

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

ARCHAEOLOGICAL

S E R V I C E S

**Nightingale Lane, South Marston,
Swindon, Wiltshire**

Geophysical Survey (Magnetic)

by Kyle Beaverstock

Site Code: NLS18/186

(SU 1972 8791)

**Nightingale Lane, South Marston,
Swindon, Wiltshire**

Geophysical Survey (Magnetic) Report

For Bower Mapson Homes Ltd

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code NLS 18/186

January 2019

Summary

Site name: Nightingale Lane, South Marston, Swindon, Wiltshire

Grid reference: SU 1972 8791

Site activity: Magnetometer survey

Date and duration of project: 10th January 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: NLS 18/186

Area of site: c. 1ha

Summary of results: No magnetic anomalies of archaeological significance were detected over the course of the survey.

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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www.tvas.co.uk/reports/reports.asp.*

Report edited/checked by: Steve Ford✓ 01.02.19 Tim Dawson✓ 01.02.19
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Nightingale Lane, South Marston, Swindon, Wiltshire A Geophysical Survey (Magnetic)

by Kyle Beaevsrtock

Report 18/186

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Nightingale Lane, South Marston, Swindon, Wiltshire (SU 19721 87907) (Fig. 1). The work was commissioned by Peter Mapson on behalf of Bower Mapson Homes Ltd. 7 The Avenue, Stanton Fitzwarren, Swindon, SN6 7SE.

Planning permission (S/18/1483) is to be sought from Swindon Borough Council to construct new housing on a parcel of land north of Nightingale Lane. As a consequence of the possibility of archaeological deposits on the site which may be damaged or destroyed by development, a geophysical survey has been proposed. The results of the survey will be used to provide targets for any subsequent trenching. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012) and the Borough's policies on archaeology. The field investigation was carried out to a specification approved by Melanie Pomerory-Kellinger, County Archaeologist for Wiltshire County Council. The fieldwork was undertaken by Kyle Beaverstock and Kayce Herrick on the 10th of January 2019 and the site code is NSL 18/186.

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 eastern side of South Marston, approximately 6km north-east of Swindon (Fig. 2). The site is bounded by a residential estate to the south-west, Nightingale Lane to the south-east and farmland to the north-west and north-east. This relatively flat parcel of land is currently under pasture for the grazing of horses and sits at a height of 97m above Ordinance Datum (aOD). The underlying geology is stated as being Kimmeridge Clay in the south-west and Alluvium in the north-east (BGS 1974).

Site history and archaeological background

The archaeological potential of the site has been highlighted in a briefing document produced by Wiltshire County Archaeology Service. This stems from its location within the historic (medieval) core of the village. The

parish church of St Mary Magdalene lies c. 100m or so to the north-west and is usually considered to lie close to the original centre of the settlement. Geophysical survey to the west of the site has also revealed a wide range of probable archaeological sites.

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-east to south-west zig-zag orientation. There were no significant obstructions other than some overgrowth along the site boundary.

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 of 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 -7.70 to 7.74 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.

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 3.4.2 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

No significant magnetic anomalies were detected over the course of the survey other than some magnetic disturbance in the north-east of the site caused by a metal fence marking a property boundary as well as a possible service/pipe although it is difficult to discern due to the amount of magnetic disturbance which may be masking other features. There was a high dipolar magnetic signal in the area of the site entrance due to the gate along the south-eastern boundary as well as two patches of magnetic debris between these. Several dipolar magnetic spikes were also detected across the site that were most likely the result of buried ferrous objects or magnetic debris.

Conclusion

No anomalies of archaeological significance were detected over the course of the survey.

References

- BGS, 1974, *British Geological Survey*, 1:50,000, Sheet 252, Solid and Drift 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, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

Appendix 1. Survey and data information

Programme:

Name: TerraSurveyor
Version: 3.0.25.0

Raw data

Filename: nightingalelane.xcp
Description: Imported as Composite from: nightingalelane.xyz
Instrument Type: MLgrad601 import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 588794.124123916, 5716247.76253494 m
Southeast corner: 588981.714123916, 5716111.26253494 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Source GPS Points: 30463

Dimensions

Composite Size (readings): 1443 x 1050
Survey Size (meters): 188 m x 136 m
Grid Size: 188 m x 137 m
X Interval: 0.13 m
Y Interval: 0.13 m

Stats

Max: 107.13
Min: -109.74
Std Dev: 15.05
Mean: -2.19
Median: 0.64
Composite Area: 2.5606 ha
Surveyed Area: 1.1159 h

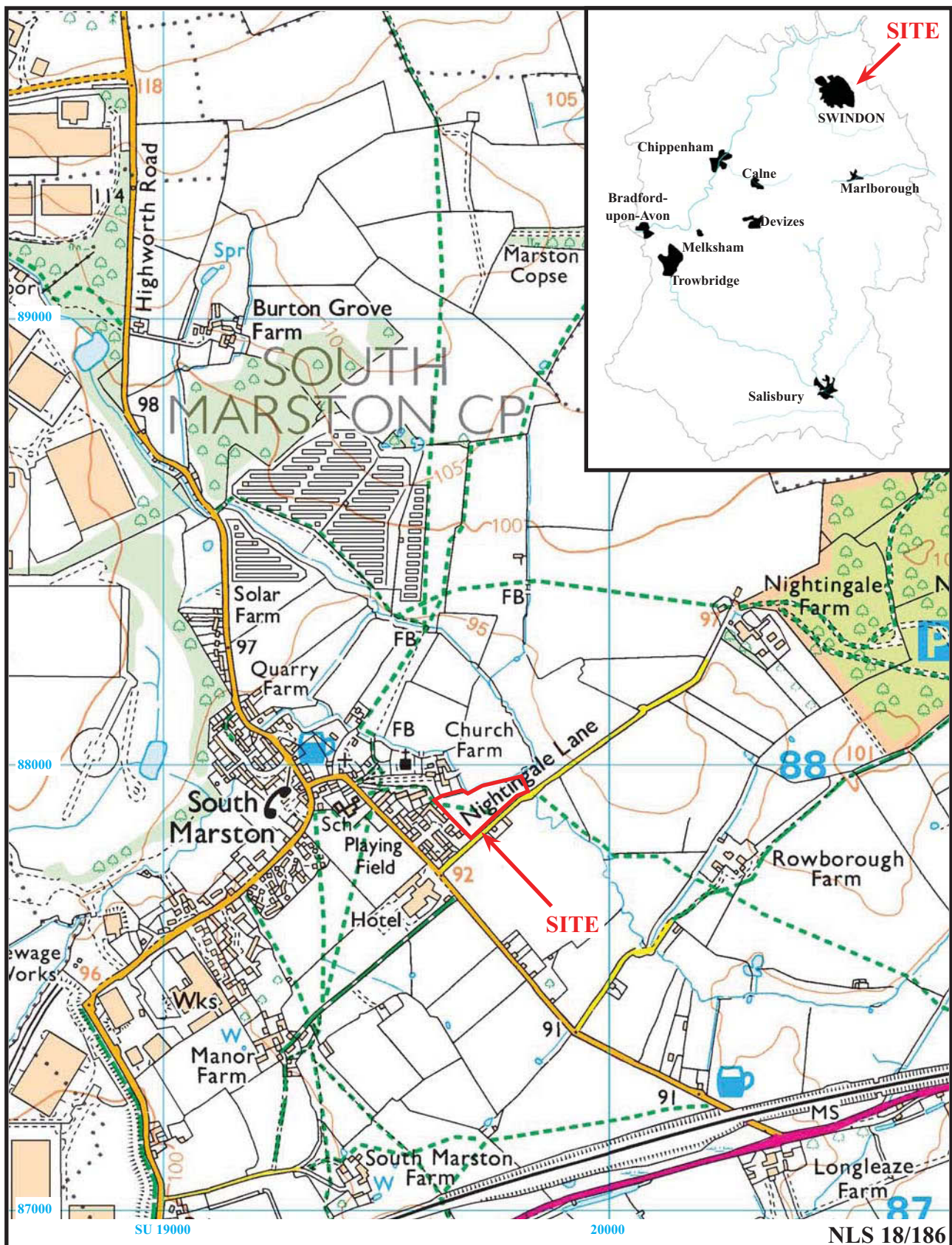
Processed data

Stats

Max: 7.74
Min: -7.70
Std Dev: 2.54
Mean: -0.53
Median: -0.01
Composite Area: 2.5606 ha
Surveyed Area: 1.1159 ha

GPS based Proce5

- 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 -7.00 to 7.00



**Nightingale Lane, South Marston,
Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)**

**Figure 1. Location of site within South Marston and
Wiltshire.**

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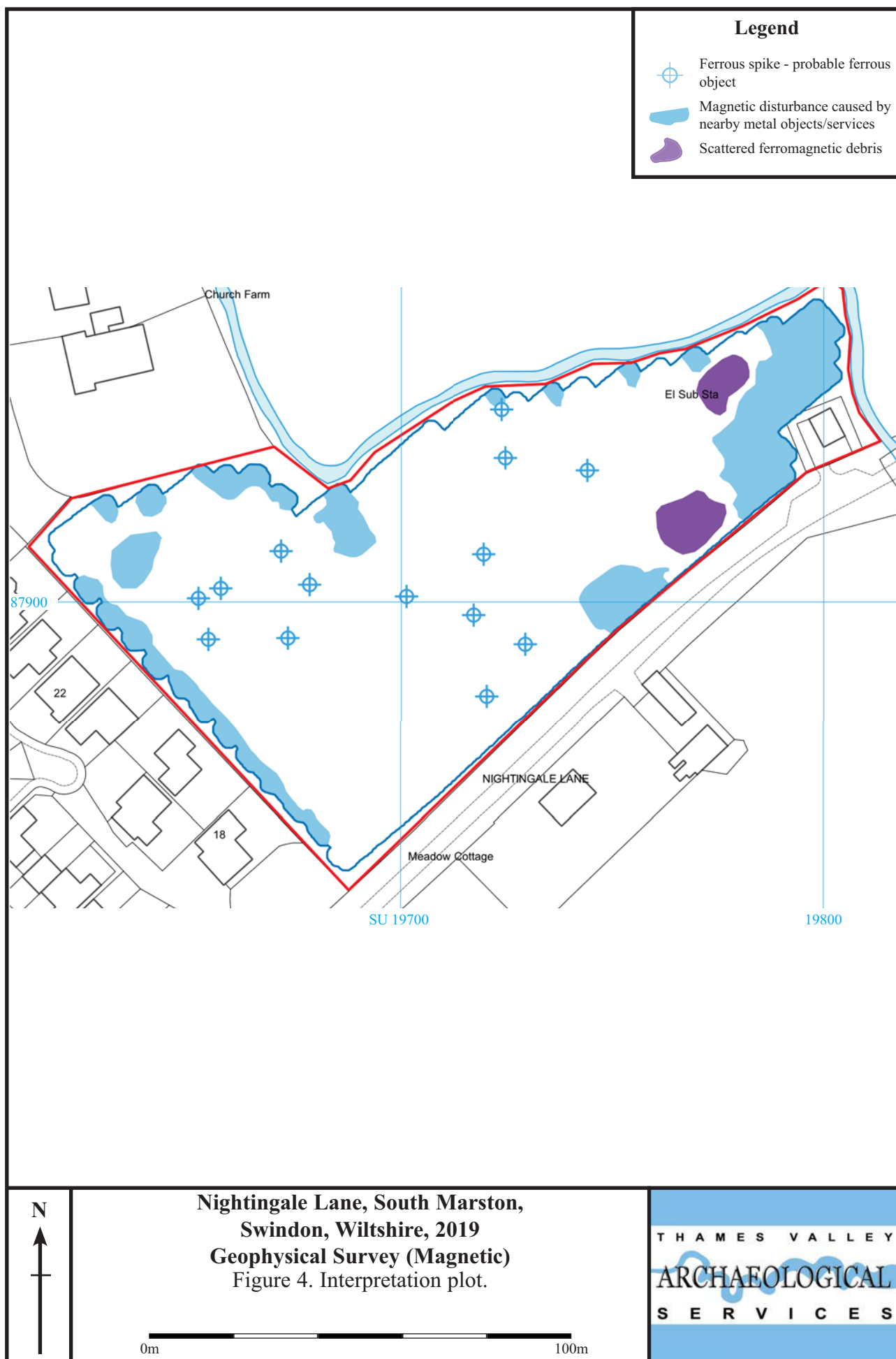




Plate 1. South end of site looking south-west.



Plate 2. South end of site looking west.



Plate 3. North end of site, looking north-east.

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**Nightingale Lane, South Marston,
Swindon, Wiltshire**
Archaeological Geophysical Survey (Magnetic)
Plates 1 to 3.

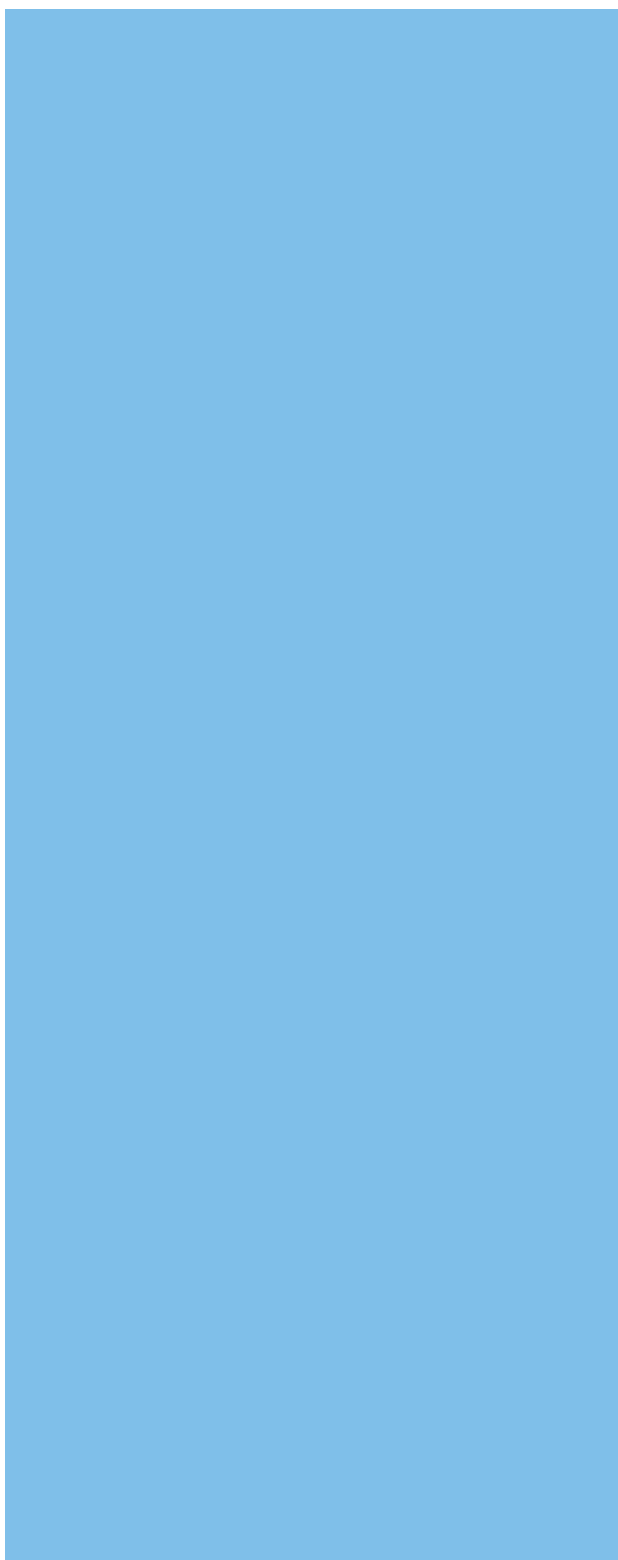
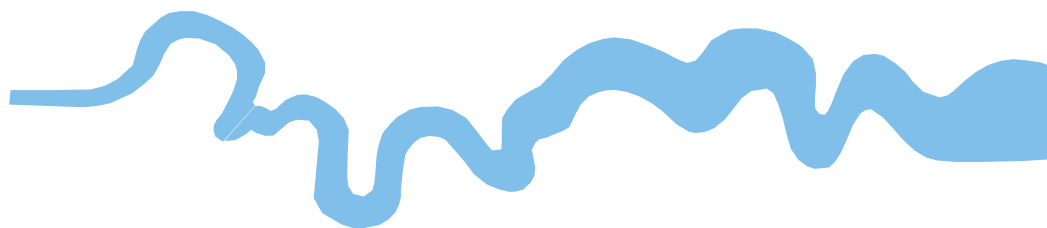
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TIME CHART

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





**Thames Valley Archaeological Services Ltd,
47-49 De Beauvoir Road,
Reading RG1 5NR**

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

***Offices in:
Brighton, Taunton, Stoke-on-Trent and Ennis (Ireland)***