

T H A M E S V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

**Churchfields Farm, Ladywood Road,
Salwarpe, Worcestershire**

Geophysical Survey (Magnetic)

by Tim Dawson

Site Code: CFD 14/61

Fieldwork Activity Number: WSM57095

(SO 8767 6149)

**Churchfields Farm, Ladywood Road,
Salwarpe, Worcestershire**

Geophysical Survey (Magnetic) Report

For Mr Michael Davies

by Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code CFD 14/61

April 2014

Summary

Site name: Churchfields Farm, Ladywood Road, Salwarpe, Worcestershire

Grid reference: SO 8767 6149

Site activity: Magnetometer survey

Date and duration of project: 1st April 2014

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: CFD 14/61

Worcestershire Fieldwork Activity Number: WSM57095

Area of site: 1.48ha

Summary of results: A range of both bipolar and dipolar magnetic anomalies were recorded along with two possible positive anomalies. The former most likely represent buried ferromagnetic objects while the latter may be cut features. However, it is unlikely that they represent archaeological remains.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies and will be deposited with the ADS in due course.

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 All TVAS unpublished fieldwork reports are available on our website: www.tvas.co.uk/reports/reports.asp.

Report edited/checked by: Steve Ford✓ 11.04.14 Steve Preston✓ 11.04.14

Churchfields Farm, Ladywood Road, Salwarpe, Worcestershire A Geophysical Survey (Magnetic)

by Tim Dawson

Report 14/61

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Churchfields Farm, Ladywood Road, Salwarpe, Worcestershire (SO 8767 6149) (Fig. 1). The work was commissioned by Mr Alex Lawrence of Reading Agricultural Consultants, Gate House, Beechwood Court, Woodcote, Reading RG8 0RR on behalf of Mr Michael Davies, Churchfields Farm, Salwarpe, Droitwich, Worcestershire WR9 0AH.

A planning application (W/03/2626) has been submitted to Wychavon District Council for the construction of a new dairy cow cubicle building and other dairy farming-related structures in a field to the southeast of the farmyard. A geophysical survey has been requested in order to evaluate the potential of the proposed development impacting any buried archaeology.

This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012), and the District's policies on archaeology. The field investigation was carried out to a specification approved by Mr Mike Glyde, Historic Environment Planning Officer at Worcestershire Archive and Archaeology Service. The fieldwork was undertaken by Tim Dawson and Lizzi Lewins on 1st April 2014 and the site code is CFD 14/61.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies and will be deposited with the ADS in due course.

Location, topography and geology

The site is located at Churchfields Farm, approximately half way between the hamlets of Salwarpe to the north and Ladywood to the south and *c.*1km southwest of Droitwich Spa (Fig. 1). The site consists of the eastern end of a rectangular field of pasture *c.*100m southeast of the farmyard. It is bounded to the southwest by the remainder of the field and on the other three sides by hedgerows and post and wire fencing. The majority of the survey area is largely flat at a height of *c.*41m above Ordnance Datum although it begins to slope downhill towards its south-western end with a steep hollow in the southern corner. The underlying geology is recorded as Keuper Marl (BGS 1976).

Weather and ground conditions during the survey started off foggy and damp but the surface dried off quickly as the sun came out. The field surface was covered with short to medium length grass overlying a rutted, uneven ground surface, particularly in the centre of the survey area (Pl. 1-2).

Site history and archaeological background

While no known heritage assets are recorded in the proposed development area, the site has the potential to contain previously unrecorded remains. Recent fieldwork in the vicinity has identified prehistoric, Romano British and Anglo Saxon remains, in areas where previously no such evidence was known (Glyde 2014). The manor of *Salewarpe* is recorded in Domesday Survey (Mills 1998, 299; Williams and Martin 2002, 481, 486) as a small estate with a mill, woodland and five salt pans.

Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m 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 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. The grid was laid out aligned to the survey area's western extent covering the entire eastern end of the field. The steepness of the slope in the southern corner and the close proximity of wire fencing along the northern edge prevented surveying in these immediate areas.

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 English Heritage (2008) and the Institute for Archaeologists (2002, 2011).

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 fast yet detailed survey 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 GeoXH 6000 handheld GPS system with sub-decimetre 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 TerraSurveyorLite 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.

Process	Effect
Clip from -3.00 to 3.00 nT	Enhance the contrast of the image to improve the appearance of possible archaeological 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.

Once processed, the results are presented as a greyscale plot shown in relation to the site (Fig. 3), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are

shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.22.01, 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 TerraSurveyorLite in 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 rotated to orientate it to north and combined with grid and site plans 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 vast majority of magnetic anomalies recorded by the survey were either dipolar or bipolar which usually indicate the presence of buried ferromagnetic objects. A further two discreet positive anomalies were noted which may represent buried pits of archaeological origin [Fig. 4: 1] although a slight negative “shadow” adds uncertainty to this a interpretation. The northern corner of the magnetic plot is characterised by a large area of magnetic disturbance which follows the edge of the field [2], this was caused by the close proximity of the wire fencing to the survey area in this area.

Conclusion

The geophysical survey at Churchfields Farm was undertaken as planned with only one small area where the steepness of the ground prevented survey from taking place. A pair of discreet positive anomalies may indicate the presence of two pit-type features which can tentatively be interpreted as being of archaeological origin. The remaining anomalies noted by the survey are most likely caused by buried ferromagnetic objects of unknown date.

References

- BGS, 1976, *British Geological Survey*, 1:50,000, Sheet 182, Solid and Drift Edition, Keyworth
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)
- Glyde, M, 2014, ‘Requirements for an Archaeological Evaluation at Churchfields Farm, Ladywood Road, Salwarpe, Droitwich Spa, Worcestershire’, Worcester
- IFA, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading
- IFA, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading
- Mills, 1998, *Oxford Dictionary of English Place-Names*, Oxford
- NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London
- Williams, A and Martin, G H, 2002, *Domesday Book: A Complete Translation*, London

Appendix 1. Survey and data information

Raw data

Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 328 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions

Composite Size (readings): 560 × 140
Survey Size (meters): 140 m × 140 m
Grid Size: 20 m × 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats

Max: 100.00
Min: -100.00
Std Dev: 3.64
Mean: -0.09
Median: -0.02
Composite Area: 1.96 ha
Surveyed Area: 1.3609 ha

PROGRAMME

Name: TerraSurveyor
Version: 3.0.25.1

Source Grids: 41

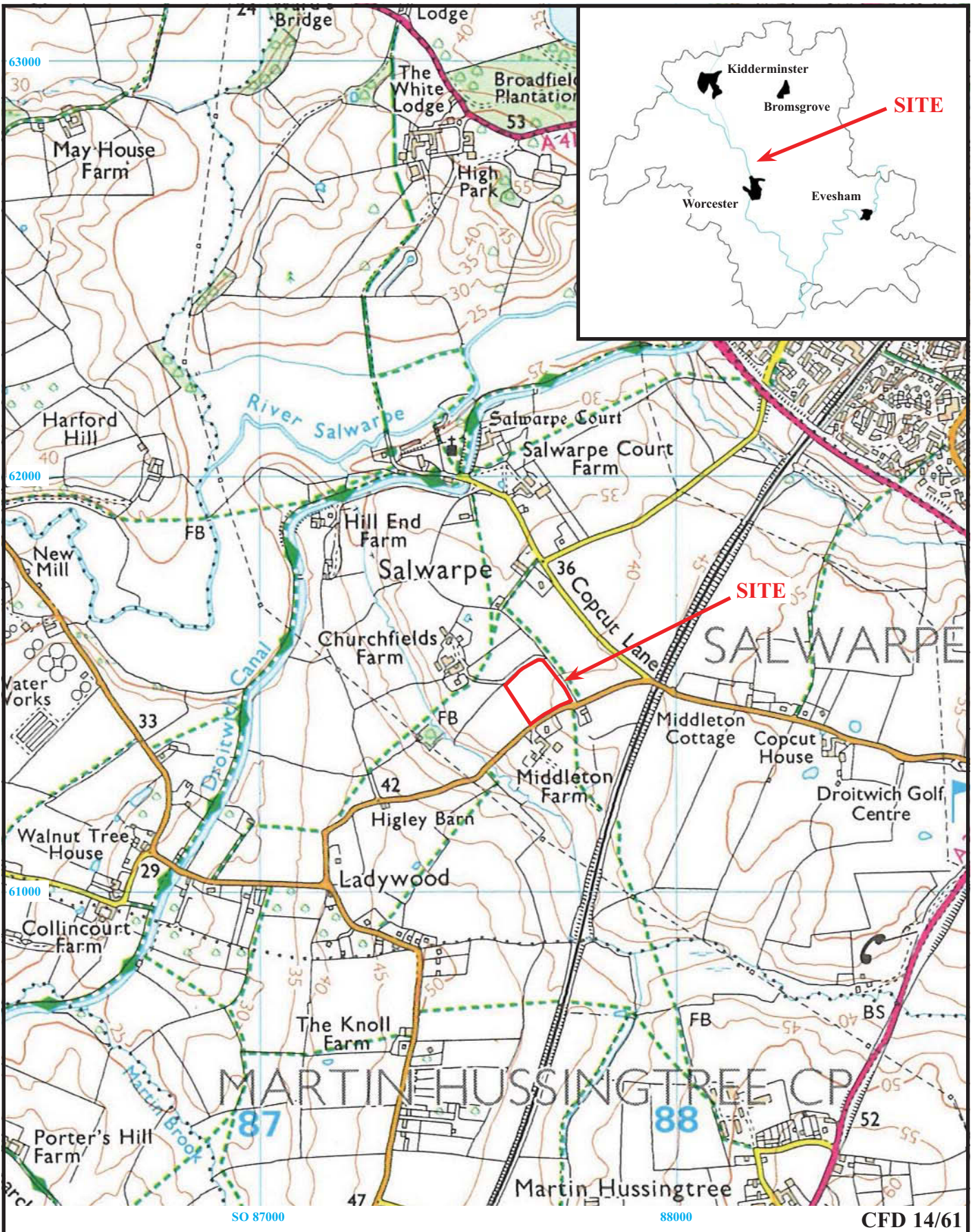
1 Col:0 Row:1 grids\01.xgd
2 Col:0 Row:2 grids\02.xgd
3 Col:0 Row:3 grids\03.xgd
4 Col:0 Row:4 grids\04.xgd
5 Col:0 Row:5 grids\05.xgd
6 Col:1 Row:0 grids\06.xgd
7 Col:1 Row:1 grids\07.xgd
8 Col:1 Row:2 grids\08.xgd
9 Col:1 Row:3 grids\09.xgd
10 Col:1 Row:4 grids\10.xgd
11 Col:1 Row:5 grids\11.xgd
12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

Processed data

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.75
Mean: -0.01
Median: 0.01

Processes: 4

1 Base Layer
2 DeStripe Median Sensors: All
3 Despike Threshold: 1 Window size: 3×3
4 Clip from -3.00 to 3.00 nT



**Churchfields Farm, Ladywood Road,
Salwarpe, Worcestershire, 2014
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Salwarpe and Worcestershire.

Reproduced from Ordnance Survey Explorer 204 at 1:12500
Ordnance Survey Licence 100025880

THAMES VALLEY
ARCHAEOLOGICAL
SERVICES



CFD 14/61

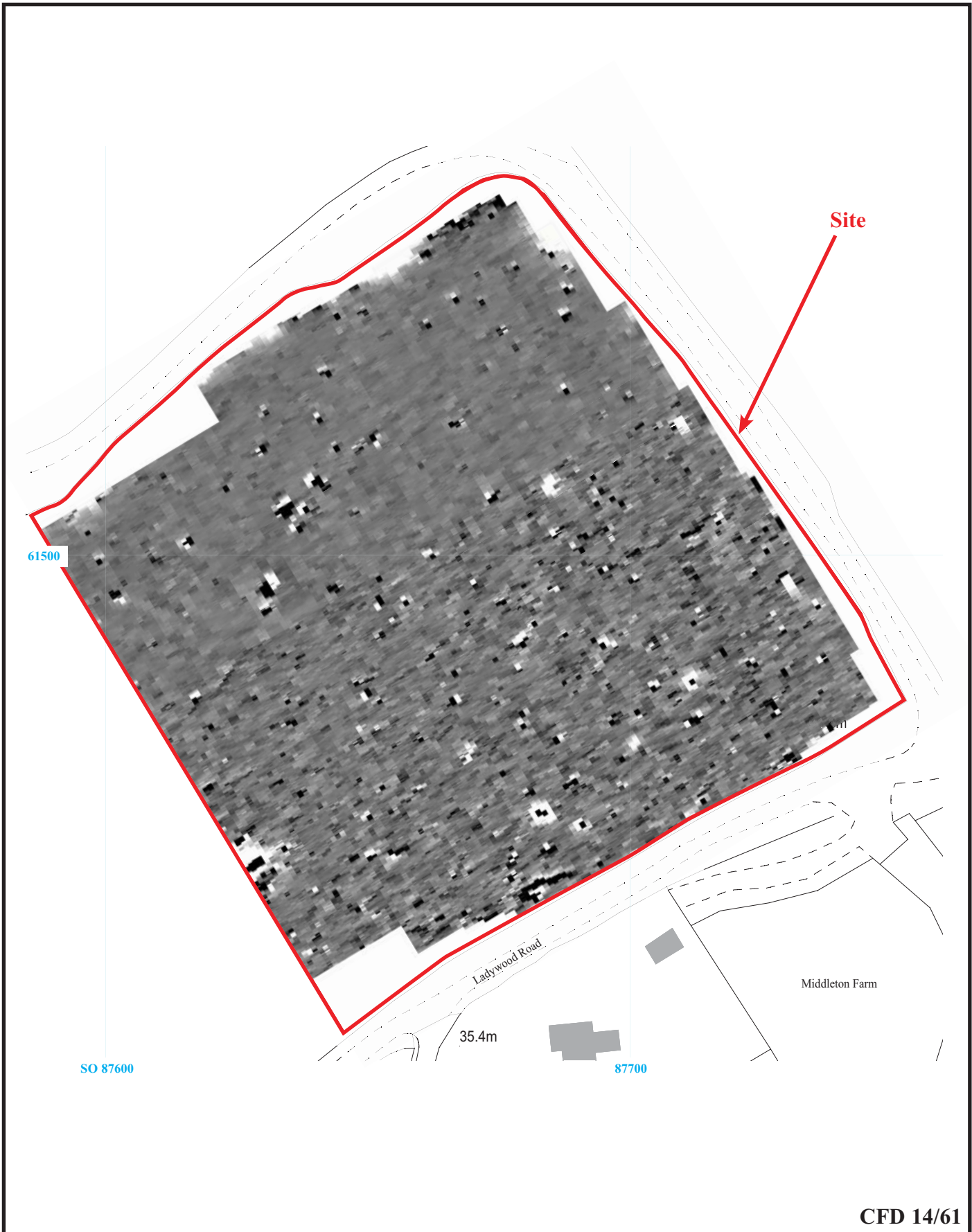
**Churchfields Farm, Ladywood Road,
Salwarpe, Warwickshire, 2014
Geophysical Survey (Magnetic)**

Figure 2. Survey grid layout and georeferencing points.



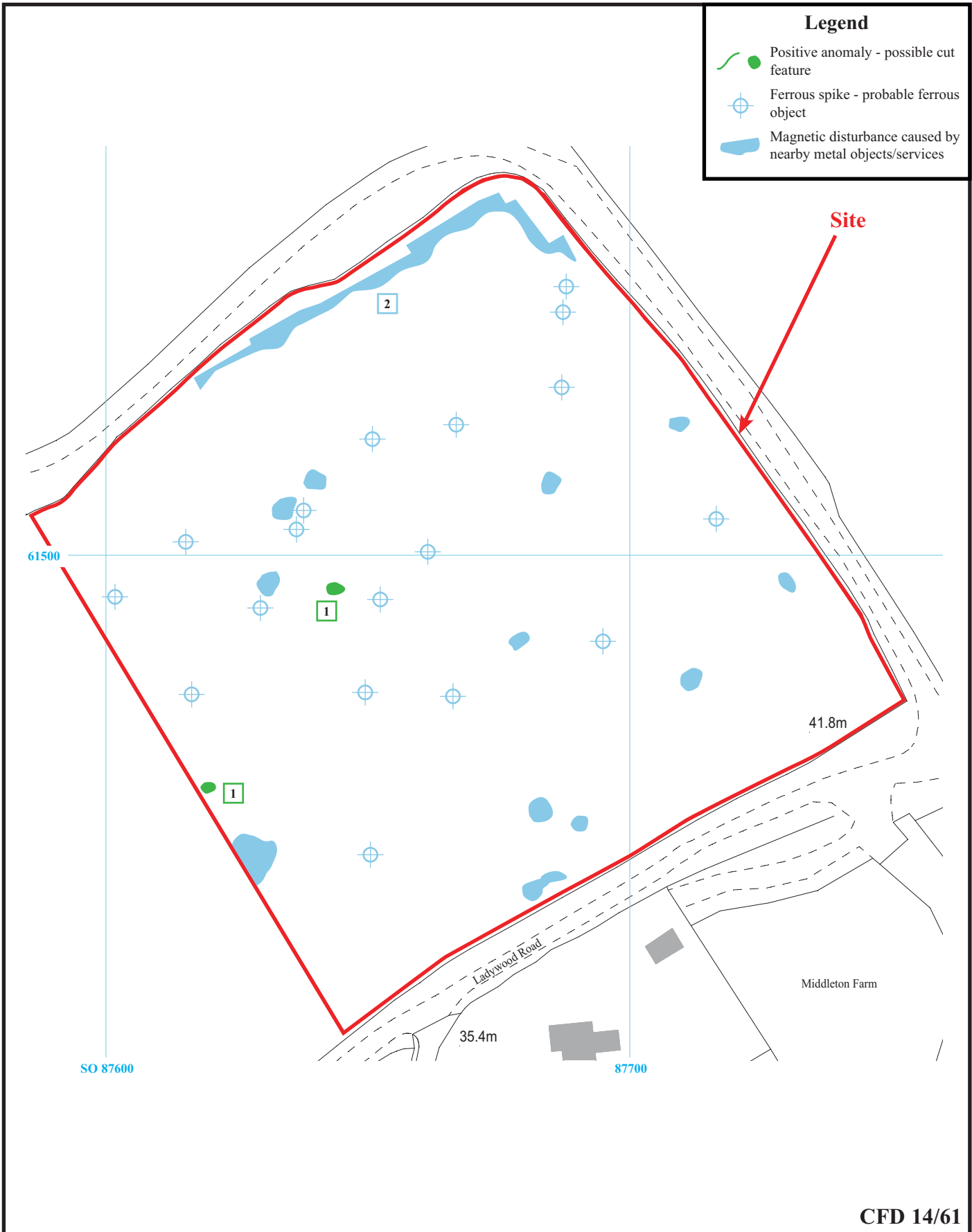
THAMES VALLEY
ARCHAEOLOGICAL
SERVICES





CFD 14/61

<p>N</p>	<p>Churchfields Farm, Ladywood Road, Salwarpe, Worcestershire, 2014 Geophysical Survey (Magnetic)</p> <p>Figure 3. Plot of minimally processed gradiometer data.</p>		
----------	---	--	--



**Churchfields Farm, Ladywood Road,
Salwarpe, Worcestershire, 2014
Geophysical Survey (Magnetic)**

Figure 4. Interpretation plot of magnetic data.

0m 50m

THAMES VALLEY
ARCHAEOLOGICAL
SERVICES



Plate 1. The survey area, looking east.



Plate 2. The south-eastern site boundary looking northeast showing the slope towards the southern corner.

CFD 14/61

**Churchfields Farm, Ladywood Road,
Salwarpe, Worcestershire, 2014
Geophysical Survey (Magnetic)**

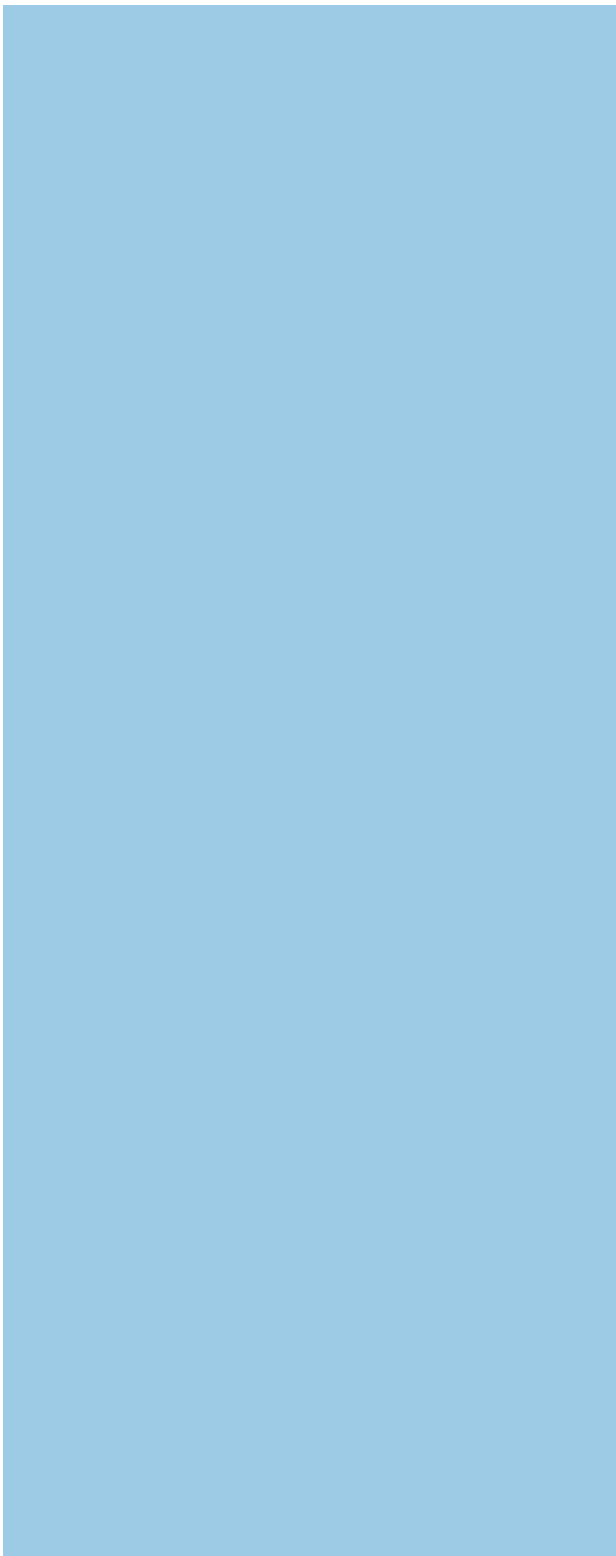
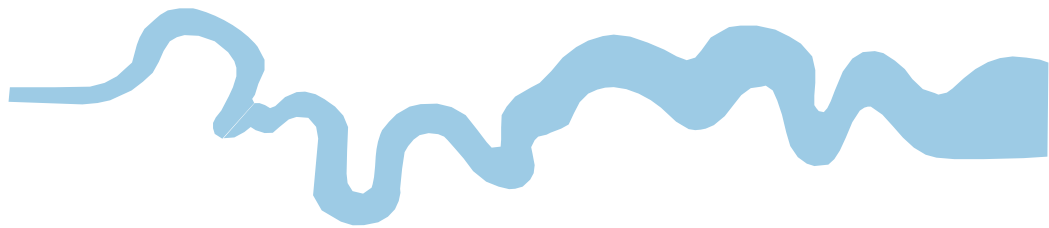
Plates 1 - 2.

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
Iron Age _____	BC/AD 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,
Berkshire, RG1 5NR**

**Tel: 0118 9260552
Fax: 0118 9260553
Email: tvas@tvas.co.uk
Web: www.tvas.co.uk**