Degannwy Castle, Degannwy, Conwy

Geophysical Survey

GAT Project No. 2068
Report No. 791
March 2009

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DEGANNWY CASTLE, DEGANNWY (G2068)

GEOPHYSICAL SURVEY

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DEGANNWY CASTLE, DEGANNWY (G2068)

GEOPHYSICAL SURVEY

SUMMARY

A geophysical survey of an area around Degannwy Castle has been undertaken for Cadw as part of a wider programme to improve interpretation of the castle. The survey revealed details of buildings and a road in the bailey along with the extent of settlement to the north of the castle. An area of activity that could be medieval was also detected adjacent to the approach road to the south. The archaeology appears to be confined to the higher ground around the two hills probably because the low ground to the north-east and south is very wet

1. INTRODUCTION

Gwynedd Archaeological Trust has been asked by Cadw to carry out a magnetometer survey at Degannwy Castle and immediate environs. The castle is located at SH 782794 and occupies two low hills with a bailey between them. The area around the hills is also thought to contain buried archaeology from the prehistoric, Roman, early medieval and later periods. Several castles were built and demolished on the site between the 11th and late 13th century. The castle was finally rebuilt in stone in the 13th century and demolished in 1263. Some masonry, mostly on the hills, has survived although much of the original stone was reputedly removed to build Conwy castle. The site is a scheduled ancient monument, and is surrounded by an area of parkland, called the Vardre, that contains earthworks that probably indicate an area of settlement along with an extensive field system some of which may be contemporary with the castle.

2. DESIGN BRIEF AND SPECIFICATION

A brief was written by Cadw, and from this a project design was produced. The design reflects the requirements of the brief and confirms to the guidelines specified in *Standard and Guidance for Archaeological Desk-based Assessment* (Institute of Field Archaeologists, 1994, rev. 2001). This geophysical survey has been carried out according to the project design.

The magnetometer survey is to accompany a desk-based assessment of the site (Kenny 2009). The report on the magnetometer survey should be viewed alongside the assessment report which contains a detailed physical and historical description of site which is not repeated here. The aims of both parts of the projects can be defined as follows:

- to identify and record the cultural heritage within the defined study area;
- to evaluate the importance of what has been identified;
- to examine ways in which it is possible to improve and enhance the conservation, interpretation and accessibility of the site.

3. ARCHAEOLOGICAL BACKGROUND

The principal remains on the site of those of a masonry castle of Henry III, probably built 1244-5. However timber castles of c. 1080 and c. 1213 preceded this, and a number of Roman and prehistoric finds have been made in the vicinity. The site, therefore, has a long history, and a large area around remains undeveloped grazing land. North of the castle are earthworks probably denoting an are of medieval settlement, whilst other earthworks suggest the presence of roads and rectangular buildings around the foot of the two hills, particularly on the north and west sides. The site was described and planned by RCAHMW (1956) and excavations were undertaken in the early 1960's (Alcock 1967).

4. METHODOLOGY

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

4.1. 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 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. 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 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.

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.

4.2 Data Collection

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

4.3 Data presentation

The data was transferred from the data-logger to a computer where it was compiled and processed using ArchaeoSurveyor 2 software. The data is presented as a grey-scale plot (Fig. 1 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. 2) 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 anomalies 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.

4.4 Data Processing

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

5. RESULTS

Two irregular areas were surveyed, to the north and south of the castle and centred on the bailey. The bailey and the earthworks to the north of it (0.9ha) were surveyed at a resolution of 0.5m x 0.25m in an attempt to detect smaller features and details of buildings. This area contained some very steep earthworks and there will inevitably have been some positionally inaccurate readings on the slopes. They were however surveyed at a very slow traverse speed in order to make the survey as accurate as possible .The remaining areas (3.5ha) were surveyed at a resolution of 1.0m x 0.25m.

The survey area was found to be magnetically quiet with low to moderate levels of magnetic enhancement, probably as a result of fairly low levels of magnetic iron oxides in the soil. A good range of archaeological features were detected as weak anomalies including minor features produced by modern ploughing. Individual anomalies are transcribed and numbered on the interpretation plan (Fig. 2)

The ditch across the northern end of the bailey (1) produced a weak anomaly but was mostly defined by banks on either side (2 and 3). The banks appear to continue to the west (4) and are perhaps associated with the northern gate.

The survey provided some indications of remains in the bailey (i.e. the area between the two hills) although the anomalies are generally weak and diffuse. A wide linear anomaly (5) in the southern half is best interpreted as a road. This runs to the southern gate. The northern part is less clear, it appears to be cut at 90 degrees by another linear feature (6) perhaps indicating that the road turns toward the north gate at this point. There are indications of rectangular features, possibly buildings, to either side of the road. Strong responses on the eastern side could also indicate destruction by burning. The northern part of the bailey produced faint anomalies that could also indicate a building (7). In general, the results from the bailey are not very clear and it was noted that stonework was not producing strong anomalies. An obvious line of stones visible as a surface feature across the centre of the bailey did not produce an anomaly although rubble at the base of the slopes on the western side produced a scatter of small anomalies (8).

The Vardre north settlement and road produced a mass of weak anomalies many of which correspond to the visible earthworks. The road (9) is fairly well-defined and is flanked on the easten side of the survey by roughly linear anomalies (10 and 11) which could be drainage ditches or areas of erosion. There is also an increased level of magnetic enhancement in this area possibly indicating burning which may be associated with activity around platforms (12) cut into the base of the mound. The edges of the earthwork platforms in the settlement produced fairly clear anomalies (13 to 17). Occasional small patches of magnetic enhancement particularly in 16 could indicate hearths. It was however noted that there was very little of the strong enhancement that would normally indicate occupation areas in a settlement. There was also no indication of any buildings and few iron objects were detected. Boundaries 18 and perhaps 19 suggest that the activity in this area may have extended further to the north. Further similar anomalies (20-22) appear to cross the earthworks and are therefore likely to

belong to a different phase. This may be earlier as there are no surface indications, suggesting that they lie beneath the earthworks. Anomaly 20 forms a fairly well-defined enclosure linking the two hills. Feature 21 seems to follow the road into the bailey for part of its length and 22 may represent an earlier form or later modification of enclosure 17. A narrow linear anomaly (23) possibly with extensions to the south could mark the northern end of plots centred on the castle, or could be modern drain. The edge of an area of anomalies at the north of the survey (24) would require a larger area of survey before interpretation could be suggested. Anomaly 25 is a well defined area of what appears to be modern ploughing bounded by a field bank (26) that is still visible as a substantial earthwork. Another are of parallel anomalies (27) may indicate that the ploughing was more extensive but did not always produce anomalies. The northern survey area
is crossed by an iron pipeline (28).

The southern survey area produced lower levels of background noise and was cut at the north-west by a fence which continues along the northern edge of the survey. The line of the road to the fort (29) and its continuation to the west (30) are partially masked by the magnetic effects of the fence. An area of increased noise (31) alongside the road up to the southern gate is bounded at the west by a bank or field boundary (32) that is still visible as an earthwork. The area contains 3 sides of a small polygonal enclosure (33) that appears to contain further internal features. Given its position, it may be related to the defence of the access to the castle. To the east of this is an area of apparently random strong magnetic anomalies that could be geological but given the lack of responses from exposed rock elsewhere on the survey could also be interpreted as building or industrial remains. A patch of increased noise, possibly just a result of excavation into the subsoil marks the site of a platform cut into the slope at the base of the western hill. Elsewhere linear anomalies 35, 36 and 37 are all visible as disused field boundaries on aerial photographs. Most appear to be early post-medieval but 36 and 32 may be contemporary with the castle (see PRN 30309, p13 in Kenny 2009). Anomaly 38 corresponds to a substantial stone culvert that is still visible in the field. A strong magnetic anomaly (39) may be a feature associated with the culvert. An area of parallel anomalies (40) crossing 36 are probably the result of ploughing but may be drainage into culvert 38. Two iron pipelines cross the survey area (41 and 42).

6. DISCUSSION

Archaeological features were detected across the whole of the survey area. Generally increased levels of noise and a complex series of overlapping anomalies indicate that occupation was mostly in the bailey between the two hills and in an area to the north of the castle. The lower land at the north-east and south of the survey area is very wet, despite modern drainage, and only appears to contain agricultural features. The survey revealed the general outlines of areas of buildings and a road in the bailey but did not detect buildings anywhere else in the area even though some of the survey was carried out at high resolution. Levels of magnetic enhancement were generally low particularly considering that there was occupation on the site for several hundred years. There are also several areas in the bailey where there is visible surviving stonework that was not detected by the gradiometer. It seems likely that there are generally low levels of magnetic ferrous compounds in both the soil and the stones used for buildings. The general low levels of iron objects such as nails detected in the soil (i.e. not a function of local geology) do however seem to be surprising considering that several phases of castle have existed on the site.

The strength of this type of survey is that it allows large areas to be surveyed relatively quickly and the results produced a good general overview of the archaeology of the area around the castle and allow recommendations for further work to be made.

There appears to be complex multiphase archaeological deposits in both the bailey and the area to the north of it. This extends beyond the visible Vardre north earthworks which have probably been truncated by ploughing. Further assessment of this area using resistivity is recommended. This technique would almost certainly be more successful than the gradiometer survey at detecting buried masonry and areas of rubble. Targeted excavation would also allow the function of the earthwork platforms to be investigated. Further assessment of the activity in the rectangular enclosure adjacent to the southern approach road is recommended. This could date from almost any period but its position adjacent to the approach to the castle suggests that a medieval dateis most likely. This could be resolved by targeted excavation.

7. REFERENCES

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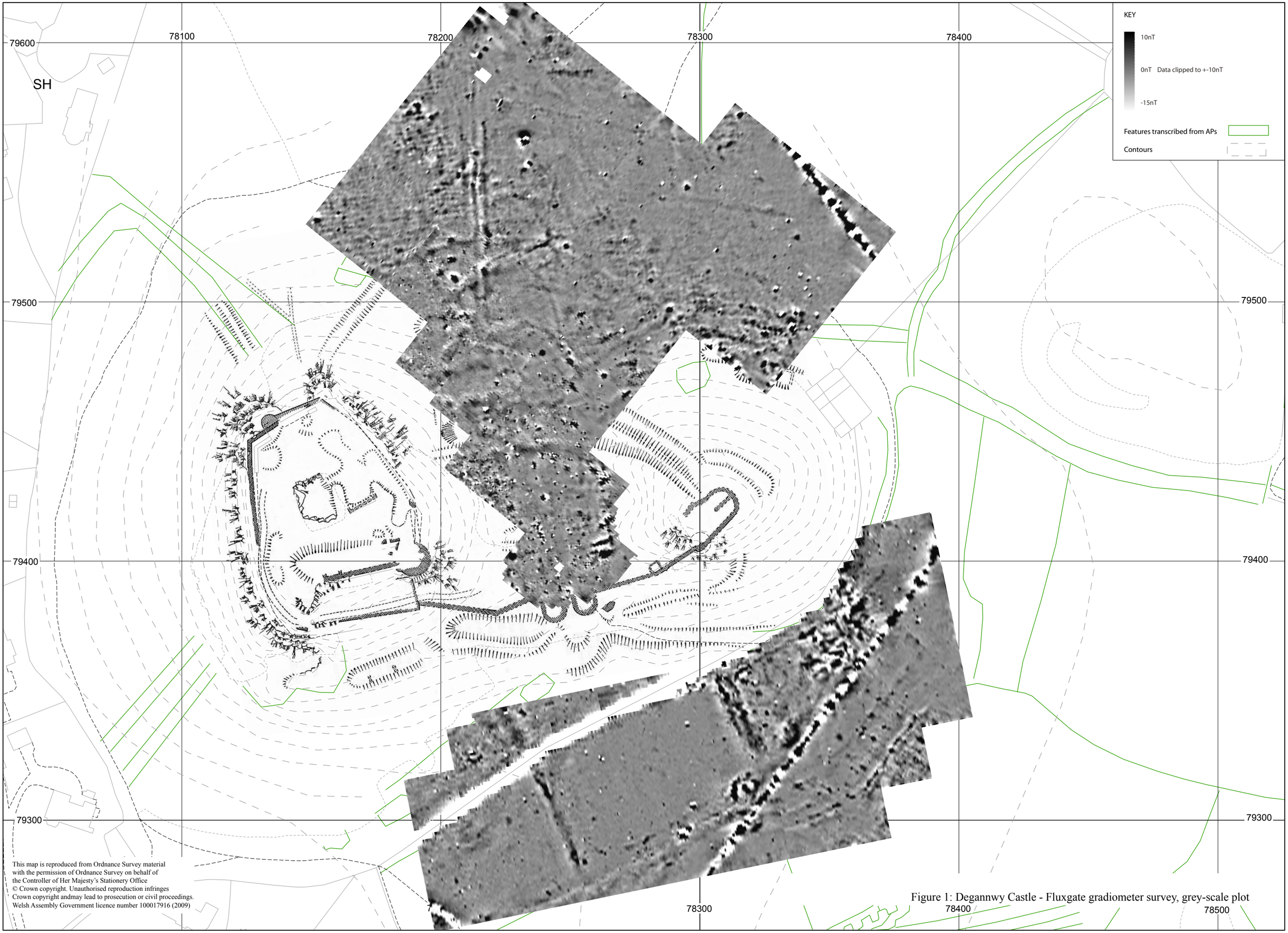

Figure 1: Degannwy Castle - Fluxgate gradiometer survey, grey-scale plot

Figure 2: Degannwy Castle - Fluxgate gradiometer survey, interpretation

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