Historic England

Geophysics

Castle Ring, Cannock Wood, Staffordshire
Report on Geophysical Survey, April 2017

Andrew Payne and Cara Pearce

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CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE

REPORT ON GEOPHYSICAL SURVEY, APRIL 2017

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SUMMARY

Fluxgate magnetometer and earth resistance surveys were conducted for the Cannock Chase Through Time project within the Iron Age hillfort at Castle Ring, Cannock Wood, Staffordshire, to enable the project volunteers to receive practical training in geophysical survey methods in the process of investigating the internal character of the monument. The magnetometer survey (0.82ha) was of limited effectiveness, recording only a weak and indistinct response over the hillfort interior revealing few obvious anomalies of archaeological significance. Earth resistance survey (0.3ha) was of more value, resulting in clear definition of a previously identified medieval building in the north-west of the hillfort, together with internal detail of this structure and evidence for possible further associated activity in its surrounds. The earth resistance data also suggests sub-surface remains of a second possible building that may represent a previously unrecorded element of the medieval complex, or a later structure perhaps related to temporary use of the site during the Second World War.

CONTRIBUTORS
The geophysical fieldwork was conducted by Andrew Payne, Cara Pearce and Dan Hunt from Historic England together with volunteers from the Chase Through Time project including: Simon Bristow, Samantha Mead, Jim Andrews, Anne Andrews, Colin Evans, Nigel Maus, Brian Cooper, Mary Cartwright, Amie Smith, Ivan Poole and Ian Jones.

ACKNOWLEDGEMENTS
The authors are grateful to the owners of the site: Cannock Chase District Council and the staff of their Countryside Service team Steve Barnes and Peter Scholes who facilitated access for the survey. Our colleague Rebecca Pullen in the Historic England, Historic Places Investigation Team North helpfully provided useful information on the previous investigation history of the hillfort in advance of the survey and Gary Ball (Staffordshire County Council) coordinated the involvement of the volunteers.

ARCHIVE LOCATION
Fort Cumberland, Portsmouth.

DATE OF SURVEY
The fieldwork was conducted during the 6th and 7th April 2017 and the report completed on 30th August 2017. The cover image shows an aerial view looking across the hillfort from the north-west with the extensive bracken vegetation cover clearly visible. The medieval building platform is visible in the foreground of the image with the village of Cannock Wood in the background (NMR_20829/52, © Historic England Archive).

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INTRODUCTION

Magnetometer and earth resistance surveys were undertaken to investigate a sample of the interior of the Iron Age hillfort at Castle Ring, Cannock Wood, Staffordshire, situated at the south eastern edge of the Cannock Chase Area of Outstanding Natural Beauty (AONB). The surveys were conducted as part of the Historic England (HE) contribution to the Staffordshire County Council Heritage Lottery Fund project 'The Chase Through Time' (RASMIS 7472), devised to support the commemoration of the Great War: Home Front Legacy by improving understanding of the extensive and well preserved First World War landscapes of local, national and international significance on Cannock Chase. While there is a strong focus on the Great War, the project will explore how the entirety of the Chase has changed over time (Went and Winton 2016).

Using a range of ground based survey methods including geophysics, Historic England, with the help of local volunteers, are mapping and exploring the remains of the First World War camps (as well as other traces of how the landscape was managed from prehistory to the present) identified from airborne laser scanning (lidar) and analysis of historic air photographs. The aim of the geophysical survey component was primarily to provide the volunteers with training and experience in using these techniques for the future investigation of sites of interest on the Chase, and to explore the internal character of the hillfort to enhance the existing earthwork investigation. This supplemented previous training by HE in support of the project in analytical earthwork survey and recording techniques, and interpretation of lidar data.

Castle Ring is a multivallate Iron Age hillfort of irregular pentagonal plan enclosing 3.6ha (Figure 1). It was selected as a suitable site for training due to ease of access and its status as a public open space offering scope for improved visitor interpretation. Castle Ring is one of the few currently scheduled ancient monuments (NHLE 1014687) in the Cannock Chase AONB and has a limited history of previous research including an earthwork survey of the form and development of the hillfort and its later land use history as part of the Beaudesert estate (NHRE uid 304764; RCHME 1987) and a poorly documented 19th-century excavation of the site of a medieval hall building located in the northern sector of the site (NHRE uid 304769; Molyneux 1863; RCHME 1988).

The site is situated on well drained sandy and coarse loamy soils of the Bridgnorth association (Soil Survey of England and Wales 1983) developed over superficial Devensian boulder clay (glacial till) deposits above Carboniferous Pennine Middle Coal Measures formation mudstone, siltstone and sandstone (Geological Survey of Great Britain 1964). Due to the vegetation within the hillfort interior, survey was limited to more open areas of grassland. Weather conditions during the field work were mostly warm, dry and sunny.

METHOD

Magnetometer survey

The magnetometer survey was conducted using a Geoscan FM36 fluxgate gradiometer over a transect of 30m grid squares running across the centre of the hillfort (Figure1) established with a Trimble R8 series Global Navigation Satellite System (GNSS) using a base station receiver and the Ordnance Survey VRS Now correction service. The magnetometer transect included the area of the suspected medieval building remains and sampled different zones of the hillfort where concentrations of occupation activity might be expected (cf Payne 2005, 25-26; Payne *et al.* 2006, 103-7). Readings were recorded on the 0.1 nanotesla (nT) resolution setting at 0.25m intervals along successive parallel traverses spaced 1.0m apart.

A linear greyscale image of the magnetometer data is presented in Figure 2 in relation to the Ordnance Survey (OS) base map after minimal post acquisition processing including the suppression of any effects due to directional sensitivity and instrumental drift, by the setting of each traverse to a zero mean, and truncation of extreme values outside the range of ±50nT. Minimally processed versions of the magnetic data are shown as a trace plot in Figure 4(A) and as a greyscale image in Figure 4(B).

Earth resistance survey

Earth resistance data was recorded over a series of 30m grid squares (Figure 1) to investigate the building remains partially visible on the surface as exposed masonry and earthwork features atop a well-formed rectangular platform in the north-west corner of the hillfort interior. The earth resistance survey was carried out using a Geoscan RM15 resistance meter and a PA5 electrode frame in the 0.5m twin electrode configuration with readings collected at 1.0m intervals along traverses spaced 1.0m apart.

The earth resistance data is presented as a linear greyscale image superimposed over the OS mapping in Figure 3 after minimal post acquisition processing including the application of a 2m radius threshold median filter to remove occasional extreme readings caused by poor probe contact (Scollar *et al.* 1990, 492). A trace plot and a greyscale image of the data are presented with the magnetic survey data for comparison in Figures 4(C) and 4(D) respectively.

RESULTS

Magnetometer survey

A graphical summary of significant magnetic anomalies [**m1-14**] discussed in the following text superimposed on base OS map data is provided in Figure 5.

The magnetic response is in general weak and indistinct with a series of vague positive linear trends [**m1-5**] which are probably related to ground topography, but may possibly be associated with the outline of the exposed walls and excavation trench around the medieval building at [**m1**]. A possible enclosure to the east may be indicated by the tentative positive linear trends at [**m3**].

A sparse scatter of localised positive anomalies [**m6**] may relate to pits and hearths typically associated with the former occupation of a hillfort (Bowden 2011), but if this is the case only a low level of activity is suggested across the interior. A single circular ring gully is suggested at [**m7**] but this is highly tentative due to the extreme weakness of the response.

Areas of ferrous magnetic disturbance [**m8-12**] may be related to temporary activity on the site in the Second World War, when the elevated position of the site may have been taken advantage of for observation post purposes. The ferrous disturbance at [**m9**] may be related to a sill-beam foundation for a probable short-lived building recorded at "j" on the RCHME plan, but the magnetic results do not add significantly to the previous interpretation other than suggesting that the causative features here are likely to be of fairly modern origin. A weakly defined rectilinear pattern of negative anomalies at [**m13**] may also be related to the sill-beam or perhaps the high resistance anomalies mapped at [**r3**] that may indicate further building remains of medieval or later origin. There is also a slight, but broad, north-south aligned scarp slope indicated on the RCHME survey plan running across [**m13**] and [**r3**] that may be of significance in relation to the geophysical anomalies here.

Further intense ferrous responses at [**m14**] occur near a group of rectangular pit-type features visible on the surface close to the ramparts on the south-east side of the hillfort indicated by "m" on the RCHME survey plan, and would be compatible with the interpretation of short-term 20th-century military use suggested by the RCHME survey.

Resistance survey

A graphical summary of significant earth resistance anomalies [**r1-6**] discussed in the following text superimposed on base OS map data is provided in Figure 6.

The building interpreted as a 14th-century medieval lodge (RCHME 1988) sits atop a pronounced earthwork platform in the highest corner of the hillfort's interior and is clearly visible on the ground as a level rectangular area with exposed masonry suggestive of one or more internal divisions. The area inside the exposed remains of the medieval building produces a much lower resistance response [**r1**] compared to the surrounding region, possibly due to the base of the building acting as a moisture trap or the result of very near surface masonry fabric causing a paradoxical anomaly (Scollar *et al.* 1990, 350-1; Fig 6.32). The outer walls or the earthwork banks around the perimeter of the building, that are thought to represent spoil heaps of formerly excavated material, are indicated by linear high resistance anomalies [**r2**] in the range 540-640 Ohms defining the rectangular foot-print of the structure with dimensions of approximately 24m by12.5m. It is probable that the resistance survey has detected the edge of the former excavation trench around the building foot-print, rather than the walls themselves, dimensions given as 20.6 by 11.5m for the extent of the building recorded from the earthworks, together with some evidence for building partitions referred to in the RCHME record (RCHME 1988).

Further rectilinear high resistance anomalies [**r3**] and [**r4**] may also represent additional previously unrecorded elements of a building complex, unrelated later structures of relatively modern origin, perhaps associated with WW2 activity, or modern footpaths that traverse this area. The surrounding background resistance is very variable with a mixed pattern of bands of lower resistance and moderately high resistance [**r5**], which may relate to variable geology or further elements of the building complex, such as paths and enclosure boundaries (as suggested by slight linear scarps mapped elsewhere within the hillfort in the RCHME survey). Extended survey coverage would be required to fully assess the wider background variation due to geological influences.

Despite the dry weather at the time of the fieldwork, surface water was visible at [**r6**] where the resistance data shows a very sharp but localised decrease due to damp ground associated with a pronounced area of scrub vegetation, possibly indicating the presence of a spring or other former water feature such as dew-pond. This area also appears to be associated with a strong ferrous response [**m11**].

CONCLUSIONS

While the magnetic survey results correlate with the RCHME earthwork plan, particularly ferrous disturbance probably associated with 20th-century military use, they provide limited additional detail and very little evidence of potential Iron Age activity, beyond an extremely sparse distribution of pit-type anomalies and other highly tentative linear trends. This may, in part, be due to the geological and soil conditions at the site. Although limited in extent, the resistance survey has revealed additional detail, including traces of a possible east-west aligned rectangular masonry building of unknown date with a number of internal partitions, which partially coincides with weak negative linear anomalies in the magnetic data. Other less clearly defined linear resistance anomalies may represent enclosure boundaries, again complementing the RCHME survey that shows fragmentary evidence for the hillfort interior being divided up into small fields or paddocks most likely in the medieval or post-medieval periods.

LIST OF ENCLOSED FIGURES

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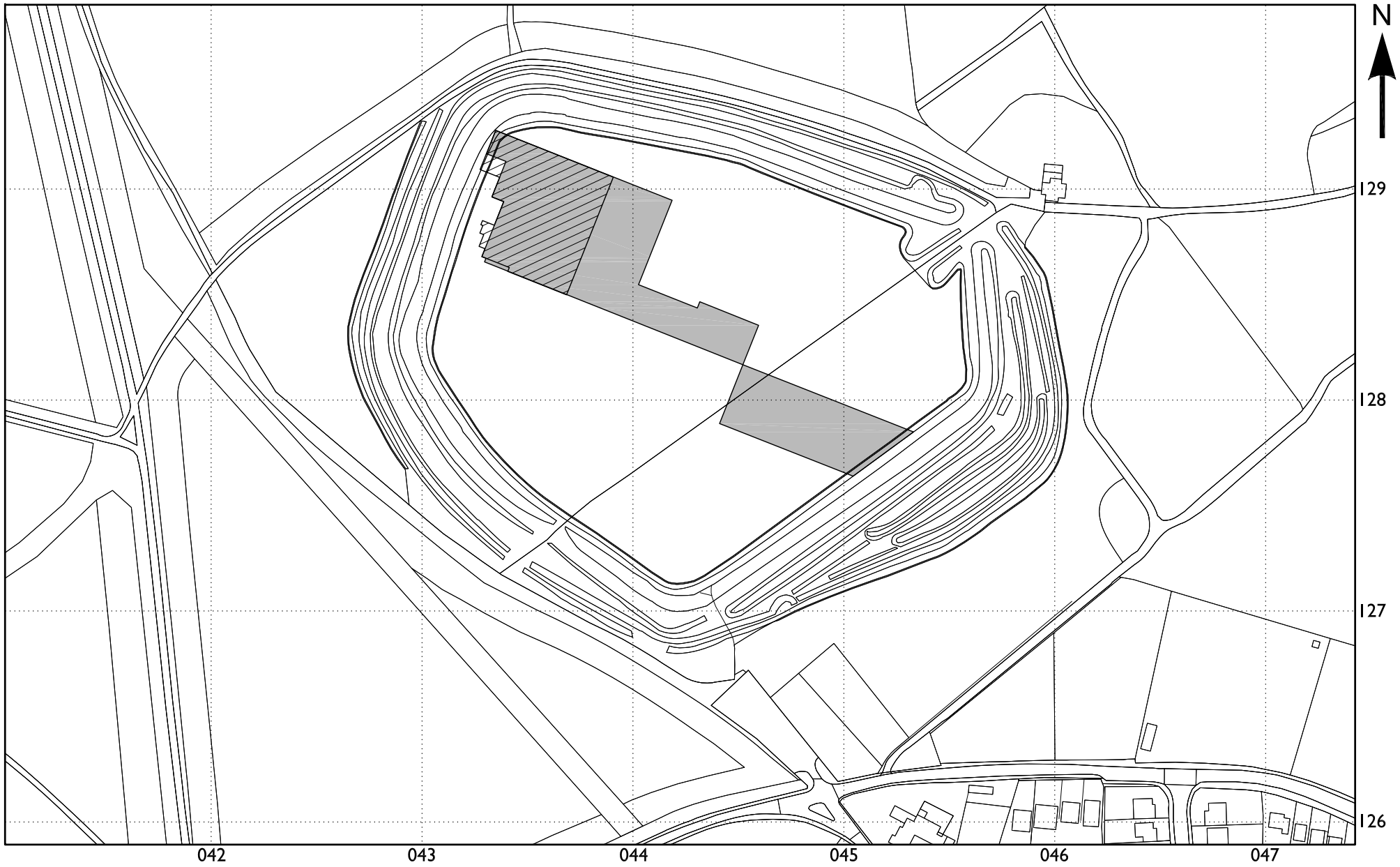
Figure 1

CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE

Location of geophysical surveys, April 2017



0 90m

1:2500

magnetometer survey

earth resistance survey

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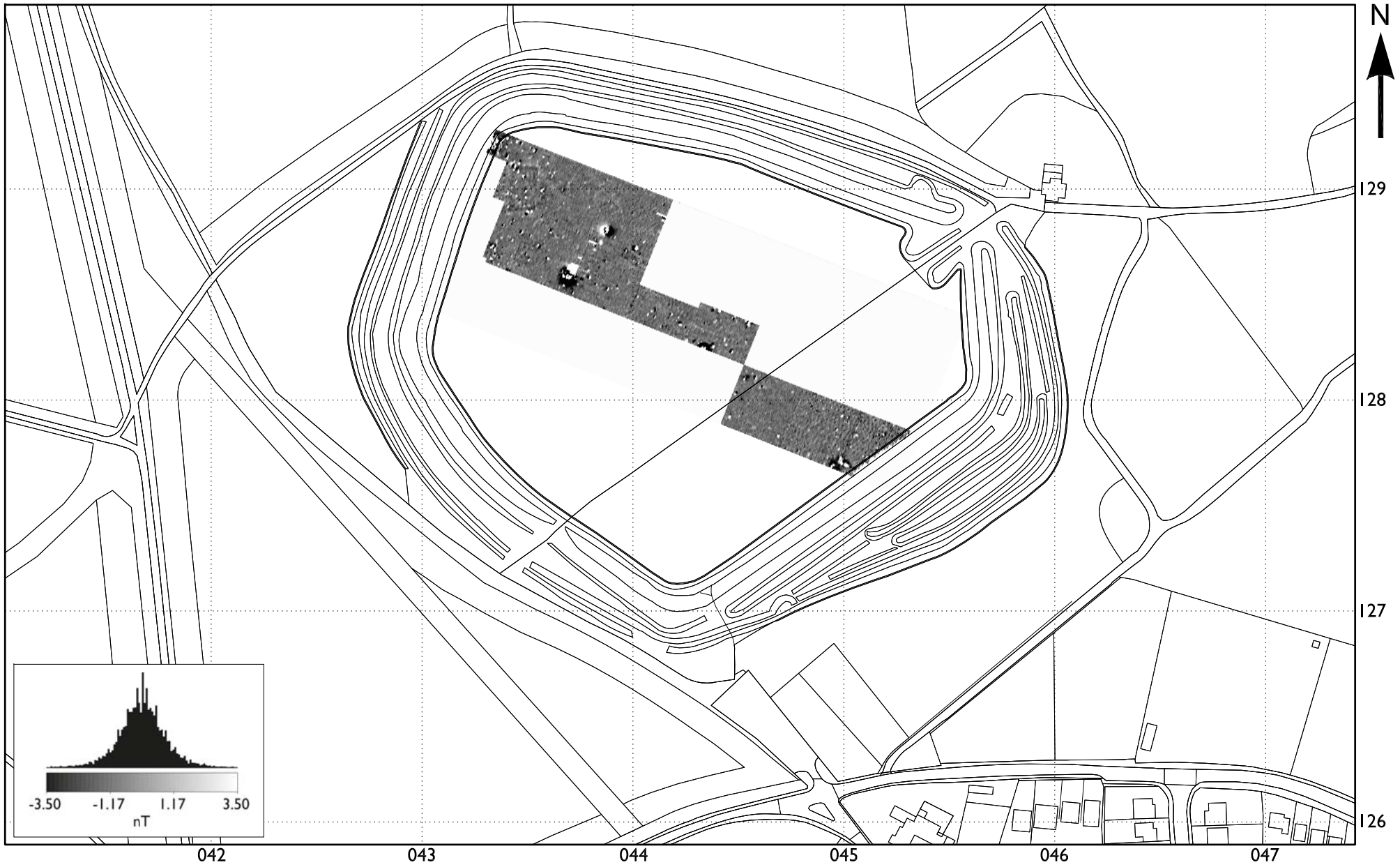
Figure 2

CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE

Location of fluxgate magnetometer survey, April 2017



0 90m

1:2500

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Figure 3

CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE

Location of earth resistance survey, April 2017

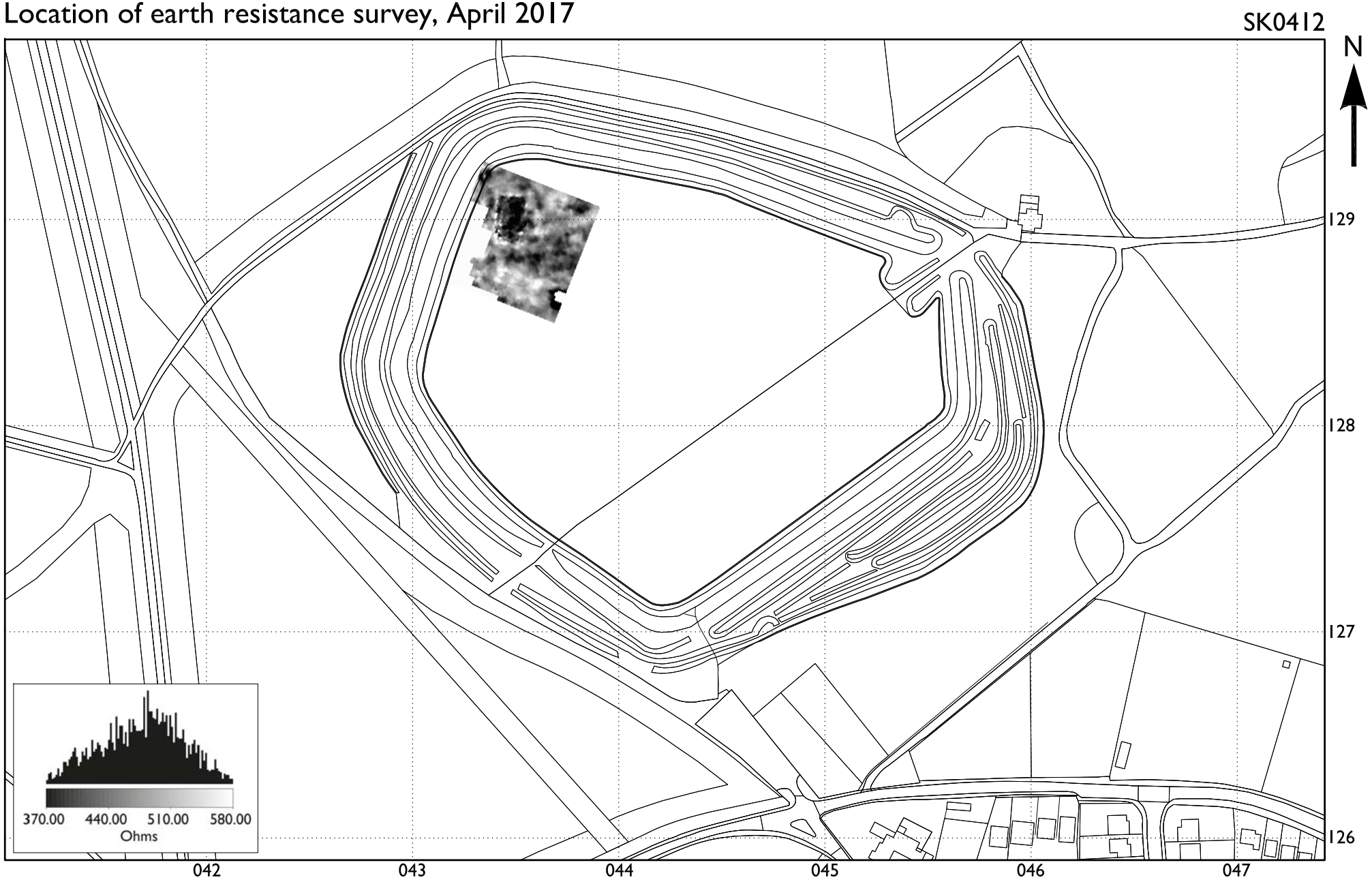

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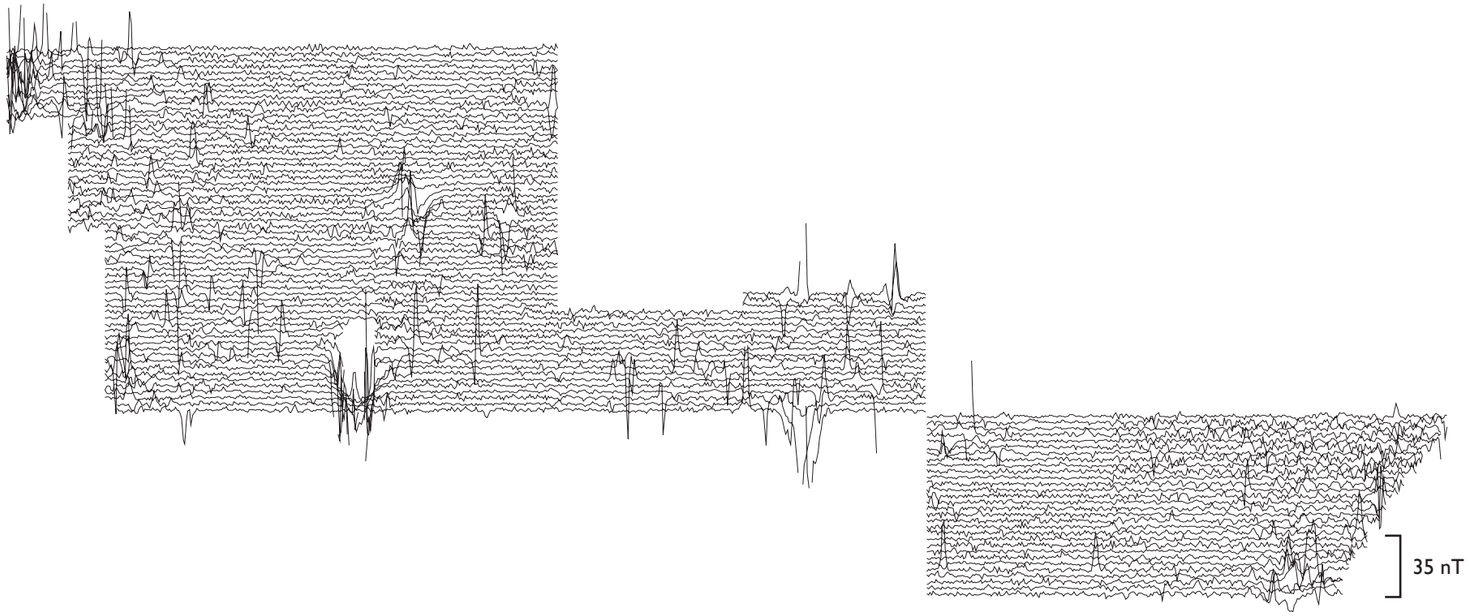
Figure 4

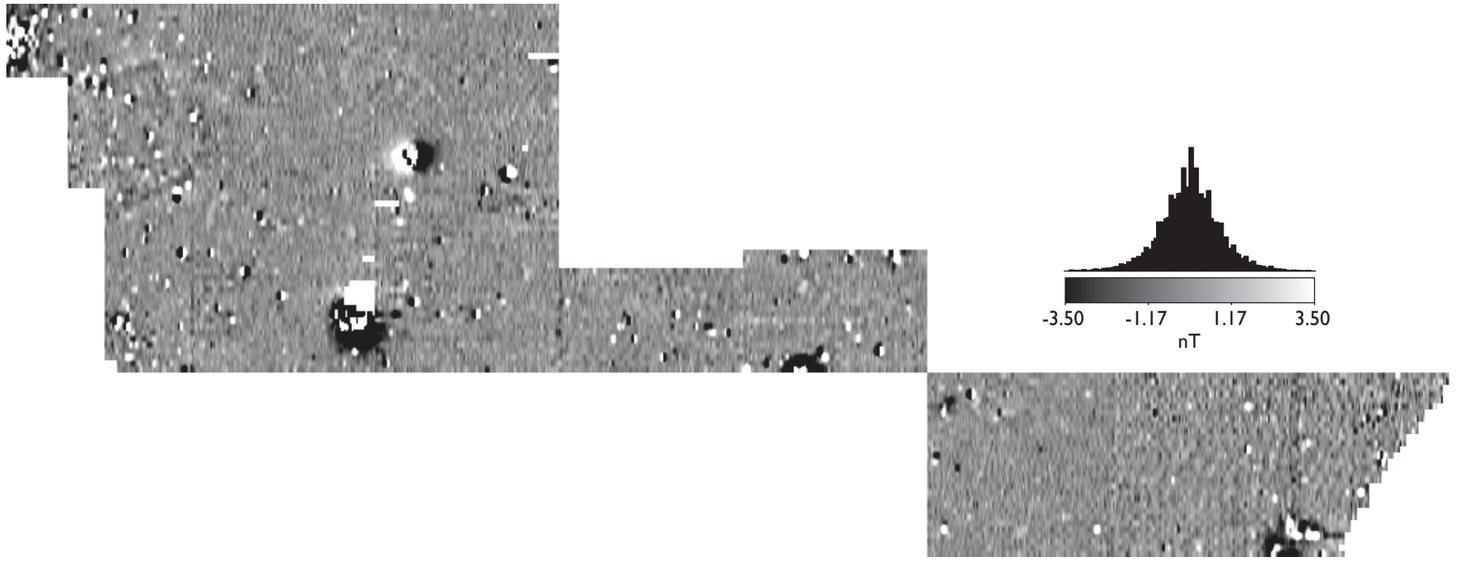
CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE Geophysical surveys, April 2017

Magnetometer data

(A)

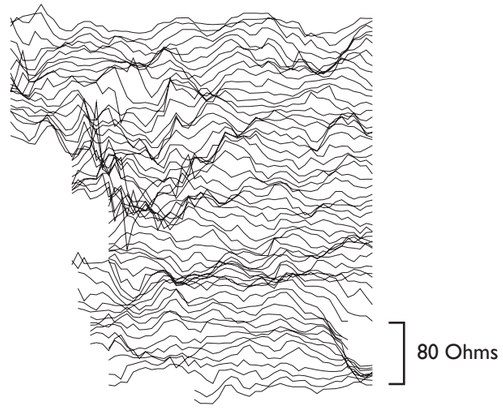


(B)

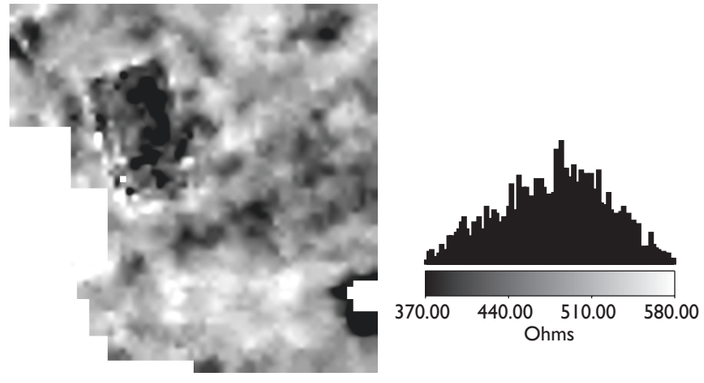


Earth resistance data

(C)



(D)



N

0 90m

1:1000

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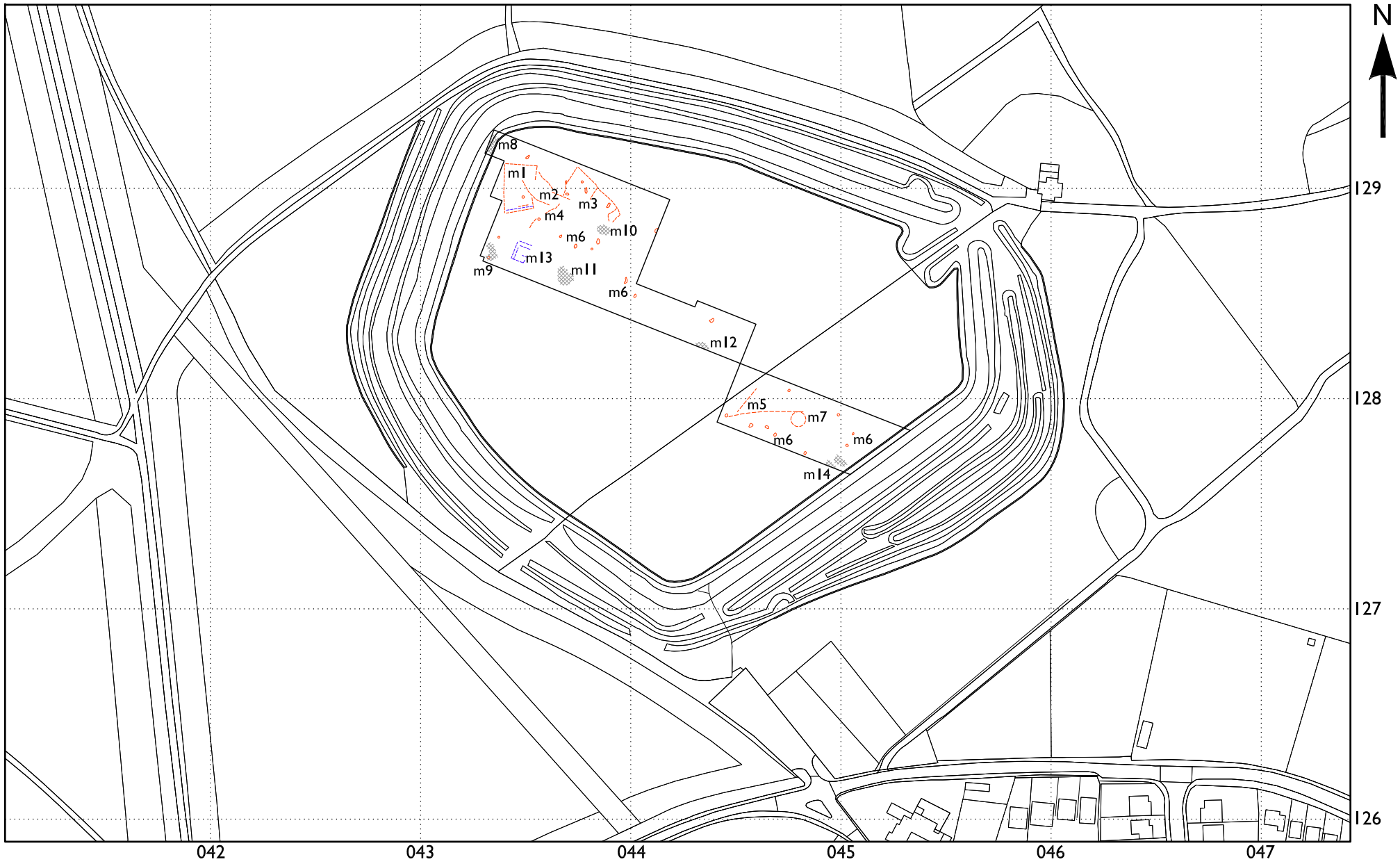
Figure 5

CASTLE RING, CANNOCK WOOD, STAFFORDSHIRE

Graphical summary of significant magnetic anomalies, April 2017

SK0412



0 90m

1:2500

positive magnetic

negative magnetic

magnetic disturbance

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Figure 6

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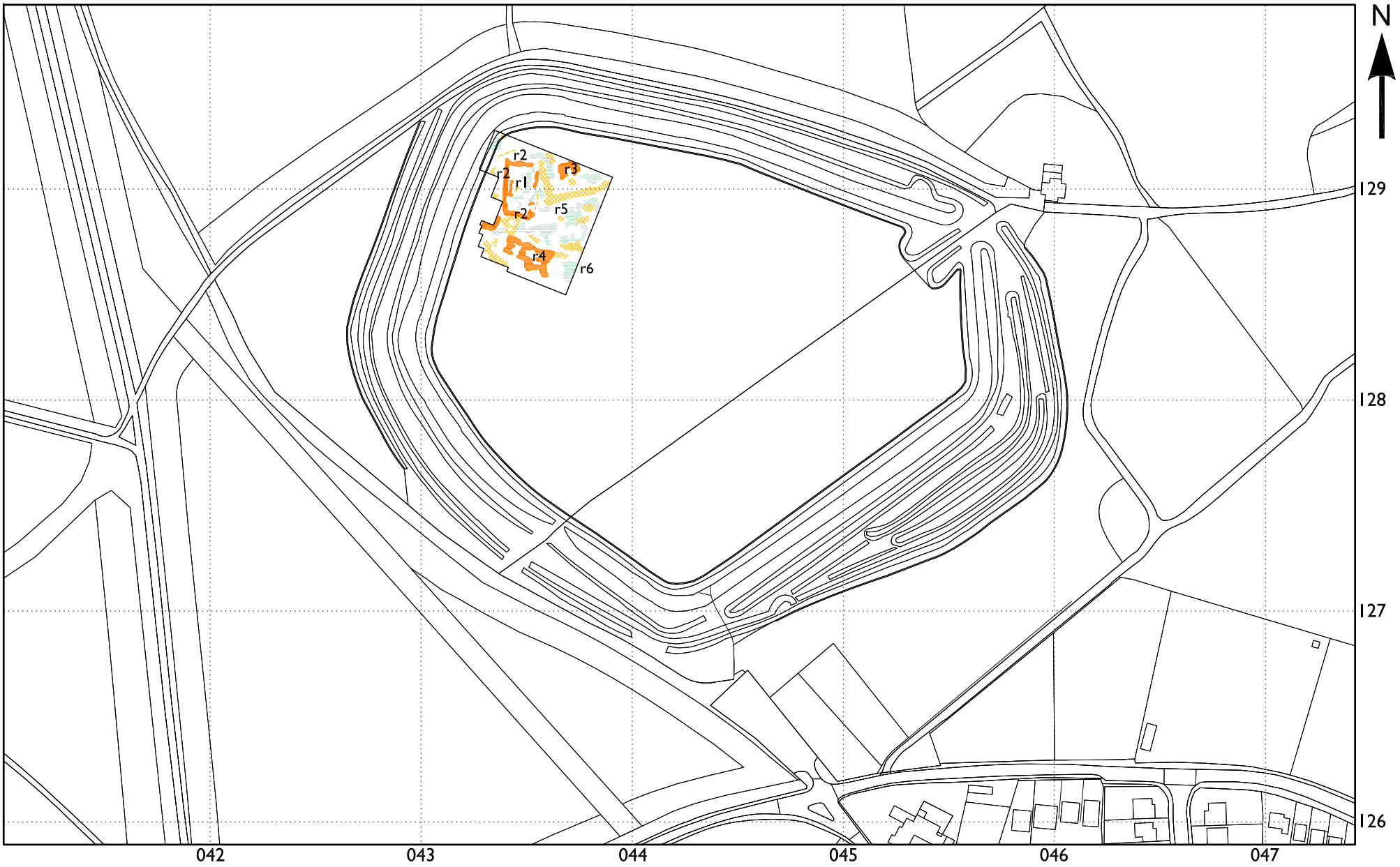
Graphical summary of significant earth resistance anomalies, April 2017

SK0412



0 90m

1:2500

very high resistance

high resistance

low resistance

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