



**magnitude**  
surveys

**Geophysical Survey Report  
of  
Main Road, Somersham  
Suffolk**

**For  
CgMs Heritage (Part of RPS Group Plc)**

**On Behalf Of  
Hopkins Homes Ltd**

**Magnitude Surveys Ref: MSTM280**

**HER Parish Code: SSH 024**

**OASIS ID: magnitud1-313439**

**April 2018**



## magnitude surveys

Unit 17, Commerce Court

Challenge Way

Bradford

BD4 8NW

01274 926020

[info@magnitudesurveys.co.uk](mailto:info@magnitudesurveys.co.uk)

### Report Written and Figures Produced by:

Chrys Harris BA MSc PhD

### Report Checked by:

Finnegan Pope-Carter BSc MSc FGS

### Report Issued:

25 April 2018

## Abstract

Magnitude Surveys was commissioned to assess the subsurface archaeological potential of a c. 1.8ha area of pasture off Main Road, Somersham, Suffolk. A fluxgate magnetometer survey was successfully completed. The geophysical results primarily reflect ferrous responses associated with the site's current configuration as paddocks. While these metallic features produce broad, overshadowing anomalies around the paddocks' fencing, the interior is relatively clear. No anomalies of an archaeological origin have been detected. Beyond the ferrous responses, weak agricultural trends have been identified, along with a number of responses classified as 'Undetermined' that may be the result of disturbances from the surrounding housing or the site's current land usage.

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## 1. Introduction

- 1.1. Magnitude Surveys Ltd (MS) was commissioned by CgMs Heritage (Part of RPS Group Plc) on behalf of Hopkins Homes Ltd to undertake a geophysical survey on a c.1.8ha area of pasture off Main Road, Somersham, Suffolk (TM 0843 4867).
- 1.2. The geophysical survey comprised hand-pulled, cart-mounted GNSS-positioned fluxgate magnetometer survey.
- 1.3. The survey was conducted in line with the current best practice guidelines produced by Historic England (David et al., 2008), the Chartered Institute for Archaeologists (CIfA, 2014) and the European Archaeological Council (Schmidt et al., 2015).
- 1.4. The survey commenced on 09/04/18 and took 1 day to complete.

## 2. Quality Assurance

- 2.1. Magnitude Surveys is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA), the chartered UK body for archaeologists, and a corporate member of ISAP (International Society of Archaeological Prospection).
- 2.2. Director Graeme Attwood is a Member of CIfA, as well as the Secretary of GeoSIG, the CIfA Geophysics Special Interest Group. Director Finnegan Pope-Carter is a Fellow of the London Geological Society, the chartered UK body for geophysicists and geologists, as well as a member of GeoSIG, the CIfA Geophysics Special Interest Group. Director Chrys Harris has a PhD in archaeological geophysics from the University of Bradford and is the Vice-Chair of the International Society for Archaeological Prospection.
- 2.3. All MS managers have relevant degree qualifications to archaeology or geophysics. All MS field and office staff have relevant archaeology or geophysics degrees and/or field experience.

## 3. Objectives

- 3.1. The geophysical survey aimed to assess the subsurface archaeological potential of the survey area.

## 4. Geographic Background

4.1. The site is located off Main Road, Somersham, approximately 9km north-east of Ipswich (Figure 1). Survey was undertaken across an area of horse paddocks bounded on the east by Main Road, on the south by allotments, on the north by residential buildings, and on the west by arable fields (Figure 2). The paddocks were enclosed by wooden fences.

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	Flat, short pasture.	A line of isolated fence posts ran SW-NE through the southern half of the area. Two large trailers/vehicles were present in the north-western corner, next to the farm on the northern boundary.
2	Flat, short pasture.	A gate at the northern end connected to Area 1. A water trough was present in the north-eastern corner.
3	Flat, short pasture.	A gate at the northern end connected to Area 1. A water trough was present in the north-eastern corner.
4	Flat, short pasture.	A gate at the northern end connected to Area 1. A water trough was present in the north-eastern corner.
5	Flat, short pasture.	A gate at the northern end connected to Area 8. A water trough was present in the north-western corner.
6	Flat, short pasture.	A gate at the western end connected to Area 5. A paved driveway was located to the north. A water trough was present in the south-eastern corner.
7	Flat, short pasture.	A gate at the western end connected to Area 5.
8	Flat, short pasture.	A gate at the western end connected to Area 5. A large trailer/vehicle was located to the north, beside a gravel driveway that lead to the farm along the northern boundary.
9	Flat, short pasture.	A paved driveway was located to the south. A water trough was present in the south-western corner.

4.3. The underlying geology comprises chalk of the Newhaven chalk formation. No superficial deposits are recorded (British Geological Survey, 2018).

4.4. The soils consist of freely draining slightly acid loamy soils (Soilscapes, 2018).

## 5. Archaeological Background

- 5.1. The following section summarises results from an HER search on Heritage Gateway (2018) within 0.5km of the site.
- 5.2. A circular cropmark (MSF15178), interpreted as a possible small ring ditch, is recorded to the north-east of site, in the fields abutting the housing off Main Road. The only other record indicating possible prehistoric activity is a flaked axehead findspot (MSF5276), c. 460m south-west of site.
- 5.3. Tudor Grange, located c. 350m north-west of site, is associated with listings relating to 15<sup>th</sup> and 16<sup>th</sup> century farm buildings (MSF25412) and a post-medieval dovecote (MSF13397).
- 5.4. Modern and historic Ordnance Survey maps of the area do not record any former subdivisions or features within the survey area. The configuration of the field has remained relatively consistent.

## 6. Methodology

### 6.1. Data Collection

6.1.1. Geophysical prospection comprised the magnetic method as described in the following table.

6.1.2. Table of survey strategies:

Method	Instrument	Traverse Interval	Sample Interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer	1m	200Hz reprojected to 0.125m

6.1.3. The magnetic data were collected using MS' hand-carried GNSS-positioned system.

6.1.3.1. MS' hand-carried system was comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a Hemisphere S321 GNSS Smart Antenna RTK GPS outputting in NMEA mode to ensure high positional accuracy of collected measurements. The Hemisphere S321 GNSS Smart Antenna is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

6.1.3.2. Magnetic and GPS data were stored on an SD card within MS' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.

6.1.3.3. A navigation system integrated with the RTK GPS was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

## 6.2. Data Processing

6.2.1. Magnetic data were processed in bespoke in-house software produced by MS. Processing steps conform to Historic England's standards for "raw or minimally processed data" (see sect 4.2 in David et al., 2008: 11).

Sensor Calibration – The sensors were calibrated using a bespoke in-house algorithm, which conforms to Olsen et al. (2003).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

## 6.3. Data Visualisation and Interpretation

6.3.1. This report presents the gradient of the sensors' total field data as greyscale images. The gradient of the sensors minimises external interferences and reduces the blown-out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features can be clearer in the respective gradient or total field datasets. Multiple greyscale images at different plotting ranges have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot (Figure 8). XY trace plots visualise the magnitude and form of the geophysical response, aiding in anomaly interpretation.

6.3.2. Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historic maps, LiDAR data, and soil and geology maps. Google Earth (2018) was consulted as well, to compare the results with recent land usages.



## 7. Results

### 7.1. Qualification

7.1.1. Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources. Where possible an anomaly source will be identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports. MS actively seek feedback on their reports as well as reports of further work in order to constantly improve our knowledge and service.

### 7.2. Interpretation

#### 7.2.1. General Statements

- 7.2.1.1. Geophysical anomalies will be discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual will be discussed individually.
- 7.2.1.2. **Undetermined** – Anomalies are classified as Undetermined when the anomaly origin is ambiguous through the geophysical results and there is no supporting or correlative evidence to warrant a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally not ferrous in nature.
- 7.2.1.3. **Ferrous (Discrete/Spread)** – Discrete ferrous-like, dipolar anomalies are likely to be the result of modern metallic disturbance on or near the ground surface. A ferrous spread refers to a concentrated deposition of these discrete, dipolar anomalies. Broad dipolar ferrous responses from modern metallic features, such as fences, gates, neighbouring buildings and services, may mask any weaker underlying archaeological anomalies should they be present.

### 7.3. Discussion

- 7.3.1. The geophysical results are presented in consideration with satellite imagery (Figure 6) and historic maps (Figure 7).
- 7.3.2. The fluxgate magnetometer survey has produced a variable response across the site. The paddock fences, driveways, and housing have produced broad ferrous anomalies (Figure 6), which will overshadow weaker underlying signals—should any be present. However, away from these features, the results are relatively clear (Figure 3).

7.3.3. Minor linear trends on a sub N-S alignment have been identified towards the north-west of site. These correlate with cropmarks visible in recent satellite imagery (Figure 6) and likely indicate minor agricultural activity.

7.3.4. Two areas of weak disturbance have been classified as 'Undetermined (Spread)'. These do not appear to be associated with any features noted at the time of survey or visible in satellite imagery. They do not appear to form coherent features and could indicate disturbed or deposited material. There are no characteristics of these responses that would directly support an archaeological origin. Several strong, discrete anomalies have also been indicated towards the north-west. These anomalies do not exhibit a distinct morphology or patterning to suggest an archaeological origin.

## 8. Conclusions

8.1. A fluxgate magnetometer survey has been successfully completed across the site. While adjacent fencing, driveways, and structures have produced broad ferrous anomalies around the edges of the paddocks, the paddock interiors are relatively clear. No anomalies have been classified as archaeological in origin. Several 'Undetermined' responses are considered more likely to be resultant from modern or agricultural disturbances. Minor agricultural trends have been detected across the north-west end of site as well.

## 9. Archiving

9.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.

9.2. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to the any dictated time embargoes.

9.3. Whenever possible, MS has a policy of making data available to view in easy to use forms on its website. This can benefit the client by making all of their reports available in a single repository, while also being a useful resource for research. Should a client wish to impose a time embargo on the availability of data, this can be achieved in discussion with MS.

## 10. Copyright

10.1. Copyright and the intellectual property pertaining to all reports, figures, and datasets produced by Magnitude Services Ltd. is retained by MS. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by MS.

## 11. References

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MSTM280 - Main Road, Somersham, Suffolk


Figure 1 - Site Location

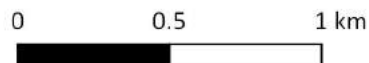
1:25,000 @ A4

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OS (100056946)

 Survey Area




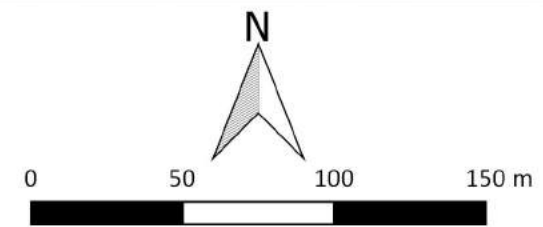
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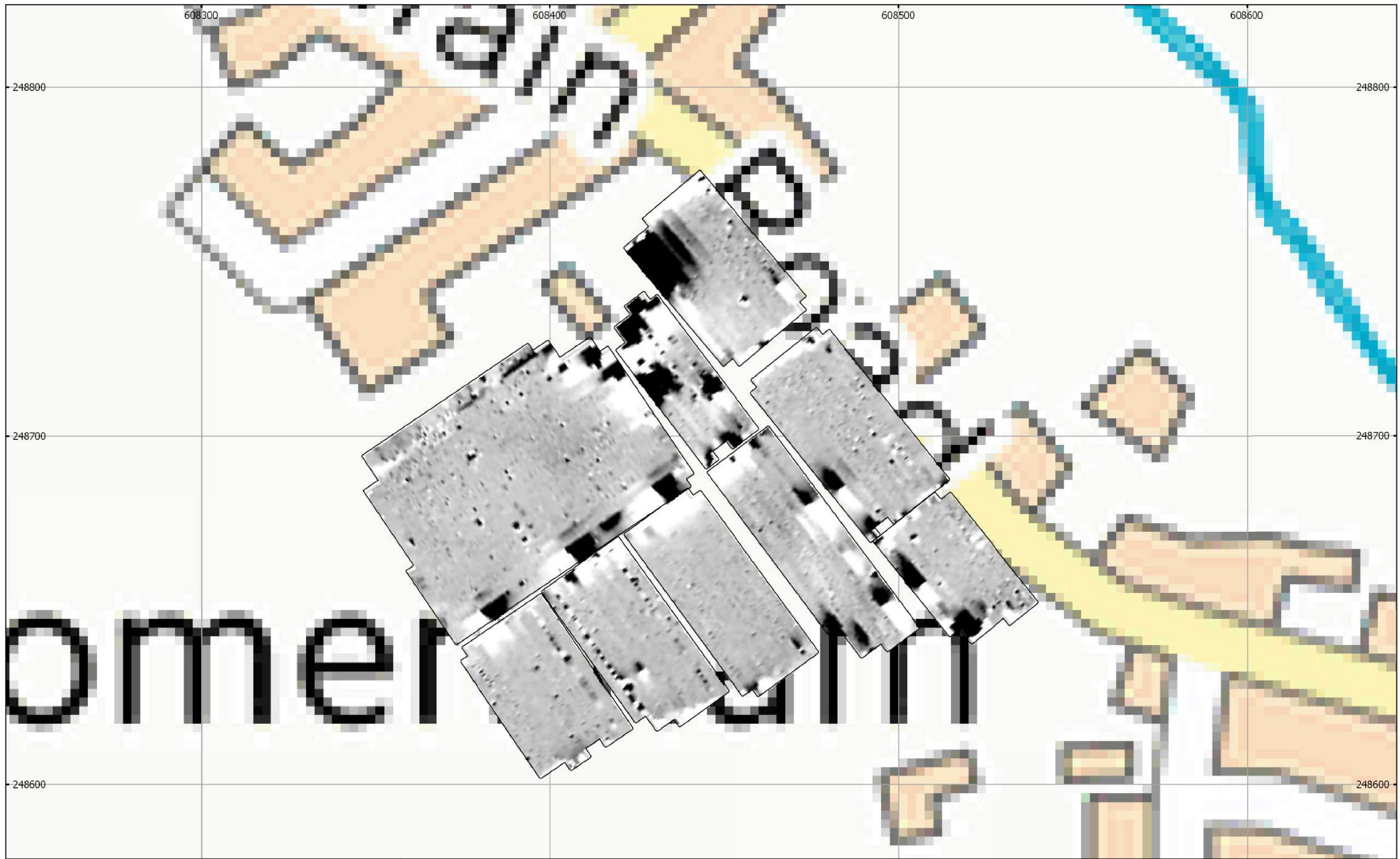


MSTM280 - Main Road, Somersham, Suffolk  
Figure 2 - Location of Survey Areas  
1:5000 @ A3  
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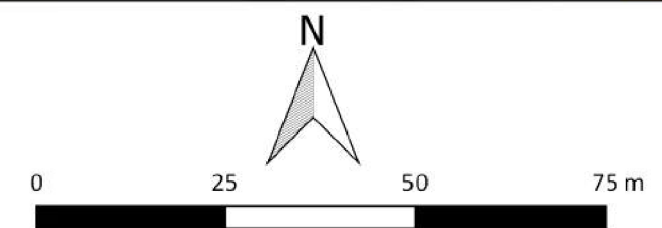
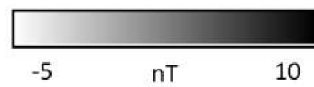
 Survey Extent







MSTM280 - Main Road, Somersham  
 Figure 3 - Magnetic Gradient (Wide Plotting Range)  
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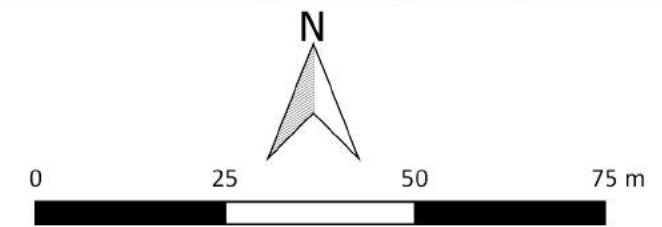
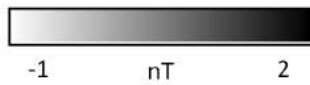


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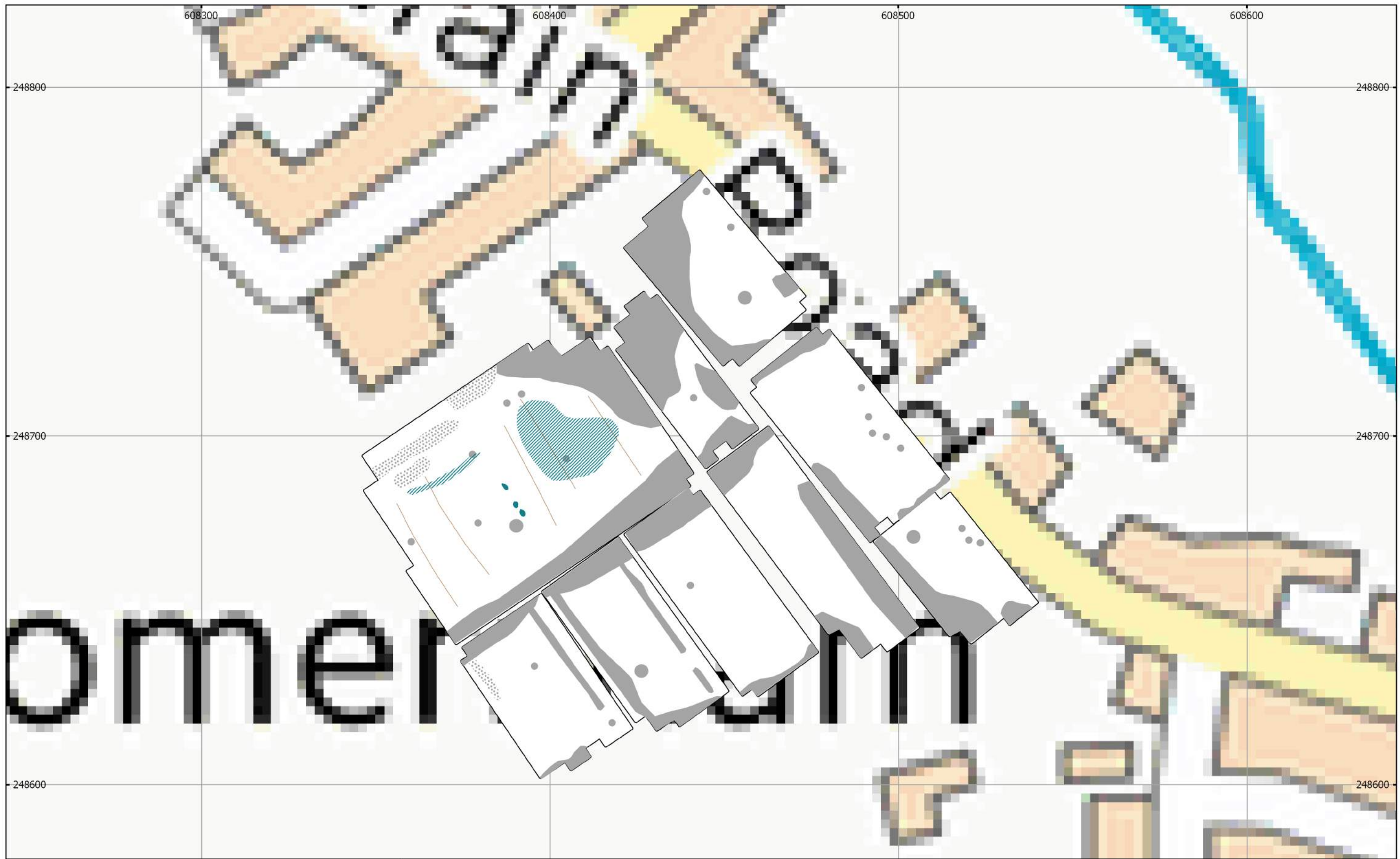




MSTM280 - Main Road, Somersham  
 Figure 4 - Magnetic Gradient  
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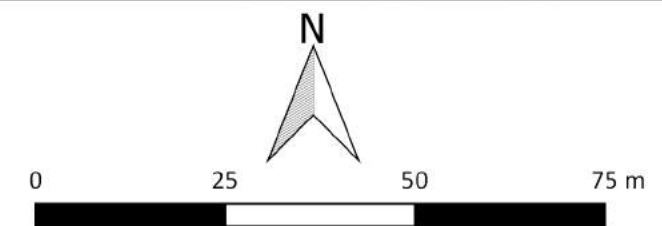






MSTM280 - Main Road, Somersham  
 Figure 5 - Magnetic Interpretation  
 1:1000 @ A3  
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- Agricultural (Trend)
- Ferrous (Dipolar)
- Undetermined (Strong)
- Undetermined (Weak)
- Ferrous (Spread)/Magnetic Disturbance

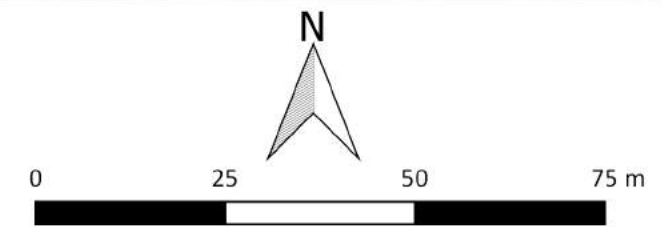




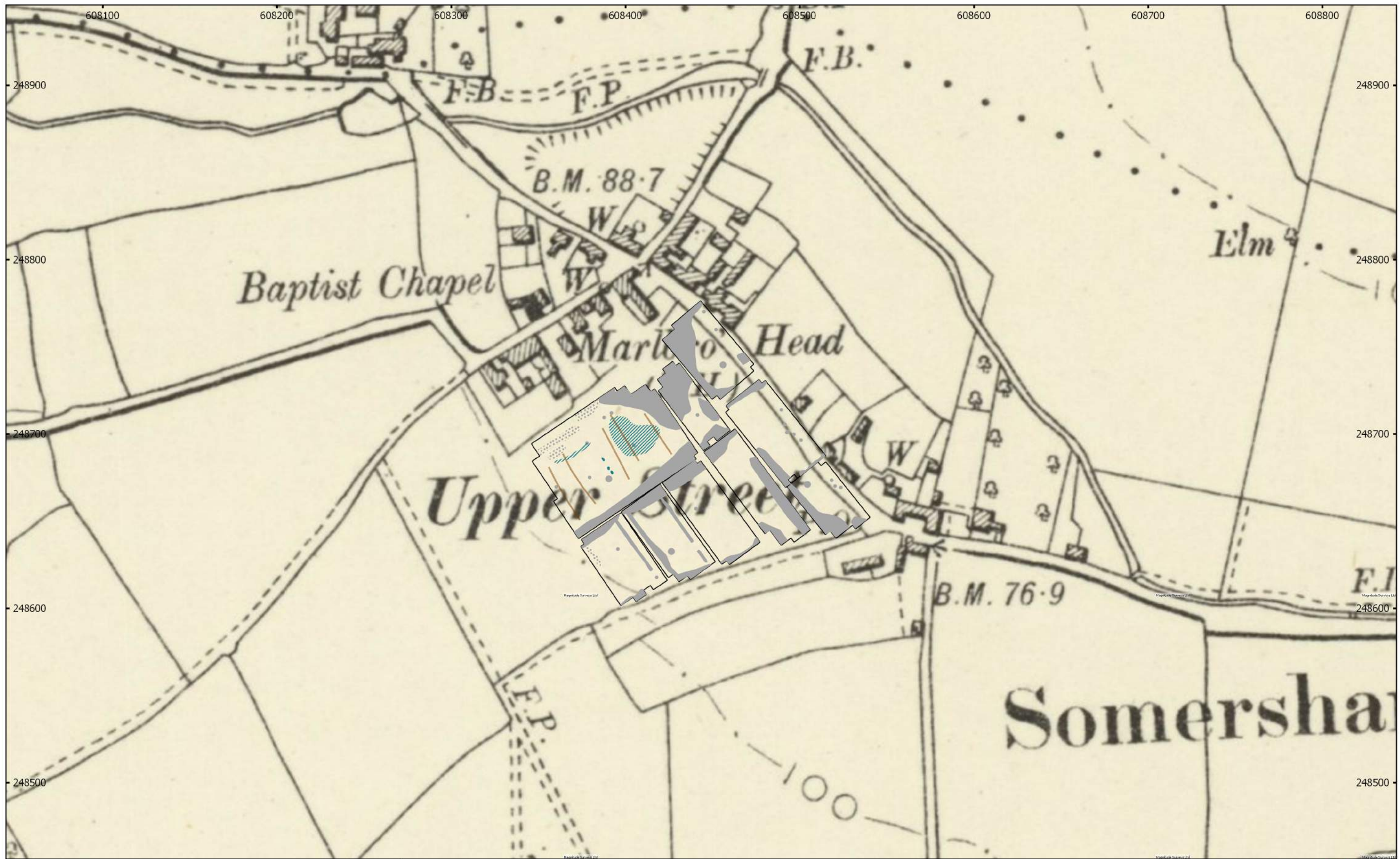


MSTM280 - Main Road, Somersham  
 Figure 6 - Magnetic Interpretation over Satellite Imagery  
 1:1000 @ A3  
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 Contains satellite imagery © 2018 Bing

- Agricultural (Trend)
- Undetermined (Strong)
- Undetermined (Weak)
- Ferrous (Dipolar)
- Ferrous (Spread)/Magnetic Disturbance

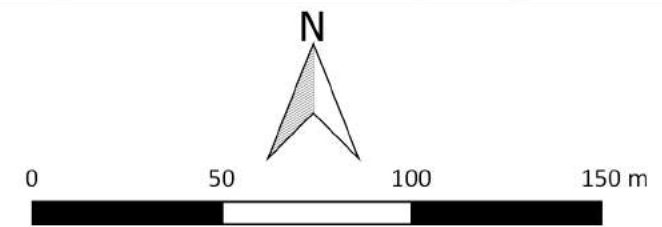




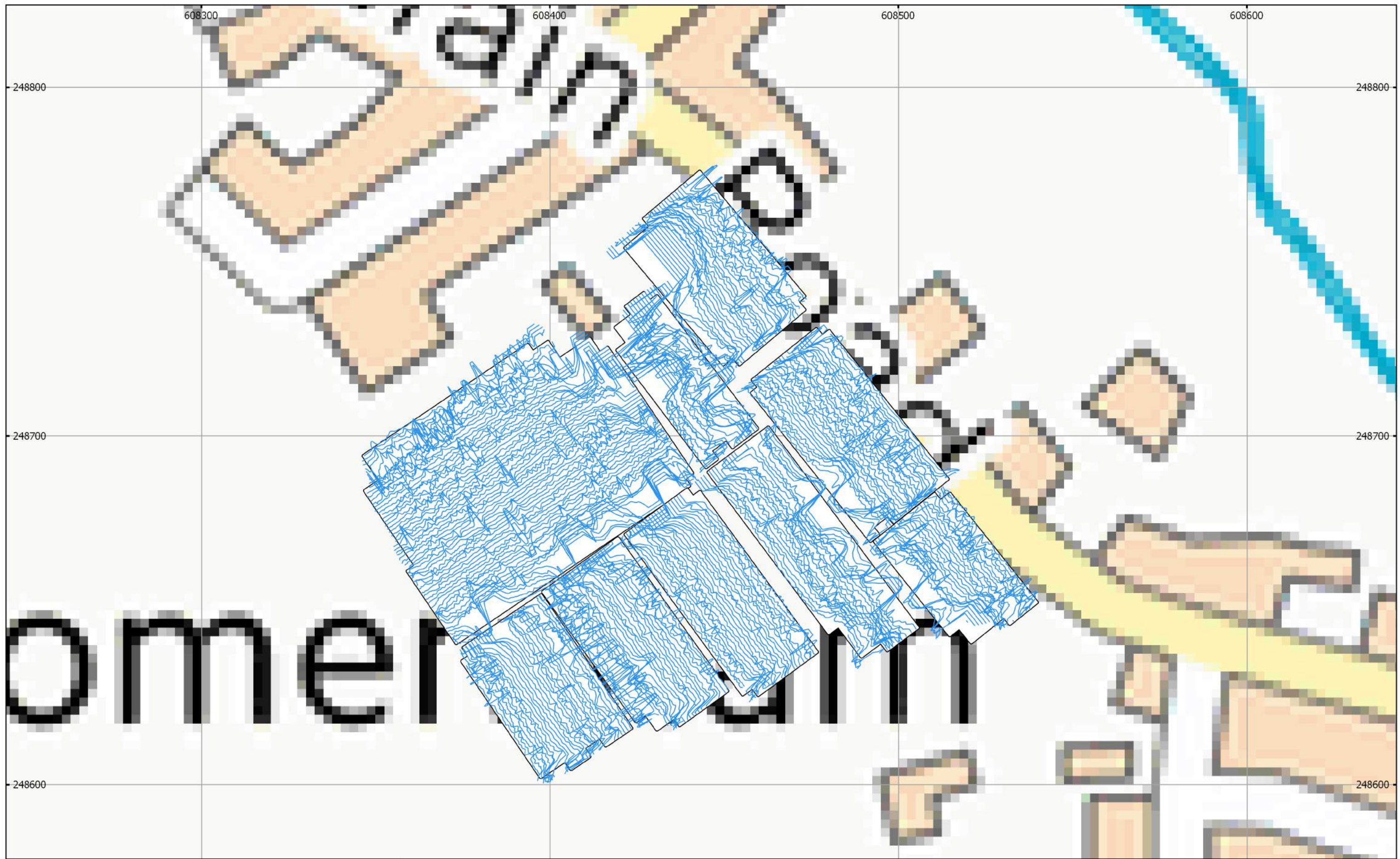


MSTM280 - Main Road, Somersham  
 Figure 7 - Magnetic Interpretation over Historic Maps  
 1:1000 @ A3  
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 Contains historic maps: Ordnance Survey, 6" 2nd edition c. 1882-1913 ©  
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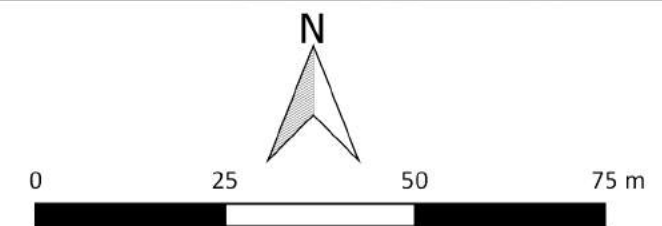
- Agricultural (Trend)
- Undetermined (Strong)
- Undetermined (Weak)
- Ferrous (Dipolar)
- Ferrous (Spread)/Magnetic Disturbance







MSTM280 - Main Road, Somersham  
Figure 8 - XY Trace Plot  
20nT/cm at 1:1000 @ A3  
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## Printable version

**OASIS ID: magnitud1-313439**

### Project details

Project name	Somersham, Suffolk
Short description of the project	Magnitude Surveys was commissioned to assess the subsurface archaeological potential of a c. 1.8ha area of pasture off Main Road, Somersham, Suffolk. A fluxgate magnetometer survey was successfully completed. The geophysical results primarily reflect ferrous responses associated with the site's current configuration as paddocks. While these metallic features produce broad, overshadowing anomalies around the paddocks' fencing, the interior is relatively clear. No anomalies of an archaeological origin have been detected. Beyond the ferrous responses, weak agricultural trends have been identified, along with a number of responses classified as 'Undetermined' that may be the result of disturbances from the surrounding housing or the site's current land usage.
Project dates	Start: 09-04-2018 End: 09-04-2018
Previous/future work	Not known / Not known
Any associated project reference codes	SSH 024 - HER event no.
Type of project	Field evaluation
Current Land use	Grassland Heathland 5 - Character undetermined
Monument type	PLOUGH MARKS Uncertain
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	Unknown
Position in the planning process	Not known / Not recorded
Solid geology	CHALK (INCLUDING RED CHALK)
Drift geology	Unknown
Techniques	Magnetometry

### Project location

Country	England
Site location	SUFFOLK IPSWICH IPSWICH Somersham
Postcode	IP8 4QA
Study area	1.8 Hectares
Site coordinates	TM 0843 4867 52.096527336429 1.043301721228 52 05 47 N 001 02 35 E Point
Lat/Long Datum	Not applicable

(other)

Height OD / Depth Min: 1m Max: 1m

**Project creators**

Name of Organisation	Magnitude Surveys Ltd
Project brief originator	Unknown
Project design originator	Magnitude Surveys Ltd
Project director/manager	Finn Pope-Carter
Project supervisor	Chrys Harris
Type of sponsor/funding body	Developer

**Project archives**

Physical Archive Exists?	No
Digital Archive recipient	Magnitude Surveys
Digital Archive ID	MSTM280
Digital Contents	"Survey"
Digital Media available	"Geophysics", "Text", "GIS"
Paper Archive Exists?	No

**Project bibliography 1**

Publication type	Grey literature (unpublished document/manuscript)
Title	Geophysical Survey Report of Main Road, Somersham Suffolk
Author(s)/Editor(s)	Harris, C.
Other bibliographic details	MSTM280
Date	2018
Issuer or publisher	Magnitude Surveys Ltd
Place of issue or publication	Bradford
Description	Digital Report in PDF format
Entered by	Chrys Harris (info@magnitudesurveys.co.uk)
Entered on	2 May 2018

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