Archaeological Services
University of Durham

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

on behalf of
Dr Thomas Pinhorn

Report 2368
February 2010

Archaeological Services
Durham University
South Road
Durham DH1 3LE
Tel: 0191 334 1121
Fax: 0191 334 1126
archaeological.services@durham.ac.uk
www.durham.ac.uk/archaeological.services

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368

February 2010

Archaeological Services Durham University

on behalf of

Dr Thomas Pinhorn

Contents

1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted on land at Fawley Court, Henley-on-Thames. The works comprised the geomagnetic survey of five areas.

1.2 The works were commissioned by Dr Thomas Pinhorn and conducted by Archaeological Services Durham University.

Results

1.3 Probable buried services, such as pipes or cables, were identified in Areas 1, 3 and 4. It is possible that these anomalies could reflect brick-lined tunnels but in this instance it is considered more likely that the anomalies reflect services.

1.4 Possible soil-filled features were identified in Areas 1 and 2. Disturbed ground was identified in Area 5.

Recommendations

1.5 Ground penetrating radar (GPR) could be used to try to clarify the nature of the intense linear anomalies detected in this survey. Such a survey would give a better indication of the size and depth of sub-surface features and voids, and provide a clearer indication of whether or not such features are in fact services or tunnels. GPR could also be used over areas where geomagnetic survey techniques were not suitable, such as the tarmac paths and within the folly and gatehouse.

1.6 Further geophysical survey in the grounds of Fawley Court could be undertaken to provide information on the layout of former gardens or to locate other garden features.

2. Project background

Location (Figure 1)

2.1 The study area comprised land at Fawley Court, Henley-on-Thames, Oxfordshire (NGR centre: SU 7652 8422). Fawley Court is situated off the A4155 approximately 1 mile north of Henley-on-Thames. The River Thames lies to the east of the house. Five surveys were undertaken: three on lawned areas to the west, east and south of the main house; one on a grassed area west of the house; and one in a wooded area near the folly, south-east of the house.

Objective

2.2 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, in particular to try to determine the locations and orientations of brick tunnels that run out from beneath the house.

Methods statement

2.3 The surveys have been undertaken in accordance with instructions provided by the client and with current best practice (see para. 5.1 below).

Dates

2.4 Fieldwork was undertaken on 16th and 17th February 2009. This report was prepared between 22nd and 24th February 2010.

Personnel

2.5 Fieldwork was conducted by Natalie Swann and Richie Villis. Data processing and report preparation was by Natalie Swann and Duncan Hale, the Project Manager, with illustrations by Ed Davies and Janine Watson.

Archive/OASIS

2.6 The site code is **HFC10**, for **H**enley-on-Thames **F**awley **C**ourt 20**10**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-72922**.

3. Archaeological and historical background

3.1 References to Fawley Court date back to the Domesday Book. An earlier building on the site was severely damaged by Royalist soldiers in the Civil War. The current house, reputedly designed by Sir Christopher Wren, was built in 1684 for Colonel William Freeman, a London merchant. The famous woodcarver and sculptor, Grinling Gibbons, was responsible for the design of the outstanding ceiling in the Crimson Room. In 1770-71 Lancelot 'Capability' Brown was engaged to landscape the gardens and James Wyatt was commissioned to redecorate the principal ground floor rooms in the fashionable neo-classical style.

3.2 Fawley Court stayed in the Freeman family until it was purchased by Edward Mackenzie, the Scottish banker and railway entrepreneur, in 1853. His son, William, enlarged the house and added a new wing. Alterations also included the cutting of the ornamental waterway, now lined with trees, from the garden down to the River Thames.

3.3 The house was requisitioned by the Army in World War II and used as a military intelligence school and training camp. In 1953, the house was purchased by the Congregation of the Marian Fathers for use as a school for Polish boys, the Divine Mercy College. In the early 1970s, St Anne's Church, founded by Prince Stanislaw Radziwill, was built in the grounds. The school closed in 1986 and more recently the property has been used as a retreat and conference centre. Fawley Court is a Grade I listed building.

4. Landuse, topography and geology

4.1 The survey areas comprised lawn to the west, south and east of Fawley Court and a wooded area to the south-east, west of the folly.

4.2 The study area was predominantly level with a mean elevation of 33.5m OD.

4.3 The underlying solid geology of the area comprises Holywell Nodular Chalk Formation and New Pit Chalk Formation, which are overlain by Shepperton Gravel Member.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2002).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance, it was considered likely that brick-lined tunnels might extend through the survey areas, and that other types of feature such as ditches and pits, paths, trackways, wall foundations and other garden features might also be present.

5.4 Given the anticipated nature and depth of targets, and the non-igneous geological environment of the study area, a geomagnetic technique, fluxgate gradiometry, was considered appropriate. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 A 20m grid was established across survey Areas 1-4; a 30m grid was established in Area 5. These were tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system with real-time correction.

5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 20m or 30m grid units. The instrument sensitivity was 0.03nT, the sample interval 0.25m and the traverse interval 1.0m, thus providing 1,600 sample measurements per 20m grid unit and 3,600 sample measurements per 30m grid unit.

5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (unfiltered) data. The greyscale images and interpretations are presented in Figures 2-7; the trace plots are provided in Figure 8. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relates the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to each dataset:

clip	clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic.
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities.
despike	locates and suppresses iron spikes in gradiometer data.
interpolate	increases the number of data points in a survey to match sample and traverse intervals. In this instance the data have been interpolated to 0.25 x 0.25m intervals.

Interpretation: anomaly types

5.10 Colour-coded geophysical interpretation plans are provided. Two types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths.

Interpretation: features

General comments

5.11 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as bits of iron and bricks.

Area 1

5.12 Several scatters and chains of intense dipolar magnetic anomalies were identified across this area. By reducing the contrast in the survey images these can be resolved into six linear features (Figure 3). These anomalies are typical of buried utilities such as ferrous pipes and sometimes cables. It is possible, however, that brick-lined tunnels could produce similar magnetic anomalies, or indeed that the pipes could be housed within tunnels, as noted in one example seen on site. In this instance, given the size and nature of the anomalies, it is considered that they are more likely to reflect services than tunnels.

5.13 A narrow, linear positive magnetic anomaly aligned north-east/south-west across the central part of the survey could reflect a soil-filled gully, or possibly clay covers over an electrical cable.

5.14 Large, discrete dipolar magnetic anomalies near the north-east, south-east and south-west edges of the survey area almost certainly reflect lights, concrete posts and signposts. The dipolar magnetic anomalies along the eastern edge of the survey area reflect security lights.

Area 2

5.15 Some weak, linear positive magnetic anomalies were detected in this area. These could reflect soil-filled features, possibly associated with former landscaping or garden features.

Area 3

5.16 A chain of intense dipolar magnetic anomalies was detected aligned approximately north-east/south-west. As in Area 1, this is considered likely to reflect a ferrous service pipe but could possibly reflect a continuation of the tunnel system from the house.

Area 4

5.17 A similar chain of dipolar magnetic anomalies was detected aligned approximately north-west/south-east in this area, which is likely to reflect a ferrous service pipe but could possibly reflect a continuation of the tunnel system from the house.

Area 5

5.18 This area is characterised by a high concentration of dipolar magnetic anomalies, which almost certainly reflects disturbed ground. Due to the small size of the available survey area between the trees, it was not possible to determine the extent of this disturbed ground, but it almost certainly contains ferrous and/or fired debris.

6. Conclusions and recommendations

6.1 0.9ha of geomagnetic survey was undertaken at Fawley Court, Henley-on-Thames, Oxfordshire.

6.2 Probable buried services were identified in Areas 1, 3 and 4. It is possible that these anomalies could reflect brick-lined tunnels, but in this instance it is considered more likely that the anomalies reflect services.

6.3 Possible soil-filled features were identified in Areas 1 and 2. Disturbed ground was identified in Area 5.

6.4 Ground penetrating radar (GPR) could be used to try to clarify the nature of the intense linear anomalies detected in this survey. Such a survey would give a better indication of the size and depth of sub-surface features and voids, and provide a clearer indication of whether or not such features are in fact services or tunnels. GPR could also be used over areas where geomagnetic survey techniques were not suitable, such as the tarmac paths and within the folly and gatehouse.

6.5 Further geophysical survey in the grounds of Fawley Court could be undertaken to provide information on the layout of former gardens or to locate other garden features.

7. Sources

David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper **6**, Institute of Field Archaeologists

Schmidt, A, 2002 *Geophysical Data in Archaeology: A Guide to Good Practice*. Archaeology Data Service, Arts and Humanities Data Service

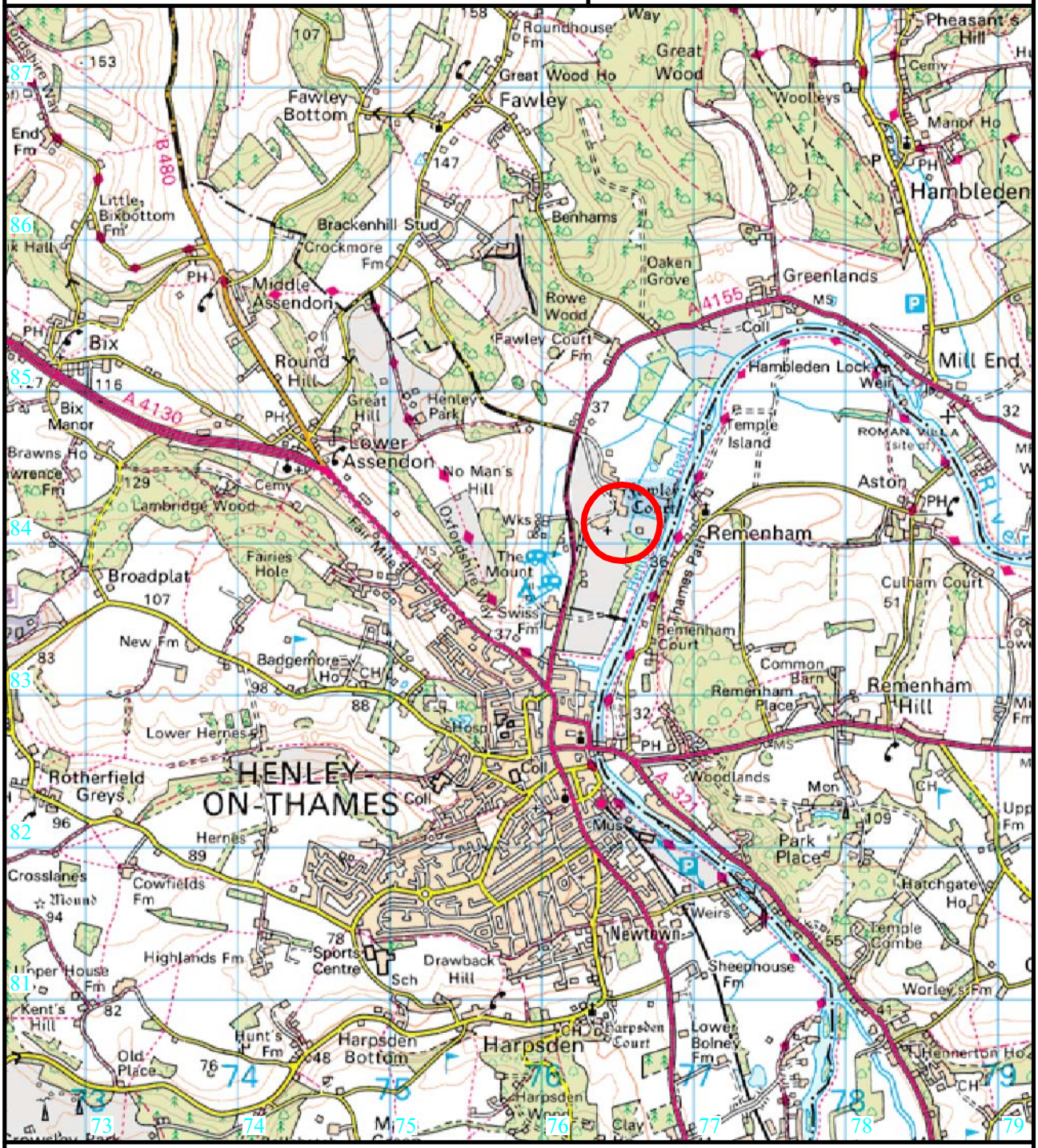
Archaeological Services
University of Durham

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368
Figure 1
Site location

on behalf of
Dr Thomas Pinhorn



Archaeological Services
University of Durham

on behalf of
Dr. Thomas Pinhorn

0 50m

scale 1:1000 - for A3 plot

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368

Figure 2
Areas 1-4 geophysical survey

Archaeological Services
University of Durham

on behalf of
Dr. Thomas Pinhorn

0 50m

scale 1:1000 - for A3 plot

outline of survey area

50.00
41.67
33.33
25.00
16.67
8.34
0
-8.34
-16.67
-25.00
-33.33
-41.67
-50.00 nT

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368
Figure 3
Areas 1-4 geophysical survey (reduced contrast)

Archaeological Services
University of Durham

on behalf of
Dr. Thomas Pinhorn

0 50m

scale 1:1000 - for A3 plot

outline of survey area

positive magnetic anomalies

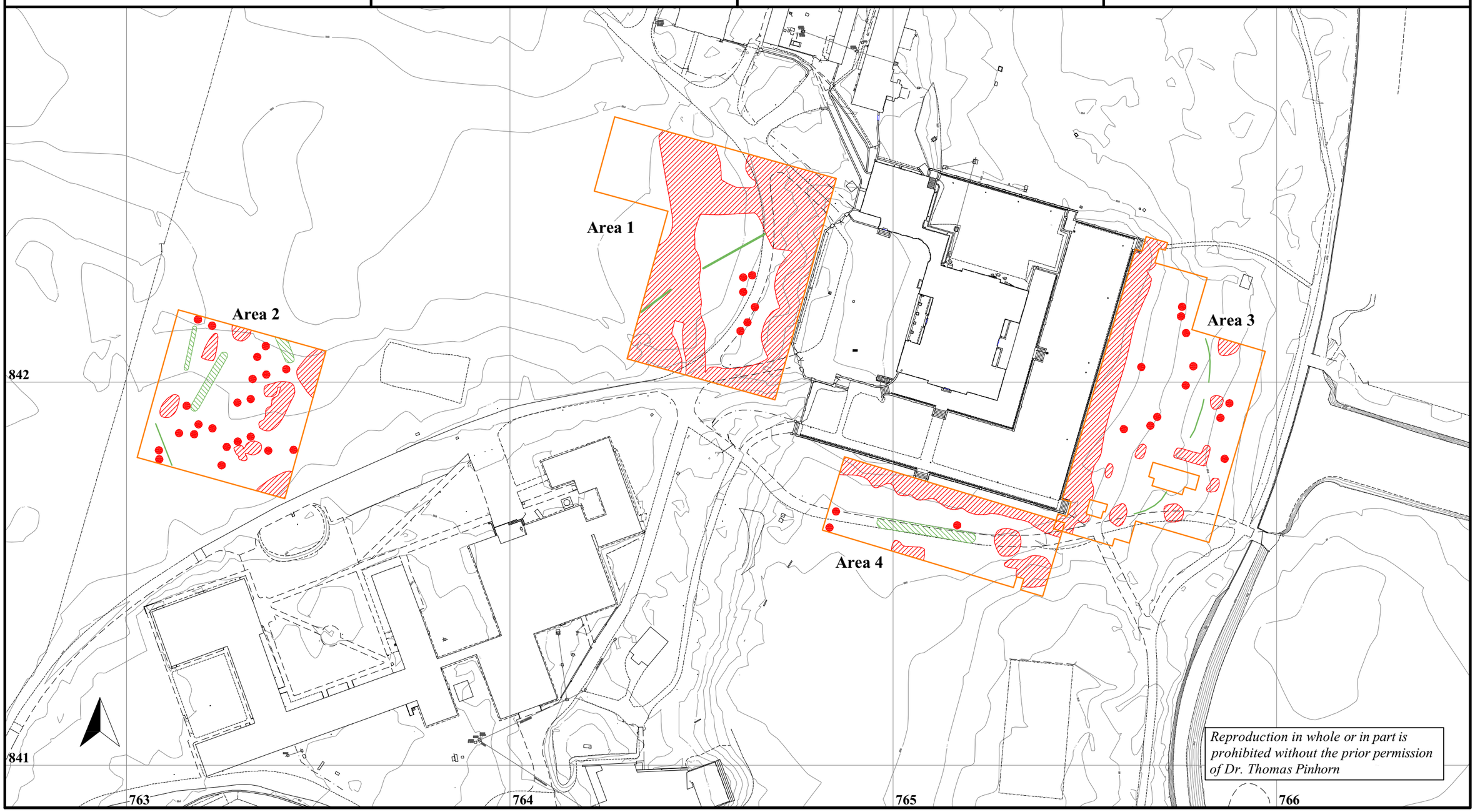
dipolar magnetic anomalies

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368

Figure 4
Areas 1-4 geophysical interpretation



Archaeological Services
University of Durham

on behalf of
Dr. Thomas Pinhorn

0 50m

scale 1:1000 - for A3 plot

outline of survey area

soil-filled features

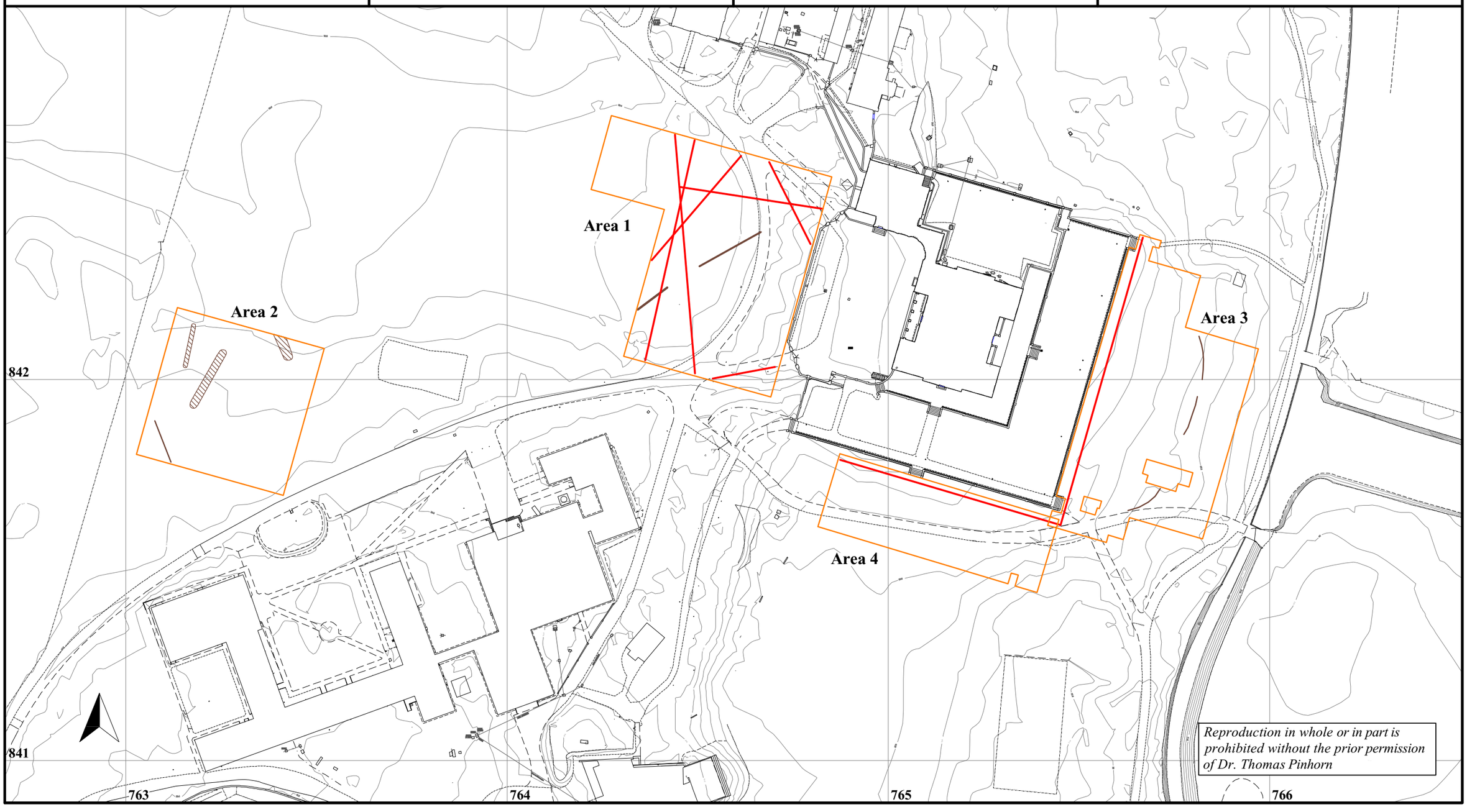
probable services

Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368

Figure 5
Areas 1-4 archaeological interpretation



Archaeological Services
University of Durham

Fawley Court, Henley-on-Thames, Oxfordshire

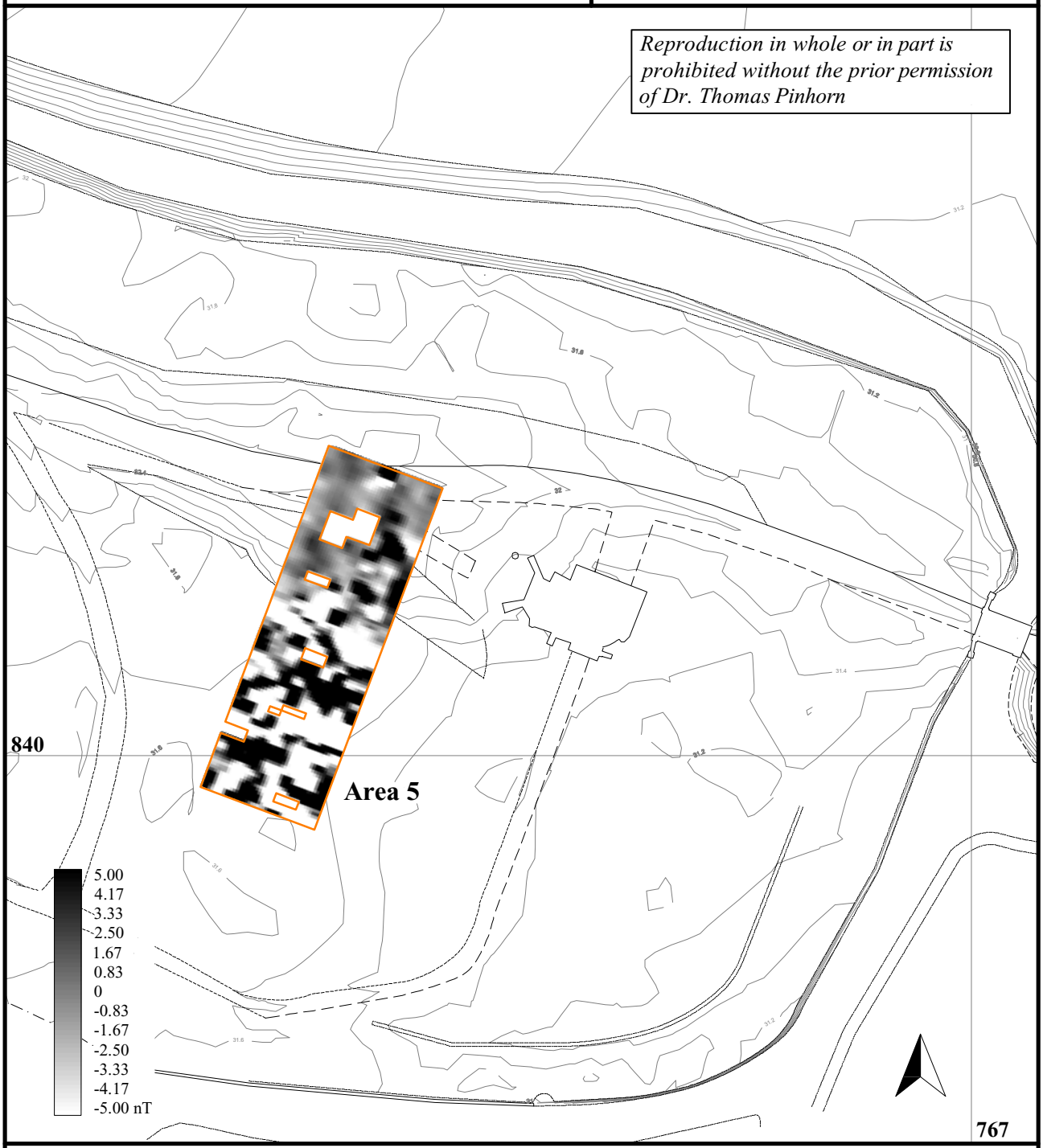
geophysical surveys

Report 2368
Figure 6
Area 5 geophysical survey

on behalf of
Dr. Thomas Pinhorn

0 25m

scale 1:500 - for A4 plot



outline of survey area

Archaeological Services
University of Durham

on behalf of
Dr. Thomas Pinhorn

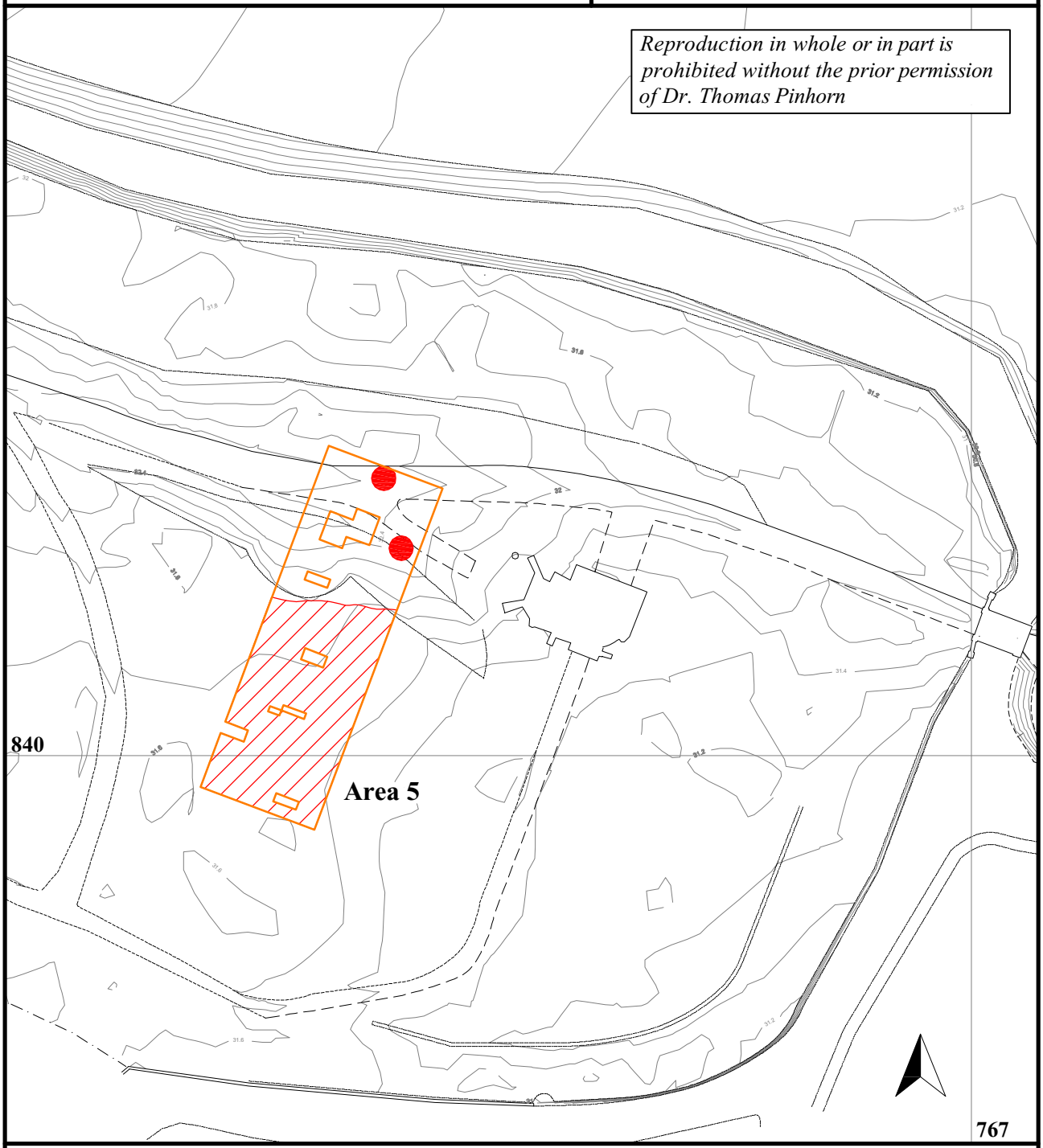
Fawley Court, Henley-on-Thames, Oxfordshire

geophysical surveys

Report 2368
Figure 7
Area 5 interpretation

0 25m

scale 1:500 - for A4 plot



outline of survey area

dipolar magnetic anomalies / disturbed ground

Fawley Court, Henley-on-Thames, Oxfordshire: geophysical surveys; Report 2368

Figure 8: Trace plots of geomagnetic data