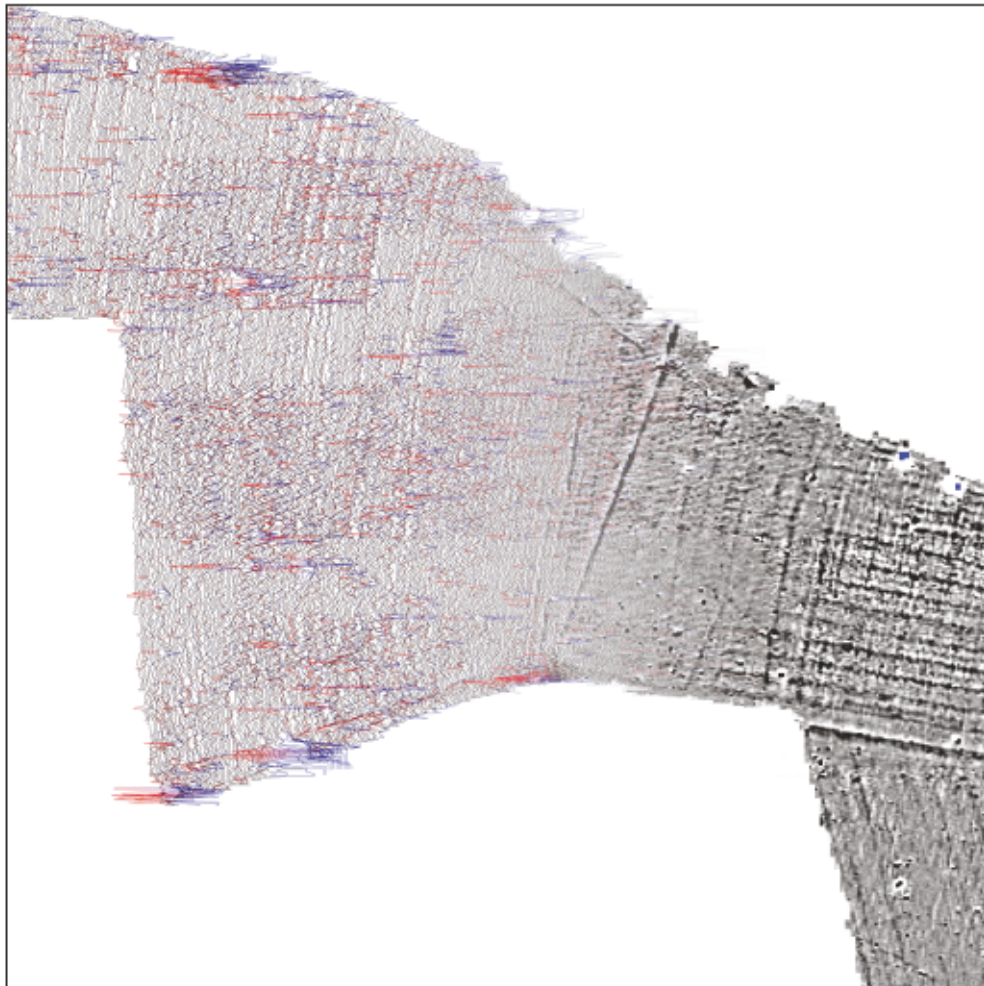




making sense of heritage

# Melksham Town FC

## Detailed Gradiometer Survey Report



Ref: 102041.01  
February 2014



**Melksham Town FC  
Melksham, Wiltshire**

**Detailed Gradiometer Survey Report**

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**February 2014**

**Report Ref. 102041**



## Quality Assurance

<b>Project Code</b>	102041	<b>Accession Code</b>		<b>Client Ref.</b>	
<b>Planning Application Ref.</b>		<b>Ordnance Survey (OS) national grid reference (NGR)</b>	392100 162910		

<b>Version</b>	<b>Status*</b>	<b>Prepared by</b>	<b>Checked and Approved By</b>	<b>Approver's Signature</b>	<b>Date</b>
v01	E	CD/AS	PAB		12/02/2014
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\* I = Internal Draft; E = External Draft; F = Final

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# Melksham Town FC Melksham, Wiltshire

## Detailed Gradiometer Survey Report

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## **Melksham Town FC Melksham, Wiltshire**

### **Detailed Gradiometer Survey Report**

#### **Summary**

A detailed gradiometer survey was conducted over land at Melksham, Wiltshire. The project was commissioned by Wiltshire Council 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 pasture fields immediately north of Melksham Community Oak School, approximately 9km west of Devizes and 1.7km east of the centre of Melksham. Gradiometer survey was undertaken over all accessible part of the site. The site occupies largely flat land which gently slopes up towards the eastern extent. The gradiometer survey has demonstrated the presence of anomalies of possible archaeological interest within the survey area, along with a region of increased magnetic response, plough trends and several modern services.

The geophysical data show regular ploughing trends throughout the survey area, thought to relate to ridge and furrow activity from differing agricultural periods on the site. Several former field boundaries have also been identified, suggesting that the current field system was once more enclosed. Several areas of increased magnetic response have also been identified, some relating to agricultural activity and some probably natural in origin. Possible pit anomalies are also present throughout the site.

The geophysical survey was undertaken between the 6<sup>th</sup> to the 22<sup>nd</sup> January 2014.



## **Melksham Town FC Melksham, Wiltshire**

### **Detailed Gradiometer Survey Report**

#### **Acknowledgements**

The detailed gradiometer survey was commissioned by Wiltshire County Council. The assistance of Jenny Rowe, Richard Pearce and the Wiltshire County Council Team is gratefully acknowledged in this regard. Wessex Archaeology would also like to thank Melksham Oak Community School for granting access.

The fieldwork was directed by Ben Urmston and assisted by Clara Dickinson, Alistair Salisbury, Laura Andrews, Rachel Chester and Jennifer Smith. Clara Dickinson processed and interpreted the geophysical data in addition to writing this report. The geophysical work was quality controlled by Dr. Paul Baggaley. Illustrations were prepared by Ken Lymer. The project was managed on behalf of Wessex Archaeology by Ben Urmston.





# Melksham Town FC Melksham, Wiltshire

## Detailed Gradiometer Survey Report

### 1 INTRODUCTION

#### 1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by Wiltshire County Council to carry out a geophysical survey of land at Melksham, Wiltshire (**Figure 1**), hereafter “the Site” (centred on NGR 392100 162910). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of proposed development 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 The Site

- 1.2.1 The survey area comprises of agricultural pasture fields, 1.7km to the east of Melksham, and 9 km west of the centre of Devizes (**Figure 1**). Detailed gradiometer survey was undertaken over all accessible parts of the Site, a total of 25.2 ha.
- 1.2.2 The Site occupies 5 irregular shaped pasture fields of flat land, lying at 40m above Ordnance Datum (aOD), gently sloping upwards to 43m aOD towards the eastern extent. The survey area is bordered by Melksham Oak Community School playing fields in the south with the other extents of the survey area defined by Thyme Road to the north, and farmland to the east and west.
- 1.2.3 The soils underlying the Site are likely to be typical brown sands of the 712b (Denchworth) association and typical brown earths of the 711f (Wickham 2) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.
- 1.2.4 The underlying geology comprises of Oxford Clay Formation which comprises of mudstone sedimentary bedrock. Superficial geology of the area is mapped as areas of Head and Alluvium.

### 2 METHODOLOGY

#### 2.1 Introduction

- 2.1.1 The detailed magnetometer 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 6<sup>th</sup> January to the 22<sup>nd</sup> January. Field conditions at the time of the survey were largely suitable, with the survey area under pasture. However geophysical survey was prevented in some areas due to presence of obstructions in the field.

## 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 ( $\pm 7$ 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. In places, further data processing was undertaken to reduce the effect of periodic errors within the data resulting largely from ground conditions.
- 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. Regions of increased magnetic response, ferrous anomalies and a number of trends have also been detected. Modern services have also been detected.
- 3.1.2 Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (**Figures 2, 3, 5 and 6**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image. The XY trace plots are presented at  $\pm 25$ nT at 25nT per cm.
- 3.1.3 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (**Figures 4 and 7**). Full definitions of the interpretation terms used in this report are provided in **Appendix 2**.
- 3.1.4 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 At the northwestern extent of survey area there are several anomalies of possible interest, including several responses thought to be possible archaeology (e.g. **4000**). These are small, sub circular anomalies which display strong positive magnetic values, possibly caused by pit-type features. These are found beside several linear and curvilinear





responses which are interpreted as trends. However it is unclear what these features relate to, and from what period they date. The magnetic background is relatively quiet otherwise.

- 3.2.2 Several linear trends are noted in **4001**, located in the northwestern field of the survey area. These are considered to be ploughing scars running in a north-south direction, which possibly relate to ridge and furrow. These extend from the north of the survey area to the south with wide regular intervals between each response. These are crossed by ploughing trends running perpendicular, in an east-west orientation. These are more narrowly spaced and do not present as strong a response as the north-south trends. Both are thought to relate to different periods of agricultural activity on the site. Several areas of increased magnetic response are also noted, thought to relate to the more distinct plough trends, since are found on the same alignment as some of the plough features. Several trends following a northwest-southeast orientation are also present and are found at the southwestern extent of the survey area, although their origin is uncertain.
- 3.2.3 In **4002**, the plough trends continue through the site, although the horizontal trends can be seen to start extending gently up towards the north-east. Several possible archaeology responses are also identified, which again show high positive magnetic values and are small, sub circular in form, similar to those identified in **4000**. These are probably caused by pit-type features.
- 3.2.4 Several possible archaeology anomalies are also identified in **4003**. Some small pit-type responses are identified to the west, whereas to the east, a long linear feature which follows a northeast to southwest orientation is visible, dividing the field. This anomaly does not seem to follow the orientation of the plough trends, and due to its width, and increased magnetic response, is likely to represent a former field boundary. However it is worth noting that the plough trends do not seem to respect this boundary, and continue beyond the feature towards the east. Trends have also been identified in the dataset which extend in a mostly northwest-southeast direction, but it is unknown what period the anomalies date to.
- 3.2.5 Several responses can be seen at **4004**, which are interpreted to be linear trends, following a northeast-southwest orientation. These extend from the southernmost extent of the possible field boundary, towards the top of the survey area. The origin of these anomalies is unknown.
- 3.2.6 Plough trend responses at **4005** continue to follow the vertical and horizontal orientations previously described, but display a greater magnetic response than seen in previous areas. Anomalies interpreted as trends are also identified, with both northeast-southwest and northwest-southeast orientations present.
- 3.2.7 Possible archaeology anomalies can be identified at **4006** in the form of two small circular features within the data, which display high magnetic values and are probably pit-type features. A long linear response of possible archaeology is also present, which extends across the width of the area. This feature is similar in form to the boundary feature described at **4003**, so it is likely that this relates to another former field boundary. However unlike the previous field boundary, the current orientations of plough trend responses do not encroach beyond this border.
- 3.2.8 Ploughing trends are once again noted at **4007**, but these follow a northwest-southeast orientation. This is thought to be related to a different phase of agricultural activity, since these ploughing trends respect the field boundaries, and do not encroach above the field boundary noted at **4006**. Several possible archaeology, pit-type responses and several



linear trends, which are seen to follow a roughly east-west orientation, are also noted, but the origins of which are unknown.

- 3.2.9 Within the middle field of the survey area, several possible archaeological anomalies are of interest, seen at **4008**. These are long linear anomalies which display strong magnetic responses. These possibly relate to a former field boundary system which runs parallel to the top border of the field's survey area. The anomaly also appears to run through the modern field boundary, which divides the middle survey field from the easternmost field. In several places, strong linear responses are also present, heading from the boundary feature and out of the survey area; in a continuing north-easterly direction, suggesting the field system may possibly have been subdivided. Plough trends running on both east-west and northeast-southwest orientations are also of note, found within this field boundary structure. However, the northeast-southwest orientated trends continue beyond the former field boundary and through into the main extent of the survey area. These are similar in form to the vertical trends described in **4002**, and display wide regular intervals between each response.
- 3.2.10 A long linear anomaly, interpreted as possible archaeology is visible at **4009**. This thought to be a former field boundary, running in a northwest-southeast direction, dividing the survey field. Again this feature does not respect the current field boundary, and seems to continue through to the easternmost field, on the same orientation. Several linear trends following this orientation are also present nearby, but their origins are unknown. A very strong ferrous response can be seen originating from a modern service. This runs almost north-south through this survey field, and through into the easternmost field at its south-western extent.
- 3.2.11 A broad sub-circular area of increased magnetic response can be seen in the northwest of the survey field at **4010**. This anomaly is thought to be caused by natural origins. Directly below this feature several small linear trends can be identified, which follow a northwest-southeast orientation, however their definition is unclear. Another possible archaeological feature is also identified towards the south, again thought to represent another pit-type feature, due to the large magnetic response and small circular form.
- 3.2.12 **4011** displays another linear possible archaeology feature, interpreted as a former field boundary. This follows a similar orientation to the two others field boundary features described at **4009** and **4008**, and again continues to divide the field. The feature displays high magnetic values towards its centre. As it extends towards its western extent, the anomaly becomes faint and more ephemeral. This feature is also fragmented, coincident with the several ploughing trends, suggesting that later activity may have truncated the feature in places. It also extends through the modern field boundary appearing in the eastern survey field. Several trends also extend nearby along the same orientation, although their purpose is unclear.
- 3.2.13 A very strong ferrous response can be seen entering the field from the south at **4012**. This originates from a modern service, which runs almost north-south through the survey field, as described at **4009**. Several trends are also present, which are orientated northwest-southeast, at the south edge of the field's survey area. However, the purpose and origin of these features is not clear.
- 3.2.14 Within the easternmost survey field at **4013**, are several linear responses which are interpreted as possible archaeology. These are similar to anomalies described in **4008**, which continue along the same pathway, running parallel to the top of the survey area. Several strong linear features can be seen extending towards the northeast, again segmenting the boundary into several distinct areas. Plough trends extend in a northeast-



southwest orientation, from within the field boundary and into the south and rest of the survey area.

- 3.2.15 At **4014**, the linear field boundary anomaly continues, although the response becomes less defined, as the strength of the feature decreases. However it is possible to observe that the feature starts to deviate from its adjacent pathway with the survey boundary, as it turns toward the south-east, before being masked by highly ferrous, modern service response which is orientated North-South. This modern service response runs throughout the survey field, generally following the eastern field boundary before turning directly north-south once again, within the southernmost field. Several small pit-like responses can also be seen in region, interpreted as possible archaeology.
- 3.2.16 Several trends are noted towards the middle of the survey field at **4015**. These are roughly east-west in orientation; however a sub rectangular feature is of interest which displays trends on a northeast-southwest alignment. However to what period it relates, is unclear. A continuation of the former field boundary described at **4009** can also be seen, situated to the west of the field. This continues through the modern day field boundary from the middle survey field, but starts to dissipate after a short distance. Another pit-like anomaly interpreted as possible archaeology is located above the possible field boundary.
- 3.2.17 At **4016**, several possible archaeology features are of interest. Extending from the western boundary is a linear response which is interpreted as a former field boundary, as described at **4011**. This extends partially into the survey field, on a northwest-southeast orientation, before the response starts to weaken, and dissipates. Towards the east of the linear field boundary, are several pit-type features, interpreted as possible archaeology. These are as described previously, and are sub circular in shape displaying high magnetic values. In the south west extent of the field, the westernmost modern service described at **4012**, enters and exits the survey field, running almost north-south. This continues in the southernmost survey field, as well as diverging towards the west.
- 3.2.18 A broad linear feature of increased magnetic response can be seen at **4017**. This runs parallel to the southernmost field boundary extending towards the north-east until it is masked by the stronger ferrous responses produced by the easternmost modern service described at **4014**.
- 3.2.19 A broad, linear anomaly of increased magnetic response is visible in the southernmost field at **4018**. This extends from the western field boundary, running on a northeast-southwest orientation until it becomes masked by the stronger ferrous responses from the modern service. The feature then continues for a short period beyond the service. It is unknown however, to what this feature relates to. Both modern services (e.g. **4008**, **4014**) described previously are present within this survey field. The western service extends into the north-western area of the survey, until hitting its terminus midway through the field. This may be related to a modern water trough which is located in this area. The eastern service extends in the survey field from the north-eastern corner along its previous orientation before turning midway, directly towards the north and exiting the survey area in the south.
- 3.2.20 Several plough trends on a northeast-southwest orientation can also be found here towards the north. These are consistent with plough trends found in the easternmost field and described in **4013**, so it is possible that the modern field boundary does not relate to previous agricultural practices.



- 3.2.21 Several linear trends and possible archaeological pit-type features are present at **4019**. These are randomly distributed across the area and do not display any orientation. Due to this it is difficult to determine from what period they date.
- 3.2.22 At **4020**, several small linear trends are present which follow an east-west orientation. These may be related to an archaeological feature but are too indistinct to define. Another possible pit-like feature can be seen which is identified as possible archaeology.
- 3.2.23 At **4021**, several more trends and pit-like features are visible. The linear trends seem to follow a loose northeast-southwest orientation, as well as several on an opposing northwest-southeast orientation. However it is difficult to date these features due to their poor definition from the magnetic background.

### **3.3 Gradiometer Survey Results and Interpretation: Modern Services**

- 3.3.1 There are several modern services located in the data however gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

## **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, several ploughing trends and several modern services.
- 4.1.2 Several possible field boundaries have been identified, which sub-divide the survey fields. The nature of the former boundaries also infers that the field system may have differed, as several boundaries do not respect the current field's borders.
- 4.1.3 Ploughing trends of several orientations have been identified in most of the survey area, with several regions displaying two opposing alignments. This is thought to relate to ridge and furrow activity on the site, from different periods of agricultural activities. However, it is difficult to estimate the date or period from which these features relate.
- 4.1.4 Numerous pit-like anomalies and linear and curvilinear trends are also present throughout the dataset, but it is similarly difficult to determine whether they are archaeological in origin; it is possible that they are the result of natural or agricultural processes.
- 4.1.5 The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies, however. Similarly, it is difficult to estimate the depth of burial of the services through gradiometer survey.
- 4.1.6 The extent of magnetic disturbance associated with the services and the frequency of small-scale ferrous anomalies have reduced the area in which it is possible to detect archaeological features. The trends identified within the survey area exhibit only weak contrast with the general magnetic background, and it is difficult to assess whether more substantial archaeological features would produce more readily detectable anomalies.



- 4.1.7 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. 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.





## 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  $\pm 100$ 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.

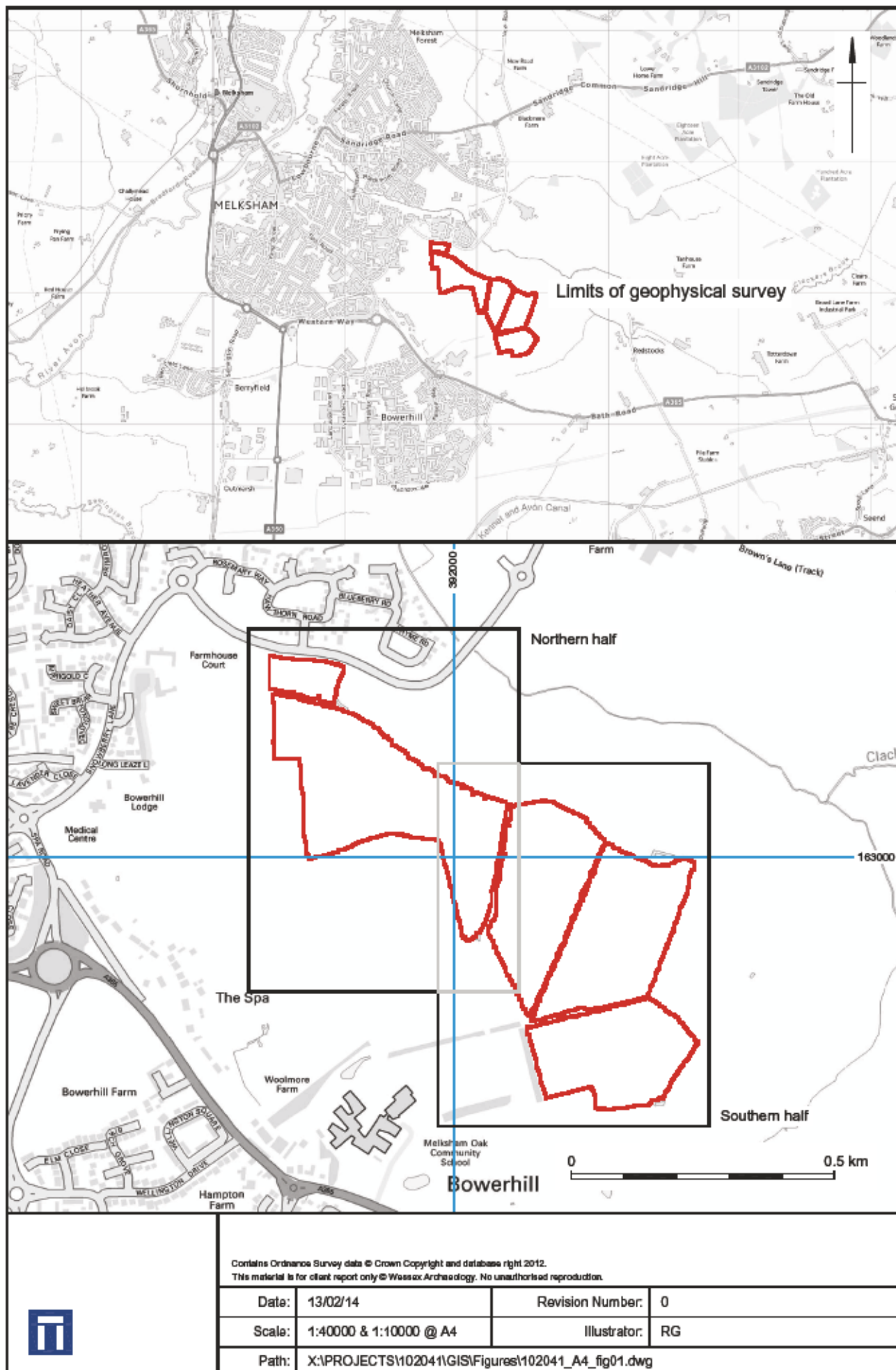
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

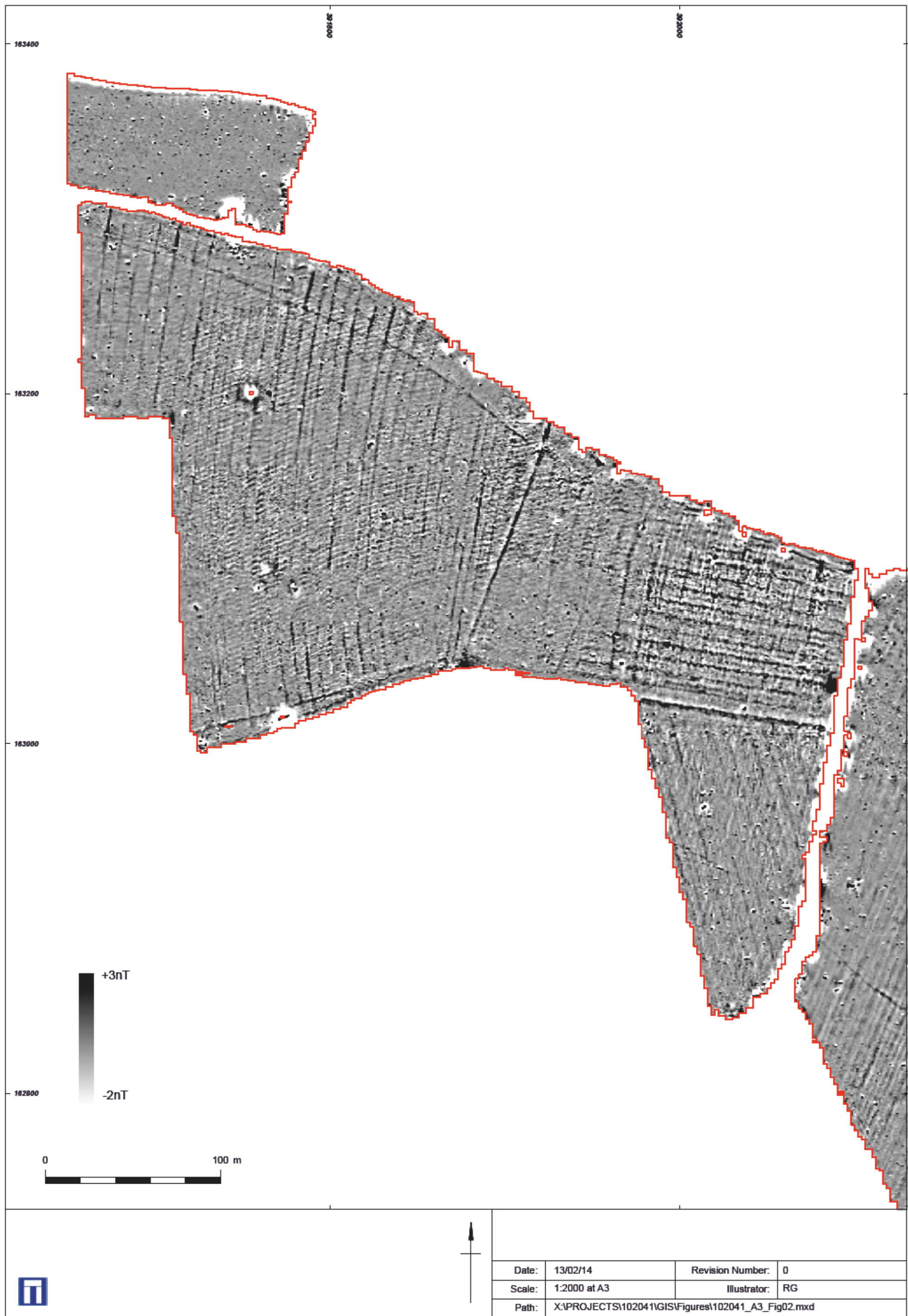
Finally, services such as water pipes are marked where they have been identified.



Site location plan

Figure 1

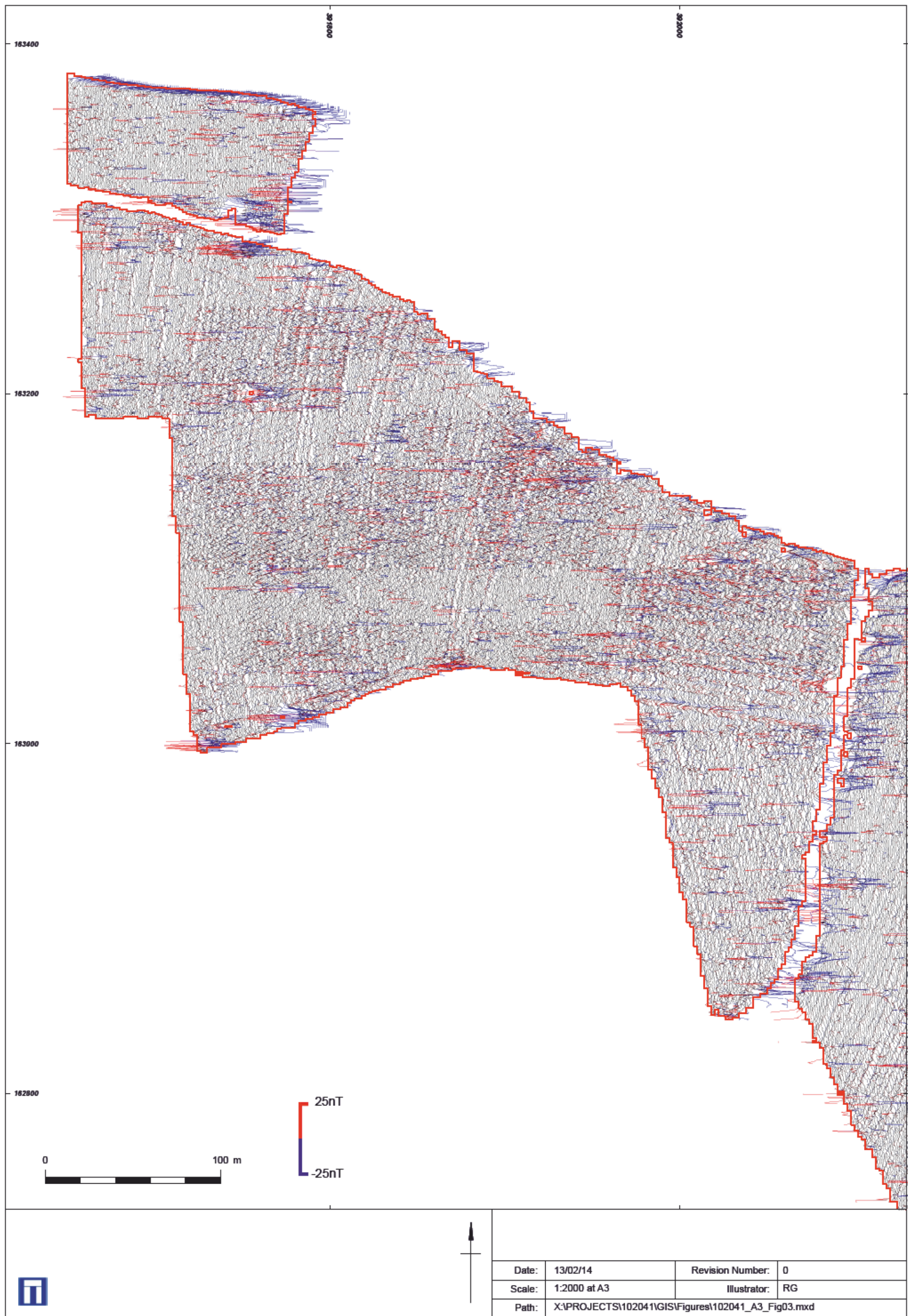




Greyscale images (northern half of site)

Figure 2

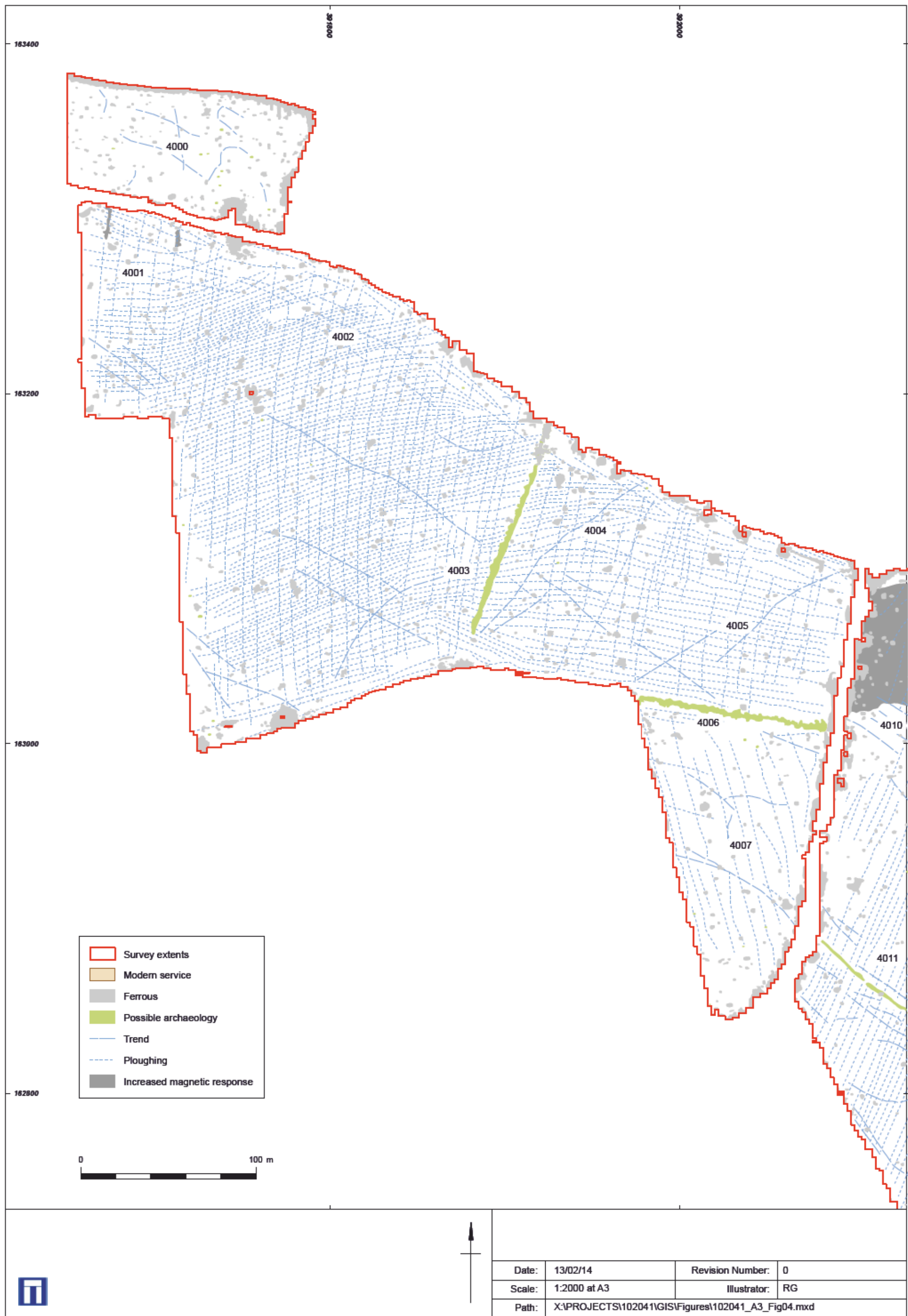




XY trace (northern half of site)

Figure 3





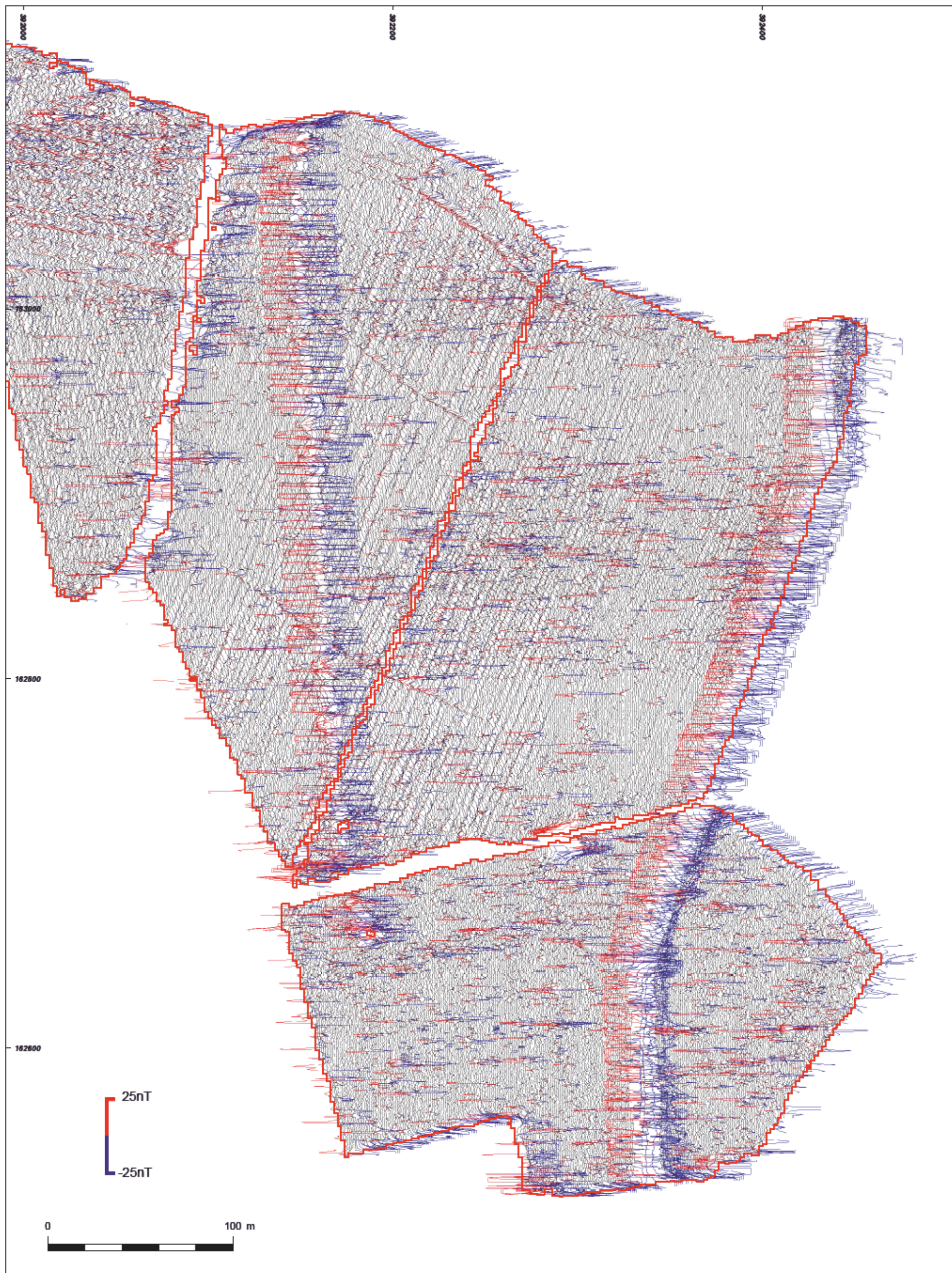
Interpretation (northern half of site)

Figure 4







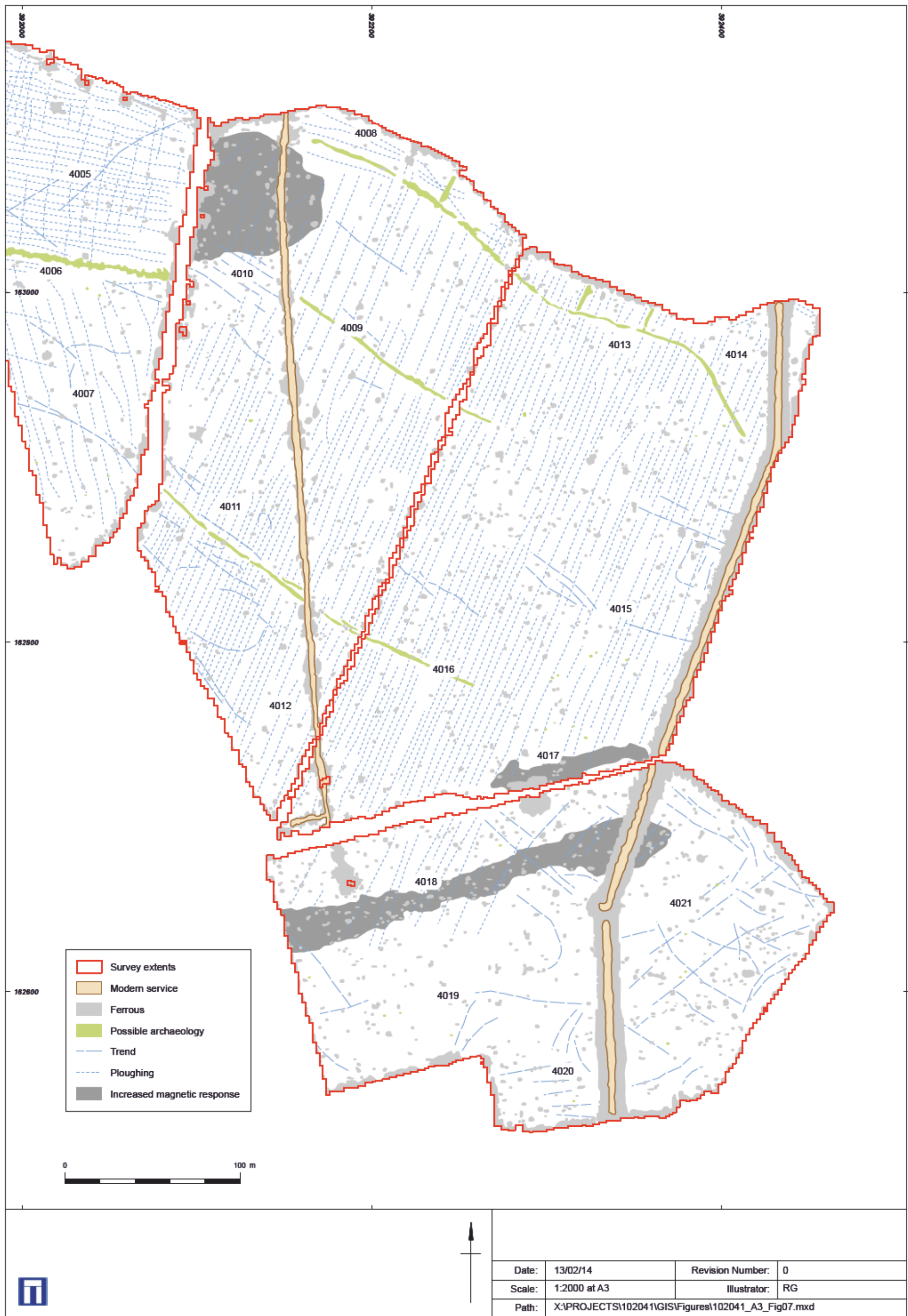


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XY trace (southern half of site)

Figure 6





Interpretation (southern half of site)

Figure 7





salisbury rochester sheffield edinburgh



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