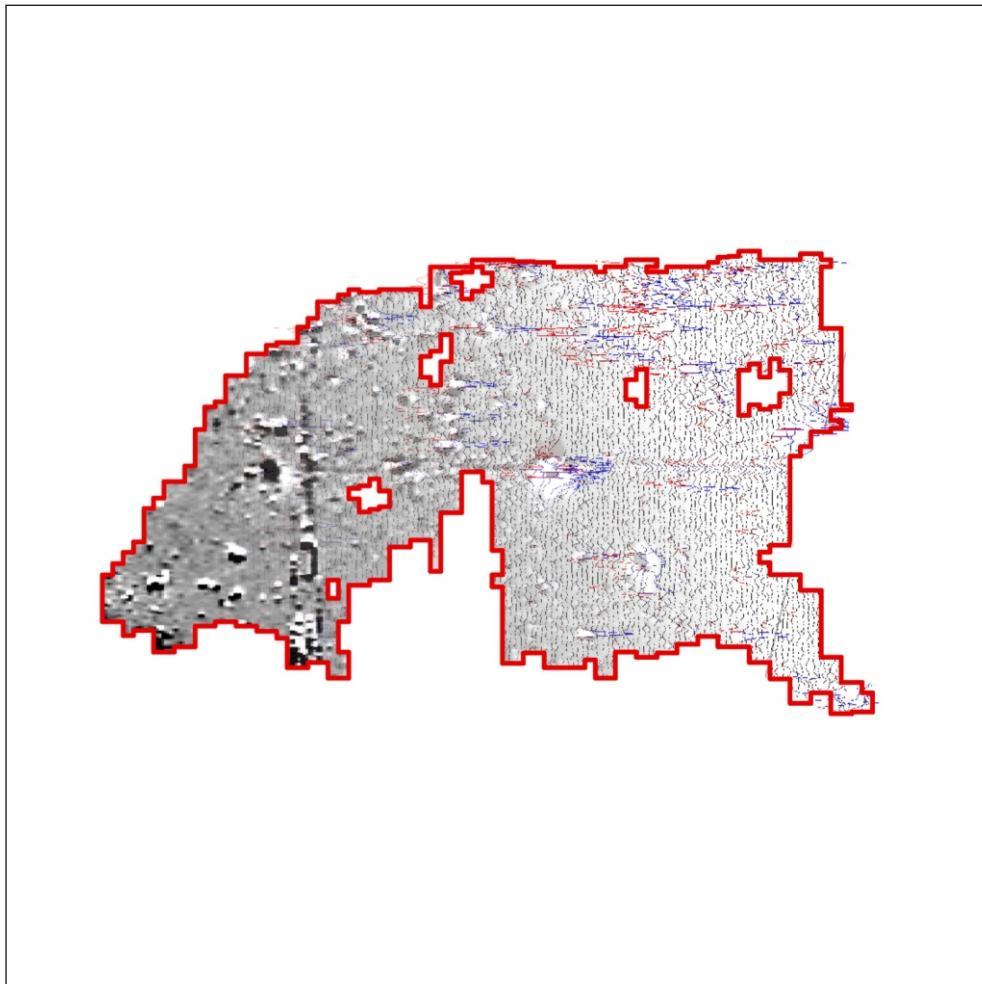




making sense of heritage

Restrop Road Purton, Wiltshire

Detailed Gradiometer Survey Report



Ref: 79581.01
March 2014



**Restrop Road
Purton, Wiltshire**

Detailed Gradiometer Survey Report

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* I = Internal Draft; E = External Draft; F = Final

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Restrop Road, Purton, Wiltshire

Detailed Gradiometer Survey

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Restrop Road, Purton, Wiltshire

Detailed Gradiometer Survey

Summary

A detailed gradiometer survey was conducted over land at Restrop Road in Purton, Wiltshire. The project was commissioned by Persimmon Homes with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features on the site ahead of a proposed development.

The site comprises of a pasture field approximately 240 metres southwest of Purton village centre. The site occupies a field due east of Restrop Road and south of Red Gables Close. The gradiometer survey covered 0.86ha and has demonstrated the presence of anomalies of possible archaeological interest within the survey area, along with areas of increased magnetic response.

Several clusters of pit-like anomalies have been identified within the dataset; an archaeological origin cannot be ruled out for these anomalies although natural or agricultural processes may cause similar responses.

Two linear anomalies, oriented N-S and E-W, can be seen across the centre of the site. One of these corresponds with a historic field boundary and an existing manhole cover lies along the line of the other, suggesting that these anomalies are not likely to be of significant archaeological interest.

Several linear trends can be seen within the dataset, although it is possible that these relate to agricultural activity or near-surface geological changes.



Restrop Road, Purton, Wiltshire

Detailed Gradiometer Survey

Acknowledgements

The detailed gradiometer survey was commissioned by Persimmon Homes. The assistance of Ian Gazzard is gratefully acknowledged in this regard.

The fieldwork was directed by Clara Dickinson, Alistair Salisbury and Rachel Williams. Rachel Williams and Ben Urmston processed and interpreted the geophysical data in addition to writing this report. The geophysical work was quality controlled by Ben Urmston. Illustrations were prepared by Richard Milwain. The project was managed on behalf of Wessex Archaeology by Andy Crockett.



Restrop Road, Purton, Wiltshire

Detailed Gradiometer Survey

1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by Persimmon Homes to carry out a geophysical survey of land at Restrop Road, Purton, (**Figure 1**), hereafter “the Site” (centred on NGR 408321 187294). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of proposed development at the Site and follows a previous Heritage Statement (HS, WA 2011).
- 1.1.2 The aim of the geophysical survey was to establish the presence/absence, extent and character of detectable archaeological remains within the survey area.
- 1.1.3 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

1.2 The Site

- 1.2.1 The survey area comprises pasture fields east of Restrop Road, some 240 metres southwest of the centre of Purton (**Figure 1**). Detailed gradiometer survey was undertaken over all accessible parts of the Site, a total of 0.84 ha.
- 1.2.2 The Site currently occupies a pasture field on the southern outskirts of Purton. The Site rises from 130m above Ordnance Datum (aOD) in the south eastern corner to 135m aOD. The overall survey area is bounded by gardens on the northern extent, Restrop Road on the eastern extent, allotments on the western extent and to the south lay further pasture fields. Some areas of the site were inaccessible due to the dense nature of the brambles and thickets.
- 1.2.3 The soils underlying the Site are likely to be the brown rendzinas soils of the 343d (Sherborne) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts suitable for the detection of archaeological remains through gradiometer survey.

1.3 Archaeological and Historic Background

- 1.3.1 The previous HS (WA 2011) did not identify any known heritage assets within the Site, neither designated nor undesignated; several listed buildings lie close by although it was concluded that the setting of the Site had no bearing upon these buildings.
- 1.3.2 No archaeological interventions were identified in the HS and therefore the archaeological resource has not been directly quantified. It was considered that there was a moderate potential for late prehistoric and Romano-British remains, and possible agricultural features from the Saxon period on. However, the potential resource from all archaeological periods was noted as being poorly understood at the time of its writing.



2 METHODOLOGY

2.1 Introduction

- 2.1.1 The detailed gradiometer survey was conducted using a Bartington Grad601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (2008).
- 2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 19th February 2014. Field conditions at the time of the survey were acceptable.

2.2 Method

- 2.2.1 Individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (2008).
- 2.2.2 The gradiometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (2008). Data were collected in the zigzag method.
- 2.2.3 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse function (± 5 nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey areas, with no interpolation applied.
- 2.2.4 Further details of the geophysical and survey equipment, methods and processing are described in **Appendix 1**.

3 GEOPHYSICAL SURVEY RESULTS AND INTERPRETATION

3.1 Introduction

- 3.1.1 The gradiometer survey has been successful in identifying anomalies of possible archaeological interest across the Site, large areas of increased magnetic responses, several linear trends along with a probable drainage ditch. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1: 1000 (**Figures 2** and **3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ± 25 nT at 50nT per cm for the XY trace plots.
- 3.1.2 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figure 4**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 3.1.3 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

3.2 Gradiometer Survey Results and Interpretation

- 3.2.1 The linear band of high magnetic response that extends across the field north- south, **4000**, is likely to correspond to a former field boundary. This former boundary appears on historic mapping and is therefore not likely to be of significant archaeological interest.



- 3.2.2 A second linear band of high magnetic response extends across the field east- west, **4001** and **4003**. The regularity of this band indicates that it is possibly archaeological in origin; however there is a ferrous manhole cover located in the centre of the anomaly suggesting that it may be some form of field drain. It also appears to abut or join **4000** and may therefore be associated with it; however, the direct relationship is masked by magnetic disturbance at the western extent of **4001**.
- 3.2.3 Numerous linear trends can be seen throughout the site, **4000**, **4001**, **4002** and **4004**. It is likely that some of these are as the result of ploughing or other agricultural activity. These extend predominately north-west to south-east.
- 3.2.4 There are clusters of pit-like anomalies across the Site, **4001**, **4002** and **4004**, these are possibly archaeological in origin but may also be caused by agricultural or natural processes.
- 3.2.5 The area of high magnetic response **4005** is related to a pylon and unlikely to relate to archaeology.

4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest within the Site, in addition to regions of increased magnetic response.
- 4.1.2 A former field boundary has been identified, although this appears to be historic in origin.
- 4.1.3 A number of linear anomalies and pit-like responses have been detected, although their interpretation has been made less confident by their weak contrast with the local magnetic background and often random distributions. Trends and regions of increased magnetic response can be seen throughout, which are likely to be associated with agricultural activity.
- 4.1.4 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of gradiometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey.

5 REFERENCES

- English Heritage, 2008. *Geophysical Survey in Archaeological Field Evaluation*. Research and Professional Service Guideline No 1, 2nd edition.
- Soil Survey of England and Wales, 1983. *Sheet 5, Soils of South West England*. Ordnance Survey, Southampton.
- Wessex Archaeology, 2011. *Restrop Road, Purton, Wiltshire: Heritage Statement*. Client report 79580.01



APPENDIX 1: SURVEY EQUIPMENT AND DATA PROCESSING

Survey Methods and Equipment

The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate gradiometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of gradiometers suppresses any diurnal or low frequency effects.

The gradiometers have an effective resolution of 0.03nT over a ± 100 nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

Wessex Archaeology undertakes two types of magnetic surveys: scanning and detail. Both types depend upon the establishment of an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by English Heritage (2008) for geophysical surveys.

Scanning surveys consist of recording data at 0.25m intervals along transects spaced 10m apart, acquiring a minimum of 80 data points per transect. Due to the relatively coarse transect interval, scanning surveys should only be expected to detect extended regions of archaeological anomalies, when there is a greater likelihood of distinguishing such responses from the background magnetic field.

The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH, 2008).

Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.



Post-Processing

The magnetic data collected during the detail survey are downloaded from the Bartington system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

Typical data and image processing steps may include:

- Destripe – Applying a zero mean traverse in order to remove differences caused by directional effects inherent in the gradiometer;
- Destagger – Shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- Despike – Filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data)

Typical displays of the data used during processing and analysis:

- XY Plot – Presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies.
- Greyscale – Presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.



APPENDIX 2: GEOPHYSICAL INTERPRETATION

The interpretation methodology used by Wessex Archaeology separates the anomalies into two main categories: archaeological and unidentified responses.

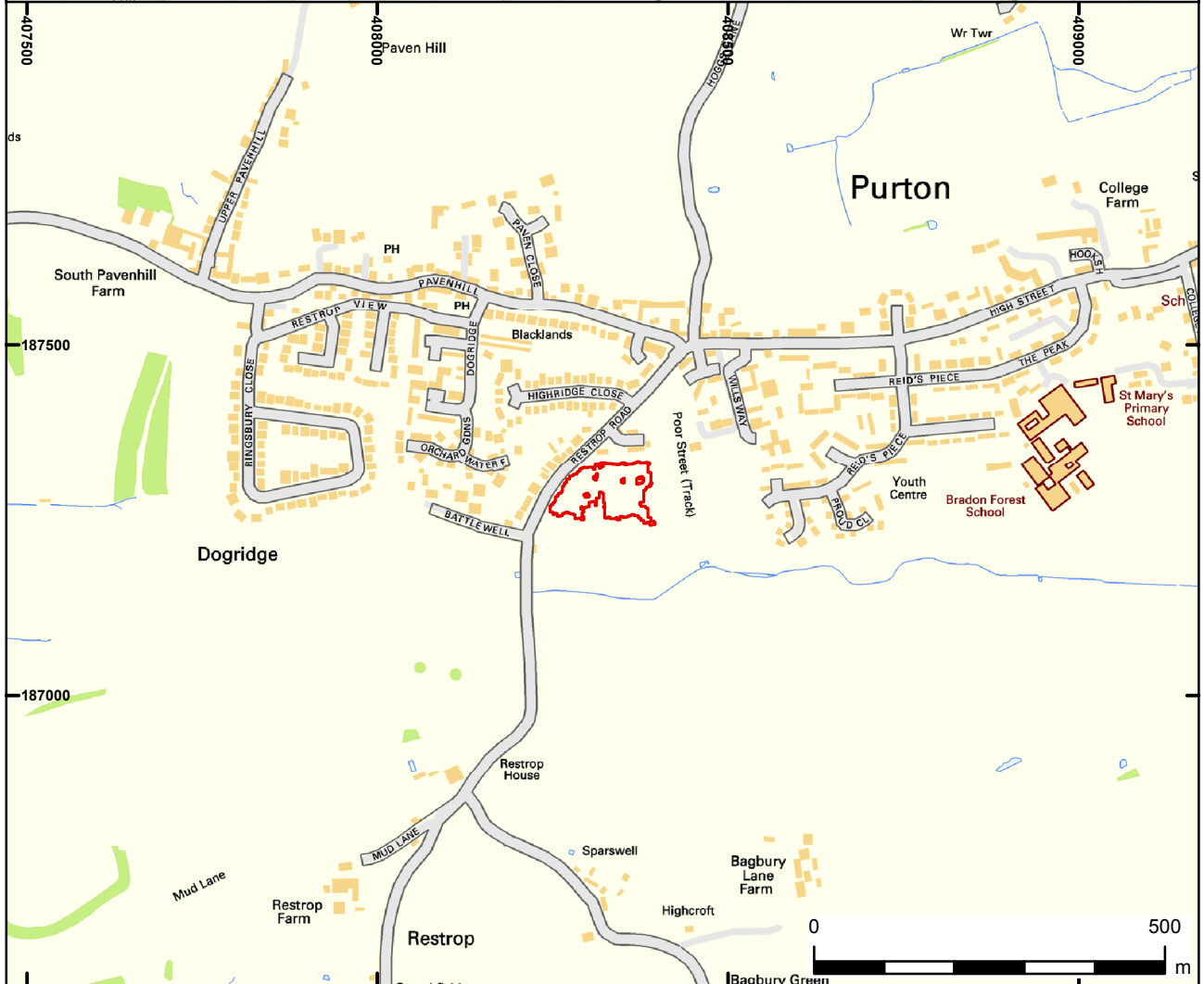
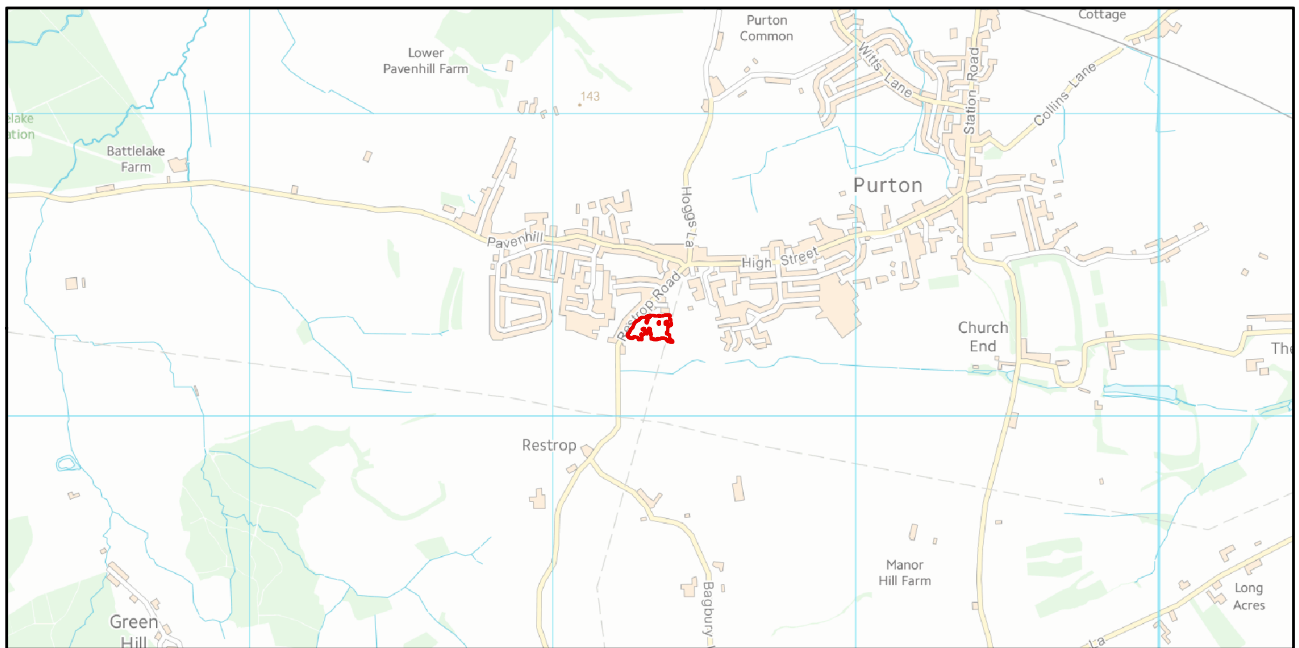
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:



- Archaeology – used when there is a clear geophysical response and anthropogenic pattern.
- Probable archaeology – used for features which give a clear response but which form incomplete patterns.
- Possible archaeology – used for features which give a response but which form no discernible pattern or trend.

The unidentified category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- Increased magnetic response – used for areas dominated by indistinct anomalies which may have some archaeological potential.
- Trend – used for low amplitude or indistinct linear anomalies.
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.

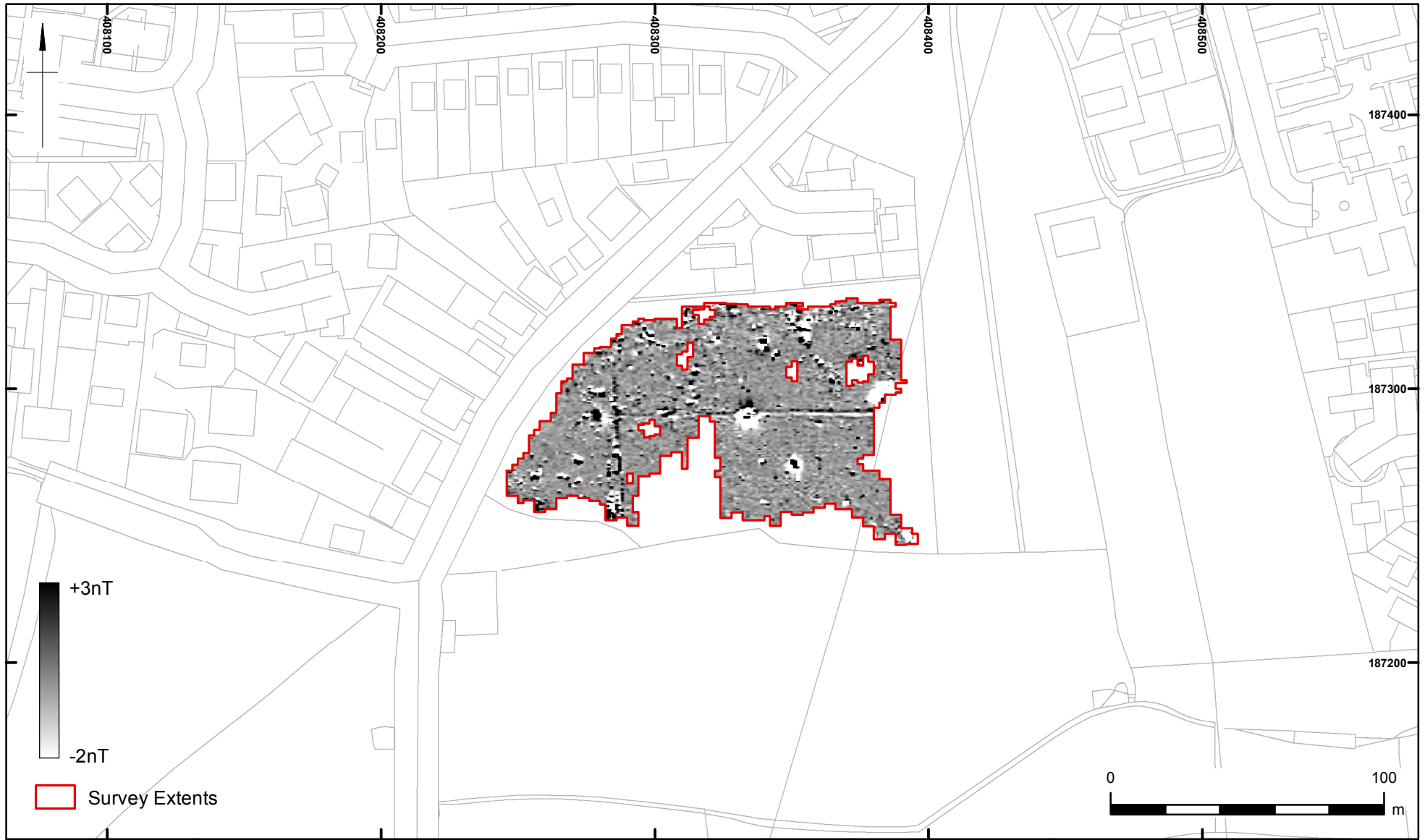
Finally, services such as water pipes are marked where they have been identified.




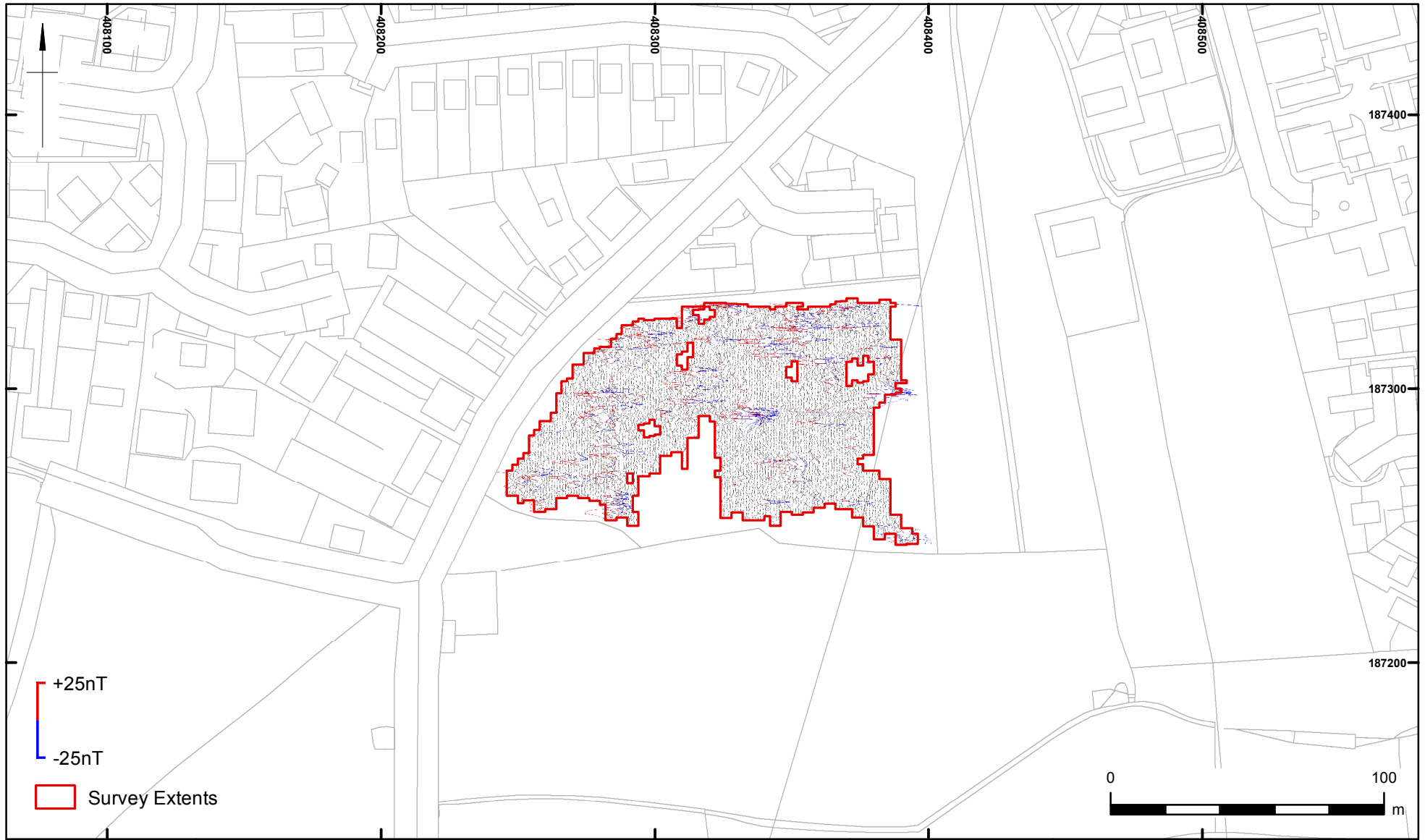
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Site location and survey extents

Figure 1



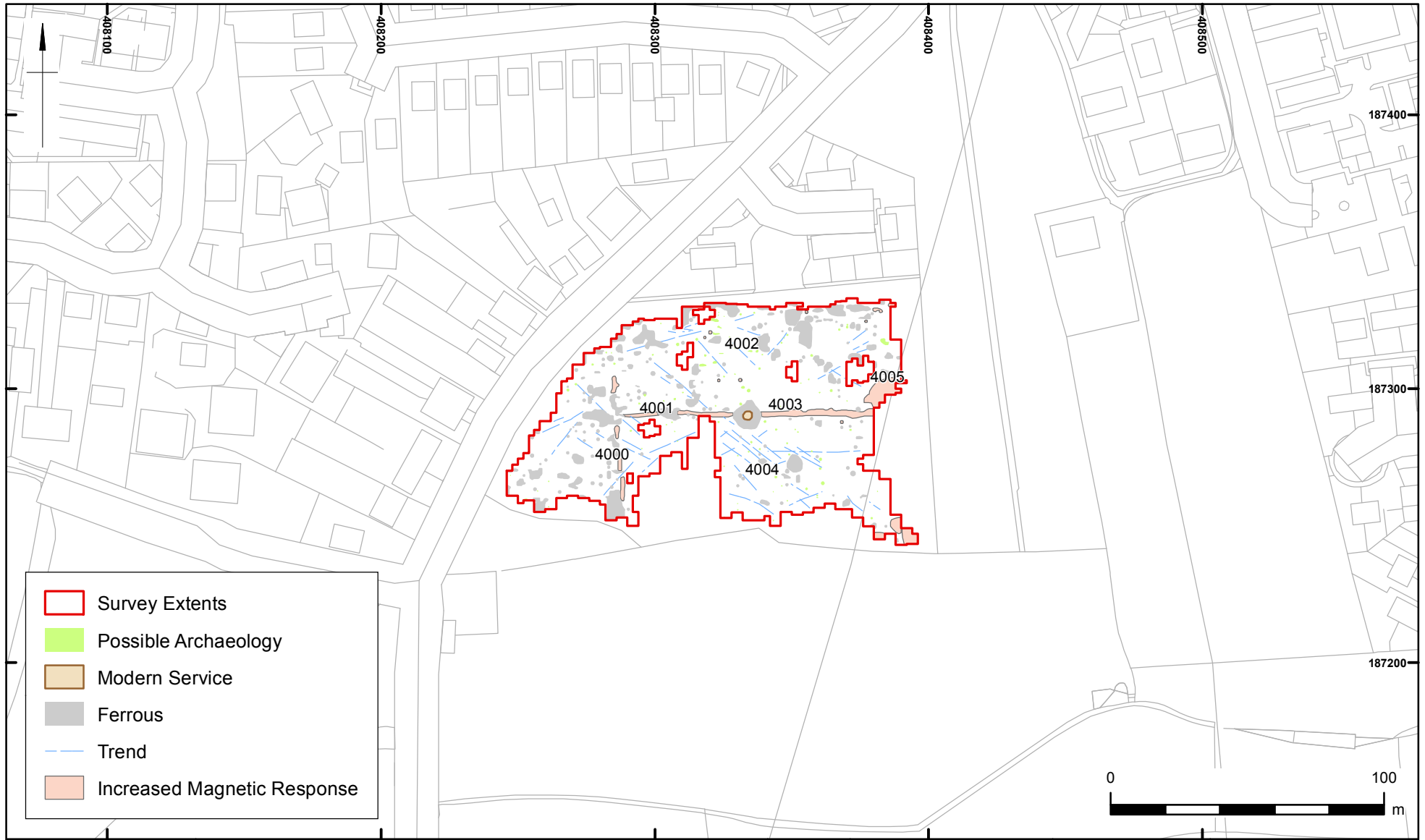
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XY trace

Figure 3



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Interpretation

Figure 4



salisbury rochester sheffield edinburgh



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