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Ancient Monuments Laboratory
Report 70/96

# REPORT ON GEOPHYSICAL SURVEY, JULY 1996, HINTON ST MARY, DORSET

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Summary

Resistivity and magnetometer surveys were carried out at Hinton St Mary, Dorset, to provide detailed information about the immediate setting of an important 4th-century Roman mosaic unearthed in 1963. Previous excavation at the site had only provided a partial indication of the true pattern of the Roman remains. Further information was now required in order to assist site management. The survey successfully revealed evidence for a substantial complex of buried building remains and ditched features - mainly in the scheduled area (SAM Dorset 711) but also extending outside it. The character of the Roman remains can now be more fully appreciated and this will enable improved management and interpretation of the site in the future.

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# Hinton St Mary, Dorset

## Report on Geophysical Surveys, July 1996

### INTRODUCTION

In 1963, a mosaic floor of Roman date was discovered by Mr W J White during building work on the southern edge of the village of Hinton St Mary in Dorset (NGR ST 785/159). The mosaic contains a portrait generally accepted to be of Christ, which is of international importance as evidence for early Christianity in Britain in the third and fourth centuries AD. Shortly after its discovery the mosaic was removed and taken to the British Museum for conservation (where it is now on display) and the field where it was found was designated a scheduled ancient monument (SAM Dorset 711). The British Museum also carried out a limited amount of trial excavation at the site south and west of the find-spot (see Figure 1), which revealed a series of walls aligned mostly south-west to north-east (Painter 1965). These were thought at the time to represent several ranges of buildings possibly laid out around three sides of a rectangle, but little further research has been carried out on the site and the wider context of the mosaic still remains improperly understood.

In recent years the site has been subject to development pressures and in order for English Heritage to respond to these realistically, more information on the site was required, particularly on its detailed character, articulation, survival and extent. Consequently a geophysical survey was commissioned from the Ancient Monuments Laboratory (AML) by Paul Gosling (Inspector of Ancient Monuments for Dorset) with the aim of mapping any buried archaeological features in the area of the mosaic. It was hoped that the use of geophysical techniques would enable the basic ground plan of the Roman remains at Hinton to be better defined and understood for future planning purposes and also to allow improved management and interpretation.

### METHOD

In the following description Area 1 is defined as the scheduled field which produced the mosaic find. Area 2 is the small pasture field south of Area 1 and north of Tinwood Cottage. Area 3 is the arable field south and west of Areas 1 and 2 (see survey location plans, Figures 1 and 5).

#### General considerations

The geological conditions at Hinton (Upper Jurassic Corallian limestone and clay deposits of the Stour formation, overlain by brashy clayey soils of the Sherborne association) are well suited to magnetic prospection (cf Watchfield, Oxfordshire: Linford and Payne 1992). Magnetometer survey used in such conditions should be capable of detecting a range of archaeological features including silted-up ditches, pits and deposits of burnt material. However, resistivity survey is generally more capable of detecting wall foundations and

therefore both techniques were employed as, together, they often provide complementary information.

The survey was extended beyond the scheduled area in an effort to examine the wider setting of the villa remains, but it was only possible to survey this area (Area 3) using magnetometry because of a maize crop and time constraints.

**Resistivity survey**

A single survey grid of 30m squares was set out in Areas 1 and 2 (see Figure 1) and readings of the earth resistance were taken across each grid square following the standard AML procedure (see Annex A, Note 1). The results are presented as a series of computer generated plots in Figure 2. The initial raw data is presented in the form of a traceplot and a non-linear greyscale plot (Figures 2a and 2b). In addition, in order to improve the visibility of archaeologically significant anomalies, the initial data was enhanced using 3 and 5m radius Gaussian high-pass filters (Scollar 1990) to remove broad (geological background) trends and highlight features less than 3 and 5m in width respectively (Figures 2c and 2d). Directional filtering was also employed (Figure 2e) to emphasise features aligned along the main north-east to south-west axis of the villa. A further plot of the resistivity data in its locational setting is provided in Figure 3, and an interpretation of the resistivity data is supplied on Figure 4.

**Magnetometer survey**

Areas 1 and 2 were surveyed using the same grid as the resistivity survey, but because of a lack of visibility between the field boundaries, Area 3 was surveyed on a separate grid layout (see Figure 5). Each 30m grid square was surveyed with a fluxgate magnetometer following the standard AML procedure (Annex A, Note 2). Greyscale and traceplots of the raw magnetometer data from Areas 1/2 and Area 3 are provided on Figure 6 and a plot of the magnetometer data in its locational setting is provided on Figure 7. An interpretation of the magnetometer surveys is also supplied in Figure 8.

## RESULTS

*Uppercase letters in bold type refer to resistivity anomalies on the survey interpretation supplied on Figure 4. Lower case letters correspond to magnetic anomalies indicated on Figure 8.*

**Resistivity survey** (Figures 2, 3 and 4)

*Area 1*

In Area 1, the resistivity survey has detected the outlines of an elaborate series of buildings as high resistance anomalies indicative of in-situ buried stone-work. A schematic interpretation of the possible layout of the buildings is provided on Figure 4. There appear to be at least three separate ranges of building (**A** - **C**) aligned roughly parallel with one another on a north-east to south-west axis surrounding a larger rectangular area (**D**) concurring with and extending upon the evidence from the excavations. The presence of some overlapping curving anomalies and alignments at slightly different angles to each other may

indicate successive phases of building. South of and at a right angle to the main concentration of buildings a further possible wall or double walled feature (**E**) has been located. This coincides with a ditch bounded by a wall recorded by the excavation and a possible ditch located by the magnetometer survey (**n**). Another ditch feature (**F**) runs alongside and follows the same alignment as the north-east edge of building (**A**) where it has also been detected as a magnetic anomaly (**m**). Within building (**A**), several areas of higher resistance (**G**) strongly suggest the preservation of floor layers (perhaps further mosaic pavements) or deposits of collapsed building materials. Excavation on the edge of (**G**) recorded a building 24 feet (7.3m) wide containing a geometric pattern mosaic with partially robbbed out walls and a tessellated corridor on its south-east side. On the south-west edge of the survey in Area 1, beyond feature (**E**) there is evidence of a further rectilinear building (**H**: again about 7m wide, but of unknown extent to the south-west).

Very high resistance values were recorded over the area that previously contained the mosaic (**I**), but elsewhere on the site no response was obtained over former excavation trenches[1].

*Area 2*

Area 2 appears to contain few resistivity anomalies of obvious archaeological significance. However, there is an indistinct linear low resistance anomaly (**J**) corresponding to an L-shaped ditch alignment located more clearly by the magnetometer survey (**p**) near the eastern edge of the field. A pronounced high resistance anomaly is also present in the south-west of the area at (**K**) but whether it is of archaeological or modern origin is unclear. Several service pipes have been detected as linear anomalies (**L**) running between the Forge and Tinwood Cottage.

**Magnetometer survey** (Figures 6, 7 and 8)

*Modern interference*

The magnetometer survey has been adversely affected by interference from iron objects littered widely throughout Areas 1 and 2, - this is entirely to be expected, given the presence of a long established forge in the north-east corner of Area 1. Similar disturbance occurs near the field boundary west of Tinwood Cottage in the southern part of Area 3. Large areas of disturbance were also caused by the presence of corrugated iron sheds in the north-east part of Area 1, buried pipes, a septic tank near Tinwood Cottage and a former pond filled in with unknown dumped material near the kink in the southern boundary of Area 1 (Mr White pers comm).

*Archaeological anomalies*

In spite of this magnetic interference, the survey has successfully detected a number of potentially archaeological anomalies. Amongst these are positive linear anomalies in Areas

[1] This is unfortunate as it would have enabled the excavation findings to be tied in better with the results of the survey. (The field boundaries of the scheduled area appear to have altered since the location plan of the excavations was published in 1965, making it difficult to accurately overlay the excavation details on the survey. However, despite the difficulties of relating the two sets of findings there is generally a good fit between the resistivity anomalies and the courses of walls recorded by excavation - see Figure 3)

1 and 2 which probably represent buried ditches (**m - p**) on Figure 8).

Several other possible ditches have been detected in Area 3 (**q - t**), but because of the interrupted survey coverage it is not possible to tell if these features are linked to the ditches located in Area 1 to the north-east. The response to the ditch (**q**) running north-south in Area 3 appears to fade out towards the extreme southern edge of the survey, suggesting a fall-off in the intensity of past settlement activity in this direction. The anomaly from the same ditch is clearly enhanced near the possible building located alongside its course further to the north (see below).

In general there is no clear evidence in the magnetic data for buildings, but groups of localised anomalies (**u, v**) do coincide with resistance anomalies associated with buried buildings in Area 1 (see above). The magnetic anomalies may represent magnetic materials contained within the former structures including burnt and fired features such as hearths and ovens or dumps of pottery, brick or tile. A linear negative magnetic anomaly (**w**) in Area 2 may indicate a buried wall, drain or pipe made of material (such as stone or plastic) with a lower magnetic susceptibility than the surrounding soil. Its interpretation as a buried wall of Roman date is open to doubt, because there is no corresponding high resistance anomaly in the resistivity data.

A distinct rectlinear or oval-shaped area of anomalous readings (**x**) adjacent to the north-south ditch in Area 3 may well represent a further unsuspected building. But, the precise interpretation and relationship to the main villa complex must remain uncertain.

## CONCLUSIONS

These survey results indicate that, with the apparent exception of the far north-west edge of the field, the majority of the scheduled area contains detectable archaeological remains. These findings have verified the layout of Roman walls and buildings suggested by the earlier British Museum excavations and have, besides, added further detail regarding the form and extent of buried features in the scheduled area and beyond. Although the main evidence for Roman buildings is concentrated in the scheduled field, further archaeological activity does extend into the arable field to the south-west (as confirmed by the presence of Roman pottery observed on the surface of the field). The survey thus clearly reveals that the scheduled area is not an adequate reflection of the full extent of archaeological activity at Hinton. In addition, it needs to be borne in mind that there may be other buried remains present on the site which are not susceptible to detection by current geophysical methods.

Archaeological interpretation of the geophysical evidence is difficult, owing to the interrupted survey coverage and the presence of widespread contamination from modern activities. Although a partial pattern of building foundations has been revealed, and can, in part, be related back to the very limited excavation findings, a coherent overall pattern remains elusive. The pattern of linear anomalies could perhaps be taken to suggest the presence of a core area of buildings constructed in several phases within an enclosure[2] - although the evidence for the latter must be admitted to be very conjectural and composed only of fragmented anomalies. It is also unfortunately not possible to know from the survey evidence

[2] This arrangement is paralleled for example by the 4th-century villa at Barton Court Farm, Oxfordshire (see Miles (ed) 1986, fig.4)

alone whether the ditches and buildings are contemporary with one another. It is quite possible that the ditches may represent an earlier pre-villa phase of enclosure on the site as found at other excavated Roman villas (for example Gorhambury, Herts, and Beadlam, North Yorks) or even a later series of boundaries (for instance a Medieval field system). The ditches do however seem to respect the alignment of the Roman building remains located by resistivity and excavation, and it is therefore reasonably likely that these two sets of features are broadly contemporary.

A yet fuller picture could be obtained by further survey. The fall-off in the magnetic response to ditches in the extreme southern and western parts of the survey suggests a decrease in archaeological activity towards the floodplain of the River Stour and that a continuation of the survey in this direction would probably be unproductive. However, further resistivity survey over magnetic anomaly (x) would help establish the significance of this curious feature[3]. Unfortunately, the presence of built-up areas around the existing scheduled area prevent any further attempt at tracing the extent of the site to the north and east.

Surveyed by: M Cole 8-10 July 1996
A Payne

Reported by: A Payne 2nd October 1996

Archaeometry Branch
Ancient Monuments Laboratory

[3] If it does actually represent the remains of a building it is in an appropriate location for a bath-house and the positive magnetic response is compatible with a heated structure.

## REFERENCES

Painter, K S, 1965 Excavation of the Roman Villa at Hinton St Mary 1964, *Proceedings of the Dorset Natural History and Archaeological Society,* **86**, 150-4

Linford, N, and Payne, A, 1992 Magnetometer surveys at Watchfield 1985 and 1988 in Scull, C, 1992 Excavation and Survey at Watchfield , Oxfordshire, 1983-92, *Archaeological Journal*, **149** (1992), 124-281

Miles, D (edited by), 1986 Archaeology at Barton Court Farm, Abingdon, Oxon, *Oxford Archaeological Unit Report* **3**, *CBA Research Report* **50**.

Scollar, I (ed), 1990 *Archaeological Prospecting and Remote Sensing*, Topics in Remote Sensing **2**, Cambridge University Press.

## LIST OF FIGURES

## ANNEX A : Notes on standard procedures

1) Resistivity Survey: Each 30 metre square is surveyed by making successive parallel traverses across it, all aligned parallel to one pair of the square's edges. For a 1m reading density (used as standard unless otherwise stated), each traverse is separated by a distance of 1m from the last; the first and last traverses being 0.5 metres from the nearest parallel square edge. Readings are taken along each traverse at 1 metre intervals, the first and last readings being 0.5 metres from the nearest square edge. In the case of a reading density 0.5m instead of the usual 1.0m, the intervals are reduced to 0.5m and 0.25m respectively.

Unless otherwise stated in the main report text, the measurements are made with a Geoscan RM15 earth resistance meter incorporating a built-in data logger, using the Twin Electrode configuration with a 0.5 metre mobile probe separation. As it is usually only relative changes in resistivity that are of interest in archaeological prospecting, no attempt is made to correct these measurements for the geometry of the twin electrode array to produce an estimate of the true apparent resistivity. Thus, the (raw data) readings presented in plots will be the actual values of earth resistance recorded by the meter, measured in Ohms (Ω). Where correction to apparent resistivity has been made, for comparison with other electrical prospecting techniques, the results are quoted in the units of apparent resistivity, Ohm-m (Ωm).

Measurements are recorded digitally by the RM15 meter and subsequently transferred to a portable lap-top computer for permanent storage and preliminary processing. Additional processing is performed on return to the Ancient Monuments Laboratory using desktop workstations and a suite of digital image processing programmes specially developed at the AML for archaeological geophysics.

2) Magnetometer Survey: Each 30m square is surveyed by making successive parallel traverses across it, all parallel to that pair of square edges most closely aligned with the direction of magnetic North. Each traverse is separated by a distance of 1 metre from the last; the first and last traverses being 0.5 metre from the nearest parallel square edge. Readings are taken along each traverse at 0.25 metre intervals, the first and last readings being 0.125 metre from the nearest edge of the square.

These traverses are walked in so called "zig-zag" fashion, in which the direction of travel alternates between adjacent traverses to maximise survey speed. However, the magnetometer is always kept facing in the same direction, regardless of direction of travel, to minimise heading error.

Unless otherwise stated the measurements are made with a Geoscan FM36 fluxgate gradiometer which incorporates two vertically aligned fluxgates, one situated 0.5 metre above the other; the bottom fluxgate is carried at a height of approximately 0.2 metres above the ground surface. The FM36 incorporates a built-in data logger that records measurements digitally; these are subsequently transferred to a portable laptop computer for storage and initial processing. Additional processing is performed on return to the Ancient Monuments Laboratory using desktop workstations and a series of programmes specially developed by the AML for processing archaeological geophysical data.

It is the opinion of the manufacturer of the Geoscan instrument that two sensors placed 0.5m apart do not produce a true measure of vertical magnetic field gradient. Hence, when results are presented, the difference between the field intensity measured by the top and bottom sensors is quoted in units of nano-Tesla (nT) rather than in the units of magnetic gradient, nano-Tesla per metre (nT/m).

FIGURE 1

# HINTON ST MARY, DORSET
## (SITE OF ROMAN MOSAIC FIND)

## Location of Resistivity Survey, July 1996

**KEY**

Site of mosaic discovery

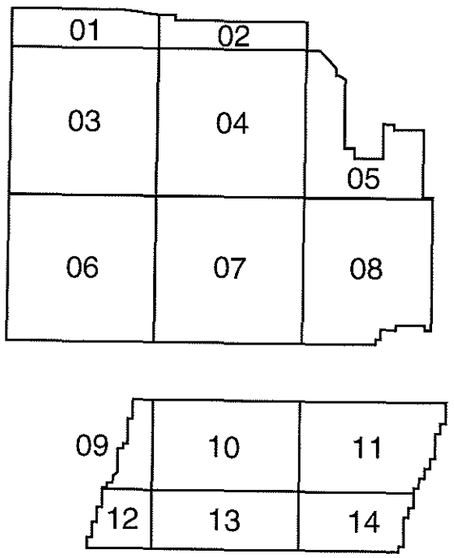
Previously excavated features 1 - 4

wall alignment

excavated trench

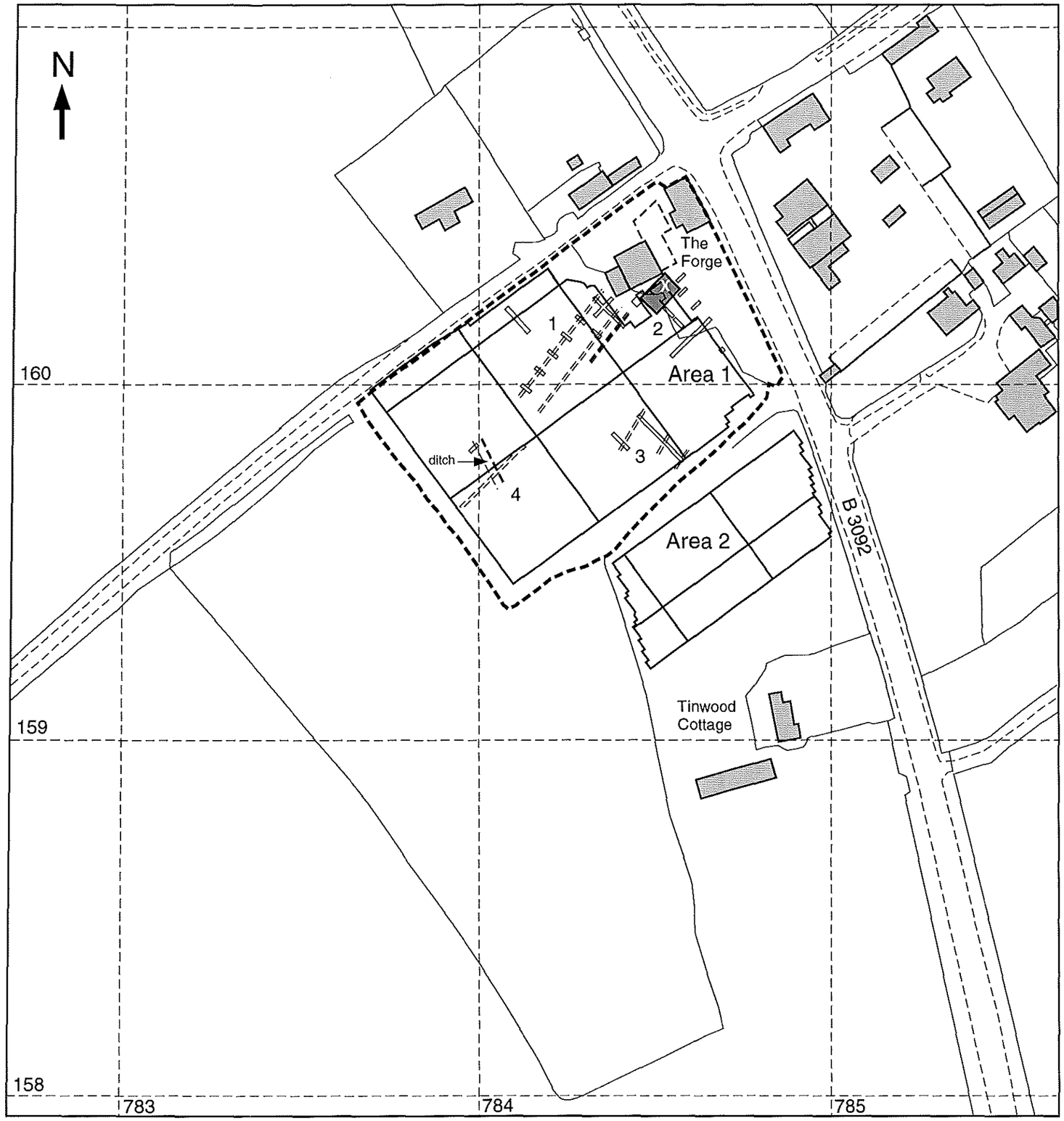
Scheduled area (Dorset 711)

Survey grid






AMLab 96

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Scale

0 50 100 150m

FIGURE 2

# HINTON ST MARY
# Resistivity Data

A) Greyscale of raw data

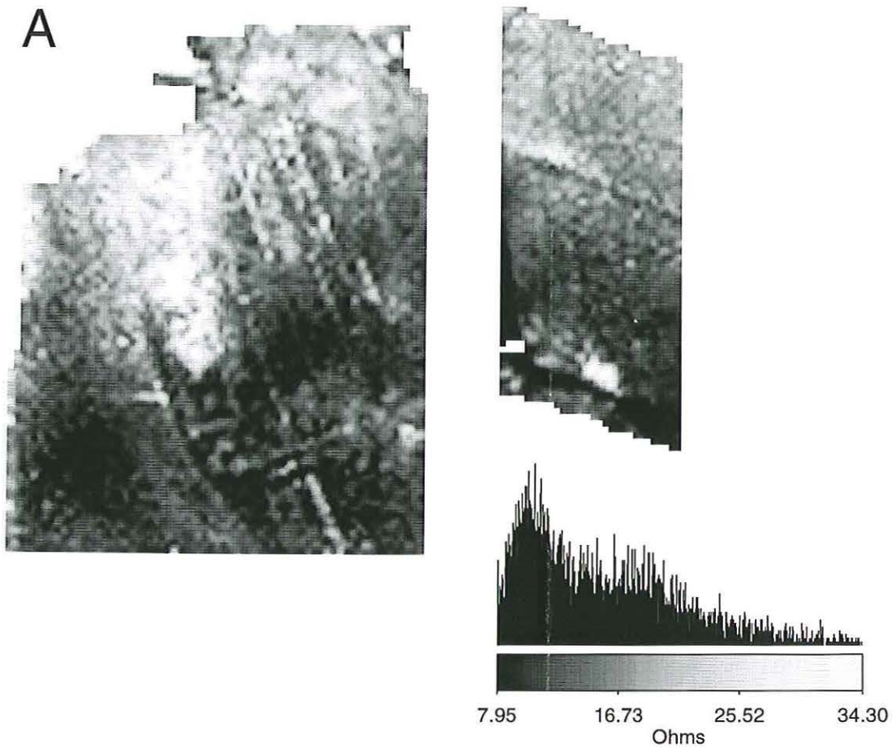
B) Traceplot of raw data

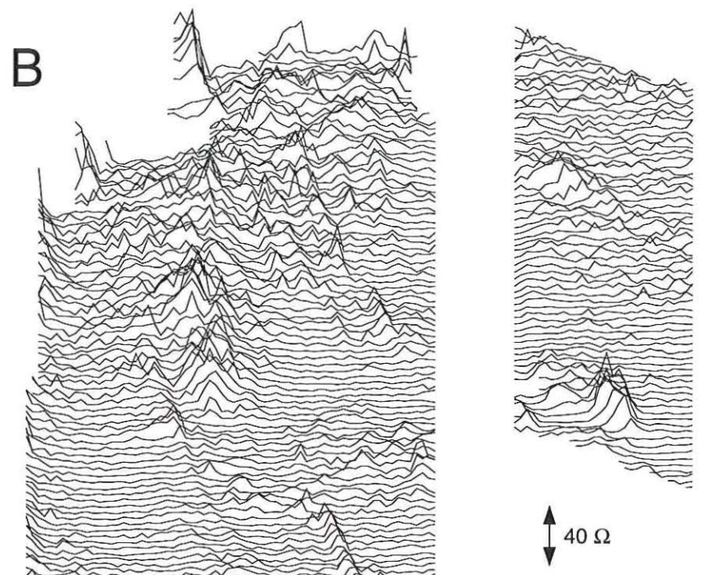
C) Greyscale plot of data enhanced with a Gaussian high-pass filter (5m radius)

D) Greyscale plot of data enhanced with a Gaussian high-pass filter (3m radius)

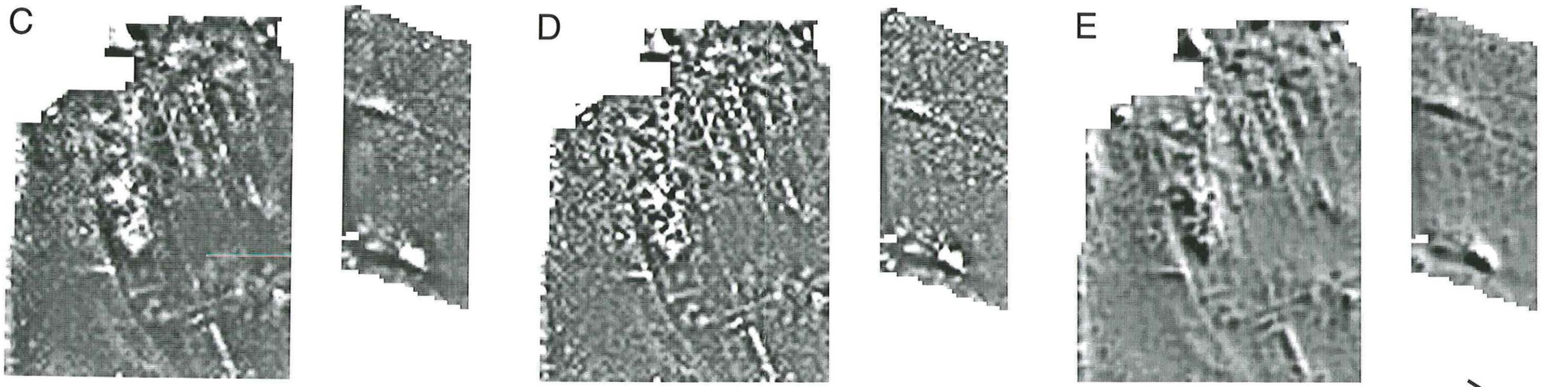
E) Greyscale plot of data enhanced with a directional filter from the SW

RAW DATA




FILTERED DATA




METRES

0 10 30 60 90

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FIGURE 3

# HINTON ST MARY, DORSET

## Location of Resistivity Survey, July 1996

**KEY**

Site of mosaic discovery

Previously excavated features 1 - 4

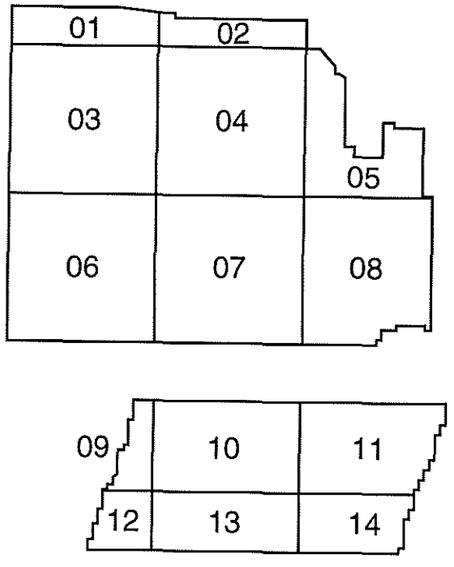
wall alignment

excavated trench

Scheduled area (Dorset 711)



Survey grid



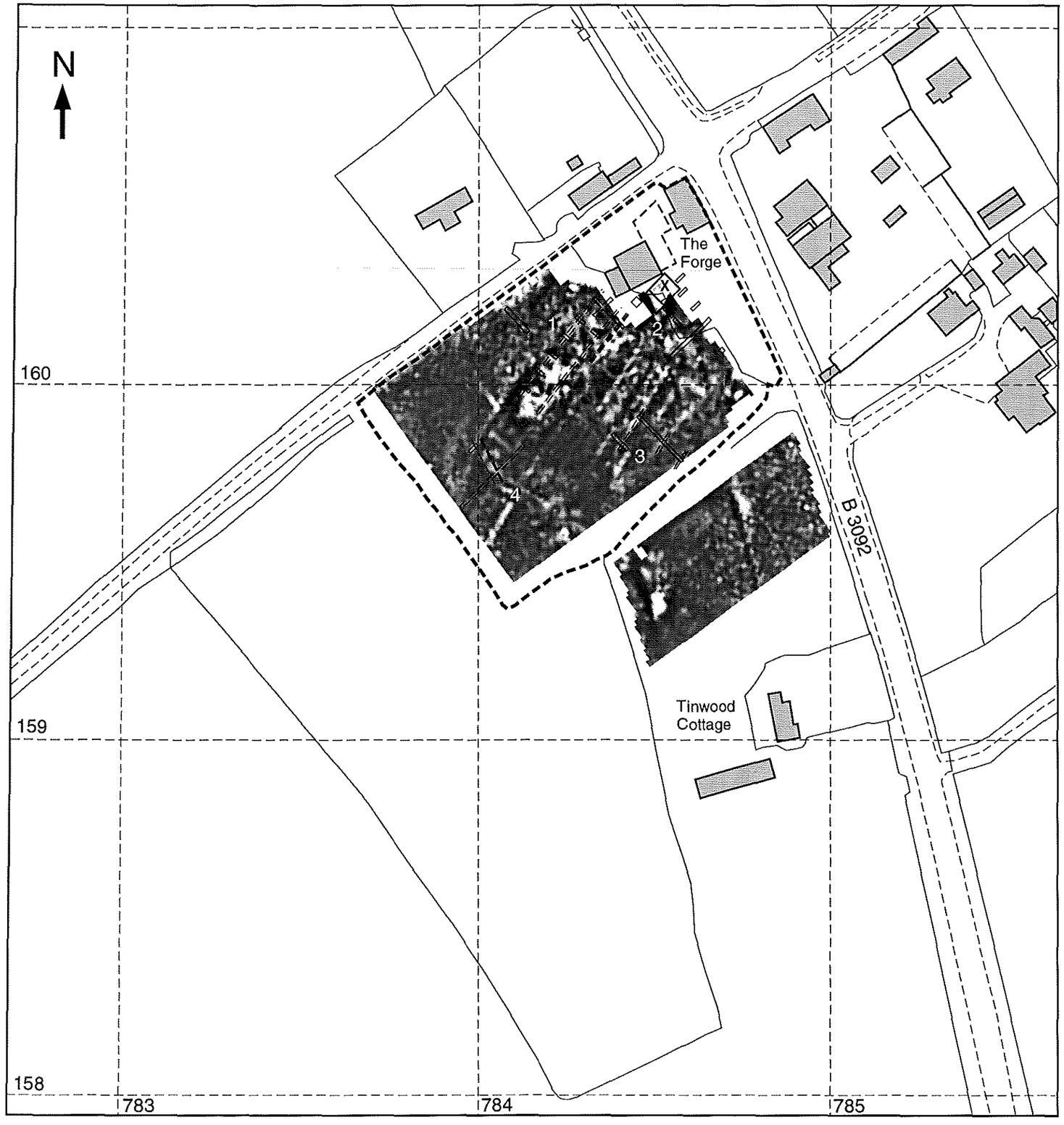




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FIGURE 4

# HINTON ST MARY, DORSET

## Interpretation of Resistivity Survey

**KEY**

linear high resistance anomalies - walls

distinct

indistinct

buried resistive layers/surfaces - floors/rubble deposits

linear low resistance anomalies - ditches

distinct

indistinct

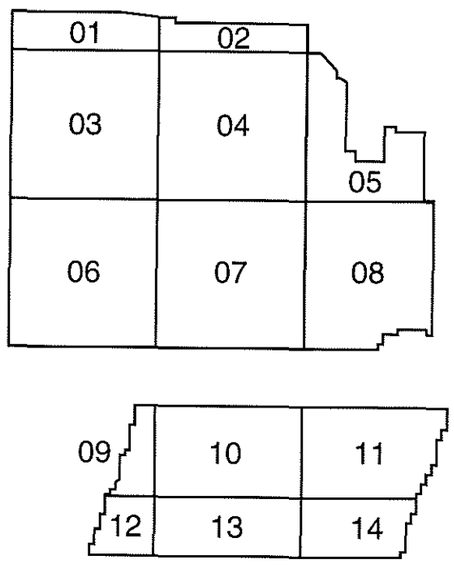
modern service trenches

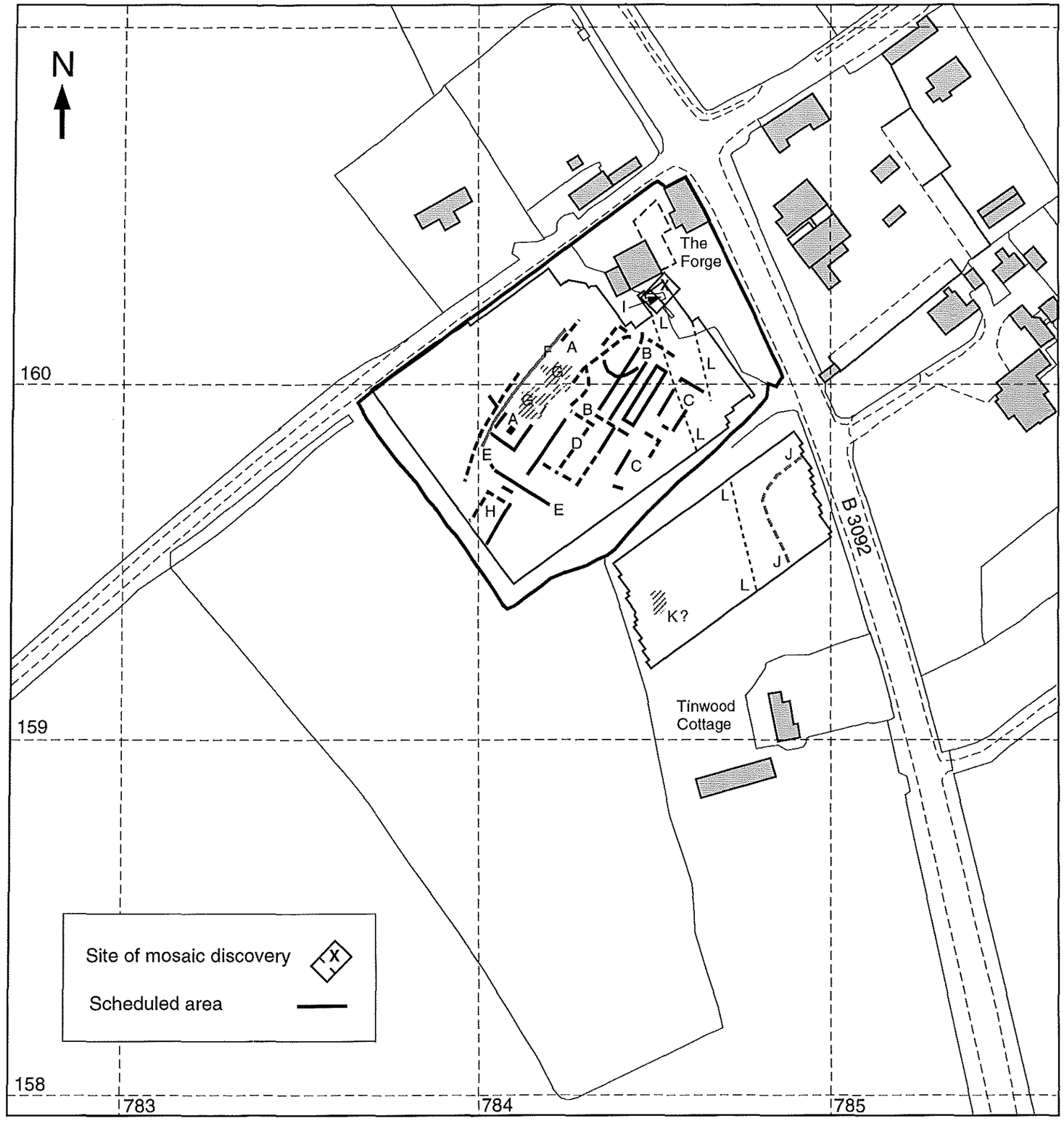
A - L : anomalies refered to in report text

? : anomalies of uncertain nature



survey grid

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Scale

0 50 100 150m

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FIGURE 5

# HINTON ST MARY, DORSET
## (SITE OF ROMAN MOSAIC FIND)

## Location of Magnetometer Survey, July 1996

**KEY**

Site of mosaic discovery

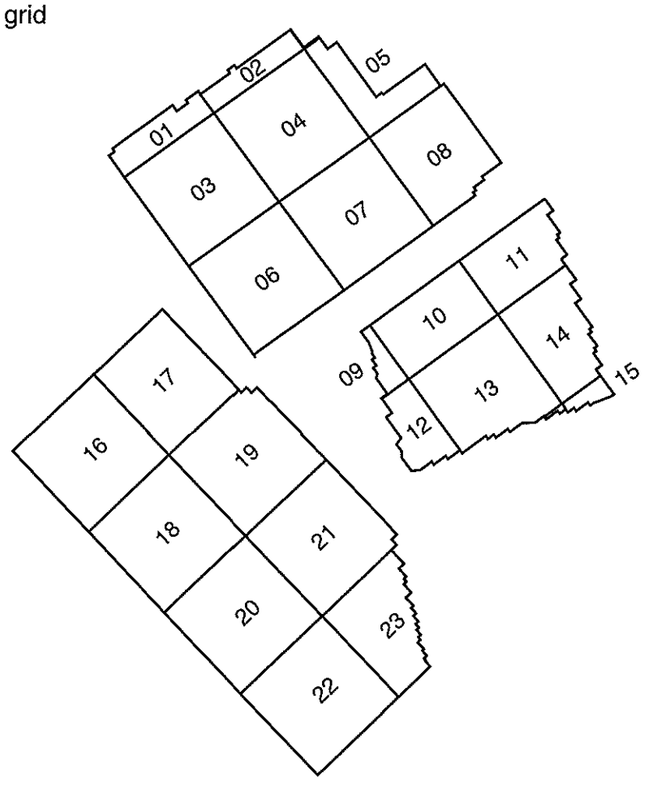
Previously excavated features 1 - 4

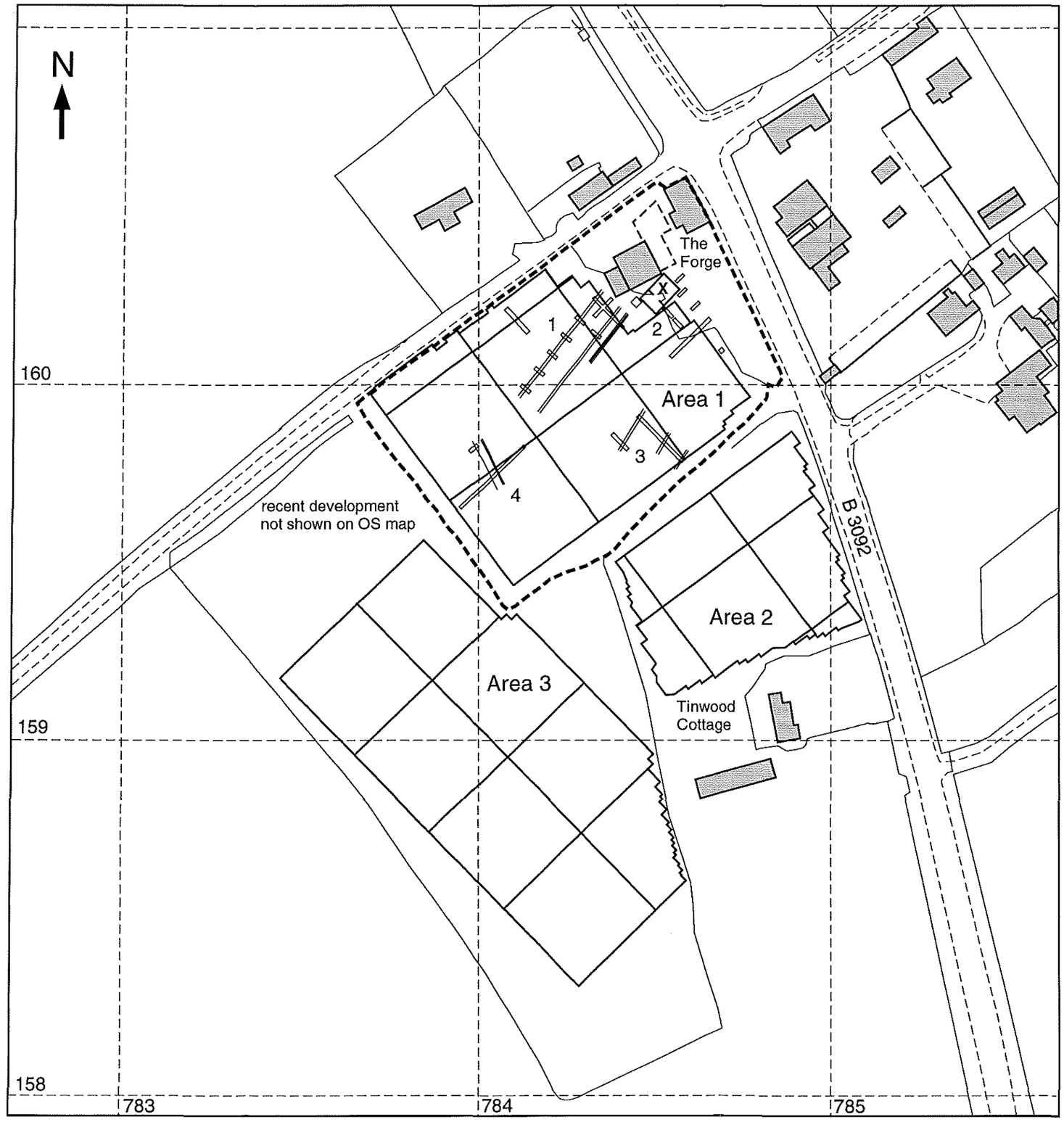
wall alignment

excavated trench

Scheduled area (Dorset 711)

Survey grid




ST 78/15

Scale
0 50 100 150m

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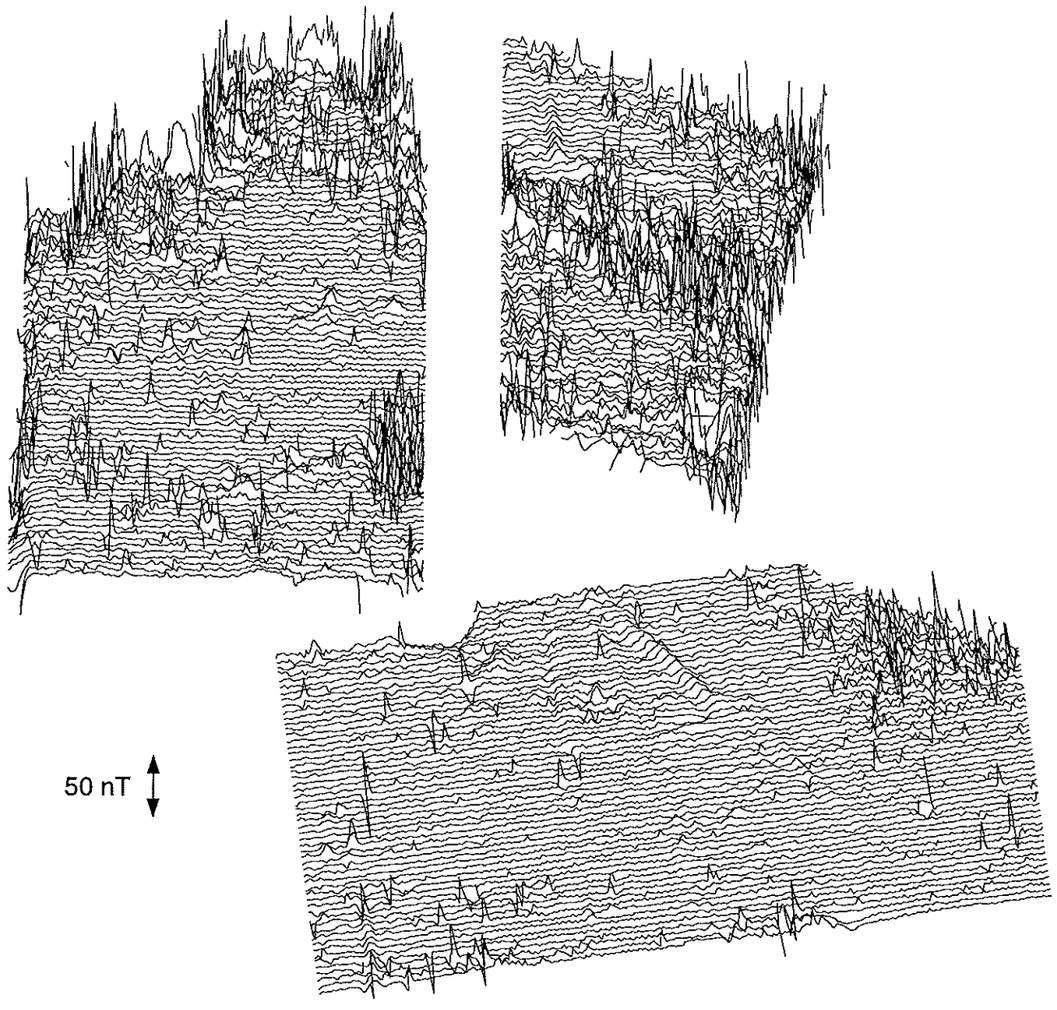
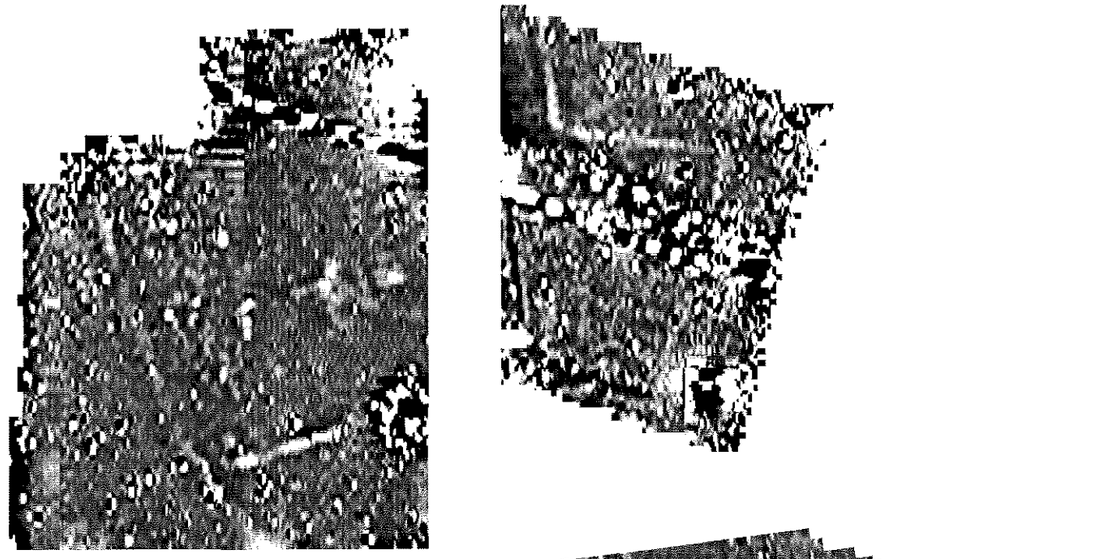
FIGURE 6

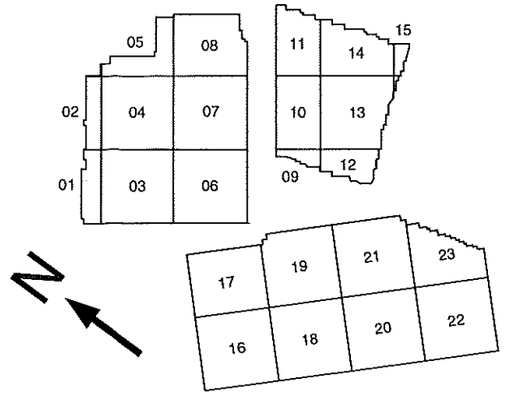
# HINTON ST MARY Magnetometer Data

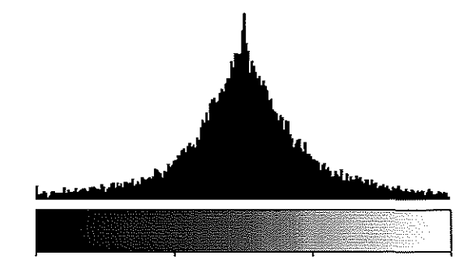
i) Traceplot of raw data (after initial drift correction and reduction of responses to iron)




ii) Greyscale plot of equivalent data






Scale

0 50 100 150m

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FIGURE 7

# HINTON ST MARY, DORSET

## (SITE OF ROMAN MOSAIC FIND)

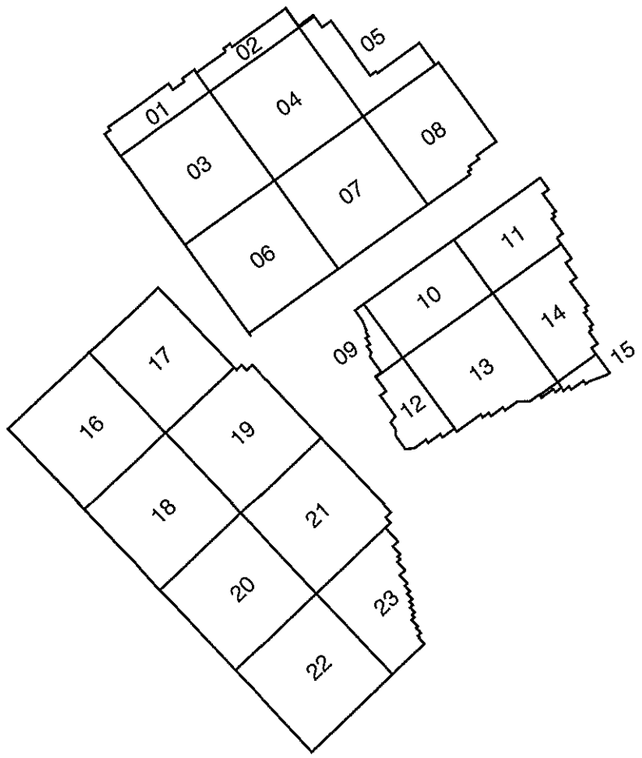
## Location of Magnetometer Survey, July 1996

**KEY**

Site of mosaic discovery 


Scheduled area (Dorset 711) ----------

Survey grid







ST 78/15

Scale

0 50 100 150m

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FIGURE 8

# HINTON ST MARY, DORSET

## Interpretation of Magnetometer Survey

### INTERPRETATION OF ANOMALIES

1. MODERN

areas affected by interference from ferrous sources

metal service pipes

former pond infilled with magnetic rubbish

2. ARCHAEOLOGICAL

areas of anomalous activity

clear positive linear anomalies - ditches

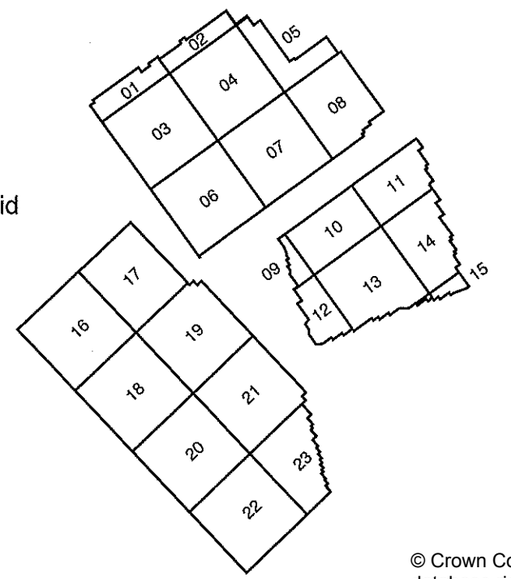
indistinct positive linear anomalies - possible ditches

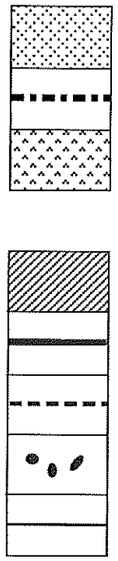
discrete positive anomalies - pits/burnt features

negative linear anomaly - buried wall or drainage feature

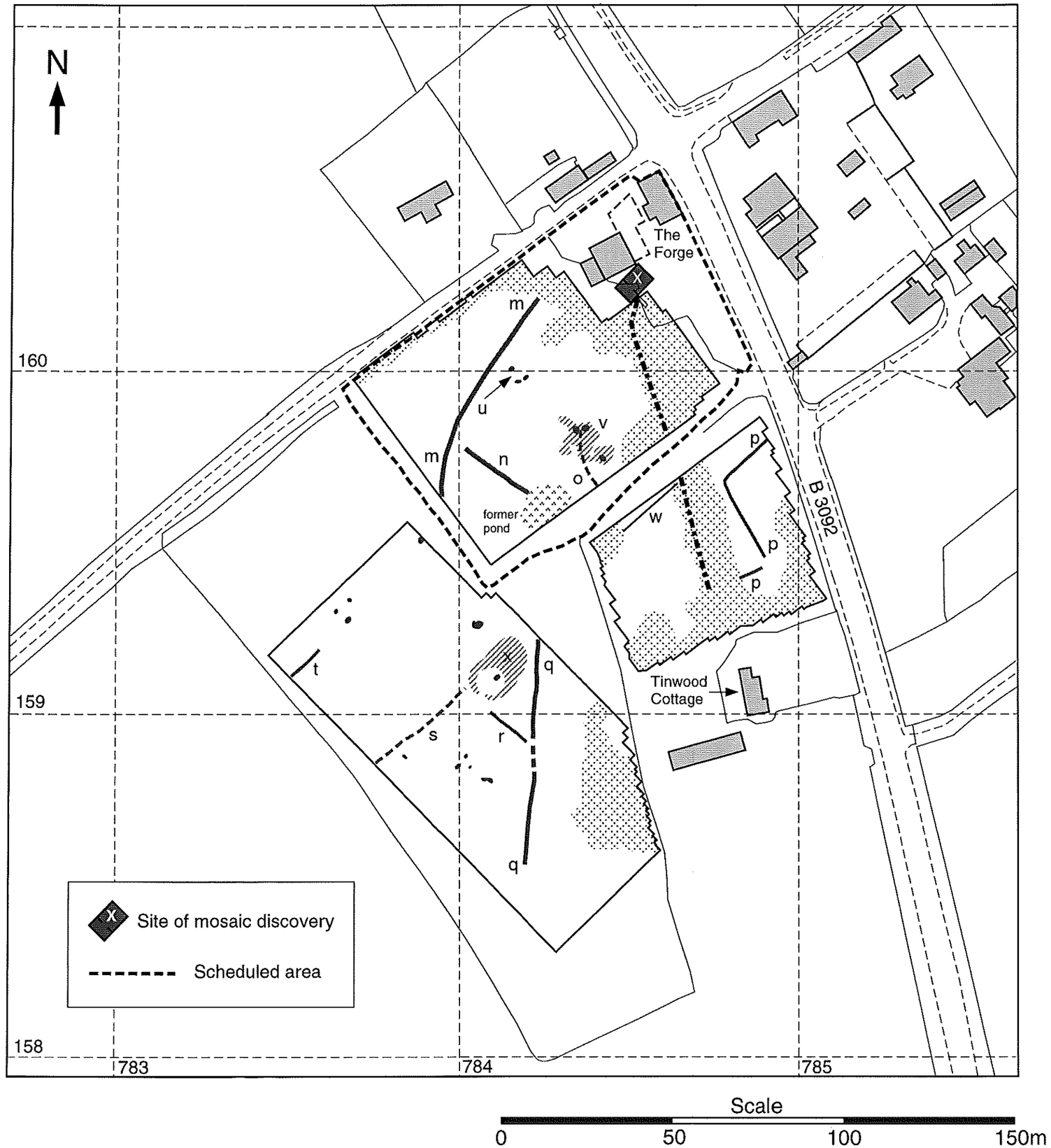
m - x : anomalies referred to in report text

Survey grid







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