SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Proposed Reservoir

Back Lane
Snape Watering, Suffolk

Client:
Langmead Farms

Date:
March 2018

SNP 115
Geophysical Survey Report
SACIC Report No. 2018/020
Author: Timothy Schofield HND BSc MCIfA

Proposed Reservoir, Back Lane Snape Watering, Suffolk SNP 115

Geophysical Survey Report

SACIC Report No. 2018/20

Author: Timothy Schofield

Illustrator: Timothy Schofield

Editor: Rhodri Gardner

Report Date: March 2018

HER Information

Site Code:	**SNP 115**
Site Name:	**Proposed Reservoir, Back Lane, Snape Watering, Suffolk**
Report Number	**2018/20**
Planning Application No:	**DC/16/4527**
Date of Fieldwork:	**29th – 30th January 2018**
Grid Reference:	**TM 3930 5980**
Oasis Reference:	**307154**
Curatorial Officer:	**Rachael Abraham**
Project Officer:	**Timothy Schofield**
Client/Funding Body:	**Langmead Farms**

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

Prepared By: Timothy Schofield
Date: March 2018

Approved By: Rhodri Gardner
Position: Director
Date: March 2018
Signed: 

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Summary

In January 2018 Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed fluxgate gradiometer survey on land reserved for an agricultural reservoir to the south of Back Lane, Snape Watering, Suffolk. A total area of 2.52ha was prospected for anomalies of an archaeological derivation within the cut line of the proposed reservoir.

The detailed fluxgate gradiometer survey recorded a narrow range of geophysical anomalies, indicative of a relic field boundary, archaeological pits, geological anomalies and agricultural furrows. The results of the non-intrusive survey reveal a low potential for magnetic anomalies of an archaeological origin.

1. Introduction

The proposed reservoir and bunds will occupy a total area of *c.* 4.94ha, however topsoil stripping and subsequent excavation will only be undertaken in the central reservoir area with bunds built up from the existing ground level. Suffolk Archaeology CIC were contracted to carry out the geophysical survey within the central cut line that was a total of 2.52 hectares of the single arable field to the south of Back Lane, Snape Watering, Suffolk (Fig. 1).

Suffolk Archaeology CIC were commissioned to undertake the project by Andrew Hawes in January 2018, prior to determination of the planning application (no. DC/16/4527), in accordance with paragraph 128, 129 and 141 of the National Planning Policy Framework.

Figure 1. Site location (red)

2. Geology and topography

The site is located *c*. 1.7km to the north of the settlement of Snape, in the centre of a single arable field (TM 3930 5980) to the south of Back Lane (Fig.1). Two wooden overhead electric poles are extant in the western quarter of the field that slopes gently from 20m Above Ordnance Datum in the northeast to 19m in the southwest.

The bedrock geology consists of Chillesford Church sand, formed 2 million years ago in the Quaternary Periods when the local environment was dominated by shallow seas (BGS, 2018). Overlain by superficial deposits of Lowestoft Formation Diamicton, formed up to 2 million years ago in the Quaternary Period in glacigenic conditions (BGS, 2018).

3. Archaeology and historical background

The geophysical survey was required by Rachael Abraham of SCCAS/CT in order to inform the archaeological evaluation brief for the proposed agricultural reservoir. A background search of the Suffolk Historic Environment Record has been undertaken and is summarised as follows. Recorded 450m to the southwest is a Neolithic leaf shaped arrowhead (SNP 002). A Bronze Age barrow inhumation and cremation cemetery that further contains Saxon burial remains, is located 925m to the southeast (SNP 007). Roman and Anglo-Saxon pottery sherds and a Roman coin have been recovered from a scatter found during ploughing, 675m to the southeast (SNP 024). An early medieval pit containing pottery sherds (SNP 018) is recorded 650m to the southeast. A medieval pottery scatter (SNP 031) is recorded 800m to the southeast. A 10m length of medieval wall, a kiln, brick and pottery (SNP 019) were recorded on the side of the road opposite Snape House water mains, 350m to the southwest. Medieval ditches, pits, postholes, hearths and an oven (SNP 014) were recorded 800m to the southeast. Located 575m to the southeast is a barrow of unknown date (SNP 008).

An examination of the Ordnance Survey (OS) maps held by SACIC, dating from 1887 to 1990, reveal that a hedgerow formerly ran on a northwest to southeast alignment, up to the northern field boundary from the dog-leg in the southwestern corner. The RAF air photographs also show this boundary was in existence at the same time that the plantation was extant in the eastern half of the field, this plantation is further recorded on the 1957-58 OS map. It is thought that this field subdivision was removed some time

after the 1990 OS map was published and the plantation is no longer illustrated on the 1971 OS map.

4. Methodology

Instrument type

A Bartington DualGRAD 601-2 fluxgate gradiometer was employed to undertake the detailed geophysical survey; the weather, ground and geological soil conditions were found to be suitable.

Instrument calibration and settings

One hour was allocated to allow the instruments' sensors to reach optimum operating temperature before the survey commenced each day. The weather was wet and overcast, ground conditions were challenging with extremely soft underfoot conditions. Instrument sampling intervals were set to 0.25m along 1m traverses (four readings per metre).

Survey grid layout

The detailed survey was undertaken within 20m grids (Fig. 2, blue grid), orientated northeast to southwest and geolocated employing a Leica Viva GS14 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

The site had a moderately low magnetic background signature that allowed the anomalies to contrast well with the local magnetic field. Good quality raw survey data

was collected and minimal data processing was required. Datasets were composited and processed using DW Consulting's Terrasurveyor v.3.0.33.6; raw grid files, composites and raster graphic plots will be stored and archived in this format. Minimal processing algorithms were undertaken on the raw (Figs. 3 – 4) and processed datasets (Fig. 5); data 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 – 5) has been produced (Fig. 6).

Survey grid restoration

Three virtual survey grid stations were placed on survey grid nodes along the baselines of the survey grid, this will allow the geophysical anomalies to be retargeted during the subsequent evaluation trenching (Fig. 2).

5. Results and discussion

Very soft underfoot conditions were encountered during the survey, caused by the presence of the previous seasons potato furrows being ploughed flat, then harrowed and reseeded with the current crop, leaving a heavily aerated topsoil. Weak linear trends are recorded on Figure 4, that delineate the ridges of the potato crop, they are aligned parallel to the northern boundary of the field, running *c*. west-southwest to east-northeast across the entire dataset (but not recorded as anomalies on Figure 6).

Isolated dipolar responses (grey spots) are likely to be caused by magnetic, ferrous objects lost within the topsoil. It is possible that some may represent artefacts of a potential archaeological origin, although equally they could define modern magnetic rubbish introduced during manuring events.

A strong dipolar area of magnetic disturbance (grey hatching) has been recorded across the entire southern length of the dataset, thought to be caused by the presence of a ferrous service pipe located just beyond the southern extent of the survey area.

A positive linear trend (blue line) orientated north-northwest to south-southeast in the

western quarter of the dataset delineates the location of the extant overhead power cable and its two associated wooden poles recorded as blue dots along this line. The power cable is thought to have been originally sited in this location because it was once a field boundary, the boundary ditch is recorded as three discontinuous positive linear anomalies (red hatching) within the dataset.

Seven weak broad positive linear anomalies (green hatching) were prospected during the survey. Their broad and weak nature is usually indicative of natural magnetic changes within the geology, however, it is possible that they could be associated with quarry pit type anomalies backfilled with non-magnetic material, although no quarrying activity is recorded on the historic OS mapping. The smaller discrete variants may be more indicative of tree throw type anomalies, a plantation is recorded in the eastern side of the field on the 1957-58 OS map.

Ten discrete positive anomalies (orange hatching) were recorded across the dataset that are indicative of archaeological pits, however a natural or modern derivation cannot be completely ruled out.

Three positive linear anomalies (red hatching) all orientated north-northwest to south-southeast are indicative of a discontinuous relic field boundary ditch that is recorded on OS mapping until at least 1990. This field subdivision is likely to be associated with the extant overhead electric power cable (blue line).

6. Conclusion

The fluxgate gradiometer survey prospected a narrow range of geophysical anomalies, with a low to moderate archaeological potential. It would be prudent to target the full range of geophysical anomalies by trial trenching to assess the interpretations given within this report. Areas devoid of anomalies should be further investigated for features of an archaeological derivation that could remain undetected below the ploughsoil.

7. Archive deposition

The paper and digital archive will be kept at the SACIC office in Needham Market, before deposition in the Suffolk County Council Stores in Bury St Edmunds.

8. Acknowledgements

The fieldwork was carried out by Cameron Bate and Tim Schofield, and directed by Tim Schofield. Project management was undertaken by Rhodri Gardner. The report illustrations were created by Tim Schofield and the report was edited by Rhodri Gardner.

9. Bibliography

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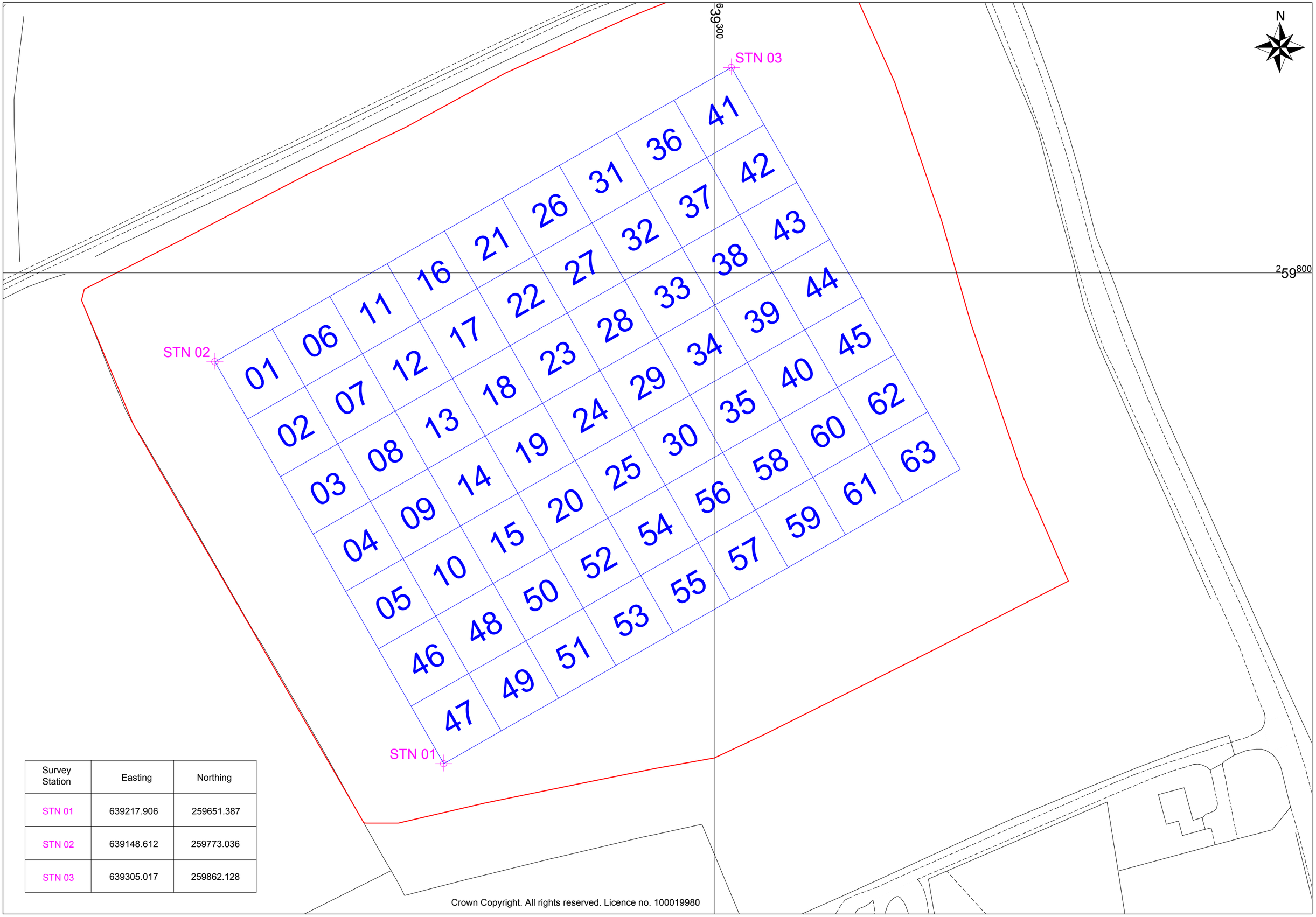

Survey Station	Easting	Northing
STN 01	639217.906	259651.387
STN 02	639148.612	259773.036
STN 03	639305.017	259862.128

Figure 2. Survey grid and georeferencing information

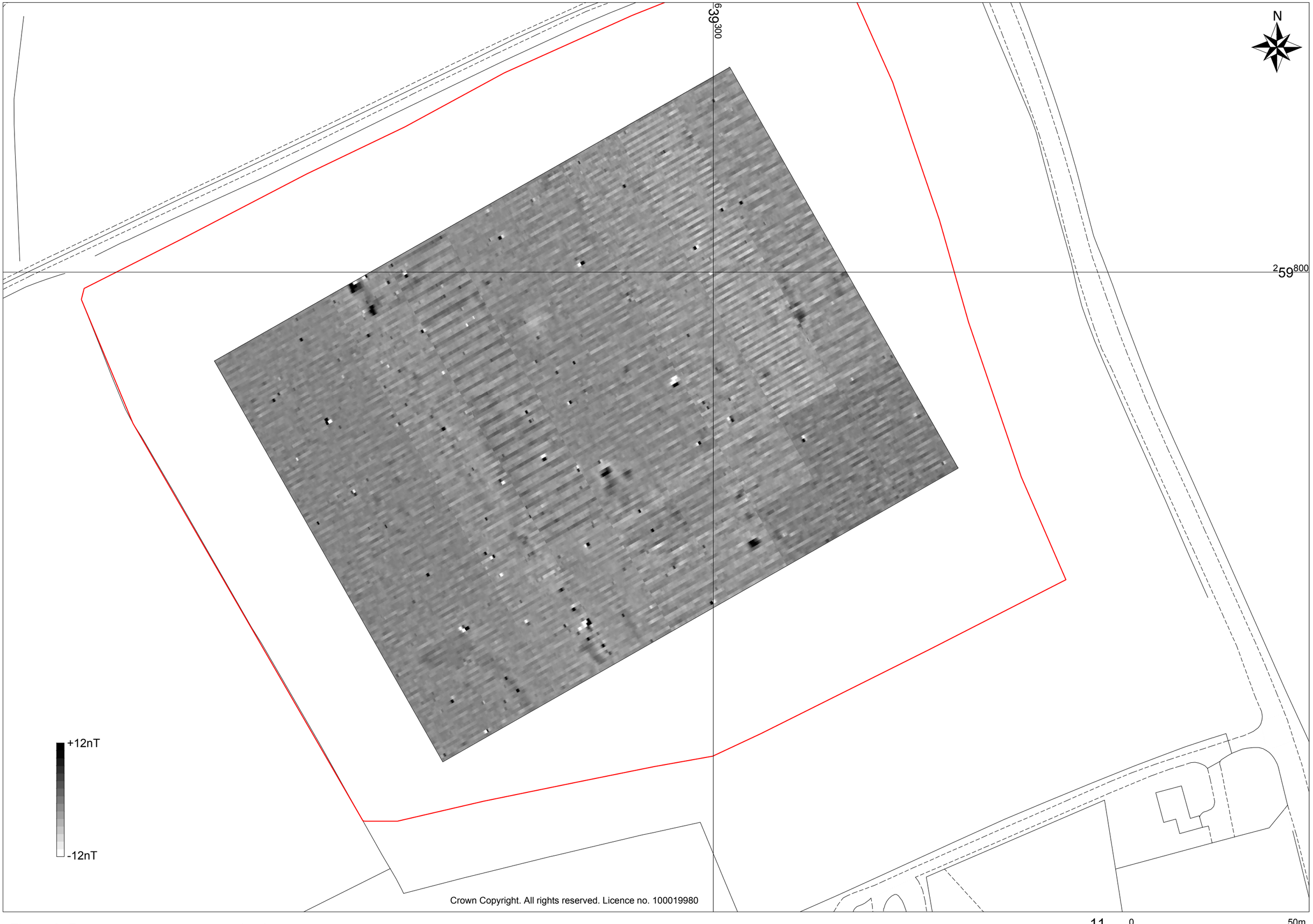

Figure 3. Raw magnetometer greyscale plot

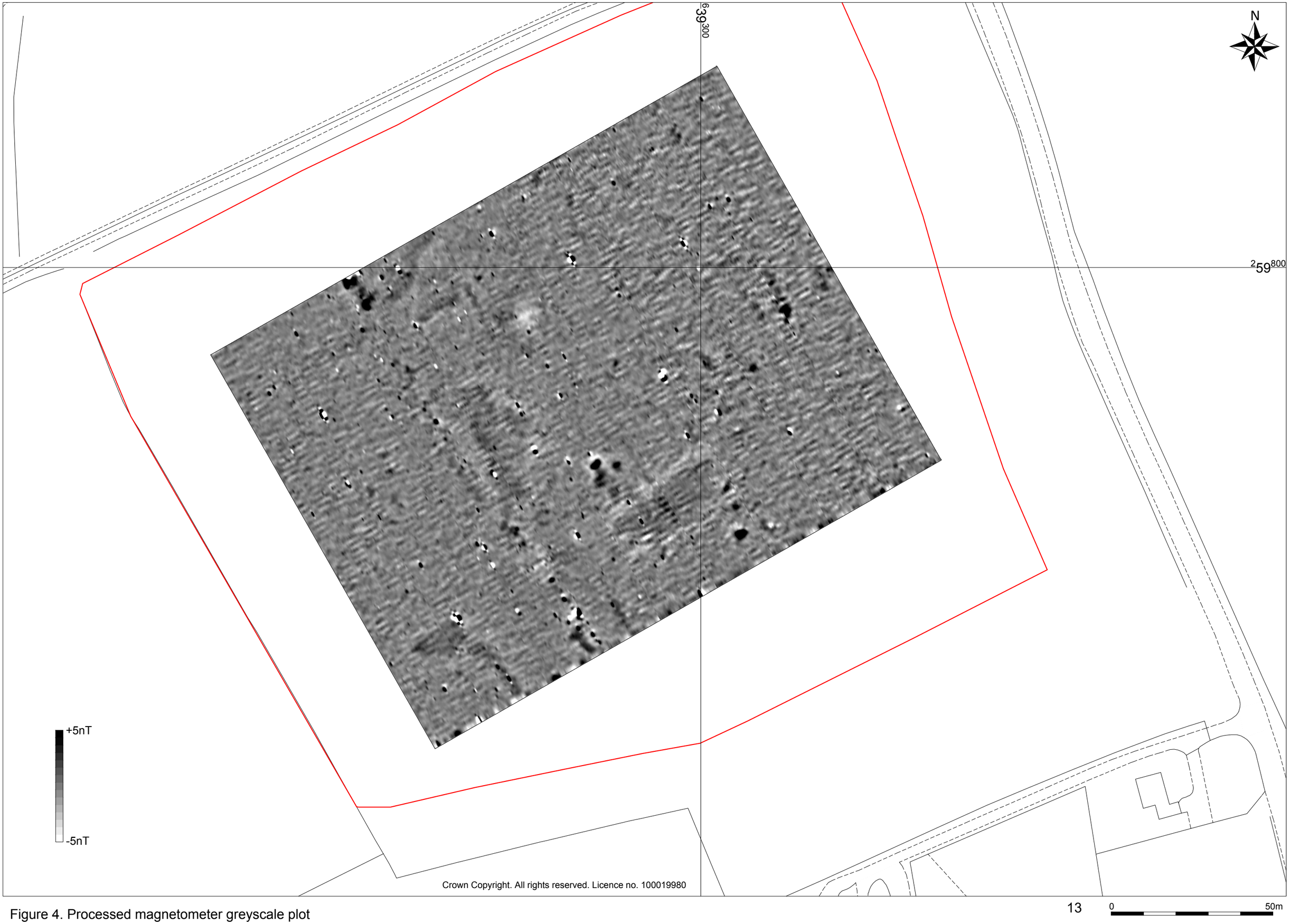

Figure 4. Processed magnetometer greyscale plot

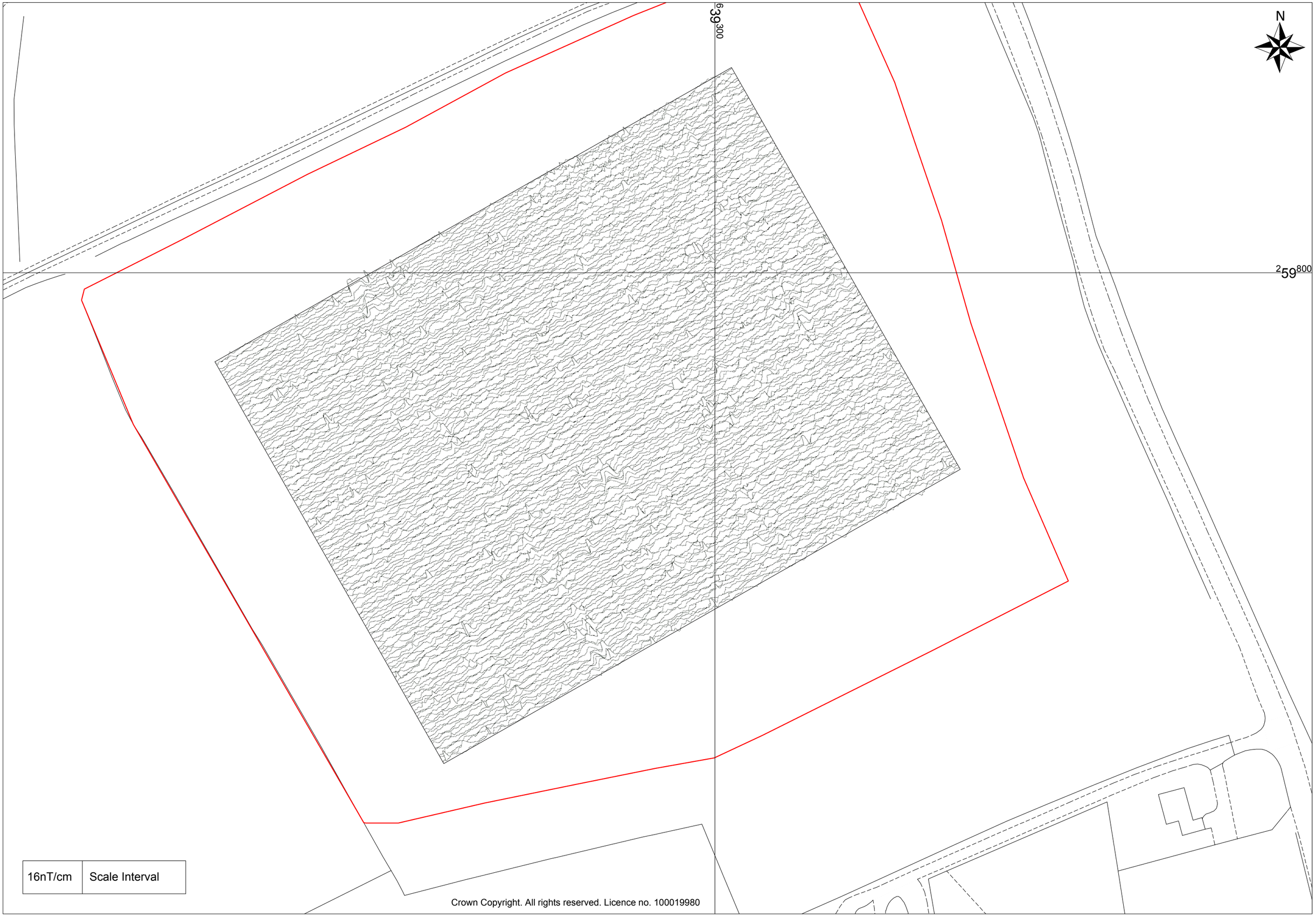

Figure 5. Processed magnetometer xy trace plot

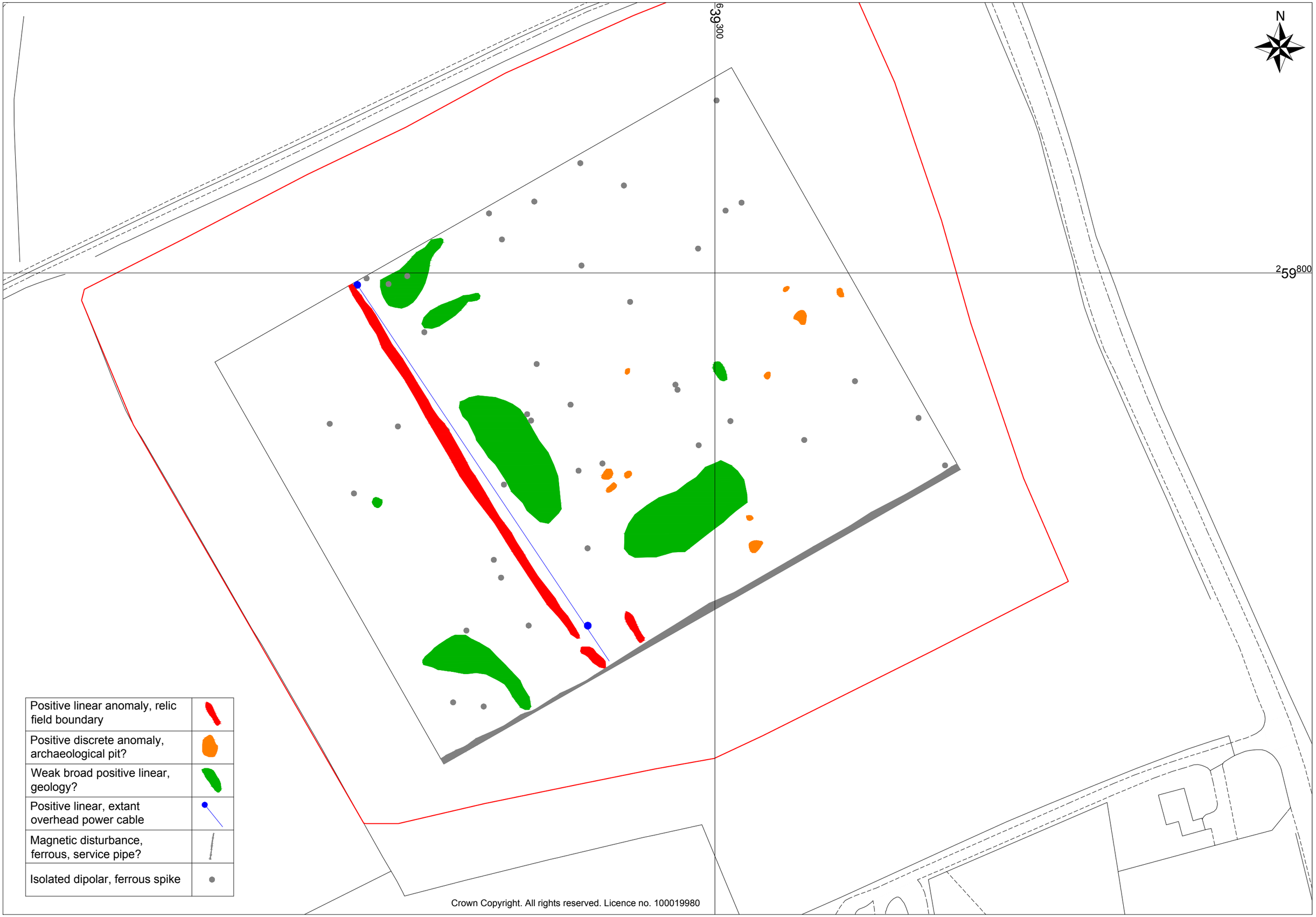

Figure 6. Interpretation plot of magnetometer anomalies

Appendix 1. Metadata sheets

Survey Grids

Source Grids: 63	
1	Col:0 Row:0 grids\01.xgd
2	Col:0 Row:1 grids\02.xgd
3	Col:0 Row:2 grids\03.xgd
4	Col:0 Row:3 grids\04.xgd
5	Col:0 Row:4 grids\05.xgd
6	Col:0 Row:5 grids\46.xgd
7	Col:0 Row:6 grids\47.xgd
8	Col:1 Row:0 grids\06.xgd
9	Col:1 Row:1 grids\07.xgd
10	Col:1 Row:2 grids\08.xgd
11	Col:1 Row:3 grids\09.xgd
12	Col:1 Row:4 grids\10.xgd
13	Col:1 Row:5 grids\48.xgd
14	Col:1 Row:6 grids\49.xgd
15	Col:2 Row:0 grids\11.xgd
16	Col:2 Row:1 grids\12.xgd
17	Col:2 Row:2 grids\13.xgd
18	Col:2 Row:3 grids\14.xgd
19	Col:2 Row:4 grids\15.xgd
20	Col:2 Row:5 grids\50.xgd
21	Col:2 Row:6 grids\51.xgd
22	Col:3 Row:0 grids\16.xgd
23	Col:3 Row:1 grids\17.xgd
24	Col:3 Row:2 grids\18.xgd
25	Col:3 Row:3 grids\19.xgd
26	Col:3 Row:4 grids\20.xgd
27	Col:3 Row:5 grids\52.xgd
28	Col:3 Row:6 grids\53.xgd
29	Col:4 Row:0 grids\21.xgd
30	Col:4 Row:1 grids\22.xgd
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32	Col:4 Row:3 grids\24.xgd
33	Col:4 Row:4 grids\25.xgd
34	Col:4 Row:5 grids\54.xgd
35	Col:4 Row:6 grids\55.xgd
36	Col:5 Row:0 grids\26.xgd
37	Col:5 Row:1 grids\27.xgd
38	Col:5 Row:2 grids\28.xgd
39	Col:5 Row:3 grids\29.xgd
40	Col:5 Row:4 grids\30.xgd
41	Col:5 Row:5 grids\56.xgd
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47	Col:6 Row:4 grids\35.xgd
48	Col:6 Row:5 grids\58.xgd
49	Col:6 Row:6 grids\59.xgd
50	Col:7 Row:0 grids\36.xgd
51	Col:7 Row:1 grids\37.xgd
52	Col:7 Row:2 grids\38.xgd
53	Col:7 Row:3 grids\39.xgd
54	Col:7 Row:4 grids\40.xgd
55	Col:7 Row:5 grids\60.xgd
56	Col:7 Row:6 grids\61.xgd
57	Col:8 Row:0 grids\41.xgd
58	Col:8 Row:1 grids\42.xgd
59	Col:8 Row:2 grids\43.xgd
60	Col:8 Row:3 grids\44.xgd
61	Col:8 Row:4 grids\45.xgd
62	Col:8 Row:5 grids\62.xgd
63	Col:8 Row:6 grids\63.xgd

Raw Data

Filename	Snape 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)	720 x 140
Survey Size (meters)	180 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	100.00
Min	-100.00
Std Dev	2.34
Mean	-1.45
Median	-1.34
Composite Area	2.52 ha
Surveyed Area	2.52 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Raw Data Schedule

Processes:
1 Display Clip -12 +12

Processed Data

Filename	Snape 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)	720 x 140
Survey Size (meters)	180 m x 140 m
Grid Size	20 m x 20 m
X Interval	0.25 m
Y Interval	1 m
Stats	
Max	101.29
Min	-99.53
Std Dev	2.02
Mean	0.01
Median	0.00
Composite Area	2.52 ha
Surveyed Area	2.52 ha
Program	
Name	TerraSurveyor
Version	3.0.33.6

Processed Data Schedule

Processes:
1 DeStripe Median Sensors: All
2 Display Clip -5 +5
3 Graduated Shade

Appendix 2. Technical data

Detailed magnetometer survey

Detailed magnetometer survey is the most commonly employed archaeological geophysical prospection method in Britain; sensitive sensors can cost-effectively cover large areas of ground, rapidly recording anomalies that are indicative of cultural settlement activity. These anomalies can then be further investigated by field archaeologists to quantify a form and function. The magnetometer is a passive instrument that detects both permanent thermoremanent and temporary magnetic responses.

Thermoremanent Magnetism

When a material containing iron oxides, for example clay, is heated above the Curie point, weakly magnetic compounds transform in to highly magnetic oxides that can be detected by the sensors of a magnetometer (Clark, 1996). For instance, the iron oxide haematite has a Curie temperature of 675 Celsius and magnetite 565 Celsius. Once these temperatures are reached, the oxides become demagnetised, on cooling their magnetic properties become permanently re-magnetised and align in the direction of the Earth's magnetic field (Gaffney and Gater, 2003). Over time the direction of the Earth's magnetic field changes allowing these directional differences to be detected by the magnetometer.

Strongly heated features such as hearths, kilns or furnaces frequently reach the Curie temperature and become permanently magnetised. These permanent magnetic responses are some of the strongest cultural features that can be recorded.

Temporary Magnetism

Magnetic susceptibility is the ease with which a magnetic field can pass through a material, therefore the higher the material's magnetic susceptibility, the stronger the induced magnetic field will be. Temporary magnetisation occurs within material that is magnetically susceptible, this material acquires its own local magnetic field that combines with the Earth's magnetic field causing an anomaly to stand out from the background noise (Clark, 1996). These anomalies are subtler in nature, being derived from material that has been magnetically enhanced by cultural activity which has become concentrated into features over time. Anomalies that have temporary

magnetisation include backfilled pits, ditches, field systems, occupation areas, land drains, remnant and existing field boundaries (David *et al*, 2014).

The key to a successful survey is having good contrast between the magnetic susceptibility of an archaeological feature with the surrounding superficial deposits. If there is no discernible difference between the two mediums it may be unlikely that the magnetometer will successfully prospect the feature. Archaeological features can also be masked by high magnetically susceptible topsoil, or deep overlying subsoil and colluvial deposits.

Ferrous anomalies

Ferrous objects are a common source of permanent magnetism, usually isolated with a strong dipolar signature. Some of these responses may have an archaeological derivation, however they are probably more indicative of modern iron objects introduced through manuring or lost within the topsoil.

Bartington DualGRAD 601-2 Fluxgate Gradiometers

Fluxgate gradiometers are the most commonly employed class of instrument in the UK. Two 1m sensitive sensors are affixed to a frame mounted 1m apart in a vertical plane and harnessed to the trunk of a geophysical surveyor or attached to a cart. Each sensor contains two fluxgate magnetometers with a 1m vertical separation. The sensor above records the Earth's magnetic field (magnetic background) while the sensor below records the local magnetic field. The two sensors need aligning before recording can begin and a zero station is located in an area with low magnetic variation for this purpose. After the sensors have been aligned, the survey can begin. When differences in the magnetic field strength occur between the two vertical magnetometers within each sensor, a positive or negative reading is recorded that is relative to the magnetic background of the zero station. Positive anomalies include pits, ditches and agricultural furrows. Negative anomalies commonly prospected include earthwork embankments, land drains and geological features.

Sensors are normally mounted to a height of 0.30m above the surface, and can detect to a depth of between one and two metres below the ground. The first survey traverse is commonly undertaken in an east to west direction.

Magnetic Anomalies

Isolated dipolar responses

Isolated dipolar responses are commonly recorded throughout a dataset and are usually indicative of modern ferrous material deposited within the topsoil horizon. In some instances, the anomalies may be of an archaeological derivation. They are isolated, strong and dipolar in character.

Areas of magnetic disturbance

These anomalies are usually caused by building demolition rubble, ferrous boundaries, slag waste dumps, modern buried rubbish, pylons and services. Strong and dipolar in character, they are commonly recorded over a wide area.

Linear trends

Linear trends can be either positive or negative magnetic responses depending on the nature of the material present within the feature. If the anomaly is broad and weak, it is more likely to be of geological origin. Stronger positive linear trends are more likely to be of archaeological derivation, caused by settlement activity washing rich humic, charcoal and fired deposits into a feature. Negative linear trends are more commonly associated with bank deposits or land drains, with the less magnetically susceptible superficial deposits deposited at the top of the feature. Curvilinear trends are usually of archaeological origin, commonly interpreted as ring ditches or drip-gullies.

Discrete anomalies

Discrete anomalies can either be positive or negative in nature recorded within a localised area. Those that are positive are more likely to be of an archaeological origin, with negative discrete anomalies more commonly interpreted as natural geological variations.

Thermoremanent responses

These responses are caused by the heating of material containing iron to above the Curie temperature, they are strong and discrete in nature. In Britain high positive readings are recorded to the south of the anomaly with high negative readings recorded to the north.

Appendix 3. OASIS form

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: suffolka1-307154

Project details

Project name	Proposed Reservoir, Back Lane, Snape, Suffolk, Geophysical Survey
Short description of the project	In January 2018 Suffolk Archaeology Community Interest Company (SACIC) undertook a detailed fluxgate gradiometer survey on land reserved for an agricultural reservoir to the south of Back Lane, Snape Watering, Suffolk. A total area of 2.52ha was prospected for anomalies of an archaeological derivation within the cut line of the proposed reservoir. The detailed fluxgate gradiometer survey recorded a narrow range of geophysical anomalies, indicative of a relic field boundary, archaeological pits, geological anomalies and agricultural furrows. The results of the non-intrusive survey reveal a low potential for magnetic anomalies of an archaeological origin.
Project dates	Start: 29-01-2018 End: 30-01-2018
Previous/future work	No / Yes
Any associated project reference codes	SNP 115 - Sitecode
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 3 - Operations to a depth more than 0.25m
Monument type	RELIC FIELD BOUNDARY DITCH TYPE ANOMALY Uncertain
Monument type	ARCHAEOLOGICAL PIT TYPE ANOMALIES Uncertain
Monument type	NATURAL GEOLOGICAL TYPE ANOMALIES Uncertain
Monument type	QUARRY PIT TYPE ANOMALIES Uncertain
Significant Finds	NONE None
Methods & techniques	'"Geophysical Survey"'
Development type	Agricultural Reservoir
Prompt	National Planning Policy Framework - NPPF
Position in the planning process	Pre-application
Solid geology (other)	Chillesford Church Sand
Drift geology (other)	Lowestoft Formation Diamicton
Techniques	Magnetometry

Project location

Country	England

Site location	SUFFOLK SUFFOLK COASTAL SNAPE Back Lane, Snape, Suffolk
Study area	2.52 Hectares
Site coordinates	TM 3930 5980 52.183852862768 1.501020928895 52 11 01 N 001 30 03 E Point
Height OD / Depth	Min: 19m Max: 20m

Project creators

Name of Organisation	Suffolk Archaeology CIC
Project brief originator	Local Authority Archaeologist and/or Planning Authority/advisory body
Project design originator	Rachael Abraham
Project director/manager	Rhodri Gardner
Project supervisor	Tim Schofield
Type of sponsor/funding body	Landowner
Name of sponsor/funding body	Andrew Hawes

Project archives

Physical Archive Exists?	No
Digital Archive recipient	Suffolk HER
Digital Contents	"Survey"
Digital Media available	"Geophysics","Survey","Text"
Paper Archive recipient	Suffolk HER
Paper Contents	"Survey"
Paper Media available	"Report","Survey ","Unpublished Text"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Proposed Reservoir, Back Lane, Snape Watering, Suffolk, Geophysical Survey Report
Author(s)/Editor(s)	Schofield, T. P.
Other bibliographic details	R2018/020
Date	2018
Issuer or publisher	Suffolk Archaeology CIC
Place of issue or publication	Needham Market
Description	A4 Bound report with A3 fold-out Figures
URL	www.suffolkarchaeology.co.uk

Entered by	Tim Schofield (tim.schofield@suffolkarchaeology.co.uk)
Entered on	8 March 2018

OASIS:

Appendix 4. Written scheme of investigation

SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Proposed Reservoir, Back Lane

Snape, Suffolk

Client:
Andrew Hawes

Date:
January 2018

SNP 115
Written Scheme of Investigation and Risk Assessment – Geophysical Survey
Author: Tim Schofied HND BSc MCIfA

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Project details

Planning Application No:	TBC
Curatorial Officer:	TBC (SCCAS/CT)
Grid Reference:	TM 3930 5980
Area:	*c*. 2.52ha
HER Event No/Site Code:	SNP 115
OASIS Reference:	307154
Project Start date:	29th January 2018
Project Fieldwork Duration:	*c*. 2 days
Client/Funding Body:	Andrew Hawes
SACIC Project Manager:	Tim Schofield
SACIC Project Officer:	Tim Schofield
SACIC Job Code:	TBC

1. Introduction

- A program of geophysical survey is required on the site of a proposed farm reservoir, off Back Lane, Snape, Suffolk (Fig. 1), prior to determination of the planning application, in accordance with paragraph 128, 129 and 141 of the National Planning Policy Framework.
- The work is required by the archaeological adviser to the Local Planning Authority (LPA), of Suffolk County Council Archaeological Service/Conservation Team (SCCAS/CT).
- The proposed reservoir, including bunds, occupies an area of *c.* 4.94ha, however Suffolk Archaeology Community Interest Company (SACIC) has been informed that the development will only involve topsoil stripping and subsequent excavation within the central reservoir area, with the bunds simply being built up from existing ground level.
- Suffolk Archaeology have been contracted to carry out a *c.*2.52ha survey of the central area that will be subjected to ground disturbance by the development. This Written Scheme of Investigation (WSI) details how the survey will meet the requirements as laid out in the SCCAS/CT geophysical survey guidelines (SCCAS/CT 2017), and has been submitted to SCCAS/CT for approval on behalf of the LPA. It provides the basis for measurable standards and will be adhered to in full, unless otherwise agreed with SCCAS/CT.
- It should be noted that the geophysical survey is only a first stage in a potential program of works. This WSI covers the geophysical survey only. Any further stages of archaeological work that are required in relation to the proposed development after the survey will be specified by SCCAS/CT, and will require new documentation (Brief and WSI) and estimate of costs. Such works could have considerable time and cost implications for the development and the client is advised to consult with SCCAS/CT as to their obligations following receipt of the geophysical survey report.

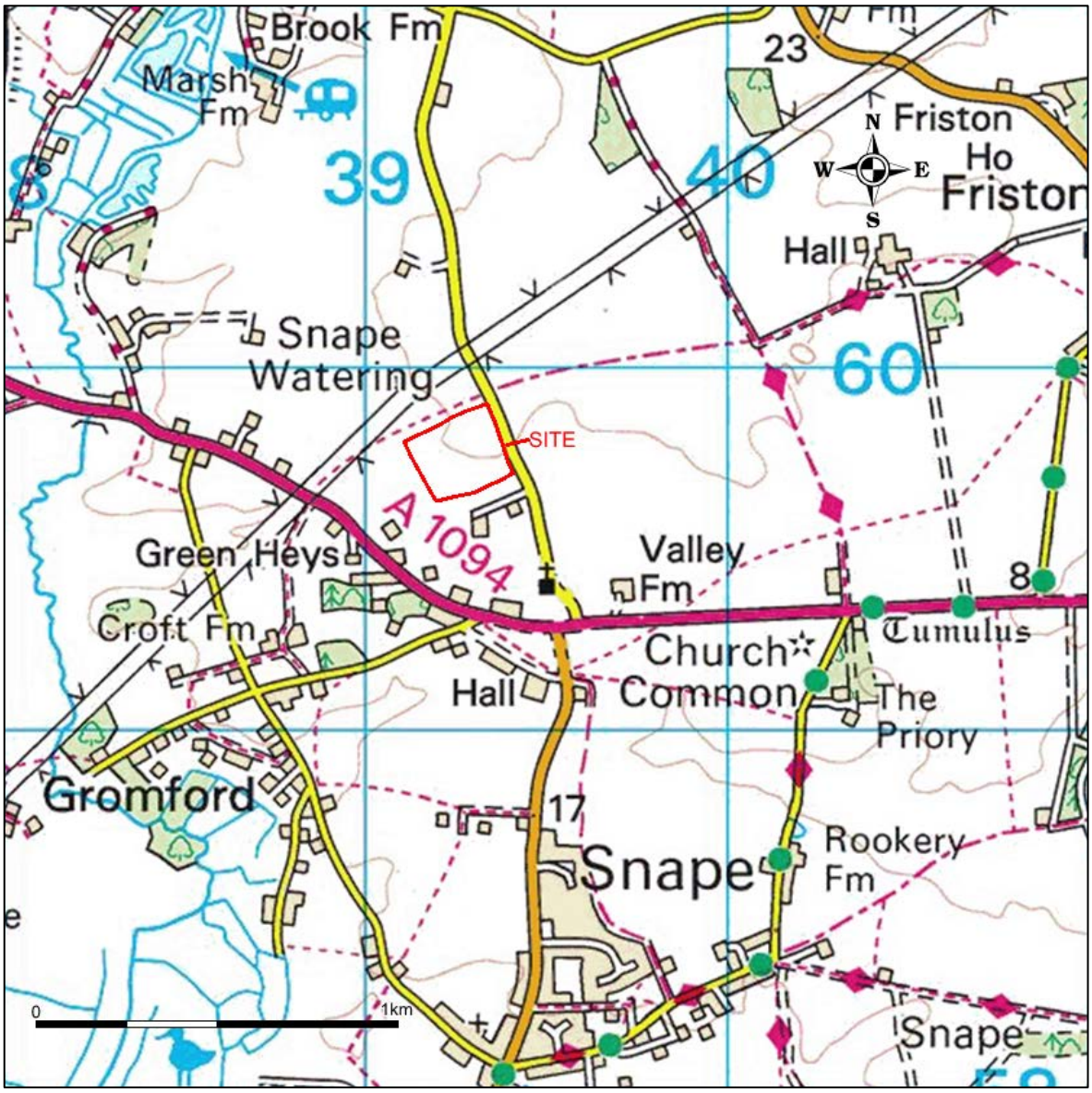

Figure 1. Location map

2. The Site

- The site lies within an arable landscape, located *c.* 1.7km to the north of the settlement of Snape, in the centre of a single arable field at TM 3930 5980, to the west of the unnamed road and Sloe Lane junction (Fig.1). Two wooden service line poles are extant to the west of the field.
- The site gently slopes from 20m Above Ordnance Datum in the northeast to 19m in the southwest.
- The bedrock geology consists of Chillesford Church sand, formed 2 million years ago in the Quaternary Periods when the local environment was dominated by shallow seas (BGS 2018). This is overlain by superficial deposits of Lowestoft Formation Diamicton, formed up to 2 million years ago in the Quaternary Period in glacigenic conditions, detrital in nature (BGS 2018).

3. Archaeological and Historical Background

- The geophysical survey is required by SCCAS/CT in order to inform the archaeological evaluation brief for the proposed agricultural reservoir.
- The site is set within a single agricultural field. A Neolithic leaf shaped arrowhead is recorded (SNP 002), 450m to the southwest. A Bronze Age barrow inhumation cremation cemetery, also containing Saxon burial remains are located 925m to the southeast (SNP 007). Roman and Anglo-Saxon pottery sherds and a Roman coin have been recovered from a scatter after ploughing, 675m to the southeast (SNP 024). An early medieval pit containing pottery sherds is recorded 650m to the southeast (SNP 018). A medieval pot scatter (SNP 031) is recorded 800m to the southeast. A 10m length of medieval wall, a kiln and brick and pottery were recorded on the side of the Road opposite Snape House water mains (SNP 019), 350m to the southwest. Medieval ditches, pits, postholes, hearths and an oven (SNP 014) are recorded 800m to the southeast. A barrow of unknown date is recorded (SNP 008) 575m to the southeast.
- A full search of the Suffolk Historic Environment Record has been commissioned and will be used within the survey report.
- An initial examination of historic mapping held by SACIC has been made. The Ordnance Survey (OS) maps from 1887 to 1990 reveal that where the field dog-legs in its southwestern corner, a hedgerow formerly ran on a northwest to southeast alignment up to the northern field boundary. The RAF photographic record also shows this boundary to exist and a plantation on the eastern side of the field, this plantation is also recorded on the 1957-58 OS map. It is believed that the field subdivision was removed some time after the 1990 OS map was published, the plantation is no longer illustrated on the 1971 OS map.

4. Project Objectives

- A systematic fluxgate gradiometer survey is to be undertaken across all areas of the proposed reservoir site where groundworks will be carried out.

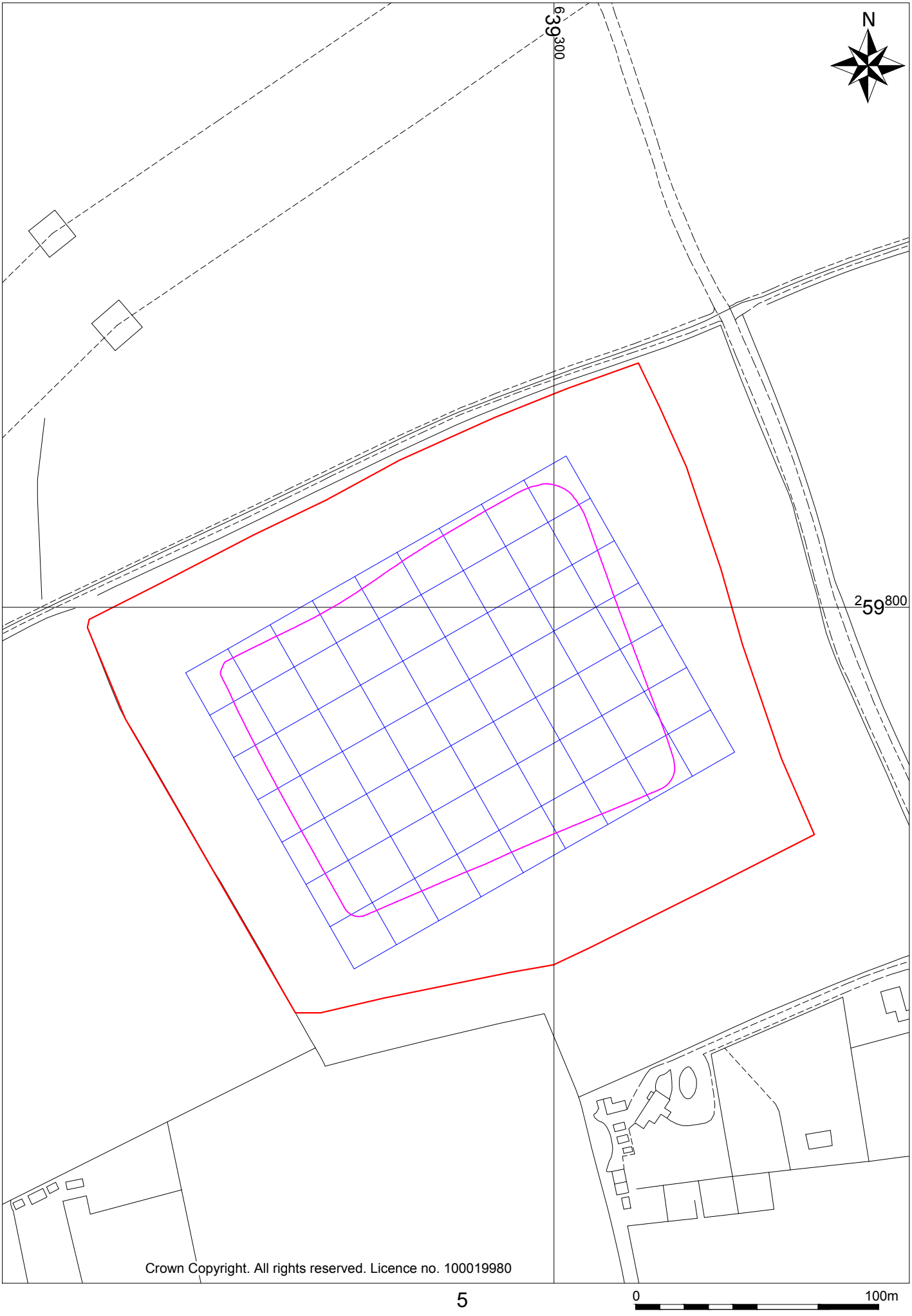

Figure 2. Proposed geophysical survey grid (dark blue), cut line (magenta)

5. Geophysical Survey Method Statement

5.1. Management

- The project will be managed by SACIC Project Officer Tim Schofield in accordance with the principles of *Management of Research Projects in the Historic Environment* (MoRPHE, Historic England 2015).
- SCCAS/CT will be given five days' notice of the commencement of the fieldwork and arrangements made for a SCCAS/CT site visit if required.
- Full details of project staff are given in section 6 below.

5.2. Project preparation

- An event number and site code have been obtained from the SCCAS/CT HER Officer and will be included on all future project documentation. An HER search has been requested.
- An OASIS online record has been initiated and key fields in details, location and creator forms have been completed.
- A Risk Assessment for the project has been completed.

5.3. Fieldwork

- Fieldwork standards will be guided by 'Standards for Field Archaeology in the East of England', EAA Occasional Papers 14, and the Chartered Institute for Archaeology's (CIfA) paper 'Standard and Guidance for archaeological geophysical survey', December 2014.
- The fieldwork will be carried out by members of SACIC led by Project Officer Tim Schofield. The fieldwork team will be drawn from a pool of suitable staff at SACIC.
- The project requires the survey of *c*. 2.52 hectares over the proposed development area (Fig. 2). The survey area is based on a cut plan provided by the client, minor modifications to the survey area may need to be made onsite to respect any areas of disturbance/contamination or other obstacles.

- The outline of the survey area ensures that a 5-10m exclusion zone can be maintained from surrounding field boundaries in order to minimise the amount of associated magnetic disturbance.

Instrument type and set-up

- The site will be surveyed using a Bartington Dual-Grad 601-2 which has high sensor sensitivity combined with rapid ground coverage. Good contrast between the magnetic susceptibility of a feature's fill (charcoal rich or humic deposits providing the best soil medium) and the local magnetic background signature of the superficial deposits will be important in achieving successful survey results.
- Best practice dictates that sensors will be secured on the same side of the instrument until the completion of the survey, and sensor heights equalised to achieve a consistent elevation across the area. The instrument will be switched on and left for at least 20 minutes before the survey of the first grid to allow the sensors to reach a suitable operating temperature.
- A zero station with low magnetic susceptibility shall be prospected within the field to allow the correction of diurnal sensor drift. This unique station will be employed throughout the survey providing a common calibration location.

Sampling interval and grid size

- The 20m survey grid will be set-out using a Leica Viva Glonass Smart Rover GS08+ to the Ordnance Survey OSGB36, converted to the National Grid Transformation OSTN15 datum that has an accuracy of +/- 0.03m. Regular testing of the instruments accuracy will be undertaken employing stations with known ETRS89 coordinates. All raw data recorded by the GPS will be uploaded to the project folder, suitably labelled and kept as part of the project archive.
- A 1m traverse interval and 0.25m sample interval will be utilised.

Data capture and archiving

- A pro-forma survey sheet will be completed each day; unique grid numbers will be

allocated to enable a data composite to be created. Instrument readings will be recorded on the internal data logger and downloaded to a laptop at midday and also in the evening, this will allow the data to be checked for quality on site and for grids to be re-surveyed if required.

- Data will be filed in project specific folders separated into daily datasets. The daily datasets will be combined into a single composite on completion of the fieldwork.
- Data will be stored in project specific folders that will be downloaded onto a laptop and then backed-up onto an external server in the evening of each day.
- Metadata sheets will be completed and inserted into the report as an appendix.
- All on-site derived site data will be entered onto a digital (Microsoft Access) SACIC database compatible with the Suffolk HER.

Data processing and presentation

- Raw survey data will be collected to a high standard to enable only minimal processing of the datasets to be required. Typically, these algorithms may comprise de-spike and zero mean sensor. The data will also be clipped at a suitable level to enable the anomalies to be presented with best clarity.
- Raw and processed greyscale plots and xy trace plots of the datasets shall be exported from Terrasurveyor into AutoCAD.
- An interpretation plan based on the combined interpretations of the raw, processed and xy trace plots will be produced using AutoCAD. All figures shall be georeferenced within the National Grid and printed at an appropriate scale.

Software

- The software used to process the data will be DW Consulting's Terrasurveyor v3.0.32.4. Images will be exported from Terrasurveyor into a geo-referenced grid within an AutoCAD drawing. Interpretation plans of the anomalies will then be digitised using AutoCAD.

5.4. Report

- The report will be commensurate with the results of the fieldwork and will be consistent with the principles of Management of Research Projects in the Historic Environment (MoRPHE, Historic England, 2015), Geophysical survey in Field Evaluation (Historic England, 2008) and the Standard and Guidance for Archaeological Geophysical Survey (Chartered Institute for Archaeologists, 2014), containing the following: a summary, description of the project background, site location, survey methodology, detailed description of the nature, location and extent of anomalies, discussion of the anomalies, impact assessment, site potential and possible further work. Scaled raw, processed, xy data plans and an interpretation plan will also be included.
- The report will include a summary in the established format for inclusion in the annual *'Archaeology in Suffolk'* section of the Proceedings of the Suffolk Institute of Archaeology and History.
- A copy of this Written Scheme of Investigation will be included as an appendix in the report.
- Metadata sheet tables will form one of the appendices within the report.
- A technical data sheet will be included as an appendix.
- The report will include a copy of the completed project OASIS form as an appendix.
- An unbound draft copy of the report will be submitted to SCCAS/CT for approval within 6 months of completion of fieldwork.

5.5. Project archive

- On approval of the report a printed and bound copy will be lodged with the Suffolk HER. A digital .pdf file will also be supplied, together with a digital and fully georeferenced vector plan showing the application area and survey location, compatible with MapInfo software.
- The online OASIS form for the project will be completed and a .pdf version of the report uploaded to the OASIS website for online publication by the Archaeological Data Service. A paper copy of the form will be included in the project archive.

- A second bound copy of the report will be included with the project archive.
- A digital .pdf copy of the approved report will be supplied to the client, together with our final invoice for outstanding fees. Printed and bound copies will be supplied to the client on request.
- The project archive, consisting of all paper and digital records, will be deposited in the SCCAS/CT Archaeological Store at Bury St Edmunds within 6 months of completion of fieldwork. The project archive will be consistent with MoRPHE (Historic England, 2015) and ICON guidelines. The project archive will also meet the requirements of SCCAS/CT (SCCAS/CT 2017).
- The project costing includes a sum to meet SCCAS/CT archive charges. A form transferring ownership of the archive to SCCAS/CT will be completed and included in the project archive.
- If the client, on completion of the project, does not agree to deposit the archive with, and transfer to, SCCAS/CT, they will be expected to either nominate another suitable depository approved by SCCAS/CT.

5.6. Bibliography

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SCCAS, 2017, *Requirements for a Geophysical Survey*.

Witten, A. J., 2006, *Handbook of Geophysics and Archaeology.* Equinox Publishing Ltd. London.

Websites

British Geological Survey 2017

http://mapapps.bgs.ac.uk/geologyofbritain/home.html

6. Project Staffing

6.1. Management

SACIC Manager	Dr Rhodri Gardner
SACIC Project Manager	John Craven

6.2. Fieldwork

The fieldwork team will be derived from the following pool of SACIC staff.

Name	Job Title	First Aid	Other skills/qualifications
Tim Schofield	Project Officer	Yes	Geophysical Surveyor
Catherine Douglas	Project Officer	Yes	Geophysical Surveyor
Cameron Bate	Project Assistant	No	Geophysical Surveyor

6.3. Report production

The production of the site report, graphics and submission of the project archive will be carried out by Tim Schofield.

Appendix 1. Health and Safety

1. Introduction

The project will be carried out following the SACIC Health and Safety Management System at all times. The SACIC Health and Safety Policy Statement reads as follows:

SuffolkArchaeologyCommunityInterestCompanyiscommittedtoensuringthehealth,safetyandwelfare ofitsemployees,anditwill,sofarasisreasonablypracticable,establishproceduresandsystemsnecessary to implement this commitment and to comply with its statutory obligations on heal th and safety. Our Personnelareinformedoftheirresponsibilitiestoensuretheytakeallreasonableprecautions,toensure the safety, health and welfare of those that are likely to be affected by the acts and emissions of our organisationsundertakings .

SuffolkArchaeology CommunityInterestCompany understandsourdutytoidentifythesignificanthazards thatmaybecreatedbyourundertakingsandtoriskassessthiseaccordinglytoensurethatsuitableand effectivecontrolsareimplementedtominim iserisktoasuitablelevelasfarasisreasonablypracticable.

Wealsoacknowledgeourduty,sofarasisreasonablypracticable:

- *Toprovideasafeworkingenvironmentforourworkforce,fulfilourstatutorycommitments andactivelymanageandsupervis ehealthandsafetyatwork;*
- *Toidentifytherisksassociatedwithourbusinessactivitiesandensuresuitableandsufficient controlmeasuresareinplace.*
- *Ensure regular consultation with our employees on matters which affect their health and Safety.*
- *To ensure that all plant and equipment used by our employees is fit for purpose and adequatelymaintained.*
- *Toprovidesuitablestorageandensuresafehandlingof Hazardoussubstances.*
- *Toensurethatallworkersarecompetenttoundertaketheirdailyworkactivitiesbyproviding allrelevantinformationandtraining,considerationwillalsobegiventoanyemployeeswho donothaveEnglishasafirstlanguage.*
- *Topreventaccidentsandcasesofworkrelatedillhealthbyensuringarobustreportingand investigationsystemisinplace.*
- *Toliaiseandcommunicateeffectivelyregardinghealthandsafetymatterswhenworkingon otherpersonspremises.*
- *To ensure that there is an effective system of induction, training, communication and supervisiontootherperson svisitingorworkingonourpremises.*
- *To have access to competent advice, this will be provided by Agility UK (Training and Consultancy)Ltd.Whowillassistsusinthecontinuousimprovementinourhealthandsafety performance and management through regular review and revision of this policy; and to provide suitable resources required to make this policy and our Health and Safety arrangementseffective.*

2. Specific project issues

Introduction

All SACIC staff will be aware that they have a responsibility to:

- Take care of their own health and safety and that of others who may be affected by what they do, or fail to do, at work.
- Follow safe systems of work and other precautions identified in the project risk assessments.
- Report any changes to personal circumstances that may affect their ability to work safely.
- Report potential hazards, incidents and near misses to the Project Officer/supervisor.

A pre-site inspection has been made of the site and applicable SACIC Risk Assessments for the project are included below.

All SACIC staff are experienced in working on a variety of archaeological sites and permanent staff all hold a CSCS (Construction Skills Certification Scheme) card. All staff have been shown the SACIC Health and Safety Manual, copies of which are held at the SACIC office in Needham Market. All staff will read the site WSI and Risk Assessments and receive a site safety induction from the Project Officer prior to starting work. All staff will be issued with appropriate PPE.

From time to time it may be necessary for site visits by other SACIC staff, external specialists, SCCAS/CT staff or other members of the public. All such staff and visitors will be issued with the appropriate PPE and will undergo the required inductions.

Site staff, official visitors and volunteers are all covered by SACIC insurance policies. SACIC also has professional negligence insurance. Copies of these policies are available on request.

Welfare facilities

Due to the limited nature of the project, it is proposed that SACIC staff will work from their vehicle and travel to public facilities if required. A vehicle will be on site at all times.

First Aid

A member of staff with the First Aiders at Work qualification will be on site at all times. A First Aid kit and a fully charged mobile will also be in vehicle/on site at all times.

Site access and security

Access to the site is off the unnamed road to the east of the field, a couple of entranceways could be used. The site is private arable land, bounded by hedgerows, but is open to general access.

Contaminated ground

Details of any ground contamination have not been provided by the client. If any such is identified then groundworks will cease until adequate safety and environmental precautions are in place.

Advice will be sought from HSE and relevant authorities if required concerning any of these issues.

Hazardous Substances

No hazardous substances are specifically required in order to undertake the archaeological works.

Underground services

Details of known services have not been provided by the client.

Overhead Powerlines

An overhead powerline crosses the site.

Personal Protective Equipment (PPE)

The following PPE is issued to all site staff as a matter of course. Additional PPE will be provided if deemed necessary.

- Hard Hat (to EN397).
- High Visibility Clothing (EN471 Class 2 or greater).
- Safety Footwear (EN345/EN ISO 20346 or greater – to include additional penetration-resistant midsole).

- Gloves (to EN388).
- Eye Protection (safety glasses to at least EN 166 1F).

SACIC Environment Policy

Suffolk Archaeology is committed to the sustainable management of the local and global environment to support local communities and growth in our local economy. We will strive to reduce our carbon emissions, to protect and enhance the natural and historic environment and to tackle the issues of a changing climate. In delivering our services, we are committed to meeting all relevant regulatory, legislative and other requirements, and to the continual improvement of our environmental performance.

We will endeavour to:

- Prevent environmental pollution and minimise waste;
- Reduce our carbon emissions;
- Continually improve our energy efficiency and reduce our use of resources;
- Reduce the impact of vehicle travel by our employees;
- Implement sustainable procurement practices where possible;
- Enhance biodiversity, conserve distinctive landscapes and protect the historic environment.

All existing and new SACIC subcontractors are issued annually with an Environmental Guidance Note For Contractors.

On site the SACIC Project Officer will monitor environmental issues and will alert staff to possible environmental concerns. In the event of spillage or contamination, e.g. from plant or fuel stores, EMS reporting and procedures will be carried out in consultation with the SACIC EMS Officer.

The client and/or landowner has not informed SACIC of any environmental constraints upon the development area but none are expected as the site is wholly within arable agricultural use

All rubbish will be bagged and removed either to areas designated by the client or returned to SACIC for disposal.

3. Project Contacts

SACIC

SACIC Manager	Dr Rhodri Gardner	01449 900120
SACIC Project Manager	John Craven	01449 900121
SACIC Finds Dept	Richenda Goffin	01449 900129
SACIC H&S	John Craven	01449 900121
SACIC EMS	Jezz Meredith	01449 900124
SACIC Outreach Officer	Alex Fisher	01449 900125

Emergency services

Local Police		101
Local GP	Sole Bay Health Centre, Teal Close, Reydon, IP18 6GY	01502 722326
Location of nearest A&E	James Paget University Hospital, Lowestoft Road, Gorleston, Great Yarmouth, Norfolk, NR31 6LA	01493 452452
Environment Agency	Customer Services Line (8am to 6pm) 24 hour Emergency Hotline	03708 506 506 0800 807060
Essex and Suffolk Water	24 hour Emergency Hotline	0845 782 0999
National Gas Emergency Service	Gas emergency hotline	0800 111 999
UK Power Networks	East England electricity emergency hotline	0800 783 8838
Anglian Water	24 hour Emergency Hotline	08457 145 145

Client contacts

Client	Andrew Hawes	
Client Agent		
Site landowner		

Archaeological contacts

Curator	TBC (SCCAS/CT)	01284 741232
Consultant		
EH Regional Science Advisor	Dr Zoe Outram	01223 582707

4. Geophysical Technical Information

Detailed magnetometer survey

Detailed magnetometer survey is the most commonly employed archaeological geophysical prospection method in Britain, sensitive sensors can cost-effectively cover large areas of ground, rapidly recording anomalies that are indicative of cultural settlement activity. These anomalies can then be further investigated by field archaeologists to quantify a form and function. The magnetometer is a passive instrument that detects both permanent thermoremanent and temporary magnetic responses.

Thermoremanent Magnetism

When a material containing iron oxides, for example clay, is heated above the Curie point, weakly magnetic compounds transform in to highly magnetic oxides that can be detected by the sensors of a magnetometer (Clark). For instance the iron oxide haematite has a Curie temperature of 675 Celsius and magnetite 565 Celsius. Once these temperatures are reached, the oxides become demagnetised, on cooling their magnetic properties become permanently re-magnetised and align in the direction of the Earth's magnetic field (Gaffney and Gater). Over time the direction of the Earth's magnetic field changes allowing these directional differences to be detected by the magnetometer.

Strongly heated features such as hearths, kilns or furnaces frequently reach the Curie temperature and become permanently magnetised. These permanent magnetic responses are some of the strongest cultural features that can be recorded.

Temporary Magnetism

Magnetic susceptibility is the ease with which a magnetic field can pass through a material, therefore the higher the materials magnetic susceptibility, the stronger the induced magnetic field will be. Temporary magnetisation occurs within material that is magnetically susceptible, this material acquires its own local magnetic field that combine with the Earth's magnetic field causing an anomaly to stand out from the background noise (Clark). These anomalies are more subtle in nature, being derived from material that has been magnetically enhanced by cultural activity and become concentrated into features over time. Anomalies that have temporary magnetisation include backfilled pits, ditches, field systems, occupation areas, land drains, remnant and existing field

boundaries (David, 2011).

The key to a successful survey is having good contrast between the magnetic susceptibility of an archaeological feature with the surrounding superficial deposits. If there is no discernible difference between the two mediums it may be unlikely that the magnetometer will successfully prospect the feature. Archaeological features can also be masked by high magnetically susceptible topsoil, or deep overlying subsoil and colluvial deposits.

Ferrous anomalies

Ferrous objects are a common source of permanent magnetism, usually isolated with a strong dipolar signature. Some of these responses may have an archaeological derivation, however they are probably more indicative of modern iron objects introduced through manuring or lost within the topsoil.

Bartington DualGRAD 601-2 Fluxgate Gradiometers

Fluxgate gradiometers are the most commonly employed class of instrument in the UK. Two 1m sensitive sensors are affixed to a frame mounted 1m apart in a vertical plane and harnessed to the trunk of a geophysical surveyor or attached to a pulled cart. Each sensor contains two fluxgate magnetometers with 1m vertical separation. The sensor above records the Earth's magnetic field (magnetic background) while the sensor below records the local magnetic field. The two sensors need aligning before recording can begin, a zero station is located in an area with low magnetic variation for this purpose. After the sensors have been aligned, the survey can begin. When differences in the magnetic field strength occur between the two vertical magnetometers within each sensor, a positive or negative reading is recorded that is relative to the magnetic background of the zero station. Positive anomalies include pits, ditches and agricultural furrows. Negative anomalies commonly prospected include earthwork embankments, land drains and geological features.

Sensors are normally mounted to a height of 0.30m above the surface, and can detect to a depth of between one and two metres below the ground. The first survey traverse is commonly undertaken in an east to west direction.

Magnetic Anomalies

Isolated dipolar responses

Isolated dipolar responses are commonly recorded throughout a dataset and are usually indicative of modern ferrous material deposited within the topsoil horizon. In some instances the anomalies may be of an archaeological derivation. They are isolated, strong and dipolar in character.

Areas of magnetic disturbance

These anomalies are usually caused by building demolition rubble, ferrous boundaries, slag waste dumps, modern buried rubbish, pylons and services. Strong and dipolar in character, they are commonly recorded over a wide area.

Linear trends

Linear trends can be either positive or negative magnetic responses depending on the nature of the material present within the feature. If the anomaly is broad and weak, it is more likely to be of geological origin. Stronger positive linear trends are more likely to be of archaeological derivation, caused by settlement activity washing rich humic, charcoal and fired deposits into a feature. Negative linear trends are more commonly associated with bank deposits or land drains, with the less magnetically susceptible superficial deposits deposited at the top of the feature. Curvilinear trends are usually of archaeological origin, commonly interpreted as ring ditches or drip-gullies.

Discrete anomalies

Discrete anomalies can either be positive or negative in nature recorded within a localised area. Those that are positive are more likely to be of an archaeological origin, with negative discrete anomalies more commonly interpreted as natural geological variations.

Thermoremanent responses

These responses are caused by the heating of material containing iron to above the Curie temperature, they are strong and discrete in nature, in Britain high positive readings are recorded to the south of the feature, and high negative readings are recorded to the north.

SUFFOLK ARCHAEOLOGY

• A HISTORY OF EXPERTISE •

Geophysical Survey Risk Assessments

A pre-site inspection and assessment has been made of the site and the following SACIC Risk Assessments apply to the project and are included below.

SACIC GSRA1	Manual handling and outdoor working
SACIC GSRA2	Use of hand tools and instrumentation

Geophysical Survey Risk Assessment 1 Manual handling and outdoor working

Activity	Location	Hazard	Risks	Persons affected	Initial risk	Control measures	Residual risk	Name	Date	Rescue procedures
Manual handling of survey instruments and working outdoors.	Various.	Extremes of heat, cold and wet weather. Trip hazards.	Hypothermia, heat stroke, sunburn. Minor injuries. Carrying heavy equipment for prolonged periods.	All field staff.	9	All staff provided with appropriate clothing for weather conditions. No staff to work alone in extreme conditions. Regular sweep for trip hazards.	2	T Schofield	25/01/18	First Aid if required. Call emergency services if necessary.

	Likelihood				
Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Initial Risk
Residual Risk

Likelihood	Severity	Risk (likelihood x severity)
1. Highly unlikely	1. Slight inconvenience	1-5 Low
2. May occur but very rarely	2. Minor injury requiring first aid	
3. Does occur but only rarely	3. Medical attention required	6-12 Medium
4. Occurs from time to time	4. Major injury leading to hospitalisation	
5. Likely to occur often	5. Fatality or serious injury leading to disablement	13-25 High

Geophysical Survey Risk Assessment 2 Use of hand tools and survey instruments

Activity	Location	Hazard	Risks	Persons affected	Initial risk	Control measures	Residual risk	Name	Date	Rescue procedures
Surveying, setting out and use of small hand tools and marker canes.	Various.	Splinters from poorly maintained equipment, trip hazards from unused equipment, trip hazards from uneven ground, some heavy lifting, tape winding.	Minor injuries.	All field staff.	8	Ensure all tools in serviceable condition. Careful policing of temporarily unused equipment (e.g. no discarded hand tools, hand tapes pegged down). Ensure all tools and instrumentation carried appropriately.	4	T Schofield	25/01/18	First Aid if required. Call emergency services if necessary.

	Likelihood				
Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Initial Risk
Residual Risk

Likelihood	Severity	Risk (likelihood x severity)
1. Highly unlikely	1. Slight inconvenience	1-5 Low
2. May occur but very rarely	2. Minor injury requiring first aid	
3. Does occur but only rarely	3. Medical attention required	6-12 Medium
4. Occurs from time to time	4. Major injury leading to hospitalisation	
5. Likely to occur often	5. Fatality or serious injury leading to disablement	13-25 High

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