

# **Land at Hilltop Farm, Ramside, Pitlington, County Durham**

## **geophysical surveys**

*for*

**Christopher Padgett Architects**

*on behalf of*

**Ramside Hall Estates**

**Report 2245**  
August 2009

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## geophysical surveys

### *Report 2245*

August 2009

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for

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*The Dovecote, 4 Hunwick Hall Farm, Church Lane, Hunwick, Crook,  
Co Durham DL15 0JS*

on behalf of

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## **1. Summary**

### ***The project***

- 1.1 This report presents the results of geophysical surveys conducted in advance of proposed development at Hilltop Farm, Ramside, Pittington, County Durham. The works comprised geomagnetic survey of six areas totalling approximately 18ha.
- 1.2 The works were commissioned by Christopher Padgett Architects on behalf of Ramside Hall Estates and conducted by Archaeological Services Durham University.

### ***Results***

- 1.3 A rectilinear ditched enclosure of probable late prehistoric/Romano-British date was detected in Areas 1 and 7. Several other features were also identified both within and outside the enclosure, including several possible ring-ditches and parts of double-ditched trackways. Whilst some of these are almost certainly associated with the enclosure, others may provide evidence for an earlier phase of unenclosed settlement here.
- 1.4 Additional soil-filled features of possible archaeological origin were also identified in other parts of the proposed development area.
- 1.5 Traces of former ridge and furrow cultivation were almost certainly detected across Areas 1, 6, 7 and 8, while possible traces were also detected in Area 3.
- 1.6 Some of the anomalies detected correspond to former field boundaries and trackways shown on post-medieval maps.

## 2. Project background

### *Location* (Figures 1 & 2)

- 2.1 The study area was located at Hilltop Farm, Ramside, Pittington, County Durham (NZ 31401 43897). The proposed development area measured 39.8ha and was bounded by Pittington Beck to the south-east, Broomside Cutting to the south-west, Pittington Lane to the north-west and farmland to the north-east. Six surveys covering approximately 18ha were undertaken in fields to the immediate north, west and south of Hilltop Farm.

### *Development proposal*

- 2.2 The development proposal was for an extension to the existing golf course at Ramside Hall Hotel; the planning reference is 4/06/00494/RM.

### *Objective*

- 2.3 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, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in advance of development.

### *Methods statement*

- 2.4 The surveys have been undertaken in accordance with instructions from the client and a Written Scheme of Investigation prepared by Archaeological Services and approved by the Assistant Archaeologist at Durham County Council Archaeology Section.

### *Dates*

- 2.5 Fieldwork was undertaken between 29<sup>th</sup> January and 1<sup>st</sup> February 2007. This report was completed in August 2009.

### *Personnel*

- 2.6 Fieldwork was conducted by Graeme Attwood (Supervisor), Lorne Elliott, Louise Robinson, Natalie Swann and Richie Villis. This report was prepared by Duncan Hale (the survey Project Manager) with illustrations by Janine Watson and David Graham.

### *Archive/OASIS*

- 2.7 The site code was **HFR07**, for **Hilltop Farm Ramside 2007**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services is registered with the **Online Access to the Index of archaeological investigations** project (OASIS). The OASIS ID number for this project is **archaeol3-63365**.

## 3. Archaeological and historical background

- 3.1 An archaeological desk-based assessment (DBA) of the proposed development area and its environs was undertaken (Archaeological Services 2006) prior to the geophysical surveys.

- 3.2 In summary, the results of the assessment indicated that:
- crop-marks have been identified on aerial photographs very close to Hilltop Farm; one particular crop-mark is typical of an Iron Age settlement
  - there are four grade II listed buildings within a 1km radius of Hilltop Farm
  - the area was occupied during the medieval and post-medieval periods; it is probable that traces of ridge and furrow cultivation have the potential to survive
  - the proposed development has the potential to impact upon the archaeological resource through landscaping, changes to the ground levels, drainage and the construction of foundations and associated services.

#### **4. Landuse, topography and geology**

- 4.1 At the time of survey, Areas 1, 2, 6, 7 and 8 were in cultivation; Area 3 was grassland. Areas 4 and 5, occupying relatively steep ground in the east of the proposed development area, were not included in the geophysical survey programme.
- 4.2 The proposed development area was situated at the top of an east-facing slope. The land in the north-western part slopes slightly down towards Pittington Lane, while that in the south and east is gently undulating before descending a steep slope to the low-lying ground next to Pittington Beck. The elevation of the study area ranges from 65m to 95m OD.
- 4.3 The solid geology of the area consists of Carboniferous Westphalian coal measures, and is overlain by drift geology of boulder clay, sands and gravels.

#### **5. Geophysical survey**

##### ***Standards***

- 5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation 2<sup>nd</sup> edition* (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, based on previous work and aerial photographs, it was considered likely that cut features such as ditches and pits would be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.
- 5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. 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 30m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a global positioning system.
- 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 30m grid units. The instrument sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 3600 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 3-5; the trace plots are provided in Figure 6. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla.
- 5.9 The following basic processing functions have been applied to the data:
- |                           |  |
|---------------------------|--|
| <i>clip</i>               | clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic.     |
| <i>zero mean traverse</i> | 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. |
| <i>destagger</i>          | corrects for displacement of anomalies caused by alternate zig-zag traverses.  |
| <i>despike</i>            | 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 0.25m x 0.25m intervals.

***Interpretation: anomaly types***

5.10 A colour-coded geophysical interpretation plan is provided. Three 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.

*negative magnetic* regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids.

*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 A colour-coded archaeological interpretation plan is provided.

5.12 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as furrows, ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning.

5.13 Series of parallel, weak, positive magnetic anomalies which almost certainly reflect traces of former ridge and furrow cultivation have been detected across Areas 1, 6, 7 and 8. Possible traces of former ridge and furrow may also have been detected in Area 3.

5.14 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 horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plan, however, they have been omitted from the archaeological interpretation plan and the following discussion.

**Area 1**

5.15 Several positive magnetic anomalies have been detected in this area. Some are very weak but still reflect relative increases in high magnetic susceptibility materials and almost certainly represent the remains of soil-filled ditches. The most prominent anomalies comprise two sides of a rectilinear ditched enclosure, which continues across the field boundary into Area 7 to the

immediate north. Probable entrance causeways have been detected in the east and west sides, as well as indications of internal features including at least one possible ring-ditch. This enclosure, previously identified on aerial photographs, is almost certainly a small enclosed farmstead, common in the late prehistoric/Romano-British period. A number of these sites in the Durham area have been confirmed by archaeological excavation in recent years.

- 5.16 Parts of two possible double-ditched trackways have been detected outside the enclosure in Areas 1 and 7.
- 5.17 A small circular anomaly to the south-west of the enclosure almost certainly reflects a ring-ditch; similar, weaker anomalies elsewhere in this field could also reflect the remains of ring-ditches. The ring-ditches are typically 10-15m in diameter and could either be associated with roundhouses from a (typically earlier) unenclosed settlement or with burials.
- 5.18 A chain of intense dipolar magnetic anomalies detected along the north-eastern boundary almost certainly reflects a ferrous service pipe to the farm. This feature also cuts through the rectilinear enclosure.

#### **Area 2**

- 5.19 Intense linear anomalies traversing this area almost certainly correspond to former field boundaries and tracks, some of which are shown on early Ordnance Survey editions. For example, the sinuous concentration of intense magnetic anomalies heading south from the farm almost certainly reflects a clinker or rubble-based track adjacent to a former boundary.
- 5.20 Three intense anomalies forming a row aligned north-west/south-east correspond to telegraph poles.
- 5.21 A concentration of small dipolar magnetic anomalies in the western part of the area almost certainly indicates an area of ground disturbance including ferrous an/or fired debris.

#### **Area 3**

- 5.22 Possible soil-filled features were detected here, though interpretation of these anomalies is restricted by the limited survey area. Possible traces of former ridge and furrow may have been detected on the slope in the northern part of this area, though these could also reflect the local geomorphology.

#### **Area 6**

- 5.23 The most prominent anomalies in this area comprise traces of ridge and furrow farming and a broad intense band corresponding to a former clinker trackway which provided access into adjacent fields. Faint positive magnetic anomalies to either side of the track almost certainly reflect drainage ditches associated with the track.



### **Area 7**

- 5.24 The remains of a rectilinear ditched enclosure and several possibly associated anomalies (including part of a double-ditched track and possible ring-ditches) were detected here, as described in Area 1 above. Occasional other linear anomalies across this area could reflect former ditches or boundary features.
- 5.25 Traces of ridge and furrow farming were detected across the whole field. It is likely that the anomalies associated with the former ridge and furrow ploughing have hindered the identification of additional earlier features.

### **Area 8**

- 5.26 The most prominent anomalies in this area comprise traces of ridge and furrow farming.
- 5.27 A former field boundary was also detected aligned north-east/south-west. Occasional other linear anomalies across this area could reflect former ditches or boundary features.
- 5.28 Three large positive magnetic anomalies detected along the eastern edge of the field could reflect large soil-filled pits.

## **6. Conclusions**

- 6.1 Approximately 18ha of geophysical survey were conducted in advance of proposed development at Hilltop Farm, Ramside, Pittington, County Durham.
- 6.2 A rectilinear ditched enclosure of probable late prehistoric/Romano-British date was detected in Areas 1 and 7. A field boundary and service pipe cut through the enclosure. Several other features were also identified both within and outside the enclosure, including several possible ring-ditches and parts of double-ditched trackways. Whilst some of these are almost certainly associated with the enclosure, others may provide evidence for an earlier phase of unenclosed settlement here.
- 6.3 Additional soil-filled features of possible archaeological origin were also identified in other parts of the proposed development area.
- 6.4 Traces of former ridge and furrow cultivation were almost certainly detected across Areas 1, 6, 7 and 8, while possible traces were also detected in Area 3.
- 6.5 Some of the anomalies detected correspond to former field boundaries and trackways shown on post-medieval maps.
- 6.6 A services pipe was detected in Area 1.

**7. Sources**

Archaeological Services 2006 *Land at Hilltop Farm, Ramside, Pittington, County Durham: archaeological desk-based assessment*. Unpublished Report **1536**, Archaeological Services Durham University

David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation, 2<sup>nd</sup> edition*. 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

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Figure 1

Location map

for  
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on behalf of  
**Ramside Hall Estates**

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proposed development area



scale 1:25 000 - for A4 plot





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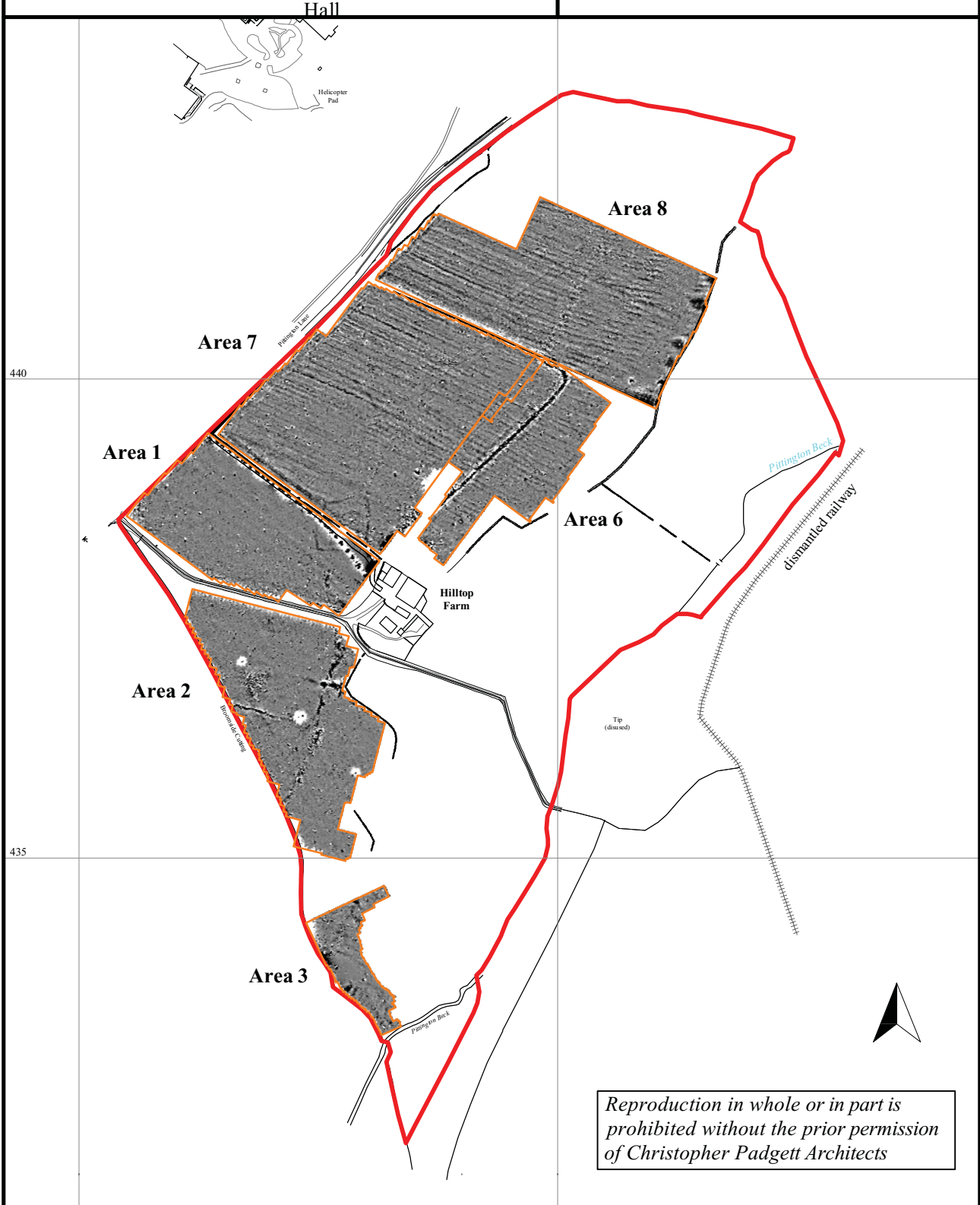
Figure 2

Location of geophysical surveys

for  
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on behalf of  
**Ramside Hall Estates**

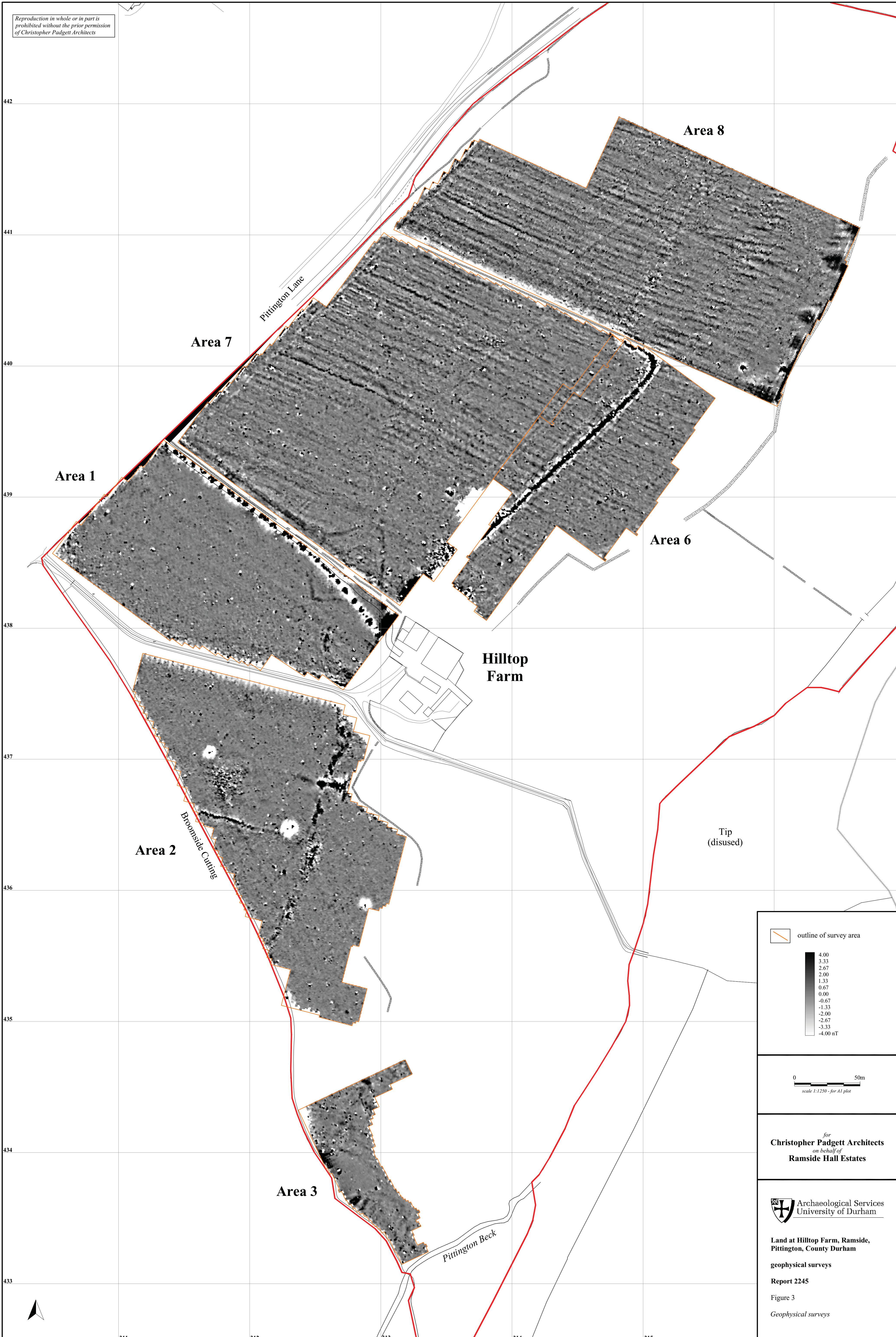


scale 1:6000 - for A4 plot



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Area 8

Area 7

Area 1

Area 6

Hilltop Farm

Area 2

Tip (disused)

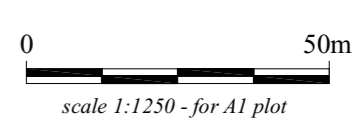
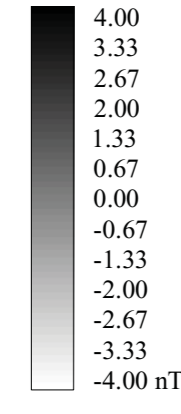
Area 3

Pittington Lane


Broomside Cutting

Pittington Beck

outline of survey area



for  
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Figure 3

Geophysical surveys



311

312

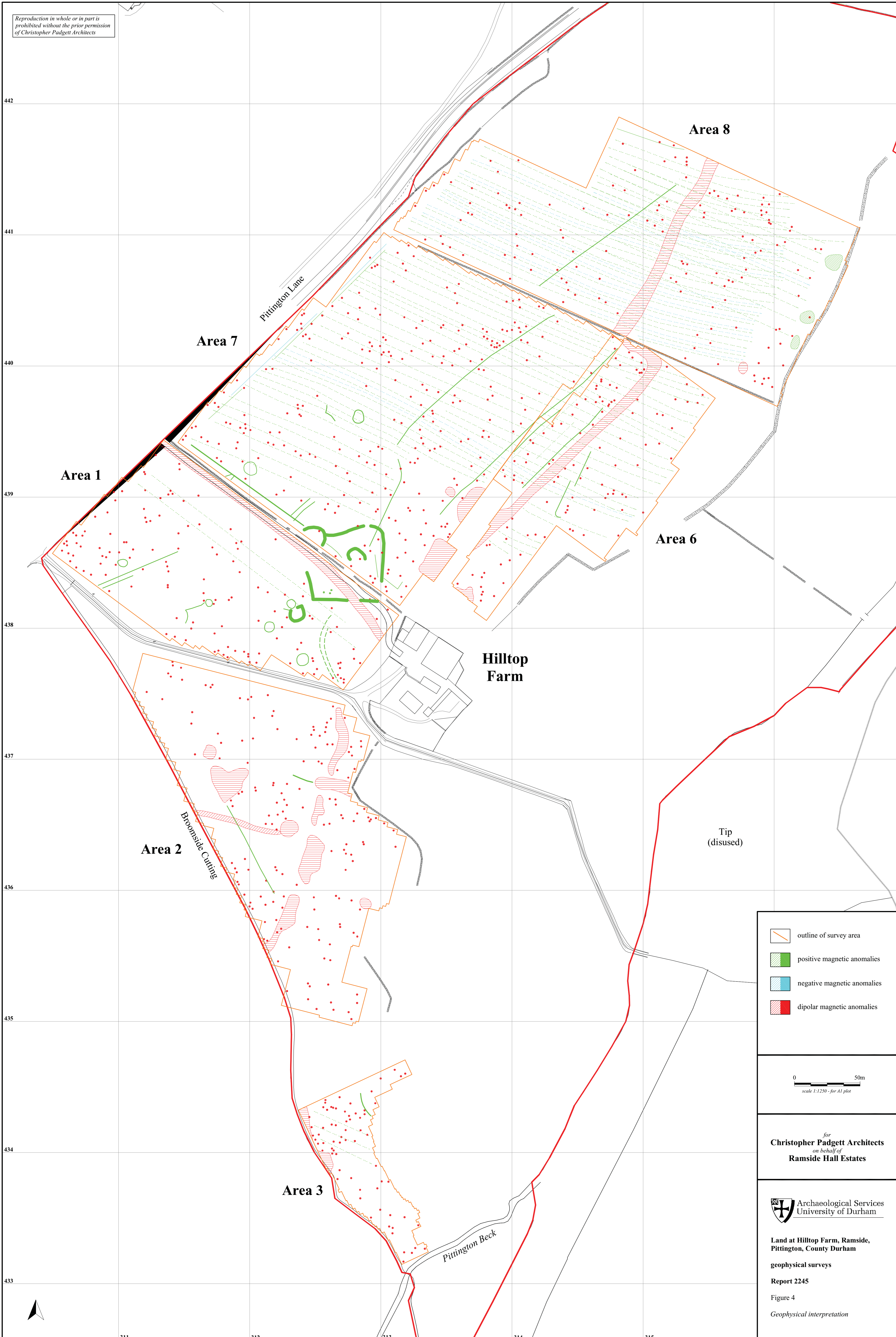
313

314

315

442  
441  
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433


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- outline of survey area
- positive magnetic anomalies
- negative magnetic anomalies
- dipolar magnetic anomalies

0 50m  
scale 1:1250 - for A1 plot

for  
**Christopher Padgett Architects**  
on behalf of  
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 Archaeological Services  
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Figure 4

Geophysical interpretation

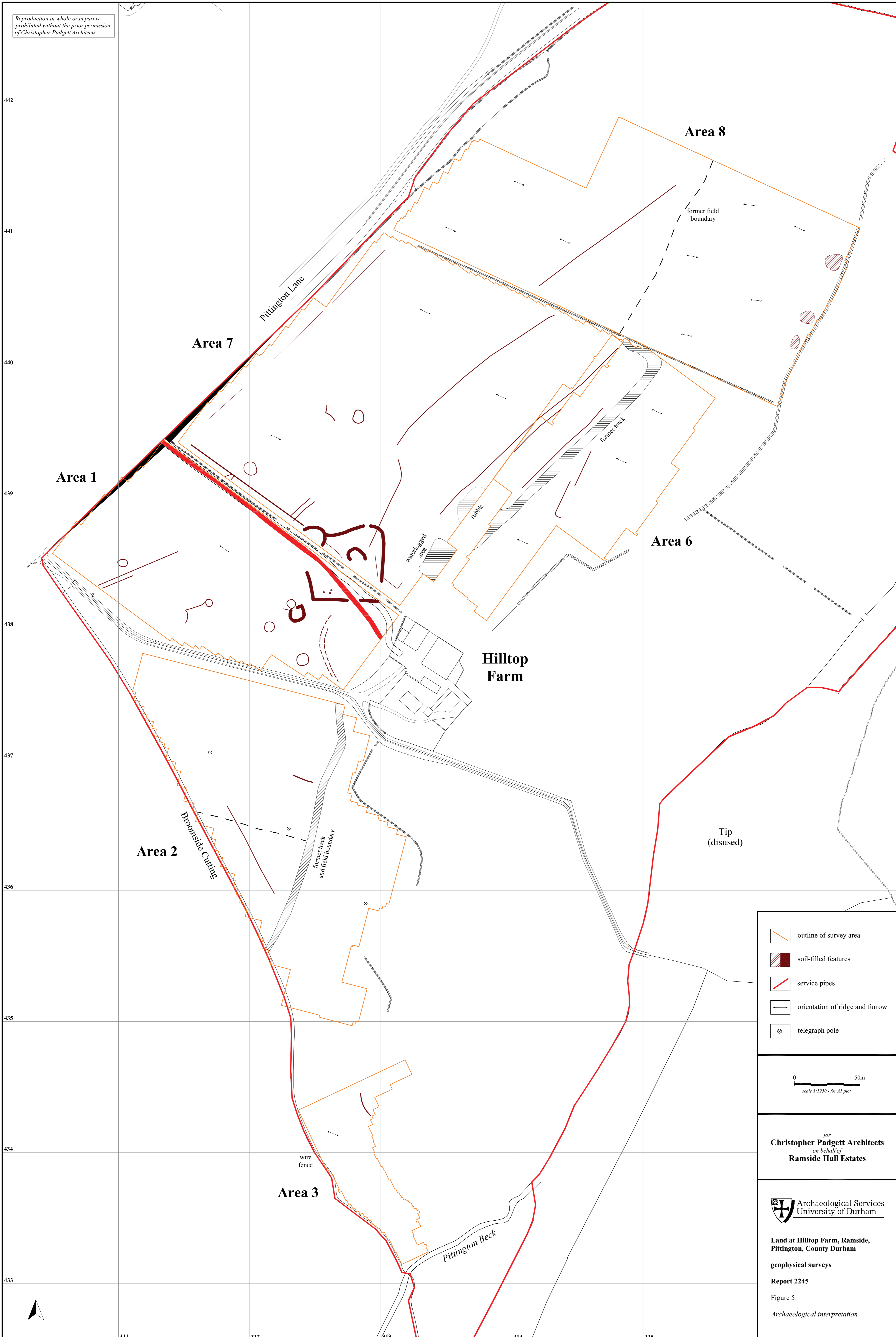
311

312

313

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315



- outline of survey area
- soil-filled features
- service pipes
- orientation of ridge and furrow
- telegraph pole

0 50m  
scale 1:1250 - for A1 plot

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Figure 5  
Archaeological interpretation

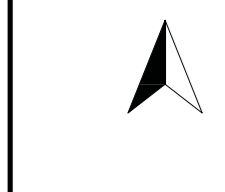


Figure 6: Trace plots of geomagnetic data

