Archaeological Services
University of Durham

# Upsland Farm, Kirklington, North Yorkshire

# geophysical surveys

*on behalf of*
**On-Site Archaeology**

**Report 2172**
April 2009

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## Contents

# 1. Summary


***The project***

1.1 This report presents the results of geophysical surveys conducted in advance of proposed development at Upsland Farm, Kirklington, North Yorkshire. The works comprised the geomagnetic survey of three areas totalling 1.5ha.

1.2 The works were commissioned by On-Site Archaeology and conducted by Archaeological Services Durham University in accordance with a WSI provided by Archaeological Services and a Section 42 licence granted by English Heritage.

***Results***

1.3 Possible linear and rectilinear ditches have been identified in Area 1, south and southeast of the present farm buildings. A possible stone feature, such as a path or drain, and possible evidence of past cultivation were also detected in Area 1.

1.4 No features of probable archaeological origin have been identified in Areas 2 and 3, however, the intense anomalies associated with the farm buildings and other modern structures and rubble would almost certainly mask any anomalies arising from any archaeological features, if present.

# 2. Project background

***Location*** (Figure 1)

2.1 The study area comprised land at Upsland Farm, a former medieval moated site near Kirklington, North Yorkshire (NGR centre: SE 4303 4797). Three surveys totalling 1.5ha were conducted within the boundaries of the moat. The site is a Scheduled Ancient Monument (no. 28251).

***Development proposal***

2.2 The development proposal is for extensions to the existing farmhouse and the construction of sporting and other recreational facilities.

***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 proposed development 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 a Written Scheme of Investigation provided by Archaeological Services Durham University and a licence granted by English Heritage under Section 42 of the Ancient Monuments and Areas Act 1979 (as amended by the National Heritage Act 1983).

***Dates***

2.5 Fieldwork was undertaken on the 26th March 2009. This report was prepared between 1st and 3rd April 2009.

***Personnel***

2.6 Fieldwork was conducted by Matt Claydon and Natalie Swann (Supervisor). This report was prepared by Natalie Swann with illustrations by Edward Davies and edited by Duncan Hale, the Project Manager.

***Archive/OASIS***

2.7 The site code is **KUF**, for **K**irklington **U**psland **F**arm 20**09**. 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 **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-57729**.

# 3. Archaeological and historical background

3.1 Upsland Farm is a scheduled medieval moated site (SAM no. 28251). A raised central platform measuring 200m by 100m, surrounded by a ditch, lies on gently undulating land. The site is an unusual elliptical shape and on the

northern side of the site the ditch has been modified to form a pond. The platform is currently approached by a causeway at the north, which is thought to be the original entrance.

3.2 The name suggests it was the site of a medieval manor. Today part of the site is occupied by farm buildings.

3.3 The site lies within an archaeologically significant landscape, including, amongst other remains, the three Thornborough henges and cursus.

## 4. Landuse, topography and geology

4.1 At the time of the survey the area comprised gardens to the east and south of the farm buildings with sheds, a greenhouse, kitchen garden and wasteland to the west, all within the boundary formed by the moat. A tarmac road leads from the B6297 along the causeway to the farmhouse.

4.2 The area was predominantly level with a mean elevation of 40m OD.

4.3 The underlying solid geology of the area comprises Roxby Formation, which is overlain by drift geology of glaciofluvial deposits.

## 5. Geophysical survey

***Standards***

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation 2nd edition* (David, Linford & Linford 2008); the Institute of Field 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 variety of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar and electromagnetic survey. Some techniques are more suitable than others in particular situations, depending on a variety of 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 visible earthworks and the known history of the site, it was considered likely that cut features such as ditches and pits might 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***

5.4 A 30m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system (GPS) with real-time correction providing sub-metre accuracy.

5.5 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.

5.6 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***

5.7 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 2-4; the trace plots are provided in Figure 5. 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.

5.8 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. |
| *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. |
| *destagger* | corrects for displacement of anomalies caused by alternate zig-zag traverses. |
| *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***

5.9 Colour-coded geophysical interpretation plans are provided in Figure 3. 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***

5.10 Colour-coded archaeological interpretation plans are provided in Figures 4.

**General comments**

5.11 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,

5.12 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 plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

**Area 1**

5.13 A linear positive magnetic anomaly aligned northwest-southeast has been detected along the approximate centre of this area; a similar, weaker anomaly lies parallel to, 6-7m to the east. These anomalies may reflect soil-filled features such as ditches, which may once have flanked a track or path.

5.14 At the southern end of the survey a curvilinear positive magnetic anomaly is aligned parallel to the moat. This corresponds with the top of the bank around the raised platform which comprises much of this area. This anomaly appears to continue southeastwards, following the line of the moat, though it is weaker here and there is a less noticeable bank on the ground.

5.15 A number of discrete positive magnetic anomalies have also been detected in the southeastern part of the area; some are grouped closely together and may reflect soil-filled features such as pits, while others are more irregular.

5.16 To the immediate northeast of the pits is a very small rectilinear anomaly which could reflect a small soil-filled trench or garden feature.

5.17 In the southwestern part of the survey area there are a number of very weak parallel positive magnetic anomalies, which could possibly reflect past cultivation of the field.

5.18 A number of other weak and linear or rectilinear positive magnetic anomalies have been detected across this area, which could reflect ditch remains or former garden features. Two weak anomalies aligned northeast-southwest in the northwestern part of the area correspond to an earthen bank evident in the field.

5.19 In the east of the survey area a curvilinear negative magnetic anomaly has been detected. This anomaly may reflect stone or gravel, perhaps used as a former path or drain.

**Area 2**

5.20 Many of the dipolar magnetic anomalies detected across this area reflect existing features, such as a tarmac road and buildings in the west and southwest of the area and a telegraph pole and garden furniture in the centre. The anomalies to the north and southeast may reflect subsurface ferrous items or rubble, possibly associated with building construction or the widening of the moat to form a pond directly to the north of this area.

**Area 3**

5.21 The dipolar magnetic anomalies in this area reflect the surrounding buildings and brick wall as well as a concrete yard surface and subsurface ferrous or fired debris.

## 6. Conclusions

6.1 Geomagnetic survey was undertaken at Upsland Farm, Kirklington, prior to proposed development.

6.2 Possible linear and rectilinear ditches have been identified in Area 1, south and southeast of the present farm buildings. A possible stone feature, such as a path or drain, and possible evidence of past cultivation were also detected in Area 1.

6.3 No features of probable archaeological origin have been identified in Areas 2 and 3, however, the intense anomalies associated with the farm buildings and other modern structures would almost certainly mask any anomalies arising from any archaeological features, if present.

## 7. Sources

David, A, Linford, N, & Linford, P, 2008 *Geophysical survey in archaeological field evaluation, 2nd 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.

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Figure 1
*Location map*

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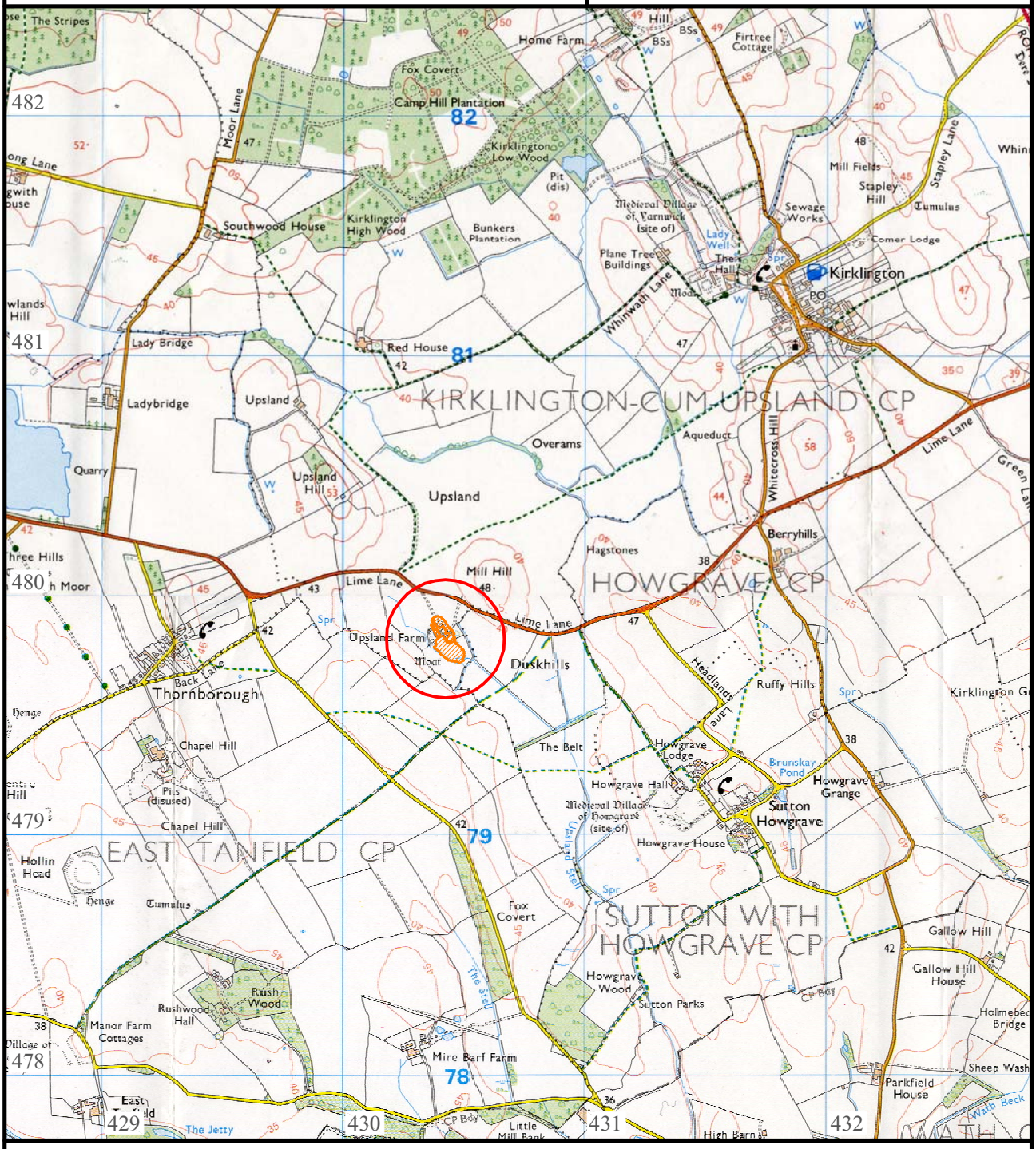


site location

0 1km

*scale 1:25 000 - for A4 plot*

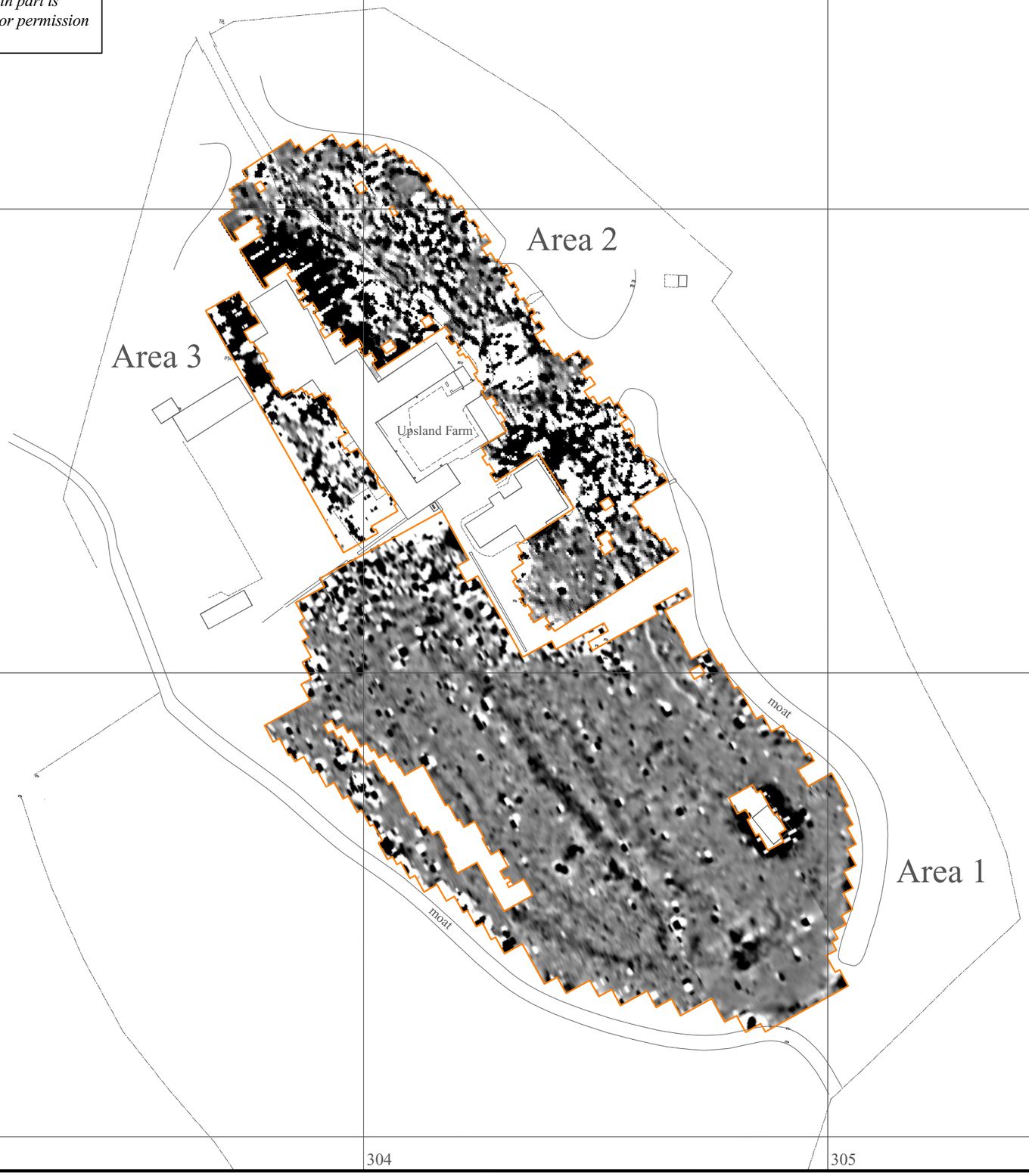


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Figure 2

*Geophysical survey results*

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0 50m

*scale 1:1000 - for A3 plot*

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0.00
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

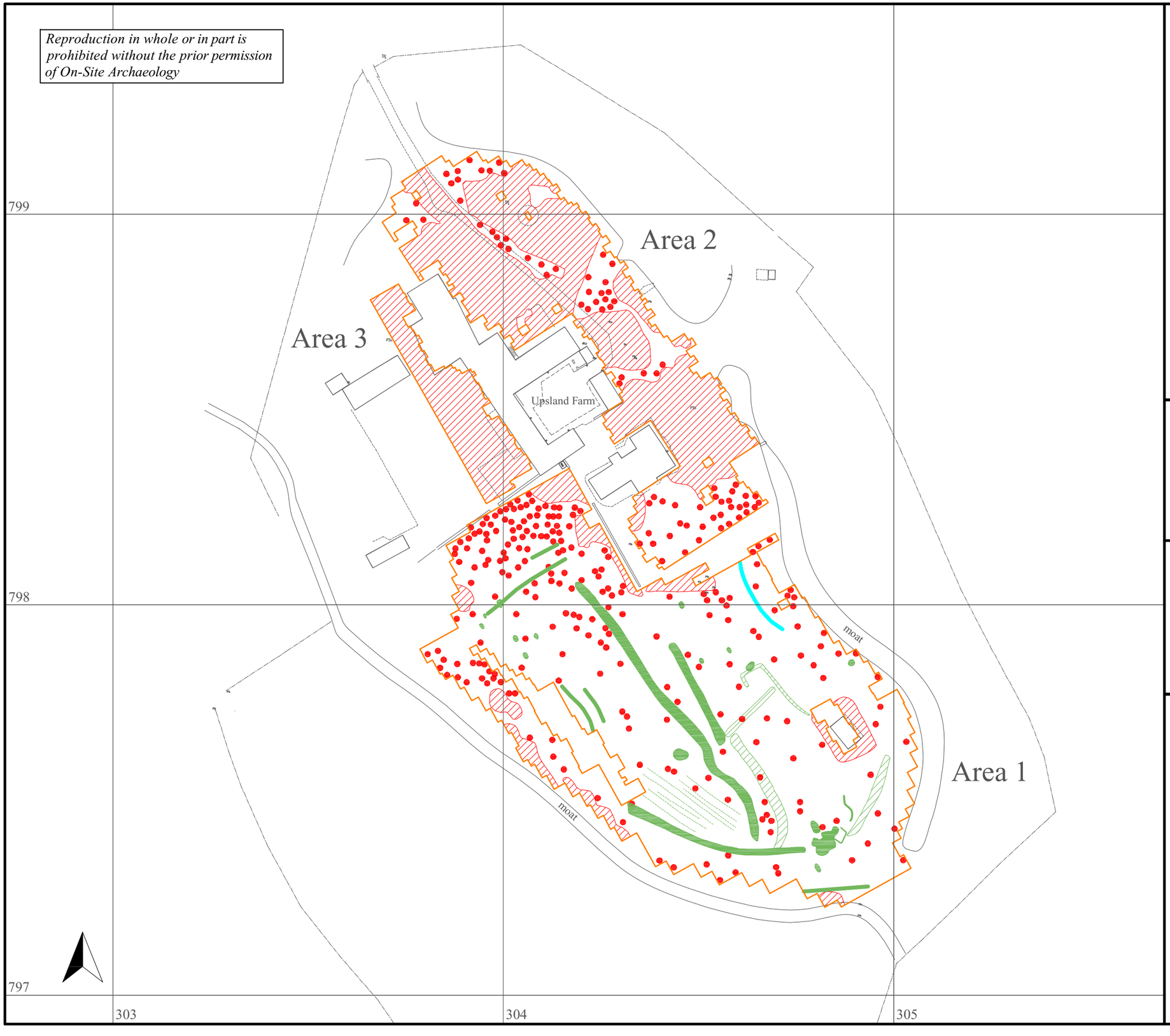


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Figure 3

*Geophysical interpretation*

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0 50m

*scale 1:1000 - for A3 plot*

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

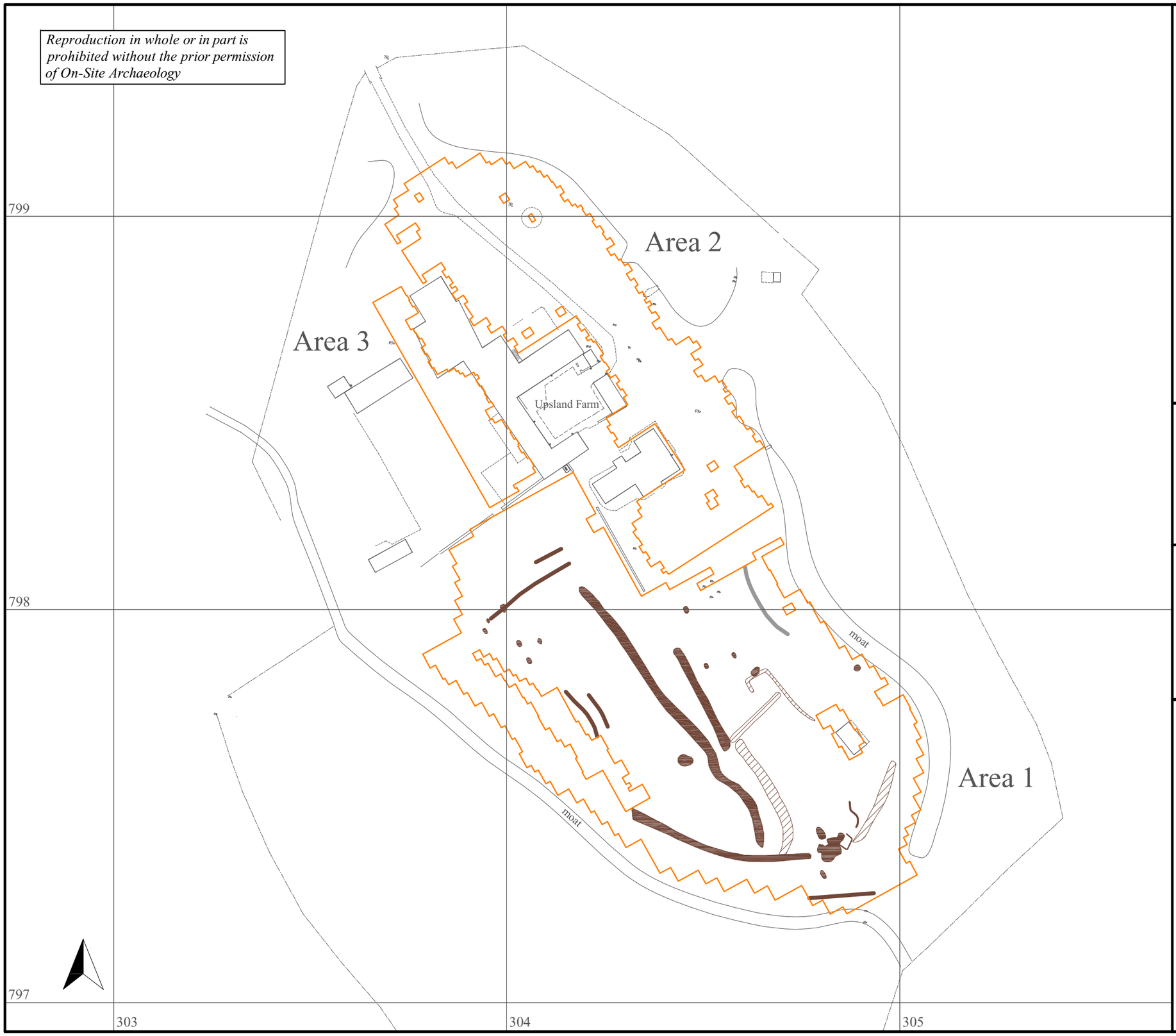


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Figure 4

*Archaeological interpretation*

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0 50m

*scale 1:1000 - for A3 plot*

outline of survey area

soil-filled features

stone/rubble

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**Figure 5: Trace plots of geomagnetic data**