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Ancient Monuments Laboratory
Report 34/94

REPORT ON GEOPHYSICAL SURVEY AT PENHALE MOOR, PENHALE, CORNWALL

N Linford

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Summary

Magnetic survey of the site at Penhale Moor, Cornwall, confirmed the presence of archaeological anomalies detected as a series of cropmarks by previous aerial photography. Subsequent trial excavation by the Cornish Archaeological Unit, prior to the construction of the A30 road improvements, revealed the presence of a Bronze Age dwelling and an associated scatter of pit/post hole features.

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PENHALE MOOR, Cornwall.

Report on geophysical survey, February 1993

Introduction

Low level aerial photographs taken by Aerofilms on 30/1/1989 for the Department of Transport identified two groups of circular cropmarks along the line of proposed widening of the A30. Following the recommendations made by the Cornish Archaeological Unit's (CAU) evaluation and the success of previous AML survey work in the locality (Payne *forthcoming*), a magnetic survey was conducted within the field containing the two groups of crop marks.

The site (OS SW 9057) lies over the Meadfoot beds with calcareous slate, grit and thin limestone.

Method

A magnetometer survey was deemed to be the most suitable survey technique due to the earlier success of this technique in the locality (Payne *forthcoming*) and was conducted in conjunction with a topsoil magnetic susceptibility survey.

A survey grid divided into 30m squares was established over the site (**Figure 1** - location plan) with partial squares extending to the field boundaries. The area was then surveyed with a Geoscan FM36 fluxgate gradiometer along successive N-S traverses separated by 1.0m intervals. Readings were logged every 0.25m and the data was downloaded to a microcomputer in the field. Final presentation of the data has been enhanced by the application of a local median filter to remove the intense response of buried/surface iron and a low pass Gaussian filter to suppress image noise (Scollar *et al* 1990); the data is presented as a greyscale image and a traceplot (**Plan A**) and a greyscale image superimposed upon the OS map (**Figure 2**). A summary of anomalies (**Figure 3**) is provided to aid the interpretation of the data.

Topsoil magnetic susceptibility measurements were taken at a 15m sample interval using a Bartington MS2 meter and field search loop. The data is displayed as a greyscale image superimposed over the OS map in **Figure 4**.

Results

Magnetometer survey

The site has responded well to magnetic survey techniques and a number of linear and discrete anomalies are discernable (see Figure 3) above the background noise level. The magnetic response is more intense in the SE area of the field and it is unclear whether this effect represents increased anthropogenic activity in this area or a variation in the depth and/or the natural magnetic characteristics of the topsoil (Nowakowski 1994).

A number of linear positive anomalies occur within the survey area (Plan A and Figure 3) although the data is not of sufficient clarity to suggest any distinct form, such as the definition of an enclosure. The most significant anomaly appears as two ditches approximately 5m apart crossing the survey area from N to S and has been identified from excavation evidence to be of medieval date (Nowakowski 1994) - possibly a former trackway or field boundary. The interpretation of the other linear/curvilinear anomalies is hampered by their incomplete nature, although they probably represent buried ditches.

Subsequent trial excavation in the NE of the survey area revealed the remains of a Bronze Age stone and wooden residential structure with an (?)earlier structure immediately to the S. Both excavated features are partially visible in the magnetometer data (square 3) as a circular positive anomaly surrounded by incomplete negative annulus. This suggests an accumulation of magnetically enhanced soil within the structure (?possibly caused by domestic fires) and a negative response from the magnetic "voids" created by the circle of stone enclosing the building. Analysis of the data in light of the excavation evidence tentatively suggests the location of a similar anomaly in square 2 to the W, although it should be stressed that the response from this anomaly is less intense.

The identification of a series of truncated (by modern ploughing) pits and postholes to the S of the Bronze Age dwelling (squares 7 and 8) during excavation has not been replicated within the geophysical data. The data from this site contains a high degree of "soil noise" (due to the highly magnetic nature of the topsoil - see below; also Scollar 1990 p443) which may, in part, have obscured the magnetic response of small, discrete pit/posthole type features. However, a number of larger, discrete, positive anomalies have been identified to the W of the survey area perhaps suggesting the location of a selection of the most intense pit type anomalies.

Topsoil Magnetic Susceptibility survey

Topsoil susceptibility readings are consistently high over the entire survey area, although no clear focus of activity is discernable beyond the linear concentration of high values running NS through squares 7, 11 and 15. The significance of the halo of low readings evident around the edge of the current field boundaries is impossible to ascertain and may well be influenced by recent agricultural practice.

Conclusion

The survey has successfully demonstrated the presence of a number of magnetic anomalies over the site which have, in part, correlated with the results of trial excavation and aerial photographic evidence. Unfortunately the effects of ploughing and magnetic noise have curtailed the identification of subtle, discrete features. The palimpsest of linear anomalies has also proved difficult to unravel due to the limited area available for survey and the failure of the majority of these anomalies to form a coherent pattern of enclosure/boundary ditches.

Surveyed by: M Cole
N Linford

Date of survey: 17/2/93

Reported by: N Linford

Date of report: 3/10/94

Enclosed Figures and Survey Plans:

Figure 1 - Location of the survey data.

Figure 2 - Magnetometer survey data superimposed upon OS map.

Figure 3 - Summary of magnetic anomalies.

Figure 4 - Topsoil magnetic susceptibility data.

PLAN A - Magnetometer data (1:1000).

References

Nowakowski, JA. 1994 A30 Project Report (No:14) Cornwall Archaeological Unit, Truro.

Payne, A. *forthcoming* - Report on geophysical survey at Penhale, Ancient Monuments Laboratory report series.

Scollar, I, *et al* 1990 Archaeological Prospecting and Remote Sensing, 507-508, Cambridge.

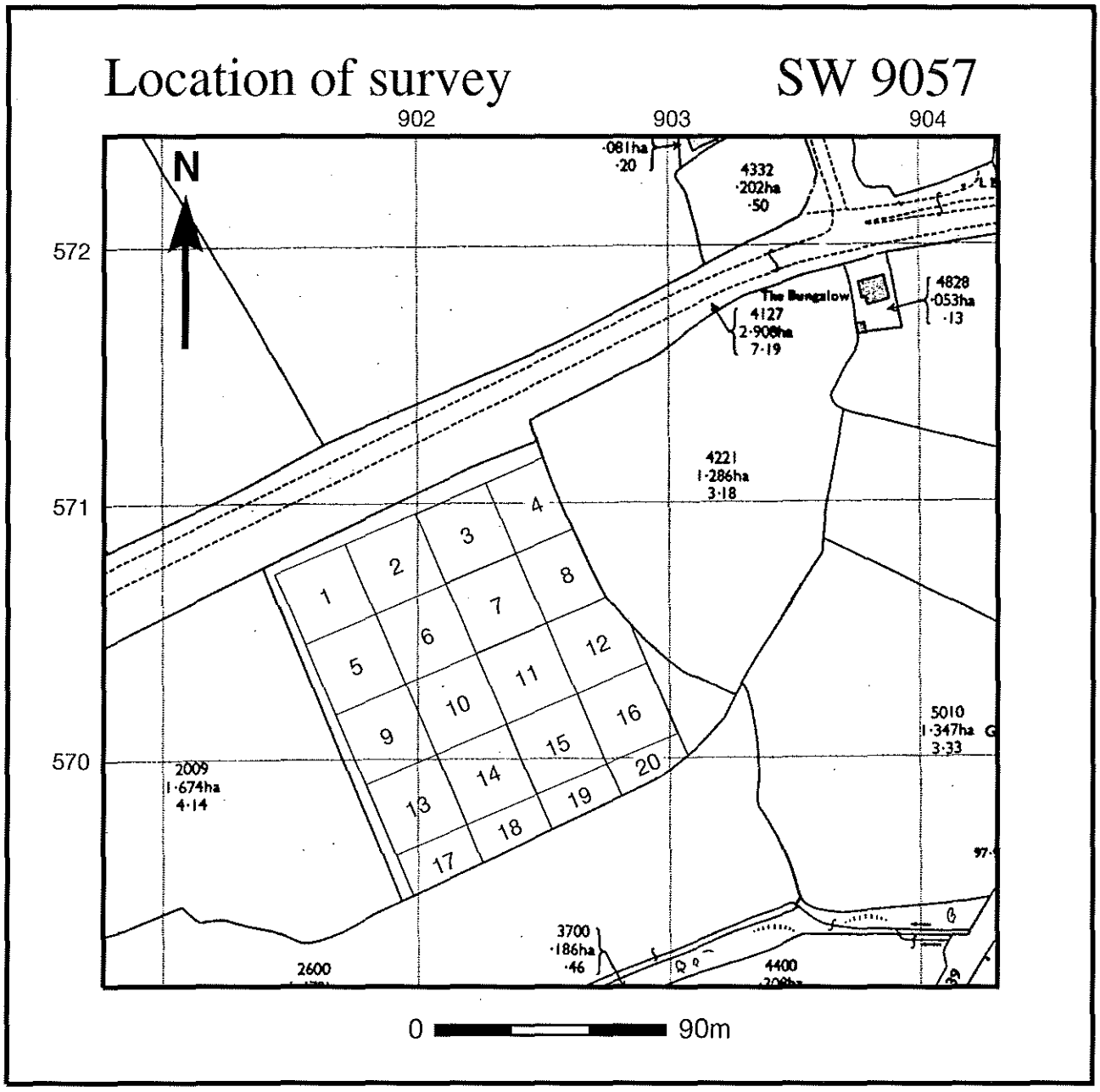


Figure 1; Location of survey data.

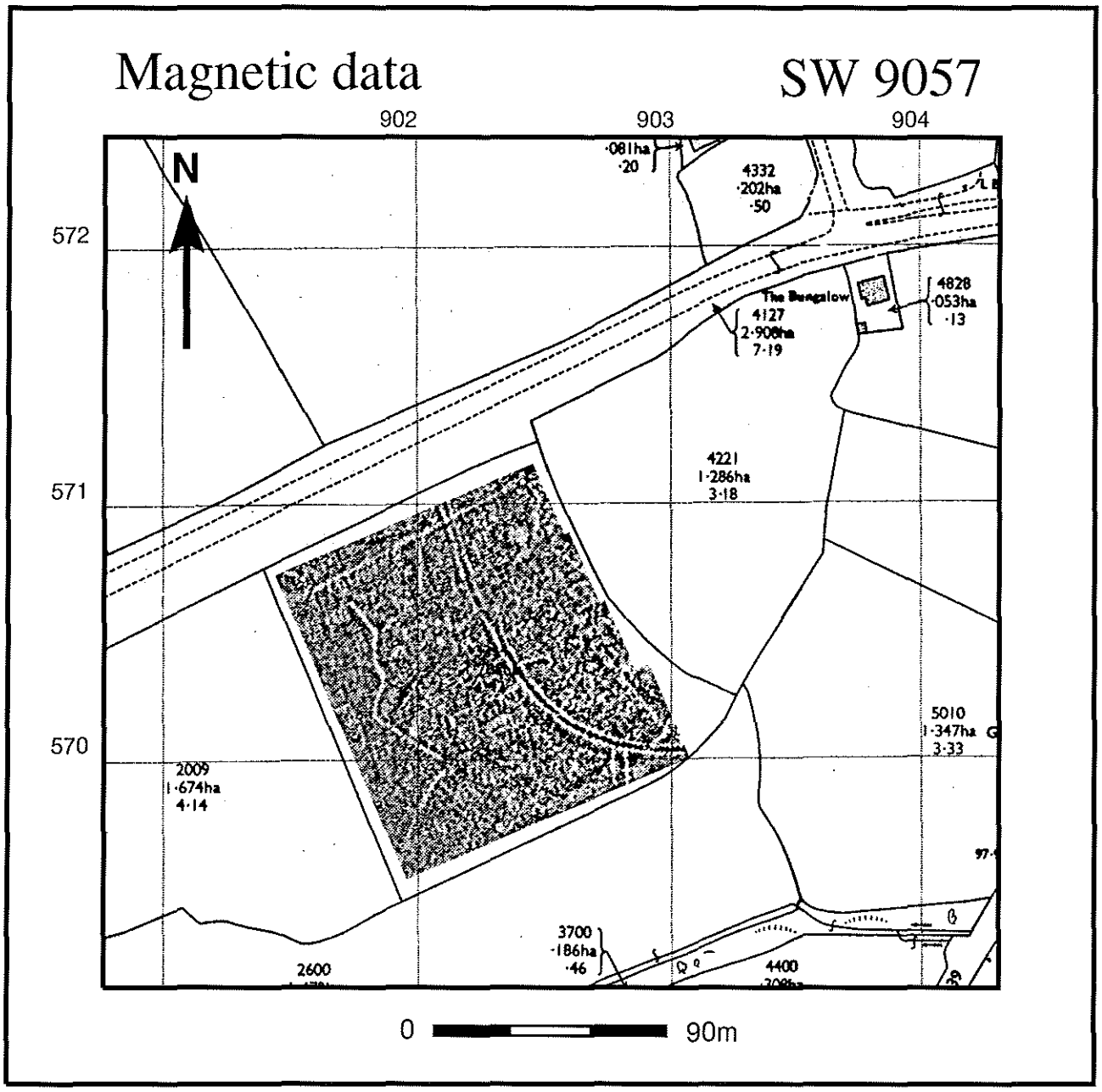


Figure 2; Magnetic data superimposed upon OS map.

PENHALE MOOR, CORNWALL.
Summary of magnetic anomalies

Figure 3; summary of magnetic anomalies

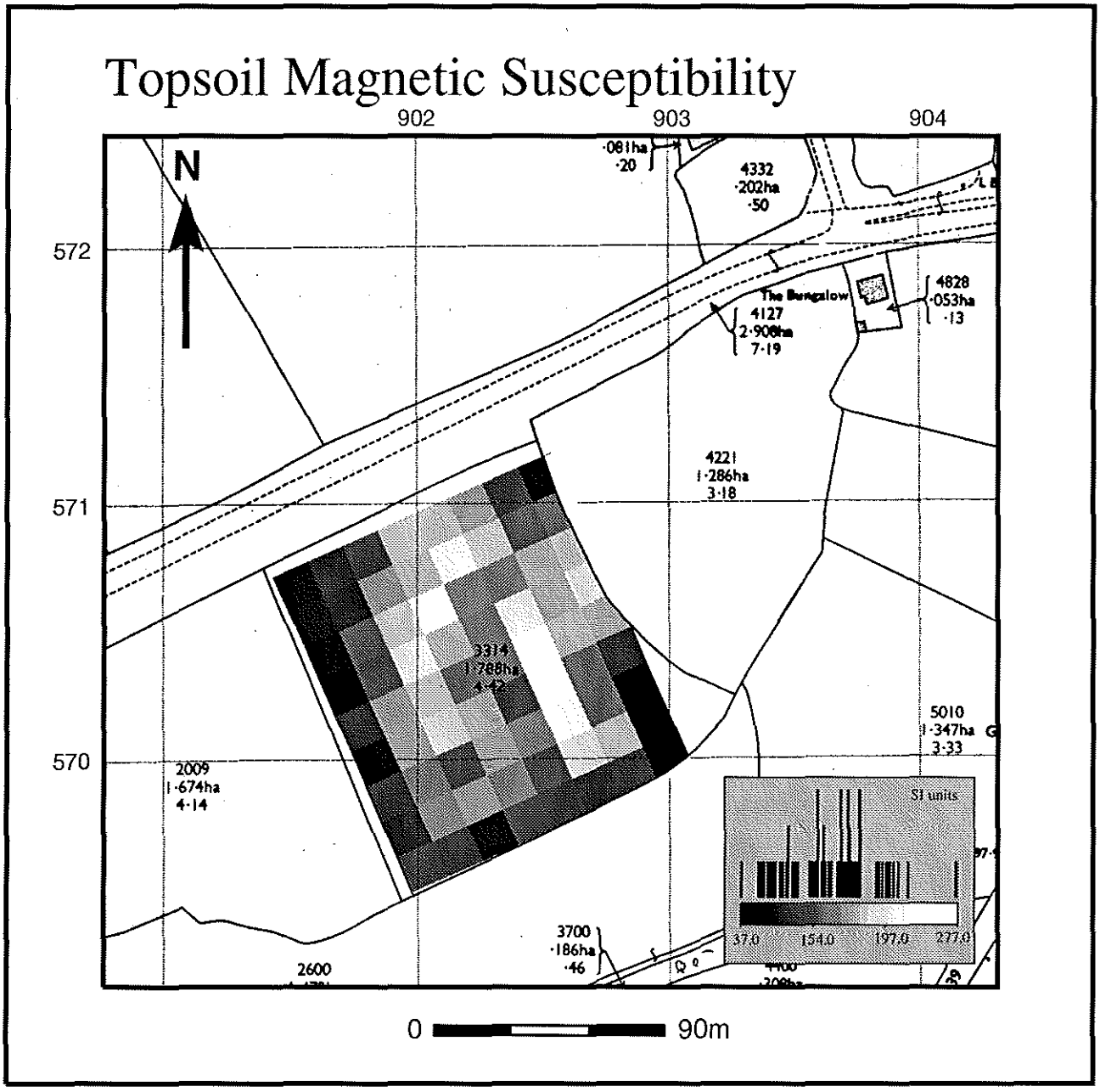


Figure 4: Topsoil Magnetic susceptibility data.

PENHALE, CORNWALL.

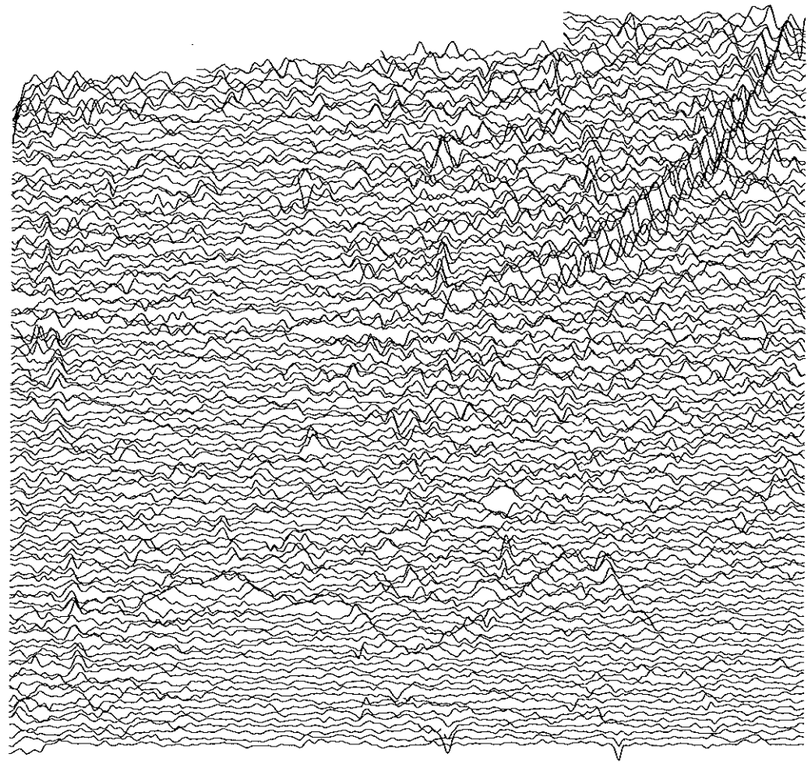
Magnetometer survey February 1993

Plan A

N

1. Greytone smoothed data

2. Traceplot smoothed data



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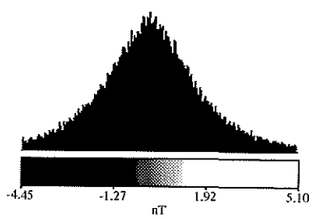

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