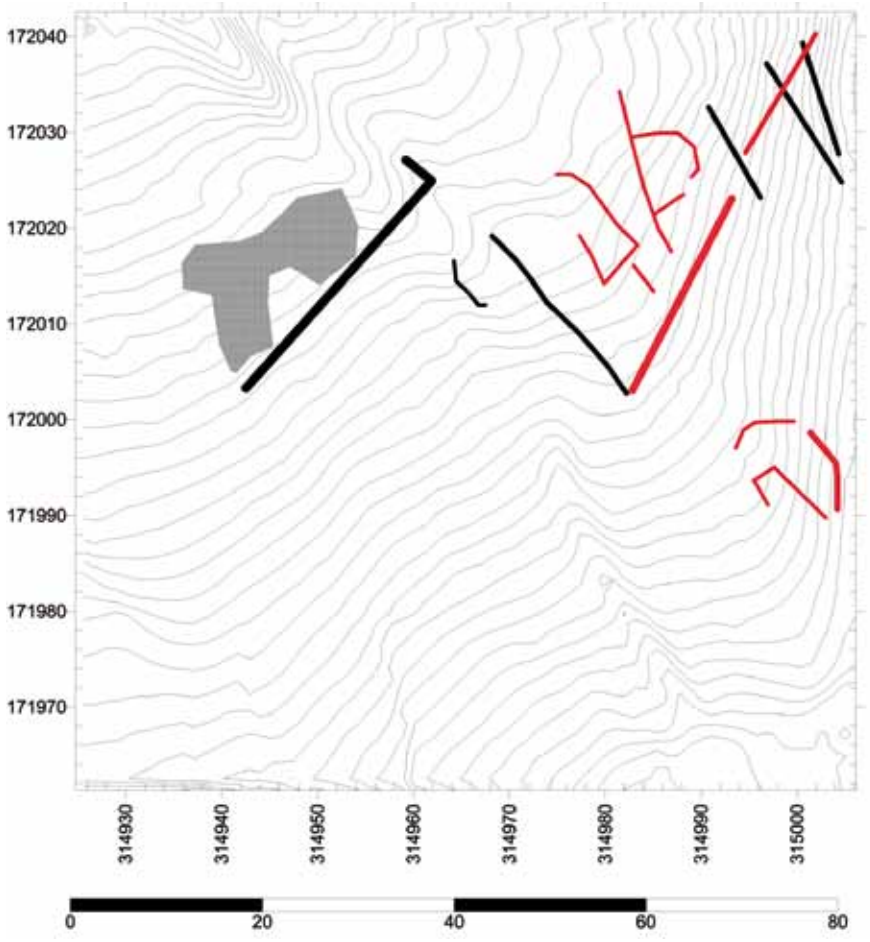

Figure 9 Contour survey (0.20m) showing resistivity (red) and magnetic anomalies (black and grey).

(see below 3.2). This field boundary may also be represented on the resistivity plot as a suitable north-west / south-east aligned high resistance linear.

Two incomplete north-west / south-east aligned sub-rectilinear anomalies may represent wall foundation trenches of small buildings. Given that the ground starts to drop off quite sharply to the south of the

linear ditch this interpretation of the southerly anomaly, which may be enclosed within a curvilinear ditch, is perhaps more speculative. Two suitable north / south aligned linear anomalies and a partial curving anomaly can also be identified, but interpretation is difficult. A diffuse north / south aligned band of high resistance with lower resistance readings to either side which roughly aligns with southern bank B is most likely to reflect the underlying geology rather than a continuity of the bank; indeed the topographic survey suggests that the latter feature runs further to the west (see Figures 3 and 9).

3.2 *Gradiometer Survey* (see figures 8 and 10)

Due to time limitations and the constraints imposed by undertaking simultaneous surveys within a comparatively small area it was decided that only those grids closest to the earthworks should be targeted.

The most prominent feature is a strong and regular dipole anomaly which runs into the survey area for a short distance on north-west / south-east alignment before turning 90 degrees and running *c.* 25m north-

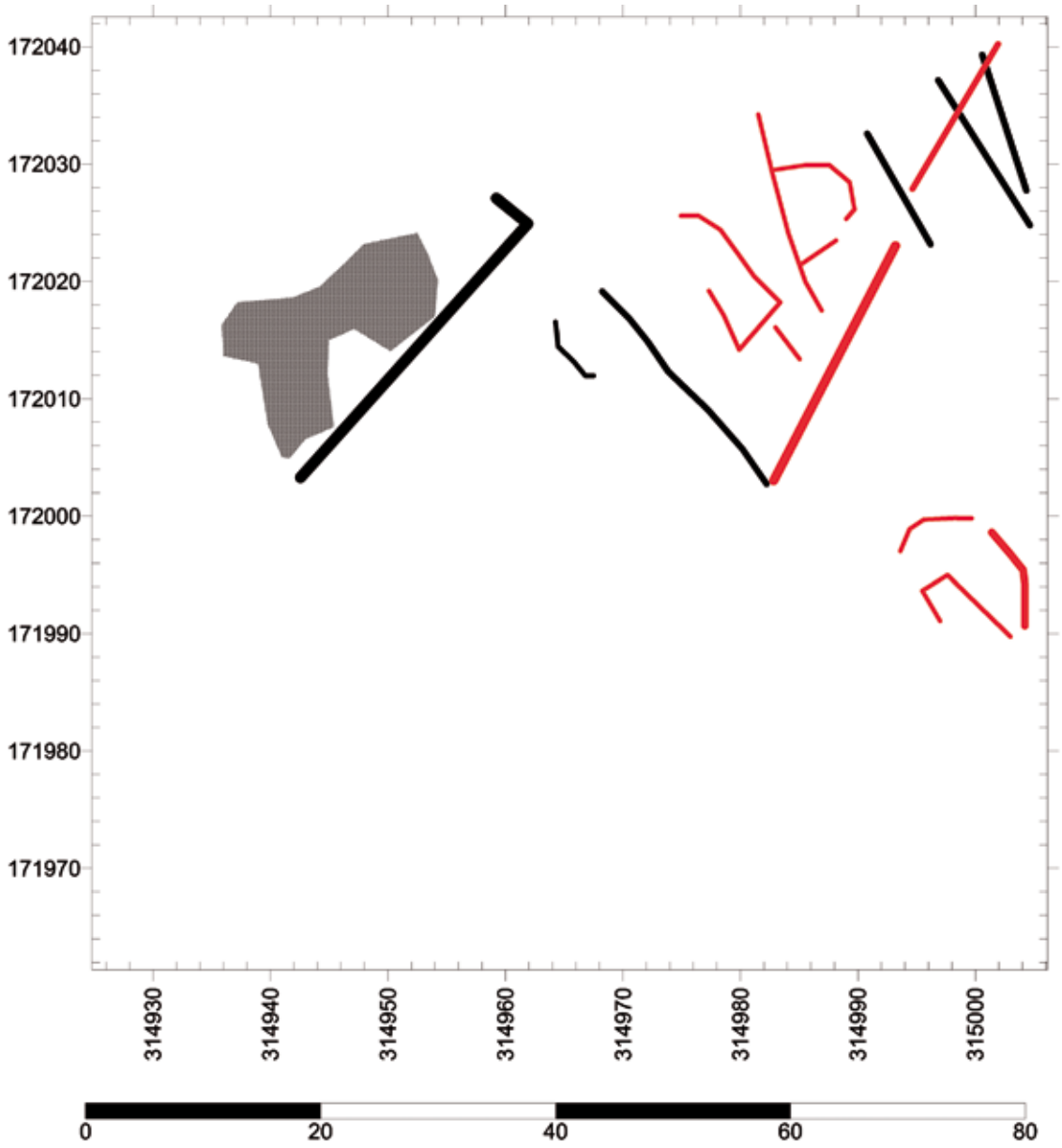

Figure 10 Interpretation of figures 6 and 7, resistivity anomalies in red, magnetic anomalies in back and grey.

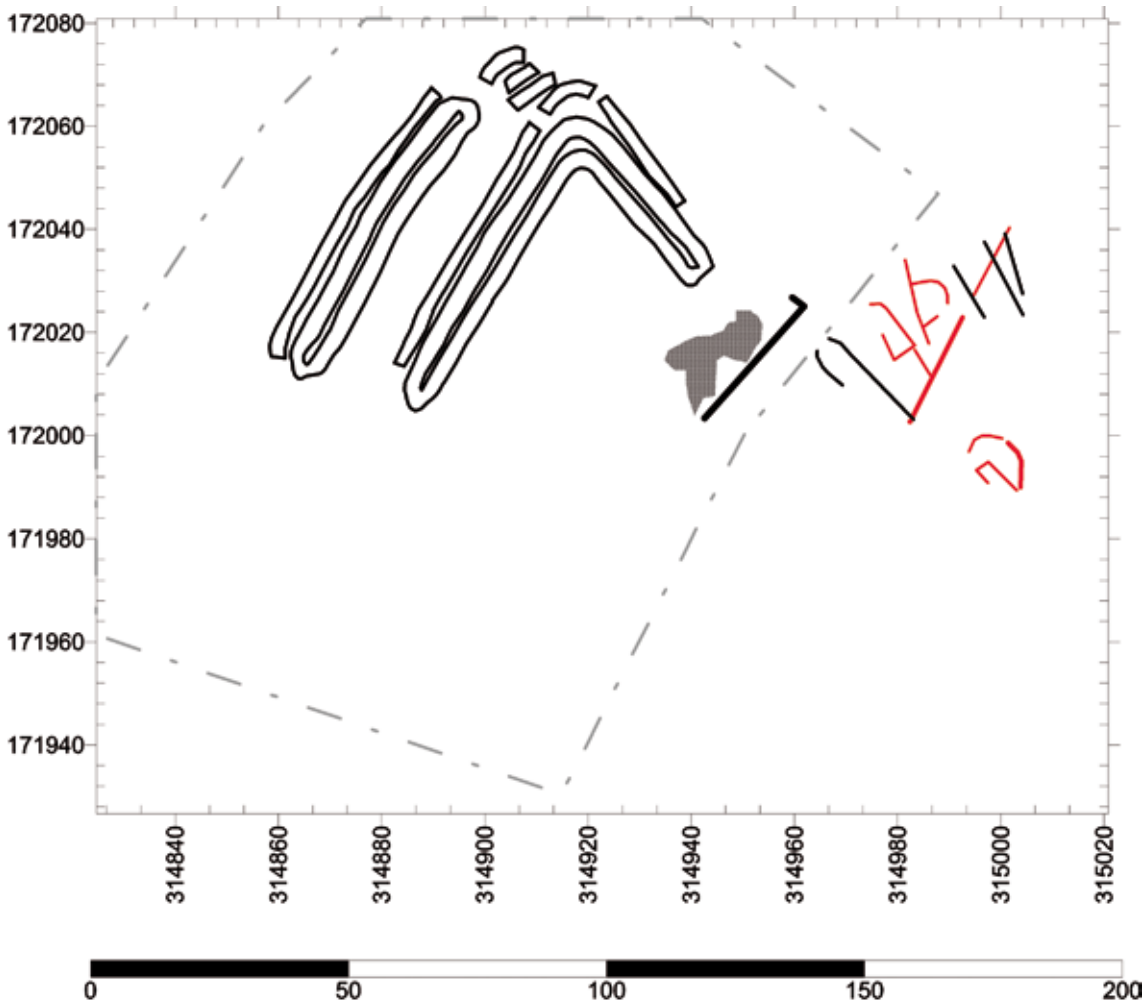

Figure 11 The southern banks (Tyn y Coed enclosure) with its scheduled area (dot-dash line) and resistivity (red) and magnetic (black and grey) anomalies.

east / south-west beyond the edge of the survey area. This anomaly may run along the ditch of southern bank B which the topographic survey suggests extends into the survey area at this point (see figures 3 and 9). Whilst it is tempting to interpret this anomaly as the return of the ditch, its strength and regularity does not support this. Indeed it may most plausibly be interpreted as a post-medieval/modern ceramic water/ drainage pipe. If this is correct then it may have been associated with the area of very high magnetic responses immediately to the north. This interpretation is not supported by the recent history of the site however, and interpretation must remain speculative until archaeological evaluation has been undertaken. Given that these features lie within the scheduled area (see Figure 11), this should be a priority.

The other magnetic anomalies are more subtle, but include two parallel linear features which may respect the possible line of the continuation of south bank B and which may be related to the ditch identified in the resistivity survey. The, now removed, field boundary which is marked on the OS map also shows clearly (see Figure 1).

3.3 *Topographic Survey* (see Figures 3 and 9)

The topographic survey was targeted at identifying what, from visible inspection, appears to be the continuation, in much denuded form, of southern bank B beyond the maximum extent recorded by the Royal Commission. Indeed figures 3 and 9 do appear to show that southern bank B runs *c.* 40m further south than indicated by the Royal Commission. Moreover a ditch roughly aligned on southern bank B can also be identified running from the south of the survey area. This can be interpreted as a hollow way or track, and may be visible as the track leading from Tyn y Coed house which is marked on an estate map of the 1750s (Glamorgan Records Office DF/26).

4 Discussion

The results of the surveys confirm that southern bank B does extend further south than has previously been indicated. They have also revealed evidence of features, including a ditch and two possible buildings which have not previously been identified. The date, function and significance of these are difficult to determine however. Their location in relation to the scheduled area around the Tyn y Coed earthworks is shown in Figure 11. The presence of strong, possibly modern, anomalies within the scheduled area is surprising, and should be subject, where possible, to further investigation.

5 Acknowledgments

I am extremely grateful to Chris Matts of the Woodland Trust of David Watts of Tyn y Coed House for their cooperation and encouragement throughout the survey. Scheduled monument consistent for the work was granted by Cadw and I am grateful to Joseph Cliff for his guidance on this. The surveys were undertaken by Leo Thomas, Rhys Morgan, Joe Lewis, Alice Forward, Matt Nicolas and Nick Wells who worked very hard in extremely difficult conditions. Technical support was provided by Tim Young, Steve Mills and Alan Lane. Special thanks to Nick Wells for his hospitality and patience.

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Table

Point	Easting	Northing
A1	314924.79	171962.56
A2	314924.79	171982.56
A3	314924.79	172002.56
A4	314924.79	172022.56
A5	314924.79	172042.56
B1	314944.79	171962.56
B2	314944.79	171982.56
B3	314944.79	172002.56
B4	314944.79	172022.56
B5	314944.79	172042.56
C1	314964.79	171962.56
C2	314964.79	171982.56
C3	314964.79	172002.56
C4	314964.79	172022.56
C5	314964.79	172042.56
D1	314984.79	171962.56
D2	314984.79	171982.56
D3	314984.79	172002.56
D4	314984.79	172022.56
D5	314984.79	172042.56
E1	315004.79	171962.56
E2	315004.79	171982.56
E3	315004.79	172002.56
E4	315004.79	172022.56
E5	315004.79	172042.56

Grid references (eastings and northings) of the survey grid points (see Figure 4).

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