ARCHAEOLOGICAL GEOPHYSICAL SURVEY

Off Site Works
Land at Rowden Park
Chippenham
Wiltshire  SN15 2NN

September 2014
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Non technical summary

A fluxgate gradiometer survey was undertaken on land at Rowden Park, Chippenham, Wiltshire.

The survey represents a second phase of geophysical survey targeted on the proposed sites of six balancing ponds. An earlier survey was carried out in the northern and central regions of the proposed residential and commercial development.

The survey detected traces of probable and ditches pits in Areas 3 – 5. Examples in Area 4 lie within a zone of cropmark ditches, although it is unclear if any of the latter corresponds with geophysical anomalies.

Magnetic variation induced by modern and recent occupation includes a service (Area1), a former boundary (Area 2), cultivation (including ploughed out ridge and furrow in Areas 2 and 4) and miscellaneous ‘ferrous’ debris or features. Feasibly, elements of variation adjacent to the northern boundary of Area 2 relate to the former course of Pudding Brook.

Natural responses include weak variation indicative of probable palaeochannels.

Fig.1: Location of site and survey
1.0 Introduction

Acting for CgMs, Cotswold Archaeology commissioned Pre-Construct Geophysics Ltd (PCG) to undertake a fluxgate gradiometer survey on land at Rowden Park, Chippenham, Wiltshire.

Following an earlier survey of the northern part of the site by PCG (Bunn, 2014), additional survey was requested across the proposed locations of six balancing ponds (Fig. 1). These lie to the east of the primary development, which comprises a mix of residential properties and employment zones (site centred at NGR 39100 172000).

The objective of the survey is to detect and precisely locate any potential buried archaeological features using non-intrusive techniques.

This report incorporates information that has been selectively extracted from an Archaeological Desk Based Assessment (DBA) prepared by CgMs (Hawkins, 2014) and also from the report of the initial geophysical survey (Bunn, 2014).

2.0 Location and description (Figs. 1, 2, 3, 5)

The proposed development site lies at the southern edge of Chippenham (Fig.1). It encompasses three separate blocks of agricultural land, with the northern two areas situated to the east/north of the B4643 and the southern area to the south of the road. Milbourne Farm buildings lie in the mid-northern part of the site. The proposed locations of six balancing ponds (PCG designated survey Areas 1 - 6) lie to the east of the primary development.

3.0 Geology and topography

The solid geology of the targeted survey areas comprises Kellaways Formation – Sandstone, Siltstone and Mudstone¹.

Superficial deposits are not recorded in Area 1. River Terrace Deposits, 1 – Sand and Gravel are recorded in all other survey areas.

The response of archaeological remains within these geologies is generally variable (English Heritage, 2008).

The survey areas are situated on generally level ground at between 48m and 50m AOD.

4.0 Archaeological Context (Fig. 7)

Extracts from the conclusions of the DBA (Hawkins, 2014):

- The study site is thought to have a low archaeological potential for the Palaeolithic.
- The study site has a moderate to good archaeological potential for the Mesolithic with short term ‘camp site’ occupation most likely to be represented.
- The study site can be assessed as having a variable archaeological potential for the Neolithic and Bronze Ages. Funerary monuments and ritual enclosures may be represented on the higher ground on the southern and northern parts of the site. Elsewhere evidence for land division and agricultural activity may be represented.
- Low status Iron Age and Roman agricultural activity, with occasional associated agricultural structures and low status burials are likely to be represented across the site.
- The study site has a low archaeological potential for the Anglo Saxon and early medieval periods and a limited archaeological potential for the late Medieval, post Medieval and Modern periods, though evidence for land division and agricultural activity may be represented.
• The southern part of the site allocated for employment use has been subject to a comprehensive archaeological investigation as has the eastern part of the central development area.

• Past archaeological impacts are likely to have been restricted to ploughing, with moderate but widespread archaeological impacts.

• Except in the area of the Riverside Park and the existing Forest area the scale of the proposed development suggests it is unlikely that any archaeological remains present would survive the redevelopment process.

• Within the Riverside Park and the existing Forest area, there is a potential to preserve any archaeological remains present in situ.

Aerial reconnaissance suggests that potential ditches lie within and adjacent to Area 4 (Hawkins, 2014, see also Fig. 7).

The geophysical survey of the mid and central parts of the site identified limited evidence of archaeological remains (Bunn, 2014). These comprise potential ditches and pits in the north-western and south-eastern regions of the targeted areas.

5.0 Methodology


5.1 Fluxgate Gradiometry is a non-intrusive scientific prospecting tool that is used to determine the presence/absence of some classes of sub-surface archaeological features (e.g. pits, ditches, kilns, and occasionally stone walls). By scanning the soil surface, geophysicists identify areas of varying magnetic susceptibility and can interpret such variation by presenting data in various graphical formats and identifying images that share morphological affinities with diagnostic archaeological remains.

The use of gradiometry should help to establish the presence/absence of buried magnetic anomalies, which may reflect sub-surface archaeological features, and may therefore form a basis for a subsequent scheme of archaeological trenching.

The use of magnetic surveys to locate sub-surface ceramic materials and areas of burning, as well as magnetically weaker features, is well established, particularly on large green field sites. The detection of anomalies requires the use of highly sensitive instruments; in this instance the Bartington 601 Dual Fluxgate Gradiometer. This is accurately calibrated to the mean magnetic value of each survey area. Two sensors, mounted vertically and separated by 1m, measure slight, localised distortions of the earth’s magnetic field, which are recorded by a data logger.

It should be noted that this technique only records magnetic variation (relative to natural background levels). As such, the magnetic response of archaeological remains will vary according to geology/pedology. Additionally, remains may be buried beyond the effective of 1 - 2m range of the instrumentation (e.g. sealed beneath alluvium).

5.2 The survey was undertaken on 29th – 30th July 2014. The zigzag traverse method of survey was used, with readings taken at 0.25m intervals along 1.0m wide traverses.

Each survey area was established by Global Positioning Satellite using a Topcon GRS-1, with an accuracy of +/- 0.1m and subsequently geo-referenced on an Auto drawing of the site.

5.3 The data was processed using Terrasurveyor V 3.0.22.1. In order to enhance the magnetic response of weak anomalies, the data was clipped and destriped (to eliminate striping introduced by zigzag traversing). The results are plotted as trace, greyscale and
interpretive images at a scale of 1:2500 (greyscales and interpretation only: Figs. 2 - 6) and 1:1250 (Figs. 8 - 31).

5.4 Character, interpretation and presentation of magnetic anomalies

The interpretation of geophysical survey results should only be regarded as an aid to establishing the nature and origin of buried features. This can only be fully achieved by intrusive investigation.

Flagged anomalies were recorded against a backdrop of certain or likely natural variation (highlighted green). It should be noted, however, that non intrusive investigation alone is insufficient to enable a confident appraisal of some discrete and linear anomalies as natural or archaeological responses (e.g. differentiation between pits and top soil-filled natural depressions/tree throws, also ditches/cultivation with palaeochannels).

Anomalies considered to reflect modern ferrous-rich features and objects are highlighted in blue on the interpretive images. These are characterised magnetically as dipolar ‘iron spikes’, often displaying strong positive and/or negative responses. Examples include those deposited along existing or former boundaries (e.g. wire fencing), services and scatters of horseshoes, ploughshares etc across open areas. Ferro-enhanced (fired) materials such brick and tile (sometimes introduced during manuring or land drain construction) usually induce a similar, though predominately weaker response. Concentrations of such anomalies will often indicate rubble spreads, such as would be used to backfill ponds or redundant ditches, or indicate the blurred footprints of demolished structures.

Potential archaeological remains are highlighted as red on interpretive images, former boundaries/current track as yellow, cultivation as orange and services as blue lines.

On a cautionary note, fired clay associated with early activity (e.g. kilns, furnaces, tile spreads) has the same magnetic characteristics as modern brick/tile rubble. Therefore, the interpretation of such variation must consider the context in which it occurs.

6.0 Results and discussion (Figs. 2 - 31)

6.1 A1 (Figs. 2 - 4, 8 - 11)

The survey recorded:

a) Strong variation induced by a buried service (Figs. 4 & 11: highlighted pink & blue/blue line). The same service extends across the land to the west, as recorded by the earlier survey (Bunn, 2014);

b) A backdrop of natural variation (greenscale).

6.2 A2 (Figs. 2 - 4, 12 - 15)

The survey recorded:

a) A potential site of burning at the mid-northern part of the field (Figs. 4 & 15: red dot). Tentatively flagged as potentially archaeological, this may be modern, as possible traces of a scrub clearance bonfire. The latter interpretation references the recent canalisation of Pudding Brook, which formerly meandered across the northern edge of the current field (Hawkins, 2014: Figs. 6 – 12). The stream was canalised at some point between 1960 and 1985 (ibid). Not withstanding that the survey has not detected clearly defined traces of its former course (feasibly due to an overburden of alluvium), it seems likely that other elements of variation in this area relate to associated ground disturbance/backfill. This probably includes a large deposit of likely ferrous-rich debris in the north-east corner of the field (highlighted pink & blue);
b) Ephemeral magnetic traces of a former (dogleg) boundary (yellow lines), as depicted on the Lacock Tithe Map, dated 1838 (Hawkins, 2014);

c) Cultivation, probably ploughed out ridge and furrow, in the south-east corner of the survey area (dotted orange lines);

d) Subtle variation, almost certainly of natural origin (greenscale/zones boxed by dotted green lines). Linear trends conceivably reflect ferrous rich mineral deposits contained within palaeochannels;

e) Strong variation (induced by modern features and materials) along the eastern boundary, in close proximity to an electricity pole (annotated) and also including the above mentioned large zone in the north east region (highlighted pink & blue). Discrete and groups of strong anomalies were registered across the field. These typically reflect miscellaneous ferrous-rich materials/objects contained within the plough soil, such as ceramic debris, ploughshares and horseshoes.

6.3 A3 (Figs. 2 - 4, 15 - 19)

The survey recorded:

a) Potential ditches, including a curvilinear example in the eastern part of the survey area (Figs. 3 & 19: red lines). A possible pit/site of burning lies to the immediate west of the putative curvilinear ditch (red dot);

b) Traces of cultivation, possibly ridge and furrow (dotted orange lines);

c) Strong anomalies of probable modern origin, as discussed above (highlighted pink & blue);

d) A backdrop of predominately natural variation (greenscale).

6.4 A4 (Figs. 2 - 4, 20 – 23)

The survey recorded:

a) Potential ditches in the northern part of the survey area (Figs. 3 & 23: red lines). These were detected within an area of linear cropmarks (Fig. 7), although it is unclear if any directly correspond to the geophysical anomalies;

b) Widespread traces of cultivation (dotted orange lines);

c) Strong readings adjacent to northern and south-western boundaries, and isolated examples within the field (all clearly or probably of modern origin: highlighted pink & blue).

6.5 A5 (Figs. 2 - 4, 24 - 27)

The survey recorded:

a) Potential ditches and pits (Figs. 3 & 27: highlighted red). Despite the relatively small size of the survey area, a number of putative ditches appear to encompass at least one rectilinear enclosure. Whereas none have been identified by aerial reconnaissance, it should be noted that the E-W orientation of some ditches broadly corresponds that of the closest cropmarks to the east, albeit on a slightly different alignment;

b) A limited number of strong anomalies (highlighted pink & blue). It seems likely that the majority signify modern ferrous-rich objects.
6.6 A6 (Figs. 2 - 4, 28 - 31)

The survey recorded:

a) Probable cultivation (Figs. 3 & 31: dotted orange line);

b) Strong variation indicative of modern features and materials, particularly along the eastern boundary and south-east corner of the field (highlighted pink & blue). The latter probably signifies a back filled pit of some form (e.g. pond).

7.0 Conclusions

The survey detected traces of probable ditches and pits in Areas 3 – 5. Examples in Area 4 lie within a zone of cropmark ditches, although it is unclear if any of the latter corresponds with geophysical anomalies.

Magnetic variation induced by modern and recent occupation includes a service (Area1), a former boundary (Area 2), cultivation (including ploughed out ridge and furrow in Areas 2 and 4) and miscellaneous ‘ferrous’ debris or features. Feasibly, elements of variation adjacent to the northern boundary of Area 2 relate to the former course of Pudding Brook.

Natural responses include weak variation indicative of probable palaeochannels.

8.0 Acknowledgements

Pre-Construct Geophysics would like to thank Cotswold Archaeology for this commission.

9.0 References


Hawkins, D. 2014 Land at Rowden Park, Chippenham, Wiltshire, SN15 2NN Archaeological Desk-Based Assessment. CgMs Report Ref: DH/KB/16305

Fig. 2: Location of survey
(Greyscale images of processed data)
Fig. 3: Areas 1 – 3 - Location of survey (Greyscale images of processed data)

Fig. 4: Areas 1 – 3 - Interpretation

< -10nT Typically modern (rubble, metal objects/fencing etc). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

Predominantly natural, although archaeological remains typically resolve magnetically within this range (e.g. ditches/pits).

< -3 nT Typically modern (rubble, metal objects/fencing etc). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

> 3 nT

100 m

100 m

Potential pit
Potential ditch
Cultivation
Known former boundary (historic maps)
Service
Fig. 5: Areas 4 – 6 - Location of survey (Greyscale images of processed data)

Fig. 6: Areas 4 – 6 - Interpretation

Fig. 7: Extract from DBA (Fig. 2: HER plot)
>10nT Typically modern (rubble, metal objects/fencing etc). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

Predominately natural, although archaeological remains typically resolve magnetically within this range (e.g. ditches/pits).

<-10nT Typically modern (rubble, metal objects/fencing etc). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

Fig. 14: A2 – Greyscale image of processed data
Fig. 15: A2 – Interpretation

ELECTRICITY POLE
Potential pit
Potential ditch
Cultivation
Known former boundary (historic maps)
Service

Fig. 12: A2 – Greyscale image of unprocessed data
Fig. 13: A2 – Trace plot

Fig. 10: A1 – Greyscale - processed data
Fig. 11: A1 - Interpretation

Fig. 8: A1 – Greyscale - unprocessed data
Fig. 9: A1 – Trace plot
>10nT Typically modern (rubble, metal objects/fencing etc).

NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

Predominately natural, although archaeological remains typically resolve magnetically within this range (e.g. ditches/pits).

<10nT Typically modern (rubble, metal objects/fencing etc). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses

Potential pit
Potential ditch
Cultivation

Fig. 16: A3 – Greyscale image unprocessed data

Fig. 17: A3 – Trace plot

Fig. 18: A3 – Greyscale image processed data

Fig. 19: A3 - Interpretation
Typically modern (rubble, metal objects/fencing etc.). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses.

Predominately natural, although archaeological remains typically resolve magnetically within this range (e.g. ditches/pits).

< -10 nT Typically modern (rubble, metal objects/fencing etc.). NB: archaeological remains such as demolition spreads, kilns, hearths also induce such responses.

Potential pit
Potential ditch
Cultivation