

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

ARCHAEOLOGICAL

S E R V I C E S

**Land west of New Road, Pyle Hill,
Newbury, West Berkshire**

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: NRG19/185

(SU 4852 6556)

**Land west of New Road, Pyle Hill, Greenham,
Newbury, West Berkshire**

Geophysical Survey (Magnetic) Report

For Rivar Ltd

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code NRG 19/185

January 2020

Summary

Site name: Land west of New Road, Pyle Hill, Greenham, Newbury, West Berkshire

Grid reference: SU 4852 6556

Site activity: Magnetometer survey

Date and duration of project: 16th December 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: NRG19/185

Area of site: 3ha

Summary of results: A number of positive linear magnetic anomalies were detected by the geophysical survey in the eastern area of the site. These may represent buried archaeological features consisting of peripheral agricultural features as well as a possible small enclosure.

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

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Report edited/checked by: Steve Ford✓ 10.01.20 Tim Dawson✓ 10.01.20
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Land west of New Road, Pyle Hill, Greenham, Newbury, West Berkshire A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 19/185

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at New Road, Pyle Hill, Greenham, Newbury, West Berkshire (SU 4852 6556) (Fig. 1). The work was commissioned by Mr James Bull of Rivar Ltd, 5 West Mills, Newbury, Berkshire, RG14 5HG.

A planning consent (18/00529/FULEXT) has been gained from West Berkshire Council for the residential development of a c.1.3 ha parcel of land. This is in accordance with the *National Planning Policy Framework* (NPPF 2019) and the County's policies on archaeology. The field investigation was carried out to a specification approved by Sarah Orr, Senior Archaeologist for West Berkshire County Council. The fieldwork was undertaken by Kyle Beaverstock and Camila Carvalho on the 16th of December 2019 and the site code is NRG19/185.

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 2km to the south-east of Newbury, on the northern edge of Greenham (Fig. 1). The site is bounded to the north and west by open farmland, to the east by New Road and to the south by residential properties. This sub-rectangular parcel of land slopes downhill from a height of 121m above Ordinance Datum (aOD) in the south to a height of 115m aOD in the north. The land is currently rough grassland and the underlying geology is stated as Silchester Gravel (BGS 2006).

Site history and archaeological background

The archaeological potential of the site stems from its location on the margins of the archaeologically rich Kennet Valley but is in a location with a small number of sites and finds recorded within the West Berkshire Historic Environment Record. However, these finds include those of a number of Roman coins, perhaps from a dispersed hoard, or being ploughed up episodically from buried occupation deposits, which are recorded to the west. Roman pottery was found in a quarry further to the west and as a stray find to the northwest. Evaluation of

a parcel of land to the west of the site (Manisse 2018) revealed a small number of field boundaries of Roman and/or medieval date.

The site lies close to the historic centre of Greenham with the parish church just beyond the site boundary to the north-east and the medieval manor thought to lie to the east. Greenham has late Saxon origins and is noted in Domesday Book of 1086. Unusually, the presence of a church is recorded (Williams and Martin 2002). It is possible that components of the late Saxon or medieval settlement extend into the site area.

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 north to south zig-zag orientation across the survey area. A number of obstructions were encountered preventing a full survey, including areas of trees and overgrowth along the south-eastern and southern edge, in the central-southern area and along the north-western boundary. There was also the partial remains of a fence running north to south down the centre of the site dividing the field. Conditions during the survey 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 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 -4.40 to 4.20 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

A number of anomalies were encountered by the geophysical survey (Fig. 2) including numerous magnetic disturbances such as three bipolar and dipolar linear anomalies represented by both positive and negative responses of a high amplitude (Fig. 3). Two of these linear anomalies ran across the site, one on a north-northeast to south-southwest orientation for 71m the other running south-west to north-east for 212m with a third running along the south-eastern section of boundary. There were also a number of bipolar disturbances in the eastern area of site caused by water monitoring wells. In the south-eastern area (Fig. 4) a positive linear anomaly runs from the north-east to the south-west for 15m then turns to the south for 21m then to the east for 24m, the amplitude of the linear then becomes weaker and possibly runs to the north for 24m forming a small enclosure.

In the north-eastern area of the site are a number of positive linear anomalies forming a series of field boundaries, possibly of archaeological interest. The most northerly of these was an 'L' shaped positive anomaly which ran from north to south for 17m before turning to the west for 11m, to the south of this and possibly forming the boundaries of a trackway is another positive linear. This runs from the eastern boundary to the west for 92m before disappearing into the magnetic disturbance. From the centre of this linear anomaly running for 47m to the south-east is a weak positive linear anomaly, this is a positive anomaly represented by a low amplitude and may be a more subtle feature such as a gully.

Conclusion

A number of linear magnetic anomalies in the eastern area of the site were detected by the geophysical survey. These may show the presence of some peripheral agricultural features such as field boundaries as well as a small enclosure in the south eastern area of the site. These are of archaeological interest. Some areas of the site could not be surveyed due to obstructions as well as significant magnetic disturbance from buried services, which may be masking features.

References

- BGS, 2006, *British Geological Survey*, 1:50,000, Sheet 267, Bedrock and Superficial Edition, Keyworth
- CI/A, 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
- IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading
- NPPF, 2019, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London
- Manisse, P. 2018, Land east of Greenham Road, Newbury, West Berkshire, An archaeological evaluation, Thames Valley Archaeological Services report 16/113, Reading
- Williams, A and Martin, G H, 2002, *Domesday Book, a complete translation*, London

Appendix 1. Survey and data information

Programme:

Name: TerraSurveyor
Version: 3.0.25.0

Raw data

Filename: Greenham RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 448361.633825521, 165635.729306038 m
Southeast corner: 448574.833825521, 165472.059306038 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions

Survey Size (meters): 213 m x 164 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 82143, Recorded: 82143

Stats

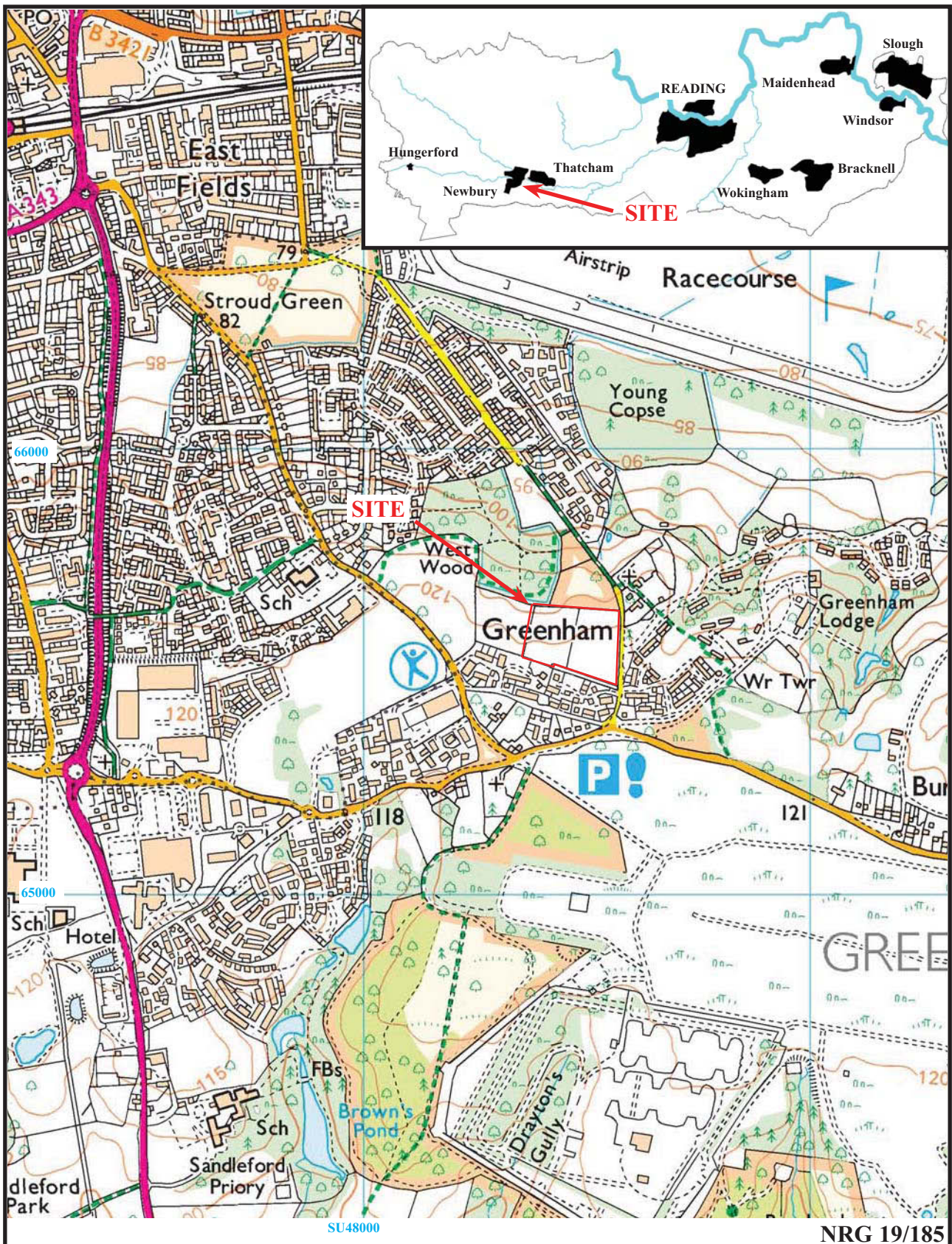
Max: 107.34
Min: -109.75
Std Dev: 10.73
Mean: -2.40
Median: -1.20
Composite Area: 3.4894 ha
Surveyed Area: 2.2115 ha

Processed data

Filename: Greenham.xcp
Stats
Max: 4.42
Min: -4.40
Std Dev: 1.52
Mean: -0.02
Median: 0.04
Composite Area: 3.4894 ha
Surveyed Area: 2.1763 ha

GPS based Proce7

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to UTM).
- 3 DeStripe Median Traverse:
- 4 Clip from -4.00 to 4.00
- 5 DeStagger by: 50.00cm, Shift Positions
- 6 DeStagger by: 50.00cm, Shift Positions
- 7 DeStagger by: 50.00cm, Shift Positions

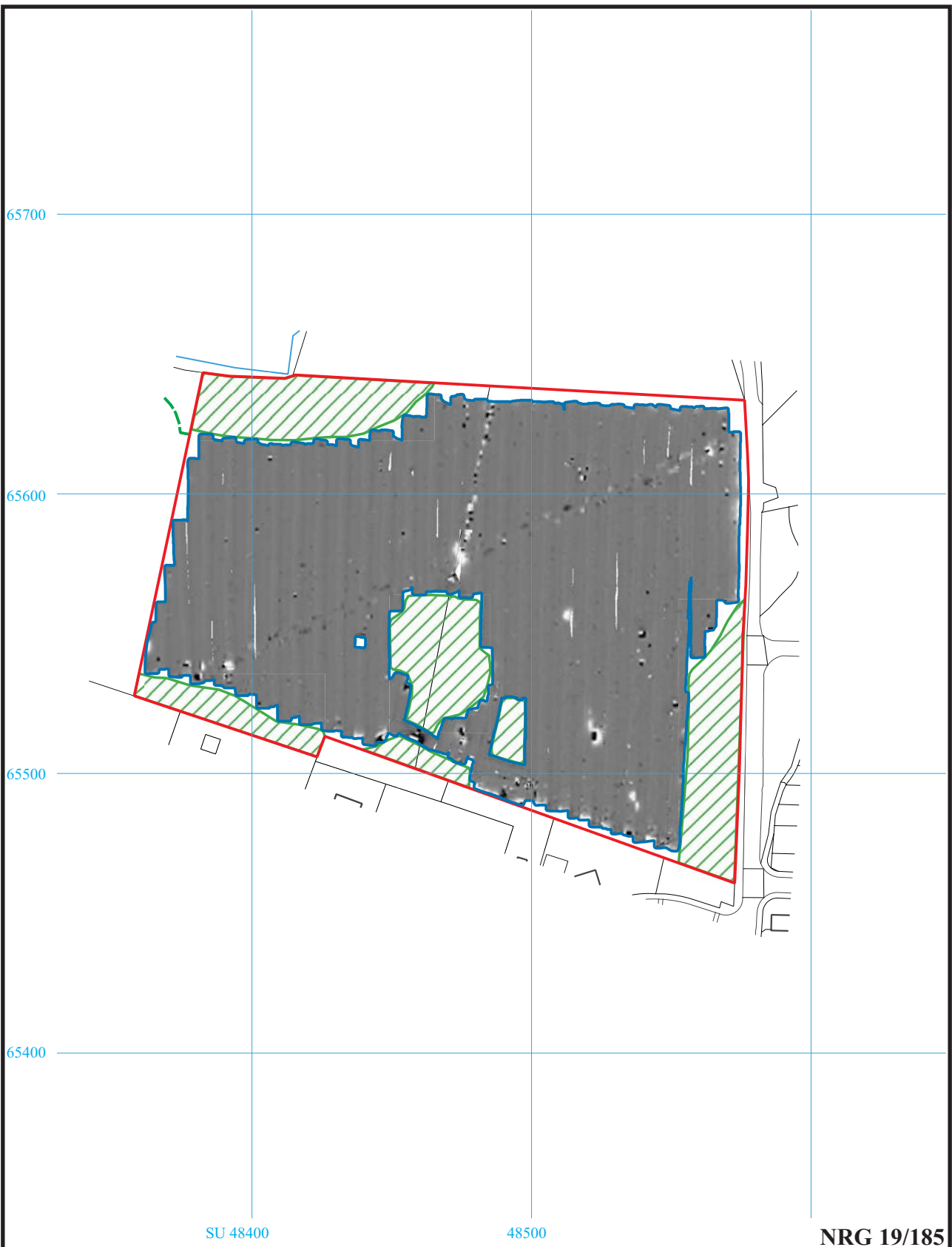


**Land west of New Road, Pyle Hill, Greenham,
Newbury, West Berkshire, 2019
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Greenham and Berkshire.

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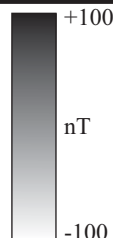
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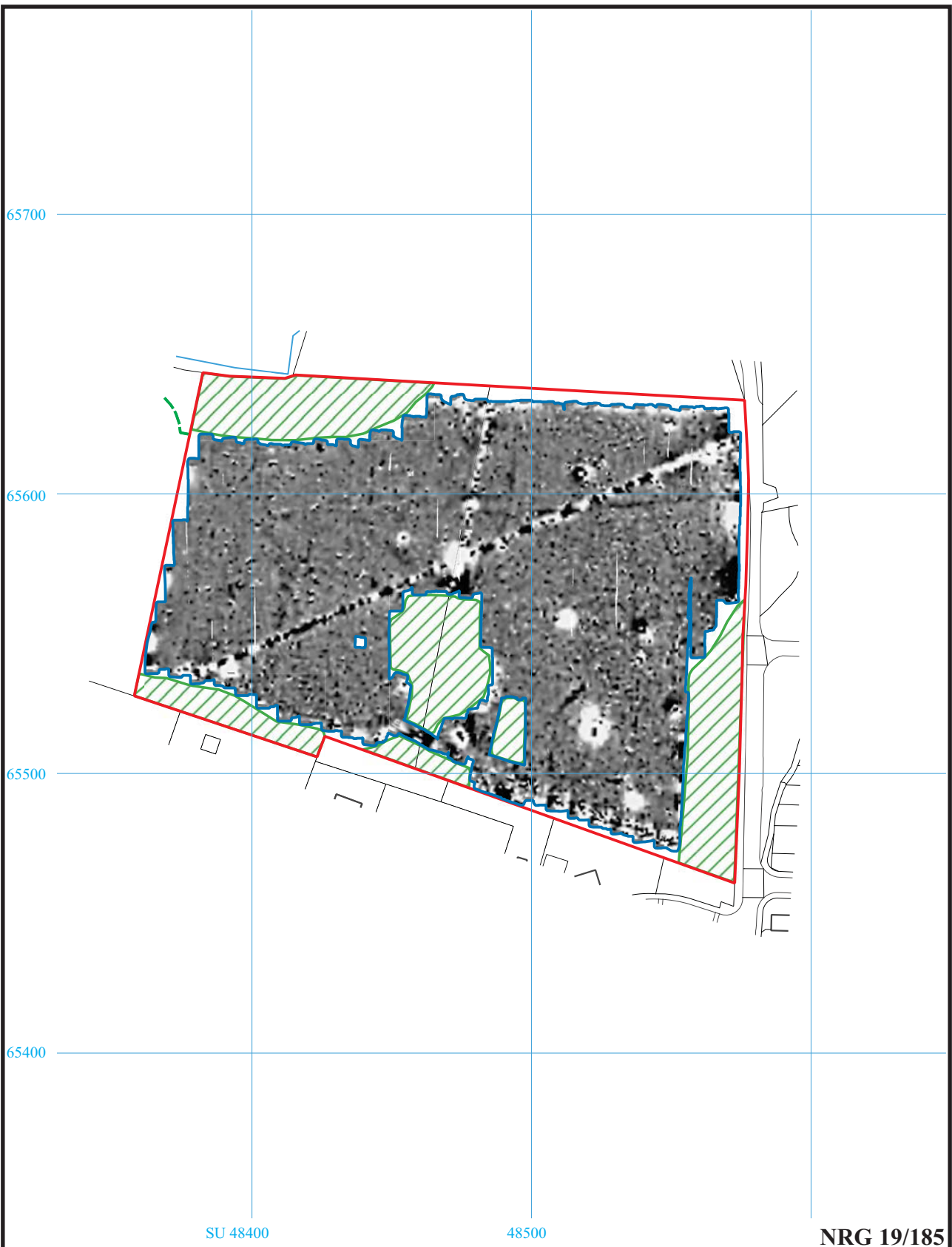


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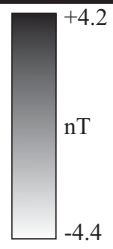


**Land west of New Road, Pyle Hill, Greenham,
Newbury, West Berkshire, 2019
Geophysical Survey (Magnetic)**
Figure 2. Plot of raw gradiometer data.

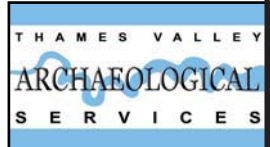




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 Figure 3. Plot of processed gradiometer data.



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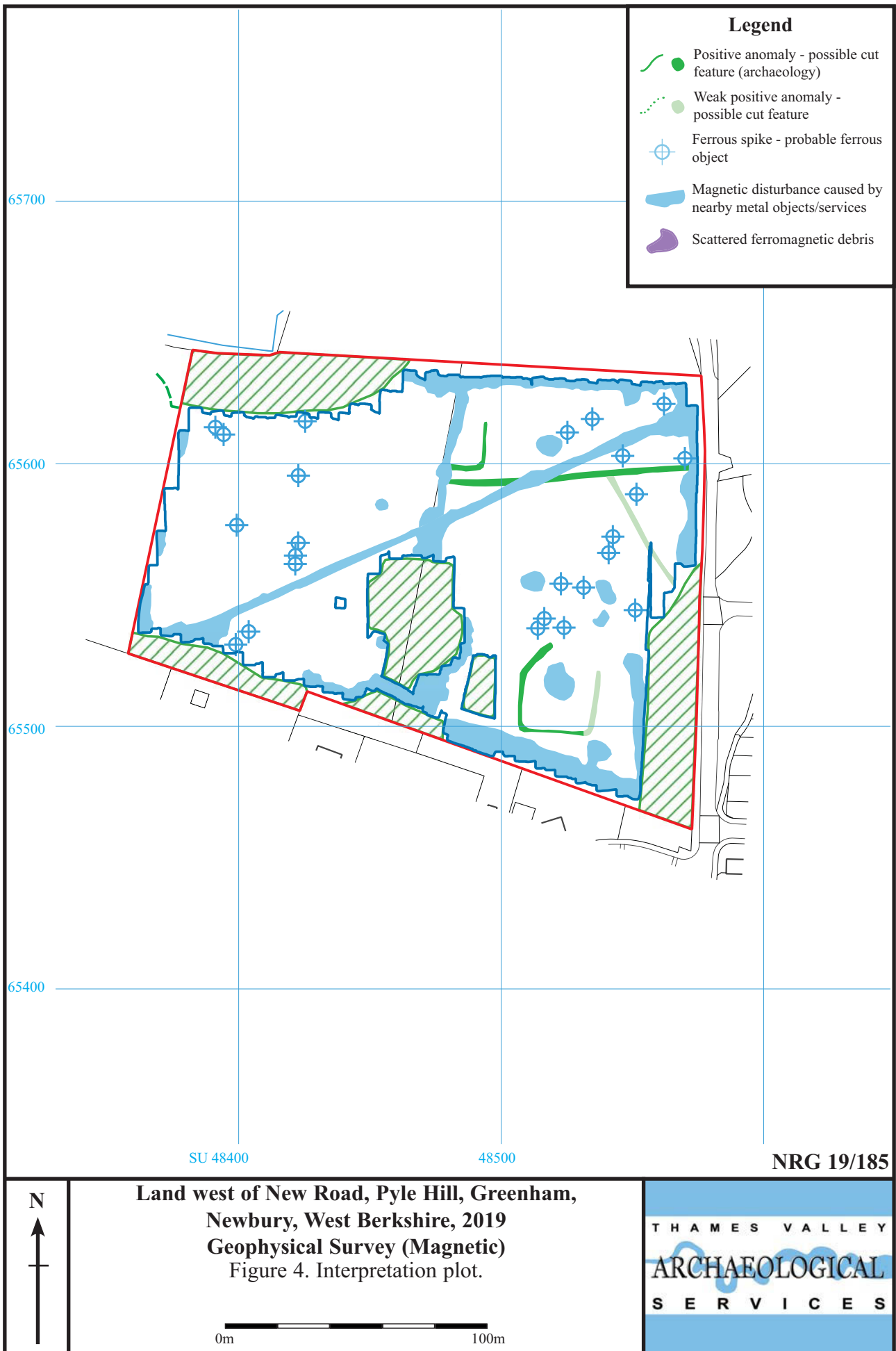




Plate 1. Eastern boundary of survey area looking north from the southeastern corner.



Plate 2. Southern boundary looking west from southeastern corner.



Plate 3. Overgrowth in the centre of site looking northwest.



Plate 4. Southwestern area of survey area looking northeast towards St Mary's Church.

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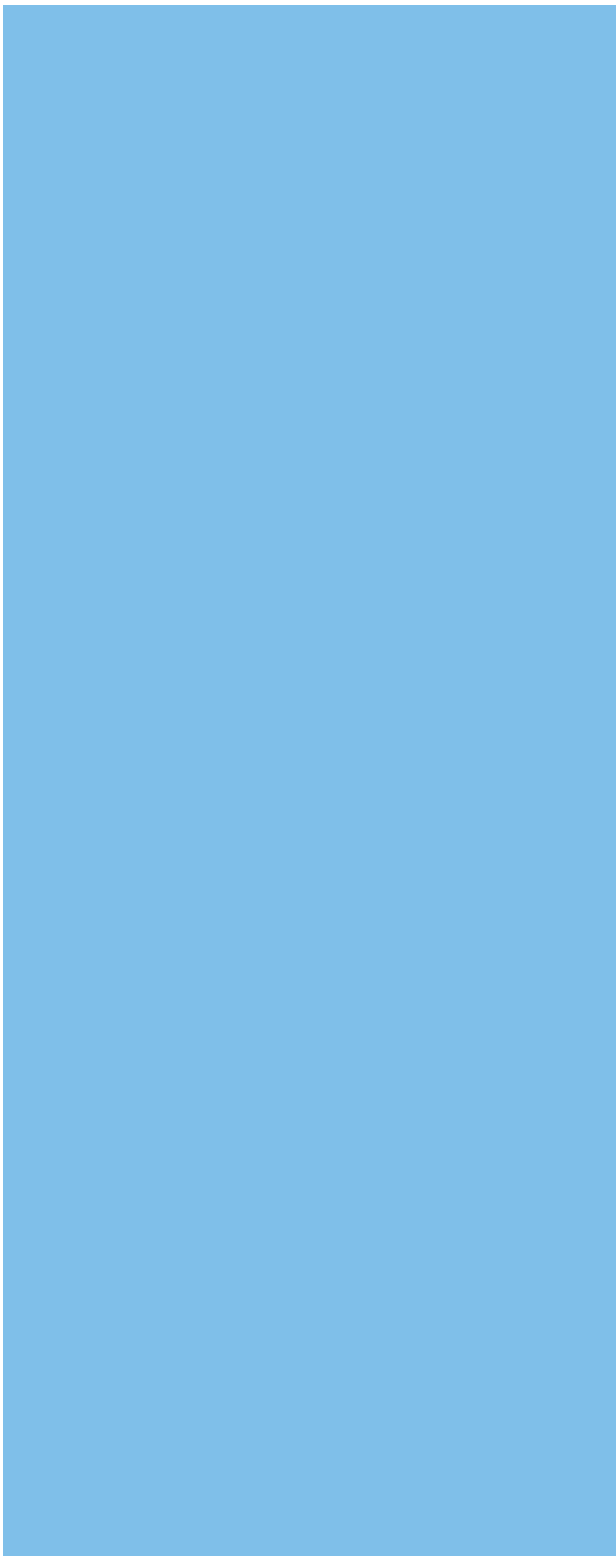
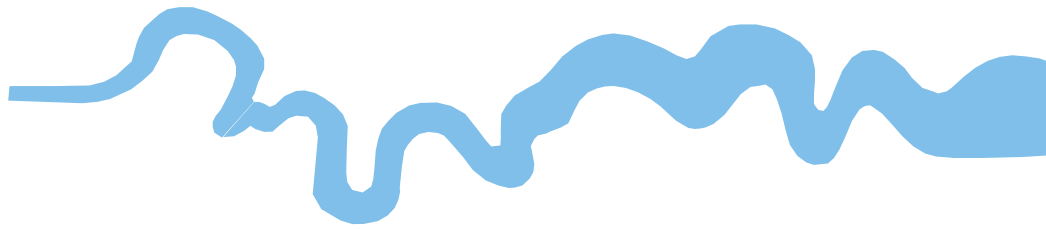
**Land West of New Road, Pyle Hill, Greenham,
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Geophysical Survey (Magnetic)
Plates 1 to 4.**

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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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