THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Land at North End Road, Steeple Claydon, Buckinghamshire

Geophysical Survey

by Kyle Beaverstock

Site Code: SCB19/193

(SP 7003 2746)

Land at North End Road, Steeple Claydon, Buckinghamshire

Geophysical Survey (Magnetic) Report

For Coleman Hicks Partnership Architects

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code SCB 19/193

January 2020

Summary

Site name: Land at North End Road, Steeple Claydon, Buckinghamshire

Grid reference: SP 7003 2746

Site activity: Magnetometer survey

Date and duration of project: 17th January 2020

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: SCB19/193

Area of site: c. 0.6ha

Summary of results: In the areas that were exmined no features or anomalies of archaeological potential were identified by the geophysical survey.

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✓ 04.02.20
	Tim Dawson✓ 4.02.20

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Land at North End Road, Steeple Claydon, Buckinghamshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 19/193

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at North End Road, Steeple Claydon, Buckinghamshire (SP 7003 2746) (Fig. 1). The work was commissioned by Mr Steven Wakefield, of Coleman Hicks Partnership Architects, Marlborough House, 69 High Street, Kidlington, Oxon, OX5 2DN. Planning permission (16/03311/AOP) has been gained on appeal (APPJ0405/W/18/3194973) from Aylesbury Vale District Council for the construction of nine new houses on a c. 0.54ha parcel of land located on North End Road, Steeple Claydon, Buckinghamshire, (SP 7003 2745). The consent is subject to a condition (15) relating to archaeology. 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 Mr Phil Markham, Archaeology Officer for Buckingham County Council. The fieldwork was undertaken by Kyle Beaverstock and Luciano Cicu on the 17th January 2020 and the site code is SCB19/193.

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 to the north of Steeple Claydon (Fig. 2), 0.3km southeast of Padbury Brook. The site is bounded by North End Road to the northwest and northeast, private property to the southwest and industrial units to the southeast. This sub-rectangular parcel of land sits at a height of 88m above Ordnance Datum, the land is currently not being utilised and the underlying geology is stated as Peterborough Member Mudstone (BGS 2002).

Site history and archaeological background

The archaeological potential of the site has been highlighted in a briefing document prepared by Mr Phil Markham of Buckinghamshire County Archaeological Service drawing on information within the Buckinghamshire Historic Environment Record. In summary, the site lies on the margins of the medieval village

of Steeple Claydon. The settlement has late Saxon origins and is recorded in Domesday Book (Williams and Martin 2002). The core of the village lies at some distance to the southeast with the parish church, manor house and earthwork, possibly associated with the civil war, lying to the south. Archaeological evaluation nearby recorded the presence of a number of undated ditches (Hargreaves 2019). Closer to the site, to the north, a number of earthworks thought to represent medieval house platforms have been identified along with a trackway, and an undated enclosure is recorded by aerial photography close to Padbury Brook. Of most significance however, is a Roman settlement in the paddock adjacent to the east of the site discovered by geophysical survey and trenching and subject to a follow up excavation.

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 northeast to southwest zig-zag orientation across most of the survey area and southeast to northwest in the north-western corner of the field. The field had a significant amount of overgrowth on the edges and in the centre of the site and conditions during the survey were mostly dry.

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 -2.20 to 2.21 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. 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 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

Of the area that was surveyed (Fig. 3), the most significant anomalies across the site are mostly caused by magnetic disturbance which is represented by dipolar signals of a high amplitude (Fig. 4). These are most likely caused by above ground ferrous objects such as fencing or buried ferrous material (Fig. 5). These, along with the overgrowth may be masking some features, especially more subtle features such as gullies or discreet features such as pits.

Conclusion

In the areas that were surveyed no features or anomalies of archaeological potential were identified by the geophysical survey.

References

BGS, 2002, *British Geological Survey*, 1:50,000, Sheet 219, Solid and Drift Edition, Keyworth

CI*f*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

Hargreaves, J, 2019, Land north of Queen Catherine Road, Steeple Claydon, Buckinghamshire, an Archaeological Evaluation, Thames Valley Archaeological Services report 17/43b, Reading

IFA, 2002, 'The Use of Geophysical Techniques in Archaeological Evaluation', IFA Paper No. 6, Reading

NPPF, 2012, *National Planning Policy Framework (revised)*, Ministry for Housing, Communities and Local Government, London

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: North End RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30
Survey corner coordinates (X/Y):
Northwest corner: 470000.785738148, 227500.717066624 m
Southeast corner: 470076.575738148, 227401.137066624 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702

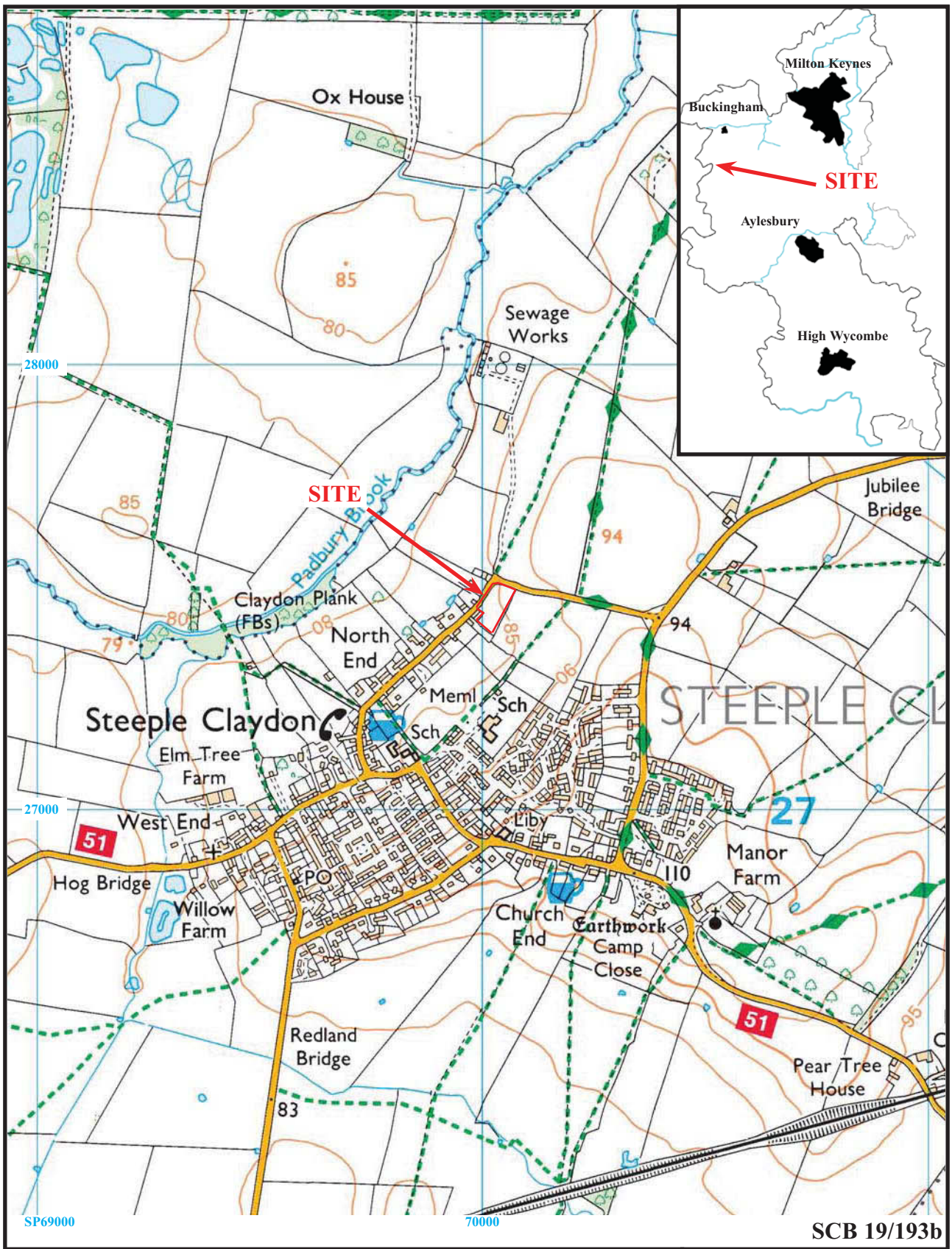
Dimensions
Survey Size (meters): 75.8 m x 99.6 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 12111, Recorded: 12111

Stats
Max: 98.81
Min: -109.34
Std Dev: 5.03
Mean: -0.82
Median: -0.34
Composite Area: 0.75472 ha
Surveyed Area: 0.36293 ha

Processed data

Filename: North End.xcp
Stats
Max: 2.21
Min: -2.20
Std Dev: 0.86
Mean: 0.03
Median: 0.00
Composite Area: 0.75472 ha
Surveyed Area: 0.36292 ha

GPS based Processes: 6
1 *Base Layer.*
2 *Unit Conversion Layer (Lat/Long to UTM).*
3 *DeStripe Median Traverse:*
4 *Despike Threshold: 1 Window dia: 3*
5 *Clip from -2.00 to 2.00*
6 *DeStagger by: 150.00cm, Shift Positio*ns



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Geophysical (magnetic) Survey

Figure 1. Location of site within Steeple Claydon and Buckinghamshire.

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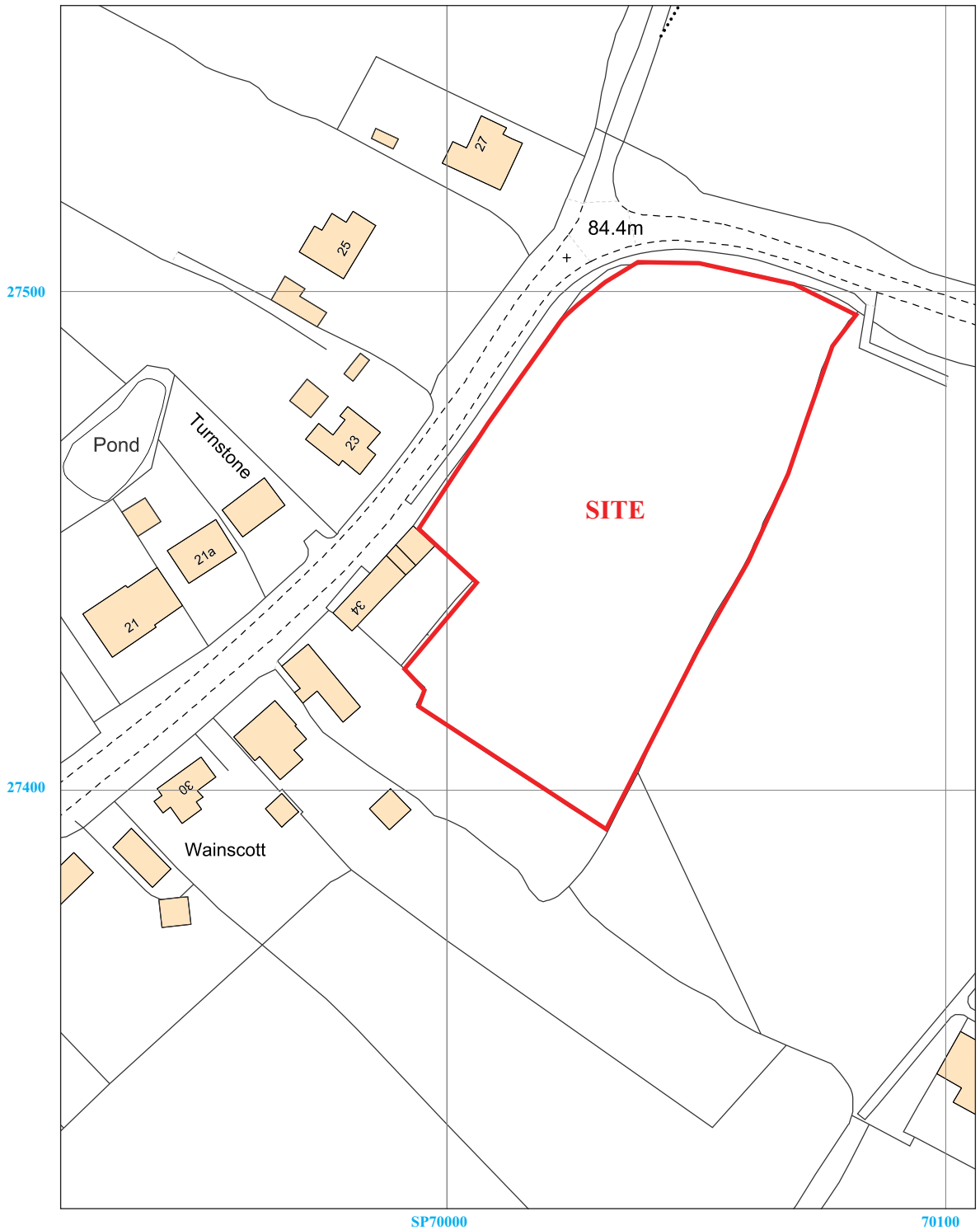

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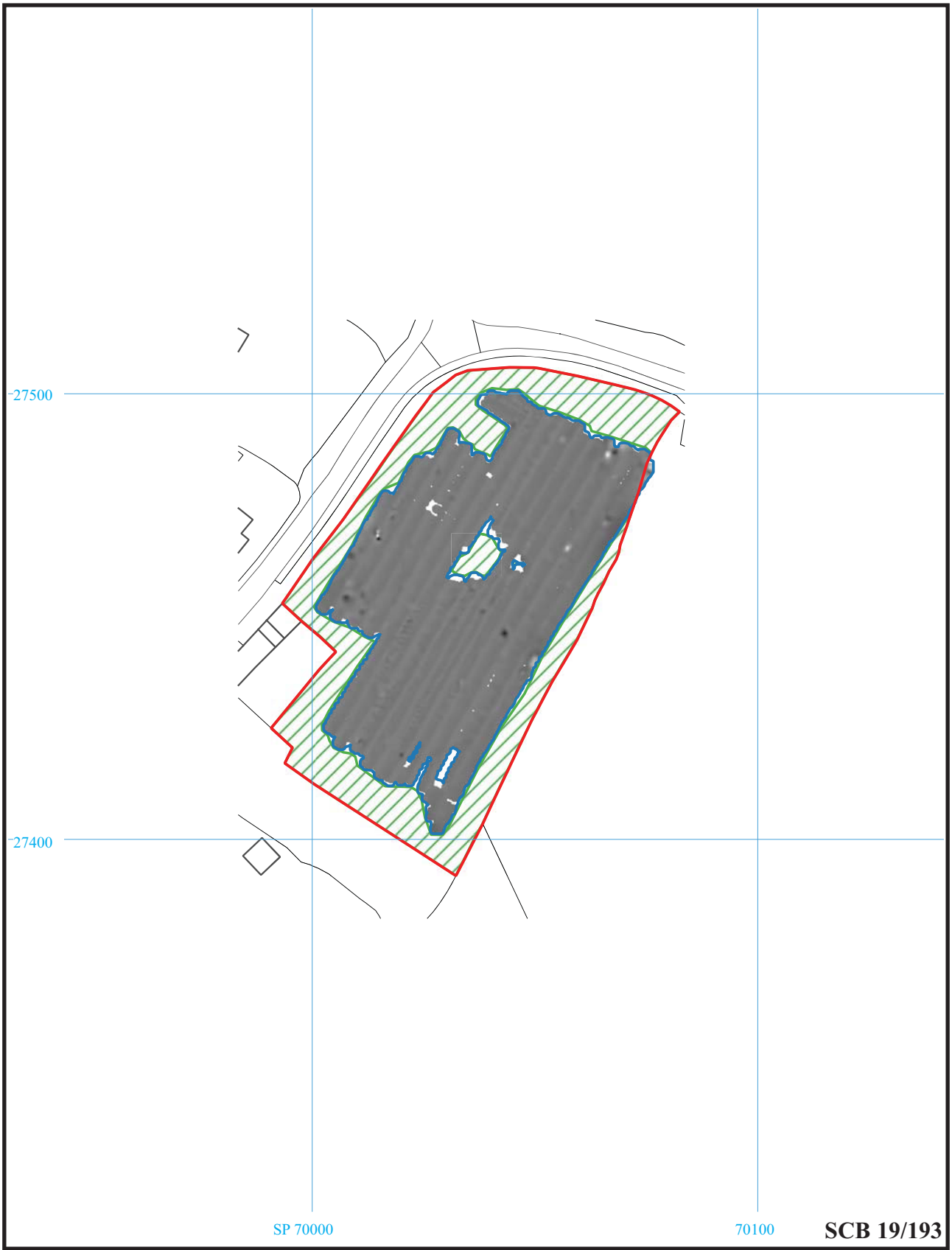
Land at North End Road, Steeple Claydon, Buckinghamshire, 2020
Geophysical (magnetic) Survey

Figure 2. Detailed location of site within Steeple Claydon and Buckinghamshire.

TVAS EAST MIDLANDS



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Land at North End Road, Steeple Claydon, Buckinghamshire, 2020
Geophysical Survey (Magnetic)
Figure 3. Plot of raw gradiometer data.

0m 50m

+100
nT
-100

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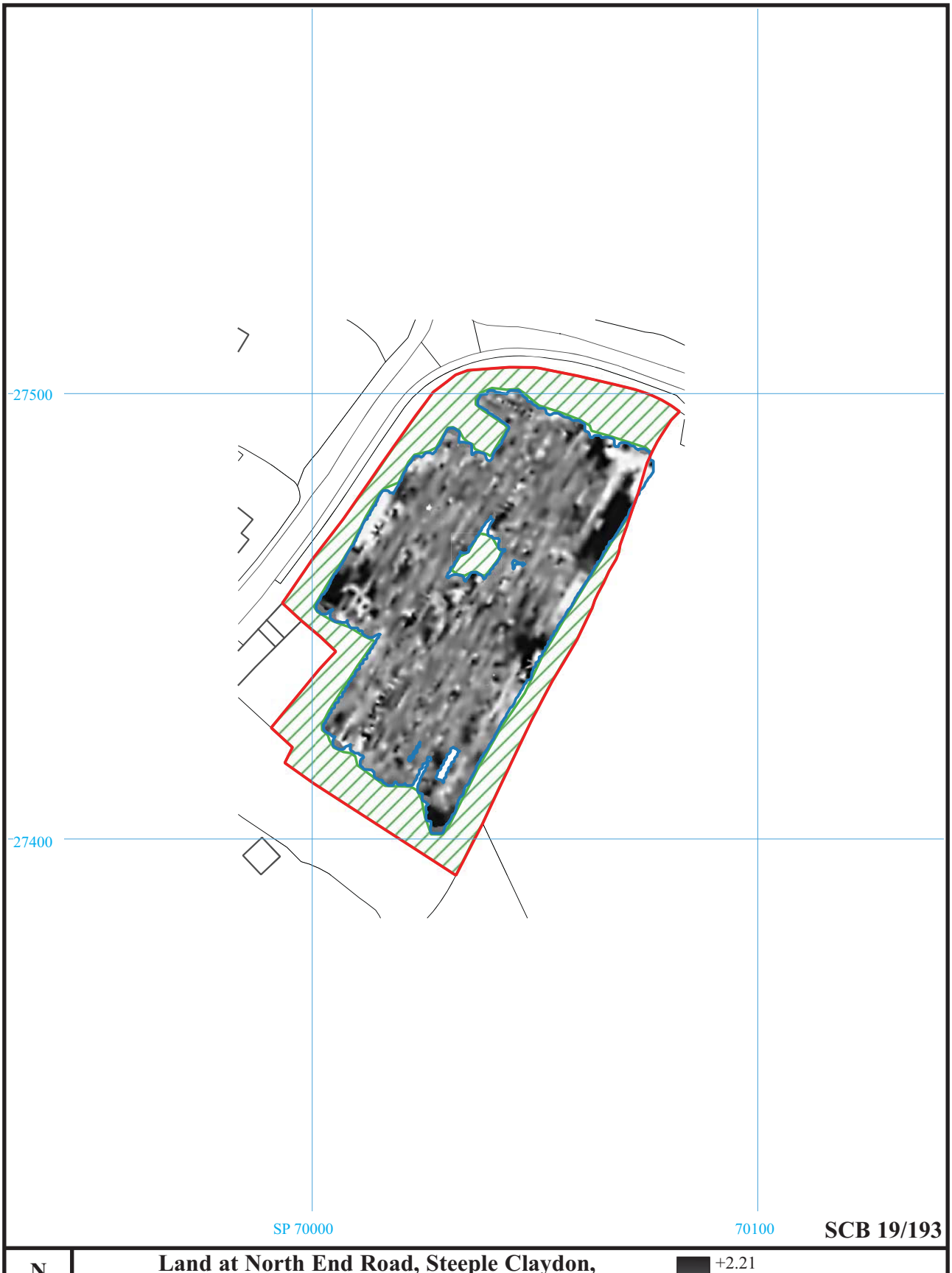

Land at North End Road, Steeple Claydon, Buckinghamshire, 2020
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Figure 4. Plot of processed gradiometer data.

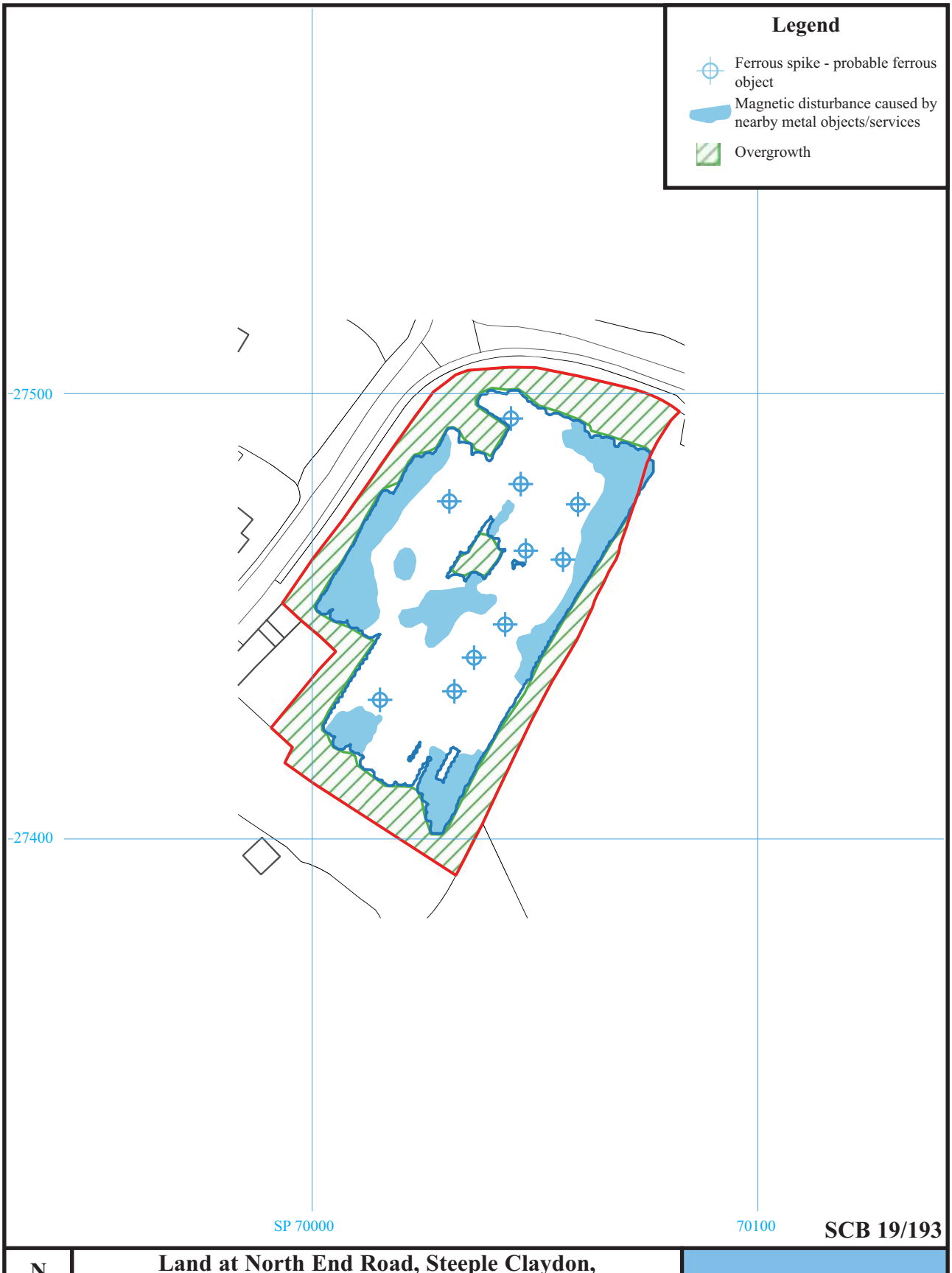

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Figure 5. Interpretation plot.

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Plate 1. Southern area of site looking southeast.

Plate 2. Western side of survey area looking north.

Plate 3. Eastern edge of survey area looking southwest.

Plate 4. Northern edge of site looking northwest.

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Plates 1 to 4.

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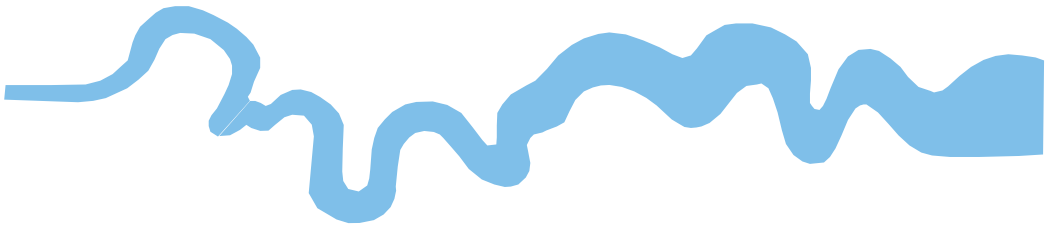
TIME CHART

	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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