THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Cerney Wick, South Cerney, Gloucestershire

Geophysical (magnetometer) survey

by Marta Buzcek and Tim Dawson

Site Code: CFW05/90

(SU 0680 9590)

Cerney Wick, South Cerney, Gloucestershire

Geophysical (Magnetometer) Survey Report

For Hills Quarry Products

by Marta Buczek and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code CWF 05/90

June 2012

Summary

Site name: Cerney Wick, South Cerney, Gloucestershire

Grid reference: SU 0680 9590

Site activity: Geophysical (magnetometer) survey

Date and duration of project: 12th and 14th June 2012

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: CWF 05/90

Area of site: 1.8ha

Summary of results: Linear positive anomalies, ferrous spikes and scattered ferromagnetic debris were recorded during the survey. Several of the positive anomalies correspond to archaeological features discovered during previous excavations to the north of the survey area.

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

Report edited/checked by:	Steve Ford✓ 18.06.12
	Andrew Mundin✓ 18.06.12

Thames Valley Archaeological Services Ltd, 47–49 De Beauvoir Road, Reading RG1 5NR
Tel. (0118) 926 0552; Fax (0118) 926 0553; email tvas@tvas.co.uk; website: www.tvas.co.uk

Cerney Wick, South Cerney, Gloucestershire
A Geophysical (Magnetometer) Survey

by Marta Buczek and Tim Dawson

Report 05/90b

Introduction

This report documents the results of a geophysical (magnetometer) survey carried out at Cerney Wick Quarry, Cerney Wick, South Cerney, Gloucestershire (SU 0680 9590) (Fig. 1). The work was carried out for Mr Andrew Liddle of Hills Quarry Products, Unit 15, Berkshire House, County Park, Shrivenham Road, Swindon, Wiltshire, SN1 2NR. The fieldwork was undertaken by Marta Buczek MA and Tim Dawson MSc on 12th and 14th June 2012 and the site code is CWF 05/90.

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 *c*.500m west of the village of Cerney Wick, approximately 3.5km to the north-west of Cricklade, within the area of the Cotswold Water Park (Fig. 1). The fields to the north and west are both disused gravel pits, now filled with water, while the site's western boundary is formed by the path of the, now defunct, Midland & South Western Junction Railway and north-western tip of the site borders the B4696 Spine Road. In general the site is flat with large portions occupied by ponds and small areas of woodland although the latter has largely been removed in advance of work starting on site leaving thickly overgrown patches. The underlying geology is described as Northmoor Sand and Gravel Member with a small section in the north and west being alluvium (BGS 1974). The site is at a height of approximately 82m above Ordnance Datum.

Site history and archaeological background

The site at Cerney Wick sits within an area dominated by landscape and settlement features of Iron Age and Roman date with possible settlement and burials of earlier prehistoric date. Recent work on the site itself and in the wider landscape has indicated a wide range of sites and finds in this area. In many cases, the scale of the works and the presence of deposits with palaeoenvironmental potential have allowed for a landscape perspective of the whole ecosystem at various times in the past. Neighbouring quarries have seen significant archaeological research in recent years (e.g., Ashton Keynes, Dryleaze Farm, Latton Lands, Eysey Manor and Latton Quarry

(Powell *et al* 2007; Milbank *et al*. forthcoming; Powell *et al* 2008; Pine 2008; Pine 2009)). Extensive mineral extraction programmes have offered unprecedented access to large tracts of past landscapes, which, while offering few particularly notable or remarkable individual 'sites' in the conventional sense, have provided substantive advances in our understanding of the spatial organization of past societies over long chronological spans. A desk-based assessment and previous excavations immediately adjacent to the survey area on the Cerney Wick site itself uncovered two ring gullies, a rectangular enclosure and several other linear and pit/posthole features, all dating to the Iron Age and Roman periods (Fig. 2) (Ford 2005, TVAS forthcoming).

More recently the site has been used as pasture with areas of hedge and undergrowth towards its western end. The area immediately to the southeast has been subject to gravel extraction and has since been partially backfilled with the remainder being reinstated as a pond (A Liddle pers. comm).

Objectives and methodology

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 set out by both English Heritage (2008) and the Institute for Archaeologists (2002).

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 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.

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 3600 sampling points across a full 30m × 30m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. The grid was set out using the southern limit of excavation as a baseline and extended to the edge of the site to the north- and south-west, the edge of a pond to the southeast and one grid square to the northeast (Fig. 2). It was anticipated that the majority of the

squares would be fully surveyed with only those along the eastern and southern edges being limited in area by the site boundaries. However, it was only possible to fully survey one grid square with the remainder being blocked by an unmarked hedgerow which, while it had been cut down, prevented the surveying of a wide strip of the centre of the area (Figs. 3 and 4).

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.

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.

Data gathered in the field was processed using the ArcheoSurveyorLite 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 -10.00 to 10.00 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
DeStripe Mean Traverse: Grids: All, Threshold: 2 SDs	Removes the striping effect within a grid caused by directional effects, instrument setup, drift, etc.
Clip at ±3.00 SD	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De Stagger: Grids: 01, Mode: Outbound By: 4 intervals	Realigns readings within a grid, in this case by 1m, to rectify the effect of long grass displacing the sensors.

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 ArcheoSurveyorLite 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 data gathered by the geophysical survey at Cerney Wick consist primarily of positive linear anomalies with several patches of scattered ferromagnetic debris (Fig. 3). Of particular note are those that appear to be extensions of the features identified during the archaeological excavations (Fig. 4).

The largest of these, running approximately east-west, is an extension of a linear feature interpreted as a post-Roman water channel while to the south another linear anomaly lines up with a ditch that was excavated orientated parallel to the channel. A third anomaly to the north of the channel appears to be an extension of a smaller section of ditch while the final section of the ring gully further to the north appears as a faint positive anomaly partially masked by a ferrous spike. Two other positive anomalies can be discerned aligned with archaeological features further to the north-west while another two linear anomalies intersect the ditch and channel at an angle of *c*.30° in the centre of the survey area, probably representing cut features of archaeological origin. To the north-west a pair of weak positive anomalies may indicate the presence of large pits or sections of a linear feature. A number of ferrous spikes are scattered across the area, probably representing buried ferrous objects which may or may not be of archaeological origin.

Scattered ferromagnetic debris, random patterns of ferrous spikes, is present across several locations within the survey area with a concentration along the northern and eastern edges. Those along the eastern edge are most likely associated with the gravel extraction and subsequent backfilling that occurred previously to the east of the survey area.

The southern boundary of the survey area was marked by a wire fence, the strong bipolar magnetic signature of which was recorded by the gradiometer. The interference was not significant enough to have a masking effect on any other possible anomalies caused by archaeological features in that area.

Conclusion

The survey was carried out largely to the original plan although a hedgerow and pond not marked on maps of the area provided unforeseen obstructions which blocked survey across a sizable portion of the site. The area that was surveyed contained several anomalies, primarily positive linear features, which are likely to be of archaeological origin. Ferrous spikes across the area suggest the presence of ferrous objects of unknown date

within the ground while patches of scattered ferromagnetic debris, particularly in the north and east, indicate areas of previous gravel extraction and other probable disturbance.

The gradiometer results correlate strongly with the archaeological features discovered during excavations immediately to the north of the survey area.

References

BGS, 1974, *British Geological Survey*, 1:50,000, Sheet 252, Solid and Drift Edition, Keyworth

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, (2nd edn), Portsmouth

Ford, S, 2005, 'Cerney Wick Farm, Cerney Wick, Gloucestershire: an archaeological desk-based assessment', Thames Valley Archaeological Services unpublished report 05/90, Reading

IFA, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Pap **6**, Reading

Milbank, D, Pine, J and Ford, S, forthcoming, 'Dryleaze Farm, Siddington, Gloucestershire: Extraction phase 4: draft publication report', Thames Valley Archaeological Services unpubl rep **07/101**, Reading

Powell, A, Perpetua, G and Mepham, 2007, 'Excavations at an Iron Age and Roman-British settlement site at Cleveland Farm, Ashton Keynes, Wiltshire', draft publication report, Wessex Archaeology project 59260.01, Salisbury

Powell, K, Laws, G and Brown, L, 2008, 'A late Neolithic/early Bronze Age Enclosure and Iron Age and Romano-British settlement at Latton Lands, Wiltshire', Oxford Archaeology, draft publication report, Oxford

Pine, J, 2008, Eysey Manor, Cricklade, Wiltshire, Phases 1 and 2a, Post-Excavation Assessment, Thames Valley Archaeological Services unpubl rep **04/87**, Reading

Pine, J, 2009, 'Latton Quarry, Latton, Wiltshire, Post-Excavation Assessment', Thames Valley Archaeological Services unpubl rep **04/22**, Reading

PPS5, 2010, *Planning for the Historic Environment,* The Stationery Office, Norwich

TVAS, forthcoming, 'Cerney Wick, South Cerney, Gloucestershire: an archaeological excavation' Thames Valley Archaeological Services unpublished report 05/90b

Appendix 1. Survey and data information

Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 16/08/2012
Assembled by: on 16/08/2012
Direction of 1st Traverse: 135 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 600 x 120
Survey Size (meters): 150 m x 120 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 9.10
Mean: 0.36
Median: 0.40
Composite Area: 1.8 ha
Surveyed Area: 0.71785 ha

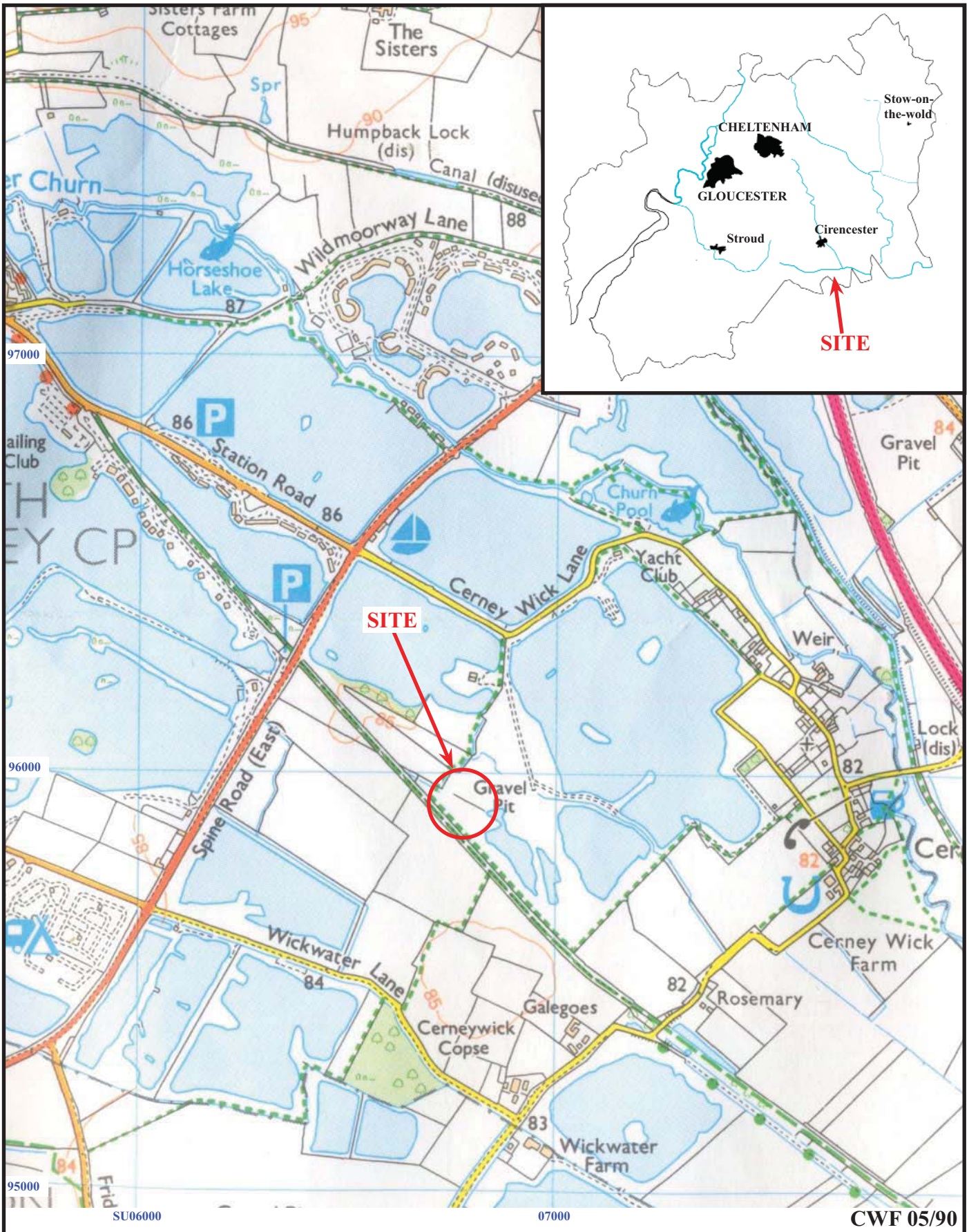
Source Grids: 13
1 Col:0 Row:1 grids\06.xgd
2 Col:1 Row:1 grids\05.xgd
3 Col:1 Row:2 grids\10.xgd
4 Col:2 Row:1 grids\04.xgd
5 Col:2 Row:2 grids\09.xgd
6 Col:2 Row:3 grids\11.xgd
7 Col:3 Row:1 grids\03.xgd
8 Col:3 Row:2 grids\08.xgd
9 Col:3 Row:3 grids\12.xgd
10 Col:4 Row:0 grids\01.xgd
11 Col:4 Row:1 grids\02.xgd
12 Col:4 Row:2 grids\07.xgd
13 Col:4 Row:3 grids\13.xgd

PROGRAMME
Name: ArcheoSurveyor
Version: 2.5.19.6

Processed data
COMPOSITE
Filename: grids processed.xcp

Stats
Max: 8.56
Min: -8.55
Std Dev: 2.63
Mean: 0.03
Median: -0.04
Composite Area: 1.8 ha
Surveyed Area: 0.71625 ha

Processes: 5
1 Base Layer
2 Clip from -10.00 to 10.00 nT
3 DeStripe Mean Traverse: Grids: All Threshold: 2 SDs
4 Clip at 3.00 SD
5 De Stagger: Grids: 01.xgd Mode: Outbound By: 4 intervals



CWF 05/90

Cerney Wick, South Cerney, Gloucestershire, 2012
Geophysical (Magnetometer) Survey

Figure 1. Location of site within Cerney Wick and Gloucestershire.

THAMES VALLEY ARCHAEOLOGICAL SERVICES

CWF 05/90

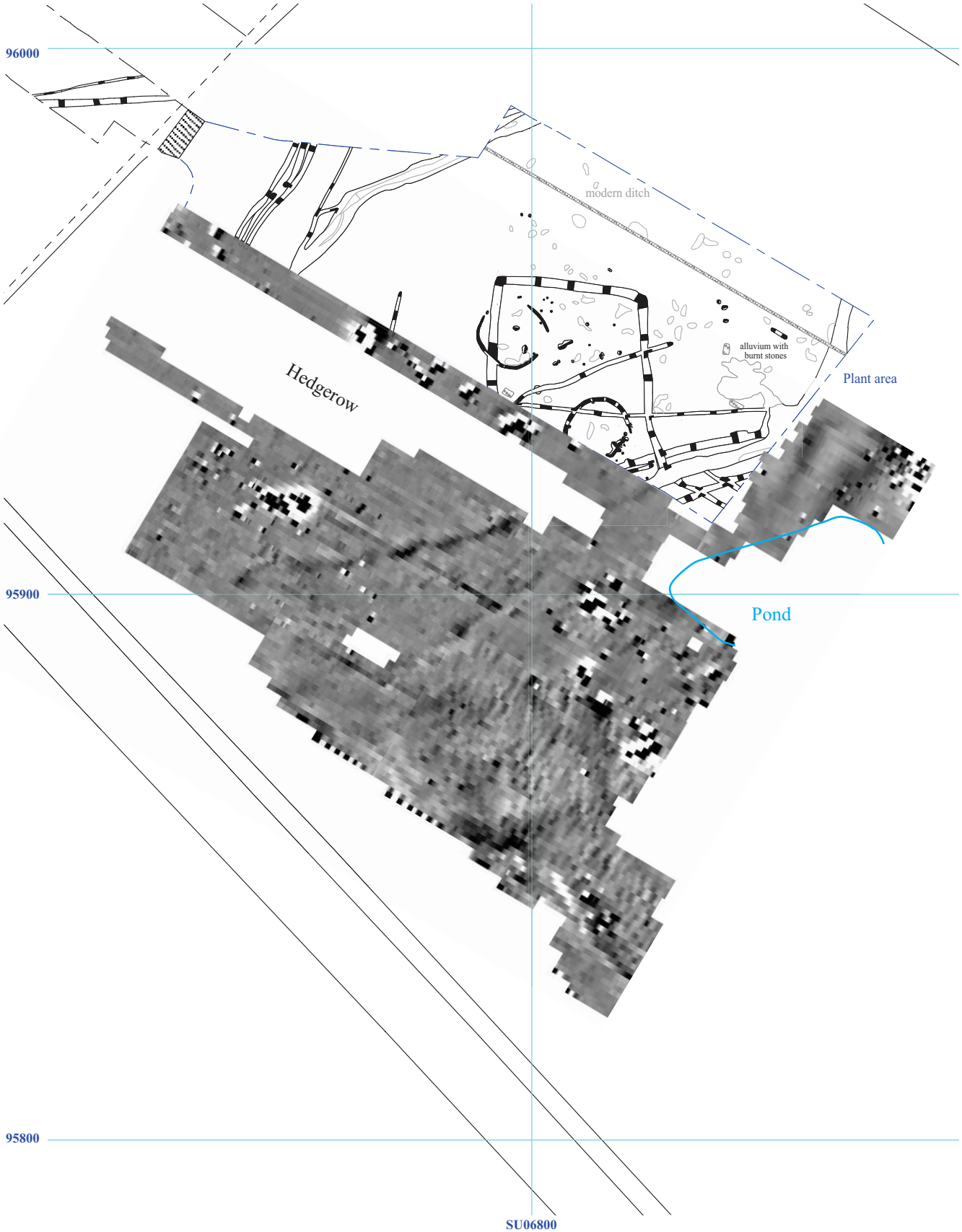
N

Cerney Wick, South Cerney, Gloucestershire, 2012 Geophysical (Magnetometer) Survey

Figure 2. Grid layout.

0 50m

THAMES VALLEY ARCHAEOLOGICAL SERVICES



CWF 05/90

N

Cerney Wick, South Cerney, Gloucestershire, 2012
Geophysical (Magnetometer) Survey

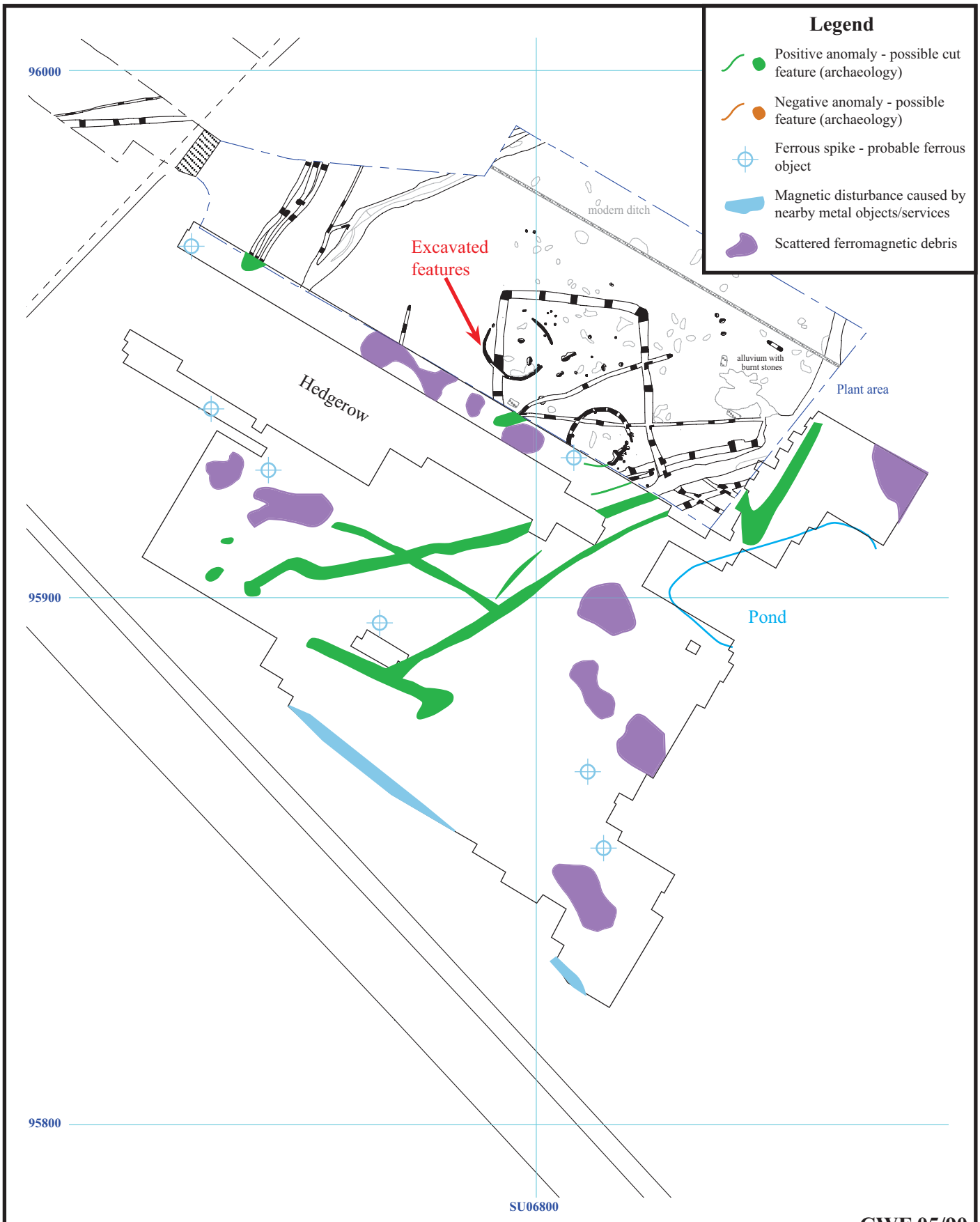
Figure 3. Plot of minimally processed gradiometer data.

+3SD

-3SD

0m 30m

THAMES VALLEY ARCHAEOLOGICAL SERVICES



CWF 05/90

N

Cerney Wick, South Cerney, Gloucestershire, 2012
Geophysical (Magnetometer) Survey

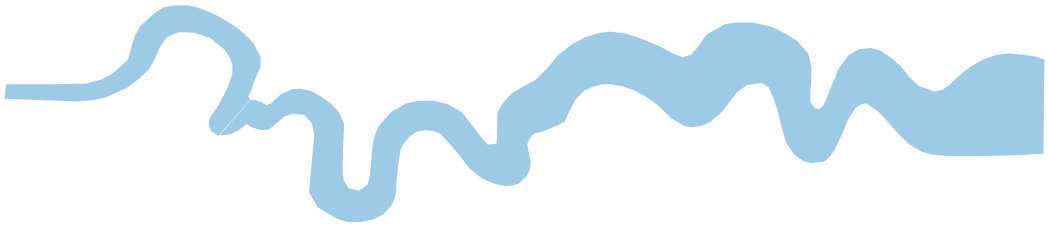
Figure 4. Interpretation of processed gradiometer data in relation to results of archaeological excavations to the north.

0m 30m

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