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LITTLE CHALFIELD, ATWORTH, WILTSHIRE
REPORT ON GEOPHYSICAL SURVEY, AUGUST 2014

Neil Linford, Paul Linford and Andrew Payne

REMOTE SENSING

ENGLISH HERITAGE

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Research Report Series 78-2014

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SUMMARY

Caesium magnetometer survey was conducted over a rectilinear ditched enclosure connected with an extended double-ditched linear "avenue" and an adjoining field system of probable Iron Age to Roman date, at Little Chalfield, Atworth, Wiltshire, recorded through the initial aerial photographic phase of the National Archaeological Identification Surveys: West Wiltshire (Lowland Pilot). A vehicle-towed, caesium magnetometer array was applied in an attempt to enhance the cropmark evidence and also identify any wider significant activity over a 17.7ha area within a single large arable field. Despite some interference from ferrous pipelines, the survey confirmed the cropmark mapping and provided some additional evidence for internal occupation activity within the ploughed levelled enclosure, including the remains of a probable circular dwelling, and suggested a wider relationship to the field systems and trackways in the surrounding landscape.

CONTRIBUTORS

The field work was conducted by Neil Linford, Paul Linford and Andy Payne from the English Heritage Geophysics Team.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to the land owner Mr Anthony Fuller of Little Chalfield Manor and his farm manager Martin Smart for facilitating access to the site to allow the survey to take place.

ARCHIVE LOCATION

Fort Cumberland, Portsmouth.

DATE OF SURVEY

The fieldwork was conducted between 26th and 29th August 2014. The report was completed on 8th January 2015. The cover shows a view of the survey in progress looking north-east.

CONTACT DETAILS

Andrew Payne, Geophysics Team (Remote Sensing), English Heritage, Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth PO4 9LD.
Tel: 02392 856750. Email: andy.payne@english-heritage.org.uk

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INTRODUCTION

Caesium magnetometer survey was conducted to investigate the site of a rectilinear ditched enclosure at Little Chalfield, Wiltshire (NGR ST 85056377, NRHE HOB UID 992877) initially identified during the aerial survey phase of the West Wiltshire, National Archaeological Identification Survey (NAIS) Lowland Pilot project (RaSMIS 6303). The NAIS Lowland project covers a 199 sq km area broadly following the (north-south) A350 road corridor between the towns of Melksham and Trowbridge, and aims to improve both the understanding of known sites and also include areas where the current archaeological record is sparse (Last 2014). The results of the project will be used to inform the management and protection of the historic environment in an area potentially subject to development pressure.

Geophysical survey was included in the project to complement the initial aerial investigation on selected sites in the project area, where ground-based methods could potentially enhance the assessment of the archaeological evidence. At Chalfield the aerial photographic record suggests the presence of a probable Iron Age and Roman multi-phase settlement consisting of a number of intercutting rectilinear enclosures with an adjoining trackway or avenue and an extensive field system, though it is also possible that some of these field boundaries could be later in origin.

The survey covered a single large arable field (17.7ha) lying fallow immediately after harvest. The local underlying geology consists of Middle Jurassic Great Oolite Series Combrash (rubbly limestone) deposits overlain by shallow well drained, brashy, calcareous clayey soils of the Sherborne (343d) association (Geological Survey of Great Britain 1965; Soil Survey of England and Wales 1983). Weather conditions were largely clear and dry for the duration of the field work with occasional heavy rain showers.

METHOD

Magnetometer survey

The magnetometer data was collected along the instrument swaths shown on Figure 1 using an array of six high sensitivity Geometrics G862 caesium vapour magnetometer sensors mounted on a non-magnetic sledge. This sledge was towed behind a low impact, All Terrain Vehicle (ATV) which also provided the power supply and housed the data logging electronics. Five of the sensors were mounted in a linear array transverse to the direction of travel 0.5m apart and, vertically, ~0.2m above the ground surface. The sixth was fixed 1.0m directly above the central magnetometer in the array to act as a gradient sensor. The sensors were set to sample at a rate of 20Hz based on the typical average travel speed of the ATV (3.2m/s) giving a sampling density of ~0.16m by 0.5m along successive swaths. Each swath was separated from the last by approximately 2.5m, navigation and positional control being achieved using a Trimble R8 series Global Positioning System (GPS) receiver mounted on the sensor platform 1.75m in front of the central sensor. Sensor output and survey location was monitored during acquisition to ensure data quality and minimise the risk of gaps in the coverage due to the use of a grid-less system.

After data collection the corresponding readings from the gradient sensor were subtracted from the measurements made by the other five magnetometers to remove any transient magnetic field effects caused by the towing ATV. The median value of each instrument traverse was then

adjusted to zero by subtracting a running median value calculated over a 60m 1D window. This operation corrects for slight biases added to the measurements owing to the diurnal variation of the Earth's magnetic field and any slight directional sensitivity of the sensors. A linear greyscale image of the combined magnetic data is shown superimposed over the base Ordnance Survey (OS) mapping on Figure 2 and minimally processed versions of the range truncated data (± 150nT/m) are shown as a traceplot and a linear greyscale image in Figures 3 and 4 respectively.

RESULTS

A graphical summary of the significant magnetic anomalies, [m1-36], discussed in the following text, superimposed on the base OS map data, is provided in Figure 5.

Background response

The general response at the site is relatively weak (<2nT) and has suffered some interference from a double water main [m1], along the southern field edge, and a domestic supply [m2], that runs diagonally across the survey area. A broad linear zone of disturbance [m3] may be related to agriculture or a slight extant ridge, and a series of weak, parallel anomalies across the survey area are also probably associated with current or relict cultivation patterns. A distinct soil change is visible to the north of the field, delimited by [m4] (and [m18] to the west), that follows the former field boundary shown on the first edition historic mapping (OS Historic County Mapping Series: Wiltshire, Epoch 1, 1843 to 1893). This area corresponds with a more subdued geophysical response [m5], perhaps associated with the stream channel running along the northern boundary, with a thin distribution of localised magnetic responses and no continuation of the linear anomalies to the south suggesting either a reduced level of archaeological activity or the masking effect of the different soil type. A scatter of pit-like responses are also present throughout the survey area and whilst some are likely to be related to activity associated with the settlement presence others may well be natural in origin (such as geomorphological or tree-throw disturbances).

The rectangular cropmark enclosure and associated activity

A series of linear and curvilinear anomalies [m6] correspond with the cropmark evidence over the rectangular enclosure and provides some additional detail particularly within the rectilinear sub-enclosure [m7], which contains evidence for internal occupation activity [m8], and the more complete definition of the ring-gully of a probable circular dwelling [m9] with associated localised responses [m10], perhaps indicative of hearths, ovens or pits. The varying orientation of the ditches possibly suggests the smaller enclosure [m7] may have been replaced or enlarged by incorporating it into [m6].

A complex of curvilinear ditch-type anomalies [m11] together with a D-shaped arrangement [m12] extend beyond [m6] suggesting the settlement developed in several phases, although it is difficult to determine a more precise chronology from the magnetic data alone. Anomaly [m12] appears to be joined to a ditch-type response [m13] extending south, but distinct from the parallel "avenue" ([m19] and [m20]) leading from the entrance of the main rectangular enclosure [m6] .

The main enclosure [m6] has a northward extension, defined by a series of ditches and sub-divisions [m14-17], of more regular rectilinear form compared to [m12], and appear to respect a linear anomaly [m18] that to the west corresponds to the former field boundary recorded on the historic mapping. Whilst [m18] may form the northern limit of the enclosed settlement, partially fossilised in later field boundaries, the aerial survey record suggests the related field systems are more extensive.

Parallel ditches [m19] and [m20] run south from [m6], together with a slightly narrower linear anomaly [m21], flanking [m20] at first before they apparently conjoin. A further linear anomaly [m22] corresponds with a field boundary evident on the first edition historic mapping (OS Historic County Mapping Series: Wiltshire, Epoch 1, 1843 to 1893),

Anomalies [m19] and [m20] form a T-junction to the south with an apparently persistent curvilinear trackway defined by [m23-25], with evidence for some realignment over time particularly at [m24]. It is unclear how this trackway relates to the current by-way between Little and Great Chalfield, running E-W approximately 70m to the south, but the cropmark transcriptions certainly suggest [m23-25] continues west on a similar alignment beyond the survey area (Figure 5).

Further ditch-type anomalies [m26] and [m27] cut across [m23-25] and may, perhaps, represent later field boundaries associated with the Medieval settlement at Little Chalfield Manor immediately to the south. However, [m26] is also possibly a continuation of [m22], the field boundary shown on the historic mapping, although the response here is partly obscured by the water main [m1].

A series of narrow linear anomalies [m28-33], suggesting either insubstantial ditches or some degradation by ploughing, are indicative of a field system respecting the boundary at [m22]. Again, it is difficult to suggest a more precise chronology although [m22] and [m28-33] do not share the same orientation as the main enclosure settlement. To the east a number of weak ditch responses [m27] and [m34-35] are present but these are on varied alignments and do not form a coherent system, although [m34] could, in part, be associated with the track from Little Chalfield shown on the historic mapping.

The unusual pattern of weak linear anomalies at [m36] may also relate to some form of agricultural activity, perhaps lazy bed cultivation, but appears different in character to the wider field system remains.

CONCLUSION

The magnetometer survey has successfully corroborated the general layout of the enclosure complex, previously identified from the aerial mapping, and indicates additional internal occupation activity that suggests the site functioned as an inhabited settlement for part of its lifetime. Additional linear anomalies revealed by the magnetic survey help to elaborate the wider multi-phase settlement at the site through a series of adjacent field systems and trackways, some of which appear to respect recent historic field boundaries. The field system to the west of the settlement is well resolved through faint ditch-type anomalies, possibly suggesting some degradation through mechanised ploughing, and distinct from the apparent land use to the east which does not appear to contain a similar pattern of regular field allotment boundaries.

LIST OF ENCLOSED FIGURES

Figure 1 Location of the caesium magnetometer instrument swaths superimposed over the base OS mapping data (1:2500).

Figure 2 Linear greyscale image of the caesium magnetometer data after initial processing superimposed over base OS mapping (1:2500).

Figure 3 Traceplot of the magnetic data after initial drift correction and reduction of extreme values. Alternate lines have been removed from the data to improve the clarity of the traceplot representation (1:1750).

Figure 4 Linear greyscale image of the magnetic data after initial processing (1:1750).

Figure 5 Graphical summary of significant magnetic anomalies with the aerial mapping evidence superimposed over the base OS mapping (1:2500).

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Figure 1

LITTLE CHALFIELD, ATWORTH, WILTSHIRE

Location of caesium magnetometer survey, August 2014

ST8463

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Figure 2

LITTLE CHALFIELD, ATWORTH, WILTSHIRE

Location of caesium magnetometer survey, August 2014

ST8463

0 90m

1:2500

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Figure 3

LITTLE CHALFIELD, ATWORTH, WILTSHIRE
Caesium magnetometer survey, August 2014

Traceplot of minimally processed caesium magnetometer data

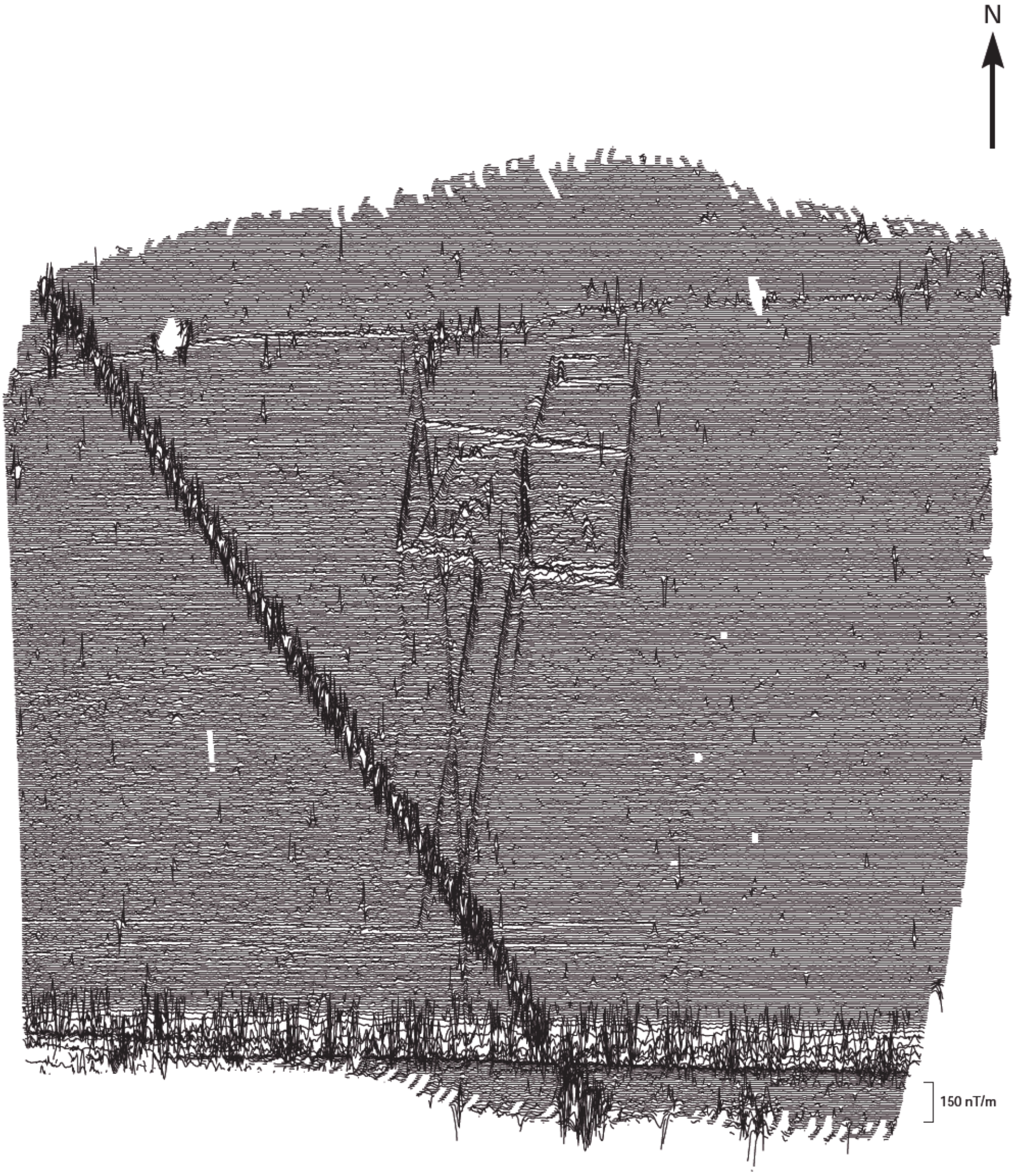

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Figure 4

LITTLE CHALFIELD, ATWORTH, WILTSHIRE
Caesium magnetometer survey, August 2014

Linear greyscale image of minimally processed caesium magnetometer data

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Figure 5

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Graphical summary of significant magnetic anomalies shown in relation to wider aerial mapping evidence

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N

639

638

637

636

635

846 847 848 849 850 851 852 853 854 855

aerial mapping evidence:
- rig and furrow alignment
- bank
- scarp
- ditch

strongly magnetic
positive magnetic
raised magnetic
negative magnetic
magnetic noise

0 90m
1:2500

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