THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Land south of Townsend Road, Shrivenham, Oxfordshire

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: TRS19/42

(SU 2337 8846)

Land south of Townsend Road, Shrivenham, Oxfordshire

Geophysical Survey (Magnetic) Report

For Jack B Developments

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code TRS 19/42

March 2020

Summary

Site name: Land south of Townsend Road, Shrivenham, Oxfordshire

Grid reference: SU 2337 8846

Site activity: Magnetometer survey

Date and duration of project: 17th March 2020

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: TRS19/42

Area of site: c. 1.6ha

Summary of results: The geophysical survey recorded significant magnetic disturbance around the site boundaries as well as a series of parallel positive linear anomalies which most likely represents agricultural activity. Nothing to suggest the presence of buried archaeological features was identified.

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✓ 27.3.20.
	Tim Dawson✓ 27.3.20

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Land at Townsend Road, Shrivenham, Oxfodshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 19/42

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Townsend Road, Shrivenham, Oxfordshire (SU 2337 8846) (Fig. 1). The work was commissioned by Liam Webster of Bluestone Planning, Suite 5 Enterprise Centre, Building 41/42, Shrivenham Business Park, Majors Road, Watchfield, Oxfordshire, SN6 8TZ on behalf of Jack B Developments, Wittas House, Two Rivers, Station Lane, Witney, OX28 4BH.

An application is to be submitted to Vale of White Horse District Council for the development of a parcel of land south of Townsend Road (Fig. 1) which will require a programme of archaeological investigation including a geophysical survey. This is in accordance with the *National Planning Policy Framework* (NPPF 2019), and the District's policies on archaeology. The field investigation was carried out to a specification approved by Hugh Coddington Senior Archaeological Officer for Oxfordshire County Council. The fieldwork was undertaken by Kyle Beaverstock and Luciano Cicu on the 17th of March 2020 and the site code is TRS19/42.

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 south western edge of Shrivenham, 1.6km east of the river Cole and 8.5km northeast of Swindon (Fig. 1). The site is a relatively flat parcel of land sitting at a height of c. 96m above Ordinance Datum. The site is bounded by Townsend Road to the north, residential properties to the west and east and farmland to the south. The underlying geology is stated as Upper Corallian Clay (BGS 1997).

Site history and archaeological background

The archaeological background has been highlighted in detail in a desk-based assessment (Baljkas 2019). To summarise, the site is lies in the archaeologically rich Vale of the White Horse. Within the site itself a findspot for a Palaeolithic handaxe although the precise location is open to doubt. On the northern edge of Shrivenham four archaeological investigations revealed extensive Iron age settlement (Leonard 2015; Andrews 2005; Bray

2014; Manisse in prep; Upson-Smith and Wolframm-Murray 2012) with some evidence of Bronze Age and Roman activity.

Methodology

Sample interval

Data collection involved the traversing of the survey area along straight and parallel lines using two cart-mounted Bartington Grad601-2 fluxgate gradiometers. Even coverage was achieved with the use of regularly spaced markers at the ends of traverses and the real-time positional trace plot. Readings were taken at 0.25m intervals along traverses 1m apart, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating northwest to southeast orientation zig-zag pattern across the eastern and western survey area and southwest to northeast in the central survey area. There were a number of obstructions within the site area including several subdividing fences, trees and standing structures.

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 two dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometers mounted upon a Bartington non-magnetic cart. A two-wheeled lightweight structure pushed by hand, the cart consisted a bank of four vertically-mounted Bartington Grad601-2 magnetic sensor

tubes at 1m apart and a Trimble Geo 7x centimetre edition GPS. Readings were collected by two Bartington Grad601-2 loggers and collated using MLgrad601 software on a Linx 12x64 tablet running Windows 10 mounted at the rear of the cart. 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.

The Trimble Geo7x centimetre edition GPS system with centimetre real-time accuracy was used to tie the cart traverses 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.

Process	**Effect**
Clip from -5.50 to 5.53 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.
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. 2) with the processed data then presented as a second figure (Fig. 3), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons.

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 2.18.15 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

There is significant amount of magnetic disturbance across the site, this is most likely caused by ferrous materials in the surrounding fencing. There is also a number of parallel positive linear anomalies running across the whole survey area, orientated northwest to southeast and between 7m and 9m apart. These most likely represent agricultural activity such as ridge and furrow or drainage.

Conclusion

The survey data contained a significant amount of magnetic disturbance caused by above ground ferrous objects which may be masking subtle variations of archaeological origin. There was also a number of parallel positive linear anomalies which most likely represent agricultural activity. Nothing suggesting the presence of buried archaeological features was recorded.

References

Andrews, M, 2005, 'Early Settlement in the Vale of White Horse: A Case Study of the Two Parishes of Shrivenham and Watchfield', Oxford University MSc Dissertation

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Upson-Smith, T and Wolframm-Murray, Y 2012, 'Archaeological evaluation of land at Farleigh Road, Shrivenham, Oxfordshire, November 2012', Northamptonshire archaeology unpubl rep 12/208, Northampton

Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

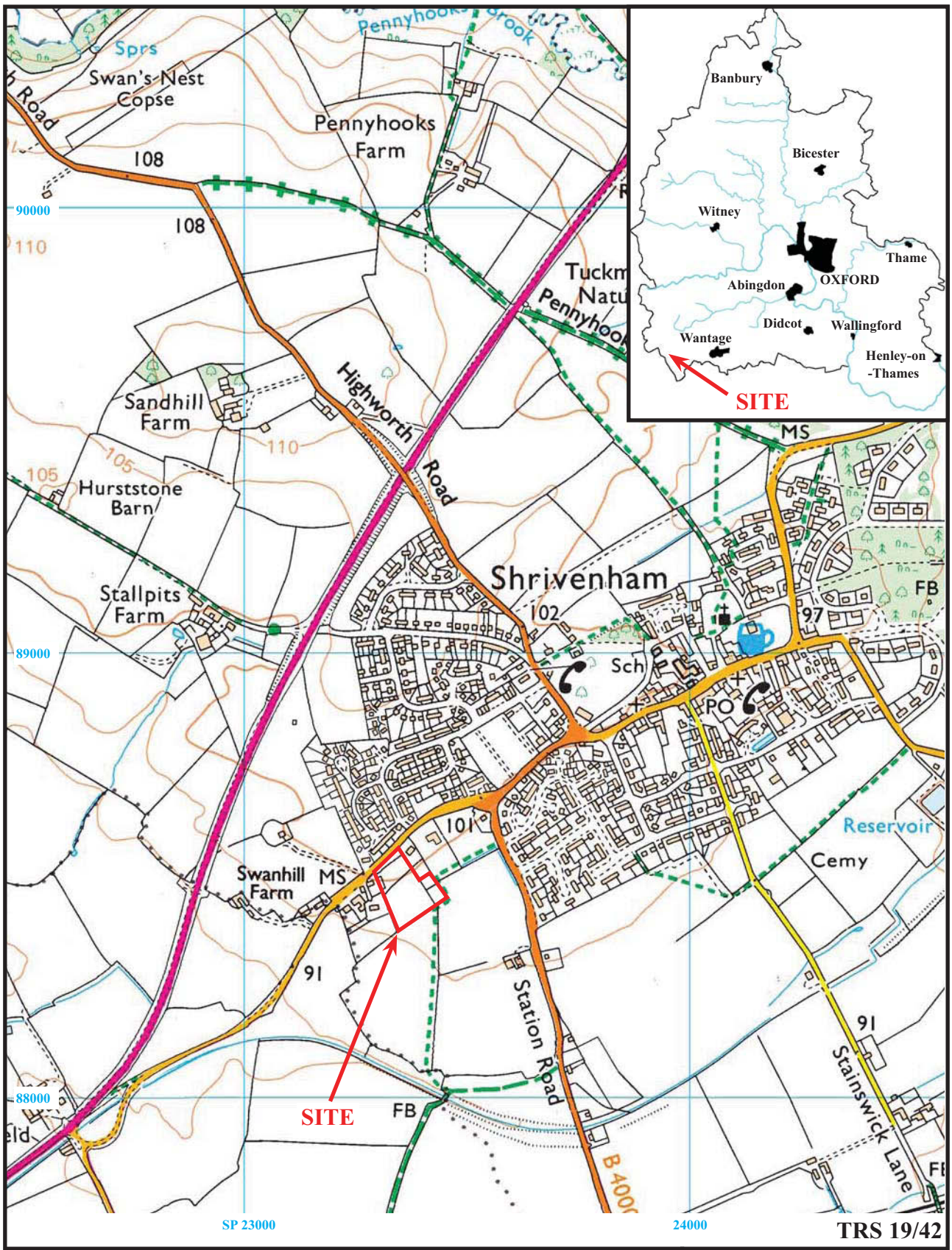
Raw data
Filename: Shrivenham RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 592482.06674466, 5716869.90760834 m
Southeast corner: 592621.42674466, 5716709.35760834 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 139 m x 161 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 30035, Recorded: 30035

Stats
Max: 106.08
Min: -109.72
Std Dev: 17.98
Mean: -0.68
Median: 0.03
Composite Area: 2.2374 ha
Surveyed Area: 1.08 ha

Processed data
Filename: Shrivenham.xcp
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.36
Mean: -0.01
Median: 0.02
Composite Area: 2.2374 ha
Surveyed Area: 1.0664 ha

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00
5 DeStagger by: 50.00cm, Shift Positions



TRS 19/42

Land south of Townsend Road, Shrivenham, Oxfordshire, 2020
Geophysical Survey (Magnetic)

Figure 1. Location of site within Shrivenham and Oxfordshire.

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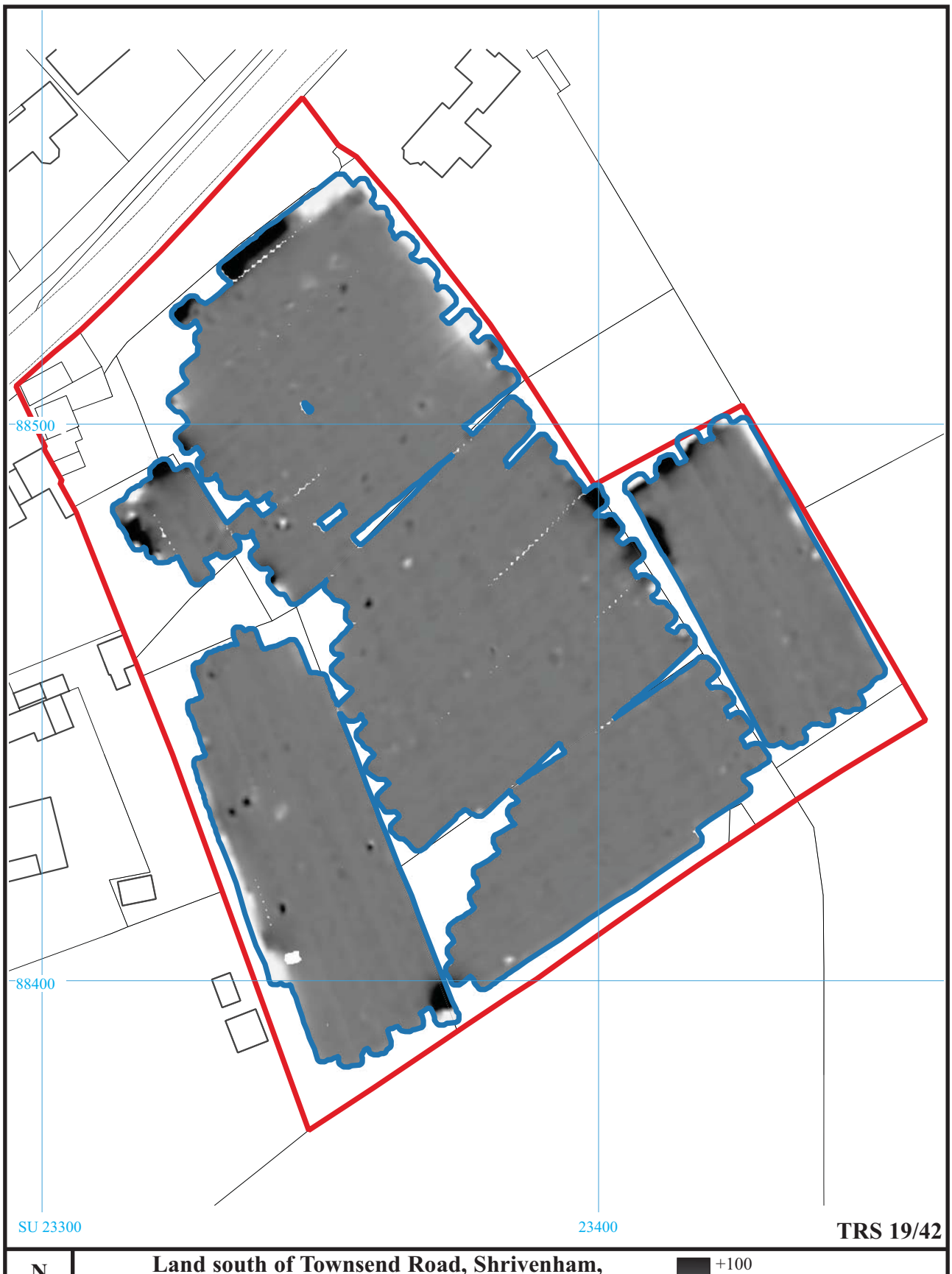

N

Land south of Townsend Road, Shrivenham, Oxfordshire, 2020
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.

0m 50m

+100
nT
-100

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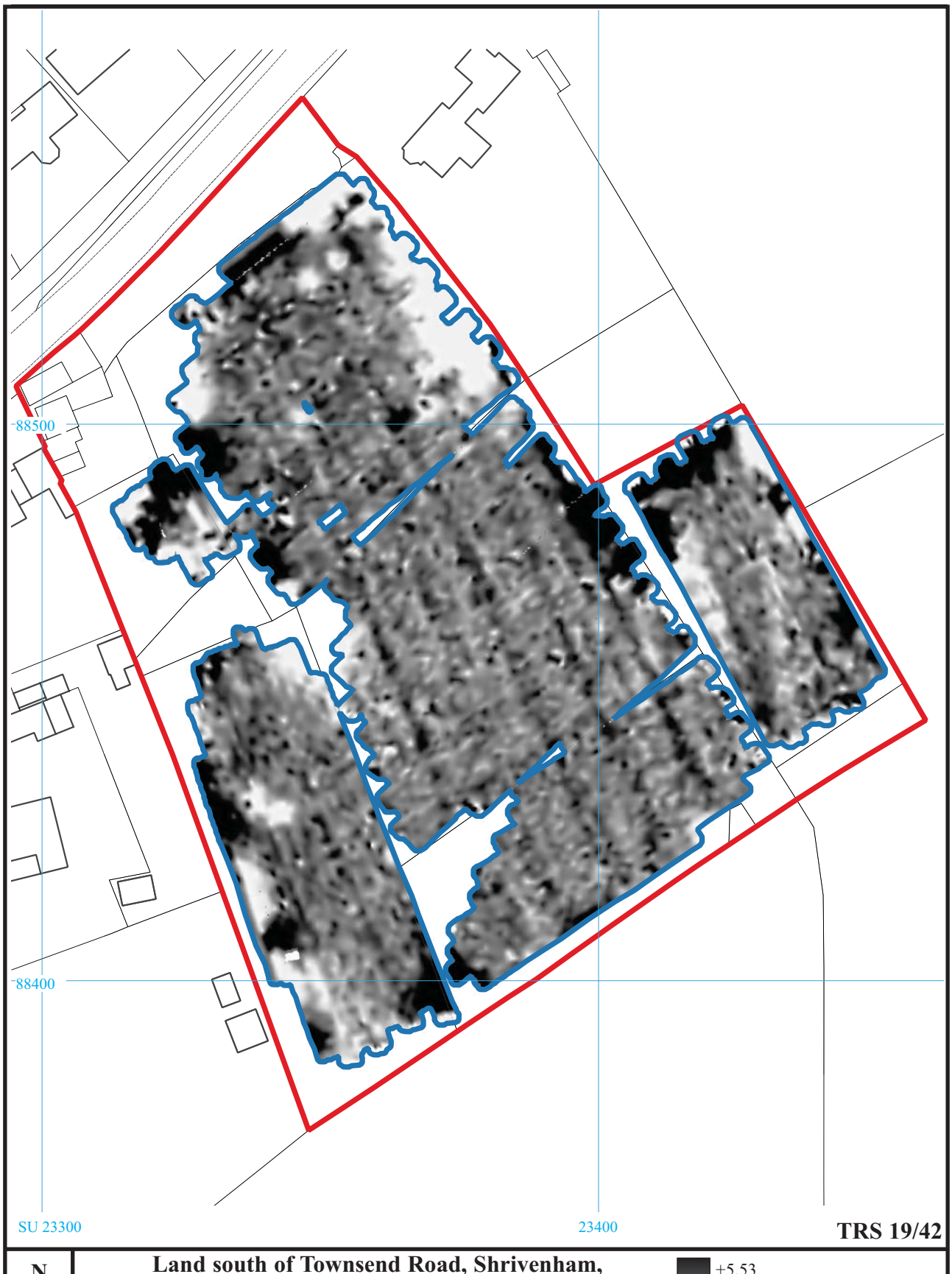

Land south of Townsend Road, Shrivenham, Oxfordshire, 2020
Geophysical Survey (Magnetic)
Figure 3. Plot of processed gradiometer data.

N

0m 50m

+5.53
nT
-5.50

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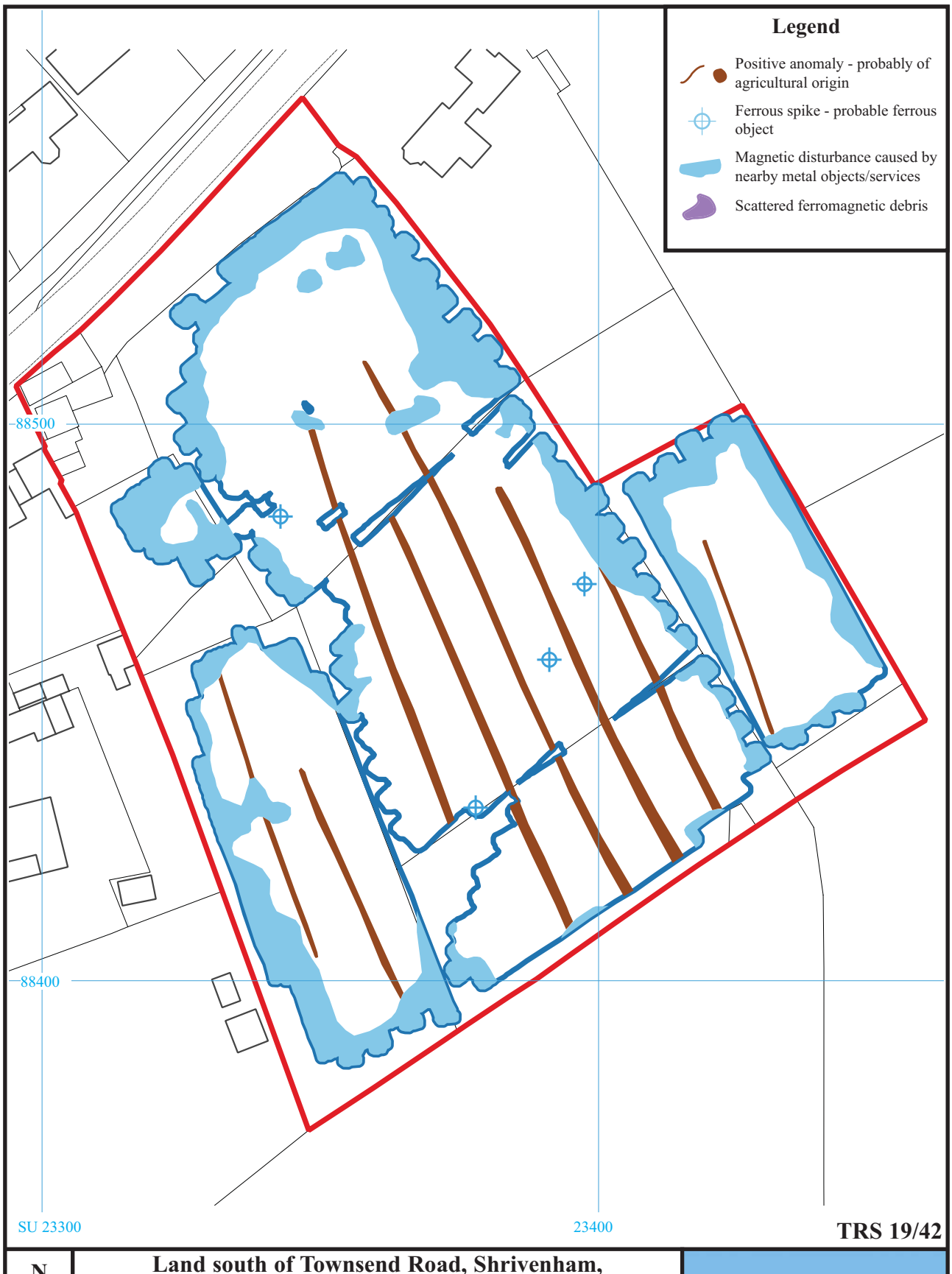

N

Land south of Townsend Road, Shrivenham, Oxfordshire, 2020
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

0m 50m

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Plate 1. Northwestern paddock of the survey area looking southeast.

Plate 2. Northern field looking northeast.

Plate 3. Central area of the site looking south.

Plate 4. Southeastern area of the site looking southeast.

Land south of Townsend Road, Shrivenham, Oxfordshire, 2020
Geophysical Survey (Magnetic)
Plates 1 to 4.

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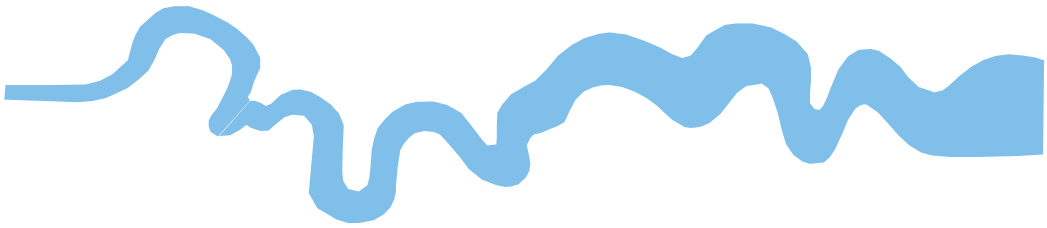
TIME CHART

	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



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