



making sense of heritage

Land east of Evesham Road, Harvington, Worcestershire

Detailed Gradiometer Survey Report



HER Activity Number Ref: WSM66589
Ref: 107330.01
January 2015



**Land east of Evesham Road, Harvington,
Worcestershire**

Detailed Gradiometer Survey Report

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Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land east of Evesham Road, Harvington, Worcestershire (centred on NGR 405228, 249165). The project was commissioned by CgMs Consulting 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 arable fields located to the east of Evesham Road, covering an area of approximately 8.6 hectares. Due to overgrowth the surveyable area was reduced to approximately 6.6ha. The geophysical survey was undertaken on 15th-19th December 2014.

The gradiometer survey has demonstrated the presence of a number of anomalies however it would appear that the majority of these are not of archaeological interest. Areas of ploughing have been identified along with a trend which corresponds with the line of a culvert and which also corresponds with a former field boundary on the 1884 Ordnance Survey map.

The completed report will be deposited with the Worcestershire HER under Activity Number **WSM66589**.



Land east of Evesham Road, Harvington, Worcestershire

Detailed Gradiometer Survey Report

Acknowledgements

Wessex Archaeology would like to thank Cathy Patrick and CgMs Consulting for commissioning the geophysical survey.

The fieldwork was undertaken by Chris Hirst and Michael Keach. Chris Breeden processed the data and Garreth Davey interpreted the geophysical data and wrote the report. The geophysical work was quality controlled by Dr. Paul Baggaley. Illustrations were prepared by Garreth Davey. The project was managed on behalf of Wessex Archaeology by Chris Swales.



Land east of Evesham Road, Harvington, Worcestershire

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by CgMs Consulting to carry out a geophysical survey of land to the east of Evesham Road, Harvington, Worcestershire (hereafter “the Site”, centred on NGR 405228,249165) (**Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application at the Site.

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 Site location and topography

1.2.1 The Site occupies a level expanse of ground at approximately 50m aOD, encompassing five fields. At the time of the survey the majority of the area was open and free of obstruction, however, the smaller field to the north east was heavily overgrown and survey was not possible here.

1.3 Soils and geology

1.3.1 The solid geology comprises Blue Lias Formation and Charmouth Mudstone Formation with superficial geological deposits of Ailstone Member stone and gravels identified across the application site (BGS 2015).

1.3.2 The soils underlying the Site are likely to comprise of loamy soils (UKSO 2015). Soils in such geological backgrounds have been demonstrated to produce magnetic contrasts suitable for gradiometer survey.

1.4 Archaeological background

1.4.1 A desk based assessment (DBA) undertaken by CGMS (2014) examined the potential for the survival of buried archaeological remains within the development area and a 1km Study Area, using information provided by the Worcestershire Historic Environment Record (HER) and the National Heritage List (NHL). The following background is summarised from the DBA.

1.4.2 There are no designated assets (Scheduled Ancient Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens and Registered Battlefields) identified within the Study Area. The Harvington and Norton Conservation Areas, along with their



associated listed buildings, lie to the southeast and southwest of the study site, respectively.

- 1.4.3 Although no heritage assets are situated in the Site, those located in the immediate surrounding area are considered relevant to the Site's wider contextual understanding.

Prehistoric Periods (450,000 BC – AD 43)

- 1.4.4 The HER holds no Prehistoric records for the Site itself, however there are a small number of unstratified Prehistoric finds within the surrounding landscape. Two Palaeolithic handaxes provide the earliest archaeological evidence within the area and were recovered c.850m to the northwest of the Site (though these may be a duplicated record of the same artefact).
- 1.4.5 The Site's topographic position – on a south-facing slope close to the Harvington Brook – combined with its underlying sand and gravel geology, would suggest a favourable position for Later Prehistoric occupation activity saw the development of more permanent settlements and farming in alluvial environs. As a result, it is perhaps unsurprising that the Bronze Age is well represented within the immediate area, with finds of a Bronze socketed axehead and Middle Bronze Age dirk both recorded to the north and a female Bronze Age inhumation, situated to the southwest of the Site.
- 1.4.6 Further Prehistoric evidence may have also been identified through the 1787 Inclosure Award, with the HER recording a reference to a field named "Barrow Piece", situated c.590m to the northwest of the Site and suggestive of a possible prehistoric barrow.
- 1.4.7 There is also a circular cropmark c.700m to the northwest of the Site, as well as a series of undated cropmarks c.860m to the north which comprises an enclosure, trackway and evidence for possible settlement remains, which may represent features of a Prehistoric date.

Romano-British (AD 43 – 410)

- 1.4.8 The HER holds no record for Romano-British evidence within the boundary of the development Site, with the Site appearing to be isolated from known foci of Roman settlement activity within the surrounding landscape.
- 1.4.9 A large multi-phase Roman farmstead has been recorded c.590m to the northwest of the Site, which also provided evidence of Roman roof tile fragments, with an extensive Romano-British settlement situated c.845m to the south of the Site.

Anglo-Saxon – Medieval (AD 410 – 1485)

- 1.4.10 The HER holds no records from this period for the Site or the Study Area, with the Site is likely to have comprised part of an undeveloped rural landscape bordering Harvington at this time.
- 1.4.11 First mentioned in late 8th century and 9th century documents, Harvington is recorded as having land granted by the Church (799 and 798 – 822 AD; VCH 1913), however, the surrounding landscape was likely settled prior to the 8th century as indicated by name typology. The name Harvington is derived from the Old English '*here-ford*' a ford suitable for the crossing of an army (though can also refer to a highway crossing), and '*tūn*', an enclosure or farmstead, meaning Army-ford farm or settlement (University of Nottingham 2013)



- 1.4.12 Harvington is later mentioned in the Domesday Survey as being a small but substantial settlement held by the monks of Worcester and containing 10 households, 2 lord's plough teams, 6 men's plough teams, ownership of slaves, 24 acres of meadow and a mill (Open Domesday 2015). However, the Site is likely to have been situated within the agricultural fields surrounding the settlement, with the focus of settlement likely to have been to the southeast of the Site.
- 1.4.13 It has also been suggested by the HER that the Site was situated within the Feckenham Forest, however by the publication of the 1611 John Speed county map of Worcestershire, Harvington is shown to be at a significant distance to the south of the Forest.
- 1.4.14 Later medieval evidence situated within the Study Area includes the Church of St. James, dated to the 12th century and is located c.415m to the southeast of the Site. Potentially representing the focus of later medieval settlement activity.
- 1.4.15 Evidence of ridge and furrow c.700m to the northwest of the Site and of elongated strip fields immediately to the west of the Site, are suggestive of extensive medieval agricultural practices within both the Site and Study Area.

Post-Medieval - Modern (AD 1486 - Present)

- 1.4.16 The HER records no Post-Medieval or Modern assets within the Site. However, there is evidence for extensive occupation within the surrounding landscape primarily relating to agricultural activity, with the majority of assets recorded for the Study Area related to these farmsteads and their outbuildings. The closest of which is the Grade II Listed Harvington Grange. Pools, quarries, the Evesham and Redditch railway and a World War II Prisoner of War Camp have been also been recorded.
- 1.4.17 Unfortunately at the time of the DBA's issue no original tithe, enclosure or estate maps covering the Site and predating the first edition Ordnance Survey were available from the Worcestershire Archives. However, a conjectural Inclosure Map, prepared from information held within the Inclosure Award was available.
- 1.4.18 The conjectural Inclosure map shows the Site situated within two large parcels of land beyond the historic Harvington village core. The presence of elongated strip fields is noted along the Evesham Road at the Site's western boundary and on the western side of Evesham Road, just to the south of the Site indicating survival of the earlier medieval agricultural landscape.
- 1.4.19 The 1884 Ordnance Survey Map shows that the Site was situated within agricultural land, with a trackway crossing the Site aligned north to south, connecting Harvington Cross with Harvington Grange and Harvington Village to the south. It is noted that a curving field boundary within the western part of the Site appears to represent a continuation north of the watercourse which feeds into the Harvington Brook, to the south. Land within and immediately surrounding Harvington is planted as orchards and the Midland Railway extends across the landscape on a southwest – northeast alignment.
- 1.4.20 The 1904 Ordnance Survey Map shows a Baptist Chapel within a land parcel on the Site's eastern boundary, but no other change is noted.
- 1.4.21 By 1927 there has been some construction immediately to the west of the Site, facing onto Evesham Road and along Village Street. Within the wider landscape, orchards now extend to the north, south and west of the study site.



- 1.4.22 The 1971 – 1973 Ordnance Survey map shows that the curving field boundary to the west had been removed. The north-eastern corner of the Site has been reorganised, with buildings fronting onto Village Street and what appear to be nursery structures extending south. The collection of structures is labelled as 'Oldfields'. There is an electricity substation just beyond the south-eastern corner of the Site. Land to the west, north and east is now developed.
- 1.4.23 By 1993 there is a sub-division of land at the south-western corner of the Site and Oldfields now has a separate property plot. There has been further residential development to the south.
- 1.4.24 The map regression exercise indicated that the Site area has been in use as arable fields from at least the 19th century to present, however individual boundaries have moved as Harvington has developed.

2 METHODOLOGY

2.1 Introduction

- 2.1.1 The detailed magnetometer survey was conducted using a Bartington Grad 601-2 dual fluxgate gradiometer system. The survey was conducted in accordance with English Heritage guidelines (English Heritage 2008).
- 2.1.2 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team on 15th-19th December 2014. Field conditions at the time of the survey were variable, although conditions were firm under foot. Due to an area of overgrowth and other obstacles, the proposed 8.9ha survey area was reduced to 6.6ha.

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 magnetometer 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 ($\pm 5nT$ 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 identified magnetic anomalies across the Site, along with areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2500 (**Figures 2 and 3**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and $\pm 25\text{nT}$ at 25nT 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 most obvious magnetic anomalies were detected in the large western field, many of these being ferrous objects.
- 3.2.2 **4000** shows a linear trend running approximately north - south; this feature correlates with the line of an existing culvert and the former field boundary presented on 1884 Ordnance Survey map. This boundary is not represented on the 1787 Conjectural Inclosure Map.
- 3.2.3 **4001** highlights a number of east-west aligned linear anomalies which respect feature **4000**. These features are interpreted as ploughing disturbance with their association with feature **4000** suggesting that they are contemporary and therefore probably 19th century in origin.

4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has detected regions of increased magnetic response across the Site, whilst these do not appear to be of archaeological interest, it is considered to have fulfilled the aims of the survey.
- 4.1.2 The majority of anomalies detected by the survey appear to present 19th century historic farming activity on the Site.



5 REFERENCES

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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 magnetometers 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 magnetometers 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 magnetometer;
- 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.

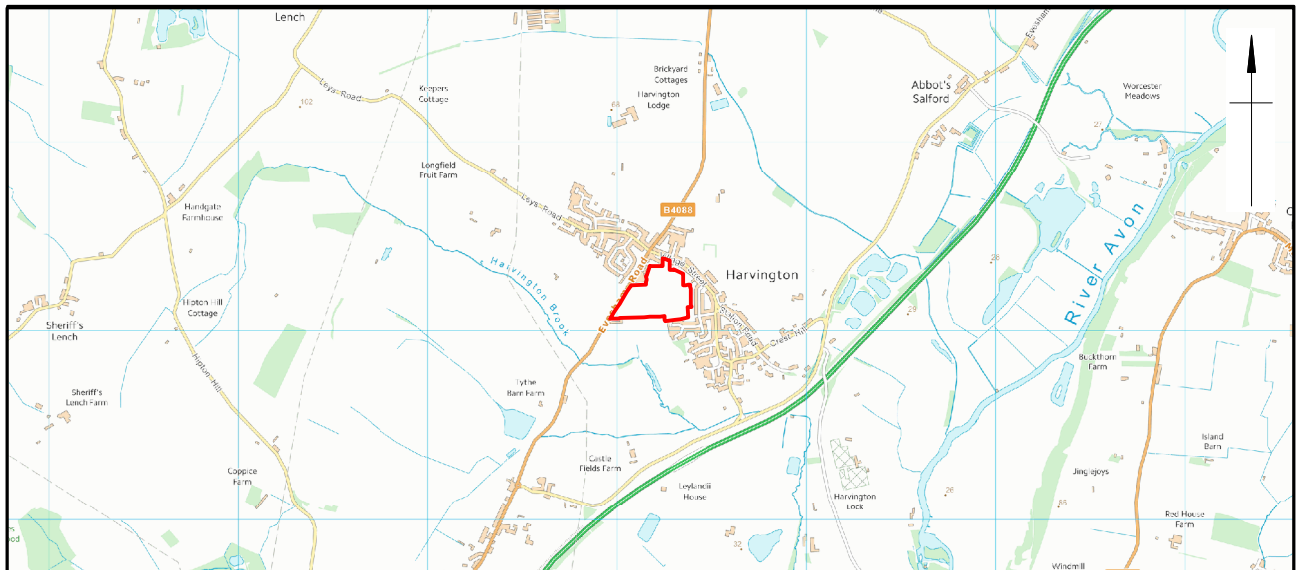
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

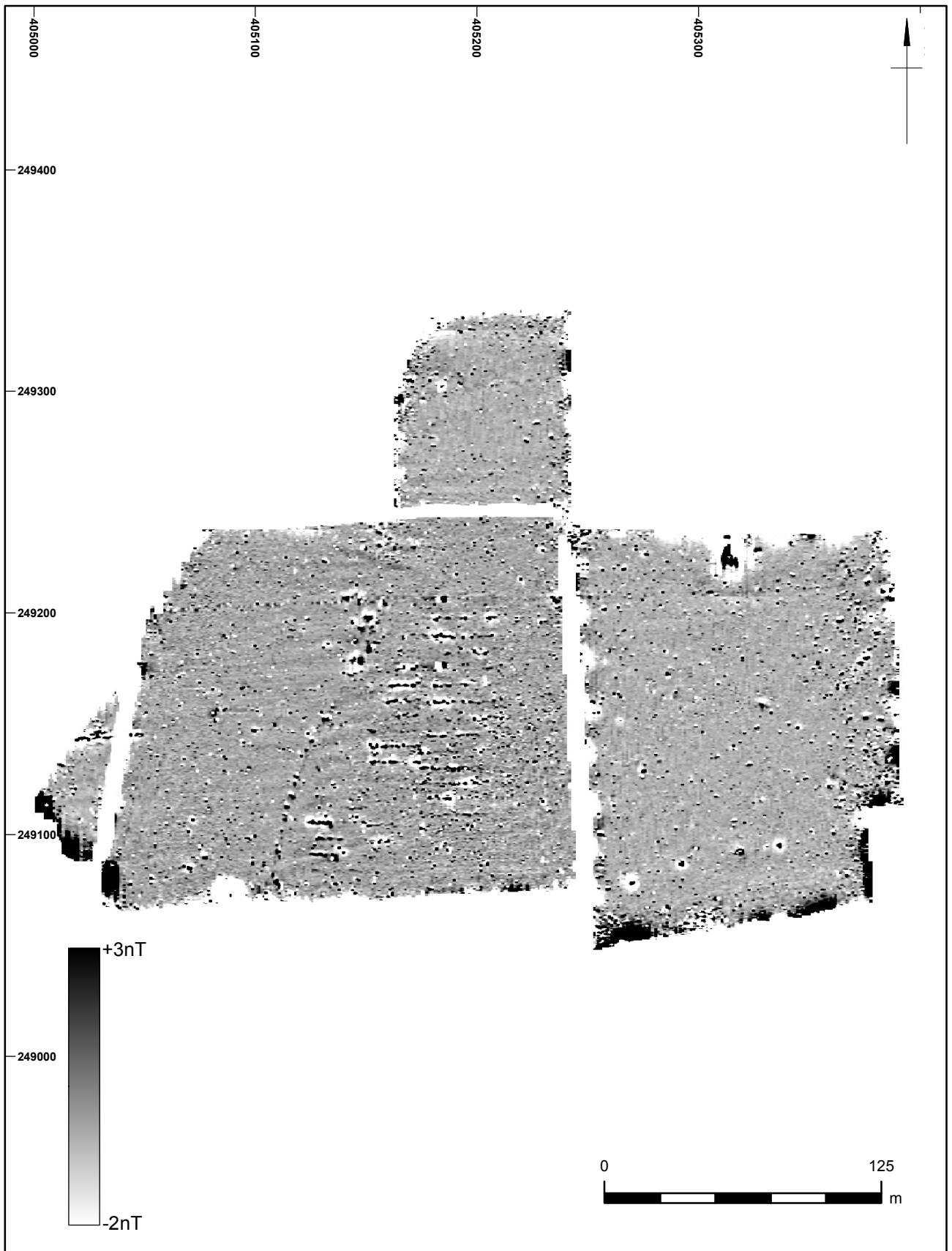
Finally, services such as water pipes are marked where they have been identified.




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Site location and survey extents

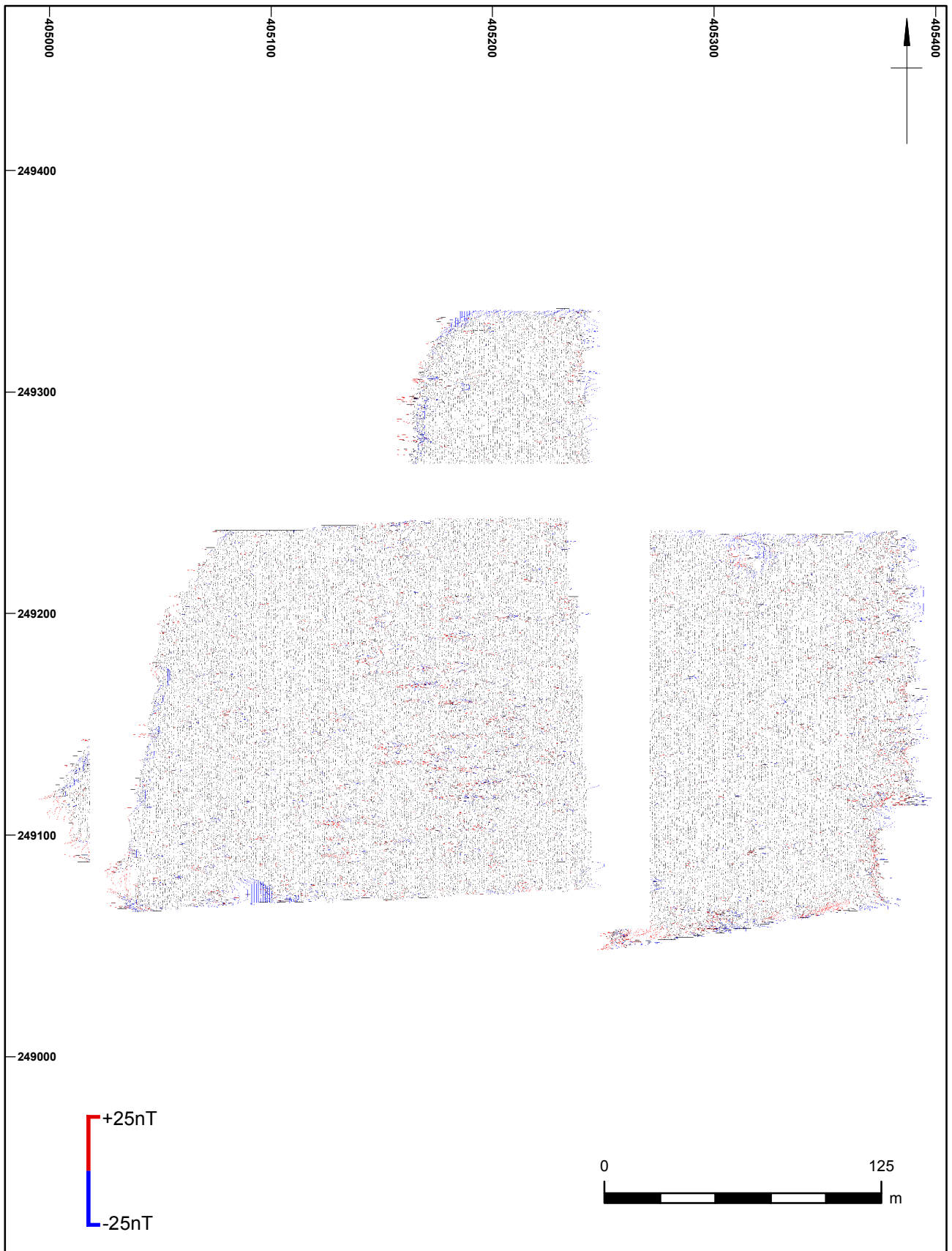
Figure 1




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Greyscale plot

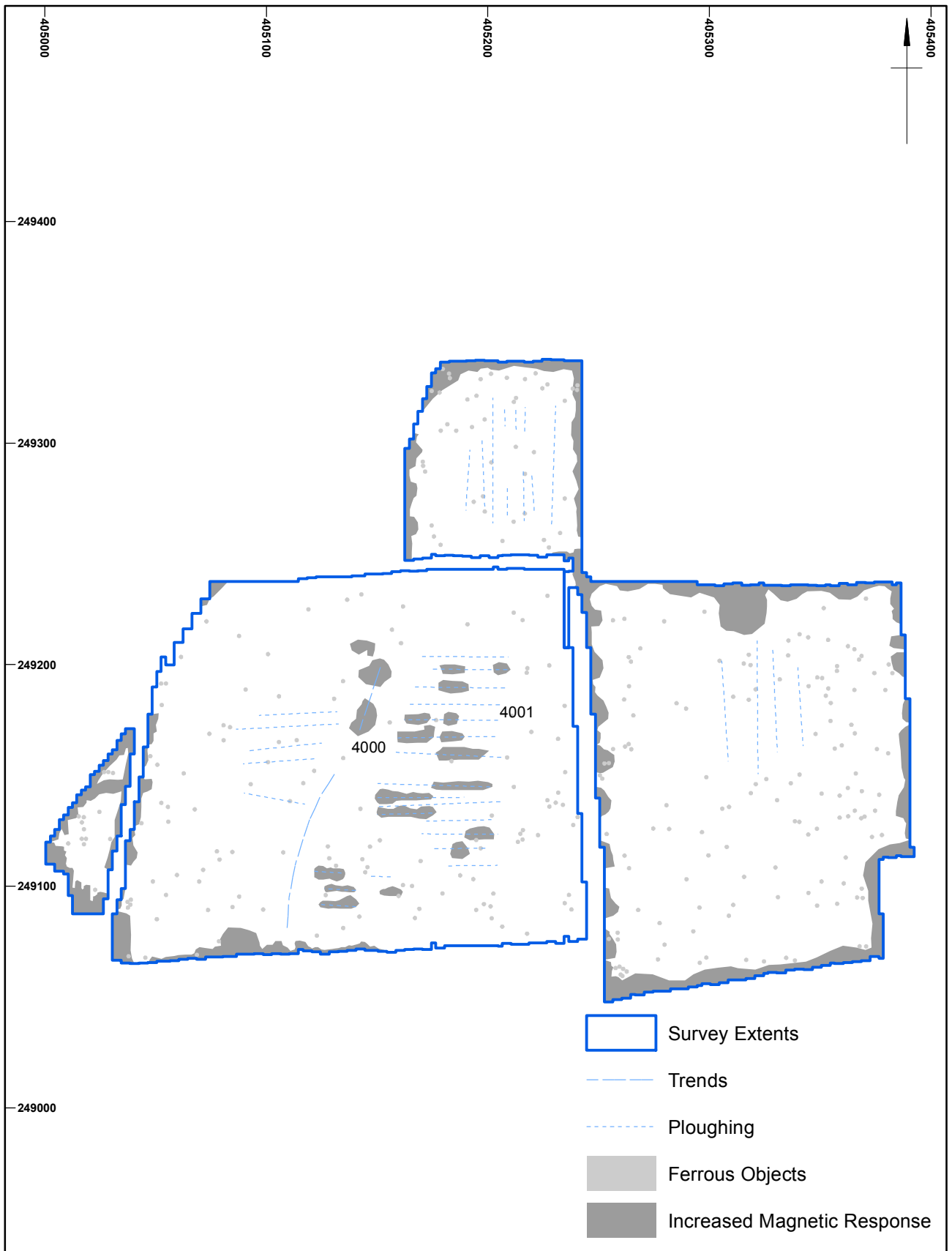
Figure 2



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XY trace plot

Figure 3



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