Ancient Monuments Laboratory
Report 152/87

SPONG HILL, NORFOLK. GEOPHYSICAL SURVEY, 1986.

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Summary

Following earlier work in 1979, this report describes magnetometer and magnetic susceptiblity surveys carried out at the Anglo-Saxon and multi-period site at Spong Hill, near Dereham, Norfolk, in 1986. Extensive magnetometer coverage of the ground around and to the north of excavations on the site was unable to detect archaeological features to any useful degree owing to poor magnetic contrasts in the soil. Topsoil magnetic susceptibility measurements over a wide area of the site did, however, reveal variations that may relate to the presence of early settlement.

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Spong Hill, Norfolk

Report on geophysical surveys, 1979 and 1986.

Introduction:
Magnetometer survey at this site was first attempted by the Ancient Monuments Laboratory in 1979 in the hope of locating cremations and other features that might indicate the extent and limits of the Saxon cemetery then under excavation. In the event, results showed that cremations were not detectable, and that other features, such as pits and ditches were only occasionally visible as weak and discontinuous anomalies (Bartlett, 1979).

Despite these very unencouraging results (confirmed during later excavation) it was decided to extend the magnetometer coverage much more widely over the site in 1986. Excavation had by then been completed, and the purpose of the survey was to search further afield for additional archaeological features that would help place those from the excavation trench in context. In particular, it was hoped that the survey might supplement evidence from cropmarks, and also identify settlement features such as sunken-featured buildings (SFBs). The increased magnetic enhancement so often associated with human settlement might also be expected to be rather greater in such areas, perhaps leading to a more effective magnetic definition than was the case over the cremation cemetery. Topsoil magnetic susceptibility, high values of which can indicate areas of former settlement where burning (and perhaps fermentation) has lead to magnetic enhancement, was also mapped as a supplement and extension to the magnetometer survey.

Survey method:

The survey was based on a 30m grid set out to the north, east and west of the former excavation trench and aligned on the main site grid. A fluxgate gradiometer was then carried systematically over the entire grid in a succession of 30m traverses spaced at 1.0m intervals. The magnetometer signal was plotted simultaneously on a chart recorder as a series of graphical traces, which are reproduced here at a reduced scale on the site plan (Plan 3). This plan shows the full magnetometer coverage, including that from 1979 (squares 35-42), and also the excavation trench with its main features (although not including the cremations). Significant magnetic anomalies have been indicated in red.

A larger area was sampled for topsoil magnetic susceptibility, as indicated on Plans 1 and 2. The samples, of about 50-100 grams each, were taken from each 30m grid intersection and from the centre of each grid square, giving a sampling interval of about 21m aligned at 45° to the main grid. The dried samples were then measured for magnetic susceptibility in the laboratory using a Bartington MS1 meter. The resulting values for magnetic susceptibility are listed at the end of this report. Plan 2, which overlays plan 1, is a computed plot of this data, with interpolations, represented as a range of dot-density tones which darken with increasing values of magnetic susceptibility.

Results:

As foreseen after the 1979 survey, magnetic response from archaeological features at Spong Hill is all but non-existent: throughout the area immediately to the north of the excavation (squares 3-34) no magnetic anomalies have been detected that are certainly of archaeological origin. Even excavated ditches seen to extend into the survey area as cropmarks have not been detected and there is no sign of the ring-ditch in square 4. Such results may best be explained by the very poor contrast in magnetic susceptibility between natural and feature-fills, which is not an uncommon circumstance on sandy and gravelly soils such as these. Although the topsoil here has a modest magnetic susceptibility, it would appear that there has been little enhancement of this beyond that of subsoil background values. The small-scale irregularities in most of the magnetic traces probably reflect the very uneven surface of the field at the time of the survey, especially over the western part of the site. The alignment of weak negative anomalies running almost north-south through squares 4 and 11 marks a cultivation boundary.

Apart from the linear ditch anomaly running through squares 35, 37 and 39, the only significant magnetic anomalies to be detected by the magnetometer are the two seen in squares 1 and 2. This outlying area was surveyed in order to test for the suspected presence of SFBs noted earlier from cropmarks. Although the detected anomalies do not agree exactly with the aerial evidence (see plan 1), it does seem highly likely that the magnetometer has in this case picked up, albeit very faintly, clear signs of occupation features.

The magnetic susceptibility survey, covering an area 225 x 345 m, extends from the excavation to well north of the SFBs mentioned above. The area coinciding with squares 3 - 30 of the magnetic survey has weak or only modest values which do not appear to form any particularly significant pattern or congruence with the arrangement of cropmarks. This is consistent with the negative magnetometer results from here.

Of more interest is the sharp drop in values over an east-west band that includes the large double-ditched barrow, and then the marked increase in susceptibility on the higher ground in the north-east corner of the survey area. The band of low readings certainly indicates a corresponding lack of magnetic enhancement only partly coincident with low ground where hill-wash may have diluted or masked higher values. The very much greater values to the north of this, however, if not of very local geological origin, might well relate to settlement activity here. The two SFBs seen by the magnetometer are close to this area of strong values whose coincidence with cropmark enclosures may also be significant.

Conclusions

Magnetometer coverage at Spong Hill has not been very helpful in locating either known or suspected archaeological features. This is a result of poor magnetic contrasts between features and the subsoil.

Rather more significant results were obtained by the measurement of absolute magnetic susceptibility of topsoil across the site. The resulting readings show considerable variation, the stronger values of which may indicate general areas in which settlement or industrial activity may have taken place. Magnetic susceptibility surveys on this scale are so far an under-used and unfamiliar technique of site prospection, and the significance of the resulting patterns must therefore remain uncertain for the moment. It might be cautioned that local changes in subsoil composition, such as might be expected on the drift deposits at Spong, could well result in a natural variation in magnetic character unrelated to archaeological activity.

Although these results are therefore inconclusive, an extension of the magnetic susceptibility survey might be of interest, and selected magnetometer coverage in areas of higher values may yet locate archaeological features rather more successfully than previously.

Surveyed by: A. David and A. Bartlett

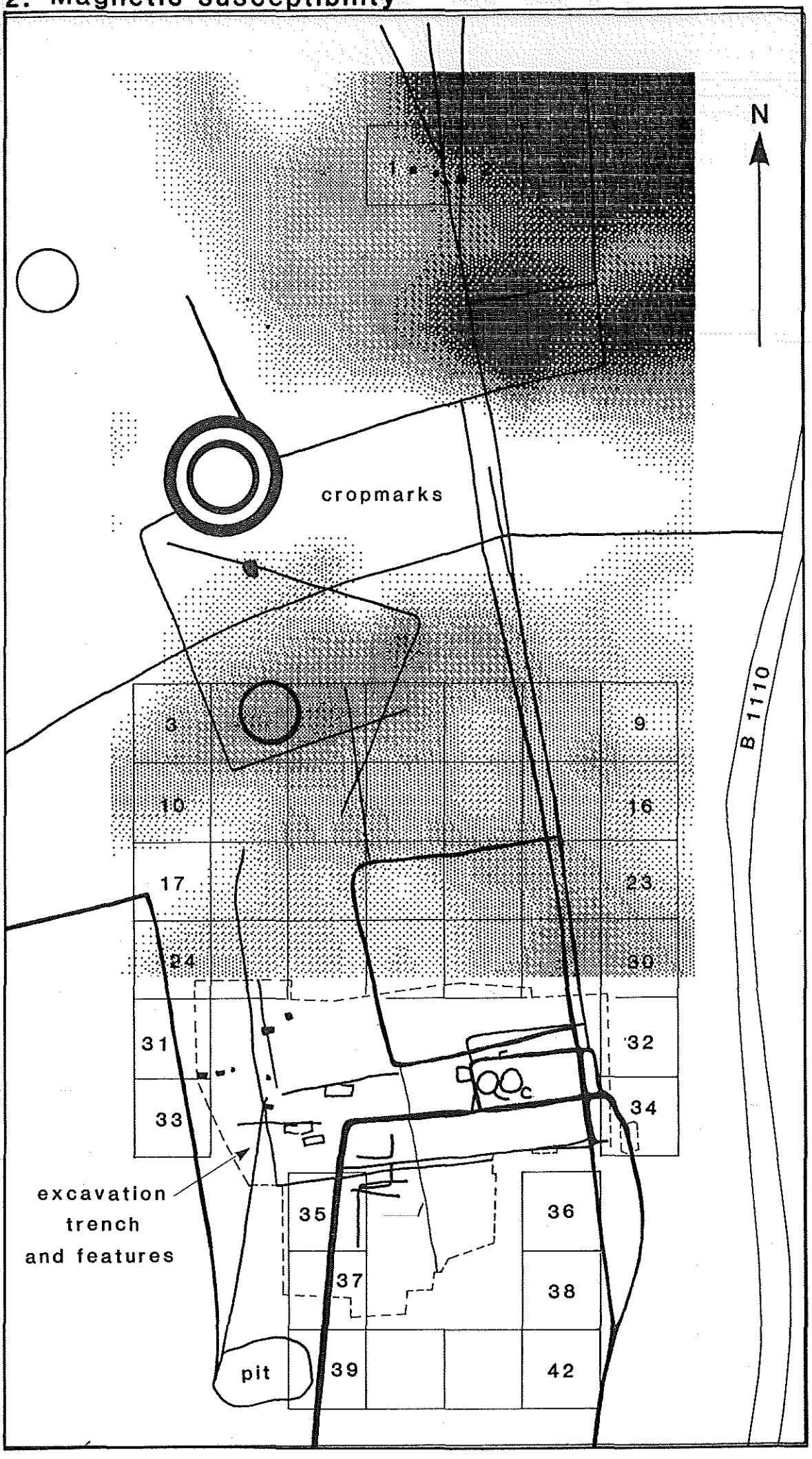
Reference: Bartlett, A. (1979), North Elmham, Norfolk. Ancient Monuments Laboratory Report Series, No. 2932.

Spong Hill: topsoil magnetic susceptibility measurements

Mass magnetic susceptibility units : x 10 exp(-8) SI/kg

grid N	E	80	95	110	125	140	155	170	185	200	215	230	245	260	275	290	E
843			46.6		41.3		39.7		67.5		86.0		81.0		90.6		
828		37.9		55.9		42.9		56.8		79.7		89.2		76.3		82.3	
813			43.5		51.5		63.4		50.2		69.9		84.8		89.6		
798		41.7		45.9		54.5		60.8		63.1		69.8		80.7		73.7	
783			37.8		50.3		53.2		54.0		64.3		67.8		57.8		
768		27.9		50.0		60.3		59.3		71.3		82.1		66.0		77.2	
753			31.7		41.0		52.1		63.9		87.3		78.9		87.0		
738		39.3		33.0		46.2		52.1		61.5		86.1		71.4		64.6	
723			42.4		42.2		37.7		35.5		41.2		45.4		52.8		
708		43.8		32.3		38.0		29.8		35.6		40.9		41.2		47.1	
693			28.7		30.1		32.5		37.4		40.0		41.5		39.3		
678		41.3		30.1		36.5		41.1		37.3		40.4		39.3		42.8	
663			39.6		45.5		51.8		40.0		40.6		35.4		45.7		
648		36.9		44.7		47.7		38.5		47.6		47.6		47.7		41.3	
633			43.6		46.6		54.6		67.3		60.5		48.3		46.5		
618		32.7		49.8		58.8		59.4		55.9		55.8		50.1		48.0	
603			52.5		64.6		65.7		58.1		46.3		50.1		42.3		
588		50.4		55.9		55.8		49.7		51.2		51.2		56.2		49.1	
573			50.8		46.4		51.4		51.1		47.1		49.5		47.2		
558		44.2		39.7		53.3		56.1		53.4		53.1		50.4		43.0	
543			38.9		45.3		47.0		43.6		53.0		55.2		48.6		
528		39.5		46.9		47.8		46.6		45.3		50.0		57.5		50.6	
513			48.9		49.2		49.2		48.0		51.2		61.9		53.7		

2. Magnetic susceptibility

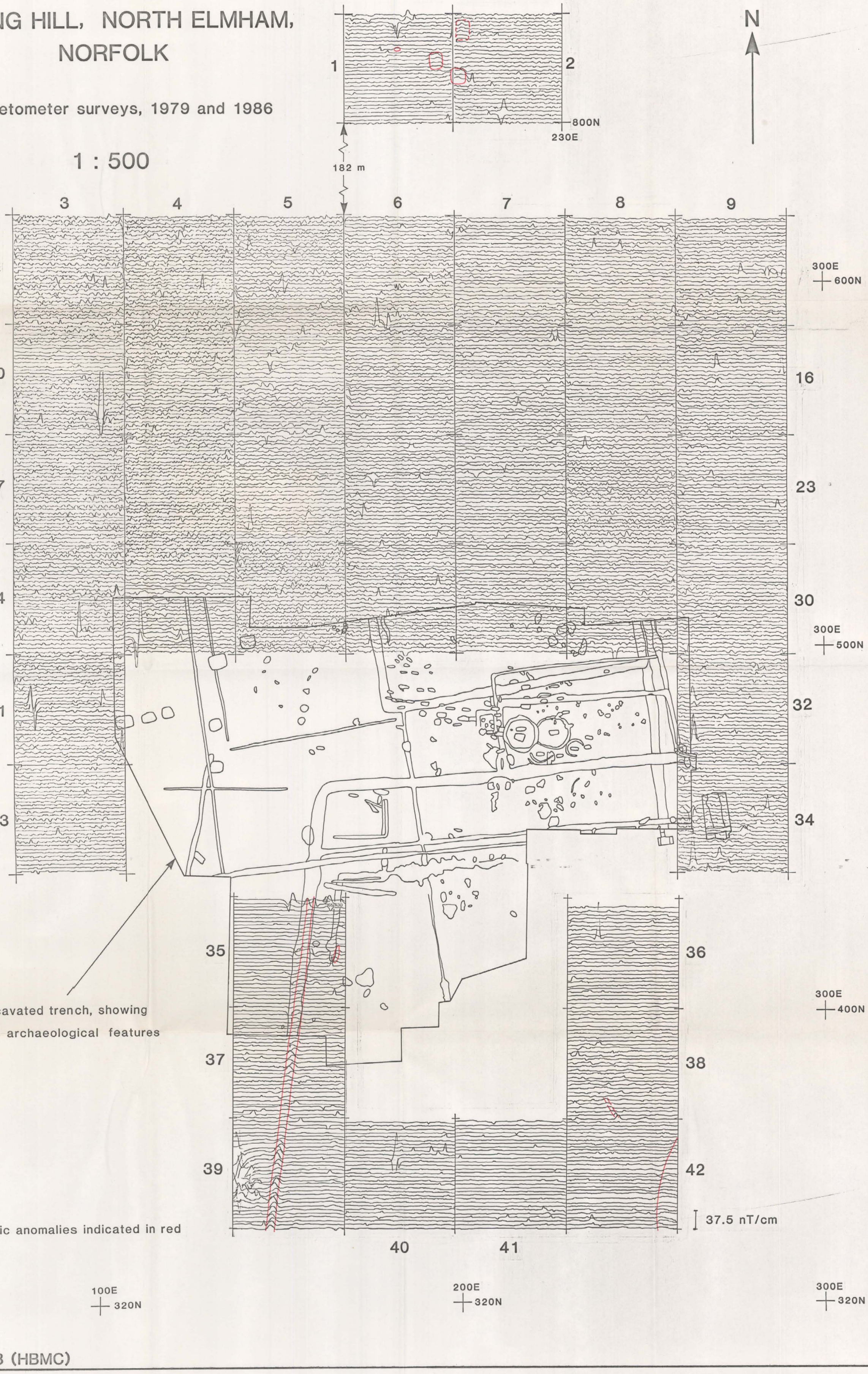


1. Magnetometer survey location 1 : 2000

SPONG HILL, NORTH ELMHAM, NORFOLK

Magnetometer surveys, 1979 and 1986

1 : 500



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