THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Land at Foxbridge, Wanborough Road, Swindon, Wiltshire

Geophysical Survey

by Kyle Beaverstock

Site Code: FWS19/22

(SU 1965 8488)

Land at Foxbridge, Wanborough Road, Swindon, Wiltshire

Geophysical Survey (Magnetic) Report

For The Peploe Trust

by Kyle Beaverstock

Thames Valley Archaeological Services Ltd

Site Code FWS 19/22

March 2019

Summary

Site name: Land at Foxbridge, Wanborough Road, Swindon, Wiltshire

Grid reference: SU 1965 8488

Site activity: Magnetometer survey

Date and duration of project: 14th – 19th of February 2019

Project coordinator: Tim Dawson

Site supervisor: Kyle Beaverstock

Site code: FWS 19/22

Area of site: 5.45ha

Summary of results: A large number of magnetic anomalies were recorded across all three survey areas. These include several positive and negative anomalies which most likely represent buried archaeological features and are primarily located along the site's north-eastern boundary. Of particular note is an area of neutral readings at the northern point of the site which may indicate the line of the Roman road. The larger of the two northern fields was characterised by areas of magnetic debris which may be the result of ground disturbance of unknown date.

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✓ 12.03.19
	Tim Dawson✓ 12.03.19

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Land at Foxbridge, Wanborough Road, Swindon, Wiltshire
A Geophysical Survey (Magnetic)

by Kyle Beaverstock

Report 19/22

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at Land at Foxbridge, Wanborough Road, Swindon, Wiltshire SU 1965 8488 (Fig. 1). The work was commissioned by Mr Aaron Smith of Fowler Architecture and Planning, 19 High Street, Pewsey, Wiltshire, SN9 5AF on behalf of the Peploe Trust.

An application to develop an irregular plot of land at Foxbridge, Wanborough Road, is to be submitted to Wiltshire County Council which will require a programme of archaeological investigation. As such, a geophysical survey has been requested in order to inform further work. As a consequence of the possibility of archaeological deposits on the site which may be damaged or destroyed by development. The fieldwork was undertaken by Kyle Beaverstock, Jamie Williams and Ashley Kruger from the 14th - 19th February 2019 and the site code is FWS 19/22.

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 Swindon, between Swindon and Wanborough. This triangular parcel of land is bounded by the A419 to the west and Wanborough Road to the east with open farmland to the south. Although relatively flat at a height of 95m above Ordinance Datum there were visible depressions in the landscape that appear to correspond to strips devoid of magnetic anomalies suggesting more recent truncation. The site consists of three fields of former arable farmland but is currently not being utilised. The underlying geology is stated as Kimmeridge Clay (BGS 1974).

Site history and archaeological background

The main source of archaeological potential derives from the site's proximity to the Roman road, Ermine Street, known locally as Wanborough road. The road follows the main route to the Roman town of *Durocornovium* which is linked to *Calleva Atrebartum* (Silchester). Due to its location on the road, there is a possibility of

further Roman roadside settlement or other occupational and agricultural deposits or features being present. A previous geophysical survey in the field to the south-east showed that extensive occupational deposits, a roadside settlement, are present and appear to extend into the proposed survey 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 and 0.5m apart in more concentrated areas, providing an appropriate methodology balancing cost and time with resolution. Traverses were walked at an alternating east to west zig-zag orientation across the north-western survey area and north-east to south-west in the southern area of the north-western field. In the larger eastern field, traverses were walked in a south-east to north-westerly direction. Most of the survey area was unobstructed, however there were significant obstructions including overgrowth and structural remains in the far north western area of the site.

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 -5.00 to 5.00 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 3.4.4 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

The results (Fig. 3) clearly show an extensive area of probable occupational deposits along the north-eastern site boundary adjacent to the Roman road, with the form of the anomalies suggesting a Roman roadside settlement. The majority of the magnetic anomalies consist of positive linear features which form a series of rectangular enclosures (Fig. 4). These most likely represent boundary ditches and/or foundation cuts, as both are cut features it is not possible to distinguish between them in the geophysical results. Whilst the majority of these anomalies appear to run along the same orientation parallel or perpendicular to the Roman road, some of the anomalies, particularly in the north-western area of the site, have a slightly different orientation whilst still respecting the road boundary suggesting several phases of occupation. In the north-east where the existing road turns towards the north there is an area with a slightly negative response. This aligns with the orientation of the occupational deposits and may represent the remains of the Roman road which is projected to run through this area.

Within these positive linear anomalies were several weak positive linear anomalies and some irregularly shaped positive anomalies which most likely represent more subtle and discrete features such as gullies and pits. Also within this is a negative linear anomaly which runs parallel to the positive linear anomaly which could indicate the presence of a bank or built-up area along the boundary of the positive linear anomaly. To the north-west of this there was a series of parallel linear positive anomalies running north-east to south-west, these most likely represent agricultural activities such as ridge and furrow. There are two areas with a linear form aligned north-east to south-west within the occupational area that are notably devoid of features. These correspond to dips or depressions in the landscape which suggests some more recent truncation or erosion of the land.

In the southern area, outside the concentrated area of anomalies is an area two weak linear anomalies running roughly north-east to south-west. These most likely represent buried ditches of archaeological interest, the southern anomaly appears to be on the same alignment as the current field boundary which would suggest a possible association. To the north-west of these running along the north-western boundary of the southern field

are two negative anomalies with an adjacent positive response, these most likely represent agricultural activity such as a headland formed by the ploughing of the land.

In the north-west of the site is an area of scattered magnetic debris, this consists of numerous dipolar responses and covered the area surrounding a concrete pad. The high responses and the position of the magnetic debris suggests a spread of ferrous material. There was also some interference from magnetic disturbance caused by the surrounding fences and a buried service. This appears as a bipolar linear anomaly which is aligned north to south and ran from the north-west of the southern field towards the south.

Conclusion

The geophysical survey revealed a concentrated area of anomalies whose form suggests a Roman roadside settlement. This appears to be a continuation of the series of anomalies revealed by a previous geophysical survey in the adjacent field to the south-east. These anomalies mostly consist of positive linear anomalies which represent either boundary ditches or structural remains. There is also some evidence to suggest that the remains of the Roman road may have survived in the north-east of the survey area where the current road deviates from its former alignment. To the south of this main area of concentrated anomalies however few anomalies were detected other than a weak positive anomaly which appears to align with the current field boundary system.

References

BGS, 1974, *British Geological Survey*, 1:50,000, Sheet 252, 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

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

Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data

Filename: Foxbridge 15-2-19 RAW.xcp
Instrument Type: MLgrad Import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 588757.905719764, 5713324.39041236 m
Southeast corner: 588884.135719764, 5713058.15041236 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 126 m x 266 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 41623, Recorded: 41623

Stats
Max: 107.34
Min: -109.75
Std Dev: 18.12
Mean: -4.76
Median: -3.53
Composite Area: 3.3607 ha
Surveyed Area: 1.2395 ha

Filename: Foxbridge 18-2-19 RAW.xcp
Instrument Type: MLgrad601 import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 588810.033148521, 5713290.91933704 m
Southeast corner: 589064.703148521, 5712931.85933704 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 255 m x 359 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 131807, Recorded: 131807

Stats
Max: 107.02
Min: -109.73
Std Dev: 14.66
Mean: -6.40
Median: -5.12
Composite Area: 9.1442 ha
Surveyed Area: 4.2054 ha

Filename: Foxbridge 19-2-19 RAW.xcp
Instrument Type: MLgrad601 import
Units:
UTM Zone: 30U
Survey corner coordinates (X/Y):
Northwest corner: 588874.868544707, 5713292.07888051 m
Southeast corner: 589061.418544707, 5713060.67888051 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 2 @ 0.5 m spacing.
Dummy Value: 32702

Dimensions
Survey Size (meters): 187 m x 231 m
X&Y Interval: 0.13 m
Source GPS Points: Active: 87487, Recorded: 87487

Stats
Max: 106.92
Min: -109.72
Std Dev: 10.18
Mean: -1.26
Median: -0.54
Composite Area: 4.3168 ha
Surveyed Area: 1.5267 ha

Processed data

Filename: Foxbridge 15-2-19.xcp
GPS based Proce6
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 -5.00 to 5.00
6 DeStagger by: 150.00cm, Shift Positions

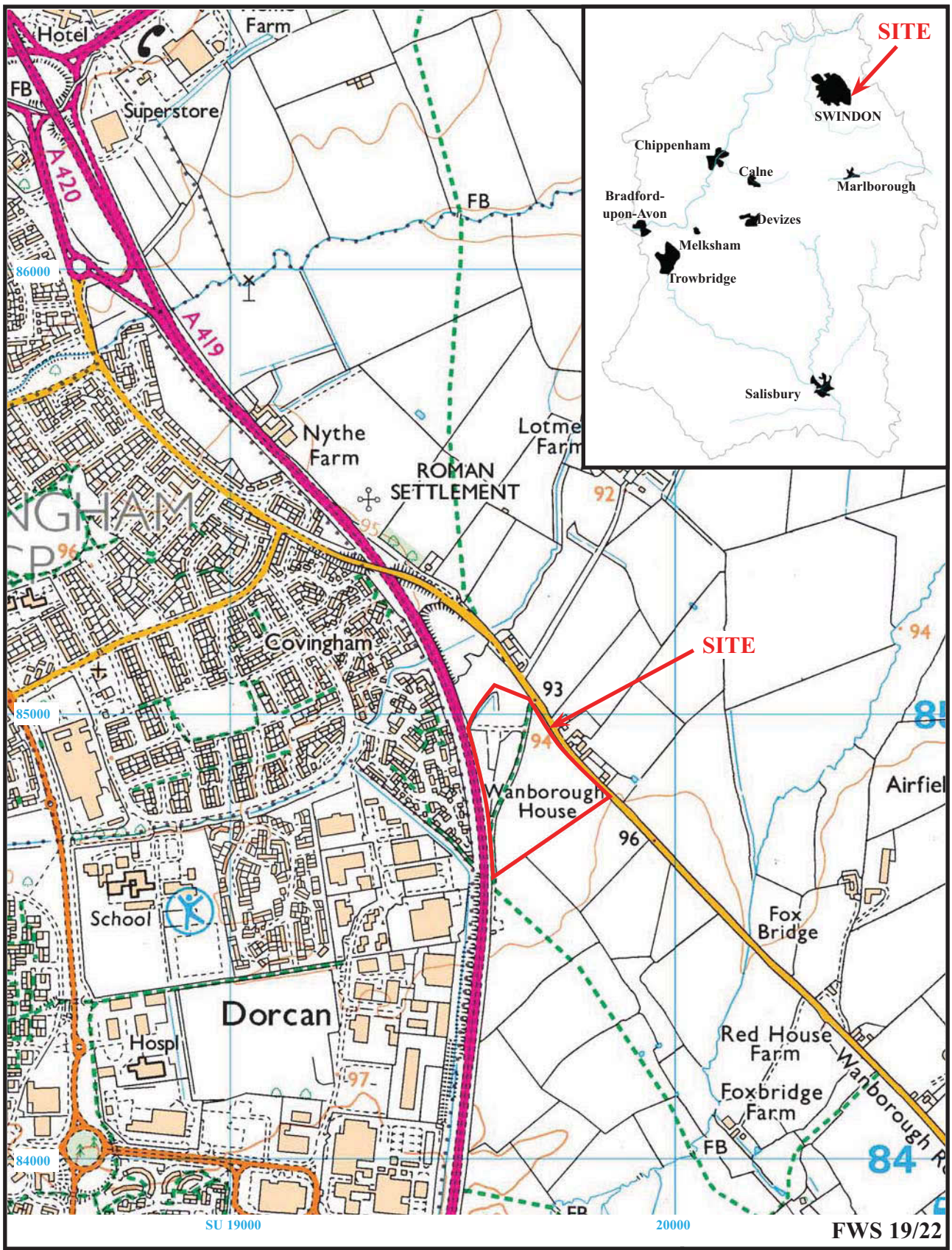
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.66
Mean: -0.24
Median: -0.01
Composite Area: 3.3607 ha
Surveyed Area: 1.2268 ha

Filename: Foxbridge 18-2-19.xcp
GPS based Proce7
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to UTM).
3 DeStripe Median Traverse:
4 Clip at 1.00 SD
5 Despike Threshold: 1 Window dia: 3
6 DeStripe Median Traverse:
7 Clip from -5.00 to 5.00

Stats
Max: 5.53
Min: -5.50
Std Dev: 1.85
Mean: -0.13
Median: -0.02
Composite Area: 9.1442 ha
Surveyed Area: 4.2054 ha

Filename: Foxbridge 19-2-19.xcp
GPS based Proce8
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 -5.00 to 5.00
6 DeStagger by: 50.00cm, Shift Positions
7 DeStagger by: 50.00cm, Shift Positions
8 DeStagger by: 50.00cm, Shift Positions

Stats
Max: 5.53
Min: -5.50
Std Dev: 1.96
Mean: 0.00
Median: 0.01
Composite Area: 4.2327 ha
Surveyed Area: 1.4065 ha



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Land at Foxbridge, Wanborough Road, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)

Figure 1. Location of site within Swindon and Wiltshire.

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Land at Foxbridge, Wanborough Road, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 2. Plot of raw gradiometer data.

0m 100m

+100
nT
-100

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Land at Foxbridge, Wanborough Road, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 3. Plot of minimally processed gradiometer data.

+5
nT
-5

0m 100m

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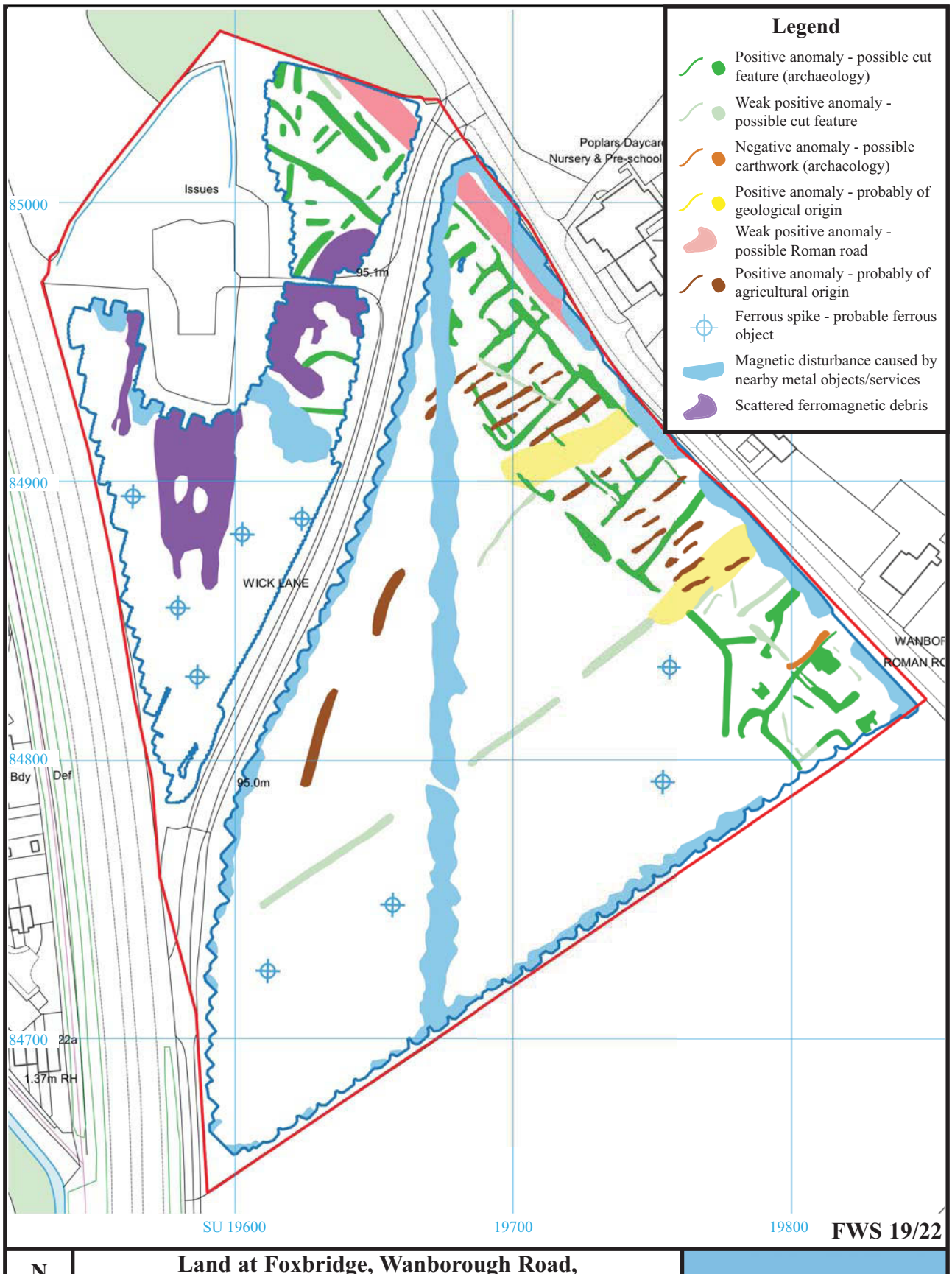

N

Land at Foxbridge, Wanborough Road, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Figure 4. Interpretation plot.

0m 100m

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Plate 1. North-west to south-east boundary of southern filed looking south-east.

Plate 2. Northern field looking south-west.

Plate 3. Southern field looking south.

Plate 4. Concreted pad in northern field looking west.

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Land at Foxbridge, Wanborough Road, Swindon, Wiltshire, 2019
Geophysical Survey (Magnetic)
Plates 1 to 4.

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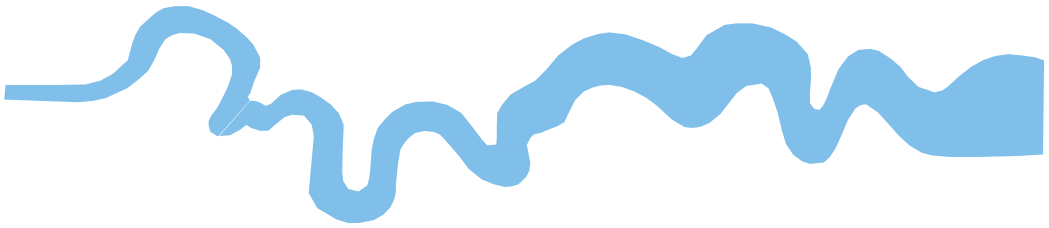
TIME CHART

	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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