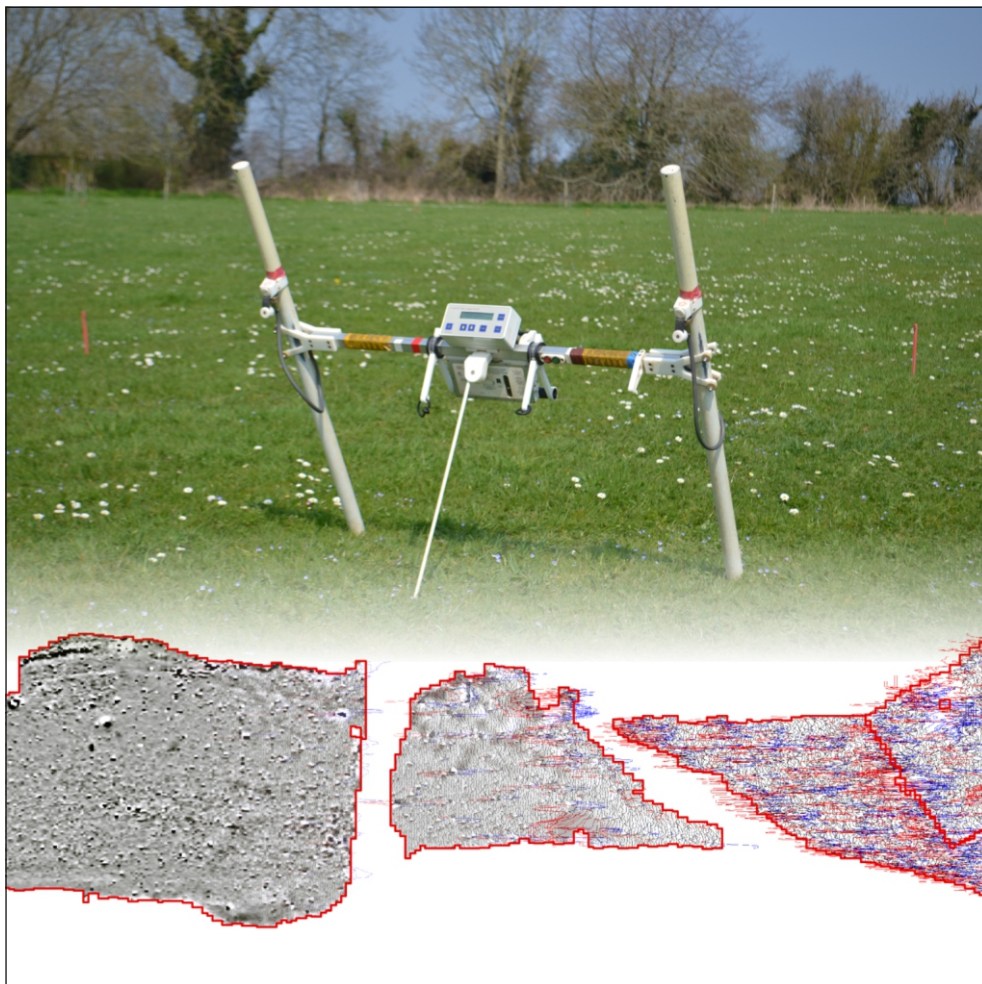




making sense of heritage

Land at Cuthbury Wimborne Minster, Dorset

Detailed Gradiometer Survey Report



Ref: 108780.02
May 2015



**Land at Cuthbury,
Wimborne Minster, Dorset**

Detailed Gradiometer Survey Report

Prepared for:
Wyatt Homes
1 Parkstone Road
Poole
Dorset
BH15 2NN

Prepared by:
Wessex Archaeology
Portway House
Old Sarum Park
Salisbury
Wiltshire
SP4 6EB

www.wessexarch.co.uk

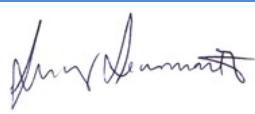

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Land at Cuthbury, Wimborne Minster, Dorset

Detailed Gradiometer Survey Report

Summary

A detailed gradiometer survey was conducted over land at Cuthbury, Wimborne Minster, Dorset (centred on NGR 400400, 099950). The project was commissioned by Wyatt Homes Ltd. with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features ahead of the residential development of the site.

The survey area comprises three areas running parallel, on the north and east side of the river Stour, and to the southwest of the town of Wimborne Minster. The areas covering a total of 8.4ha, of which 5.5ha was surveyed. The remaining 2.9ha was unsurveyable due to building works being undertaken within the survey area, field boundaries and access issues. The geophysical survey was undertaken between the 27th and 29th of April 2015. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of potential archaeological interest, a modern service and some superficial geology.

The survey is characterised by a strong magnetic background in the eastern parcels of land with fields bearing large amounts of ferrous. Faint linear trends are present in the west and south however their origin is unknown.

The anomalies identified as being of archaeological interest are primarily interpreted as small ditch features or isolated pits. These are likely to represent past agricultural land management or trackways. Due to the isolated nature of these features it is difficult to place these in their wider context.

Areas to the northeast show anomalies related to the Wimborne Town Football club. These are not archaeological in nature.



Land at Cuthbury, Wimborne Minster, Dorset

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Acknowledgements

Wessex Archaeology would like to thank Anton Howse and Wyatt Homes Ltd. for commissioning the geophysical survey.

The fieldwork was directed by Alistair Salisbury with assistance from Diana Chard. Alistair Salisbury processed and interpreted the geophysical data in addition to writing this report. The geophysical work was quality controlled by Elizabeth Richley and Lucy Learmonth. Illustrations were prepared by Elizabeth Richley. The project was managed on behalf of Wessex Archaeology by Steve Beach.



Land at Cuthbury, Wimborne Minster, Dorset

Detailed Gradiometer Survey Report

1 INTRODUCTION

1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by Wyatt Homes Ltd. to carry out a geophysical survey over land at Cuthbury, Wimborne Minster, Dorset (hereafter “the Site”, centred on NGR 400400, 099950, **Figure 1**). The survey forms part of an ongoing programme of archaeological works being undertaken in support of future development of 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 is located immediately west of the town of Wimborne Minster and approximately 9km north of the town Poole.
- 1.2.2 The Site occupies a total area of 5.5ha of land across six pasture fields, the northwestern-most currently being used as a public footpath and fallow fields and the southern-most for grazing. The Site is bounded by the river Stour to the south and west, the Cowgrove Road to the north, and residential areas of Wimborne Minster to the east. The B3078 bisects the northern and southern survey areas.
- 1.2.3 The northern parcel of land gently inclines from 18m above Ordnance Datum (aOD) at the western extent to 25m aOD in the east. The southern parcel shows a slightly raised platform above the river Stour 20m aOD.

1.3 Soils and geology

- 1.3.1 The solid geology beneath the entirety of the Site comprises of basal sands and sandy clays to grey silty clays of the West Park Farm Member Formation. Superficial deposits of river alluvium are recorded on the Site from parent Jurassic rock (BGS, 2015).
- 1.3.2 The soils underlying the Site are likely to consist of the stoneless clayey soils of the 813b (Fladbury 1) association (Soil Survey of England and Wales, 1983). These are deep clayey soils which often border rivers draining from the catchment of Jurassic rocks. Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.



1.4 Archaeological background

- 1.4.1 A Desk-Based Assessment (DBA) has been prepared by Wessex Archaeology to determine, as far as is possible from existing information, the nature, extent and significance of the historic environment (Wessex Archaeology, 2015). The results of this assessment are summarised below and will be referred to, where relevant, in the discussion of the geophysical results.
- 1.4.2 There are four Scheduled monuments identified within the 1km study area with The Leaze earthworks (**WA3**) directly neighbouring the south eastern-most geophysical survey area. The Leaze is a Scheduled medieval settlement.
- 1.4.3 There are 220 listed buildings identified within the 1km study area and aside from these, there are no other designated assets (World Heritage Sites, Conservation Areas, Registered Parks and Gardens) identified within the Study Area.
- 1.4.4 Historic mapping shows a footpath running through the Site from at least 1887 according to Ordnance Survey mapping. (Old Maps Online, 2015).

2 METHODOLOGY

2.1 Introduction

- 2.1.1 The detailed gradiometer 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 between the 27th and 29th April 2015. Field conditions at the time of the survey were mixed, with dry conditions on the first two days of survey and wet conditions on the final day. An overall coverage of 5.5ha was achieved. The remaining 2.9ha was unsurveyable due to building works being undertaken within the survey area, field boundaries and access issues.
- 2.1.3 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. Features across the Site have been identified as having a strong magnetic response which may obscure features of a weaker magnetic response within the vicinity.

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 detailed 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 English Heritage 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 throughout the survey area, 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 detailed gradiometer survey has identified a few anomalies of probable and possible archaeological interest across the Site, along with several areas of increased magnetic response and a large amount of ferrous. Results are presented as a series of greyscale plots, XY plots and archaeological interpretations at a scale of 1:2000 (**Figures 2 to 7**). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ± 25 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 6 and 7**). 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 dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.
- 3.1.4 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 present than have been identified through geophysical survey.
- 3.1.5 It should also be noted that gradiometer survey may not detect 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.

3.2 Gradiometer survey results and interpretation

- 3.2.1 Positive linear responses have been identified at **4000** and **4001** that extend briefly along the northern extent of the Site before terminating at the survey boundary. It is not possible to ascertain whether they extend beyond the boundaries defined by the geophysical survey. These run parallel to old field boundaries dating back to at least 1887 (Old Maps Online, 2015) and have been interpreted as ditches that may be related to agricultural activity. This feature has been classified as possible archaeology due to the lack of corresponding features found by the DBA (Wessex Archaeology, 2015).
- 3.2.2 Due to the extents of the geophysical survey it is not possible to determine whether the possible ditch interpreted at **4002** extends further beyond that of the survey area.
- 3.2.3 A number of sub-circular anomalies can be seen in the data at **4003** and **4004**. Values ranging from 2.5nT to 6nT can be seen in the dataset which are consistent with pit-like features. However, these are interpreted as possible archaeology as there is no direct



evidence of a relationship with the ditches seen elsewhere at the Site. These may be historic or modern in origin as they are located within the bounds of a public footpath and Wimborne Town Football Club's training ground.

- 3.2.4 Weak linear trends can be seen throughout the Site. Those at **4005** and **4006** appear to run parallel to field boundaries so may have archaeological significance. Those at **4006** lie on an east-west alignment and run along the route of a well-established footpath that can be dated as far back as 1887 (Old Maps Online, 2015). Similar linear trends, though more irregular in alignment, can be seen central to the western survey. These are not thought to have any archaeological provenance.
- 3.2.5 Large irregular areas of superficial geology can be seen spread throughout the Site at **4005**, **4007**, **4008** and **4013**. The form of the geology in the geophysics is weakly defined so may suggest some alluvial deposits or past artificial landscaping.
- 3.2.6 The eastern parcel of land contains the current training ground for the Wimborne Town Football club. Four sub-circular ferrous anomalies bearing large halos with an approximately 0.2m diameter can be seen positioned centrally to the field at **4009**. These are football goals observed by the field team. The 100m by 60m pitch is bounded by a rope fence with iron posts which can be clearly seen in the dataset.
- 3.2.7 In the northwest a large ferrous anomaly **4010** has been detected by the geophysical survey and relates to the pylon.
- 3.2.8 Weakly defined linear trends, **4011**, follow the western survey extents of the southern survey area. As the anomalies match the field boundary so closely the likely origin of these are agricultural. However the exact nature is not certain.
- 3.2.9 The Scheduled Monument: The Leaze (Wessex Archaeology, 2015) closely borders the eastern edge of the southernmost survey area. There is a possibility that some of the weakly defined linear trends depicted at **4012** that lie on a southwest-northeast alignment are related to these historic earthworks. These anomalies may represent ditches running from the 12th century settlement and into the river Stour. The magnetic background of this area appears more disturbed than that of the remaining survey area which may suggest past landscaping or disruption to the ground.
- 3.2.10 North of the B3078 at **4015** a small parcel of land measuring 0.2ha was surveyed. No clear archaeological anomalies were discovered in the data but large amounts of ferrous mask any potential underlying archaeology present.

3.3 Modern Services

- 3.3.1 Modern service **4014** aligned east-west is intersected by an additional service striking north-south. The disturbance caused by these may conceal any surrounding archaeology.
- 3.3.2 The dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, based upon the materials used and backfill area of the service trenches. The physical dimensions and exact location of the services may differ from their magnetic extents in plan.



4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest across the Site. In addition to these, anomalies interpreted as areas of superficial geology and linear trends have also been identified.
- 4.1.2 The survey is characterised by a strong magnetic background, especially in the north-easternmost survey area. The neighbouring fields exhibit a number of linear trends and some areas of superficial geology.
- 4.1.3 The most striking features of the geophysical survey are the four ferrous anomalies described at **4009**. These have been identified as football goals related to the Wimborne Town Football Club.
- 4.1.4 Anomalies of possible archaeological interest are primarily linear ditch features and irregular pit anomalies. Due to the limited occurrence and clear form of these it is not possible to ascertain the nature of these features, although it is likely to relate to past agricultural activity.
- 4.1.5 Immediately neighbouring the southern survey area is the Scheduled Monument, The Leaze. Due to the proximity of these historic earthworks it was thought that any anomalies seen in this area may be associated with this medieval feature. However, only weakly defined linear trends, **4012**, were discovered in the geophysics with unclear provenance.



5 REFERENCES

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Wessex Archaeology, 2015. *Archaeological Desk-Based Assessment, Land at Cuthbury, Wimborne Minster, Dorset*. Unpublished Client Report.

English Heritage, 2008. *Geophysical Survey in Archaeological Field Evaluation*. Research and Professional Service Guideline No 1, 2nd edition.

5.2 Cartographic and documentary sources

Soil Survey of England and Wales, 1983. *Sheet 5, Soils of South West England*. Ordnance Survey: Southampton.

5.3 Online resources

British Geological Survey, <http://bgs.ac.uk> [accessed May 2015]

Old Maps Online, <http://www.oldmapsonline.org> [accessed May 2015]



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.

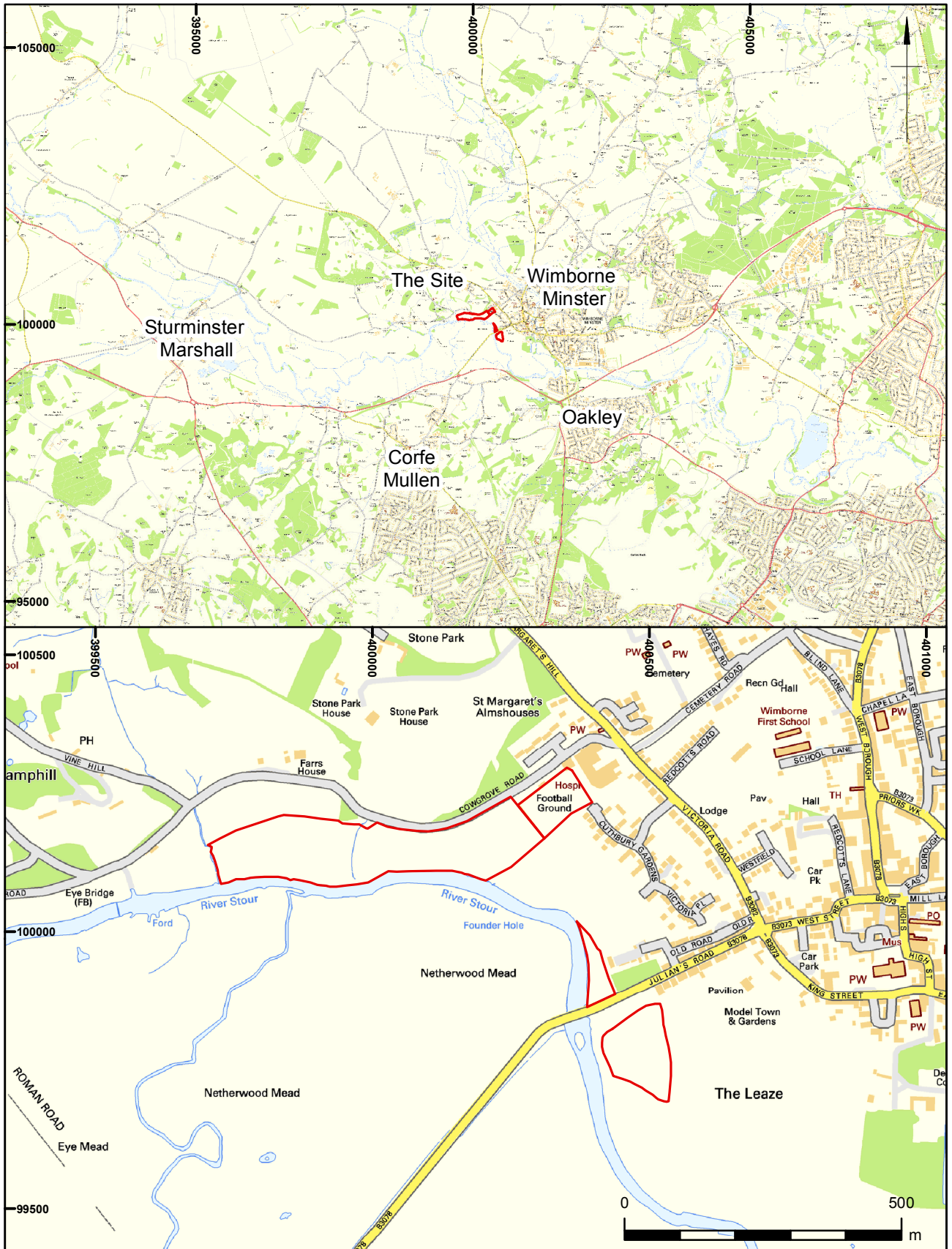
The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided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

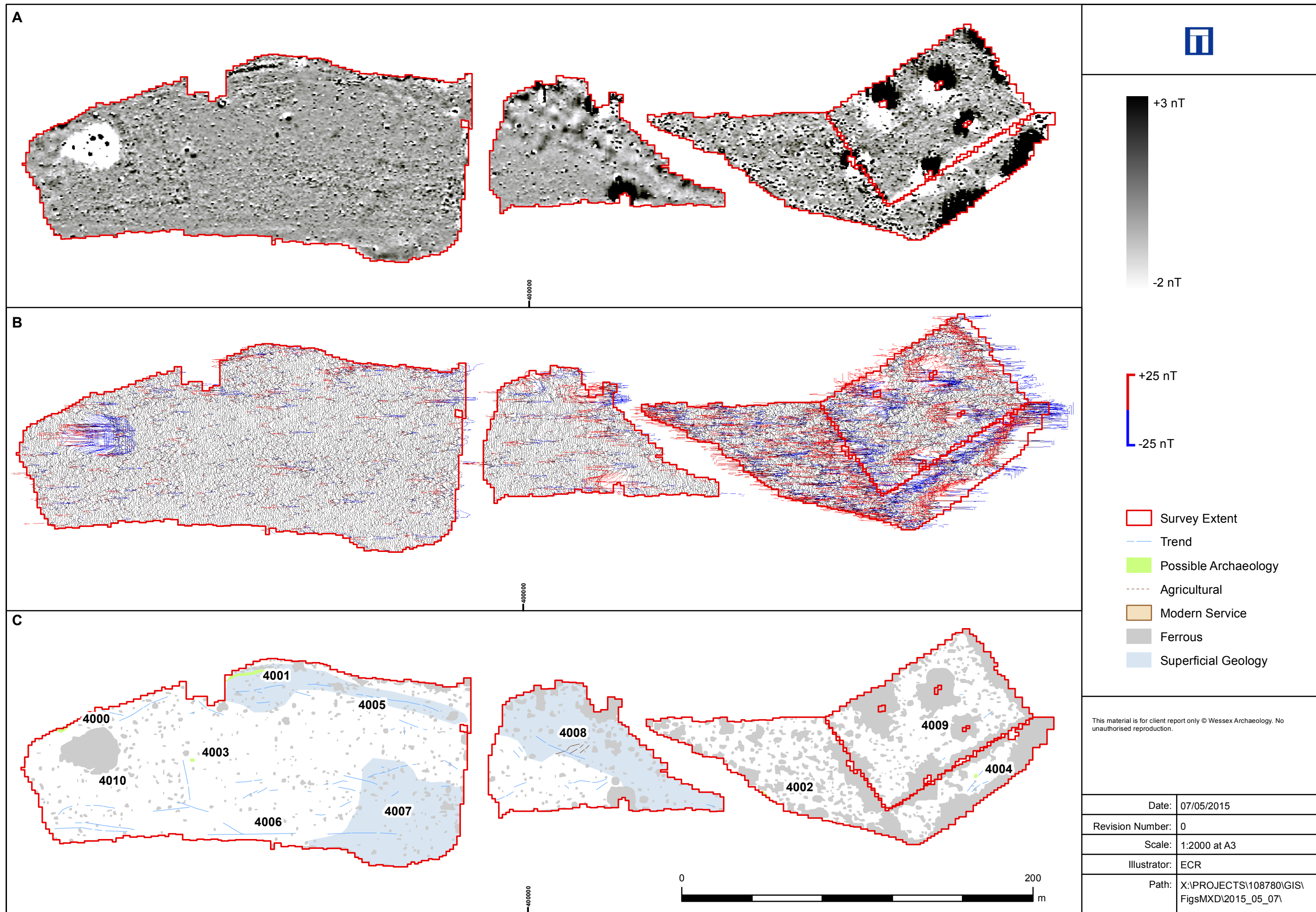
Finally, services such as water pipes are marked where they have been identified



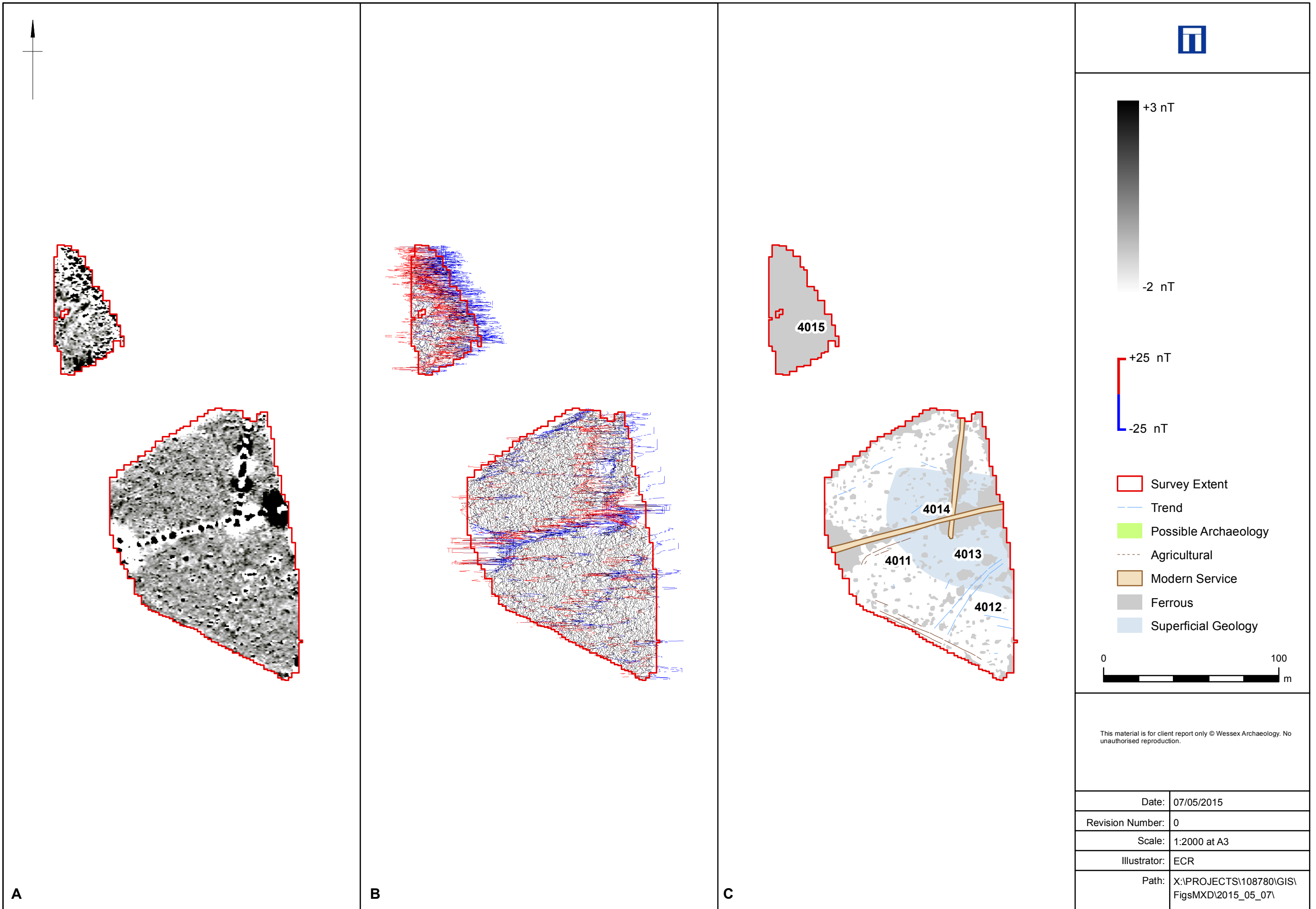
	 Site Extent		Contains Ordnance Survey data © Crown copyright and database right 2015. This material is for client report only © Wessex Archaeology. No unauthorised reproduction.	
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Site Location and Survey Extents

Figure 1



Northern Extents Grey Scale Plot (A), XY Plot (B) and Archaeological Interpretation (C)



Southern Extents Grey Scale Plot (A), XY Plot (B), and Archaeological Interpretation (C)



Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www.wessexarch.co.uk



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