SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

‘World War 2 Treasure Hunters’ TV Series
Banks Marsh, Ribble Estuary & Hesketh Bank
Lancashire

Client:

EMPORIUM PRODUCTIONS

Date:
July 2018

Series 1, Episode 8
Geophysical Survey & Metal Detector Survey Reports
SACIC Report No. 2017/121
Authors: Timothy Schofield, Mark Sommers & Stephen Taylor

Banks Marsh, Ribble Estuary & Hesketh Bank, Lancashire

‘World War 2 Treasure Hunters’ Television Series Series 1, Episode 8

Geophysical Survey & Metal Detector Survey Reports

Authors: Timothy Schofield, Mark Sommers, Stephen Taylor

Illustrator: Timothy Schofield, Mark Sommers

Editor: Stuart Boulter

Report Date: July 2018

HER Information

Site Name:	**Banks Marsh, Ribble Estuary & Hesketh Bank, Lancashire**
Date of Fieldwork:	**3rd – 4th July 2017**
Grid Reference:	**SD 3835 2345 & SD 4380 2330**
Oasis Reference:	**suffolka1-324547**
Project Officers:	**Timothy Schofield, Mark Sommers**
WWII Finds Expert:	**Stephen Taylor**
Client:	**Emporium Productions Ltd**

Digital report submitted to Archaeological Data Service:
http://ads.ahds.ac.uk/catalogue/library/greylit

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Date: July 2018

Approved By: Stuart Boulter
Position: Senior Projects Officer
Date: July 2018

Signed: 

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Summary

On the 3rd and 4th July 2017, Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed magnetometer and metal detector survey at Banks Marsh, in the Ribble Estuary, Lancashire and a metal detector survey at Hesketh Bank, Lancashire. The aim of the geophysical survey was to aid in the location and recovery of the remains of a downed Junkers Ju88 by the Lancashire Aircraft Investigation Team in the Ribble Estuary and to locate and record artefacts relating to the anti-aircraft battery at Hesketh Bank.

The fluxgate gradiometer survey was deployed to the west of a magnetometer survey undertaken on the salt marsh in April 2016 by Cranfield University, that recorded a range of very high magnetic readings thought to locate the remains of the downed Ju88. A single very large bipolar magnetic response was prospected during the current survey, indicating that the remains of the aircraft were also likely to continue further to the west.

At the Hesketh Bank site, approximately 5km to the east of Banks Marsh, a few finds relating to the WW2 anti-aircraft battery were recorded and recovered close to extant concrete gun platforms during the metal detector survey.

1. Introduction

On the 3rd and 4th July 2017 a detailed magnetometer survey was undertaken at Banks Marsh in the Ribble Estuary, followed by a metal detector survey at a second site in Hesketh Bank, Lancashire (see Fig.1). The geophysical and metal detector surveys were commissioned by Emporium Productions Ltd, as part of a television series investigating the history of the anti-aircraft battery at Hesketh Bank.

The specific research aims of the detailed magnetometer and metal detector surveys were:

- To prospect for anomalies associated with the downed Ju88 at Banks Marsh in the Ribble Estuary, defining the full extent of the crash site;
- To locate, record and recover evidence of WW2 activity at the anti-aircraft battery at Hesketh Bank.

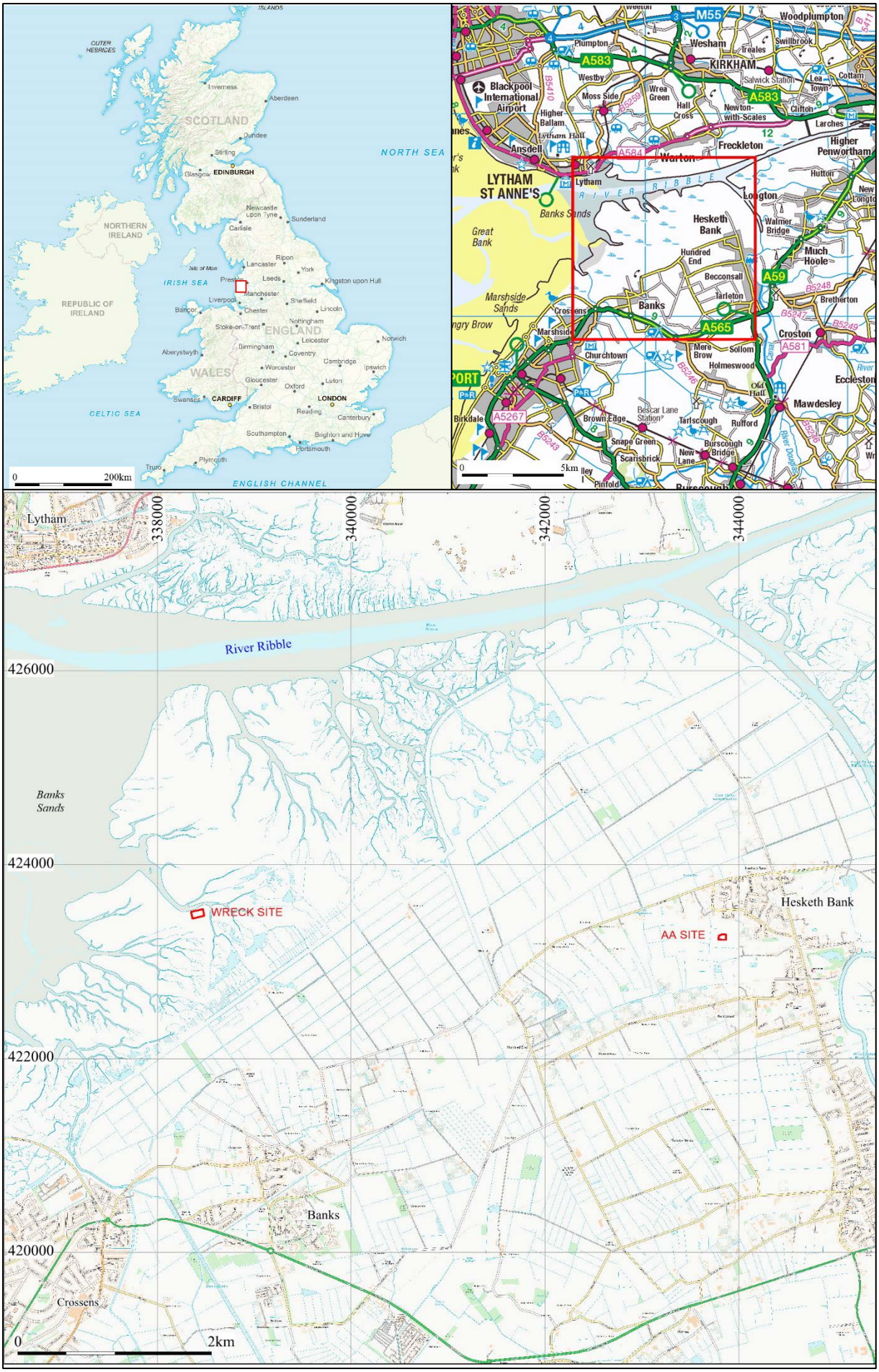

Figure 1. Site location

2. Geology and topography

Banks Marsh is located in the Ribble Estuary, on a National Nature Reserve (SD 3835 2345), at a height of 3m above Ordnance Datum (AOD). The anti-aircraft battery at Hesketh Bank (SD 4380 2330) is present within a field grazed by horses, at a height of 10m AOD.

The bedrock geology at Banks Marsh is described as Triassic Rocks of mudstone, siltstone and sandstone formed during the Triassic Period in hot deserts. At Hesketh Bank it is described as Tarporley Siltstone Formation, mudstone, siltstone and sandstone of the Triassic Period when the local environment was dominated by lakes.

Information regarding the superficial geology at Banks Marsh was not available, while at Hesketh Bank it is classified as Devensian Till Diamicton, deposited in the Quaternary Period during ice age conditions by the actions of ice and meltwater (BGS 2018).

3. Archaeological background

Banks Marsh

On the 7th April 1941 a Junkers Ju88 took off from the airfield of Saint-André-de-l'Eure in northern France, its primary target was covered in cloud, so its secondary target of the Mersey dock yards near Liverpool was approached. The Ju88A-5 8138 ‘B3+IN’ loaded with two 500kg high explosive (HE) bombs was intercepted by a Boulton Paul Defiant Mk.I N3445 ‘JT-F’ of No.256 Squadron that took-off from RAF Squires Gate near Blackpool. Two bursts from its machine guns sent the plane down into the Ribble Estuary, with three of the four crew bailing out, the fourth members’ body was found in the wreckage on the following day. Two of the crew survived the jump with the body of the third being recovered from a sandbank on the estuary a few days after.

The Lancashire Aircraft Investigation Team (LAIT) began their search for the downed Ju88A-5 8138 ‘B3+IN’ in 1996, acting on information collected from local and official sources. They used a deep seeking metal detector to search for the plane in the area believed to be the crash site, but to no avail. A magnetometer survey was subsequently undertaken on the same area, but once again the results came back negative.

In 2015, the LAIT decided to re-examine the background data they had collected, to start a renewed search for the plane. Overlying RAF air photographs (AP's) over modern AP's revealed that they may have been looking in the wrong area, with the tidal gutters moving over the decades. Armed with this new information LAIT decided to search a new area, employing two magnetometers, one large magnetic response was recorded. This magnetic response was further investigated using a probe rod, which confirmed the presence of a solid object. A subsequent magnetometer survey undertaken in drier conditions in September 2015, prospected further magnetic anomalies. Following the survey, a trench was excavated over one of these large magnetic responses, the crankshaft from one of the Junkers engines was revealed, thus confirming the crash site.

In April 2016, a detailed fluxgate gradiometer survey was undertaken by Pete Masters of Cranfield University locating multiple high magnetic signals. In July 2017 LAIT excavated trenches over the anomalies prospected, these excavations were filmed as part of this episode.

Hesketh Bank

Hesketh Bank was chosen for metal detector survey, due to the location of the extant remains of a former WW2 heavy anti-aircraft battery, on what is now a field for horse grazing. Associated military buildings and a military road are still visible as structures on air photographs, with the gun positions and command post elements still extant on the 1989 Ordnance Survey and Google Earth photographs. The site was listed as being unarmed in 1942.

4. Methodology

Geophysical Survey

Instrument type

A Bartington DualGRAD 601-2 fluxgate gradiometer was employed to undertake the detailed geophysical survey; the weather was wet with outbreaks of sunshine; the geological conditions were found to be favourable for magnetometer survey.

Instrument calibration and settings

One hour was allocated to allow the instrument's sensors to reach optimum operating temperature before the survey commenced; the weather was hot and sunny. Instrument sampling intervals were set to 0.25m along 1m traverses (four readings per metre).

Survey grid layout

The detailed survey was undertaken in three 20m grids (Fig. 2, blue grid), orientated *c.* northeast to southwest and geolocated employing a Leica Viva GS08+ Smart Rover RTK GLONASS/GPS, allowing an accuracy of +/- 0.03m. Data were converted to National Grid Transformation OSTN15.

Data capture

Detailed fluxgate gradiometer survey data points were recorded on an internal data logger that were downloaded and checked for quality at midday and in the evening, allowing grids to be re-surveyed if necessary. A pro-forma survey sheet was completed to allow data composites to be created. Data were filed in unique project folders and backed-up onto an external storage device and then a remote server in the evening.

Data software, processing and presentation

Datasets were composited and processed using DW Consulting's Terrasurveyor v.3.0.33.6; the raw grid files, composite and raster graphic plots will be stored and archived in this format. The processing algorithms undertaken on the raw (Fig. 3) and processed datasets (Figs. 4 and 5); schedules are presented in Appendix 1.

Data composites were exported as raster images into AutoCAD. An interpretation plan based on the combined results of the raw, processed and xy trace plots (Figs. 3, 4 and 5) has been produced (Fig. 6).

Survey grid restoration

In order to accurately relocate the grid, three virtual survey stations were placed on survey grid nodes located along the baselines (Fig. 2).

Metal Detector Survey

The metal detecting survey was undertaken by a group of detectorists, all of whom have a specific interest in WW2 sites, each used their own detecting equipment.

The metal detector survey was undertaken along transects to cover both sites. All finds recovered were bagged and issued a findspot number. The findspot was then georeferenced using the GPS equipment detailed above. Multiple finds recovered within close proximity to each other were recorded under the same findspot number. Small find numbers were later allocated to every find during post-excavation processing.

5. Results and discussion

Geophysical Survey (Marsh Bank)

The detailed fluxgate gradiometer survey was undertaken within three grids, as an extension of the previous geophysical survey undertaken by Cranfield University in 2016. A narrow range of anomalies were prospected, the strongest of which was likely to be associated with the downed aircraft.

An area of magnetic disturbance (grey hatching) records the location of magnetic material, caused by the presence of the site tent which was used as a base for the project.

An irregular curvilinear anomaly (cyan hatching) delineates the meandering course of a small gutter, that runs into the Ribble Estuary. It is recorded as a negative anomaly due to it being a negative landscape feature recorded at a greater distance from the base of the sensors and therefore appearing as a low magnetic response.

Four positive discrete anomalies (orange hatching) are of unknown origin, it is possible that they are of a geological or potentially an archaeological origin.

One large positive discrete anomaly (red hatching) was prospected just to the west of the strong area of magnetic disturbance (magenta hatching). This response is thought to be associated with the structure of the downed JU88.

A single strong area of magnetic disturbance (magenta hatching) is likely to be associated with the remains of the downed JU88, these are very strong magnetic readings of similar magnitude to those recorded on the 2016 geophysical survey located nearby.

Metal Detector Survey (Hesketh Bank)

The metal detector survey recovered only a few finds, a pig tail that was probably used to fence off the anti-aircraft battery, a fuze safety cover no. 199 from a 3.7inch shell which may have been fired at the Luftwaffe as well as a variety of cartridges and bullets from WW2. No personal items were recovered.

6. Conclusion

Despite covering an area of only three 20 by 20m grids, the geophysical survey prospected anomalies of a similar magnitude and character to those recorded during the preceding magnetometer survey. It is likely that these very strong magnetic readings derive from structural remains of the Luftwaffe Junkers Ju88, that was shot down by the RAF Defiant aircraft.

Only a few artefacts were recovered from Hesketh Bank, the majority of which relate to WW2 era spent ordnance. No personal items were prospected during the metal detector survey.

7. Archive deposition

The paper and digital archive will be kept at the SACIC office in Needham Market, before deposition in the Lancashire SMR.

8. Acknowledgements

The detailed magnetometer survey and metal detector fieldwork was directed by Tim Schofield and Mark Sommers, the team of detectorists was led by Stephen Taylor and comprised Richard Jordan, Adrian Jones, Martin Dewick and Matthew Sabourn. Project management was undertaken by Rhodri Gardner.

Thanks to Nick Wotherspoon and his colleagues at the Lancashire Aircraft Investigation Team.

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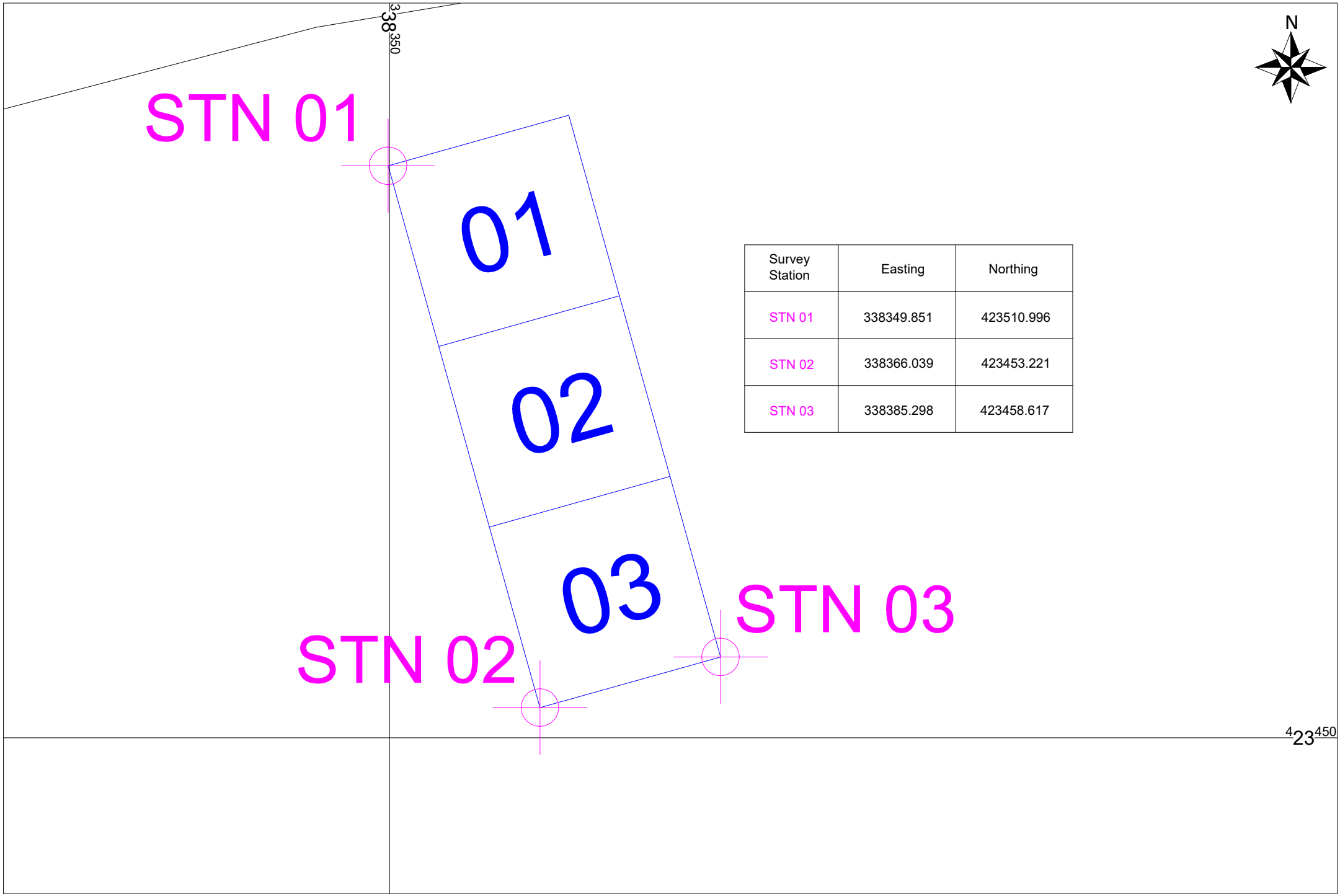

Survey Station	Easting	Northing
STN 01	338349.851	423510.996
STN 02	338366.039	423453.221
STN 03	338385.298	423458.617

Figure 2. Survey grid and georeferencing information

0 25m

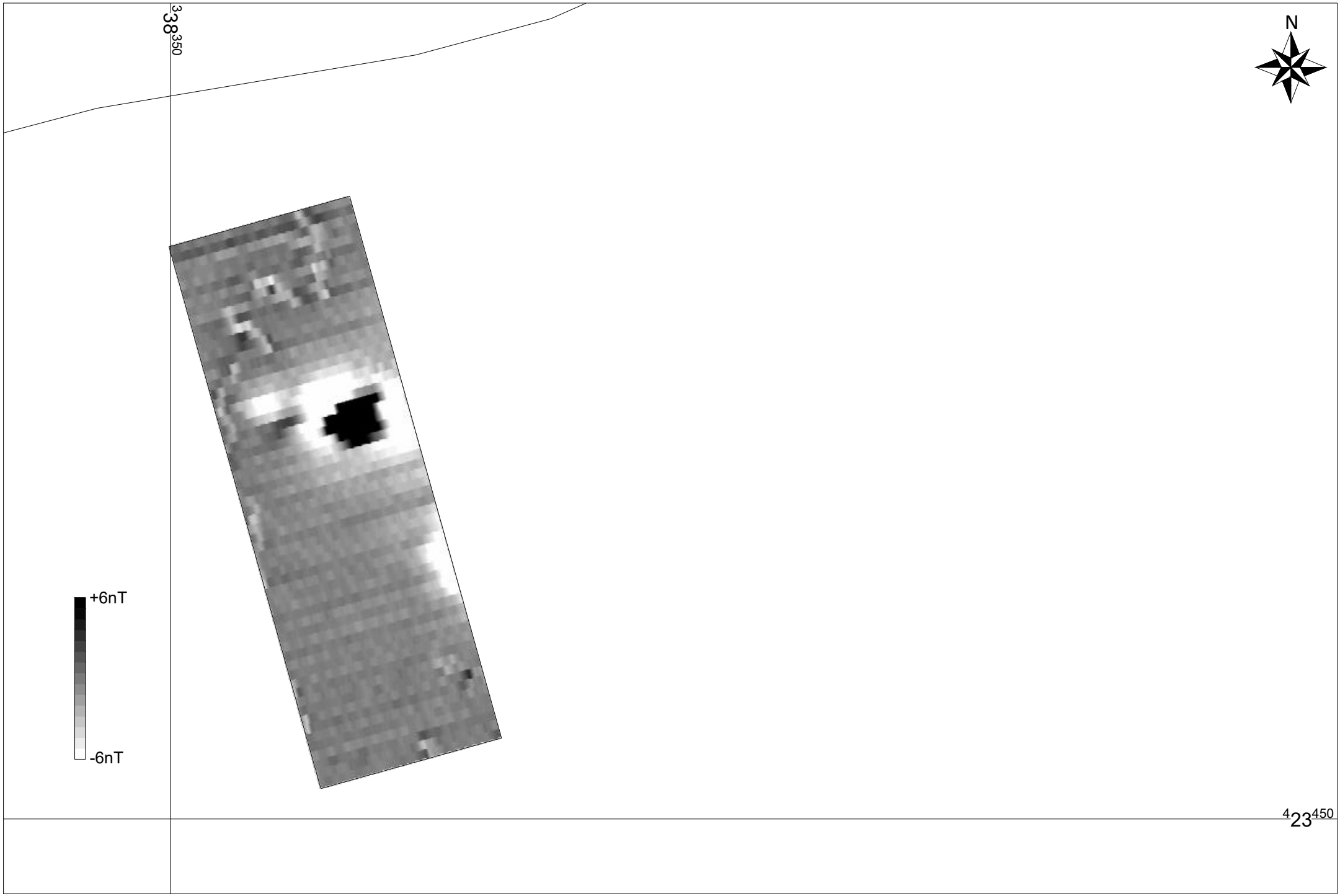

Figure 3. Raw magnetometer greyscale plot

0 25m

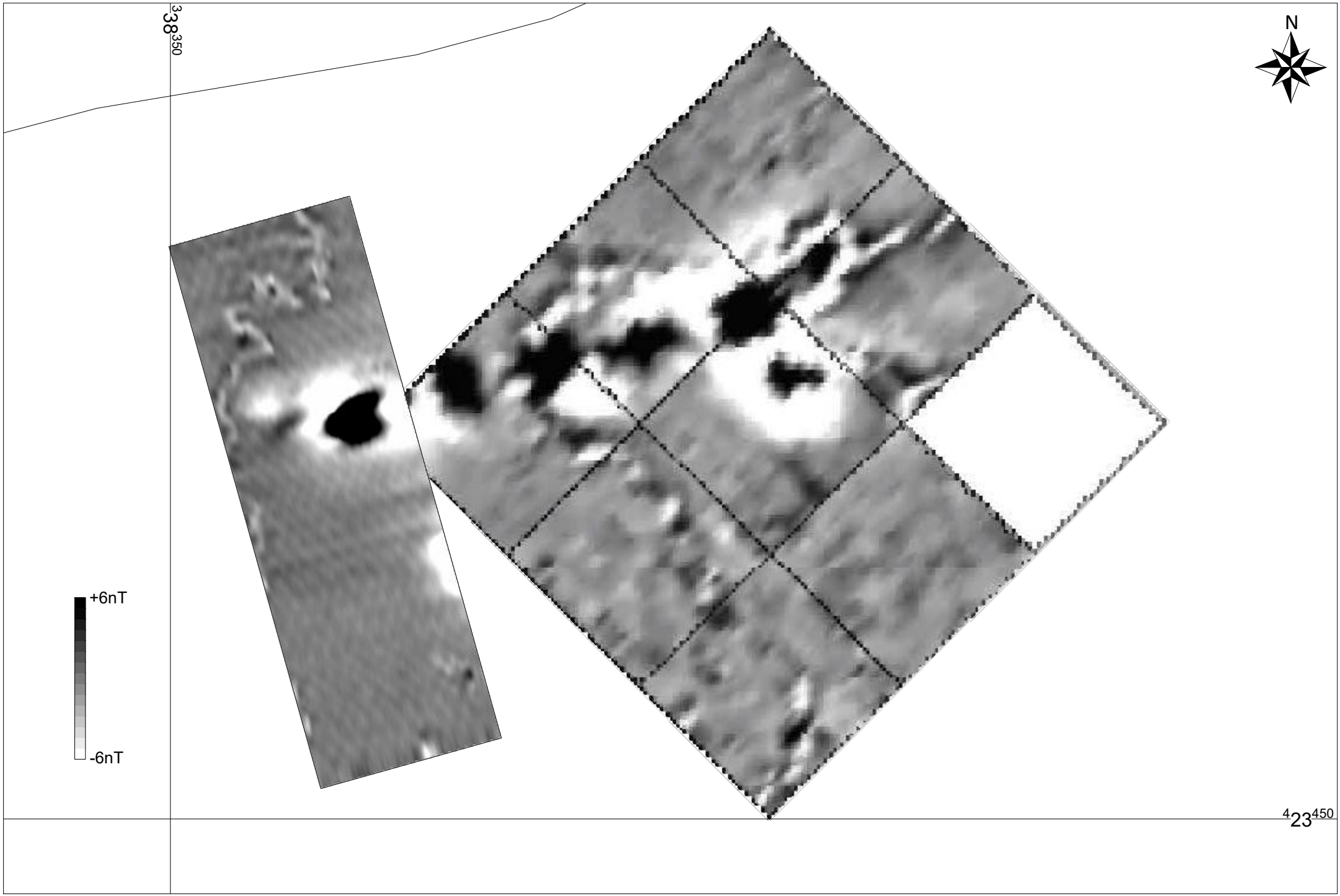

Figure 4. Processed magnetometer greyscale plot overlying Cranfield University magnetometer data to the east.

0 25m

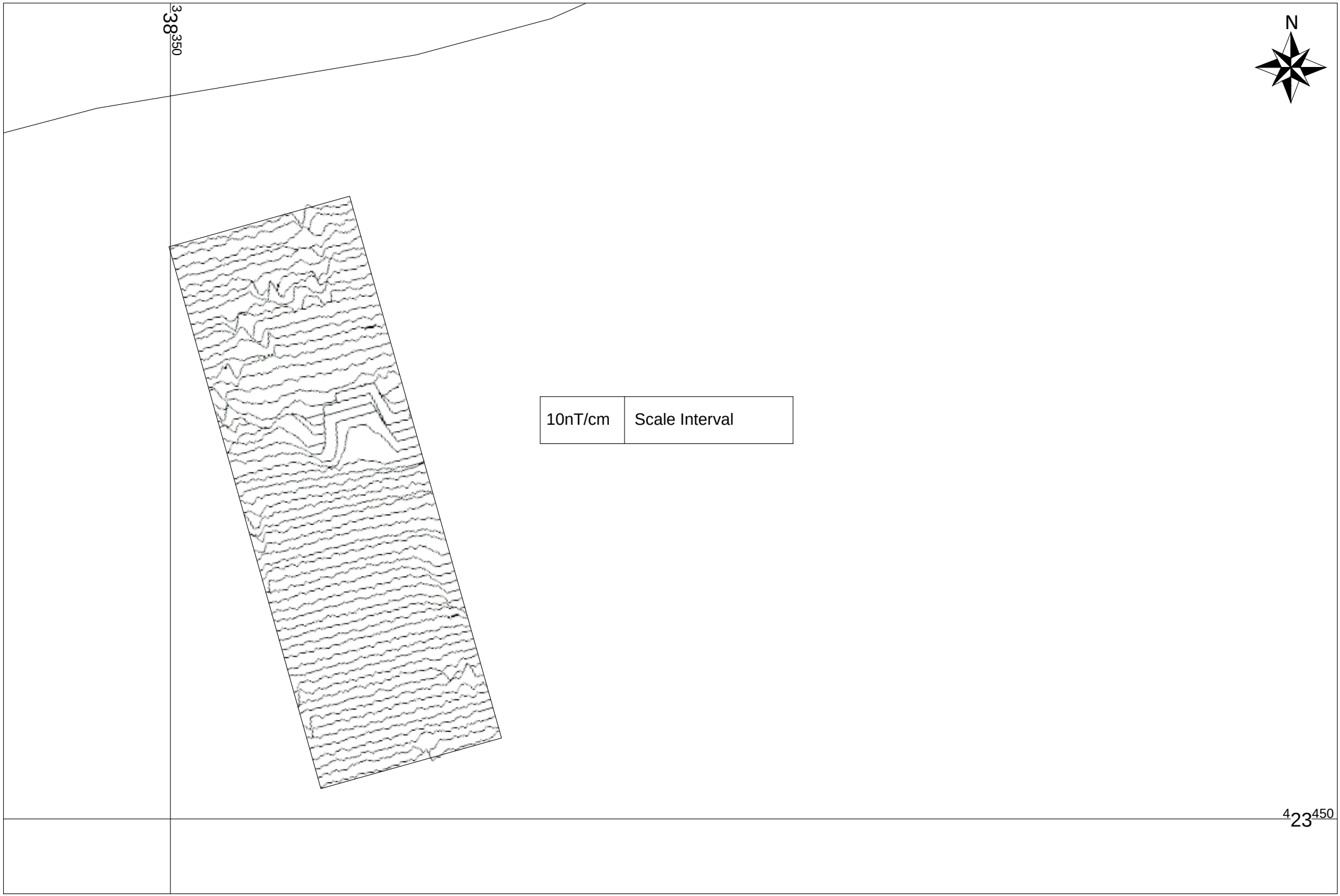

Figure 5. Processed magnetometer xy trace plot

0 25m

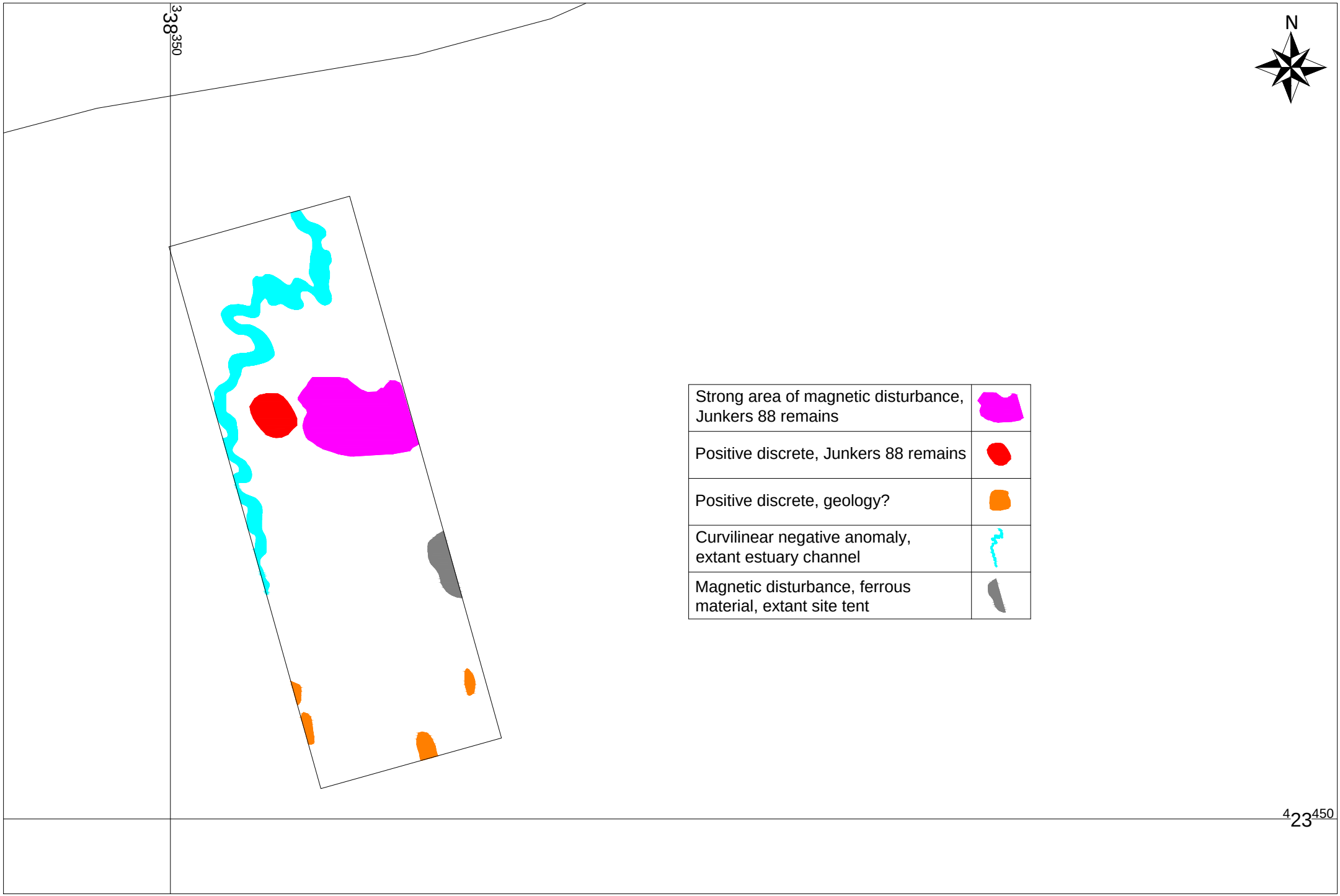

Figure 6. Interpretation plot of magnetometer anomalies

0 25m

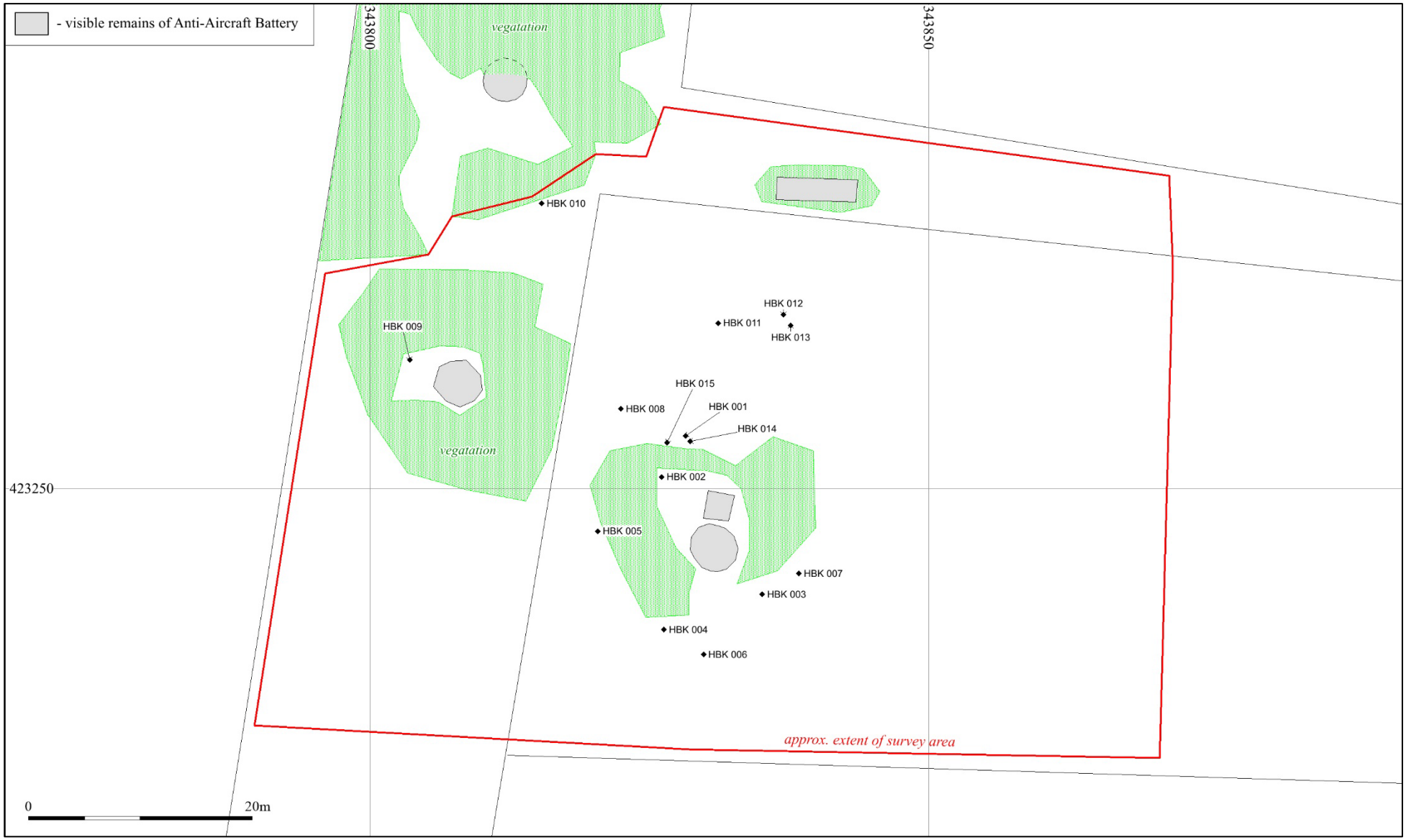

Figure 7. Hesketh Bank - Metal detector findspots

Appendix 1. Banks Marsh Metadata sheets

Banks Marsh Metadata

Source Grids: 3
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\03.xgd

Banks Marsh Raw Mag Data

Filename	BM1 Raw.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Direction of 1st Traverse	90 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	160 x 60
Survey Size (meters)	20 m x 60 m
Grid Size	20 m x 20 m
X Interval	0.125 m
Y Interval	1 m
Stats	
Max	77.36
Min	-80.39
Std Dev	6.10
Mean	-0.70
Median	-0.38
Composite Area	0.12 ha
Surveyed Area	0.12 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Raw Data Schedule

Processes: 1
1 Display Clip -6 +6

Banks Marsh Processed Mag Data

Filename	BM1 Pro.xcp
Description	
Instrument Type	Grad 601 (Gradiometer)
Units	nT
Direction of 1st Traverse	90 deg
Collection Method	ZigZag
Sensors	2 @ 1.00 m spacing.
Dummy Value	2047.5
Dimensions	
Composite Size (readings)	160 x 60
Survey Size (meters)	20 m x 60 m
Grid Size	20 m x 20 m
X Interval	0.125 m
Y Interval	1 m
Stats	
Max	78.36
Min	-79.70
Std Dev	6.09
Mean	-0.25
Median	0.00
Composite Area	0.12 ha
Surveyed Area	0.12 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Processed Data Schedule

Processes: 5
1 DeStripe Median Sensors: Grids: 01.xgd
2 DeStripe Median Sensors: Grids: 02.xgd
3 DeStripe Median Sensors: Grids: 03.xgd
4 Display Clip -6 +6
5 Graduated Shade

Appendix 2. Metal detector finds from Hesketh Bank

List

Find Spot No.	**Description**	**NGR**
HBK 001	.380 bullets (*c.*13)	343828, 423255
HBK 002	Mushroomed .380 bullet	343826, 423251
HBK 003	Aluminium cap	343835, 423241
HBK 004	Fragment of broken cast iron (?drain pipe)	343826, 423237
HBK 005	Fragment of broken cast iron (?drain pipe)	343820, 423246
HBK 006	Fragment of broken cast iron (?drain pipe)	343830, 423235
HBK 007	Fragment of broken cast iron (?drain pipe)	343838, 423242
HBK 008	Fuze safety cover no. 199 (from a 3.7inch shell)	343822, 423257
HBK 009	Fragment of broken cast iron (?drain pipe)	343804, 423262
HBK 010	Fragment of broken cast iron (?drain pipe)	343815, 423276
HBK 011	2x Pennies (both 1918)	343831, 423265
HBK 012	Bullet ?.455	343837, 423266
HBK 013	.303 cartridge	343838, 423265
HBK 014	Mushroomed .380 bullet	343829, 423254
HBK 015	Pig tail fragment	343827, 423254

Appendix 3. OASIS form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: suffolka1-324547

Project details

Project name	Banks Marsh, Ribble Estuary and Hesketh Bank, Lancashire; Geophysical survey and metal detector survey
Short description of the project	On the 3rd and 4th July 2017, Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed magnetometer and metal detector survey at Banks Marsh, in the Ribble Estuary, Lancashire and a metal detector survey at Hesketh Bank, Lancashire. The aim of the geophysical survey was to aid in the recovery of the remains of a downed JU88 in the Ribble Estuary and to locate and record artefacts relating to the anti-aircraft battery at Hesketh Bank. The fluxgate gradiometer survey was deployed to the west of a magnetometer survey undertaken in April 2016, that recorded a range of very high magnetic readings thought to locate the remains of the downed JU88. A single very large bipolar magnetic response was prospected during the current survey indicating that the remains of the aircraft were also likely to continue further west. At the second site Hesketh Bank, approximately 5km to the east of Banks Marsh, a few finds relating to the WW2 anti-aircraft battery were recorded and recovered close to the extant concrete gun platforms during the metal detector survey.
Project dates	Start: 03-07-2017 End: 04-07-2017
Previous/future work	Not known / Not known
Type of project	Research project
Site status	National Nature Reserve
Current Land use	Coastland 4 - Saltmarsh
Monument type	WW2 AIRCRAFT CRASH SITE Modern
Significant Finds	JUNKERS 88 Modern
Significant Finds	.303 CARTIDGES Modern
Significant Finds	PIGTAIL FRAGMENT Modern
Significant Finds	.380 BULLET Modern
Significant Finds	.455 BULLET Modern
Significant Finds	NO. 199 FUZE SAFETY COVER Modern
Investigation type	""Geophysical Survey""
Prompt	Research
Solid geology	TRIASSIC MUDSTONES
Drift geology	Unknown
Techniques	Magnetometry

Project location

Country	England
Site location	LANCASHIRE WEST LANCASHIRE HESKETH WITH BECCONSALL Banks Marsh,

	Ribble Estuary and Hesketh Bank, Lancashire
Study area	0.12 Hectares
Site coordinates	SD 3835 2345 53.703609692647 -2.933991292581 53 42 12 N 002 56 02 W Point
Site coordinates	SD 4380 2330 53.7028769441 -2.851407632991 53 42 10 N 002 51 05 W Point
Height OD / Depth	Min: 3m Max: 10m

Project creators

Name of Organisation	Suffolk Archaeology CIC
Project brief originator	Not applicable - not under planning jurisdiction
Project design originator	Not applicable - not under planning jurisdiction
Project director/manager	Stephen Taylor
Project director/manager	Rhodri Gardner
Project supervisor	Steven Taylor
Project supervisor	Timothy Schofield
Project supervisor	Mark Sommers
Type of sponsor/funding body	Client
Name of sponsor/funding body	Emporium Productions

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Lancashire SMR
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey"
Paper Archive recipient	Lancashire SMR
Paper Contents	"Survey"
Paper Media available	"Unpublished Text"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	'World War 2 Treasure Hunters' TV Series Banks Marsh, Ribble Estuary and Hesketh Bank Lancashire
Author(s)/Editor(s)	Schofield, T. P.
Author(s)/Editor(s)	Sommers, M.
Author(s)/Editor(s)	Taylor, S.
Other bibliographic	2017/121

details	
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Issuer or publisher	Suffolk Archaeology CIC
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