

**T H A M E S      V A L L E Y**

**ARCHAEOLOGICAL**

**S E R V I C E S**

**Land at Hanwell Fields Phase 2,  
Banbury, Oxfordshire**

**Geophysical Survey (magnetic)**

**by Kyle Beaverstock**

**Site Code: HRB21/169**

**(SP 4472 4273)**

# **Land at Hanwell Fields Phase 2, Banbury, Oxfordshire**

**Geophysical Survey (Magnetic) Report**

**For Manor Oak Homes Ltd**

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code HRB 22/200

**August 2022**

## Summary

**Site name:** Land at Hanwell Fields Phase 2, Banbury, Oxfordshire

**Grid reference:** SP 4472 4273

**Site activity:** Magnetometer survey

**Date and duration of project:** 23 - 26 August 2022

**Project coordinator:** David Sanchez

**Site supervisor:** Kyle Beaverstock

**Site code:** HRB21/169

**Area of site:** 8.2ha

**Summary of results:** A number of parallel positive linears, most likely ridge and furrow were detected across the site as well as a large positive linear which may indicate the presence of land division.

**Location of archive:** The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

*This report may be copied for bona fide research or planning purposes without the explicit permission of the copyright holder. All TVAS unpublished fieldwork reports are available on our website: [www.tvas.co.uk/reports/reports.asp](http://www.tvas.co.uk/reports/reports.asp).*

Report edited/checked by: Steve Ford ✓ 02.09.22 David Sanchez ✓ 02.09.22
---

# Land at Hanwell Fields Phase 2, Banbury, Oxfordshire A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 22/200

## Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Land at Hanwell Fields Phase 2, Banbury, Oxfordshire (SP 4472 4273) (Fig. 1). The work was commissioned by Mr William Main of Manor Oak Homes Limited, 21 The Point, Market Harborough, Leicestershire LE16 7NU.

Planning permission is to be sought from Cherwell District Council for a residential development at Hanwell Fields. As a consequence of the possibility of archaeological deposits on the site which may be damaged or destroyed by development, a geophysical survey has been recommended. The results of the survey will be used to provide additional information for the planning application. This is in accordance with the *National Planning Policy Framework* (NPPF 2021), and the District's policies on archaeology. The field investigation was carried out to a specification approved by Victoria Green, Planning Archaeologist for Oxfordshire County Archaeological Services. The fieldwork was undertaken by Kyle Beaverstock and Camila Carvalho between the 23 - 26 of August 2022 and the site code is HRB 22/200.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

## Location, topography and geology

The site is located on the northern edge of Banbury, on the north side of Duke's Meadow Drive. The site is a rectangular parcel of land that is sloped from 130m above Ordnance Datum (aOD) in the west to 102m aOD in the east. The site is currently under grass and shrubs and is not being utilised. The underlying geology is stated as Middle Lias Silts and Clays in the west and Lower Lias Mainly Clay in the east (BGS 1982).

## Site history and archaeological background

To summarise, the archaeological potential stems from a number of prehistoric sites discovered in the area including Neolithic, Bronze Age and Iron Age sites as well as a number of Palaeolithic finds. There is also some evidence of Roman activity in the area. A geophysical survey and excavations to the west of the site revealed a

number of broadly prehistoric features (Bray and Dawson 2015, McNicol-Norbury 2015a and b). To the south a geophysical survey and evaluation revealed post-Medieval ridge and furrow (Beaerstock 2021, Foster 2022).

## **Methodology**

### Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 30m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 30m × 30m grid (EAC 2015), providing an appropriate methodology balancing cost and time with resolution. The majority of the site in the central and western areas were unobstructed however in the east there was an area of overgrown vegetation. Conditions were dry and bright.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to  $10^{-9}$  Tesla, the SI unit of magnetic flux density.

### Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both European Archaeological Council (EAC 2015) and the Chartered Institute *for* Archaeologists (2002, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features.

All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble Geo7x handheld GPS system with sub-decimetre real-time accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

<b>Process</b>	<b>Effect</b>
Clip from -2.20 to 2.70 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
Interpolate: y doubled	Increases the resolution of the readings in the y axis, enhancing the shape of anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.
Search & Replace: from: ±30 nT to: ±1000 nT with: dummy	Removes extreme values resulting from magnetic interference caused by near-by ferromagnetic objects.
Range match (area: top 90, left 0, bottom 149, right 359) to top edge	Equalises the range of values between areas surveyed by different operatives, correcting for differences in setup.
De-stagger: all grids, both by -1 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 3) with the processed data then presented as a second figure (Fig. 4), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 5). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.58.00, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for

transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 2.16.2 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

## **Results**

The results of the geophysical survey show a large number of anomalies across the site, the most significant of these is a series of parallel positive linears [1] running east to west across the site. These linears are evenly spaced approximately 6 to 8m apart and most likely represent furrows from a ridge and furrow agricultural system. These are likely to be related to the post-Medieval ridge and furrow seen in the evaluation to the south. Running across the field orientated north-west to south-east is a positive linear [2], this linear is 177m long and 5m wide. This anomaly may represent a linear such as a ditch and combined with weak positive linear [3] may represent a field boundary, however, the form suggests that this may also be a geological feature such as a watercourse. To the immediate east of this is a weak positive linear [3], this is orientated east to west and runs for 157m, this linear may be a continuation of positive linear [2] however it may also be part of the ridge and furrow system. In the north east of the field is an area of magnetic debris [4], this is represented by an area of positive and negative responses in an irregular pattern. These high responses indicate the presence of thermomagnetic and ferrous material such as rubble or debris as indicated by observations during the survey. In the far east is a small area of magnetic disturbance [5] this is represented by a very high bipolar response and is likely caused by a ferrous material.

## **Conclusion**

The geophysical survey successfully showed a number of anomalies across the site. The majority of these appear to be a continuation of the medieval and post-Medieval ridge and furrow found to the south of the site, however, a large curving positive linear anomaly may indicate the presence of some form of land division. No other anomalies of archaeological interest were recorded.

## References

- BGS, 1982, *British Geological Survey*, 1:50,000, Sheet 201, Solid and Drift Edition, Keyworth
- Beaverstock, K, 2021, 'Land at Hanwell Fields, Banbury, Oxfordshire; a geophysical survey (magnetic)', Thames Valley Archaeological Services rep 21/169b
- Bray, D and Dawson, T, 2015, 'Land adjacent to Dukes Meadow Drive, Banbury, Oxfordshire: Geophysical survey (magnetic)', Thames Valley Archaeological Services rep 14/225, Reading
- ClfA, 2014, 'Standard and Guidance for archaeological geophysical survey', Reading
- EAC, 2015, *EAC Guidelines for the use of Geophysics in Archaeology: Questions to Ask and Points to Consider*, EAC Guidelines 2, Namur
- Foster, M, 2022, 'Land at Hanwell Fields, Banbury, Oxfordshire; an archaeological evaluation', Thames Valley Archaeological Services rep 21/169c
- IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading
- McNicoll-Norbury, J 2015a, 'Land adjacent to Dukes Meadow Drive, Banbury, Oxfordshire, An archaeological Evaluation', Thames Valley Archaeological Services rep 14/255b, Reading
- McNicoll-Norbury, J 2015b, 'Land adjacent to Dukes Meadow Drive, Banbury, Oxfordshire, An archaeological Excavation', Thames Valley Archaeological Services rep 14/255c, Reading
- NPPF, 2021, *National Planning Policy Framework*, Ministry of Housing, Communities and Local Govt, London

## Appendix 1. Survey and data information

### Programme:

Name: TerraSurveyor  
Version: 3.0.25.0

### Raw data

Filename: Comp 1 RAW.xcp  
Instrument Type: Grad 601 (Magnetometer)  
Units: nT  
Survey corner coordinates (X/Y):  
Northwest corner: 444561, 242608 m  
Southeast corner: 444801, 242308 m  
Direction of 1st Traverse: 0.68 deg  
Collection Method: ZigZag  
Sensors: 2 @ 1 m spacing.  
Dummy Value: 2047.5

### Dimensions

Survey Size (meters): 240 m x 300 m  
X&Y Interval: 0.25 m

### Stats

Max: 96.84  
Min: -100.00  
Std Dev: 5.03  
Mean: 0.26  
Median: 0.42  
Composite Area: 7.2 ha  
Surveyed Area: 6.2416 ha

### Source Grids: 80

1 Col:0 Row:0 grids\01.xgd  
2 Col:0 Row:1 grids\02.xgd  
3 Col:0 Row:2 grids\03.xgd  
4 Col:0 Row:3 grids\04.xgd  
5 Col:0 Row:4 grids\05.xgd  
6 Col:0 Row:5 grids\06.xgd  
7 Col:0 Row:6 grids\07.xgd  
8 Col:0 Row:7 grids\08.xgd  
9 Col:0 Row:8 grids\09.xgd  
10 Col:0 Row:9 grids\10.xgd  
11 Col:1 Row:0 grids\11.xgd  
12 Col:1 Row:1 grids\12.xgd  
13 Col:1 Row:2 grids\13.xgd  
14 Col:1 Row:3 grids\14.xgd  
15 Col:1 Row:4 grids\15.xgd  
16 Col:1 Row:5 grids\16.xgd  
17 Col:1 Row:6 grids\17.xgd  
18 Col:1 Row:7 grids\18.xgd  
19 Col:1 Row:8 grids\19.xgd  
20 Col:1 Row:9 grids\20.xgd  
21 Col:2 Row:0 grids\21.xgd  
22 Col:2 Row:1 grids\22.xgd  
23 Col:2 Row:2 grids\23.xgd  
24 Col:2 Row:3 grids\24.xgd  
25 Col:2 Row:4 grids\25.xgd  
26 Col:2 Row:5 grids\26.xgd  
27 Col:2 Row:6 grids\27.xgd  
28 Col:2 Row:7 grids\28.xgd  
29 Col:2 Row:8 grids\29.xgd  
30 Col:2 Row:9 grids\30.xgd  
31 Col:3 Row:0 grids\31.xgd  
32 Col:3 Row:1 grids\32.xgd  
33 Col:3 Row:2 grids\33.xgd  
34 Col:3 Row:3 grids\34.xgd  
35 Col:3 Row:4 grids\35.xgd  
36 Col:3 Row:5 grids\36.xgd  
37 Col:3 Row:6 grids\37.xgd  
38 Col:3 Row:7 grids\38.xgd  
39 Col:3 Row:8 grids\39.xgd  
40 Col:3 Row:9 grids\40.xgd  
41 Col:4 Row:0 grids\41.xgd  
42 Col:4 Row:1 grids\42.xgd  
43 Col:4 Row:2 grids\43.xgd

44 Col:4 Row:3 grids\44.xgd  
45 Col:4 Row:4 grids\45.xgd  
46 Col:4 Row:5 grids\46.xgd  
47 Col:4 Row:6 grids\47.xgd  
48 Col:4 Row:7 grids\48.xgd  
49 Col:4 Row:8 grids\49.xgd  
50 Col:4 Row:9 grids\50.xgd  
51 Col:5 Row:0 grids\51.xgd  
52 Col:5 Row:1 grids\52.xgd  
53 Col:5 Row:2 grids\53.xgd  
54 Col:5 Row:3 grids\54.xgd  
55 Col:5 Row:4 grids\55.xgd  
56 Col:5 Row:5 grids\56.xgd  
57 Col:5 Row:6 grids\57.xgd  
58 Col:5 Row:7 grids\58.xgd  
59 Col:5 Row:8 grids\59.xgd  
60 Col:5 Row:9 grids\60.xgd  
61 Col:6 Row:0 grids\61.xgd  
62 Col:6 Row:1 grids\62.xgd  
63 Col:6 Row:2 grids\63.xgd  
64 Col:6 Row:3 grids\64.xgd  
65 Col:6 Row:4 grids\65.xgd  
66 Col:6 Row:5 grids\66.xgd  
67 Col:6 Row:6 grids\67.xgd  
68 Col:6 Row:7 grids\68.xgd  
69 Col:6 Row:8 grids\69.xgd  
70 Col:6 Row:9 grids\70.xgd  
71 Col:7 Row:0 grids\71.xgd  
72 Col:7 Row:1 grids\72.xgd  
73 Col:7 Row:2 grids\73.xgd  
74 Col:7 Row:3 grids\74.xgd  
75 Col:7 Row:4 grids\75.xgd  
76 Col:7 Row:5 grids\76.xgd  
77 Col:7 Row:6 grids\77.xgd  
78 Col:7 Row:7 grids\78.xgd  
79 Col:7 Row:8 grids\79.xgd  
80 Col:7 Row:9 grids\80.xgd

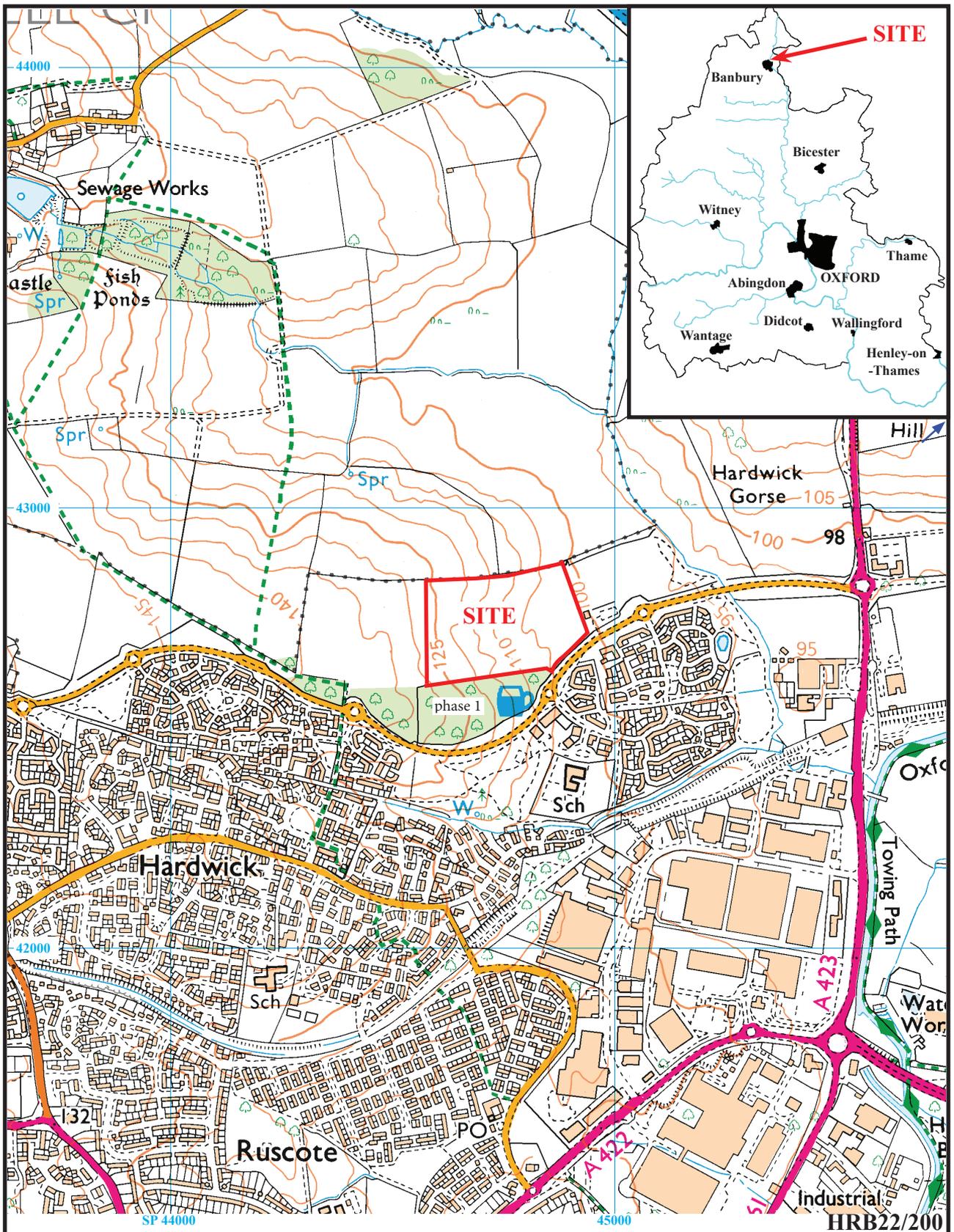
### Processed data

Filename: Comp 1.xcp  
Stats  
Max: 3.40  
Min: -3.60  
Std Dev: 1.11  
Mean: 0.09  
Median: 0.00  
Composite Area: 7.2 ha  
Surveyed Area: 6.2416 ha

### Processes: 8

1 Base Layer  
2 DeStripe Median Sensors: Grids: All  
3 Clip at 1.00 SD  
4 Clip from -2.20 to 2.70 nT  
5 De Stagger: Grids: All By: 0 intervals, 50.00cm  
6 De Stagger: Grids: All By: 0 intervals, 20.00cm  
7 De Stagger: Grids: All By: 0 intervals, 20.00cm  
8 Despike Threshold: 1 Window size: 3x3





**Land at Hanwell Fields phase 2,  
Banbury, Oxfordshire  
Geophysical survey (magnetic)**

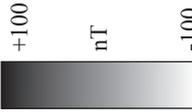
Figure 1. Location of site within Banbury and Oxfordshire.

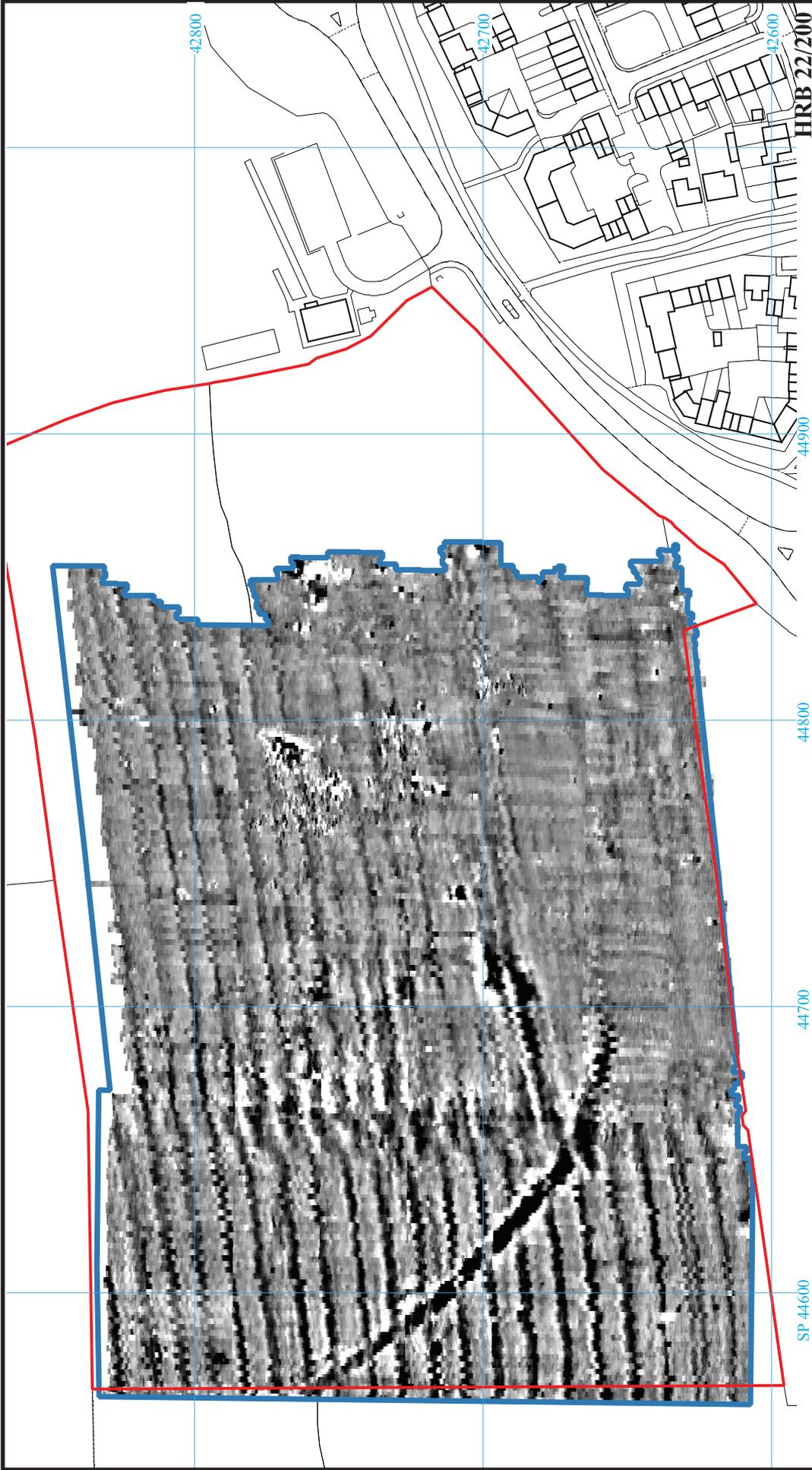
Reproduced under licence from Ordnance Survey Explorer Digital mapping at 1:12500  
Crown Copyright reserved

THAMES VALLEY  
**ARCHAEOLOGICAL**  
SERVICES



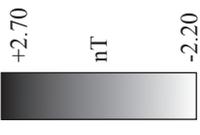
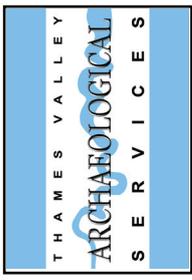
Land at Hanwell Fields Phase 2,  
 Banbury, Oxfordshire, 2022  
 Geophysical Survey (Magnetic)  
 Figure 2. Plot of raw gradiometer data.



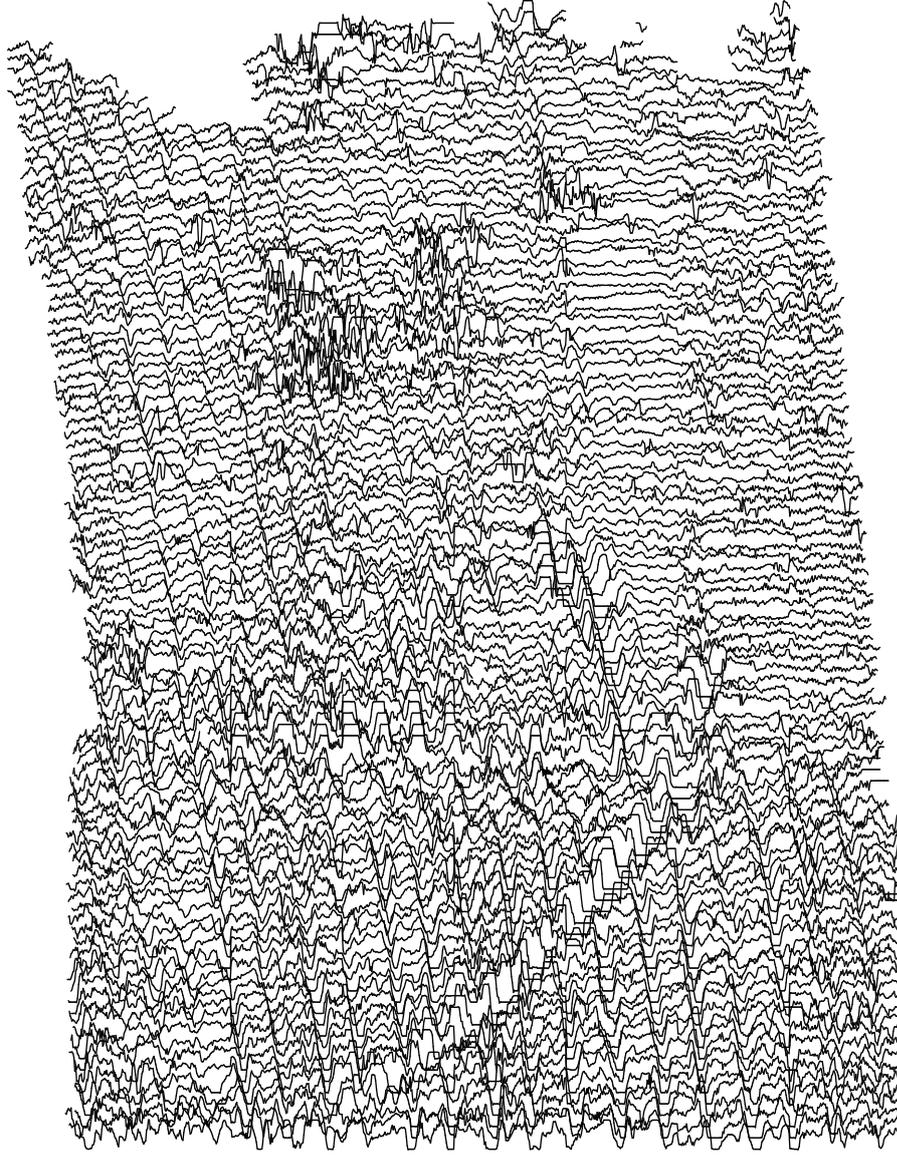


Land at Hanwell Fields Phase 2,  
 Banbury, Oxfordshire, 2022  
 Geophysical Survey (Magnetic)

Figure 3. Plot of processed gradiometer data.







42800

42700

42600

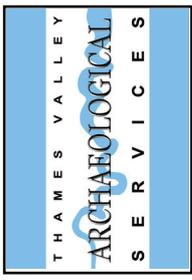
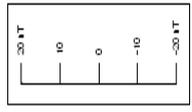
HRB 22/200

44900

44800

44700

SP 44600



**Land at Hanwell Fields Phase 2,  
Banbury, Oxfordshire, 2022  
Geophysical Survey (Magnetic)**

Figure 5. XY plot of processed gradiometer data.





Plate 1. Western part of survey area looking east



Plate 2. Eastern half of survey area looking south-east



Plate 3. Eastern area showing overgrowth looking south-east



Plate 4. Eastern area showing overgrowth looking north-east

HRB 22/200

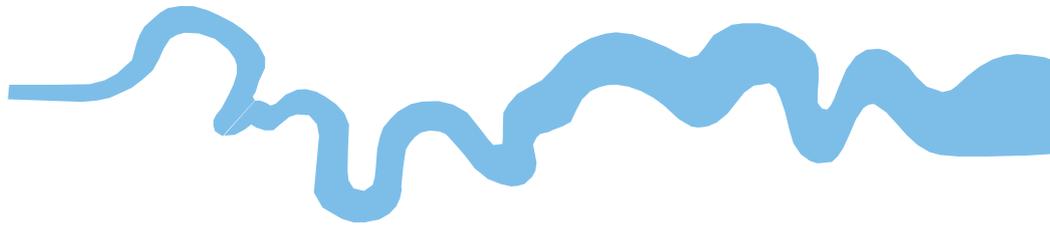
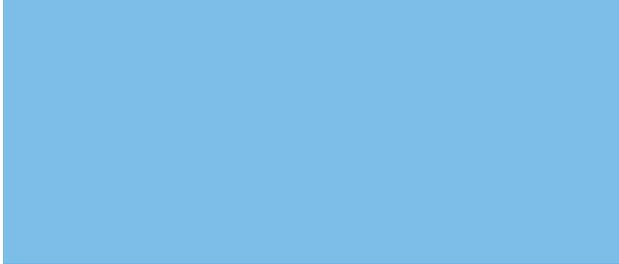
**Land at Hanwell Fields Phase 2,  
Banbury, Oxfordshire, 2022  
Geophysical Survey (magnetic)**  
Plates 1 to 4.

THAMES VALLEY  
ARCHAEOLOGICAL  
SERVICES

## TIME CHART

	Calendar Years
Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43 AD 0 BC
Iron Age _____	750 BC
Bronze Age: Late _____	1300 BC
Bronze Age: Middle _____	1700 BC
Bronze Age: Early _____	2100 BC
Neolithic: Late .....	3300 BC
Neolithic: Early .....	4300 BC
Mesolithic: Late .....	6000 BC
Mesolithic: Early .....	10000 BC
Palaeolithic: Upper .....	30000 BC
Palaeolithic: Middle .....	70000 BC
Palaeolithic: Lower .....	2,000,000 BC





**Thames Valley Archaeological Services Ltd,  
47-49 De Beauvoir Road,  
Reading RG1 5NR**

**Tel: 0118 9260552  
Email: [tvas@tvas.co.uk](mailto:tvas@tvas.co.uk)  
Web: [www.tvas.co.uk](http://www.tvas.co.uk)**

***Offices in:  
Brighton, Taunton, Stoke-on-Trent, Wellingborough  
and Ennis (Ireland)***