CASTELL PEN-YR-ALLT, LLANTOOD, PEMBROKESHIRE: GEOPHYSICAL, TOPOGRAPHICAL AND PHOTGRAPHIC SURVEY

Prepared by Dyfed Archaeological Trust
for Cadw

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SUMMARY

Castell Pen-yr-Allt (NGR SN 1578 4203) is a Scheduled Ancient Monument (PE 169) recorded as an Iron Age defended enclosure later reused as a medieval motte and bailey castle. An application was successfully made to Cadw for grant-aid to fund the recording of the site to ascertain the extent of severe erosion caused by badger setts within the defensive banks, which has been compounded by sheep-scraping on the bare stone and earth bank exposed by the badgers.

The project aimed to make a record of the site, which would lead to the production of a report, website entry and archive of the project, and provide information to assist future management plans for the monument. A geophysical (magnetometry), topographical and photographic survey of Castell Pen-yr-Allt was carried out with successful results. The topographic survey covered c.1.3ha and the geophysical survey, c.0.36ha.

The magnetometry survey demonstrated the presence of a number of buried features, which have been illustrated, described and interpreted. Many curved linear feature revealed complex multivallate defences around the north side of the enclosure, comprising ditches and stonework. A ditch also curved around the northern side of the motte some 20m from its base, and a buried wall was also seen curving around the north of the motte near to its base.

Multivallate inland promontory forts such as this are known to exist in Wales and the West Country as Early-Medieval sites that re-used earlier Iron Age hillforts (Edwards et al. 2005). It seems that this site may therefore show a continuity of development and use from the Iron Age through to the medieval era when the motte is likely to have been raised.

Other features shown in the geophysics results were buried walling along the southeast and southwest edges of the enclosure, other probable areas of buried stonework, and probable in-filled pits. North of the motte, faint positive ring shapes could be seen, including one coinciding with an observed slight earthwork. These are potentially the footprints of round-houses but it is also possible that they are marks left by large animal feeders, which are known to have been positioned in the enclosure within the last twenty years.

Badger damage at Castell Pen-yr-Allt is severe and ongoing. The information presented in this report can now be used to develop mitigation strategies and a management plan for the Scheduled Ancient Monument, such as fencing-off the worst affected areas in order to prevent access to farm animals that have been observed to compound the badger damage.

INTRODUCTION

Castell Pen-yr-Allt is a Scheduled Ancient Monument (PE 169) and is also recorded in the HER and NMR databases (PRNs 1170; 1171; NPRN 304075; also recorded as Castell-yr-Allt). From its form the monument appears to be an Iron Age defended enclosure later reused as a medieval motte and bailey castle.

No geophysical survey is known to have previously taken place at the site, but it was visited and heritage management information was written for a Heritage Management Plan under the Tir Gofal farm subsidy scheme (Poucher 2006). A small excavation also took place in 1966 but no finds or features came to light (Talbot 1966).

During site visit late in 2016 it was observed that badgers were causing severe erosion to the defensive banks of Castell Pen-yr-Allt, compounded by sheep scraping on the bare stone and earth bank exposed by the badgers.

Because of this damage, an application was successfully made to Cadw for grant-aid to fund the recording of the site before further destruction took place. It was decided that the record should take the form of topographical, geophysical (magnetometric) and photographic surveys.

The **aim** of the project was:

1. to make a record of the site

The **objectives** of the project were:

1. to provide information to assist in future management plans
2. to produce a report and archive of the project

The wider potential value of this project was that it could address general research themes for Later Bronze Age, Iron Age and medieval Wales such as settlement, land use and regionalitly, and for the medieval period, earthwork castles. These have been set out as objectives in the *Research Framework for the Archaeology of Wales*.

The topographic survey covered approximately 1.3ha and the geophysical survey, *c.*0.36ha (Figure 2). This report is fully representative of the results of the fieldwork and is complemented by an entry on the Dyfed Archaeological Trust website. All data recovered during the fieldwork will be collated into a site archive structured in accordance with specifications in Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation (Brown 2011), and the procedures recommended by the National Monuments Record, Aberystwyth.

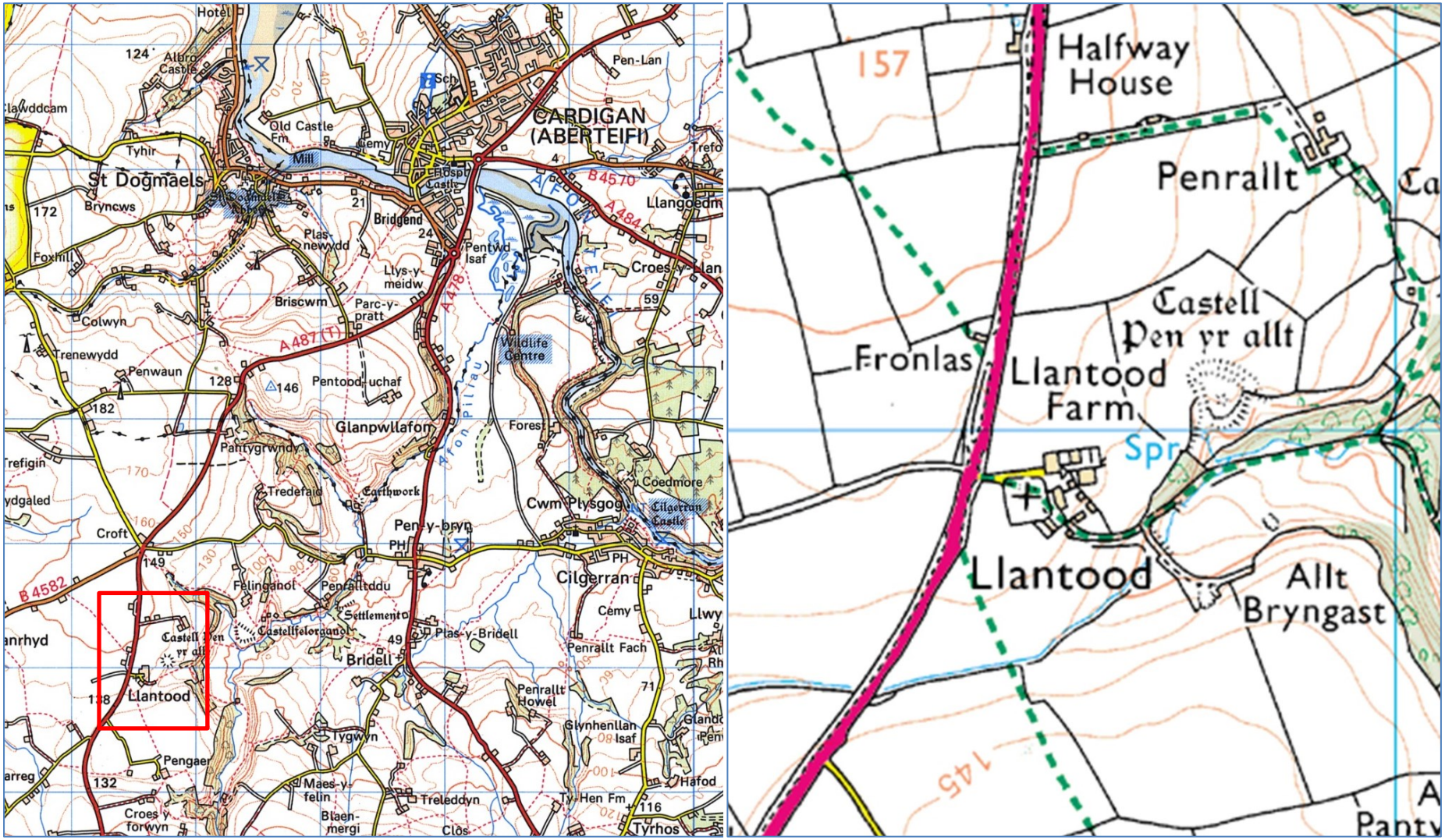

Figure 1: OS Location Maps for Castell Pen-yr-Allt, Llantood (1:50,000 on left and 1:25,000 on right). The map on the right is an enlargement of the area in red box in the map on the left.

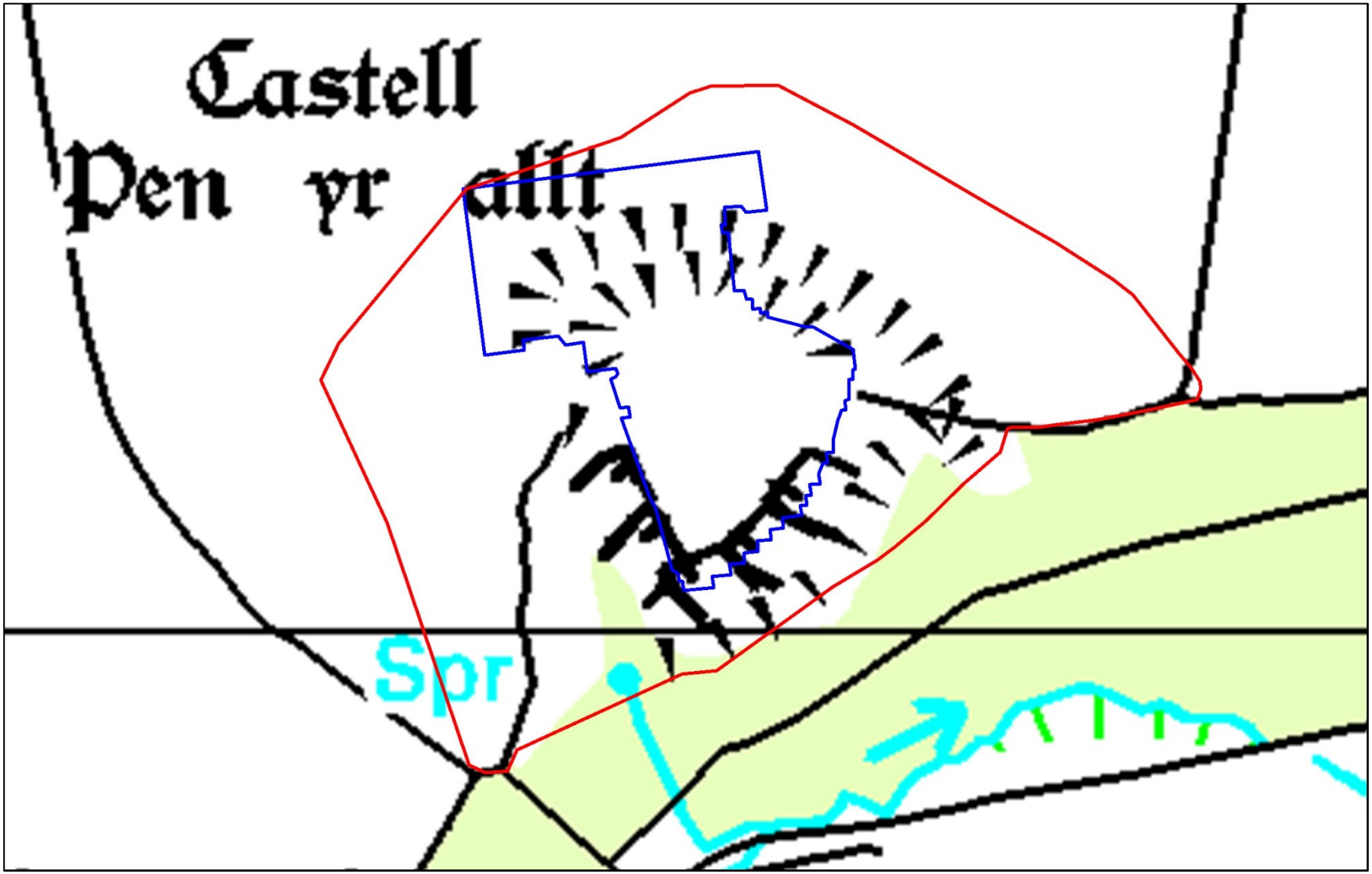

Figure 2: OS 1:10,000 Scale map showing outlines of actual areas of topographical survey (red) and magnetometry survey (blue), superimposed on the modern OS 1:10,000 map

SITE DESCRIPTION

Castell Pen-yr-Allt (SN 1578 4203) is located in the hamlet of Llantood, three miles southwest of Cardigan in Pembrokeshire. Llantood has as its nucleus a church dedicated to St Illtud (PRN 5317), but other than this the settlement has no amenities and consistes only of a few farms and houses. Castell Pen-yr-Allt lies only 200m east of the church with Llantood Farm in between them. Sited on an inland promontary 130m above sea level, the monument is naturally well protected to the southwest by steep valley sides. The interior of the site is under rough pasture and the banks have been recently cleared of scrub but there are still some gorse bushes present. The steep valley sides are under deciduous woodland, and there are also plenty of deciduous trees growing on the enclosure perimeter to its east, south and west.

The bedrock is mudstone, of the Nantmael Mudstones Formation, dated to the Ashgill Series. There are no overlying superficial geological deposits.

The monument sits on the eastern edge of a Registered Historic Landscape Charecterisation Area (HLCA): No. 413 – 'Crossway – Glanpwllafon'. This HCLA is described as a large area within modern Pembrokeshire comprising good mainly pastoral agricultural land, with a settlement pattern mainly of dispersed farmsteads and dwellings.

The description of the HCLA also contains details concerning Llantood Farm: *Llantwyd was not a manor at this time* [the 17th century]*, and reckoned only as a vill. However, it has a fine motte-and-bailey castle, which is perhaps a re-used hillfort, at 'Castell Pen-yr-allt', although without a recorded history, it shows signs of having been fortified in stone. It lies within 400m of Llantwyd parish church, and the two may be contemporary Anglo-Norman institutions. It appears, therefore, that Llantwyd was an early manor that 'failed'.*

Castell Pen-yr-Allt was visited and described in the prehistoric defended enclosures project (Murphy *et al.* 2007) and in a Tir Gofal heritage management assessment (Poucher 2006). A summary compiled from these descriptions along with that found the NMR database and observations made during this project is as follows:

The enclosure is generally polygonal, about 52m north-west to south-east by 50m, tapering to about 30m on the north-west. Ditches on its northeast and southwest sides appear to be natural streambeds that were deliberately deepened. The southwest one of these was also enhanced by being rock-cut in a fairly straight line roughly north-south with a vertical side up to 6m high. This rock cutting continued in a straight line along the southeast side of the enclosure, overlooking the natually steep valley side. It is these sheer rock-cut sides that give the enclosure its polygonal shape, for elsewhere its defences follow a curved path.

Where the enclosure faces rising ground, to the north-west, the ramparts are thought to have been doubled, but they have almost been levelled by in-filling and ploughing. A curving rampart survives only along the northeast and north sides, as well as a short section on the northwest side, overlooking a short section of ditch with two vertical rock-cut sides. Set rather off centre within the southern part of the enclosure is a ditchless steep-sided sub-circular mound, some 20m across and 2m high, with a summit about 9m across and a central depression of possible later disturbance. The motte consists of earth and stone, some stone having the appearance of tumbled masonry although no mortar is visible. The motte is mostly grass, recently cleared of scrub which has revealed a small area of erosion on top exposing earth and stonework. It is possible that the mound represents the remains of a freestanding circular masonry tower. The slight remains of drystone walling are also evident along the top of the vertical rock-cut sides of the enclosure. The walling on the short section of bank at the northwest corner of the enclosure is more substantial and looks as though is could be the remains of a rectangular building.

A drawing by G.H. Williams in 1977 (based on a plan of 1969) gives the most-detailed view of the site to date. Many of the features described above are included and topographical sections are also shown (Figure 3)

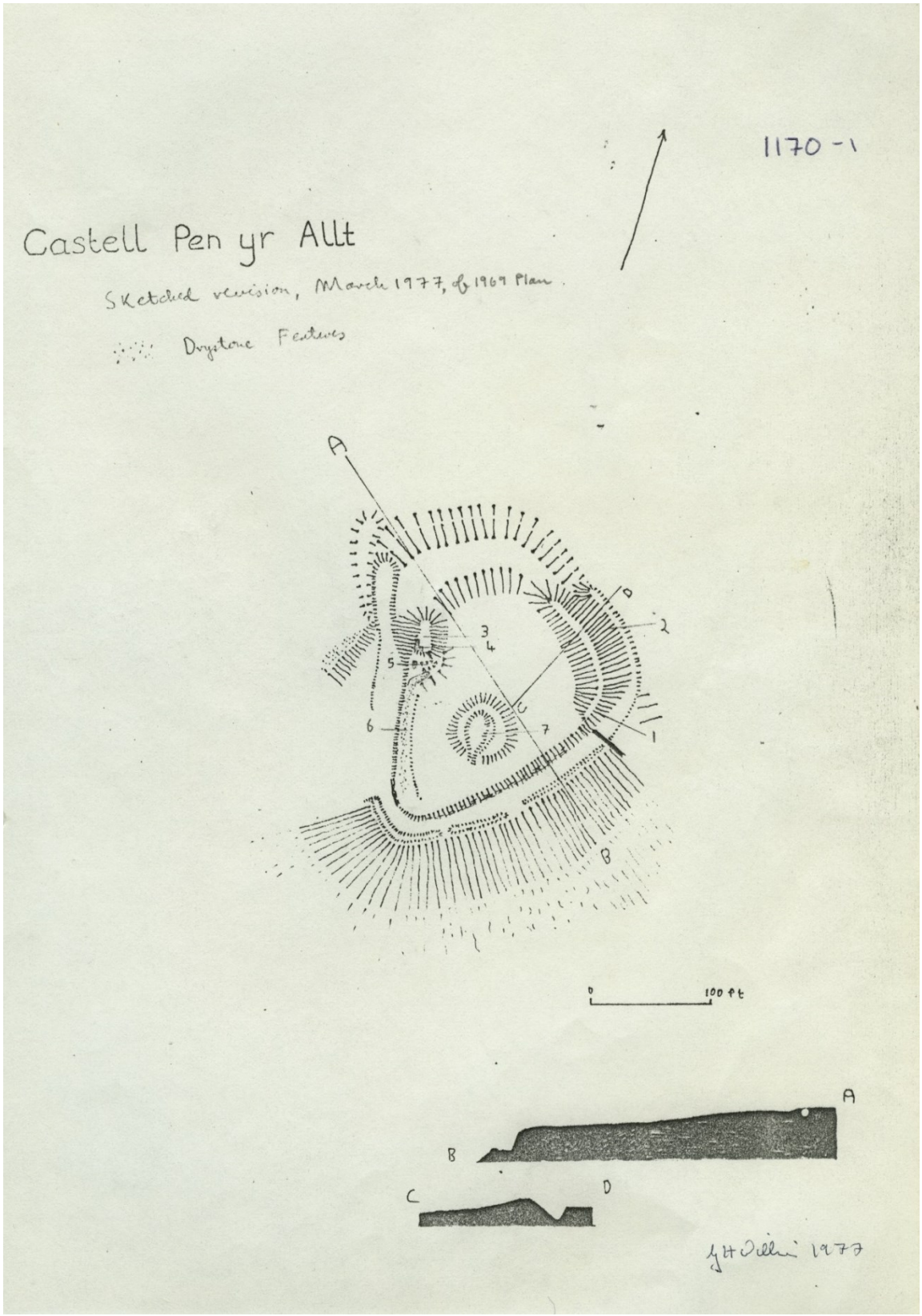

Figure 3: Sketch of Castell Pen-yr-Allt made by G.H. Williams in 1977

A small excavation is known to have taken place at the Castell Pen-yr-Allt, reported on in 1966. The report is brief: *An eroded section at the N.W. of the bank of the ringwork at Castell Pen-yr-Allt, Llantood was trowelled but……. No defence or revetment features were found* (Talbot 1966).

Aerial photographs taken from 1989 onwards by DAT and the RCAHMW have been examined and do not seem to reveal any additional features.

The first available map of Castell Pant-y-Phillip was the Llantood Parish tithe Map of 1839 (Figure 4), which shows the monument encased with a field boundary and wooded (field number 164 on the map and part of 166).

The first edition 1:2500 Ordnance Survey (OS) map of 1889 shows detail of the earthworks and trees only within the enclosure, and also a small building or enclosure just ouside the earthworks to the east (Figure 5). The next 1:2500 OS map, 1907 (Figure 6), shows the motte, and additionally the mound to its northwest that is now interpreted as a ruined building and/or part of the rampart. The depiction of the earthwork gradually changes slightly in subsequent maps: The depiction of earthworks on the north side is reduced somewhat but still appears on mapping today even though aerial photographs show that in that area they were filled in and flattened by at least as early as 1989.

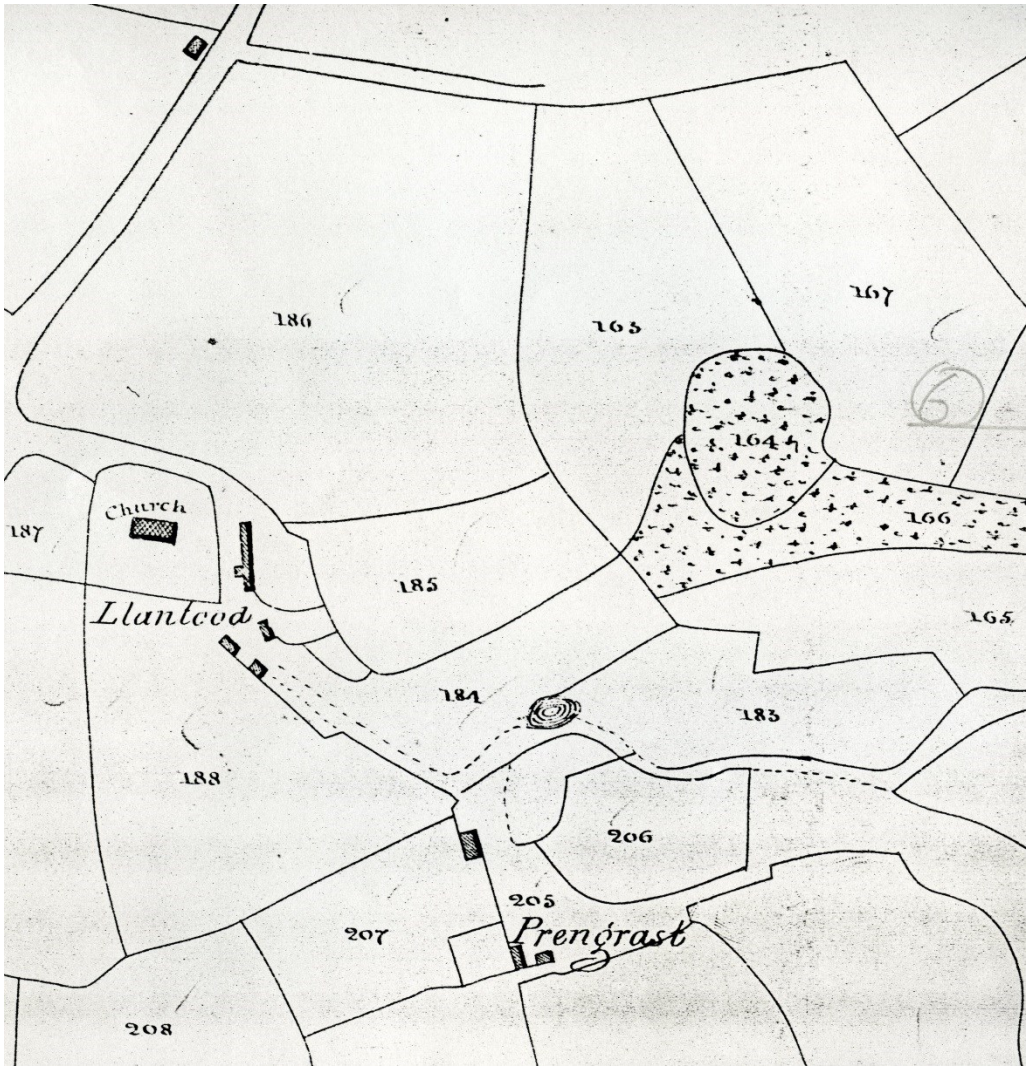

Figure 4: Extract of the Llantood Parish tithe Map of 1839

Figure 5: Extract of the 1st edition 1:2500 OS map of 1889

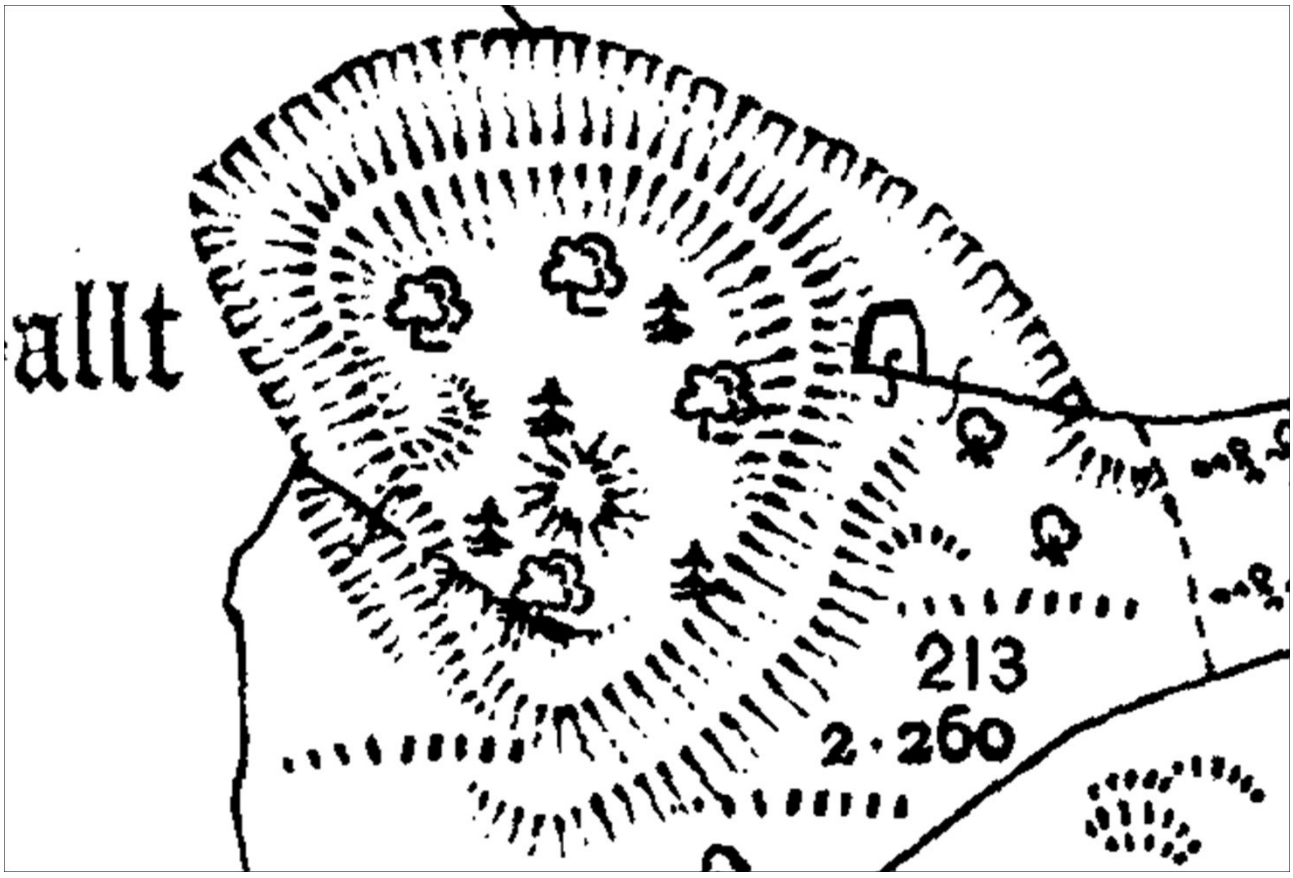

Figure 6: Extract of the 2nd edition 1:2500 OS map of 1907

TOPOGRAPHICAL SURVEY

Methodology

The survey was undertaken using a Trimble TSC2 Electronic Distance Measuring (EDM) Total Station. An EDM Total Station combines a theodolite to record vertical and horizontal angles, and an electronic distance measurement device, to enable the acquisition of 3-Dimentional coordinate data. Total stations work by reflecting an infra-red laser against a prism. EDM total stations also provide sub-centimetre relative accuracy for recordings.

Data is tied in to the local OS grid by the recording of mapped points on the earth's surface. The survey was undertaken using a subjective survey technique, relying on the expertise of the surveyor to analyse the earthworks and to record them. Subjective survey allows the user to record features in as much detail as they require. For this procedure, the EDM Total Station was used to record the tops and bottoms of slopes and spot levels evenly spread across the area.

A survey station was set up at an arbitrary point near to the desired survey area to provide suitable coverage and visibility both for topographic survey and for setting out grids for the geophysical survey. From this point further survey stations were set up to allow the topographical survey to include additional location data hidden from the original position and also known mapped features such as hedge lines. The data was downloaded onto a computer and processed using Trimble Geosite 5.1 software.

Results

Figures 7-9 show 2D plan-view representations of the results of the topographical survey.

Figure 7: Topographical survey results for Castell Pen-yr-Allt, showing surveyed bank-tops in blue, with OS 1:10,000 backing map for comparison

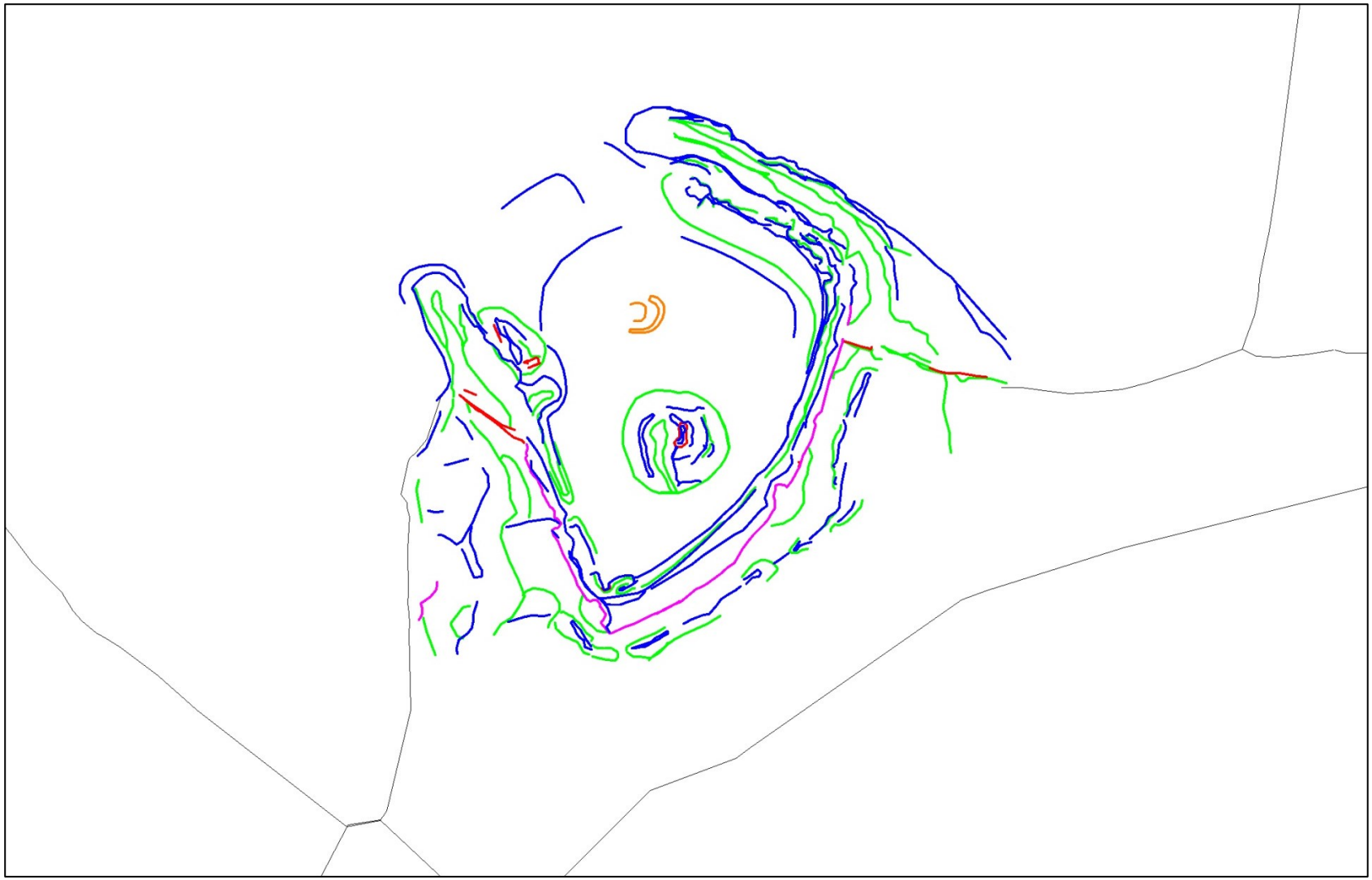

Figure 8: Topographical survey data for Castell Pen-yr-Allt. Bank-tops are in blue, bank-bottoms are green, cut rock is pink and stonework is red. The orange indicates the slight circular feature observed north of the motte (Photo 2).

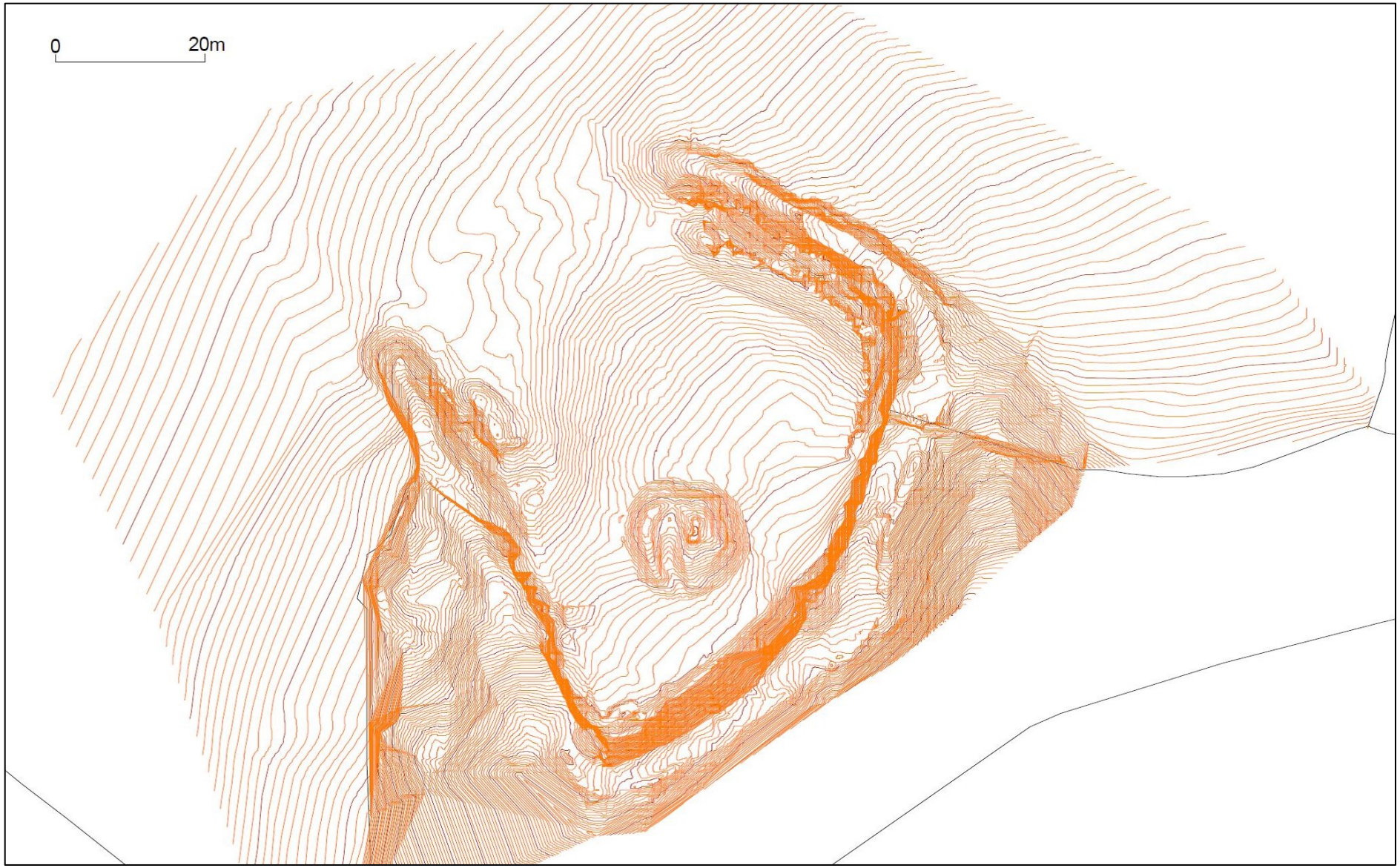

Figure 9: Topographical contour map for Castell Pen-yr-Allt

GEOPHYSICAL SURVEY

Methodology

A fluxgate gradiometer was used for the survey, which detects variations in the earth's magnetic field (full specifications are in Appendix I). Readings were taken at a high resolution on traverses 0.5m wide and every 0.25m within 20m x 20m grids across the site.

The site was surveyed over three days in February 2017. An area of *c.*0.36ha was surveyed. A Trimble TST was used to tie the survey grid into the local Ordnance Survey grid.

Limitations

Weather conditions were fine and generally dry. Some of the area was bounded by wire fencing or hedgerows containing wire fencing, which may have obscured readings taken in their immediate vicinity (mostly along the southwestern and southeastern sides of the survey area). The area was gently sloping to the south and under short pasture. Some steeper sloping areas near to the forts banks were included in the survey. The survey was undertaken by an experienced surveyor with an assistant and any variations in the data collection are likely to have been small.

During set-up the nature of the readings observed throughout the area indicated that the background magnetism of the site varied positively and negatively with respect to the average over the range associated with slight archaeological features. This is borne out in the processed data, and means that subtler discrete archaeological features such as small pits and hearths cannot be distinguished from the background geology. This consistently highly variable background magnetism is probably due to the underlying natural geology.

During processing it became clear that the geophysical anomalies representing archaeological features mostly gave higher positive and negative readings than usually seen. This implies that slighter archaeological features may have been 'masked' by these higher readings in their vicinity. Above-surface archaeology was observed to have been composed of local bedrock so it is probable that this was also the case for the sub-surface features and hence the unusually high readings would again be due to the high initial magnetism of the natural geology.

Processing, presentation and interpretation

Processing was performed using *TerraSurveyor 3.0.31*. A detailed explanation of the processing involved is described in Appendix I. The data is presented with a minimum of processing. The presence of high values caused by ferrous objects tends to hide fine details and obscure archaeological features, so the extreme values were 'clipped' to allow the finer details to show through.

The processed data is presented as greyscale plots overlaid on local topographical features (Figure 10). The main magnetic anomalies have been identified and plotted onto the local topographical features as a level of interpretation (Figures 11 and 12).

The survey results and interpretation diagrams should not be seen as a definitive model of what lies beneath the ground surface, as not all buried features will have provided a magnetic response that can be identified by the gradiometer. In interpreting those features that are recorded the shape is the principal diagnostic tool, along with comparison with known features from other surveys. The intensity of the magnetic response could provide further information - a strong response, for example, indicates burning, high ferric content or thermoremnancy in the geology. The context may provide further clues but the interpretation of many of these features is still largely subjective.

All measurements given are approximate because accurate measurements are difficult to capture during fluxgate gradiometer surveys, and the width and length of identified features can be affected by their relative depth and magnetic strength.

Results

Figure 10 shows a greyscale plot of the surveyed area.

Figures 11 and 12 show an interpretation of the geophysical anomalies detected in the data. Figure 12 shows that interpretation overlaid on the contour map produced from the topographical survey.

Dipolar features, shown in red, are mainly highly likely to be the result of ferrous items in the soil, often detritus of post-medieval and modern farming practices. The large dipole anomaly running along the edges at the south corner of the survey area was caused by the adjacent metal fence. Another cause of a dipolar reading is a buried area of burning, and it is possible that the larger and more amorphously shaped dipolar features drawn are representative of this.

Several curved linear positive and negative features indicate the buried defences around the north of the enclosure. The positive responses are given by the ditches, and negative responses show the presence of buried stone, possibly walls. One of these ditches (labelled **A** in Figure 11) is much further towards the motte than expected, and a further stone feature (**B**) is seen to curve around the north of the very base of the motte.

Multivallate inland promontory forts such as this are known to exist in Wales and the West Country as Early-Medieval sites that re-used earlier Iron Age hillforts (Edwards *et al.* 2005). It seems that this site may therefore show a continuity of development and use from the Iron Age through to the medieval era when the motte is likely to have been raised.

Features **C** align with the visible remains of the ditch as it runs north-south, and are therefore probably indicative of buried stone or walls associated with it. These seem to join in a sharp but well-defined curve to the defences that cross the north of the enclosure, but other ditches and stonework (features **D**) extend westwards too.

Areas of negative magnetism **E** most likely show the buried walling along the southeast and southwest edges of the enclosure, which were suspected to be present beforehand due to visible remnants (e.g. Photo 7) and turf covered ridges.

At the north edge of the survey area, there are some linear parallel features on a roughly north-south alignment (**F**) that meet the main defences and may be related to them, or maybe later drainage.

The rest of the negative anomalies shown in Figure 11 show the positions of either buried stones or voids. Small circular and sub-circular positive features are most likely to signify the presence of soil-filled pits. Features **G** in the southeast of the enclosure are large for pits, but small for potential round houses, and further guesses at their nature cannot be made, except that they might show where animal feeders stood for a long period of time. In the report for Tir Gofal (Poucher 2006) noted that feeders had previously been located within the scheduled area.

Other faint positive ring shapes can be seen north of the motte, including one coinciding with an observed slight earthwork (**H** in Figure 11; Photo 2). These are closer in size to round-houses but again it is possible that they are marks left by large animal feeders.

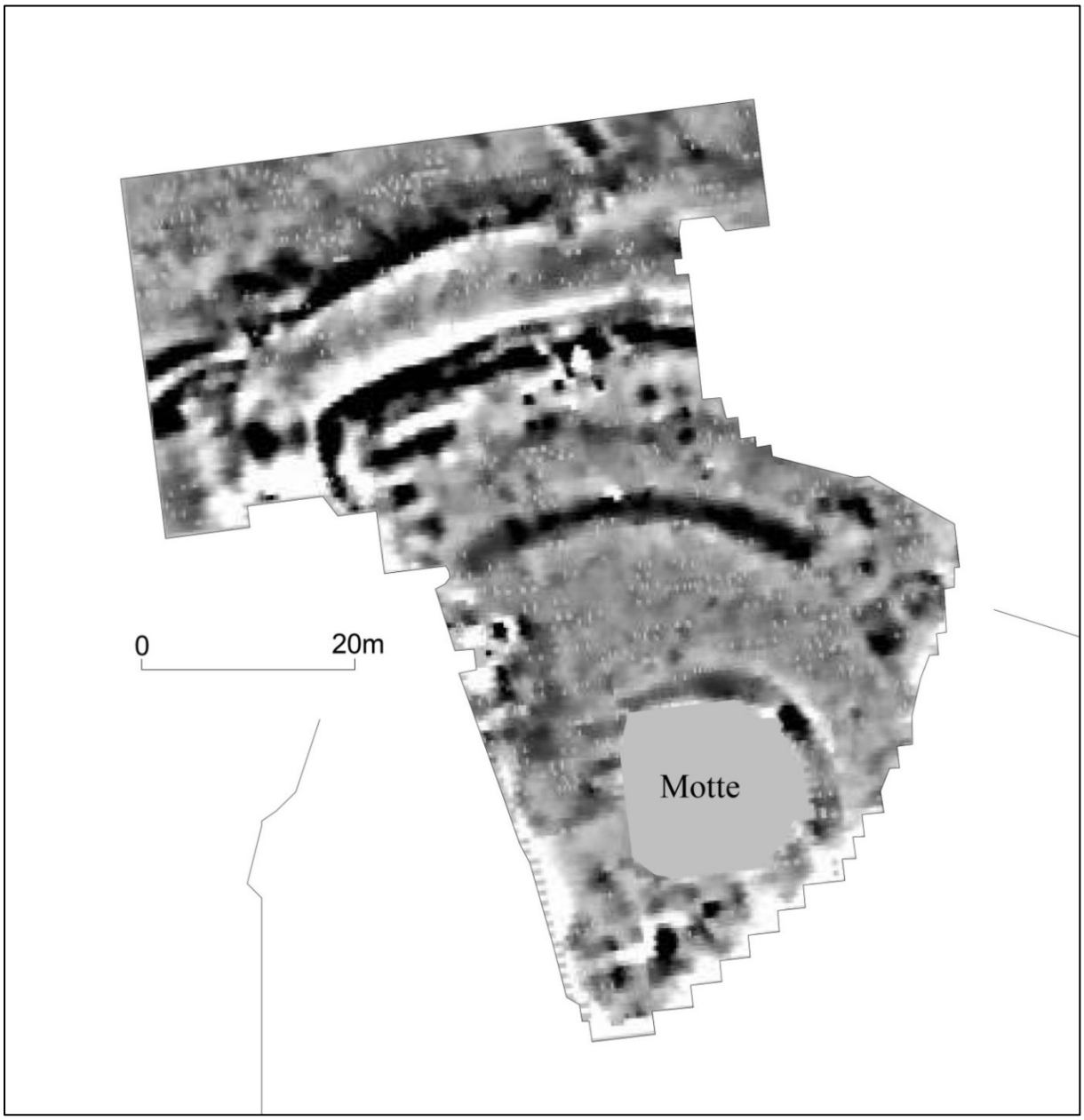

Figure 10: Processed data as a grey-scale plot, overlaid on local topographical features. The results are presented over a range of ±14nT around the local average value of magnetic field strength

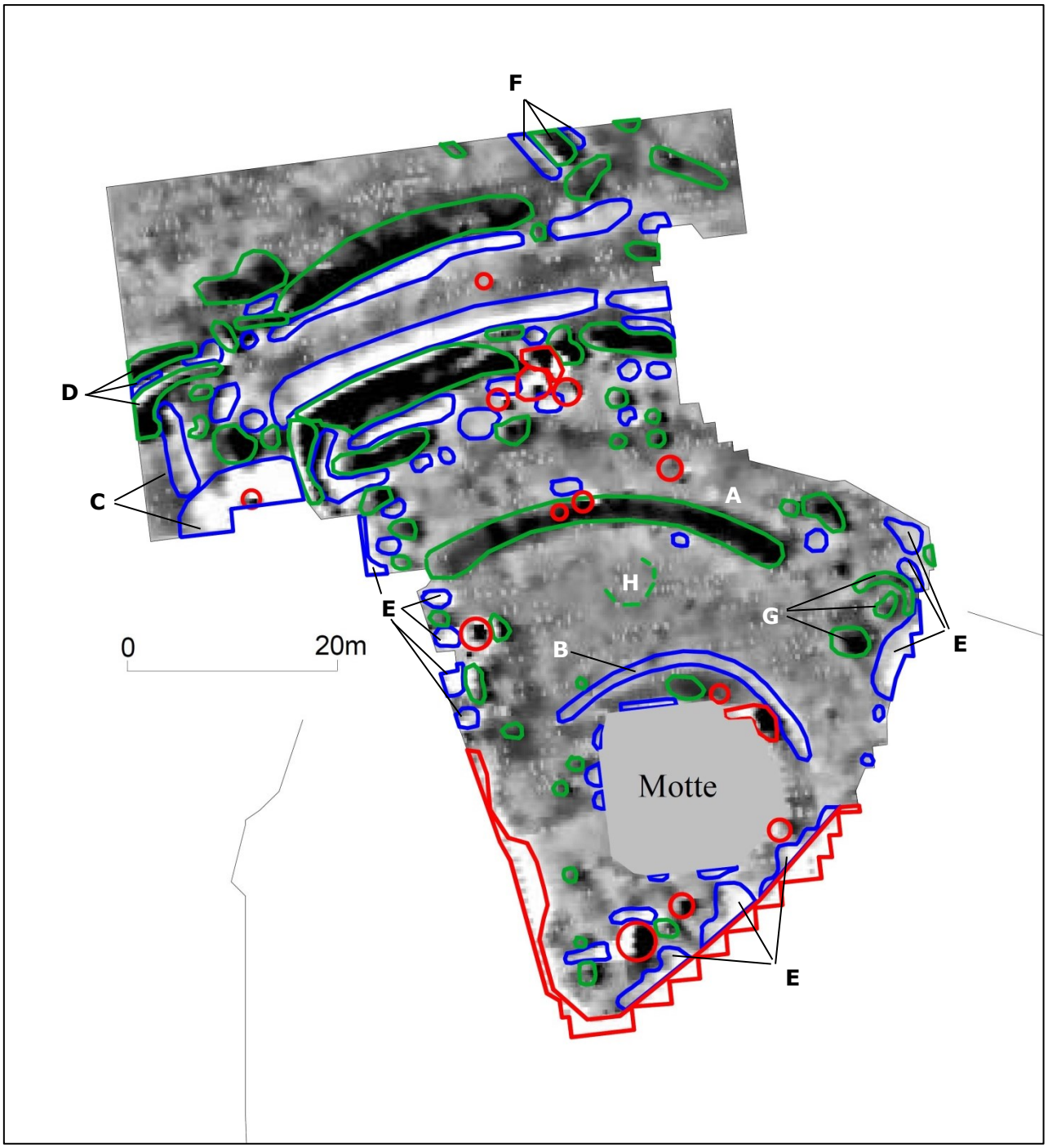

Figure 11: Interpretation plot of survey results, overlaid on local topographical features. Dipolar features are represented in red, positive features are represented in green and negative features appear in blue.

Figure 12: Interpretation of magnetic anomalies overlaid on the contour map derived from the topographical survey data. Dipolar features are represented in red, positive features are represented in green and negative features appear in blue.

PHOTOGRAPHIC SURVEY

Photo 1: Facing south-southeast. Castell Pen-yr-Allt from the field to its north, taken during magnetometry survey.

Photo 2: Facing west. Slight circular earthwork in centre of Castell Pen-yr-Allt, north of the motte, with a 1m scale.

Photo 3: Facing south. The motte at Castell Pen-yr-Allt, with a 1m scale.

Photo 4: Facing north. The motte at Castell Pen-yr-Allt, showing its current cloven shape and stonework remains on top, with a 1m scale.

Photo 5: Facing north. Stonework remains on top of the motte at Castell Pen-yr-Allt, with a 1m scale.

Figure 6: Facing southeast. Stonework remains on top of the motte at Castell Pen-yr-Allt, with a 1m scale.

Figure 7: Facing west. Wall remains at interior south corner of Castell Pen-yr-Allt, with a 1m scale.

Photo 8: Facing southwest. Remains of a bank and/or stone building on west side of Castell Pen-yr-Allt.

Photo 9: Facing northeast. Remains of a bank and/or stone building on west side of Castell Pen-yr-Allt, with the ditch in the foreground, with a 1m scale.

Photo 10: Facing northeast. Part of the remains of a bank and/or stone building on the west side of Castell Pen-yr-Allt, with a 1m scale.

Photo 11: Facing north. Part of the remains of a bank and/or stone building on the west side of Castell Pen-yr-Allt, with a 1m scale.

Photo 12: Facing south-southeast. Surviving ditch on west side of Castell Pen-yr-Allt, with a 1m scale.

Photo 13: Facing southeast. Bank of Castell Pen-yr-Allt on its northeast side. Trees beyond lie in the ditch.

Photo 14: Facing southeast. The ditch and bank on the northeast side of Castell Pen-yr-Allt, with extensive erosion on the bank, with a 1m scale.

Photo 15: Facing northwest. Inside the extensively eroded ditch on the northeast side of Castell Pen-yr-Allt, with a 1m scale.

Photo 16: Facing south. Close up of erosion on the outside of the top of the bank on northeast side of Castell Pen-yr-Allt, with a 1m scale.

Photo 17: Facing south. Dry water channel heading south-southeast from the east side of Castell Pen-yr-Allt, possibly once joined with the northeast ditch, which contained water.

Photo 18: Facing south. Looking along the sheer rock-cut side of the rampart on the east side of Castell Pen-yr-Allt, with a 1m scale.

Photo 19: Facing north. Old wall abutting the sheer rock-cut side of the rampart on the east side of Castell Pen-yr-Allt, with a 1m scale. The wall continued along the field boundary to the right.

Photo 20: Facing north-northwest. Looking along the sheer rampart with a slight bank running along on the right parallel to it. 1m scale.

Photo 21: Facing north-northwest. Close-up of the sheer rock-cut side of the rampart on the southeast side of Castell Pen-yr-Allt, with a 1m scale.

Photo 22: Facing southeast. View from just south of Castell Pen-yr-Allt, showing the steepness of the drop to the valley below.

Photo 23: Facing southeast. Sheer rock-cut side of the rampart on the west side of Castell Pen-yr-Allt, with a 1m scale.

Photo 24: Facing north. Sheer rock-cut side of rampart and remains of ditch on west side of Castell Pen-yr-Allt, with a 1m scale.

Photo 25: Facing south. Stream running steeply down valley side to south of Castell Pen-yr-Allt, extending from the region of the western part of the ditch.

Photo 26: Facing northwest. Wall retaining the outside of the bank on the west side of Castell Pen-yr-Allt, with a 1m scale.

CONCLUSION

A geophysical, topographical and photographic survey of Castell Pen-yr-Allt was carried out with successful results. A contour map of the topography was produced as well as photographic record.

The magnetometry survey undertaken at the site demonstrated the presence of a number of buried features, which have been illustrated, described and interpreted. Complex multivallate defences were revealed curving around the north side of the enclosure, comprising ditches and stonework. A ditch also curved around the north of the motte some 20m from it, and a buried wall was seen curving around the north of the motte near to its base.

Multivallate inland promontory forts such as this are known to exist in Wales and the West Country as Early-Medieval sites that re-used earlier Iron Age hillforts (Edwards et al. 2005). It seems that this site may therefore show a continuity of development and use from the Iron Age through to the medieval era when the motte is likely to have been raised.

Other features shown in the geophysics results were buried walling along the southeast and southwest edges of the enclosure, other probable areas of buried stonework, and probable in-filled pits. North of the motte, faint positive ring shapes could be seen, including one coinciding with an observed slight earthwork (Photo 2). These are potentially the footprints of round-houses but it is also possible that they are marks left by large animal feeders, which are known to have been positioned in the enclosure within the last twenty years.

Severe erosion was observed on the defensive banks of Castell Pen-yr-Allt, caused by badgers digging their setts and compounded by sheep-scraping on the bare stone and earth bank thus exposed. The information gathered during this project and presented in this report can now be used to develop mitigation strategies and a management plan for the Scheduled Ancient Monument. One such mitigation strategy might be to fence off the area most affected to prevent further erosion by sheep (although the badgers will continue to erode the site).

ACKNOWLEDGEMENTS

Ken Murphy made the initial site visit and described the badger damage. Hubert Wilson carried out the Topographical Survey and assisted the author with the Geophysical Survey.

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Database

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Cartographic

Llantood Parish Tithe Map and apportionment	1839
1st Edition Ordnance Survey 1:2500 Map	1889
2nd Edition Ordnance Survey 1:2500 Map	1907

APPENDIX I: GEOPHYSICAL SURVEY METHODOLOGY AND INSTRUMENTATION

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 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 apart. Readings were logged at intervals of 0.25m along each traverse giving 3200 readings per grid square (medium resolution on 0.5m traverses).

Geophysical Survey Data presentation

The data was transferred from the data-logger to a computer where it was compiled and processed using TerraSurveyor 3.0.31 software. The data is presented as greyscale 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 greyscale 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 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 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

A Trimble Total Station was used to tie the survey grid into the local Ordnance Survey grid.

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CASTELL PEN-YR-ALLT, LLANTOOD, PEMBROKESHIRE:

GEOPHYSICAL, TOPOGRAPHICAL AND PHOTGRAPHIC SURVEY

RHIF YR ADRODDIAD / REPORT NO. 2017/11
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Mawrth 2017
March 2017

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

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Llofnod / Signature ……Alice Day Date: 30/Mar/2017

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

James Meek

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Swydd / Position: **Head of DAT Archaeological Services**

Llofnod / Signature ……James Meek…… Date: 30/Mar/2017

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

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