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# Land off Stanley Close, Wanborough, Swindon, Wiltshire

**Geophysical Survey (Magnetic)**

**by Tim Dawson**

**Site Code: SCW09/115**

**(SU 2107 8304)**

# Land off Stanley Close, Wanborough, Swindon, Wiltshire

**Geophysical Survey (Magnetic) Report**

**For Taylor Wimpey Oxfordshire**

by Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code SCW 09/115

**November 2013**

## Summary

**Site name:** Land off Stanley Close, Wanborough, Swindon, Wiltshire

**Grid reference:** SU 2107 8304

**Site activity:** Magnetometer survey

**Date and duration of project:** 27th November 2013

**Project manager:** Steve Ford

**Site supervisor:** Tim Dawson

**Site code:** SCW 09/115

**Area of site:** 1.13ha

**Summary of results:** Several magnetic anomalies have been identified by the survey. Two sets of positive linear anomalies probably represent a series of ditches on the western and eastern sides of the site. These may be related to the Roman ditch recorded during previous trial trenching. Other anomalies of note include a group of magnetic spikes and weak positive linear anomalies which appear to form a geometric arc, possibly part of a much larger circular feature.

**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✓ 04.12.13 |
| | Andrew Mundin✓ 04.12.13 |




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# Land off Stanley Close, Wanborough, Swindon, Wiltshire
# A Geophysical Survey (Magnetic)

by Tim Dawson

**Report 09/115b**

## Introduction

This report documents the results of a geophysical survey (magnetic) carried out at a plot of land to the south of Stanley Close, Wanborough, Swindon, Wiltshire (SU 2107 8304) (Fig. 1). The work was commissioned by Ms Sarah Fabes of Taylor Wimpey Oxfordshire, Windrush Court, Suite J, Abingdon Business Park, Abingdon, OX14 1SY.

Planning consent (app no S/12/1054) has been gained from Swindon Borough Council to build *c*.12 new houses on this site. This is subject to a condition which requires the implementation of a geophysical survey.

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 Ms Melanie Pomeroy-Kellinger, County Archaeologist at Wiltshire County Council. The fieldwork was undertaken by Tim Dawson and Anna Ginger on 27th November 2013 and the site code is SCW 09/115.

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 an area of undeveloped open space located to the south of Stanley Close in Lower Wanborough, part of Wanborough, a settlement to the east of Swindon. The proposed development area is centred on NGR SU 2107 8304. It has modern residential development to east, west and north (Fig. 1). The area to the south is undeveloped rough pasture. The site is located at located on (chalk) head deposits (BGS 1974). It slopes from a height of approximately 135m above Ordnance Datum in the south to 124m aOD in the north and is about 1.13ha in size. The remains of ridge and furrow earthworks are present on the site but are mostly obscured by the thick vegetation that covers the area (Pls. 1 and 2). The northern and western edges of the field are covered in thick brambles and a patch of ground in the south-eastern quadrant is dense with thistles. Weather conditions during the survey were heavily overcast with slightly damp ground.

## Site history and archaeological background

The archaeological potential of the site has been highlighted in a desk-based assessment (Hopkins 2009). In summary, the site lies within the historic settlement of Wanborough but between the two foci now forming Upper and Lower Wanborough. The village is thought to have late Saxon origins and is mentioned in Domesday Book of 1086 (Williams and Martin 2002). The site itself is occupied by ridge and furrow field system suggesting that it was not occupied in later medieval times, but an earlier low sample- size evaluation on the site revealed the presence of a Roman ditch (JSAS 1997). Part of this evaluation sampled the surveyed field (Fig. 2).

## Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. A plan was drawn up using the Ordnance Survey Masterplan to cover the entire area with 20m grid squares. In practice, these had to be moved inwards from the site boundaries due to the presence of thick bramble growth in the north and west of the field. A dense patch of thistles also provided an obstruction to the survey in the south-eastern part and the thick clumps of grass that covered the site generally had a negative impact on the regularity of the survey.

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 English Heritage (2008) and the Institute for Archaeologists (2002, 2011).

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 fast yet detailed survey of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. 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 seem 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.

A Trimble GeoXH 6000 handheld GPS system with sub-decimetre accuracy was used to tie the site grid 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 TerraSurveyorLite 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 -2.00 to 2.00 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. |

Once processed, the results are presented as a greyscale plot shown in relation to the site (Fig. 3), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are

shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.22.01, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyorLite in 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 rotated to orientate it to north and combined with grid and site plans 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 survey recorded several magnetic anomalies across the survey area, many of which may be the result of archaeological activity. Along the western edge of the field are a group of very strong positive linear anomalies which appear to be related to one another through their similar locations and orientations **[Fig. 4: 1-5]**. Positive anomalies are usually caused by buried dug features which have then been filled in with mixed soils with linear configurations indicating a linear feature such as a ditch. Of those, on the western side of the field, **[1]** and **[2]** seem to form a portion of a field or enclosure system. **[1]** and **[3]** form the north-south ditches and the south-west corner is represented by **[1]** and a southern western edge formed by **[3]** and **[4]**. **[2]** could also form part of this system, but may be a later modification. **[4]** does not extend much further south than **[3]** but, after a gap of about 12m, it appears to continue for a short while as another positive linear anomaly **[5]**. The middle two anomalies, **[3]** and **[4]**, coincide with a north-south feature in Trench 1 from the JSAC evaluation, which was Roman in date. Between **[4]** and **[5]** is a discreet positive anomaly which may represent a pit with another, **[7]**, on the southern edge of the survey area. Another strong positive linear anomaly was identified in the northern part of the site **[8]** on a similar alignment to those described above. Towards the centre of the site are two weak positive linear anomalies which probably represent buried ditches of smaller dimensions than those discussed previously. At the southern end **[9]** extends in a north-westerly direction before turning to the north and crossing **[10]**. The second feature **[10]** appears to be a collection of weak positive linear anomalies and small magnetic spikes which form a large arc and may represent a series of pits and/or shallow gullies which, through extrapolating their layout, may once have formed a large circular feature with its centre just to the north of the survey area (Fig. 5).

Aside from the scatter of magnetic spikes across the site, probably caused by buried ferrous objects, and the large area of magnetic disturbance in the northern corner, the result of a nearby metal sign post, there are three

further notable anomalies. Areas **[11]** and **[12]** appear to be patches of magnetic disturbance which have most likely been caused by buried metallic objects but could still be of possible archaeological interest. A scatter of magnetic debris **[13]** is visible in the vicinity of linear anomalies **[1]** and **[3]** and probably represents the ground disturbance caused by the excavation of the near by evaluation trench. While these anomalies may not be of archaeological interest in themselves, it is possible that the disturbance in the magnetic field that they cause has a masking effect on underlying anomalies of archaeological origin.

The whole site is crossed by alternating positive and negative wide linear anomalies which reflect the layout of the ridge-and-furrow visible on the surface.

## Conclusion

The geophysical survey was undertaken almost to plan with the only adjustment being a slight reduction in the size of the survey area due to the presence of thick vegetation. The survey identified several linear features on the western and eastern edges of the area, possibly relating to the Roman ditch found during previous trial trenching of the site. In addition a group of magnetic spikes and weak linear anomalies appear to form an arc which crosses the centre of the site, potentially a part of a larger circular feature which extends beyond the site boundaries to the north and east. A projection of this features full extent is shown on Fig.5. It is unclear as to the origin of these anomalies, which lie on a near perfect geometric arc with a diameter of 130m suggesting they are of human origin.

## References


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English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)

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

IFA, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading

JSAC, 1997, *The Beanlands, Wanborough* WCC John Samuels Archaeological Consultants, no. 1997.073

NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

Williams, A and Martin, G H, 2002, *Domesday Book, A Complete Translation,* London

## **Appendix 1.** Survey and data information

**Georeferencing (Fig. 2):**
A: E 421001, N 183056
B: E 421036, N 183025

**Raw data**
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: Tim Dawson, Anna Ginger on 27/11/2013
Assembled by: Tim Dawson on 27/11/2013
Direction of 1st Traverse: 315 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 400 x 80
Survey Size (meters): 100 m x 80 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 6.07
Mean: 0.68
Median: 0.71
Composite Area: 0.8 ha
Surveyed Area: 0.5879 ha

Programme
Name: TerraSurveyor
Version: 3.0.19.22

Source Grids: 20
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\03.xgd
4 Col:0 Row:3 grids\04.xgd
5 Col:1 Row:0 grids\05.xgd
6 Col:1 Row:1 grids\06.xgd
7 Col:1 Row:2 grids\07.xgd
8 Col:1 Row:3 grids\08.xgd
9 Col:2 Row:0 grids\09.xgd
10 Col:2 Row:1 grids\10.xgd
11 Col:2 Row:2 grids\11.xgd
12 Col:2 Row:3 grids\12.xgd
13 Col:3 Row:0 grids\13.xgd
14 Col:3 Row:1 grids\14.xgd
15 Col:3 Row:2 grids\15.xgd
16 Col:3 Row:3 grids\16.xgd
17 Col:4 Row:0 grids\17.xgd
18 Col:4 Row:1 grids\18.xgd
19 Col:4 Row:2 grids\19.xgd
20 Col:4 Row:3 grids\20.xgd

**Processed data**
Stats
Max: 2.00
Min: -2.00
Std Dev: 0.69
Mean: 0.00
Median: 0.00

Processes: 5
1 Base Layer
2 Clip from -5.00 to 5.00 nT
3 DeStripe Median Sensors: All
4 Despike Threshold: 1 Window size: 3x3
5 Clip from -2.00 to 2.00 nT

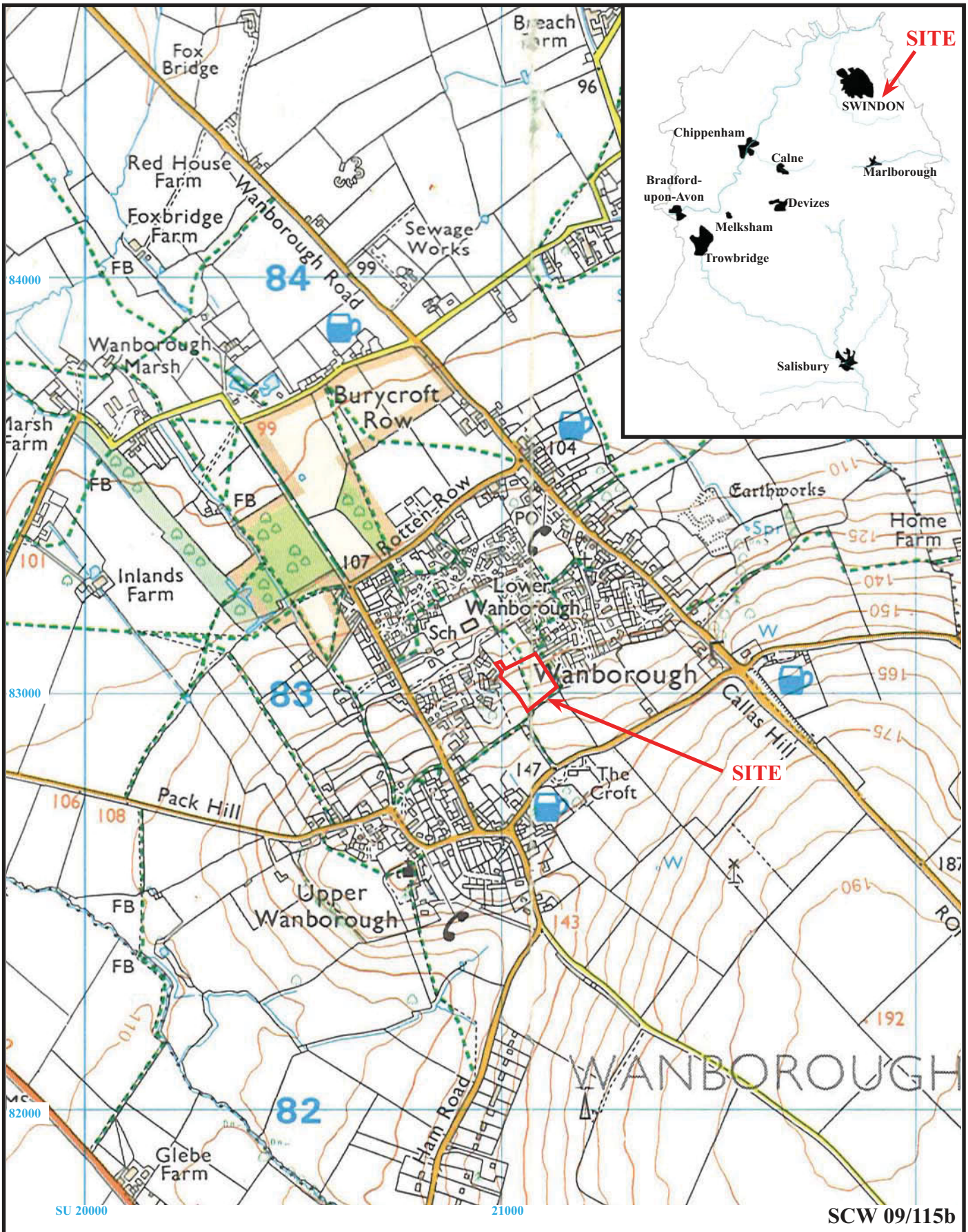


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Figure 1. Location of site within Wanborough and Wiltshire.



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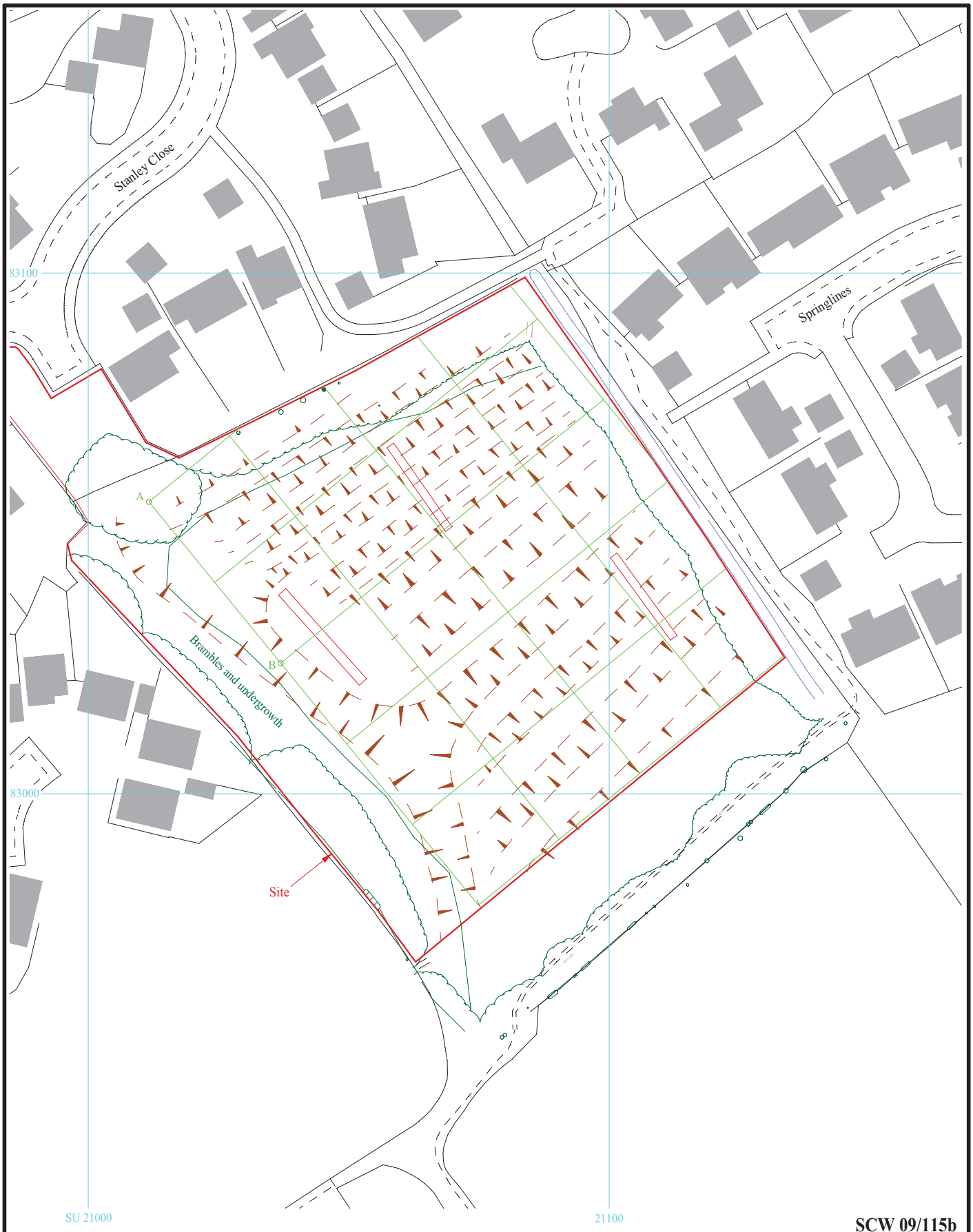


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## Geophysical Survey (Magnetic)

Figure 2. Survey grid layout showing positions of evaluation trenches and ridge-and-furrow earthworks (after JSAC 1997) and georeferencing points A and B.

0 50m

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N

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Figure 3. Plot of minimally processed gradiometer data.

+2 nT

-2 nT

0m 50m

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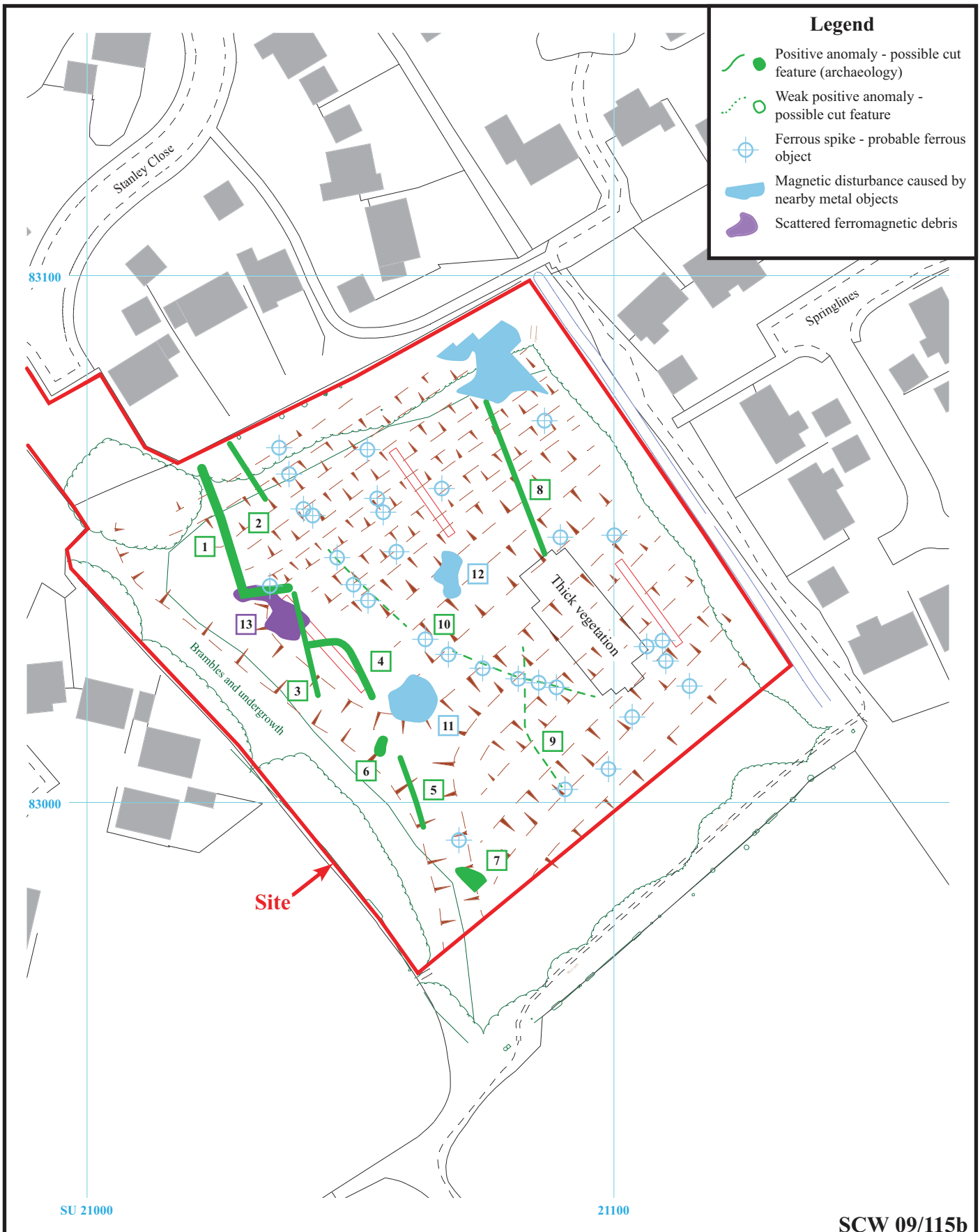


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Figure 4. Interpretation plot.

0m 50m

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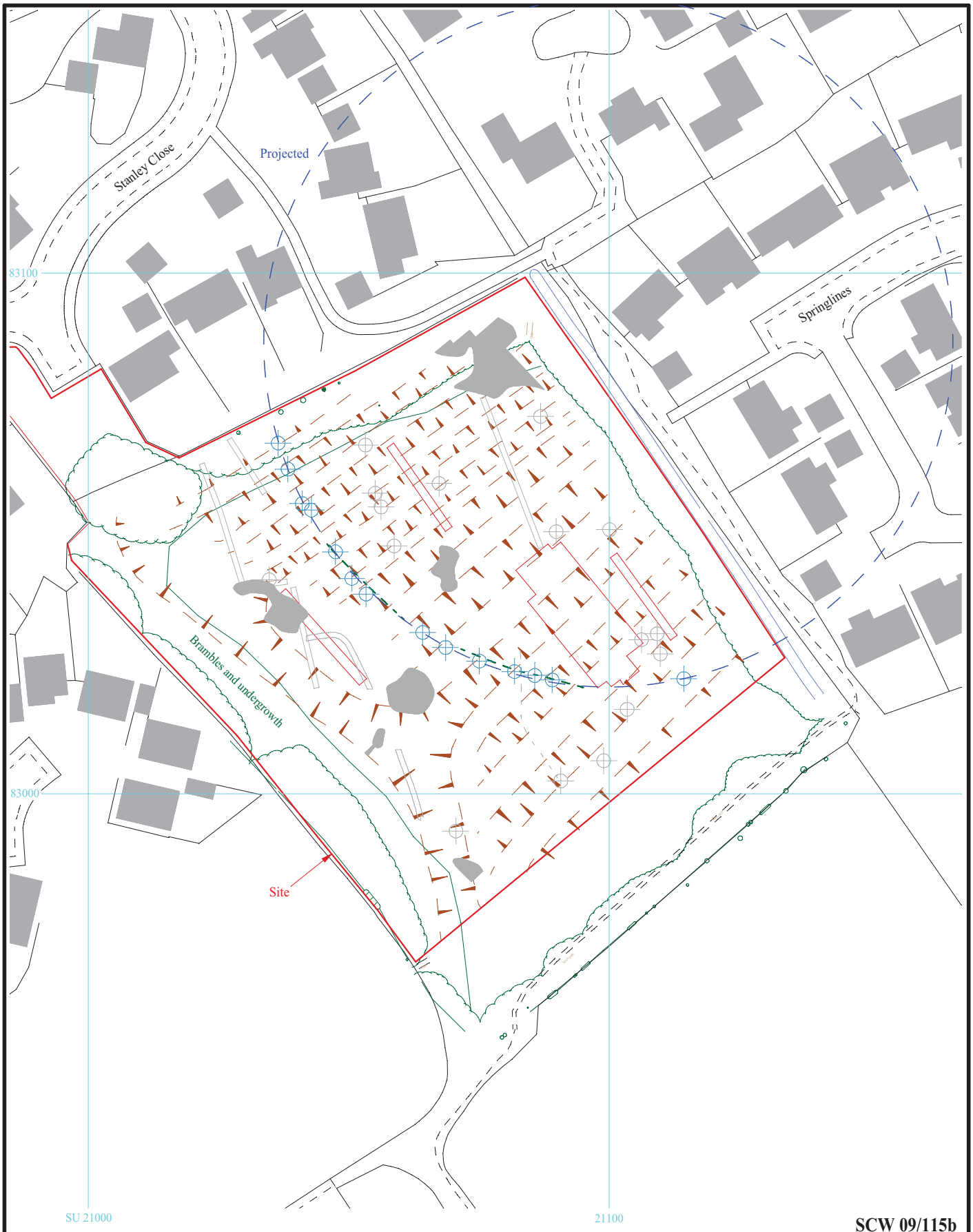


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N

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## Geophysical Survey (Magnetic)

Figure 5. Plotted anomalies showing projection of circular feature based on arc formed by magneitc spikes and weak positive anomaly [10].

0 50m

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Plate 1. The site, looking south.

Plate 2. The centre of the site, looking southwest.

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Plates 1 - 2.

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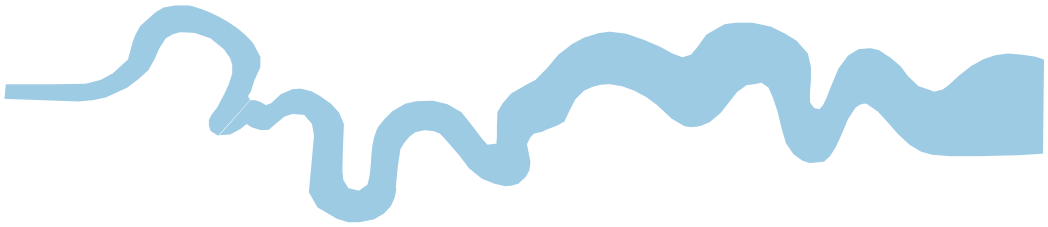
## TIME CHART

| | Calendar Years |
|---|---|
| Modern | AD 1901 |
| Victorian | AD 1837 |
| Post Medieval | AD 1500 |
| Medieval | AD 1066 |
| Saxon | AD 410 |
| Roman | AD 43 |
| Iron Age | BC/AD 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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