Block Fen, Mepal
Cambridgeshire

Report on Archaeological Geophysical Survey 2012

A.D.H. Bartlett

Surveyed by:

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for:

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Block Fen, Mepal

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Introduction

This report describes the findings from a geophysical survey which forms part of an archaeological evaluation of a proposed quarry site near Mepal, Cambridgeshire. The areas investigated lie immediately to the north of previous quarried ground (now flooded), and represent Phase 1 of a proposed future extension to the quarry workings.

The geophysical survey was commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford, by Cambridge Archaeology Unit (CAU). Fieldwork for the survey was done in mid-June 2012.

The Site

Location and Topography

The site is an area of arable farmland about 4km south east of Chatteris, and 3km north of Mepal village. It takes in parts of Block Fen and Langwood Fen, and is centred on Langwood Fen Farm (NGR TL 434846). The evaluation area (as outlined on figure 1) amounts in total to 31ha, but this includes the farm, a pond and some overgrown ground to the south east. The total survey coverage (as hatched in red on figure 1) therefore amounts to 27.3ha.

The main field in area 1 (as numbered on figures 1 and 7-8) had at the time of the survey been planted with a crop of carrots, and there were potatoes in area 2. The topsoil in each field was ridged along the rows of plants, which imposed constraints on the direction and spacing of the survey transects (as mentioned below).

Geology

The presence of the adjacent quarry indicates that the site must be on an area of sand and gravel subsoil within the surrounding silt and peat fenland. The magnetic susceptibility readings taken during the survey demonstrate that the site has a topsoil of highly magnetic silt. Readings from the greater part of the site were in a range between 170 – 400 (x 10^{-5} SI), with an overall average of 225. These readings are unusually high, and also contrast strongly with the underlying gravel. Much lower (and more normal) readings (20-50 SI) were obtained from an area of stripped gravel subsoil which is exposed next to the pond in the south east corner of the site. This contrast means that irregularities or variations in the depth of topsoil cover will give rise to magnetic anomalies, and also that any feature cut into the subsoil and containing topsoil in its fill should be strongly detectable. [It is also possible that subsurface features containing a gravel rather than soil fill might not be detectable.]

Archaeological background

The site is of archaeological interest because an area of gravel subsoil in fenland should offer suitable conditions for early settlement, as is indicated by the extensive cropmarks which have been recorded nearby. An extract from a cropmark plan supplied to us by CAU is inset in figure 1. No cropmarks are indicated within the Phase 1 evaluation areas, but settlement sites and field systems appear to be present within about 1km or less to the south and west.

Survey Methodology

Magnetometer survey

Readings for the magnetometer survey were collected using Bartington 1m fluxgate magnetometers, and are plotted at 25cm intervals along the survey transects. The results of the survey are shown as grey scale plots in sections at 1:2000 scale in figures 2-3, and as graphical (x-y trace) plots in figures 4-6. These alternative representations allow the detected magnetic anomalies to be seen in plan and profile respectively. The plots represent the readings after standard processing operations which include adjustment for irregularities in line spacing caused by heading errors (direction sensitivity in the instrument zero setting), and truncation of extreme values.

It was necessary during the survey to adjust the separation and orientation of the magnetometer transects to take account of the earth ridges in the two main fields. The differing ridge orientations in area 2 are indicated by the transect directions as seen in the graphical plot (figure 5). It was also necessary to adapt the line spacing so that lines were walked along the furrows. Transects are recorded in groups of three at 1m separation (using a triple detector array), but the furrow spacing imposed wider gaps between the sets of lines. Readings were interpolated for presentation from the initial uneven transect spacing to a uniform 1m separation.

A further complication arose from the exceptionally magnetic topsoil. This meant that minor changes in the distance of the central magnetometer in the array from the ridges to each side caused variations in the readings. (The outer magnetometers, which were each above a single ridge, were less affected.) It was therefore necessary to apply variable levels of numerical smoothing (in addition to the standard processing routines mention above) to the lines, depending on whether they were within or outside the furrows. This was largely successful, but some horizontal lines showing increased variability remain visible in the results (particularly in the grey scale plot). These effects have been disregarded in the interpretation of the survey.

Magnetic susceptibility survey

We usually supplement a magnetometer survey with background magnetic susceptibility readings, which in this case were taken at 60m intervals, using a Bartington MS2 meter with a field detector loop. Susceptibility measurements can provide a broad indication of areas in which archaeological debris, and particularly burnt material associated with past

human activity, has become dispersed in the soil. They are also affected by non-archaeological factors, including geology, past and present land use, and modern disturbances, and so provide evidence relating to soil and site conditions which can be of help in interpreting the magnetometer survey. The results are presented as a shaded plot inset in figure 8.

Presentation

An interpretation of the findings is shown superimposed (for comparison) on the graphical plots (figures 4-6), and is reproduced separately to provide a summary of the findings in figures 7-8. Features as marked include a few magnetic anomalies which may show characteristics to be expected from features of potential archaeological significance (in red). Weak magnetic anomalies of probably natural or non-archaeological origin are outlined in a light green. Probable recent or non-archaeological disturbances are indicated in brown and ferrous debris in blue. Linear markings which may represent ditches and land drains are also indicated.

Results

The survey has detected subsurface features and disturbances from various sources, although there may only be a limited likelihood that any of them are of direct archaeological significance. The clarity of the findings does not in general appear to have been substantially impaired by the geometrical and magnetic complexities arising (as mentioned above) from the presence of the crop ridges. We comment on the various categories of findings as follows.

Strongly defined linear magnetic anomalies were detected at the north of area 1, and to the east of area 2 (as labelled A and B on figures 7-8), and also in the strip surveyed (in an un-ridged cereal crop) in the field to the north west of area 1 (C). The regularity of these lines suggests they are land drains, although ceramic drain pipes often give a less uniform magnetic response. It is probable therefore that the drains are laid in trenches containing a strongly magnetic topsoil fill, which gives rise to the observed linear anomalies.

Other more isolated ditch-like linear features (at D in area 1, and E, F in area 2) are likely to be former field boundaries.

Broad weak magnetic anomalies of the kind outlined in light green are commonly seen in surveys on alluvial or wetland soil, and appear to relate to natural variations in the depth or distribution of silt. They are most concentrated in the south of area 1 (around G), but there are other less conspicuous examples in area 2 (as at H).

Some possible weak linear features are visible within this natural back ground activity, and two are marked by broken lines (J and K) in area 1. They are indicated in red for clarity, but it is perhaps more likely that they represent shallow natural channels rather than archaeological features.

The remaining features which have been outlined in red (to indicate their potential archaeological relevance) are individual magnetic anomalies which (on the basis of their

strength and profile as seen in the graphical plots 4-6) could be interpreted as silted pits. Features in this category are not in all cases clearly distinguishable from either the larger natural background features mentioned above, or from the general background noise of the survey. One possible group (of rather marginal examples) is labelled L in area 1, and other more distinct individual features include M and N in area 2. These magnetic anomalies (except perhaps at L) are widely dispersed, and do not suggest the presence of any groups or concentrations of archaeological features (of the kind which might be expected at an ancient settlement site).

Other findings include strong magnetic anomalies (outlined in brown) at various locations. These suggest recent disturbances around the farm in area 1, and near to the pond in area 2. Other strong magnetic anomalies (P) suggest pipes around the western part of area 2 (although these disturbances could in part result from a change in cultivation direction). Magnetic susceptibility values are rather higher in this western part of area 2 than elsewhere. This gives rise to a higher background noise level (as seen in the grey scale plot), but few interpretable features are visible. Another pipe (Q) crosses the area of stripped ground to the east of area 2.

Conclusions

The survey has produced a number of clearly defined findings, but they appear to be mainly of natural or recent origin. Findings include land drains (A-C) and former field boundaries (D-E), which responded strongly to the survey. This suggest that conditions at the site should also be favourable for the detection of field systems and enclosures of the kind indicated by the nearby cropmarks, but none appear to be present.

A possibility remains that ancient ditches and other features might not be detected if they are filled with relatively non-magnetic gravel subsoil rather than the highly responsive silt topsoil (or if they are buried at much greater depth than the recent ditches and drains), but the survey provides no evidence for weak or fragmentary linear features to suggest this might be the case.

Two weak linear features are marked in the interpretation (J, K), but they are close to other apparently natural features (G), and so may be shallow natural silted hollows or channels. Some possible pit-like magnetic anomalies are visible, but they are widely dispersed (except for a possible group at L), and do not suggest the presence of any clearly detectable groups of archaeological features. The survey results otherwise are consistent with the cropmark plan, which shows no recorded features within the survey area.

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17 August 2012

Fieldwork for this survey was carried out by P. Cottrell and N. Paveley.

543000E

544000E

285000N

N

Proposed survey area

Approximate survey coverage

Location of 1:2000 figures (2-3 and 7-8)

Location of 1:1250 figures (4-6)

Langwood Fen

Block Fen

Block Fen Farm

Sailing Club

overgrown

rape crop

Lake

Pond

Drain

1

2

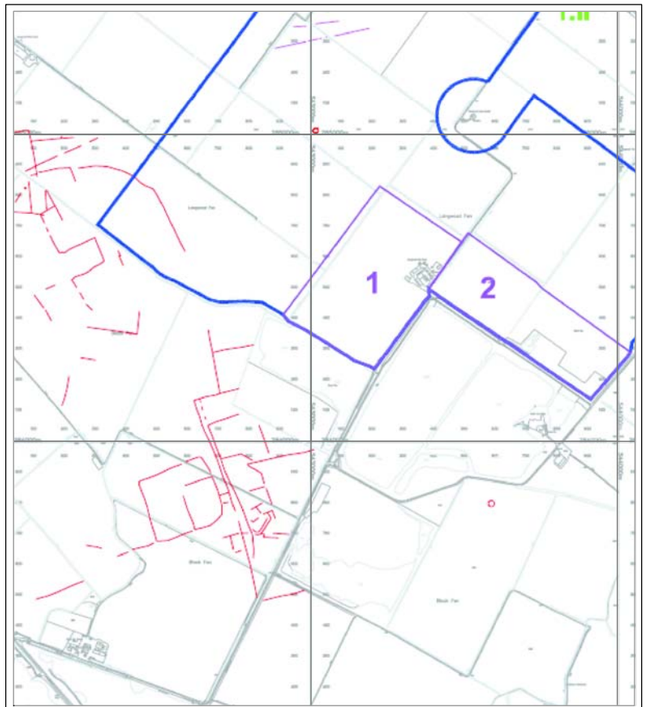
2,7

3,8

4

5

6



Survey areas with cropmarks (plan supplied by CAU) 1:20000

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Figure 1: Location of survey

0 1:5000 250m

2.8 nT
-3.0

rape crop

Drain
Drain
Drain
Drain
Drain
Drain

Lake
Lake

Block Fen

Langwood Fen

Langwood Fen Farm

Tank

BM 1.64m

Track

N

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Figure 2: Magnetometer survey (greyscale plot)

0 1:2000 100m

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2.8 nT
-3.0

Lake
Drain
Drain
Lake
Lake
Pond
Block Fen
overgrown
Block Fen Farm
Sailing Club
1.5m
1.6m

N

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Figure 3: Magnetometer survey
(greyscale plot)

0 1:2000 100m

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- magnetic anomalies (archaeological ?)
- magnetic disturbances (recent / non-archaeological)
- weak background magnetic anomalies (alluvial ground ?)
- ditches
- strong (ferrous) magnetic anomalies
- pipe (and associated magnetic disturbance)
- drain ?

Drain

Drain

Drain

N

60nT

Tank

BM 1.64m

Drain

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Figure 4: Magnetometer survey

0 1:1500 50m

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Longwood Fen

Tank

BM 1.64m

60nT

Drain

Drain

Drain

Track

Track

1.3m

N

magnetic anomalies (archaeological ?)

magnetic disturbances
(recent / non-archaeological)

weak background magnetic anomalies
(alluvial ground ?)

ditches

strong (ferrous) magnetic anomalies

pipe (and associated magnetic
disturbance)

drain ?

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Figure 5: Magnetometer survey

0 1:1500 50m

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magnetic anomalies (archaeological ?)

magnetic disturbances
(recent / non-archaeological)

weak background magnetic anomalies
(alluvial ground ?)

ditches

strong (ferrous) magnetic anomalies

pipe (and associated magnetic disturbance)

drain ?

1.5m

Pond

Block Fen

overgrown

Lake

Block Fen Farm

1.6m

Sailing Club

Lake

60nT

N

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Figure 6: Magnetometer survey

0 1:1500 50m

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magnetic anomalies (archaeological ?)

magnetic disturbances (recent / non-archaeological)

weak background magnetic anomalies (alluvial ground ?)

ditches

strong (ferrous) magnetic anomalies

pipe (and associated magnetic disturbance)

drain ?

N

Rape crop

Drain

Lake

Block Fen

Langwood Fen

Track

Tank

BM 1.64m

C

L

D

A

G

K

J

H

P

1

2

5550

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Figure 7: Summary of findings

0 1:2000 100m

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2

5850

H

P

Drain

Drain

Lake

Track

1.5m

E

M

N

Pond

Q

Block Fen

overgrown

F

B

Block Fen Farm

Lake

1.6m

Sailing Club

N

magnetic anomalies (archaeological ?)

magnetic disturbances
(recent / non-archaeological)

weak background magnetic anomalies
(alluvial ground ?)

ditches

strong (ferrous) magnetic anomalies

pipe (and associated magnetic disturbance)

drain ?

400 x 10^{-5}SI
(volume susceptibility readings)

0

Magnetic susceptibility survey 1:12500

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Figure 8: Summary of findings

0 1:2000 100m

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