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S E R V I C E S

**Land at Newton Road, Ramsbury,  
Wiltshire**

**Geophysical Survey (Magnetic)**

**by David Sanchez**

**Site Code: NRR 14/164**

**(SU 4282 1717)**

# **Land at Newton Road, Ramsbury, Wiltshire**

## **Geophysical Survey (Magnetic) Report For Rectory Homes Ltd**

by David Sanchez

Thames Valley Archaeological Services Ltd

Site Code NRR 14/164

**July 2016**

## Summary

**Site name:** Land at Newton Road, Ramsbury, Wiltshire.

**Grid reference:** SU 4282 1717

**Site activity:** Magnetometer survey

**Date and duration of project:** 11th - 13th July 2016

**Project manager:** Steve Ford

**Site supervisor:** David Sanchez

**Site code:** NRR 14/164

**Area of site:** 2.8ha.

**Summary of results:** A high number of anomalies were identified by the geophysical survey, most of them of probable agricultural origin, consisting of ridge and furrow lines caused by ploughing the field for agricultural use. A smaller number of anomalies with probable archaeological origin were identified, located in the north and north east area of the surveyed area and consisting of probable buried linear cut features.

**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✓ 26.07.16 Tim Dawson✓ 26.7.16
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# Land at Newton Road, Ramsbury, Wiltshire A Geophysical Survey (Magnetic)

by David Sanchez

**Report 14/164b**

## **Introduction**

This report documents the results of a geophysical survey (magnetic) carried out at Land at Newton Road, Ramsbury, Wiltshire (SU 4282 1717) (Fig. 1). The work was commissioned by Mr. Tim Northey, Planning Manager of Rectory Homes Ltd, Rectory House, Thame Road, Haddenham, Buckinghamshire HP17 8DA.

This survey has been undertaken as part of preparing evidence for an appeal in response to Wiltshire Council's refusal of planning application ref: 15/07232/OUT which sought outline planning permission for the erection of 25 dwellings. One of the reasons for refusal concerned the absence of field evaluation to demonstrate whether heritage assets with archaeological interest lie with the site. The geophysical survey therefore addresses this issue and as per the plan included at Figure 1, the survey has included land beyond the appeal site boundary to ensure a robust assessment of the site and its adjoining land. The results of this survey are to 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 Council policies on archaeology. The field investigation was carried out to a specification forwarded to Ms. Rachel Foster, Assistant County Archaeologist of Wiltshire Council. The fieldwork was undertaken by David Sanchez and Mike Johnson, from 11th to 13th July 2016 and the site code is NRR 14/164.

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 west margins of the village of Ramsbury which is about 18km to the south east of Swindon, Wiltshire (Fig. 1). The site itself lies on the north side of Newton Road with residential houses to the south east and south west, farmlands to the north east and north west and residential houses to the north. It occupies a 2.8ha. parcel of farmland on a hillside, slopping down to the south in the direction of river Kennet, at a height between *c.*126m and *c.*110m above Ordnance Datum and the underlying geology is mapped as Seaford Chalk Formation (BSG 2006).

The weather during the survey period was sunny in the afternoons with some clouds and showers in the morning leaving the ground soft and wet although this soon dried out.

## **Site history and archaeological background**

The archaeological potential of the proposal site has been detailed in a desk-based assessment (Tabor 2014). In summary the site lies within an area of high archaeological potential within the archaeologically rich Kennet Valley on the margins of the late Saxon and medieval settlement of Ramsbury, though no archaeology is recorded in the immediate vicinity. The site has undergone very little alteration since the early 19th century, suggesting that any buried archaeological deposits will have been well preserved.

## **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 grid plan was drawn up to cover the entire proposal site area but the presence of trees and scrubs on the boundaries of the field reduced the area available to survey, specially in the south, east and north west areas. Frequent obstructions were present on the site consisting of hay bales dispersed all over the field, which were temporary removed when possible or left as 2m wide unsurveyed areas.

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 Chartered Institute for Archaeologists (2002, 2011, 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 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 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.

A Trimble Geo7x handheld GPS system with sub-decimetre real-time 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 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.

<b>Process</b>	<b>Effect</b>
Clip from -4.80 to 5.20 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
Interpolate: y doubled	Increases the resolution of the readings in the y axis, enhancing the shape of anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.

Once processed, the results are presented as both raw and processed greyscale plots shown in relation to the site (Figs. 3 and 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 grid layout and

georeferencing information (Fig. 2) is prepared in EasyCAD v.7.58.00, 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 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 2.16.0 Nødebo 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

Various magnetic anomalies were found spanning the entire site area, ranging from strong positive anomalies of probable agricultural origin to weaker positive anomalies of possible archaeological origin (Fig. 4). Positive anomalies commonly represent buried cut features, such as pits and ditches. These can be of archaeological or agricultural origin.

The south and central area of the field appears, in the geophysics data, to show linear positive and negative anomalies of probable agricultural origin [Fig.4: 1]. These seem to be ridge and furrow lines caused by ploughing the field for agricultural use. The ridge and furrow lines of this area of the site are aligned NNE - SSW from the south limit of the surveyed area and finishing in a W - E aligned strong linear dipolar anomaly of probable, possibly indicating the presence of an old field boundary [2]. A second group of positive and negative anomalies of probable agricultural origin were located in the north and north west area of the site [3], showing linear anomalies aligned NNE - SSW and NNW - SSE thought to be a different group of ridge and furrow lines unrelated with those observed in the south and central area of the field. The last anomaly thought to be of agricultural origin is a series linear dipolar readings [11] located in the centre of the north area of the site and aligned NNW - SSE. It runs from the edge of anomaly [2] and continues beyond the north limit of the surveyed area. Its shape and relationship with the anomalies to the west [2] suggest this anomaly to be an old field boundary.

The most striking positive magnetic anomaly of probable archaeological origin consisted of two linear anomalies of curvilinear shape facing each other [4], located in the NE area of the site, at about 20m from the east limit of the surveyed area. Its shape and dimensions suggest an archaeological origin however this is

difficult to determine for certain as a large magnetic disturbance [10] aligned NNW - SSE, probably caused by buried services, block the west edge of the possible feature.

To the east of the feature described above there are two curvilinear positive anomalies [5], one weaker than the other, of probable archaeological origin. Its full shape is not possible to determine as they are partially blocked by a large magnetic disturbance caused by a metal fence located on the NE boundary of the surveyed field and probably continue beyond the limit of the site.

To the south of these features described the geophysics data shows two weak positive anomalies of possible archaeological origin with linear shape and semicircular alignment [6]. About 8m to the west of this a further positive curvilinear magnetic anomaly was identified [7]. It seems to conform a oval shape feature but its final shape and its possible relation with anomaly [6] is uncertain as the anomaly is weaker to the north and the area is partially blocked by the large area of magnetic disturbance [10].

One further positive anomaly of possible archaeological origin was identified at 5m from the north limit of the surveyed area consisting of a weak magnetic anomaly of square shape conformed by four linear anomalies [8]. Another, stronger, anomaly was noted in the southern part of the site [9]. Its discrete nature is suggestive of a buried pit-type feature.

Also evident from the geophysical survey are numerous ferrous spikes, which are commonly caused by ferrous objects found in the surface layer, or sub-surface, of the site. Common ferrous objects include agricultural debris such as broken metal from old ploughs.

## **Conclusion**

A high number of anomalies were identified by the geophysical survey, most of them of probable agricultural origin, consisting of ridge and furrow lines caused by ploughing the field for agricultural use. A smaller number of anomalies with probable archaeological origin were identified, located in the north and north east area of the site and consisting of probable buried linear cut features. Many of the features comprised curvilinear anomalies however its correct interpretation is difficult as this area of the survey is obscured by magnetic disturbances caused by metal fences and buried services.

## **References**

- BGS, 2006, *British Geological Survey*, 1:50 000, Sheet 267, Bedrock and Superficial Deposits Edition, Keyworth
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)
- CI/A, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading



CI/A, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading  
CI/A, 2014, *Standard and Guidance: for archaeological geophysical survey*, 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

Northwest corner: 428113.12, 171802.66 m  
Southeast corner: 428313.12, 171542.66 m  
Direction of 1st Traverse: 81.54 deg  
Collection Method: ZigZag  
Sensors: 2 @ 1.00 m spacing.  
Dummy Value: 2047.5

### Dimensions

Composite Size (readings): 800 x 260  
Survey Size (meters): 200 m x 260 m  
Grid Size: 20 m x 20 m  
X Interval: 0.25 m  
Y Interval: 1 m

### Stats

Max: 964.40  
Min: -1000.00  
Std Dev: 39.86  
Mean: -5.45  
Median: -2.80  
Composite Area: 5.2 ha  
Surveyed Area: 2.1839 ha

### Source Grids: 77

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2 Col:0 Row:3 grids\77.xgd  
3 Col:1 Row:2 grids\73.xgd  
4 Col:1 Row:3 grids\74.xgd  
5 Col:1 Row:4 grids\75.xgd  
6 Col:2 Row:2 grids\70.xgd  
7 Col:2 Row:3 grids\71.xgd  
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10 Col:3 Row:3 grids\68.xgd  
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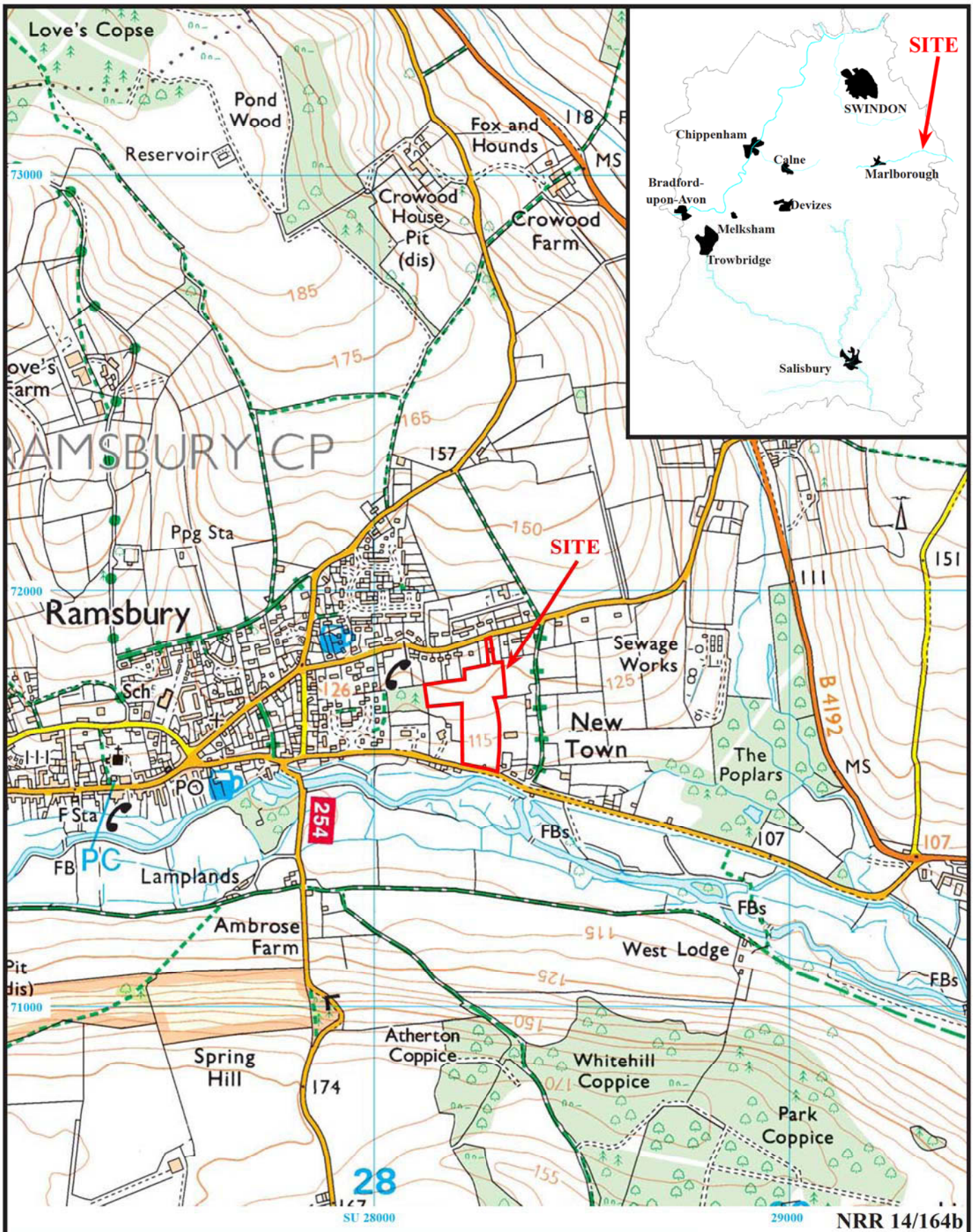
### Processed data

#### Stats

Max: 5.20  
Min: -4.80  
Std Dev: 2.09  
Mean: -0.04  
Median: 0.02  
Composite Area: 5.2 ha  
Surveyed Area: 2.1839 ha

#### Processes: 4

- 1 Base Layer
- 2 DeStripe Median Sensors: All
- 3 Interpolate: Y Doubled.
- 4 Clip from -4.80 to 5.20 nT

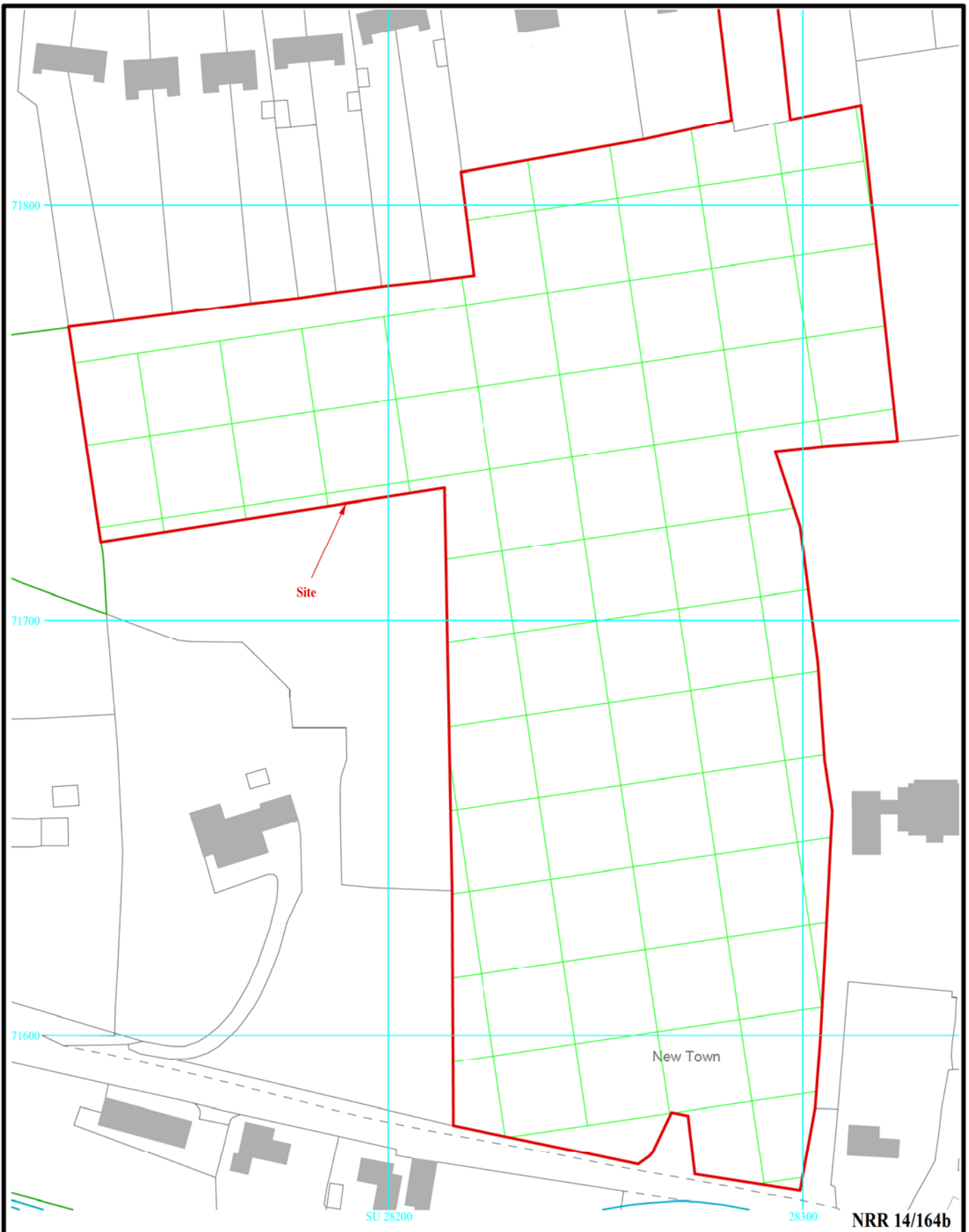


**Land at Newton Road, Ramsbury,  
Wiltshire, 2016  
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Ramsbury and Wiltshire.

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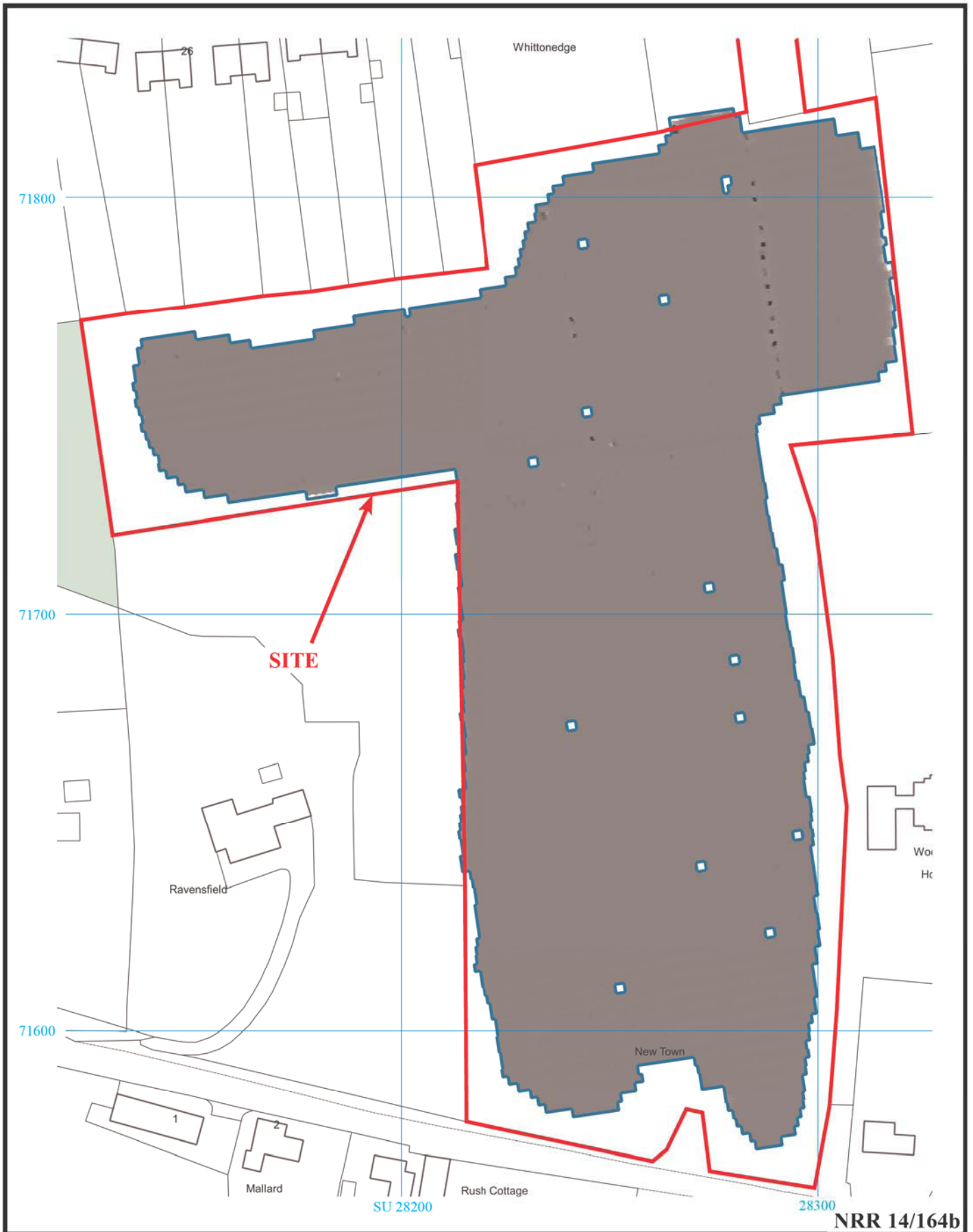


**Land at Newton Road, Ramsbury,  
Wiltshire, 2016  
Geophysical Survey (Magnetic)**

Figure 2. Survey grid layout.

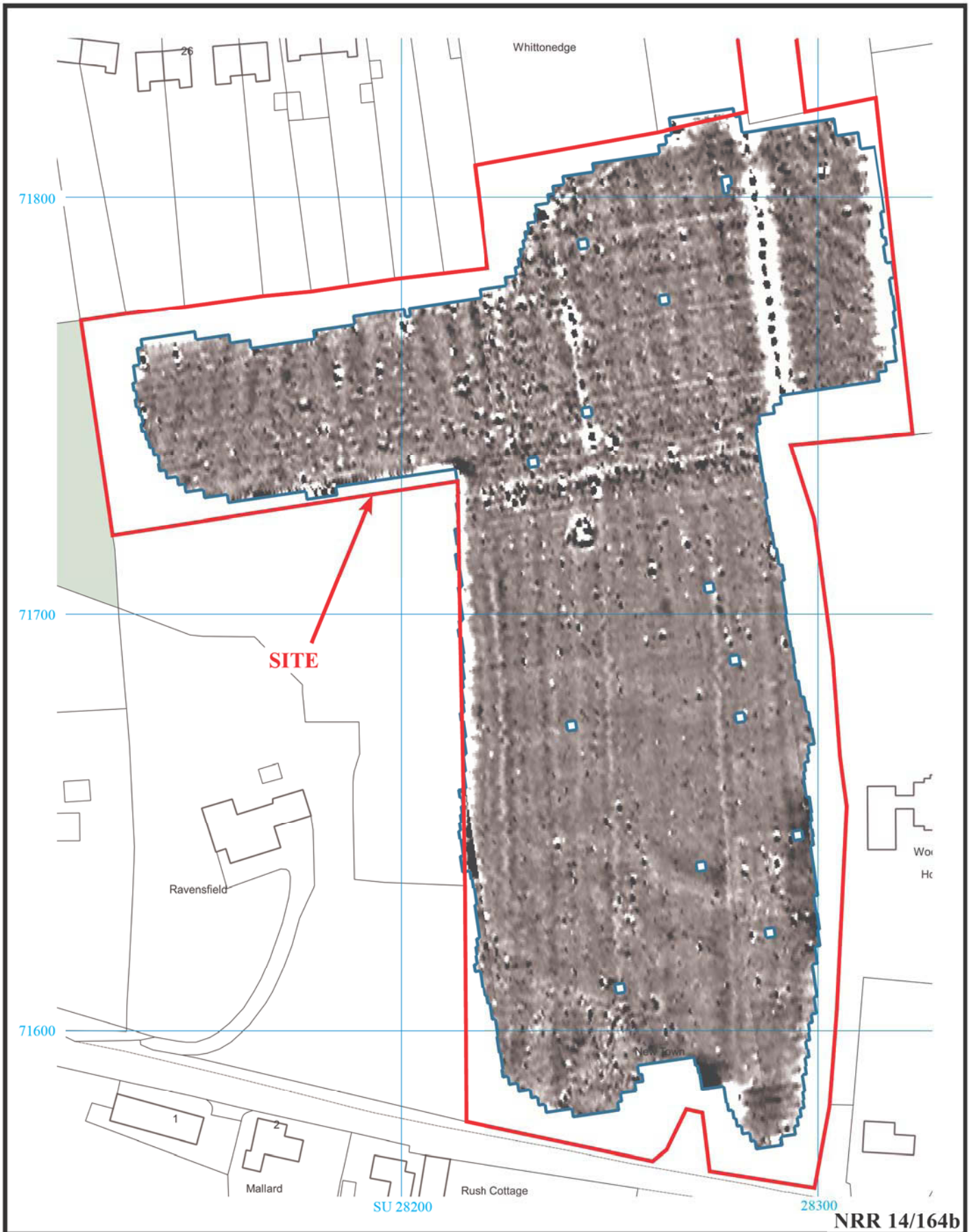


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**Land at Newton Road, Ramsbury,  
 Wiltshire, 2016**  
**Geophysical Survey (Magnetic)**  
 Figure 3. Plot of raw gradiometer data.



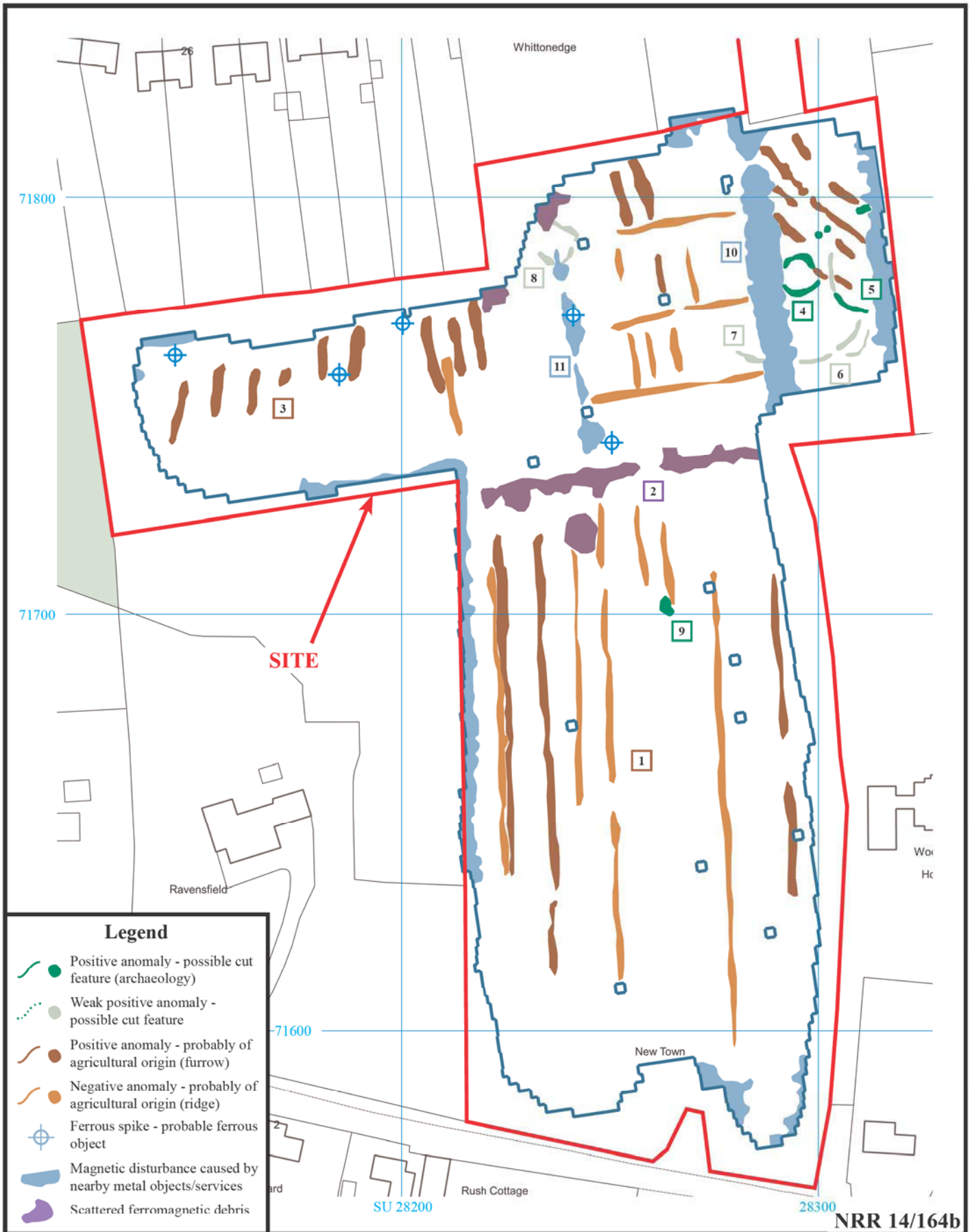


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**Land at Newton Road, Ramsbury,  
Wiltshire, 2016  
Geophysical Survey (Magnetic)**

Figure 4. Plot of minimally processed gradiometer data.





**Land at Newton Road, Ramsbury,  
Wiltshire, 2016**  
**Geophysical Survey (Magnetic)**  
 Figure 5. Interpretation plot.





Plate 1. South area of the field, looking SE.



Plate 2. North area of the field, looking NE.

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**Land at Newton Road,  
Ramsbury, Wiltshire, 2016**  
**Geophysical survey**  
Plates 1 - 2.

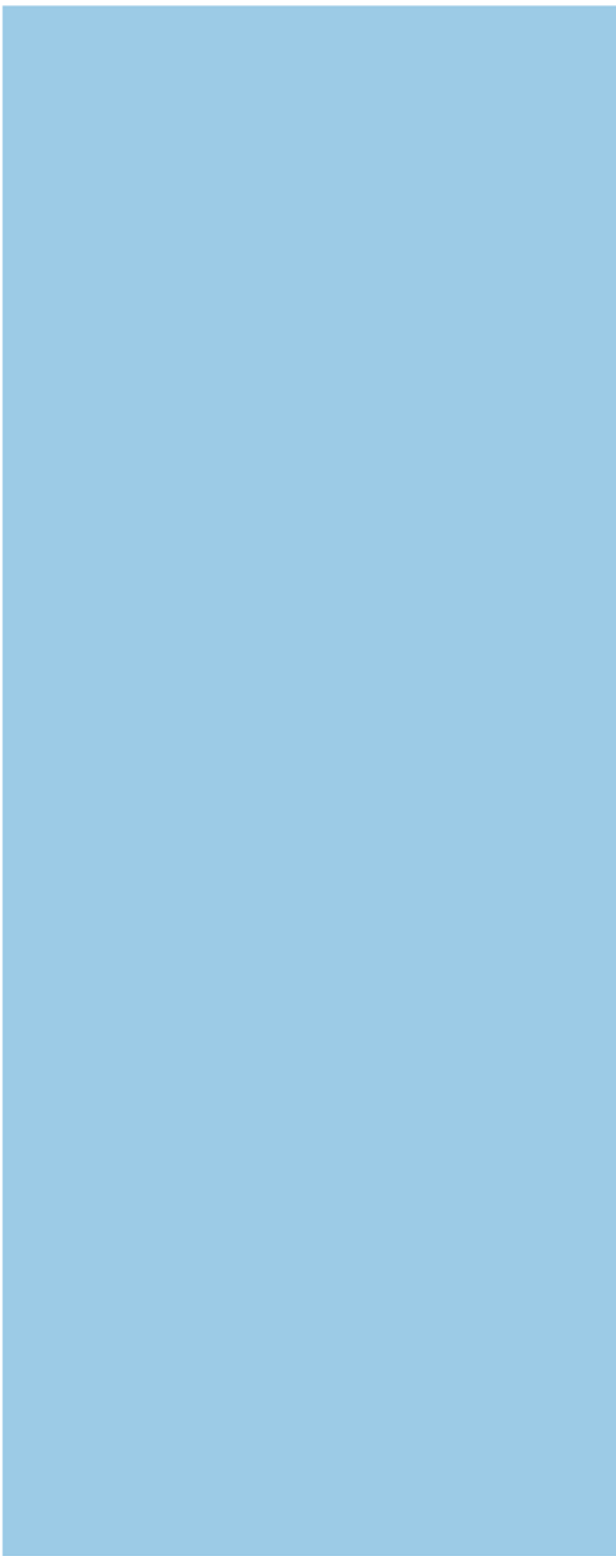
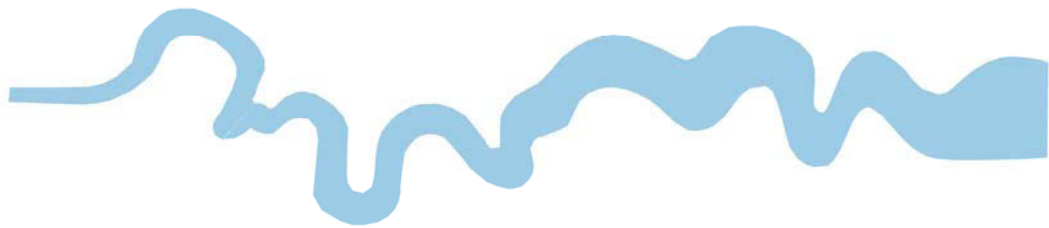
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## TIME CHART

	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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