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HOMESTEAD MOAT

WOLVERHAMPTON

BIRMINGHAM UNIVERSITY FIELD ARCHAEOLOGY UNIT 1987

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A Report by Prof. D.H. Griffiths
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on Geophysical Survey Work Carried Out by Members of
Birmingham University Field Archaeology Unit

GEOPHYSICAL SURVEYS AT HOMESTEAD MOAT, WEDNESFIELD, WOLVERHAMPTON

Homestead Moat situated just west of Ashmore Park, Wednesfield (SJ 90 8E1) is now in a built-up area, bounded on one side by Griffiths Drive and on the other by shops. The dry moat is a few feet deep, turfed and rectangular, with a length of about 90 m and a width of 70 m. As can be seen from Fig. 1 less than half the moat is preserved, the remainder having been filled in and partly paved. The area within the moat is flat and grassed over.

The surveys were carried out in May 1987.

The Surveys

The surveys were commissioned to determine what subsurface evidence remains of occupation of the site. It was thought unlikely that any brick or stone foundations would be present, and that traces of dwellings would be in the form of post holes and beam trenches, features difficult to detect. For this reason it was decided to carry out a very detailed survey of a pilot area rather than cover the whole area at a wider spacing. In fact, as Fig. 1 shows, the surveys carried out cover much of the area within the moat.

Two sets of measurements were made over the area, one of the variation of electrical resistivity, the second of the variation in the vertical component of the magnetic field gradient. Different materials have different electrical resistivities. Soils also vary considerably in resistivity, depending on their constitution and wetness and thus detailed and accurate measurements of variation in ground resistance from place to place can detect quite subtle changes in the near subsurface which may be due to buried structures or manmade disturbances of the soil. Equally, different soils show slight differences in magnetic properties and give rise to very small changes in the magnetic field and magnetic field gradient just above the ground.

The resistivity survey at Homestead Moat was carried out with a Geoscan Resistivity Meter. A 0.5 m dimension 4-electrode square array was used. Current is injected into the ground through 2 of the electrodes, the potential difference being measured across the second pair. The effective depth of penetration depends on conditions but is around 0.3 m. Lateral resolution is good, making it possible to survey on a 0.5 m grid. 5000 readings were taken on 25 m long traverses spaced 0.5 m.

The magnetic measurements were made with a Philpot Gradiometer at a full scale sensitivity of 20 μT/0.5 m at the same density as the resistivity readings. The corners of the survey are marked with wooden pegs, the tops being flush with the surface. The location of the pegs with respect to easily located features is given in the Appendix.

Results

The Resistivity Survey

Despite the fact that the survey was carried out over a period of several days marked by heavy showers and occasional persistent rain the data are in general remarkably consistent from block to block. Repeated readings at the same point indicated that it would be reasonable to log data to the nearest 0.1 ohm. The data were contoured without difficulty at 2 ohm-m intervals, the resulting map being shown in Fig. 2. Low resistivity areas have been left white; blues, reds and browns indicating increasing values, the range of anomalies lying in a quite small band between about 10 ohm-m and 40 ohm-m. Very small variations over areas of the order of 1 m^2 have been detected and it is unlikely that any features in the near subsurface giving rise to resistivity change have been missed.

As one would expect the topographic feature of the moat is clearly indicated by the belt of low resistivity crossing the map in the top left hand corner and bounded by the 20 Ωm contour.

The background resistivity in the left hand portion of the map is in the mid-twenties but rises to the mid thirties to the right.

The whole area is broken-up into a complex pattern, individual features (anomalies) having amplitudes up to about 10 ohm-m above background. Neither the shapes of individual anomalies nor the general patterns are obviously suggestive of manmade features. However there are some systematic trends which do not appear to be artefacts resulting from the sampling pattern since they cross profiles at an angle. The clearest is the diagonal alignment of small elongated anomalies in the left hand section of the map, terminating at the moat, possibly indicating some form of boundary or even a trackway. Small but larger rounded anomalies A, B and D close to the moat are perhaps worthy of investigation. Of more interest is the anomaly C, with a maximum amplitude of 30 ohm-m and bounded by the 25 ohm-m contour, the outline of which is vaguely suggestive of a building. Moving towards the bottom centre, the small sized but marked high anomalies E, F and G are clearly noteworthy and are perhaps associated with the roughly rectangular anomaly H, bounded by the 30 ohm-m contour. Attention is also drawn to the centre right anomalies I, J and K. Anomaly J, though of very small amplitude, is picked out because of its circular form and association with a well defined magnetic "high".

A considerable area of uniformly high resistivity with an amplitude of 38-40 ohm-m and marked L and M occupies the right hand side of the map. Though here, and in fact generally in this area, there is some indication of a diagonal trend in the contours (in fact at right angles to the other trend discussed earlier). The resistivity high area is irregular in form and seems likely to be due to a change in soil type or moisture content. If manmade it might be the remains of a beaten earth floor.

Perhaps surprisingly there appears to be no resistivity low anomalies to which attention need be drawn. The low value areas appear mainly as largish irregular patches, background areas betwen the "highs".

If excavation is proposed trenching along line XX' and YY' is suggested, together with investigation of the anomalies discussed, possibly beginning with anomaly J. A line of soil samples might indicate whether the source of L and M is geological rather than manmade.

The Magnetic Survey

Preliminary tests were carried out to check the appropriate instrument range for the task. At 20 μT/0.5 m the instrument appeared to be unaffected by passing traffic, to show reasonable consistency when repeated readings were taken at the same station and to show some variation over a profile. It was not possible to work at higher sensitivity. Even so, despite the fact that operators were checked for magnetic materials (eg. penknifes, key rings etc.) and the instrument zero checked frequently at base there do seem to be small jumps in the readings from block to block which reveal themselves in that contours follow the direction of the profiles.

Fig. 3 shows the contoured data. Intervals of 3 units were chosen to bring out the detail but the data are "noisy" and some averaging was carried out to make contouring possible.

The results are disappointing. The general pattern of the contours is quite irregular, there are no significant trends and virtually no correlation with the resistivity map. The only anomalies that stand out are the spatially small high positive value anomalies (single readings or small groups of readings, not contoured), often but not invariably associated with a negative anomaly. There are also a few marked negative anomalies. In the main these high amplitude anomalies are likely to be due to relatively modern metal scrap, though not necessarily so. The one anomaly of interest is the slightly larger high positive that correlates with the circular resistivity anomaly marked J on Fig. 2. Again this may just be a lump of scrap large enough to show also as a resistivity anomaly but it is perhaps worthy of investigation.

General Conclusions

The surveys do not reveal any subsurface features sufficiently well defined to make identification possible but the resistivity data are sufficiently encouraging to warrant a very limited amount of excavation at the sites specified in the account.

D.H. Griffiths

Acknowledgements

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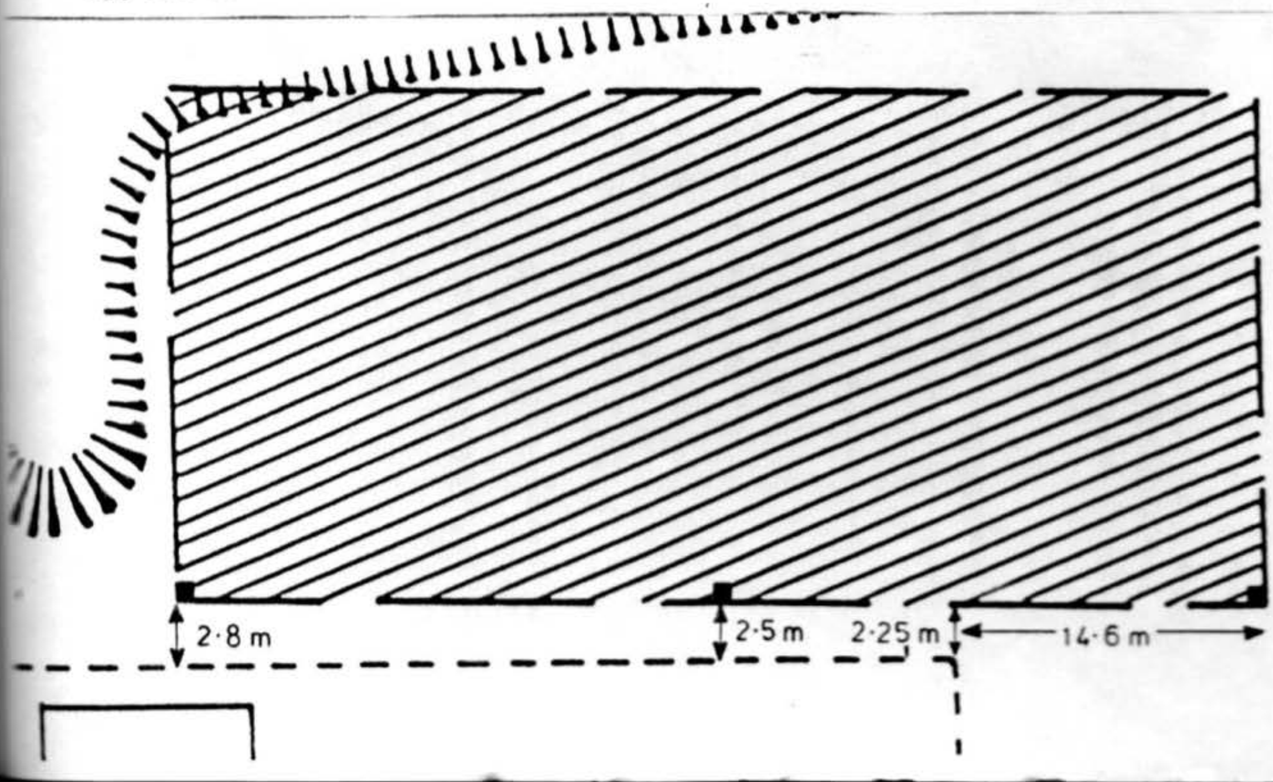
Appendix



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FIGURES

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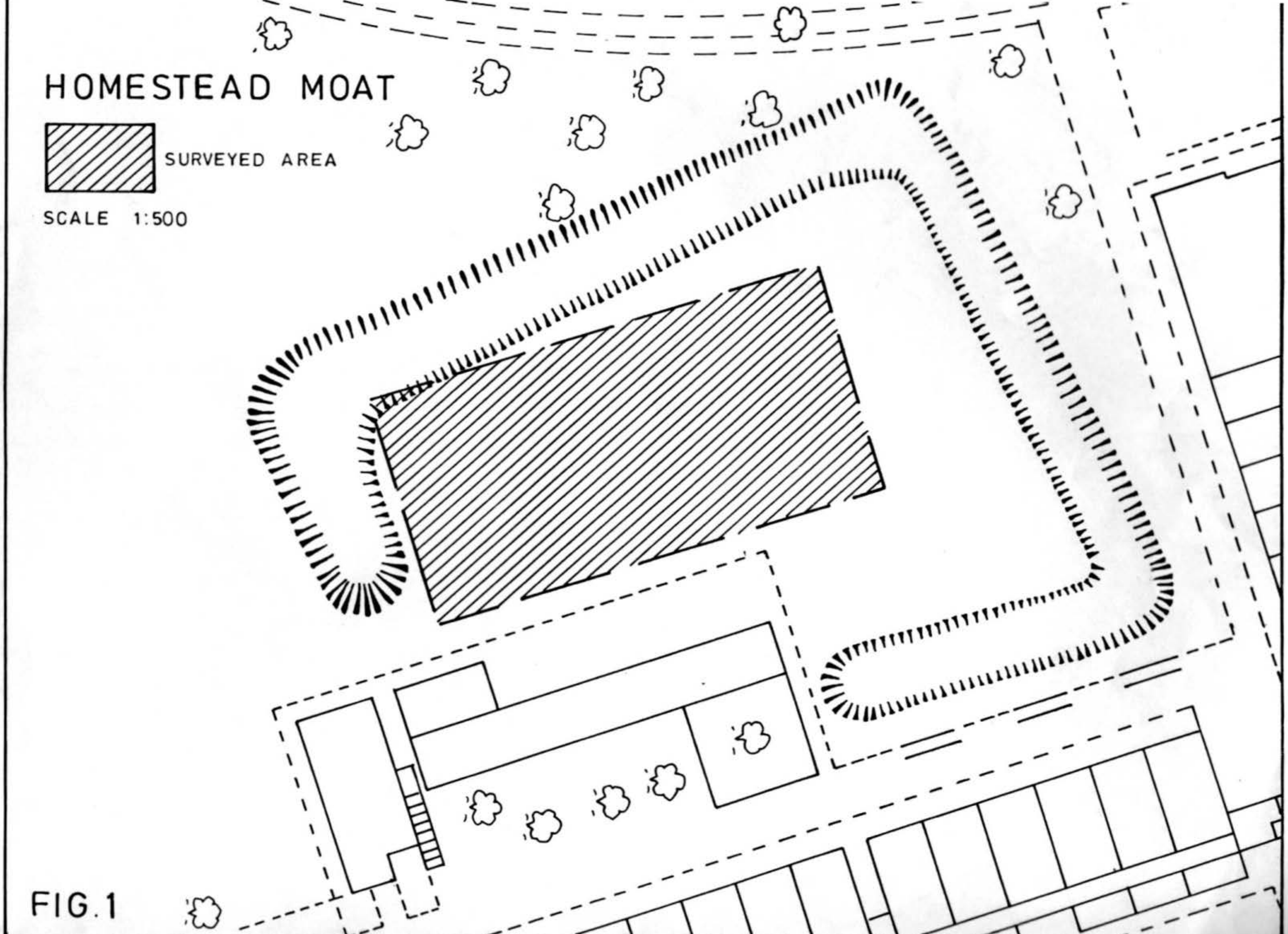

FIG.1

FIG. 2

ELECTRICAL RESISTIVITY SURVEY AT HOMESTEAD MOAT

SCALE: 2cm = 1m.

CONTOURS: ohm - metres.

FIG. 3

MAGNETIC GRADIOMETER SURVEY AT HOMESTEAD MOAT.

SCALE: 2 cm = 1 m

CONTOURS: (μ teslas / 0.5 m) x 100

HIGH POSITIVE AREAS MARKED + NEGATIVE AREAS MARKED −