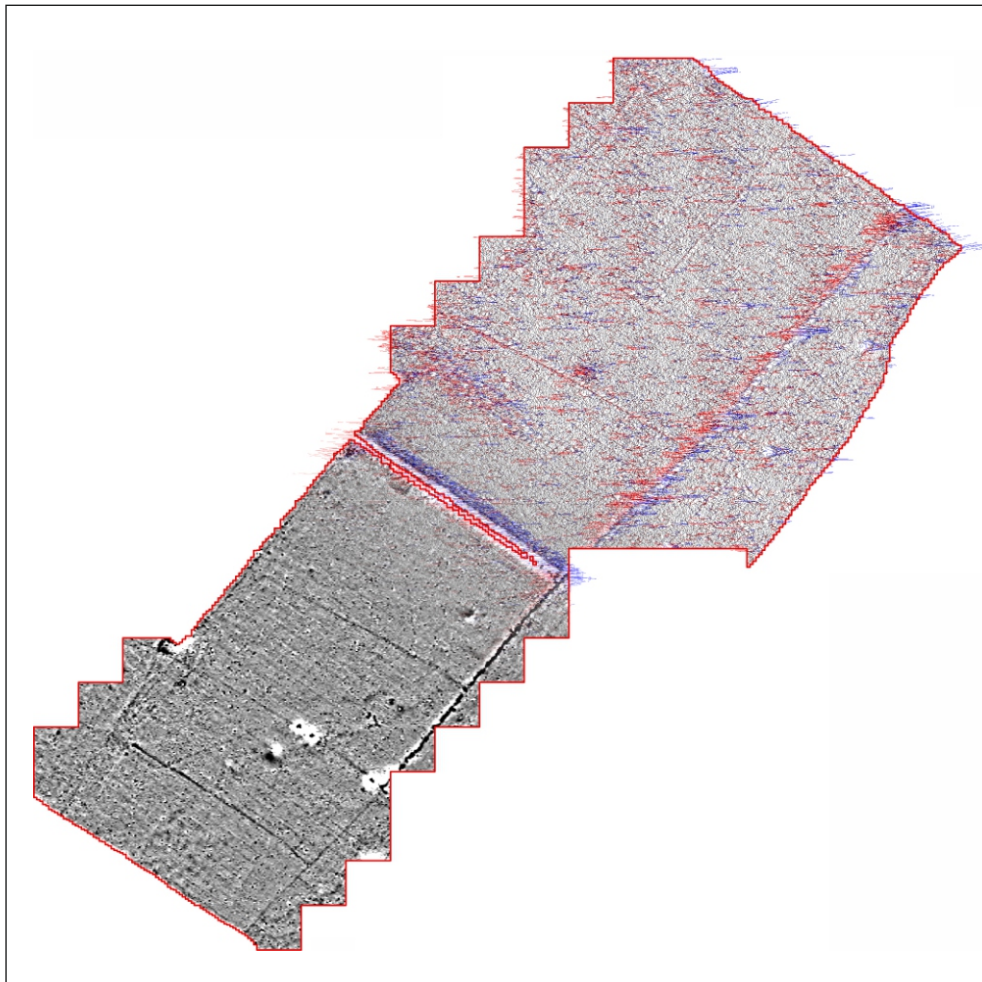




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# Sycamore Solar Park Burscough, Lancashire

Detailed Gradiometer Survey Report



Ref: 110160.02  
November 2015



# **Sycamore Solar Park Burscough, Lancashire**

## **Detailed Gradiometer Survey Report**

**Prepared for:**  
MS Power Projects Limited  
Development 53  
Chandos Place  
London  
WC2N 4HS

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

[www.wessexarch.co.uk](http://www.wessexarch.co.uk)

**November 2015**

**WA Ref. 110160.02**



## Quality Assurance

|                                  |        |   |                |                    |           |
|----------------------------------|--------|---|----------------|--------------------|-----------|
| <b>Project Code</b>              | 110160 | <b>Accession Code</b>                                     |                | <b>Client Ref.</b> | 110160.02 |
| <b>Planning Application Ref.</b> |        | <b>Ordnance Survey (OS) national grid reference (NGR)</b> | 342636, 409648 |                    |           |

| <b>Versio<br/>n</b> | <b>Status*</b>   | <b>Prepared by</b> | <b>Checked and<br/>Approved By</b> | <b>Approver's Signature</b> | <b>Date</b> |
|---------------------|--|--------------------|------------------------------------|-----------------------------|-------------|
| V 01                | I  | ECR                | CJRH                               |                             | 12/10/2015  |
| File:               | S:\PROJECTS\110160\_Reports\Terrestrial_Geophysics\110160_SycamoreGEO_ECR_.docx                  |                    |                                    |                             |             |
| V 02                | E  | ECR                | PAB                                |                             | 16/10/2015  |
| File:               | S:\PROJECTS\110160\_Reports\Terrestrial_Geophysics\110160_SycamoreGEO.docx                       |                    |                                    |                             |             |
| V 03                | F  | ECR                | PAB                                |                             | 18/11/2015  |
| File:               | \\sheffield\wessex\PROJECTS\110160\_Reports\Terrestrial_Geophysics\110160_SycamoreGEO_final.docx |                    |                                    |                             |             |

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

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# Sycamore Solar Park, Burscough, Lancashire

## Detailed Gradiometer Survey Report

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# Sycamore Solar Park, Burscough, Lancashire

## Detailed Gradiometer Survey Report

### Summary

A detailed gradiometer survey was conducted over land at Sycamore House Farm, Burscough, Lancashire (centred on NGR 342636, 409648). The project was commissioned by MS Power Projects Limited in support of a planning application for a proposed solar park, with the aim of establishing the presence, or otherwise, and nature of detectable archaeological features within the site.

The site comprises arable fields located to the south of High Lane and immediately to the north of the Northern Line of the Merseyrail network, covering an area of 27 ha. Within this the development area is around 9.18 ha with the two fields surveyed comprising around 14.6 ha. The geophysical survey was undertaken on 14<sup>th</sup>-19<sup>th</sup> September 2015. The detailed gradiometer survey has demonstrated the presence of a number of anomalies of potential archaeological interest across the Site.

The anomalies identified as being of archaeological interest are primarily pit- and ditch-like features. Of particular note is a weak curvilinear ditch-like response in to the north-eastern part of the Site that may represent a ploughed out enclosure or ring ditch. Distinct linear responses reflect earlier subdivisions of the land e aligned north-west / south-east and north-east / south-west. Several small sub-circular pit-like responses have been detected across the site which may be archaeological in origin.

A series of linear responses has been identified, comprising a historic field system which corresponds directly to field boundaries mapped on the Burscough Tithe Map of 1846.

Ploughing trends can be identified across the entire site, these are likely to be modern in origin but there is a possibility that some of them represent earlier ridge and furrow features, particularly given the archaeological context of the site. An area of increased magnetic response in the central north part of the Site may relate to an area of former burning, ceramic brick dump or debris, it could also be associated with the former field boundary.



# **Sycamore Solar Park, Burscough, Lancashire**

## **Detailed Gradiometer Survey Report**

### **Acknowledgements**

Wessex Archaeology would like to thank MS Power Projects Limited for commissioning the geophysical survey. The assistance of Jeffrey Dummett is gratefully acknowledged in this regard.

The fieldwork was undertaken by Diana Chard and Matthew Tooke. Garreth Davey processed the geophysical data and Lizzie Richley interpreted the geophysical data and wrote the report. The geophysical work was quality controlled by Genevieve Shaw and Lucy Learmonth. Illustrations were prepared by Lizzie Richley. The project was managed on behalf of Wessex Archaeology by Caroline Budd.



# Sycamore Solar Park, Burscough, Lancashire

## Detailed Gradiometer Survey Report

### 1 INTRODUCTION

#### 1.1 Project background

- 1.1.1 Wessex Archaeology was commissioned by MS Power Projects Limited to prepare a geophysical gradiometer survey for land at Sycamore House Farm, Burscough, Lancashire (hereafter 'the Site'), centred on National Grid Reference (NGR) 342636, 409648. The survey forms part of an ongoing programme of archaeological works being undertaken in support of a planning application for a proposed solar park within 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 within the civil parish of Burscough; located approximately 1.4 km north-east of Ormskirk and 1.3 km south-west of Burscough, in Lancashire.
- 1.2.2 The land ownership area is 27 ha, within this the development area is around 9.18 ha with the two fields surveyed comprising around 14.6 ha, currently utilised for pasture/ haylage/ silage. The Site is bounded by further agricultural land in all cardinal directions. The Northern Line of the Merseyrail network lies 35 m to the south and High Lane (A59) runs 200 m to the north of the Site.
- 1.2.3 The Site is on a slight incline, sloping from 39 m aOD at the north-western edge to approximately 31 m aOD at the south-eastern edge.

#### 1.3 Soils and geology

- 1.3.1 The solid geology comprises Sandstone of the Sherwood Sandstone Group with overlying superficial geological deposits of Diamicton Till, formed during ice age conditions (BGS 2015).
- 1.3.2 The soils underlying the Site are likely to consist of chromic endostagnic soils of the 572I (Flint) association (SSEW SE Sheet 1-2 1983); comprising reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. 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 An archaeological desk-based assessment (DBA) was undertaken by Wessex Archaeology (2015) which examined the potential for the survival of buried archaeological remains within the development area and a 1km Study Area.
- 1.4.2 This DBA used information provided by the Lancashire Historic Environment Record (LHER), the National Heritage List for England (NHLE), National heritage datasets including Images of England, Archaeological Data Service (ADS), OASIS, PastScape, Viewfinder, NRHE Excavation Index and Parks and Gardens UK, Historic Manuscripts and maps as well as relevant primary and secondary sources from local archives and WA's own library. The following background is summarised from the DBA.

### Previous studies

- 1.4.3 The DBA undertaken by Wessex Archaeology in 2015 established that there is an archaeological interest within the Site, with a potential for the presence of buried archaeological remains relating to post-medieval and 19<sup>th</sup> century field boundaries.
- 1.4.4 No previous intrusive archaeological investigation within the Site has been identified by the DBA. However, a geophysical survey was undertaken to the west of the area in 2012 which failed to identify any geophysical anomalies of potential archaeological origin (Archaeological Project Services 2012).

### Designated heritage assets

- 1.4.5 There are no designated historical assets within the Site however the DBA identified eight designated heritage assets within 1km radius of the Site (Section 4.2.1 WA 2015). Burscough Augustinian Priory and leper hospital is a Scheduled Monument with associated Grade I Listed upstanding building remains located approximately 250 m east of the Site. The Priory was established in the late 12th century and was suppressed during the Dissolution in the mid-16th century.
- 1.4.6 Bath Lodge, a Grade II\* Listed Building, is located approximately 100 m south of the Site.
- 1.4.7 The DBA identified that hedgerows within and at the boundaries of the Site may fulfil the criteria to be considered as historically *Important* as defined by the Hedgerows Regulations 1997 (amended 2002) (Section 4.5.5, WA 2015).
- 1.4.8 There are no listed World Heritage Sites, Registered Parks and Gardens or Registered Battlefields within the Site or within a 1km radius.

### Archaeological and historical development

- 1.4.9 The DBA identified limited recorded evidence of prehistoric, Romano-British and Anglo-Saxon activity within the Site and surrounding area, with the only recorded evidence comprising a prehistoric flint flake and sherd of Roman pottery recovered c. 1 km south of the Site (Section 4.4.3-4.4.6, WA 2015). The scarcity and/or absence of recorded evidence is however more likely to be reflective of the limited archaeological works undertaken in the vicinity rather than signifying a genuine absence of archaeological remains and as such there is unknown potential for encountering remains of Prehistoric, Iron Age or Romano-British data within the Site.





- 1.4.10 There are no recorded heritage assets dating to the Anglo-Saxon period within the Study Area. However, the place names of Ormskirk and Burscough indicate that both of these settlements were established by the late Anglo-Saxon period as both include Old Norse elements.
- 1.4.11 The DBA identified a total of sixteen heritage assets within the Study Area dating from the medieval period (section 4.4.7-4.4.10, WA 2015). The most significant comprises the site of Burscough Priory, c. 250 m east of the Site, which was established in the 1180s and continued in use until the dissolution in the 16th century. The DBA records that an archaeological watching brief within the priory in 2001 did not uncover any dateable remains; however the presence of culverts and large pieces of finished stone were identified. To the east of the priory is Blythe Hall which was the principal manor for Bursough from at least the 12th century. Cropmarks recorded from aerial photographs have identified a possible moated site and medieval trackways within the Study Area. Other medieval evidence from within the Study Area includes a water powered corn mill and several medieval stone crosses. It is, considered that the potential for encountering medieval remains within the Site is medium as the Site would have formed part of the rural hinterland between Ormskirk, Burscough Priory and Blythe Hall.
- 1.4.12 Post-medieval records predominantly comprise buildings associated with the rural landscape, including numerous farmsteads and wells dating from the 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> centuries. Other structures include the Grade II listed buildings of Bath Lodge and the former farmhouse Blythe Meadow. A former military airfield (RNAS Burscough also known as HMS Ringtail) dating from 1943-1957 was located approximately 300m north of the Site.
- 1.4.13 The map regression exercise undertaken as part of the DBA indicated that the vicinity of the Site may have been under wooded conditions during the later post-medieval period, as Teesdale's Map of Lancashire (not reproduced) depicts the Site as wooded, labelled as 'Bath Wood' with woodland symbology (WA 2015). The Site has been in use as arable fields from at least the mid-19<sup>th</sup> century to present, however internal boundaries have changed considerably over time with the removal of many internal divisions. The Burscough Tithe Map of 1846 (**Figure 5a**) and contemporary 1st Edition OS map (**Figure 5b**) depict two ponds within the Site which have since been infilled. Those hedgerows which remain within and at the edges of the Site can be identified as field boundaries on the Tithe Map of 1846 (**Figure 5a**) and as such may be considered historically *Important* as defined under the Hedgerows Regulations 1997 (as amended in 2002), and could therefore be subject to statutory protection.



## 2 METHODOLOGY

### 2.1 Introduction

2.1.1 The geophysical survey was undertaken by Wessex Archaeology's in-house geophysics team between the 14th and 19th September 2015. Field conditions at the time of the survey were good, with dry conditions throughout the period of survey. An overall coverage of 14.6ha was achieved.

### 2.2 Method

2.2.1 Individual survey grid nodes were established at 30 m x 30 m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02 m and therefore exceeds Historic England 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 1 m between sensors. Data were collected at 0.25 m intervals along transects spaced 1 m apart with an effective sensitivity of 0.03nT, in accordance with Historic England guidelines (English Heritage 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 ( $\pm 5$ 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 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 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 plots, XY plots and archaeological interpretations at a scale of 1:2500 (**Figures 2 to 4**). 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 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 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

##### Probable and possible archaeology

- 3.2.1 On the western edge of the survey extents an “L-shaped” linear response at **4000** of +4-11nT can be identified extending southwest from the survey border. The shape and magnetic property of this anomaly suggest that it may be of archaeological interest particularly as it is on a slight tangent angle from the former field boundary that it lies in close proximity to. Anomaly **4000** does in fact correspond almost exactly to a small, square feature marked on the Tithe Map of 1846, on the line of the Site boundary in this location (**Figure 5a**; inset). The slight variation in location is likely due to small inaccuracies of scale in the pre-Ordnance Survey Tithe Map. The nature of the object depicted is unclear, as the feature does not correspond to the symbology used to depict water or any other known feature class on the Tithe Map, and it cannot be identified on the 1<sup>st</sup> Edition OS map (**Figure 5b**). It is depicted as a small unfilled rectangle at the junction of four field boundaries, and therefore seems likely to be a small structure of some kind, likely agricultural given its location. Whether the structure was extant or derelict at this point is not clear.
- 3.2.2 The survey has identified a number of linear anomalies which are likely to be ditches, however they are on a different alignment to the existing field boundaries and the remains of the post-medieval field system identified on the Tithe Map (**Figure 5a**). They are also at odds with the majority of the ploughing trends, which largely correspond to the orientation of the post-medieval field system. Immediately to the south of **4000** a pair of parallel positive magnetic responses have been identified at **4001**. These are much weaker in response than **4000** and are possible ditches. The plough lines cut across **4001** (which is

oriented south-west / north-east), suggesting that these features may have been ploughed out. On a similar alignment, **4002** is an additional ditch-like response of +1-2nT with dimensions c.66 m x 1 m. This feature, similarly to those seen at **4001**, crosses the ploughing trends but has a more acute easterly alignment and as such is unlikely to be related to these. A weak trend can be seen extending 48 m northeast from this feature and may be a ploughed out extension of the same feature. Corresponding with the eastern end of this trend, **4003** lies on just off a perpendicular alignment (north-northeast / south-southwest) with similar magnetic response and width to **4002** but extending for only c.6 m. **4004** is an isolated ditch feature approximately 300 m northeast of **4002**, however it has similar magnetic properties and alignment to **4002**. It is possible these features are all associated, and some may represent elements of an earlier field system, however this cannot be confirmed based on the gradiometer data alone.

- 3.2.3 A series of ditch and pit-type responses can be seen at **4005**, these are of varying size, response strength (from +1nT - +5nT) and form but may be related to linear ditches previously mentioned; all of which have been interpreted as possible archaeology.
- 3.2.4 Of potential significance are the responses noted at **4006** and **4007**. Two broad but weak, positive magnetic curvi-linear ditch-like responses have been identified at **4006**, in the north-eastern part of the Site. These are weak in response but the ditches run across the plough lines and so may have been ploughed out through historical and modern agricultural processes at the Site. **4006**, if the responses do indeed represent a single feature, appears to form a ring ditch with a diameter of c. 45-50 m. **4007** identifies a series of pit type responses that may be related to **4006**. These features have all been interpreted as possible archaeology, and **4006** in particular may represent a ring ditch or enclosure. The date of these features remains uncertain but they are considered more likely to be of pre-modern, potentially prehistoric, date.
- 3.2.5 Numerous sub-circular positive anomalies can be seen across the Site of varying sizes and may be posthole or pits and have been interpreted as possible archaeology.

#### Historic field boundaries

- 3.2.6 A number of former field boundaries can be clearly identified across the Site. These field boundaries can be clearly identified on the Tithe Map of 1846 and in the 1<sup>st</sup> Edition OS map of the same date (**Figure 5a** and **b**). Several of these show differences in response suggesting boundaries of different date, highlighting the continual change in land segmentation and usage at the Site. Labels **4008-4010** indicate a fragmented boundary that runs parallel to the western edge of the survey extent with readings of +0.5-4nT. **4011** denotes a former field boundary that runs parallel to that identified by **4008-4010** and has similar magnetic values. A series of perpendicular former field boundaries extend south east from this such as at **4012**. The variation in magnetic response suggests that some of the south-east / north-west sub divisions may be of a different date. However, that being said, these field divisions follow the plough line alignment and may not have suffered to the same degree as the features seen at **4008-4010** and could be associated. All of these field boundaries can be identified on the Tithe Map of 1846, although of course this does not necessarily mean that they originated at the same date.
- 3.2.7 The strongest magnetic feature identified in this survey is the linear at **4013**; this is thought to be a former field boundary and corresponds with land divisions seen in historic mapping (**Figure 5**). This response is vastly different to the other field boundaries detected within the gradiometer survey with readings in excess of +10nT and in the regions of +50nT at some points, indicating a different type of boundary. At **4014**, a further



linear former field boundary has been highlighted; this appears to continue the alignment of **4013** but is of considerably weaker response. It is likely that **4013** and **4014** are related but that section at **4013** was supplanted at a later date by a more substantial field division, possibly incorporating a wall or other structure. This is somewhat borne out by the 1st Edition OS map (**Figure 5b**) which depicts a more substantial field boundary at this location.

- 3.2.8 The final two former field boundaries recognised in this survey are in the eastern extent of the Site. **4015** lies on a similar alignment to **4012** and the other north-west / south-east linear responses, but is slightly offset, whilst **4016** runs parallel to **4008-4010** and **4013**. Historic mapping from 1848 to the 1900s denotes no former land subdivisions that correspond with **4016**, indicating that this may represent an earlier field division.

#### Other responses

- 3.2.9 An area of increased magnetic response at **4017** may represent an area of former burning, a ceramic brick/rubble dump or rubbish.
- 3.2.10 In addition to the responses discussed above several further linear responses can be identified, in particular at **4018**, where a series of parallel and perpendicular possible interrelated trends can be identified. It is likely these are agricultural in origin however this interpretation is uncertain.
- 3.2.11 Several agricultural related trends can be identified across the Site; these have been interpreted as ploughing trends. The majority of the ploughing trends are aligned to the post-medieval field system seen within the survey results and on the Tithe Map (**Figure 5a**), however some can be seen to cut across this orientation. Aerial photography from the past decade (online sources) shows the variation in ploughing orientation which closely corresponds with the patterning seen in the gradiometer results. However, the spacing of the ploughing trends may also be indicative of ridge and furrow; given the archaeological context of the site and its position in the medieval hinterland of Ormskirk and Burscough priory there is the possibility that ridge and furrow was practiced at the Site and may be encountered here.
- 3.2.12 Areas of superficial geology have been identified in the southern part of the survey area.

### **3.3 Modern Services**

- 3.3.1 There were no modern services detected within the survey area.



## 4 CONCLUSION

- 4.1.1 The detailed gradiometer survey has been successful in detecting anomalies of potential archaeological interest at the Site. In addition to these, anomalies interpreted as ploughing trends, areas of increased magnetic response and former field boundaries have also been identified.
- 4.1.2 The anomalies of archaeological interest are primarily pit- and ditch-like features. The southern part of the survey areas contains several response of potential archaeological significance. **4000** shows an L-shaped strong positive response which corresponds exactly in location and form to a feature, likely an agricultural building, depicted on the Tithe Map of 1846 (**Figure 5a**).
- 4.1.3 Linear ditch-like responses at **4002**, **4003** and **4004** suggest potential trackways or ditches across the Site, of unknown date. The responses that indicate greatest potential archaeological significance are the broad, ditch-like responses highlighted at **4005** with possible associated pit-type responses (**4006**). These responses appear to form a disjointed or segmented circular enclosure or ring ditch, which has been heavily ploughed out through agricultural practices. The date of these features is unclear but it is considered that they are pre-modern, and may well be of prehistoric date.
- 4.1.4 Linear features at **4007-4016** can be identified as former field boundaries, part of a field system depicted on the 1846 Burscough Tithe Map (**Figure 5a**). All but **4016** can be recognised in historical mapping, which may indicate that **4016** denotes an earlier field division.
- 4.1.5 The area of increased magnetic response at **4017** is more difficult to define. This may represent an area of former burning or containing debris, rubbish or be a ceramic brick dump. There is a small chance it is associated with the former field boundary that crosses it however this relationship is unclear from the gradiometer data alone.
- 4.1.6 Several linear trends have been identified across the site, some of which are thought to be agricultural in origin, such as the interrelated parallel and perpendicular trends highlighted at **4017**, whereas others are unclear.
- 4.1.7 Frequent ploughing trends are visible across the Site on differing alignments. This is likely due to variable boundaries and different farming processes but these are likely to be medieval, post-medieval and modern in origin. There is the potential for some of these to represent ridge and furrow practices however the patternation of ploughing and tractor furrows from aerial photography from the past decade suggests that these are modern in provenance. As such they have been interpreted solely as ploughing trends within this report.



## 5 REFERENCES

### 5.1 Bibliography

Archaeological Project Services. 2012. *Lathom, Abbey Farm: Geophysical Survey*. Unpublished Report

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

Wessex Archaeology, 2015. *Archaeological Desk-Based Assessment, Sycamore Solar Park, Burscough, Lancashire*. Unpublished Client Report.

### 5.2 Cartographic and documentary sources

1846 Burscough Tithe Map

1848 First Edition Ordnance Survey 6" Map

Soil Survey of England and Wales, 1983. *Sheet 1, Soils of Midland and Western England*. Ordnance Survey: Southampton.

### 5.3 Online resources

UK Soil Observatory, <http://www.ukso.org> [accessed September 2015]

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

Oldmaps.co.uk, <http://www.oldmaps.co.uk>



## 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 Historic England (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 Historic England (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 four main categories: archaeological, modern, agricultural and uncertain origin/geological.

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 modern category is used for anomalies that are presumed to be relatively modern in date:

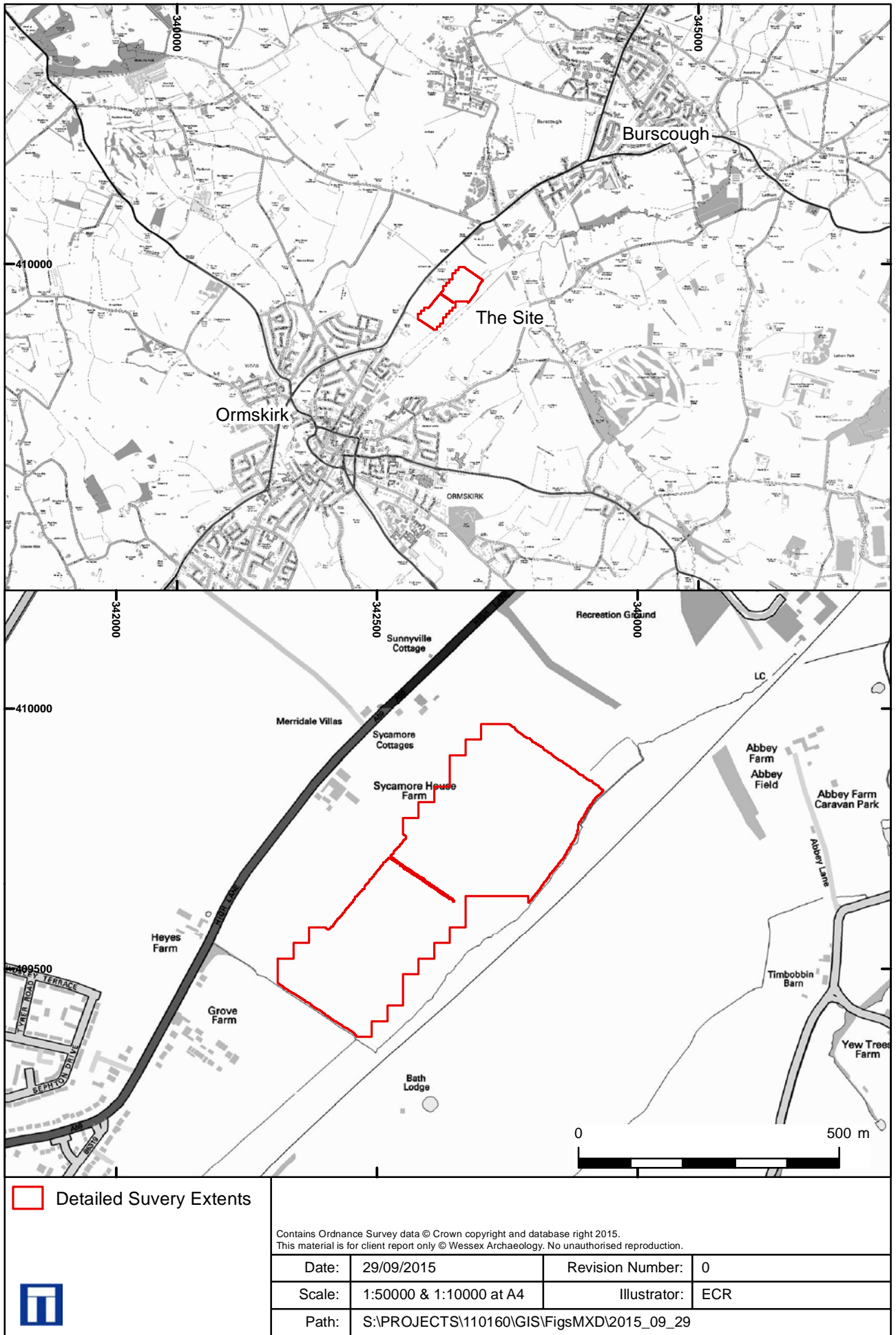
- Ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin.
- Modern service – used for responses considered relating to cables and pipes; most are composed of ferrous/ceramic material although services made from non-magnetic material can sometimes be observed.

The agricultural category is used for the following:

- Former field boundaries – used for ditch sections that correspond to the position of boundaries marked on earlier mapping.
- Agricultural ditches – used for ditch sections that are aligned parallel to existing boundaries and former field boundaries that are not considered to be of archaeological significance.
- Ridge and furrow – used for broad and diffuse linear anomalies that are considered to indicate areas of former ridge and furrow.
- Ploughing – used for well-defined narrow linear responses, usually aligned parallel to existing field boundaries.
- Drainage – used to define the course of ceramic field drains that are visible in the data as a series of repeating bipolar (black and white) responses.

The uncertain origin/geological 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.
- Superficial geology – used for diffuse edged spreads considered to relate to shallow geological deposits. They can be distinguished as areas of positive, negative or broad bipolar (positive and negative) anomalies.



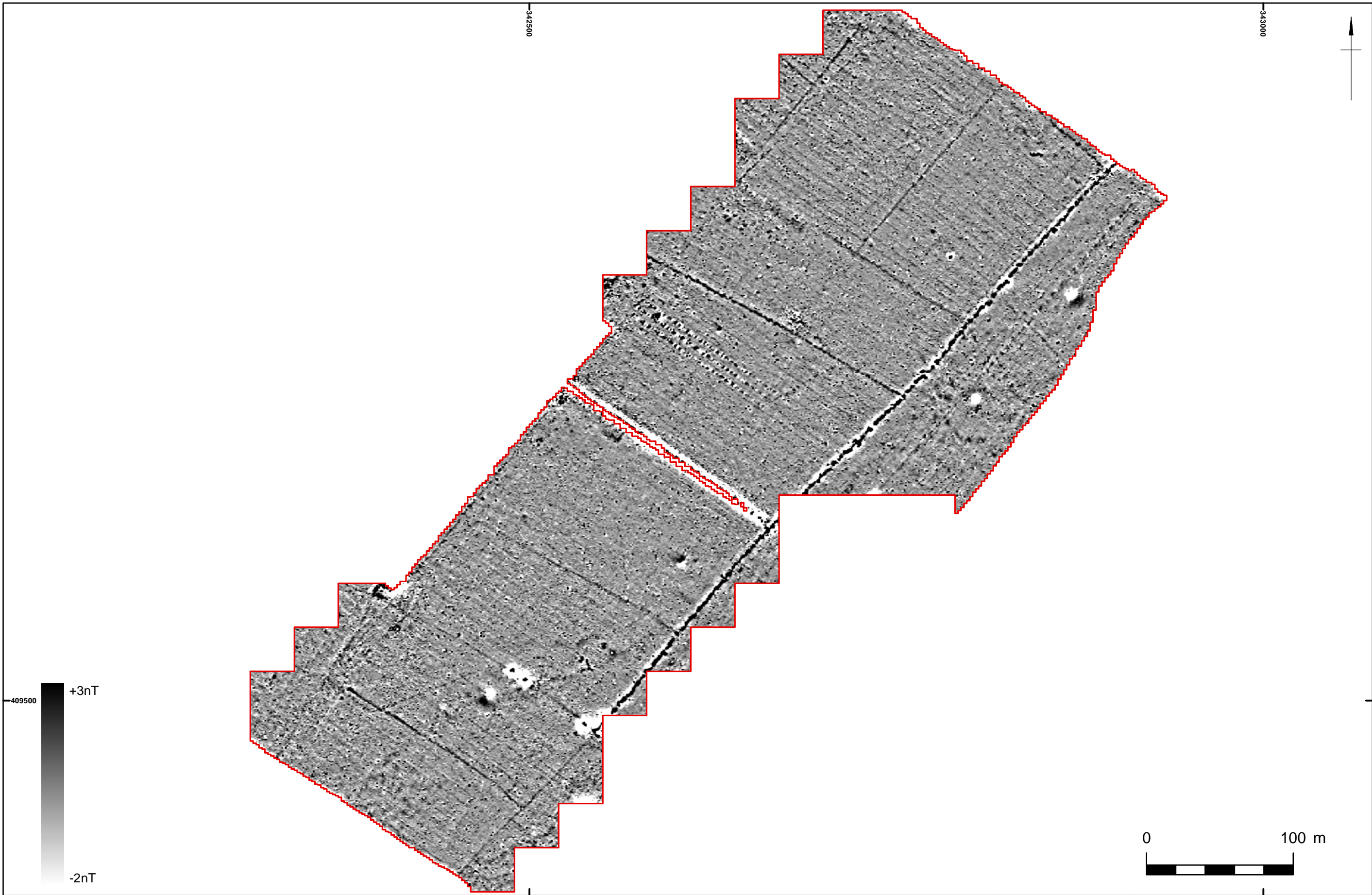
Detailed Suvery Extents

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Site Location and Detailed Survey Extents

Figure 1



Detailed Suvery Extents

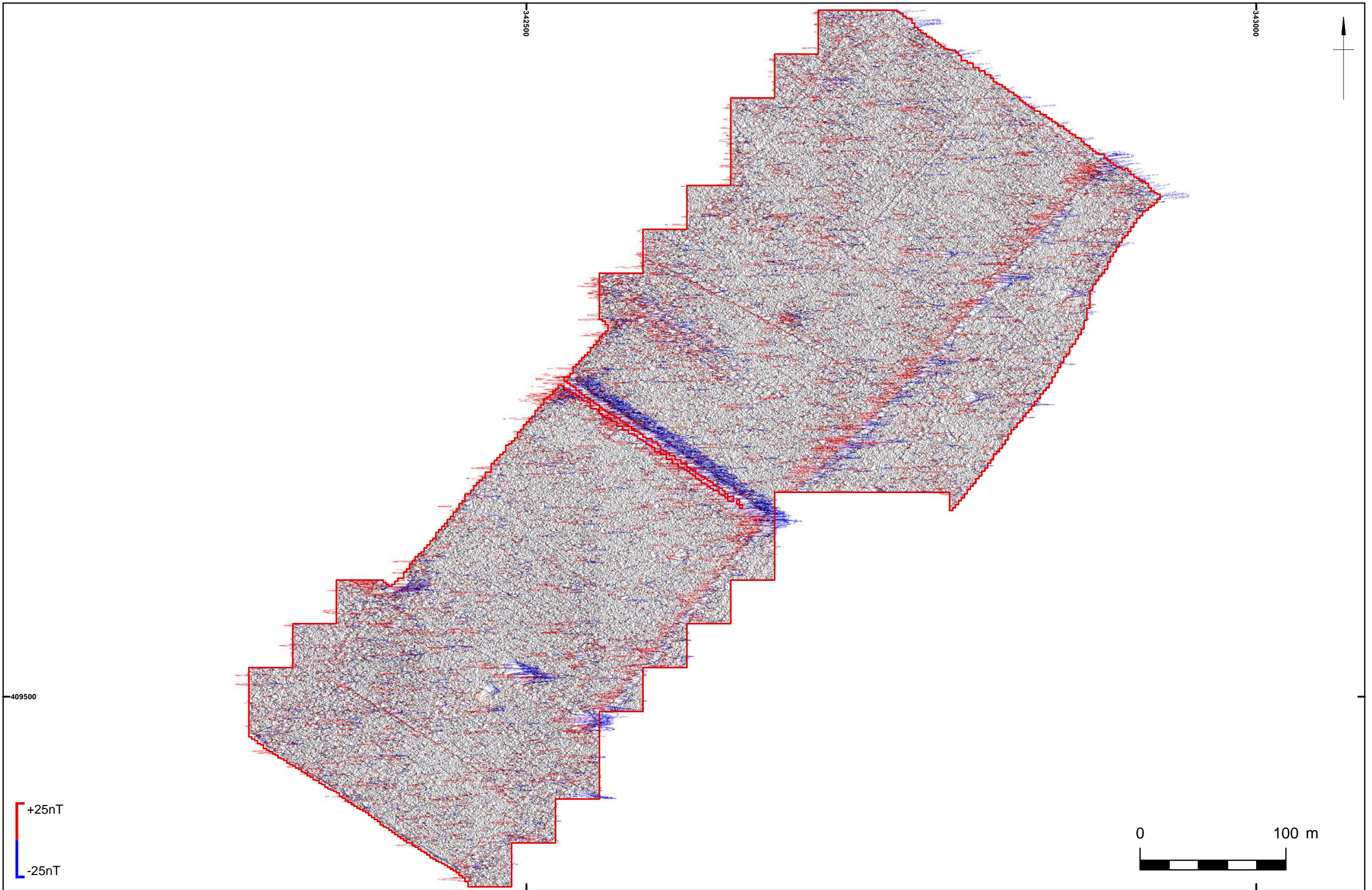
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Greyscale Plot

Figure 2



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|  |  Detailed Suvery Extents | Date: 29/09/2015                                |  | Revision Number: 0 |  |
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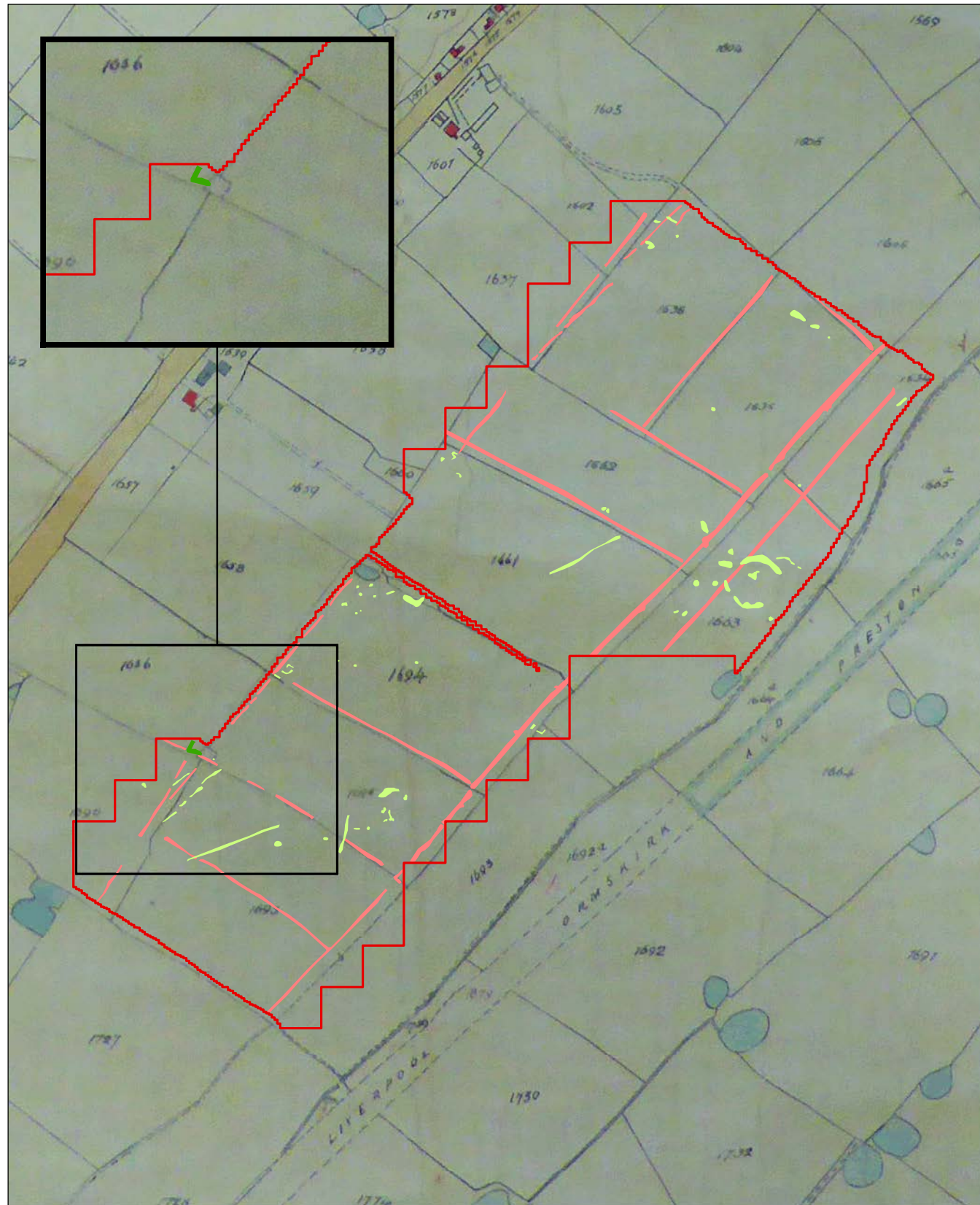
XY Trace Plot

Figure 3

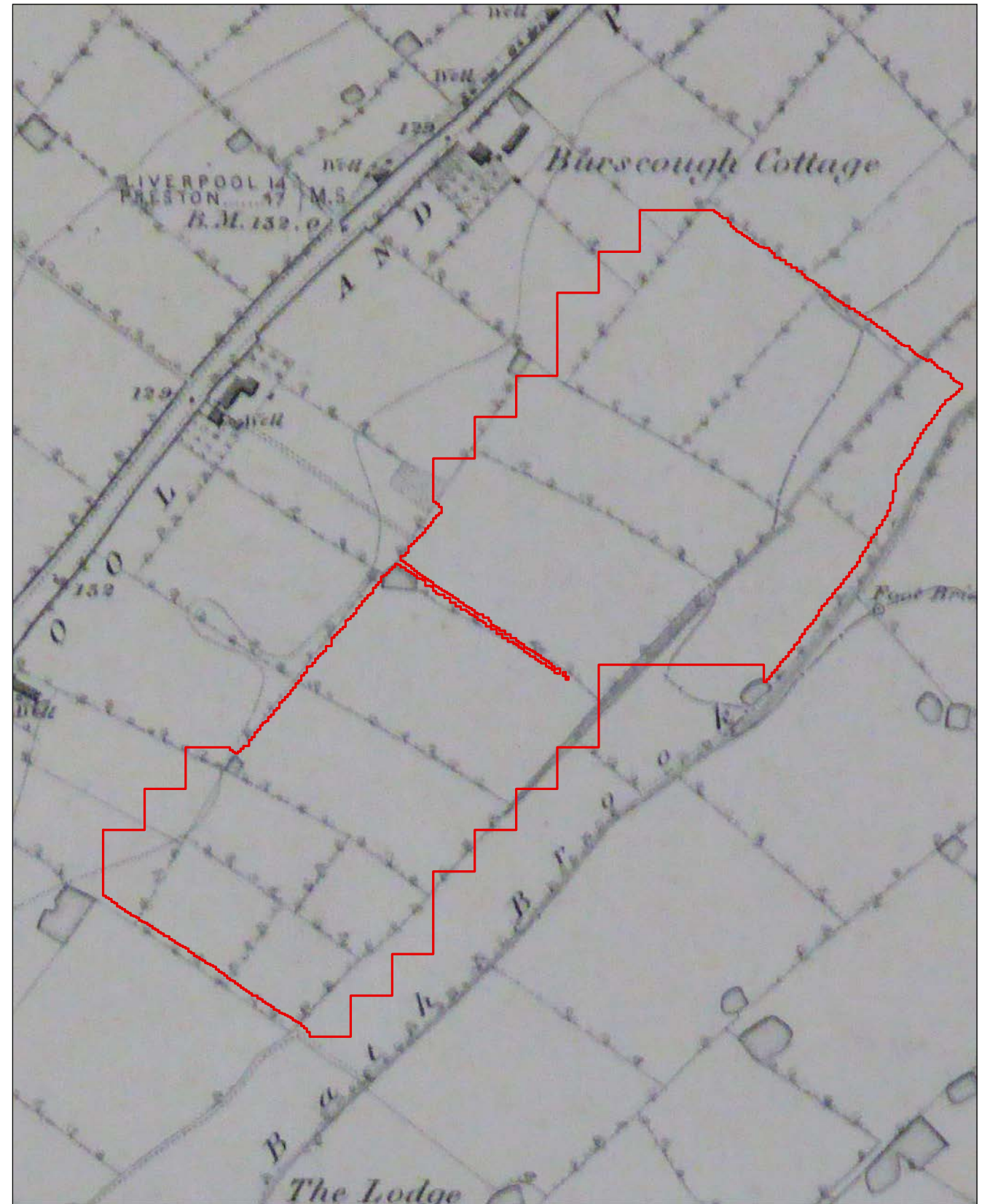


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a) 1846 Burscough Tithe Map



b) 1848 Ordnance Survey 1st Edition 6" map



- Detailed Suvery Extents
- Possible Archaeology
- Archaeology
- Former Field Boundary

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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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