

**BRAMPTON LODGE,
BRAMPTON, CAMBRIDGESHIRE**

**Report on Archaeogeophysical Survey
2009**

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Brampton Lodge

Report on Archaeogeophysical Survey 2008

Summary

A magnetometer survey has been carried out as part of an archaeological evaluation of a proposed gravel extraction site at Brampton near Huntingdon, Cambridgeshire. The survey covered the full evaluation area, with the exception of the proposed A14 improvement route, which intersects the site. The evaluation area was investigated by means of a detailed magnetometer survey, with supplementary magnetic susceptibility testing.

The site was known to contain potential archaeological features on the basis of previously recorded cropmarks. The survey findings confirmed the presence of the main cropmark sites, and have indicated the presence of additional archaeological findings at a number of locations. Two new enclosure complexes, probably representing additional settlement sites, have been detected (at B and E as identified in the report).

Unusually strong localized magnetic activity in parts of the evaluation site (fields 1 and 5) may relate to past military activity in the area.

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BRAMPTON LODGE, BRAMPTON, CAMBRIDGESHIRE

Report on Archaeogeophysical Survey of Proposed Gravel Extraction Site

Introduction

This report describes a geophysical survey which forms part of an archaeological evaluation of a proposed gravel extraction site adjacent to Brampton Lodge Farm near Brampton, Cambridgeshire. The survey was commissioned by Archaeologica Ltd on behalf of Lafarge Aggregates, and fieldwork was done in March-April 2009.

The Site

The evaluation area is centred approximately at TL 195700, and located about 2km SW of Brampton, and 5km from Huntingdon. It extends to the north, east and south of Brampton Lodge, and occupies arable fields immediately to the west of the A1. The site is intersected by the route of the proposed A14 improvement, which is the subject of a separate archaeological evaluation (currently being undertaken by Cambridge Archaeological unit on behalf of the road contractors). The remaining evaluation area (excluding the road route) covers some 79ha, within which all surveyable ground was investigated by geophysical methods, as described below. [The survey coverage in places extends beyond the evaluation boundary for reasons of simplicity in marking out the survey grid on open ground.] The extent of the evaluation area is marked by red cross hatching on the site plan (figure 1). The road route (as excluded from the survey) is shown in grey.

Geology

The site is on river terrace gravels above a bedrock of Oxford Clay. The south western corner of the evaluation area (south of Brampton Lodge) extends beyond the gravel terrace (as indicated on 1:50000 BGS geological map, sheet 187), and so may have a predominantly clay soil. The gravel soils, in particular, should provide favourable conditions for a survey of this kind, as was seen in previous surveys which we have done in comparable conditions nearby (at Godmanchester [1], and sites on the proposed A14 route [2]). A strong magnetic response was obtained from archaeological features on gravel soils in both these surveys. Successful surveys have also been undertaken on Oxford Clay, but the response may be weaker than on the gravel.

The magnetic susceptibility readings taken during the course of the present survey offer further evidence that conditions at the site should be suitable for a magnetometer survey. The mean value of the readings (as plotted in figure 16) is 27×10^{-5} SI. This is relatively high for a site on lowland geology, and should indicate a magnetically responsive soil.

One complicating factor in surveys on gravel soils is that glacial gravels often contain individual strongly magnetic stones (transported from distant igneous sources). These can give rise to small magnetic anomalies or areas of increased background disturbance in the survey plots. Some of the natural magnetic anomalies may resemble small archaeological features, although they are often distinguishable by their random plan and distribution. At this site, there are unusually strong magnetic disturbances in some areas (particularly in the fields identified below as fields 1 and 5). These are not necessarily of geological origin, as will be discussed.

Archaeological Background

The site is known to contain significant archaeological features on the basis of a previous cropmark study. Cropmark features (from a plan supplied to us by the client) are shown in figure 15. They are superimposed for comparison on a reduced scale copy of the grey scale magnetometer survey plot. County SMR numbers are shown alongside some of the main cropmarks, which are likely to represent earthworks, enclosures and settlement features of various dates, probably from the Neolithic or Bronze Age to Romano-British, or later. The northern part of the site is located close to the Houghton deserted medieval village, which lies immediately to the north west of the evaluation area. Further evidence of archaeological features at the site was provided by a geophysical survey carried out (by Pre-Construct Geophysics) early in 2008 as part of the A14 evaluation. This covered a sample strip within the road corridor, and produced clearly identifiable archaeological findings.

Survey Procedure

Magnetometer survey

The evaluation area was investigated by means of a detailed recorded magnetometer survey. This method is more reliable and informative than limited sampling-based procedures, and so is the usual preferred option for surveys of this kind.

Readings were collected using Bartington 1m fluxgate magnetometers, and are plotted at 25cm intervals along transects 1m apart. The results of the survey are shown as grey scale plots at 1:2000 scale in figures 2-6, and as graphical (x-y trace) plots at 1:1250 scale in figures 7-14.

The survey plots show the magnetometer readings after standard treatments which include adjustment for irregularities in line spacing caused by variations in the instrument zero setting, and slight linear smoothing. Additional 2D low pass filtering has been applied to the grey scale plot to reduce background noise levels.

The magnetometer responds to cut features such as ditches and pits when they are silted with topsoil, which usually has a higher magnetic susceptibility than the underlying natural subsoil. It also detects the thermoremanent magnetism of fired materials, notably baked clay structures such as kilns or hearths, and so responds preferentially to the presence of ancient settlement or industrial remains. It is also strongly affected by ferrous and other debris of recent origin.

Presentation

An interpretation of the findings is shown superimposed on the graphical plots (7 - 14), and is reproduced separately to provide a summary of the findings in figures 17-19. Features as marked on these plans include magnetic anomalies thought to be of potential archaeological significance (in red).

The survey has additionally detected areas of strong magnetic activity, much of which is unlikely to be of archaeological origin (particularly in the fields labelled 1 and 5). These areas contrast strongly with the usual more limited background activity which extends across much of the site (and may in part be caused by magnetic stones in the gravel, among other factors, as mentioned above). Magnetic anomalies in both these categories are indicated for comparison in the interpretative plans (figures 17-19). The strong disturbances are outlined in brown, and the weaker background activity is shown in orange. These minor background disturbances are indicated very faintly on the summary plans (17-19) to avoid obscuring more significant features. Only the potentially more significant magnetic anomalies are shown superimposed (in red) on the data plots in figures 7-14, and the susceptibility plot (figure 16).

The allocation of magnetic anomalies to the three main categories (archaeological / minor natural / strong natural (or recent), as indicated by red / orange / brown outlines) always involves some unavoidable ambiguity. [This is why the colours used are not entirely dissimilar from each other.] The categorisation is based on examination of the amplitude, extent, gradient and distribution of the features, but some always display ambiguous characteristics. At this site there is a highly responsive soil, and a large number of strong (and probably recent) disturbances. It is possible therefore that the number of small pit-like features is sometimes generously estimated, but it is also possible that some of the features indicated as natural or recent may be archaeologically significant.

One further small category of individual strong magnetic anomalies is indicated by dark outlines. These could well be of non-archaeological origin, but are larger than the narrow spikes which usually indicate ferrous objects. They could therefore in some cases resemble the magnetic anomalies to be expected from such features as kilns or hearths. Possible cultivation effects are shown on the summary plans in green, and pipes in blue.

Survey location

The survey was located by reference to a grid of temporary markers. The survey grid was set out and tied to national grid co-ordinates by means of a differential GPS system.

OS co-ordinates of map locations can be read from the AutoCAD version of the plans which can be supplied with this report, and used to re-locate features in the field.

Magnetic susceptibility survey

The magnetometer survey was supplemented by a background magnetic susceptibility survey with readings taken at 20m intervals using a Bartington MS2 meter and field sensor loop. The results are presented as plots of shaded squares of density proportional to the readings in figure 16. This figure shows a median filtered version of the survey (which emphasises broad trends in the data).

Susceptibility surveying can provide a useful complement to a magnetometer survey, and indicates the strength of response which is likely to be obtained. It can also be used to provide a broad indication of previously occupied or disturbed areas in which burning associated with past human occupation has enhanced the magnetic susceptibility of the topsoil, although this cannot be relied upon, and the readings are often affected non-archaeological factors, including geology and land use.

Results

The fields within the evaluation area are numbered (1-8) for reference within this report, as indicated on the location plan (figure 1), and the 1:2000 summary plans (figures 17-19). A further summary (showing potential archaeological features only) is shown combined with the susceptibility data in figure 16. A small plan inset in figure 16 shows the same survey data copied on to a plan showing field boundaries in 1772 (as supplied to us by Archaeologica Ltd). It is clear from this plan that significant findings were detected across much of the site, with the exception of the SW corner. Some of the more significant findings have been labelled for reference by letters, as shown in figures 17-19.

Field 1

The survey in this field has detected clearly defined archaeological features, but also a background of strong magnetic activity. There are linear cropmarks (probably representing a track) in the eastern half of the field, which were detected in part (as labelled at A on figure 17).

Other findings (as visible particularly in the grey scale plot) include an enclosure and other nearby features at B, as well as ditch (which continues from field 2) and a strong individual magnetic anomaly (as indicated by a dark outline) at C. The feature at C (in common with others as similarly indicated in the interpretation) lacks the sharp narrow profile to be expected from a near-surface ferrous object, and so could represent a pit with strongly magnetic fill. Such fill, if it is of archaeological origin, is likely to include burnt debris of domestic or industrial origin. An area of strongly enhanced susceptibility readings in the western half of the field would be consistent with the presence of such remains. The enclosure detected at B is close to the site of the Houghton deserted medieval village.

It is possible that other archaeological features are present in this field, but are obscured by the generally disturbed magnetic response. The reasons for the background activity are difficult to assess. The effect could be natural (and caused by magnetic stones in the gravel as mentioned previously), but the effect stops abruptly at the southern field boundary, and also in the NW corner. The magnetically quiet area in this corner has been planted for cover, but could lie beyond a former boundary, at which the magnetic effects terminate.

We tested a sample of stones and found a few gave high magnetic susceptibility readings (75+ compared with <10 for the remaining stones). This variation could account for some background magnetic activity but, given that the stones are very small, it would not necessarily be stronger than in other parts of the site. There is also no recorded change in geology (as shown on the BGS 1:50000 map) between fields 1 and 2. The disturbed response could perhaps be caused by a spread of modern debris (brick rubble, etc). The evaluation area is near the Brampton RAF camp (which is still in use to the east of the A1), and contains concrete tracks of possible wartime date, but we do not know if field 1 was ever the site of military installations. We have seen similar magnetic disturbances in at least one other previous survey of a former airfield where debris from demolished buildings and runways was scattered in the soil, but in field 1 there is no extensive surface scatter of rubble, although we are told surface rubble is visible in the SE corner. (Such debris was also seen elsewhere in the present survey, particularly in field 6.)

Field 2

The survey in this field has detected the cropmark sites, as well as numerous additional features. The level of background activity across much of the field is quite normal, in contrast to field 1. There are some strong disturbances along track ways and around Brampton Lodge, but this is not unusual near to modern activities, although it is possible that structures might have been demolished near to the farm. The background disturbances across the remainder of the site are shown in light orange, and are often quite sparse. Many of the magnetic anomalies in orange are likely to be natural.

The main findings in field 2 include the cropmark enclosure (HER 820) at D. The enclosures contain numerous smaller features, which would be consistent with the presence of settlement remains. There is also a sequence of rectangular croft boundaries (again with internal features) at E. Only fragments of these were seen as cropmarks. There is a further rectangular enclosure to the west of the field at F.

Various features are marked as natural frost cracks in the AP interpretation (as shown in yellow in figure 16). These were not detected in the survey, which is consistent with their natural origin. A linear magnetic anomaly at G aligns with a feature noted as a field boundary in the AP plan, and with one of the boundaries as shown on the 1772 map (which is inset in figure 16). There are, however, few other correspondences between linear features in the survey and the field boundaries of 1772. This perhaps suggests that post-medieval (or post-enclosure) boundaries were marked mainly by hedges rather than ditches. Once these are removed there is little physical trace of them that can be detected by the survey. The 1772 map perhaps therefore offers further evidence that most of the linear features visible in the survey represent ancient ditched enclosures.

Other parallel linear markings (in green) are likely to be cultivation effects. Magnetic disturbances caused by the oil pipeline (which intersects the evaluation area from north to south) are marked by blue outlines.

Field 3

Findings to the east of the A14 route include a long curving ditch (H on figure 18), and various individual magnetic anomalies (in red). Some of these may be pits or other features of archaeological origin. A dense cluster of magnetic anomalies to the south of the field at L probably represent archaeological features associated with a cropmark site, much of which lies within the unsurveyed A14 route.

Field 4

A broad strip of weak positive magnetic anomalies, of a kind which could perhaps represent a slight earthwork, or a naturally silted hollow, was detected at J (to the south of Brampton Lodge). This feature corresponds quite closely to the location of a track which is shown on the 1772 map (inset in figure 16). There is a relatively dense scatter of background magnetic activity in this field, but few distinct features.

Field 5

No interpretable archaeological features were seen in this field, but there are strong magnetic disturbances similar to those in field 1. These again terminate either at field boundaries, or at an artificial-seeming line within the field. The same interpretative questions therefore apply here as in field 1.

Field 6

The small area surveyed in this field includes more disturbances as seen in field 5, but no other very distinct findings.

Field 7

Archaeological features here are concentrated to the east (and possibly within) the A14 route. They are centred on the large (40m diameter) cropmark ring ditch (HER 5765 at K), which was clearly detected in the survey. This encloses and is surrounded by numerous pit and ditch-like magnetic anomalies.

An area marked by black cross hatching in figure 15 is identified in the AP interpretation as a former quarry. The survey here detected only pit-like magnetic anomalies similar to others nearby, although a slight increase in the level of disturbance within the quarry is perhaps visible in the grey scale plot. (The quarry outline has also been copied to summary plans 18 and 19.) A former quarry will often be filled with strongly magnetic debris, but here there is no evidence for this in the survey.

There are strong magnetic disturbances along the eastern field boundary where, in

contrast to field 1, rubble and debris can be seen on the ground.

The eastern half of field 7 has a strongly magnetic soil, as indicated by the susceptibility survey (figure 16). Linear cultivation effects (of a probably superficial kind) are therefore visible here in the grey scale plot. The lower susceptibility values in the western half of the field appear to reflect a change in geology. The gravel terrace is shown (on the 1:50000 map, sheet 187) as terminating at about the same location as the reduction in susceptibility readings. The lower readings to the west probably therefore reflect an increased clay content in the soil. Susceptibility variations at this site probably therefore relate primarily (as is usually the case) to geology, upon which archaeological effects might be superimposed.

There is a further area of rather inconclusive magnetic activity at the western end of the field (around M on figure 19). This group of magnetic anomalies includes pit-like features, but there are no associated ditches or enclosures of the kind seen in archaeologically productive areas of the survey. Magnetic anomalies which probably represent naturally silted hollows are often seen on flood plains near streams, as may be the case here.

Field 8

The survey has detected a complex group of features in the centre of the field around N. The findings appear to include superimposed circular and rectangular enclosures, with internal pits and other features. There are some particularly well-defined strong magnetic anomalies of a kind which may indicate hearths, kilns, or pits with burnt fill within this group of features (as indicated by dark outlines). The main circular ditch was identified at a slightly displaced location in the cropmark plan. The survey has also detected additional ditches or enclosures and possible related features in the SE corner of the field (around P). A further cropmark enclosure (HER 10066) lies within the A14 route towards the NE of this field.

The response from the western half of the field appears to be largely quiet, with the exception of a ditch or former field boundary at Q, and perhaps some additional (natural?) magnetic anomalies near to the stream.

Conclusions

The survey has produced clear archaeological findings which both confirm and expand the cropmark evidence. The most conspicuous archaeological features are the previously recorded enclosures HER 820 and HER 5765 (D and K in fields 2 and 7 on survey plans), but additional enclosure complexes have now been identified at B in field 1, and E in field 2.

Additional detail has been added to the cropmark data in the vicinity of the ring ditch (HER 5765) in field 7, and around the circular ditched enclosure at N in field 8. Additional ditches and features (P) were found in the SE corner of field 8.

The strong and very unusual magnetic disturbances in fields 1 and 5 remain difficult to explain, but may (if they are not natural) relate to past military activity at the site.

Archaeological features appear to be concentrated on the gravel terrace, and to be relatively lacking on the clay soils towards the SW of the evaluation area.

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P. Cottrell BA MA supervised the fieldwork for this project. Data processing was done by P. Cottrell and F. Prince. Fieldwork was undertaken also by S. Brown and C. Oatley.

References

[1] Bear's Croft Farm, Godmanchester, Cambridgeshire. Report on geophysical survey by Bartlett Clark Consultancy for Cambridge Archaeological Unit: 16 April 2008.

[2] A14 Improvement Ellington to Fen Ditton. Report on geophysical survey by Bartlett Clark Consultancy for Cambridge Archaeological Unit and Atkins Heritage: 23 December 2008.

Brampton Lodge Geophysical Survey

Appendix: Inventory of Selected Findings

This list includes findings of potential archaeological interest as noted in the text of this report, and labelled on the summary plans (figures 17-19). The grading (1-4) given alongside each entry refers to the reliability of the geophysical evidence rather than the archaeological significance of the findings.

- Grade 1: Distinct magnetic anomalies of probable archaeological origin.
- Grade 2: Magnetic anomalies possibly including natural or recent disturbances, but which could in part be archaeologically significant.
- Grade 3: Weak, isolated or apparently natural features; not necessarily archaeologically significant.
- Grade 4: Magnetic anomalies of probably non-archaeological origin.

Feature
Grade

Field 1

- | | | |
|---|---|-----|
| A | Linear cropmark ditches. | 1-2 |
| B | Ditched enclosures near to Houghton DMV. | 1 |
| C | Ditch + strong magnetic anomaly (perhaps industrial ?). | 1-2 |

Field 2

- | | | |
|---|--|-----|
| D | Cropmark enclosures (HER 820), and probable settlement features. | 1 |
| E | Sequence of rectilinear crofts. | |
| | 1 | |
| F | Rectangular ditched enclosure with internal features. | 1 |
| G | Example of possible former field boundary. | 1-2 |

Field 3

H	Long curving ditch (with pits, etc, nearby).	1
L	Archaeological features (near to cropmark enclosure within A14 route).	1

Field 4

J	Broad strip of weak magnetic anomalies: corresponds to track on 1772 map.	2-3
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Field 7

K	Cropmark ring ditch (HER 5765). This is located within an area containing ditches, enclosures and other archaeological features extending across much of the eastern half of the field.	1
M	Cluster of pit-like magnetic anomalies (perhaps natural silted hollows near stream).	3

Field 8

N	Superimposed circular and rectangular enclosures (including curved cropmark ditch), and settlement remains.	1
P	Extended scatter of ditches, pits, etc in SE corner of field.	1
Q	Ditch (former field boundary ?)	1