FIELD EVALUATION OF SCHEDULING PROPOSALS - CEMLYN CROPMARK

Geophysical Survey

Ymddiriedolaeth Archaeolegol Gwynedd
Gwynedd Archaeological Trust

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CEMLYN CROPMARK

Geophysical Survey

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Summary

Gwynedd Archaeological Trust carried out a geophysical survey at a site first identified by cropmarks on an aerial photograph in 1990. The survey strongly suggests that the site is a Roman fortlet built over an earlier prehistoric enclosure

1. Introduction

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A small area of geophysical survey was included in the 2014-15 phase of the Cadw Grant aided *Field Evaluation of Scheduling Proposals* (G2246) project. The project aims to provide further assessment of sites of potential national importance. The Cemlyn cropmark geophysical survey is presented as a short stand-alone report.

A cropmark was identified on an aerial photograph in 1990 during drought conditions. The photograph was taken by Mary Aris and a copy was deposited in the Gwynedd Historic Environment record (HER PRN 37976 FI file 2013). It revealed a small hilltop enclosure, with hints of internal features, and two concentric banks. The site is located 1 km from the north coast of Anglesey just to the west of the farm of Penyrorsedd in Cemlyn (Figs 1 and 2)

2. Methodology

The survey was carried out by David Hopewell and John Burman on 08/12/2014 and 09/12/2014. The site was in two fields separated by a wall with a surmounted by a single strand of wire. The survey area was in a pasture field with short grass and there were no obstacles. An area of 120m x 120 m was surveyed. Weather conditions were poor with gale-force winds and rain. This did not have a significant effect on the results.

2.1 Instrumentation

The survey was carried out using a Bartington Grad601-2 dual Fluxgate Gradiometer. This 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 Grad601 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. This is a simplified description as there are other processes and materials which 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. Strong readings are also produced by archaeological features such as hearths or kilns because fired clay acquires a permanent thermo-remnant magnetic field upon cooling. This material can also get spread into the soil leading to a more generalised magnetic enhancement around settlement sites.

Not all surveys can produce good results as anomalies can 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 undetectable features. It must therefore be stressed that a lack of detectable anomalies cannot be taken to mean that that there is no extant archaeology.

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 mu-metal 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.

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.

2.2 Data Collection

The gradiometer incorporates an on-board data-logger. Readings in the surveys were taken along parallel traverses of one axis of a 20m x 20m grid. The traverse interval in the survey was 0.5m and readings were logged at intervals of 0.25m along each traverse giving 3200 readings per grid. This is double the resolution used for general prospection and is designed to resolve smaller-scale archaeological features and increase spatial accuracy.

The survey grid on the mountain was set out using a Trimble R6 GPS system to an accuracy of +-30mm.

2.3 Data presentation

The data is transferred from the data-logger to a computer where it is compiled and processed using ArchaeoSurveyor 2 software. The data is presented as a grey-scale plot (Figs. 3 and 4) 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. This is supplemented by an interpretation diagram (Fig. 5) showing the main features of the survey with reference numbers linking the anomalies to descriptions in the written report. It should be noted that the interpretation is based on the examination of the shape, scale and intensity of the anomaly and comparison to features found in previous surveys and excavations etc. In some cases the shape of an anomaly is sufficient to allow a definite interpretation e.g. a Roman fort. In other cases all that can be provided is the most likely interpretation. The survey will often detect several overlying phases of archaeological remains and it is not usually possible to distinguish between them. Weak and poorly defined anomalies are most susceptible to misinterpretation due to the propensity for the human brain to define shapes

and patterns in random background noise. An assessment of the confidence of the interpretation is given in the text.

2.4 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.

In the magnetic data 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 survey showed large-scale spatial variation in the background magnetic field caused by deeply buried bedrock (see Fig 3). The effect of this was compensated for during the initial processing using a high-pass filter. This allowed survey-wide processing to reduce de-striping (caused by the sloping field and slight differences in the calibration of the two sensors) to be corrected. Grey-scale plots are always somewhat pixelated 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 smoothed using the "graduated shade" function in ArchaeoSurveyor 2. This calculates a continuously interpolated value for every pixel. Each pixel value is calculated by generating cubic spline curves from all the data points in both the X and Y axes. 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.

3. Results

As noted above the data was processed using a high-pass filter to compensate for the effects of magnetic bedrock. Background noise levels were fairly low and magnetic anomalies were clear, the data was clipped to +-12nT. A transcription of the various features that were detected is shown on Fig. 5. A few small ferrous anomalies were detected across the survey area; these are visible as small half-black and half-white anomalies. These were not transcribed and were almost certainly the result of small pieces of iron deposit in the topsoil during manuring.

The two features visible on the aerial photograph produced clear anomalies. The outer (1) was initially interpreted as a slightly meandering sub-circular ditched enclosure, 74m in diameter; representing the outer defences of a prehistoric defended settlement (see Waddington 2013 for examples). While this cannot be entirely dismissed an alternative and more likely interpretation is discussed below. This has an in-turned entrance on the northern side and appears to have a 35m-wide break in the ditch on the western side. The inner feature is a rectangular enclosure with dimensions of 45m x 50m and strongly rounded corners probably comprising an outer ditch (2) and an inner bank or rampart (3). There is a slightly in-turning entrance in the centre of the north side. A slight in-turn on the southern side could indicate a second entrance. This is, however, masked by the field wall. The small area hidden by the wall is slightly off-centre and narrow. This suggests that a second entrance is fairly unlikely. The interior appears to contain several rectangular buildings. A small building (4) with dimensions of c. 10m x 4m is fairly clear in the north-western quadrant. A second (5) with dimensions of 12m x 12m in the centre of western half of the enclosure is mostly defined by an area of increased noise but appears to contain subdivisions on the east side. There are also some faint linear anomalies (6) on the eastern side of the field wall. The southern part of the

enclosure is occupied by a sub-rectangular area of increased noise, possibly another building (7), but no detail was detected beyond a faint indication of subdivisions. The enclosure and internal features do not have a typical Iron Age morphology and closely resemble the small Roman fortlets found across much of Britain. Two relatively local examples, at Erglodd and Waen Ddu (Hopewell 2007 and Crane and Hopewell 2008) are both about 50m square and have either one entrance or two opposing entrances.

Examples further afield produce more striking parallels. A string of four Roman installations along the north coast of Cornwall and Devon at Old Burrow, Martinhoe, Morwenstow and St Gennys are variously described as signal stations and fortlets (Fig. 6). Martinhoe is the best documented and comprises a 42m square fortlet with sub-circular outer defences The fortlet contained two barracks and was probably garrisoned by a century of soldiers (see Fig. 7). There was evidence of possible signal fires within the outer enclosure. The site was excavated in 1960-1961 by Fox and Ravenhill (1966) Pottery from the excavations dated occupation to c.AD 55-75. Old Burrow is similar (Fig. 8) and is better preserved but appears to be earlier (AD 43-54) and contained only a cookhouse and scattered post and stake holes indicative of tented accommodation (Barber 1965). No evidence of signal fires was identified here. Mason identifies these sites as signal stations associated with the establishment of control over the Bristol Channel in preparation for the assault on Wales and access to the Usk Valley (Mason 88-89). The size and layout of the sites indicates that they are fortlets as opposed to specialised signal stations and they may not be contemporary with each other. This may rule out a chain of signal stations but their locations on prominences on the coastline indicate a function connected with shipping, possibly as lookouts with a garrison to provide security along the northern coastline.

Several other mostly linear features were detected in the survey. A parallel feature on the Sothern side (8) is almost certainly a former track-way; this coincides with a current field gate. The feature turns to the south and may continue as feature 9. A series of somewhat poorly defined linear anomalies (10 and 11) skirt the southern side of the fortlet, and may indicate the remains of a road that runs around the side of the fort, perhaps indicating that is was avoiding the extant remains of the rampart. It does not connect to the fort entrance and would have run across the line of the ditch and so is later. The features could alternatively be interpreted as former field boundaries, either standing alone or flanking the possible road. Several other linear anomalies were detected. A short fragment (12) could be the remains of Iron Age activity that was presumably supplanted by the fortlet. Features 13-17 are typical boundary ditches and presumably mark the edges of fields that predate the current 18th or 19th century estate-built boundaries. Feature 18 is somewhat wider than the rest and could be a former road or trackway, feature 19 is poorly defined and is probably another field boundary but could perhaps indicate an out turning of ditch 1. Three higher magnitude anomalies 20-22 are most likely to be the result of pieces of iron. An area of increased noise could either indicate disturbance or a natural variation in the subsoil.

4. Conclusions

Tacitus' account of the Roman invasion of Anglesey is well known. The archaeological evidence for the conquest on the island is notably lacking. The only known sites are the crossing place and associated civilian settlement at Tai Cochion (PRN 28425) near Brynsiencyn and the late Roman naval base and watchtowers near Holyhead (PRN 2514, 1762 and 3809) The somewhat hypothetical

presence of a fort or fortlet at Aberffraw has never been confirmed despite several additional areas of excavation (Burnham and Davies 2010, 310).

The morphology of the site at Cemlyn strongly suggests that it is a Roman fortlet. It lies at a height of 34m OD on a hill overlooking the north coast of Anglesey with good views in all directions. It appears to be intervisible with the probable late Roman watchtower on Penbrynyreglwys 3.4km to the west. A detailed evaluation of lines of view was, however, not possible during the survey due to poor visibility. It appears to contain rectangular buildings although their overall form is not clear. The isolated linear fragments could be interpreted as elements of larger buildings similar to the barracks at Martinhoe but this could only be confirmed by excavation.

In the absence of dating evidence, the site cannot be assigned to any particular phase of Roman occupation with certainty. All of the confirmed fortlets in Wales were in use in the first few decades of the occupation and all are on, or close to, the lines of Roman roads. Given the similarity to other first century fortlets there is a strong possibility that it is part of this early network of roads and forts. If this proves to be the case it would be the first military installation from this period to be discovered on the island and would probably indicate the position of a node in the hitherto untraceable road system. Fortlets seem to have provided a range of functions. Some seem to be staging posts between larger forts; others such as Erglodd were associated with mining. The position of the fortlet overlooking Cemlyn Bay and the north coast of Anglesey suggests a function associated with shipping. This is emphasised by its similarity to the Bristol Channel fortlets, with the outer defences perhaps indicating a function as a signal station. Fortlets were also a significant part of the Antonine garrisoning of Scotland. Breeze (1982, 100-101) notes that these fortlets each held 40 to 80 men with garrisons out-posted from nearby forts. If this pattern of garrisoning was used on Anglesey the fortlet at Cemlyn, being 36km from Segontium, would be very isolated. It is therefore likely that it was associated with an, as yet undiscovered fort, somewhere in central Anglesey.

Given its position, close to the watch-towers and late naval base, an alternative interpretation as part of the late coastal defences cannot be dismissed.

The site is currently in improved pasture and the fields have almost certainly been ploughed. Short-term threat levels are therefore low. There is probably a long-term threat from further ploughing, a few stones, probably not *in situ*, are exposed at ground level on the top of the hill and the rampart is visible as a very low, ploughed down earthwork. The site is potentially of great importance to the understanding of the Roman occupation of Anglesey. The geophysical survey suggests there is survival of some buildings within the fortlet, indicating that the site is likely to be of national importance. Confirmation of its interpretation as a Roman fortlet , its level of preservation and its allocation to a phase of Roman activity can, however, only be produced by excavation. The site should be seen as having a high research priority and is potentially of great importance to the interpretation of the surrounding landscape.

5. Acknowledgements

The project was grant-aided by Cadw. Gwynedd Archaeological Trust would like to thank Mr Williams at Penyrorsedd for permission to carry out the survey. Thanks are also due to John Burman who helped with the survey in difficult weather conditions and to Mary Aris for reporting the site to the HER.

6. References

Barber, J. 1965. 28th Report on Archaeology. Transactions of the Devonshire Association. P.102 – 104

Breeze, D.T. 1982. *The Northern Frontiers of Roman Britain*

Burnham B.C. and Davies J.L. 2010. *Roman Frontiers in Wales and the Marches*

Collingwood R.G. and Richmond I.A. 1969. *Archaeology of Roman Britain*

Fox, A. and Ravenhill, W.L.D. 1966. Early Roman Outposts on the North Devon Coast, Old Burrow and Martinhoe. *Proceedings of the Devon Archaeological Exploration Society*. 24. P.13-35

Frere, S.S. + St Joseph, J.K.S. 1983*. Roman Britain from the Air.* P.137 - 139,

Hopewell, D. 2007. *Roman Fort Environs, Geophysical Survey at Trawscoed Roman Fort and Erglodd Fortlet* (GAT report 667)

Hopewell, D. and Crane, P.2008. *Waun Ddu Roman Fortlet. Topographical and Geophysical surveys* (Cambria Archaeology report 2008/30)

Mason D. J.P. 2003. *Roman Britain and the Roman Navy*

Waddington, K. 2013. *The Settlements of Northwest Wales*

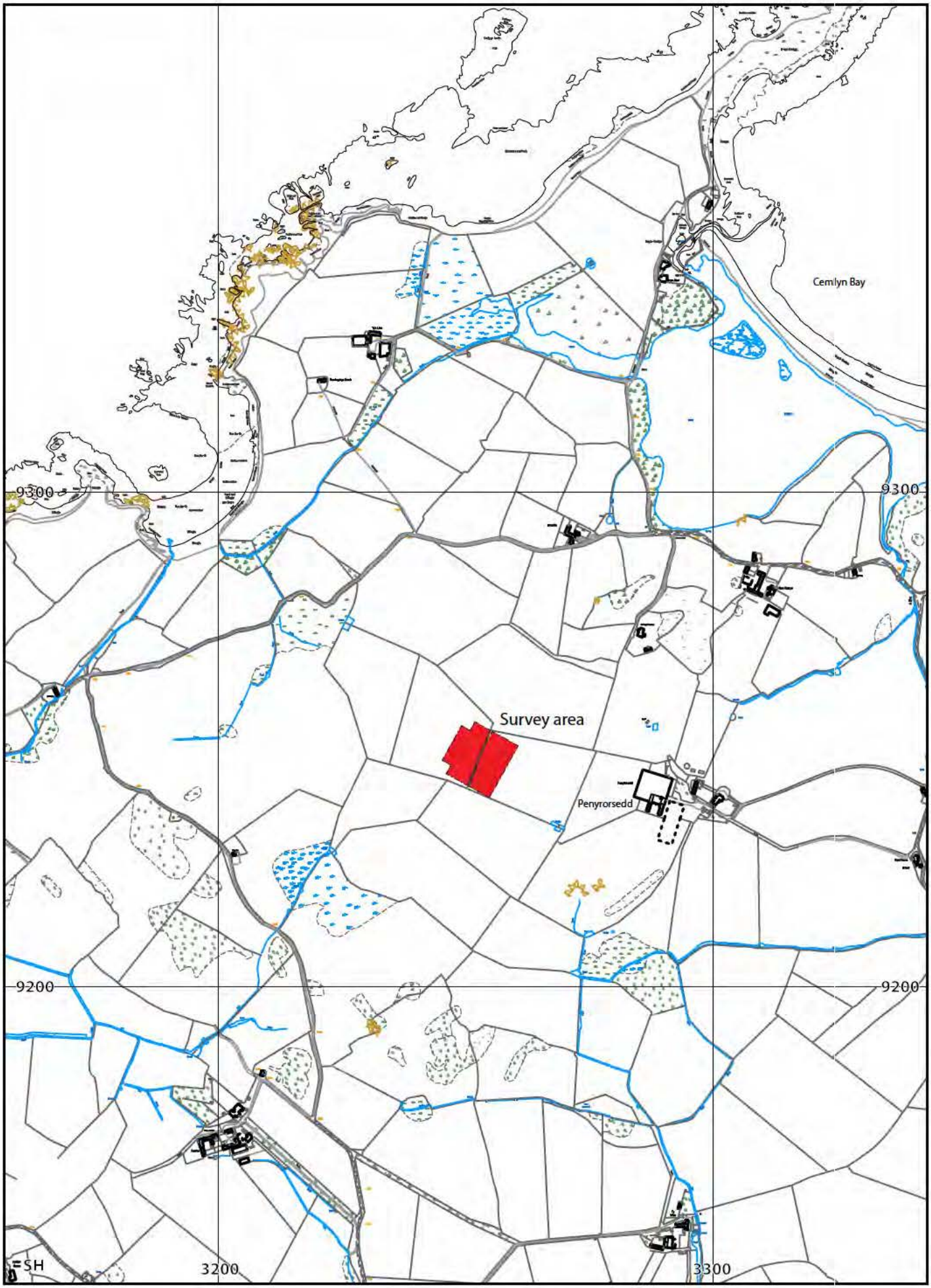

Fig. 1 Location of survey area

Fig. 2 Cropmark south of Cemlyn (PRN 37976 Mary Aris 1990)

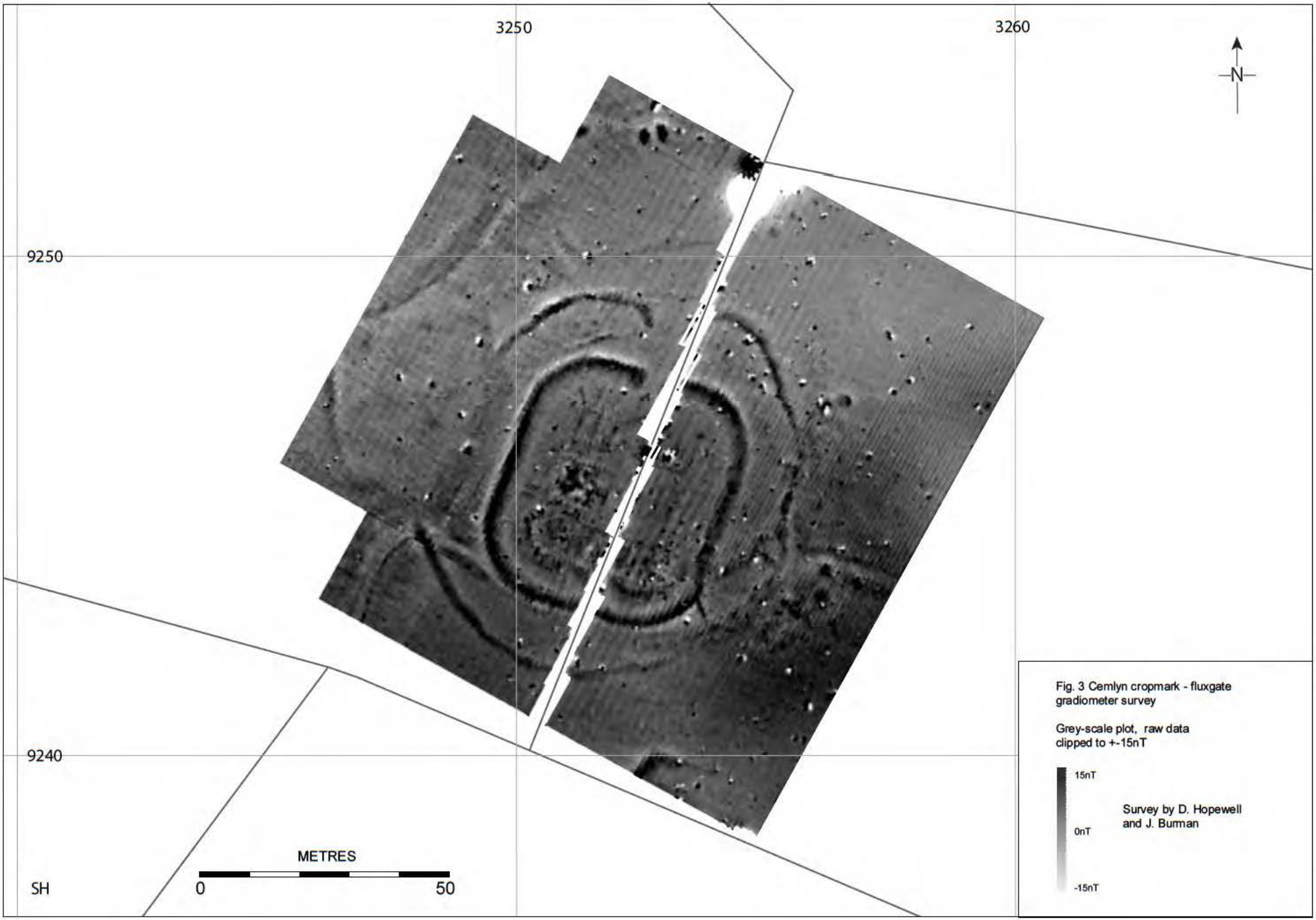

Fig. 3 Cemlyn cropmark - fluxgate gradiometer survey

Grey-scale plot, raw data clipped to +-15nT

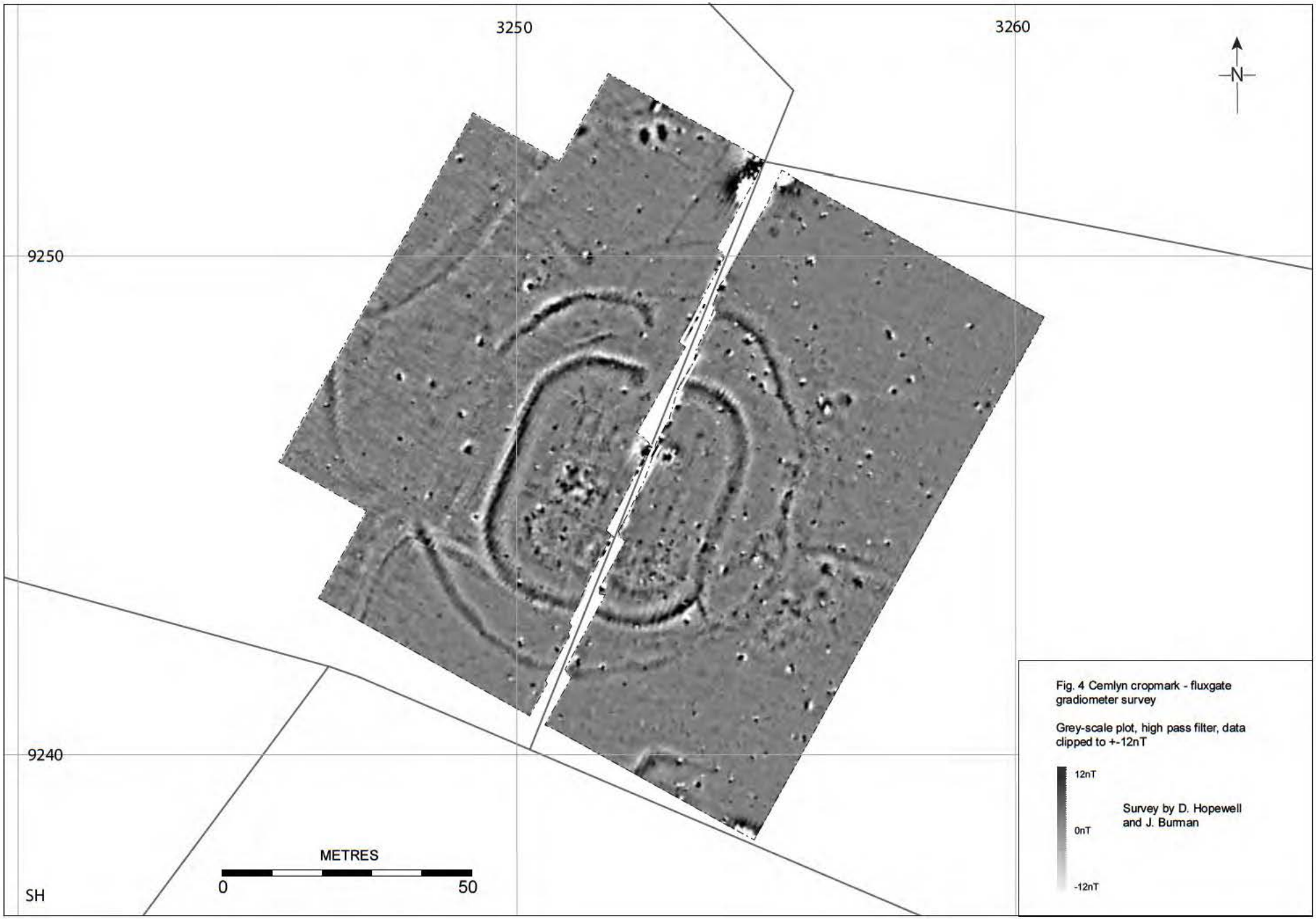

Fig. 4 Cemlyn cropmark - fluxgate gradiometer survey

Grey-scale plot, high pass filter, data clipped to +-12nT

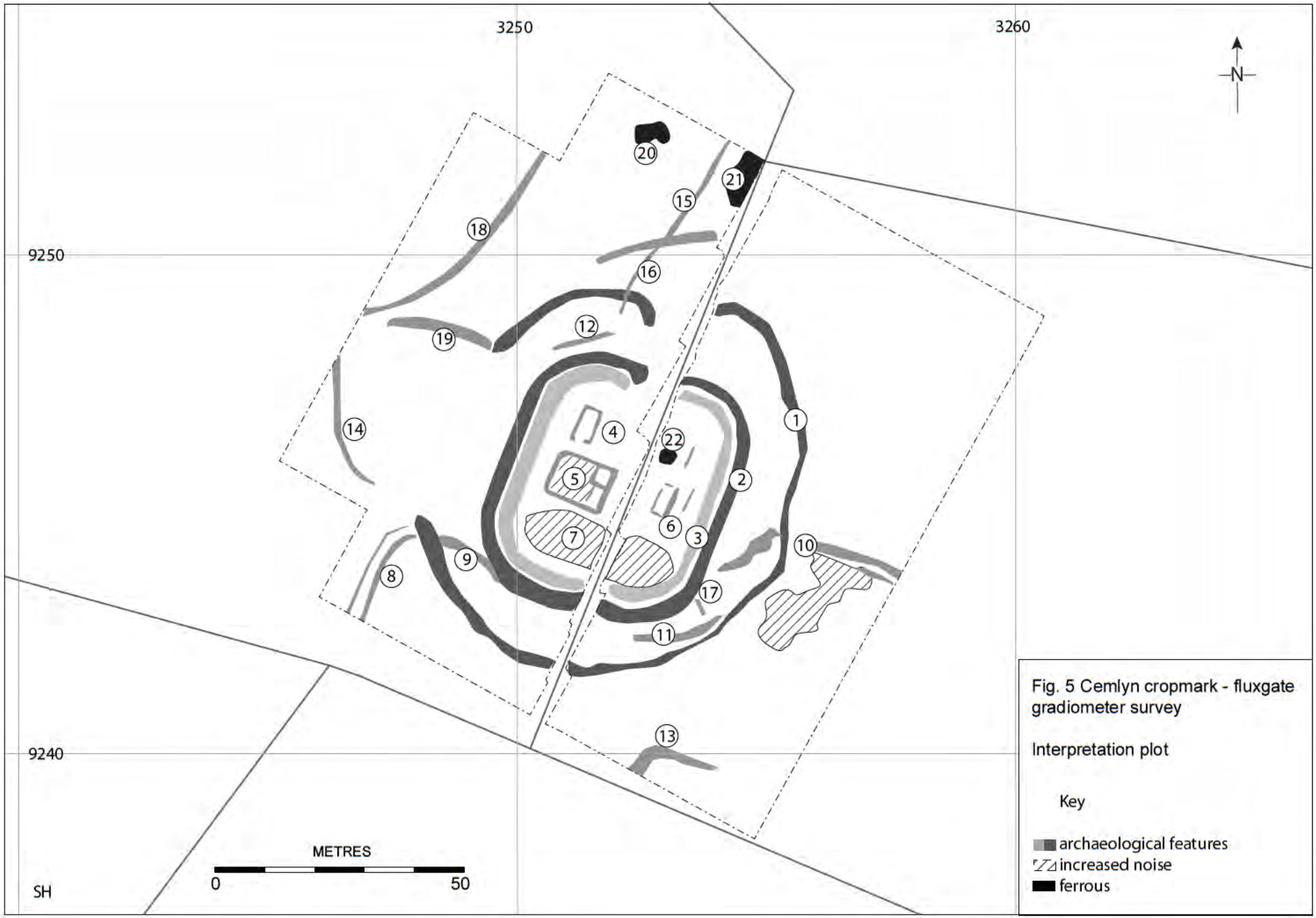

Fig. 5 Cemlyn cropmark - fluxgate gradiometer survey

Interpretation plot

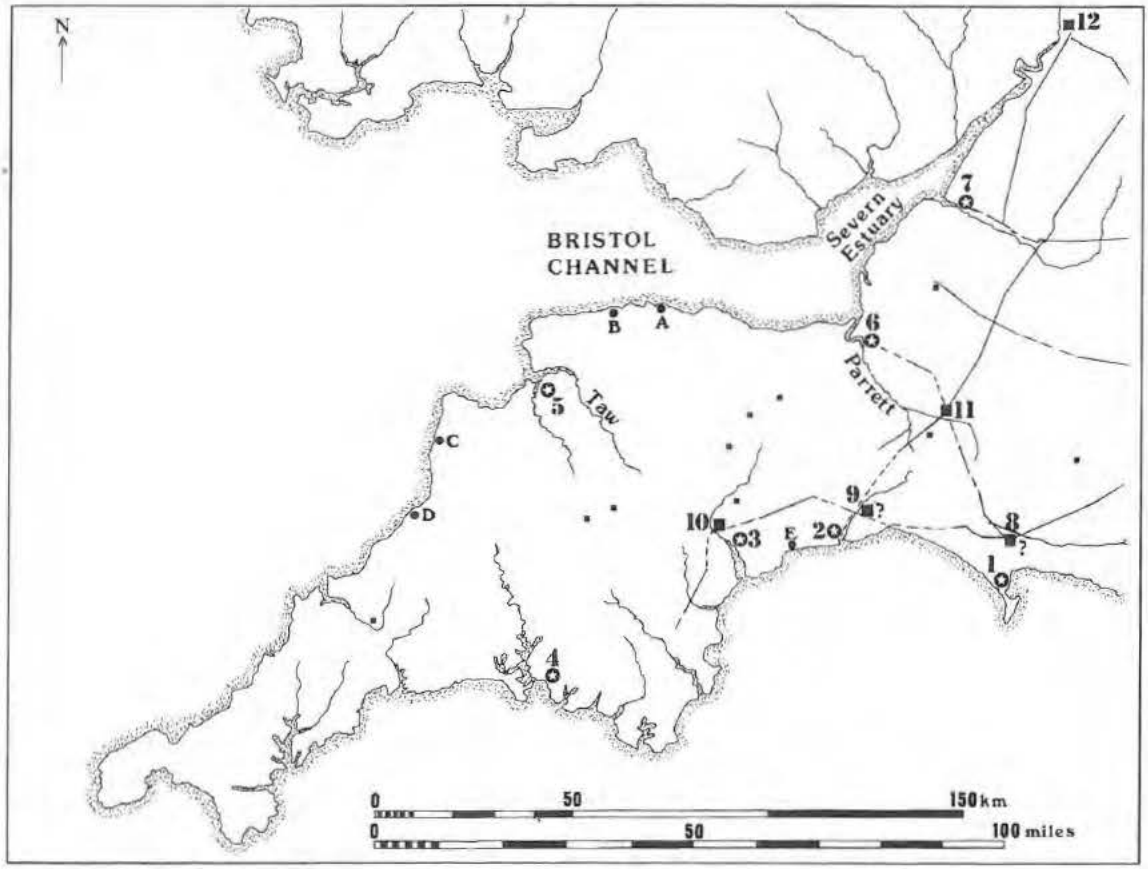

Fig. 6 *Map of the south-west and the Bristol Channel showing location of early military bases and lookout/signal stations. KEY:* Military harbours: *1 - Weymouth, 2 - Seaton, 3 - Topsham, 4 - Plymouth, 5 - Barnstaple, 6 - Bridgwater, 7 - Sea Mills. Signal stations: A - Old Burrow, B - Martinhoe, C - Morwenstow, D - St. Gennys, E - High Peak.* Legionary bases: *8 - Dorchester, 9 - Axminster, 10 - Exeter, 11 - Ilchester, 12 - Kingsholm. Auxiliary forts indicated by small squares*

From Mason 2003 Fig. 30

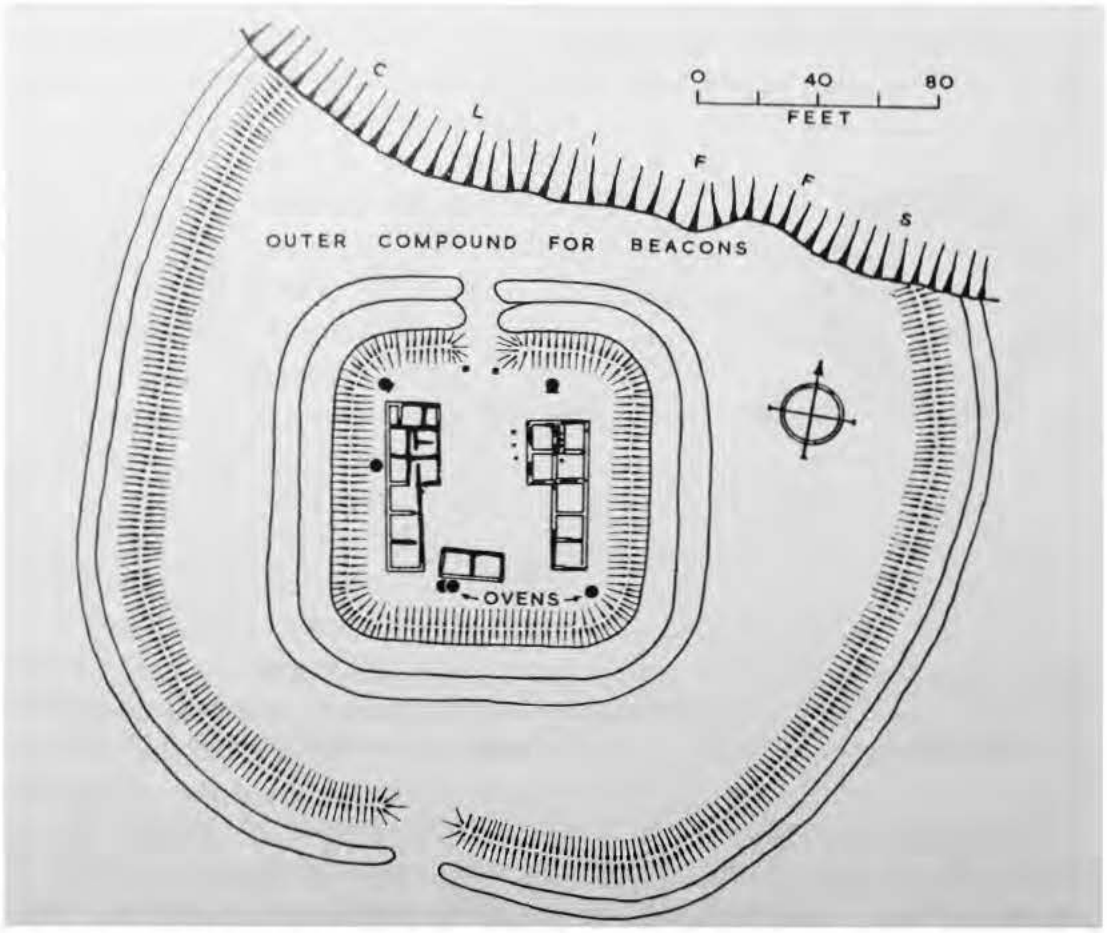

Fig. 7 Plan of the Neronian fortlet at Martinhoe (from Collingwood and Richmond 1969, Fig 22)

Fig. 8 Old Burrow fortlet 1948 (from Frere and St Joseph 1983 plate 81)

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