

GEOPHYSICAL SURVEY REPORT

STRATASCAN™



Project name:

Junction 15 of M1, Northamptonshire

Client:

CgMs Consulting Ltd

October 2014

Job ref:

J7118

Report author:

Thomas Richardson MSc AlfA

GEOPHYSICAL SURVEY REPORT

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Junction 15 of M1, Northamptonshire

Client:

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Job ref:

J7118

Field team:

Andrew Bateman BSc (Hons), **Richard Kemp** MA,
Stephen Weston BA (Hons), **Richard Collins**,
Steven Chetwynd BA (Hons), **Ben Stevens**,
Jack Lerner, **Lukasz Krawec**

Techniques:

**Detailed magnetic survey –
Gradiometry**

Project manager:

Simon Haddrell BEng(Hons) AMBCS PIFA

Survey date:

**18th August - 2nd September and
8th-10th October 2014**

Report written By:

Thomas Richardson MSc AIFA

Site centred at:

SP 753 546

CAD illustrations by:

Thomas Richardson MSc AIFA

Post code:

NN4 5EZ

Checked by:

David Elks MSc AIFA

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1 SUMMARY OF RESULTS

A detailed gradiometry survey was conducted over approximately 145.5 hectares of arable land. The survey has identified seven areas of enclosures and pits related to former settlement activity, areas of ridge and furrow cultivation, former field boundaries and an area of scattered magnetic debris that relates to an enclosure removed circa 1966. A number of possible archaeological anomalies have been identified; however it is not possible to determine their origin with any degree of confidence. The remaining anomalies are of modern or geological origin. The modern anomalies relate to former field boundaries, agricultural activity, underground services, scattered magnetic debris, ferrous objects and fencing.

2 INTRODUCTION

2.1 *Background synopsis*

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by CgMs Consulting Ltd.

2.2 *Site location*

The site is located to the west of junction 15 of the M1, Northamptonshire at OS ref. SP 753 546.

2.3 *Description of site*

The survey area is approximately 155 hectares of arable land, however areas of crop, overgrown vegetation, buildings and woodland reduced the surveyable area to 145.5 hectares. The site is generally flat with a number of small obstructions caused by pylons.

2.4 *Geology and soils*

The underlying geology is Whitby Mudstone Formation – Mudstone (British Geological Survey website). The drift geology is Oadby Member – Diamicton across the majority of the site, with an area of Glaciofluvial Deposits, Mid Pleistocene – Sand and Gravel also present. There is no recorded drift geology across the south of the site (British Geological Survey website).

The overlying soils for the majority of the site are known as Hanslope which are typical calcareous pelosols. These consist of calcareous clayey soils, some non-calcareous clayey soils. A small area of Denchworth soils area also present in the south of the site. These are typical pelo-stagnogley soils, consisting of clayey with fine loamy over clayey soils (Soil Survey of England and Wales, Sheet 4 Eastern England).

2.5 **Site history and archaeological potential**

Extract from 'Archaeological Desk-Based Assessment Land off Junction 15, M1, Collingtree, Northamptonshire' (CgMs 2014):

There are no designated archaeological heritage assets on the study site, and the only non-designated assets noted by the HER relate to an area of former Medieval/early Post Medieval ridge and furrow cultivation.

2.6 **Survey objectives**

The objective of the survey was to locate any features of possible archaeological origin in order that they may be assessed prior to development.

2.7 **Survey methods**

This report and all fieldwork have been conducted in accordance with both the English Heritage guidelines outlined in the document: *Geophysical Survey in Archaeological Field Evaluation, 2008* and with the Institute for Archaeologists document *Standard and Guidance for Archaeological Geophysical Survey*.

Detailed magnetic survey (gradiometry) was used as an efficient and effective method of locating archaeological anomalies. More information regarding this technique is included in Appendix A.

2.8 **Processing, presentation and interpretation of results**

2.8.1 **Processing**

Processing is performed using specialist software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following schedule shows the basic processing carried out on all minimally processed gradiometer data used in this report:

- | | |
|---------------------|--|
| 1. <i>Destripe</i> | (Removes striping effects caused by zero-point discrepancies between different sensors and walking directions) |
| 2. <i>Destagger</i> | (Removes zigzag effects caused by inconsistent walking speeds on sloping, uneven or overgrown terrain) |

2.8.2 **Presentation of results and interpretation**

The presentation of the data for each site involves a print-out of the minimally processed data both as a greyscale plot and a colour plot showing extreme magnetic values. Magnetic anomalies have been identified and plotted onto the 'Interpretation' drawings for the site.

3 RESULTS

The detailed magnetic gradiometer survey conducted at Junction 15 has identified a number of anomalies that have been characterised as being either of a *probable* or *possible* archaeological origin.

The difference between *probable* and *possible* archaeological origin is a confidence rating. Features identified within the dataset that form recognisable archaeological patterns or seem to be related to a deliberate historical act have been interpreted as being of a probable archaeological origin.

Features of possible archaeological origin tend to be more amorphous anomalies which may have similar magnetic attributes in terms of strength or polarity but are difficult to classify as being archaeological or natural.

The following list of numbered anomalies refers to numerical labels on the interpretation plots.

3.1 *Probable Archaeology*

- 1-7** Areas of positive linear and curvilinear anomalies across the site. These are related to areas of former settlement activity.
- 8-11** Small discrete positive anomalies. These are indicative of small former cut features, such as backfilled pits, and are likely to relate to the settlement activity seen in Anomalies 1-7.
- 12** An area of magnetic disturbance, likely to be related to the settlement activity seen in Anomaly 6.
- 13** Areas of widely spaced curving parallel linear anomalies across the site. These are indicative of ridge and furrow cultivation.
- 14** Linear anomalies in the south of the site. These are likely to relate to former field boundaries not present on available mapping.
- 15** An area of scattered magnetic debris in the south east of the site. This relates to a former enclosure present on available mapping 1885-1966.

3.2 *Possible Archaeology*

- 16 A number of positive linear anomalies across the site. These are indicative of former cut features and may be of archaeological, agricultural or natural origin.
- 17 A number of small discrete positive anomalies. These are indicative of small former cut features, such as backfilled pits, and may be of archaeological or natural origin.

3.3 *Other Anomalies*

- 18 Linear anomalies in the north of the site. These are related to former field boundaries present on available mapping 1900-1958.
- 19 An area of magnetic disturbance in the south of the site related to a former pond present on available mapping.
- 20 Areas of closely spaced parallel linear anomalies. These are indicative of modern agricultural activity, such as ploughing.
- 21 Large areas of magnetic variation across the site. These are likely to relate to geological or pedological variation.
- 22 Weak bipolar linear anomalies in the south of the site. These are indicative of land drains.
- 23 Linear anomalies in the south eastern field. These are likely to relate to underground services. Anomalies 23a may also relate to former field boundaries.
- 24 Areas of scattered magnetic debris across the site. These are likely to be modern in origin.
- 25 Areas of magnetic disturbance are the result of substantial nearby ferrous metal objects such as fences and underground services. These effects can mask weaker archaeological anomalies, but on this site have not affected a significant proportion of the area.
- 26 A number of magnetic 'spikes' (strong focussed values with associated antipolar response) indicate ferrous metal objects. These are likely to be modern rubbish.

4 CONCLUSION

The survey at Junction 15 has identified a number of anomalies of probable and possible archaeological origin. Seven areas of enclosures and pits are related to former settlement activity. It is possible that these areas are linked, but superficial deposits or later agricultural activity may be masking other responses. Areas of ridge and furrow cultivation and former field boundaries across the site suggest that the area was used as agricultural land during the medieval period. An area of scattered magnetic debris in the south east of the site relates to an enclosure removed circa 1966; this response suggests that there may have been structures within the enclosure. A number of possible archaeological anomalies have been identified; however it is not possible to determine their origin with any degree of confidence. The remaining anomalies are of modern or geological origin. The modern anomalies relate to former field boundaries, agricultural activity, underground services, scattered magnetic debris, ferrous objects and fencing.

5 REFERENCES

British Geological Survey South Sheet, 1977. *Geological Survey Ten Mile Map, South Sheet First Edition (Quaternary)*. Institute of Geological Sciences.

British Geological Survey, 2001. *Geological Survey Ten Mile Map, South Sheet, Fourth Edition (Solid)*. British Geological Society.

British Geological Survey, n.d., *website*:
(<http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps>) Geology of Britain viewer.

CgMs, 2014. *Archaeological Desk-Based Assessment Land off Junction 15, M1, Collingtree, Northamptonshire*

English Heritage, 2008. *Geophysical Survey in Archaeological Field Evaluation*.

Institute For Archaeologists. *Standard and Guidance for Archaeological Geophysical Survey*.
<http://www.archaeologists.net/sites/default/files/nodefiles/Geophysics2010.pdf>

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 4 Eastern England*.

APPENDIX A – METHODOLOGY & SURVEY EQUIPMENT

Grid locations

The location of the survey grids has been plotted together with the referencing information. Grids were set out using a Leica 705auto Total Station and referenced to suitable topographic features around the perimeter of the site or a Leica Smart Rover RTK GPS.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. A SmartNet RTK GPS uses Ordnance Survey's network of over 100 fixed base stations to give an accuracy of around 0.01m.

Survey equipment and gradiometer configuration

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTeslas (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. The instrument consists of two fluxgates very accurately aligned to nullify the effects of the Earth's magnetic field. Readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. The Grad601-2 consists of two high stability fluxgate gradiometers suspended on a single frame. Each gradiometer has a 1m separation between the sensing elements so enhancing the response to weak anomalies.

Sampling interval

Readings were taken at 0.25m centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m grid.

Depth of scan and resolution

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m, though strongly magnetic objects may be visible at greater depths. The collection of data at 0.25m centres provides an optimum methodology for the task balancing cost and time with resolution.

Data capture

The readings are logged consecutively into the data logger which in turn is daily down-loaded into a portable computer whilst on site. At the end of each site survey, data is transferred to the office for processing and presentation.

APPENDIX B – BASIC PRINCIPLES OF MAGNETIC SURVEY

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns and material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

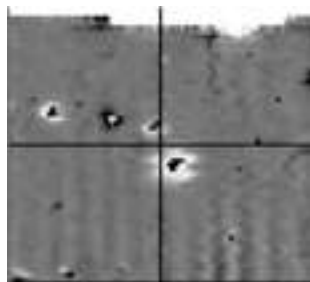
APPENDIX C – GLOSSARY OF MAGNETIC ANOMALIES

Bipolar



A bipolar anomaly is one that is composed of both a positive response and a negative response. It can be made up of any number of positive responses and negative responses. For example a pipeline consisting of alternating positive and negative anomalies is said to be bipolar. See also dipolar which has only one area of each polarity. The interpretation of the anomaly will depend on the magnitude of the magnetic field strength. A weak response may be caused by a clay field drain while a strong response will probably be caused by a metallic service.

Dipolar

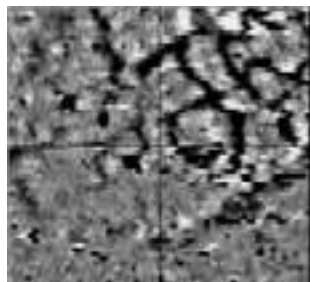


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very strong anomaly is likely to be caused by a ferrous object.

Positive anomaly with associated negative response

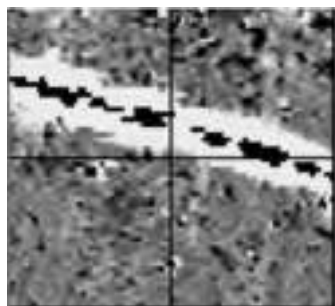
See bipolar and dipolar.

Positive linear



A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity and some may even have a natural origin.

Positive linear anomaly with associated negative response



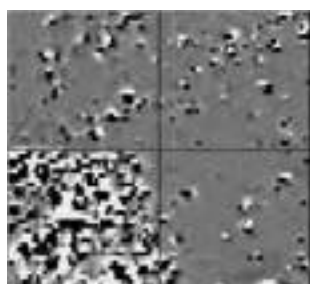
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field boundaries.

Positive point/area



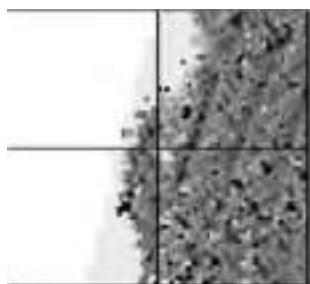
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally occurring depressions in the ground.

Magnetic debris



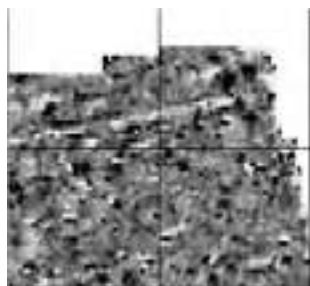
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low ($\pm 3\text{nT}$) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly ($\pm 250\text{nT}$) is more indicative of a spread of ferrous debris. Moderately strong anomalies may be the result of a spread of thermoremanent material such as bricks or ash.

Magnetic disturbance



Magnetic disturbance is high amplitude and can be composed of either a bipolar anomaly, or a single polarity response. It is essentially associated with magnetic interference from modern ferrous structures such as fencing, vehicles or buildings, and as a result is commonly found around the perimeter of a site near to boundary fences.

Negative linear

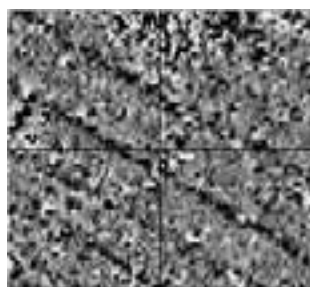


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative to the background top soil is built up. See also ploughing activity.

Negative point/area

Opposite to positive point anomalies these responses may be caused by raised areas or earthen banks. These could be of an archaeological origin or may have a natural origin.

Ploughing activity



Ploughing activity can often be visualised by a series of parallel linear anomalies. These can be of either positive polarity or negative polarity depending on site specifics. It can be difficult to distinguish between ancient ploughing and more modern ploughing. Clues such as the separation of each linear, straightness, strength of response and cross cutting relationships can be used to aid this, although none of these can be guaranteed to differentiate between different phases of activity.

Polarity

Term used to describe the measurement of the magnetic response. An anomaly can have a positive polarity (values above 0nT) and/or a negative polarity (values below 0nT).

Strength of response

The amplitude of a magnetic response is an important factor in assigning an interpretation to a particular anomaly. For example a positive anomaly covering a 10m² area may have values up to around 3000nT, in which case it is likely to be caused by modern magnetic interference. However, the same size and shaped anomaly but with values up to only 4nT may have a natural origin. Colour plots are used to show the amplitude of response.

Thermoremanent response

A feature which has been subject to heat may result in it acquiring a magnetic field. This can be anything up to approximately +/-100 nT in value. These features include clay fired drains, brick, bonfires, kilns, hearths and even pottery. If the heat application has occurred in situ (e.g. a kiln) then the response is likely to be bipolar compared to if the heated objects have been disturbed and moved relative to each other, in which case they are more likely to take an irregular form and may display a debris style response (e.g. ash).

Weak background variations



Weakly magnetic wide scale variations within the data can sometimes be seen within sites. These usually have no specific structure but can often appear curvy and sinuous in form. They are likely to be the result of natural features, such as soil creep, dried up (or seasonal) streams. They can also be caused by changes in the underlying geology or soil type which may contain unpredictable distributions of magnetic minerals, and are usually apparent in several locations across a site.

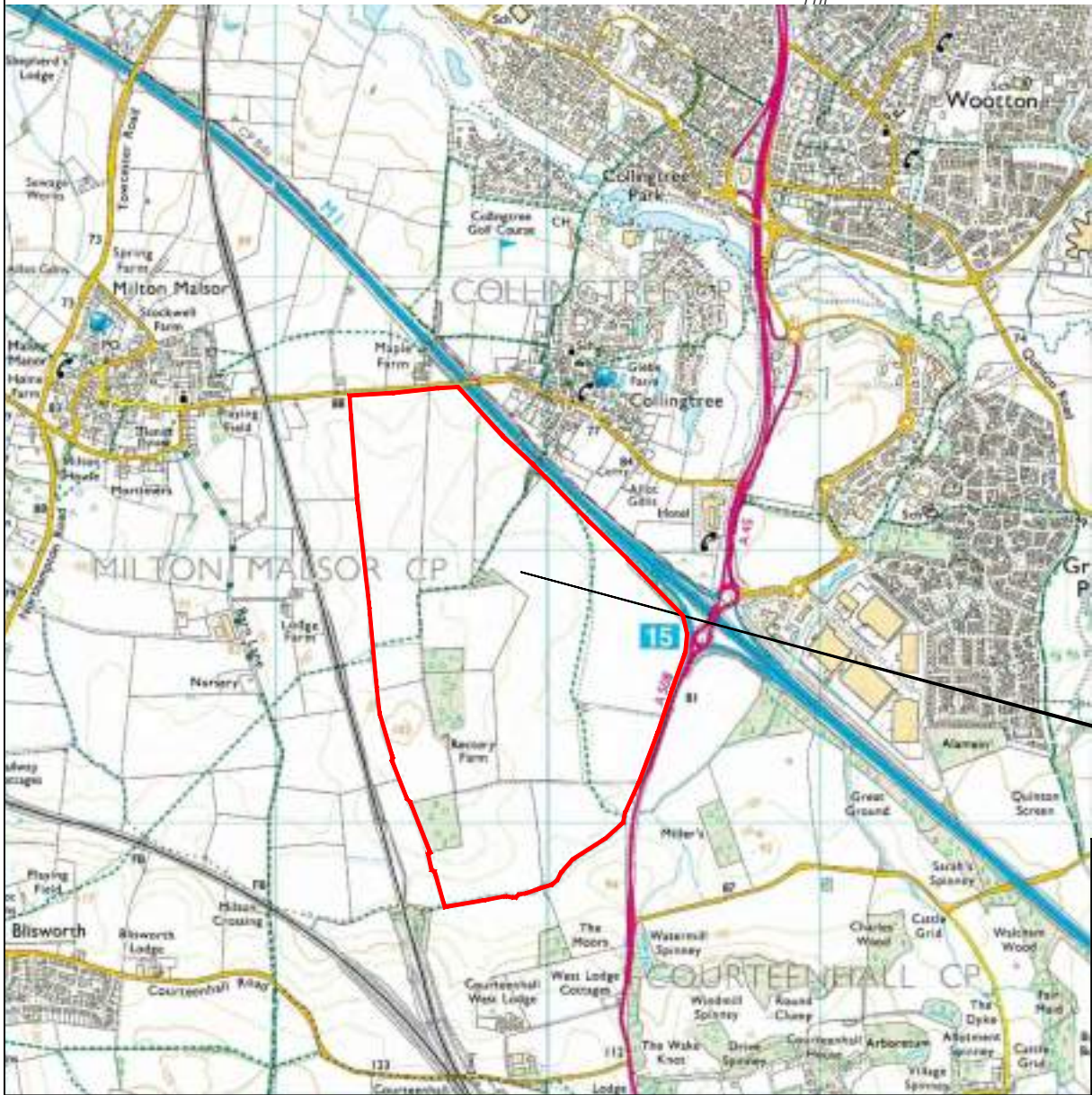
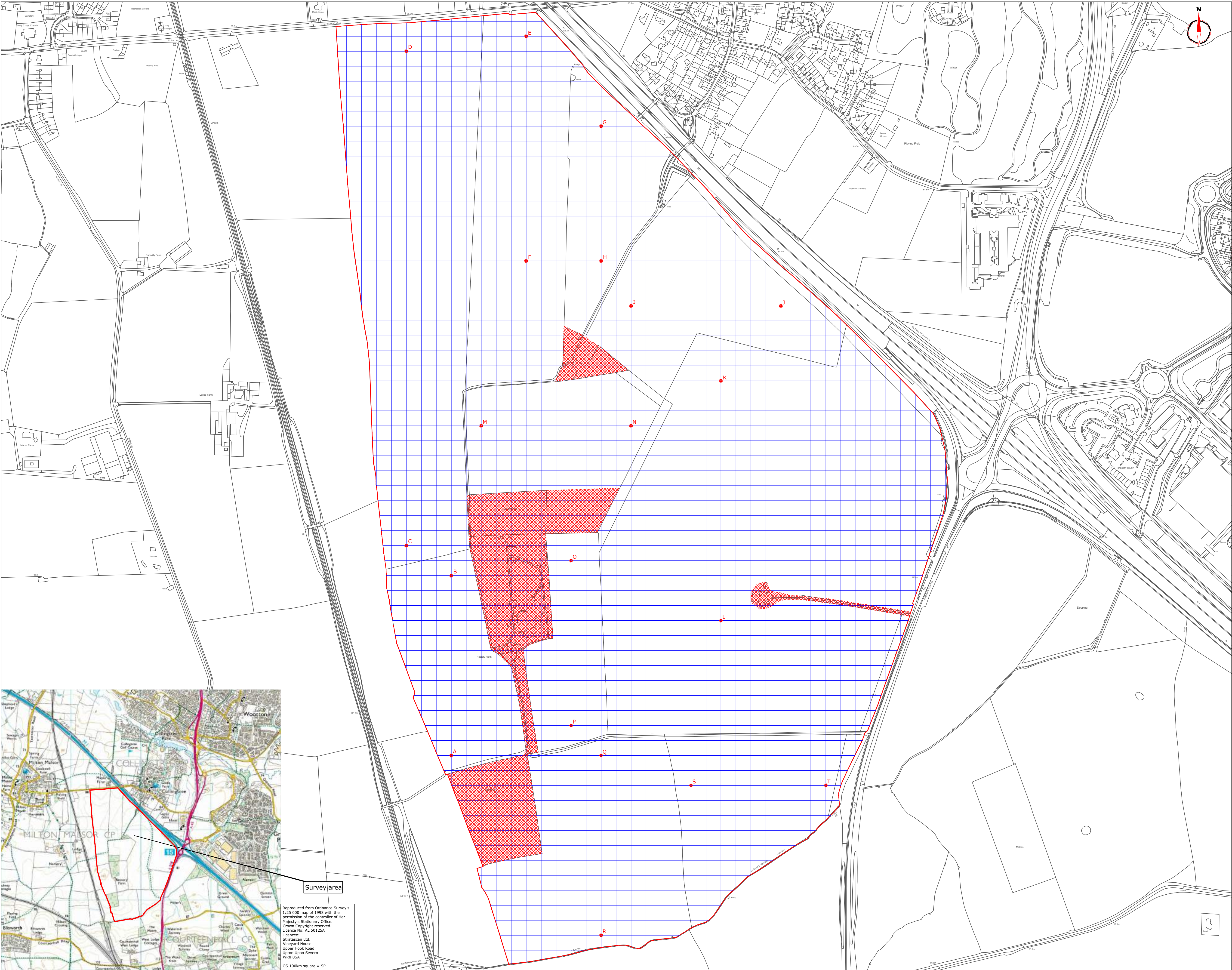
STRATASCAN™



STRATASCAN LTD

Vineyard House Upper Hook Road Upton upon Severn
Worcestershire WR8 0SA United Kingdom

T: 01684 592266 F: 01684 594142
info@stratascan.co.uk www.stratascan.co.uk



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OS 100km square = SP

Amendments

Issue No.	Date	Description
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-	-	-

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Survey area

Site centred on NGR SP 753 546

KEY

Area unsurveyable - crops, overgrown vegetation, buildings and woodland

OS REFERENCING INFORMATION

A	474512.66, 254109.44
B	474512.66, 254469.44
C	474422.66, 254529.44
D	474422.66, 255519.44
E	474662.66, 255549.44
F	474662.66, 255099.44
G	474812.66, 255369.44
H	474812.66, 255099.44
I	474872.66, 255009.44
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K	475052.66, 254859.44
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R	474812.66, 253749.44
S	474992.66, 254049.44
T	475262.66, 254049.44

Job No. J7118 Survey Date AUG 14

Client CgMs CONSULTING LTD

Project Title JUNCTION 15 OF M1, NORTHAMPTONSHIRE

Subject SITE LOCATION, SURVEY AREA & REFERENCING

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GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING

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GPR ASSOCIATION

SUMO GROUP MEMBER

Scale 1:3500

0m 30 60 90 120 150 180m

Plot A1 Checked by DGE Issue No. 01

Date OCT 14 Drawn by TR Figure No. 01



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-
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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT
+10nT
-10nT
-100nT

Job No. J7118 Survey Date AUG 14

Client CgMs CONSULTING LTD

Project Title JUNCTION 15 OF M1, NORTHAMPTONSHIRE

Subject COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - OVERVIEW

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GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING

VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
E: info@stratascan.co.uk
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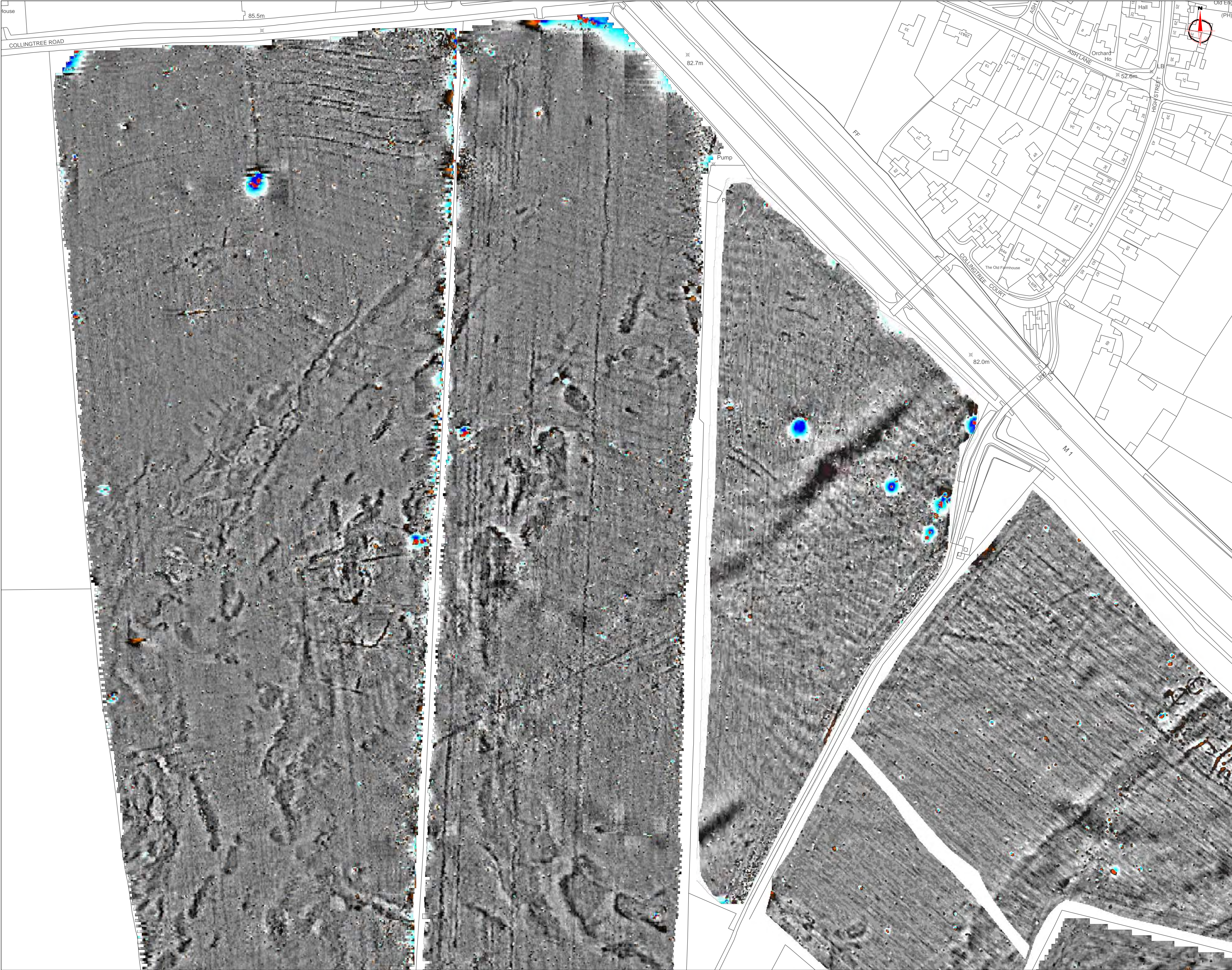
SUMO GROUP MEMBER

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Plot A1 Checked by DGE Issue No. 01

Date OCT 14 Drawn by TR Figure No. 02



Amendments

Issue No.	Date	Description
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

J7118

Survey Date

AUG 14

Client

CgMs CONSULTING LTD

Project Title

JUNCTION 15 OF M1,
NORTHAMPTONSHIRE

Subject

COLOUR PLOT OF
GRADIOMETER DATA
SHOWING EXTREME VALUES -
NORTH

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AND ENGINEERING

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WR8 0SA

T: 01684 592266
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ISO 9001

ISO 14001

Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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Figure No.

03



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.

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Survey Date

AUG 14

Client

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Project Title

JUNCTION 15 OF M1,
NORTHAMPTONSHIRE

Subject

COLOUR PLOT OF
GRADIOMETER DATA
SHOWING EXTREME VALUES -
WEST

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GROUP
MEMBER

ISO 9001:2015
certified

ISO 14001:2015
certified

Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

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DGE

Issue No.

01

Date

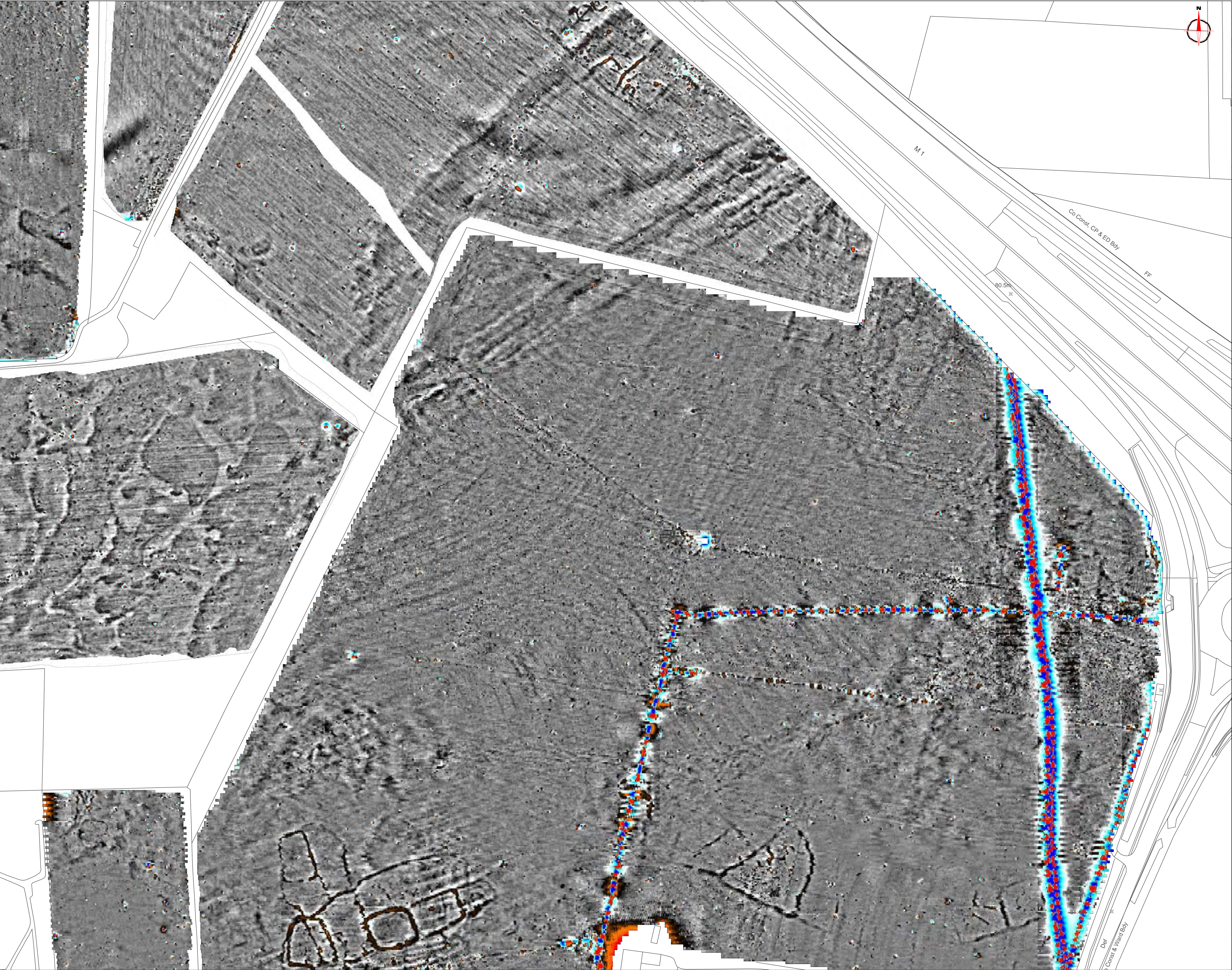
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TR

Figure No.

04



Amendments

Issue No.	Date	Description
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

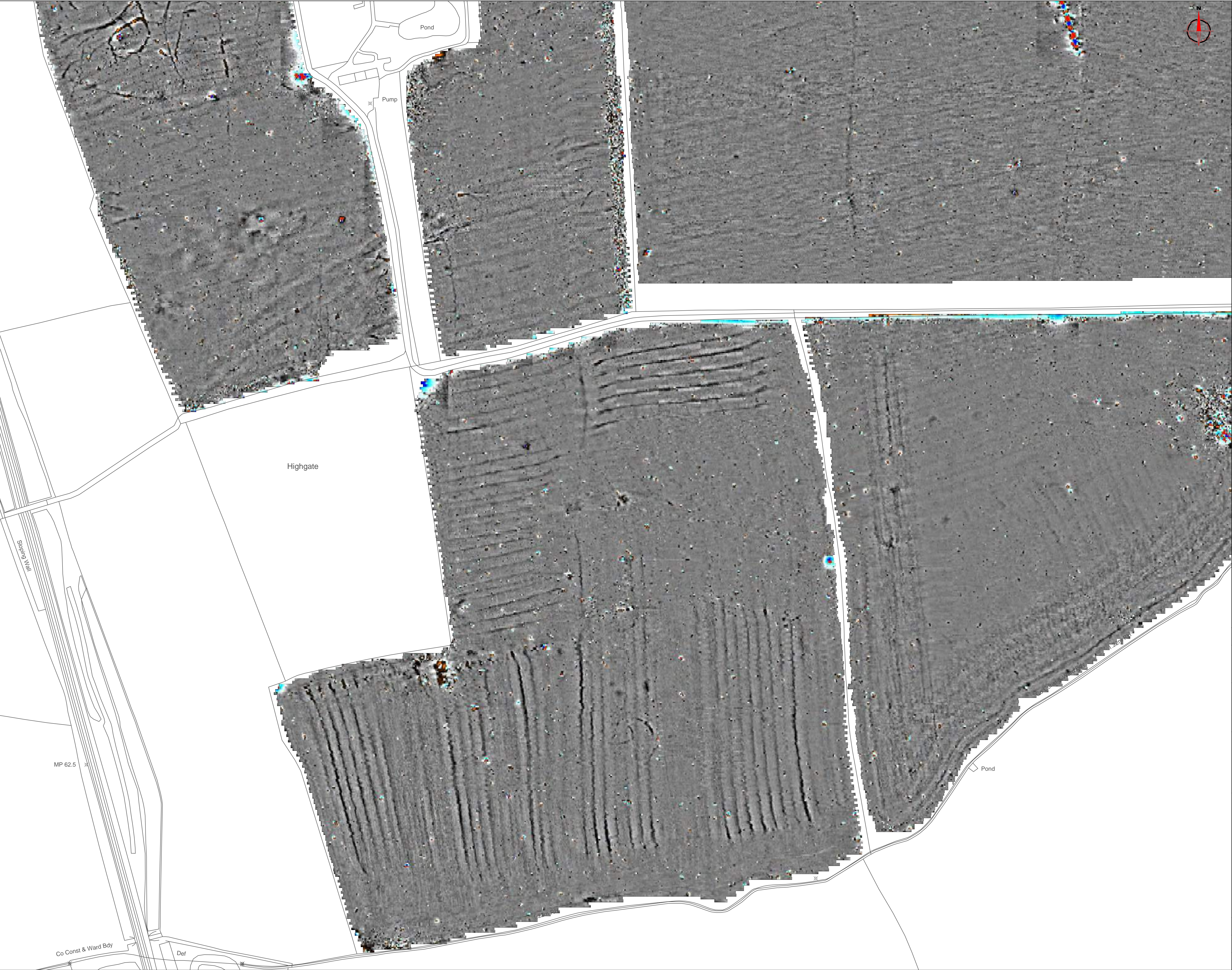
+100nT

+10nT

-10nT

-100nT

Job No.	J7118		Survey Date	AUG 14	
Client	CgMs CONSULTING LTD				
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE				
Subject	COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - EAST				
<div>STRATASCAN™</div> <div>GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</div> <div>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div> <div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div>					
<div><div><div>GPR ASSOCIATION</div><div>SUMO GROUP MEMBER</div></div><div><div>ISO 9001 certified</div><div>ISO 14001 certified</div></div></div>					
Scale	0m 10 20 30 40 50 60 70 80m				
1:1250					
Plot	A1	Checked by	DGE	Issue No.	01
Date	OCT 14	Drawn by	TR	Figure No.	05



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

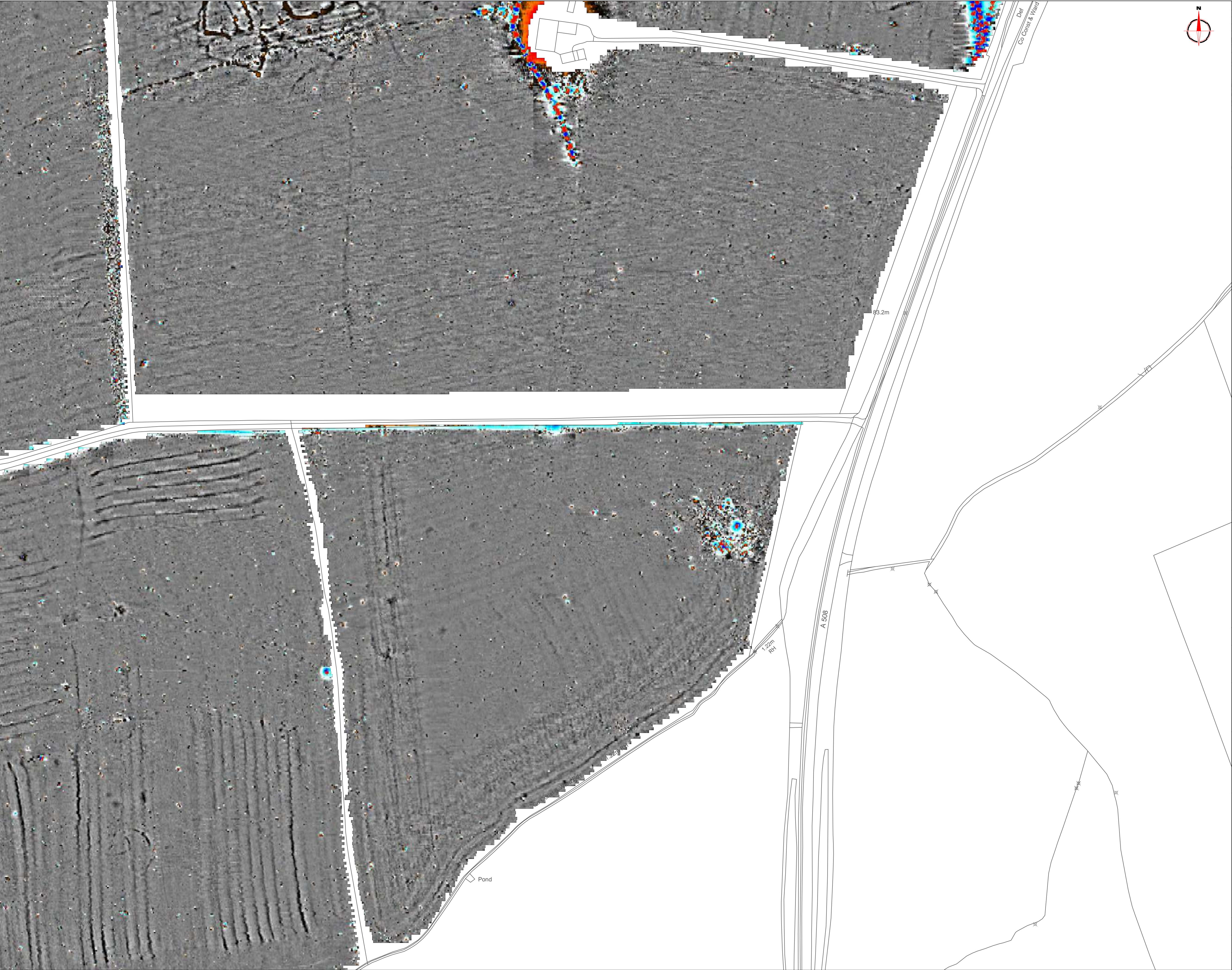
+100nT

+10nT

-10nT

-100nT

Job No.	J7118		Survey Date	AUG 14	
Client	CgMs CONSULTING LTD				
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE				
Subject	COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - SOUTH WEST				
<div>STRATASCAN™</div> <div>GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</div> <div>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div> <div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div>					
<div><div><div>EUROPEAN GPR ASSOCIATION</div><div><div>SUMO</div><div>SUMO GROUP MEMBER</div></div></div><div><div>ISO 9001 certified</div><div>ISO 14001 certified</div><div>ISO 45001 certified</div></div></div>					
Scale	0m 10 20 30 40 50 60 70 80m				
Plot	1:1250		Checked by	DGE	
Date	OCT 14		Issue No.	01	
			Drawn by	TR	
			Figure No.	06	



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +100nT (red)
Minimum -100nT (blue)

+100nT

+10nT

-10nT

-100nT

Job No.	J7118		Survey Date	AUG 14	
Client	CgMs CONSULTING LTD				
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE				
Subject	COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - SOUTH EAST				
<div>STRATASCAN™</div> <div>GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</div> <div>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div> <div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div>					
<div><div>EUROPEAN GPR ASSOCIATION</div><div>SUMO GROUP MEMBER</div><div></div><div></div><div></div></div>					
Scale	0m 10 20 30 40 50 60 70 80m				
1:1250					
Plot	A1	Checked by	DGE	Issue No.	01
Date	OCT 14	Drawn by	TR	Figure No.	07



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-
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Plotting parameters

Maximum +2nT (black)
Minimum -2nT (white)

Zero
Mean

-2nT +2nT

+2nT
-2nT

Job No.	J7118	Survey Date	AUG 14
Client			
CgMs CONSULTING LTD			
Project Title			
JUNCTION 15 OF M1, NORTHAMPTONSHIRE			
Subject			
PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - OVERVIEW			

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UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
E: info@stratascan.co.uk
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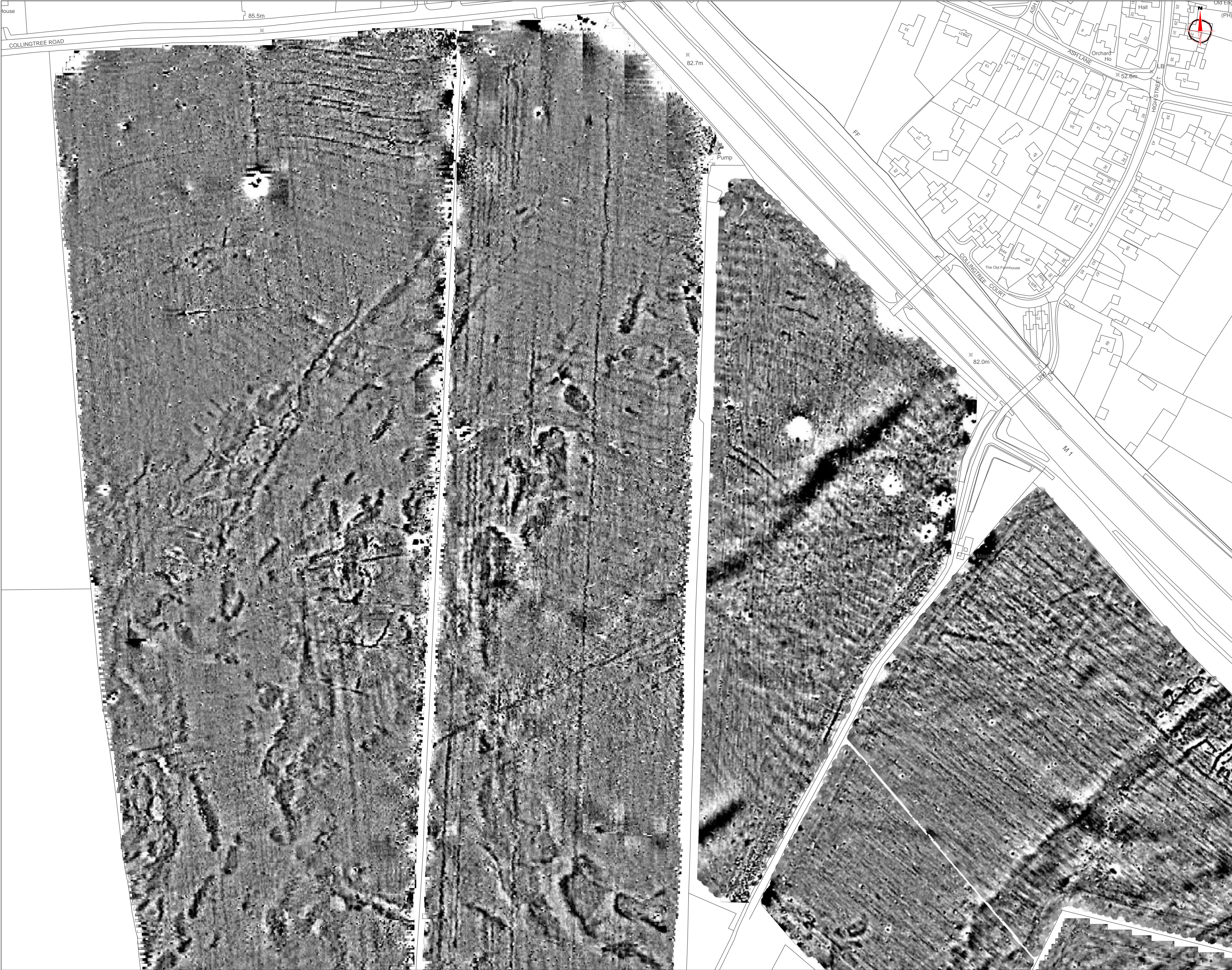
ISO 9001:2015

ISO 14001:2015

Scale
1:3500

0m 30 60 90 120 150 180m

Plot	A1	Checked by	DGE	Issue No.	01
Date	OCT 14	Drawn by	TR	Figure No.	08



Amendments		
Issue No.	Date	Description
-	-	-

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Plotting parameters

Maximum +2nT (black)
Minimum -2nT (white)

-2nT +2nT

+2nT
-2nT

Job No.	J7118		Survey Date	AUG 14	
Client	CgMs CONSULTING LTD				
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE				
Subject	PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - NORTH				
<div><div>STRATASCAN™ GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div><div><div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div><div></div></div></div>					
Scale	0m 10 20 30 40 50 60 70 80m				
1:1250					
Plot	A1	Checked by	DGE	Issue No.	01
Date	OCT 14	Drawn by	TR	Figure No.	09



Amendments		
Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +2nT (black)
Minimum -2nT (white)

-2nT +2nT

+2nT
-2nT

Job No.	J7118	Survey Date	AUG 14
Client			
CgMs CONSULTING LTD			
Project Title			
JUNCTION 15 OF M1, NORTHAMPTONSHIRE			
Subject			
PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - WEST			

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VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
E: info@stratascan.co.uk
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MEMBER

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certified

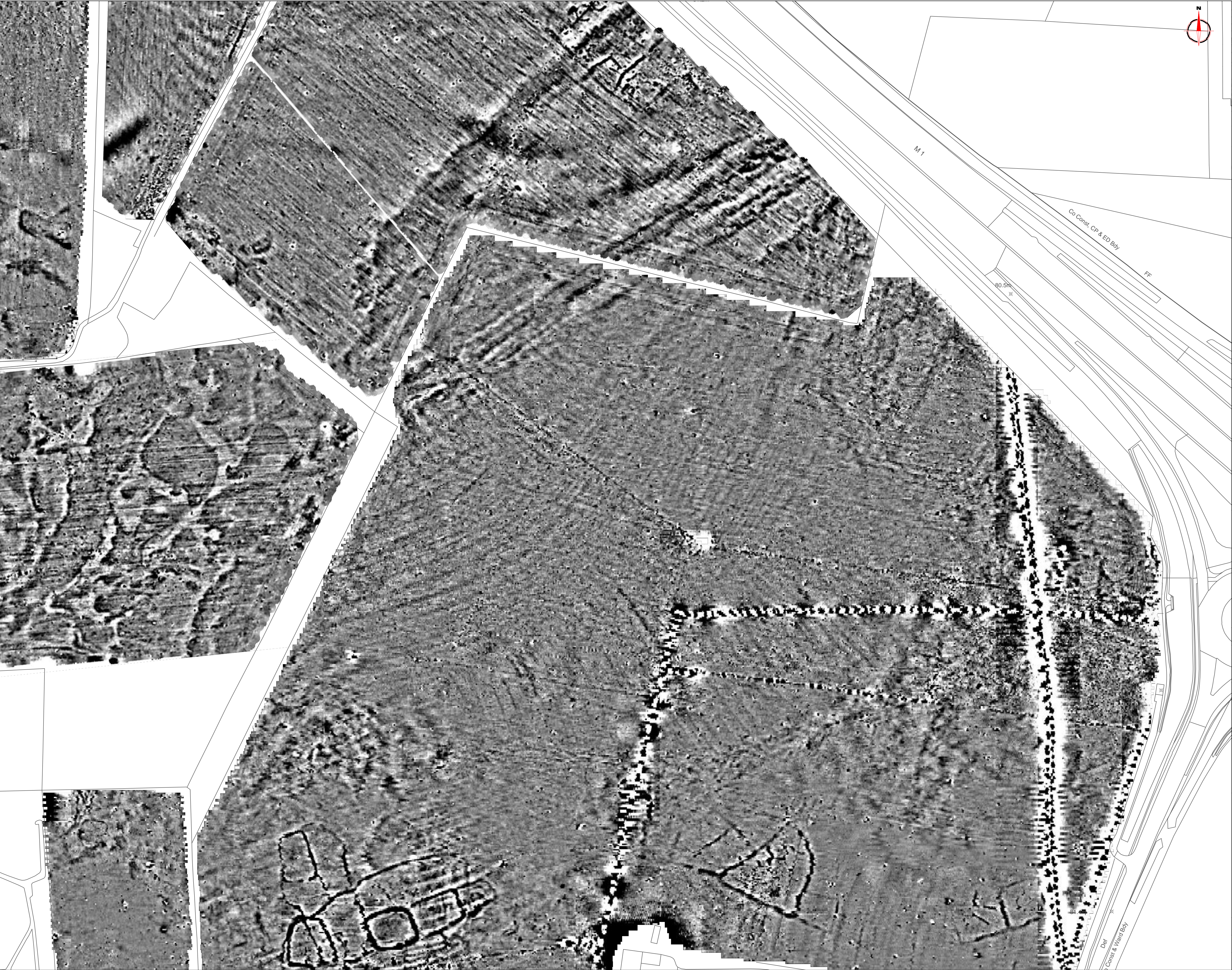
ISO 14001:2015
certified

Scale

1:1250

0m 10 20 30 40 50 60 70 80m

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 14	TR	10



Amendments		
Issue No.	Date	Description
-	-	-

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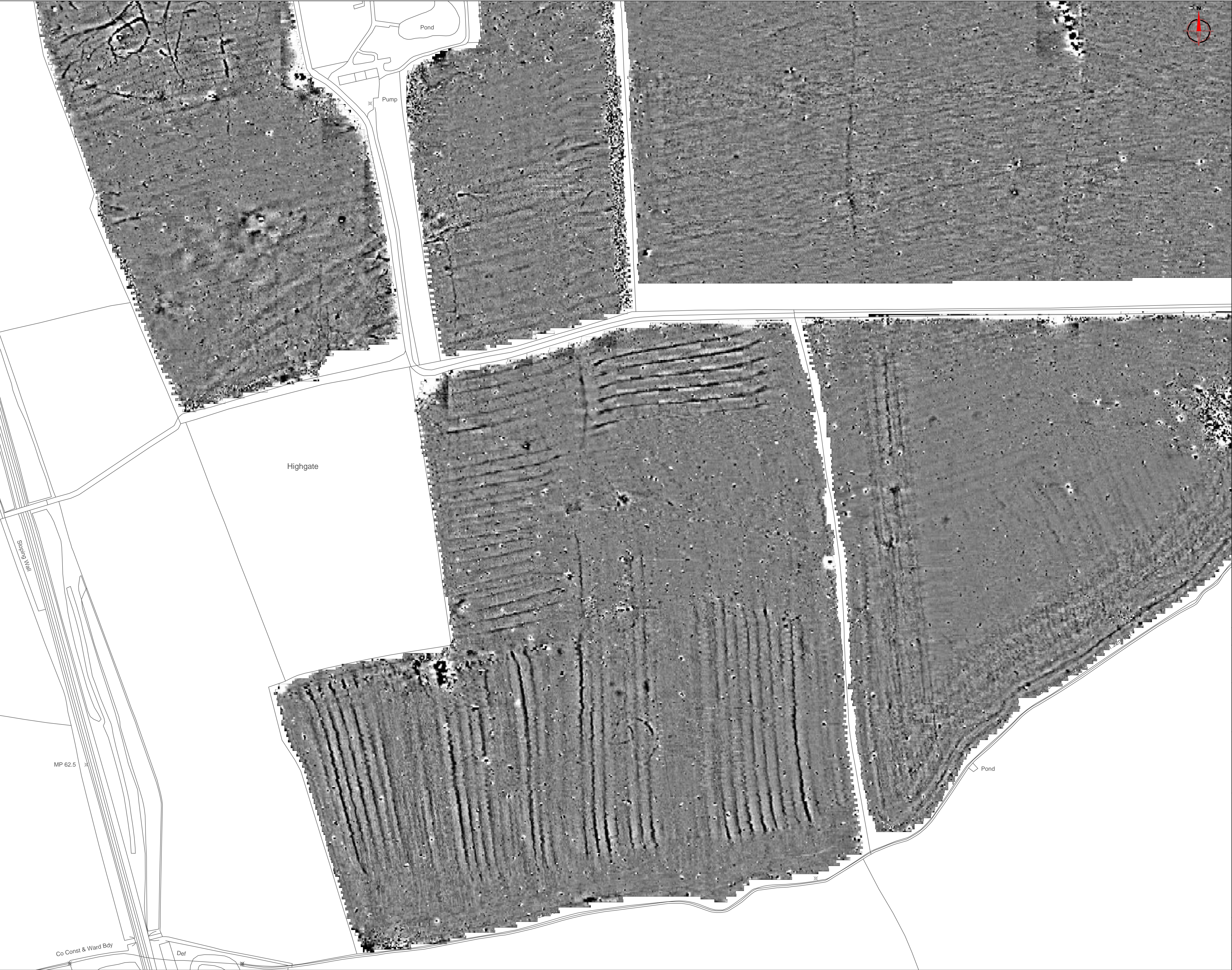
Plotting parameters

Maximum +2nT (black)
Minimum -2nT (white)

-2nT +2nT

+2nT
-2nT

Job No.	J7118	Survey Date	AUG 14
Client	CgMs CONSULTING LTD		
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE		
Subject	PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - EAST		
<div><div>STRATASCAN™ GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</div><div>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div></div> <div><div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div><div> GPR ASSOCIATION</div><div> SUMO GROUP MEMBER</div><div> ISO 9001:2015 certified</div><div> ISO 14001:2015 certified</div></div>			
Scale	0m 10 20 30 40 50 60 70 80m		
1:1250			
Plot	A1	Checked by	DGE
Date	OCT 14	Drawn by	TR
		Issue No.	01
		Figure No.	11



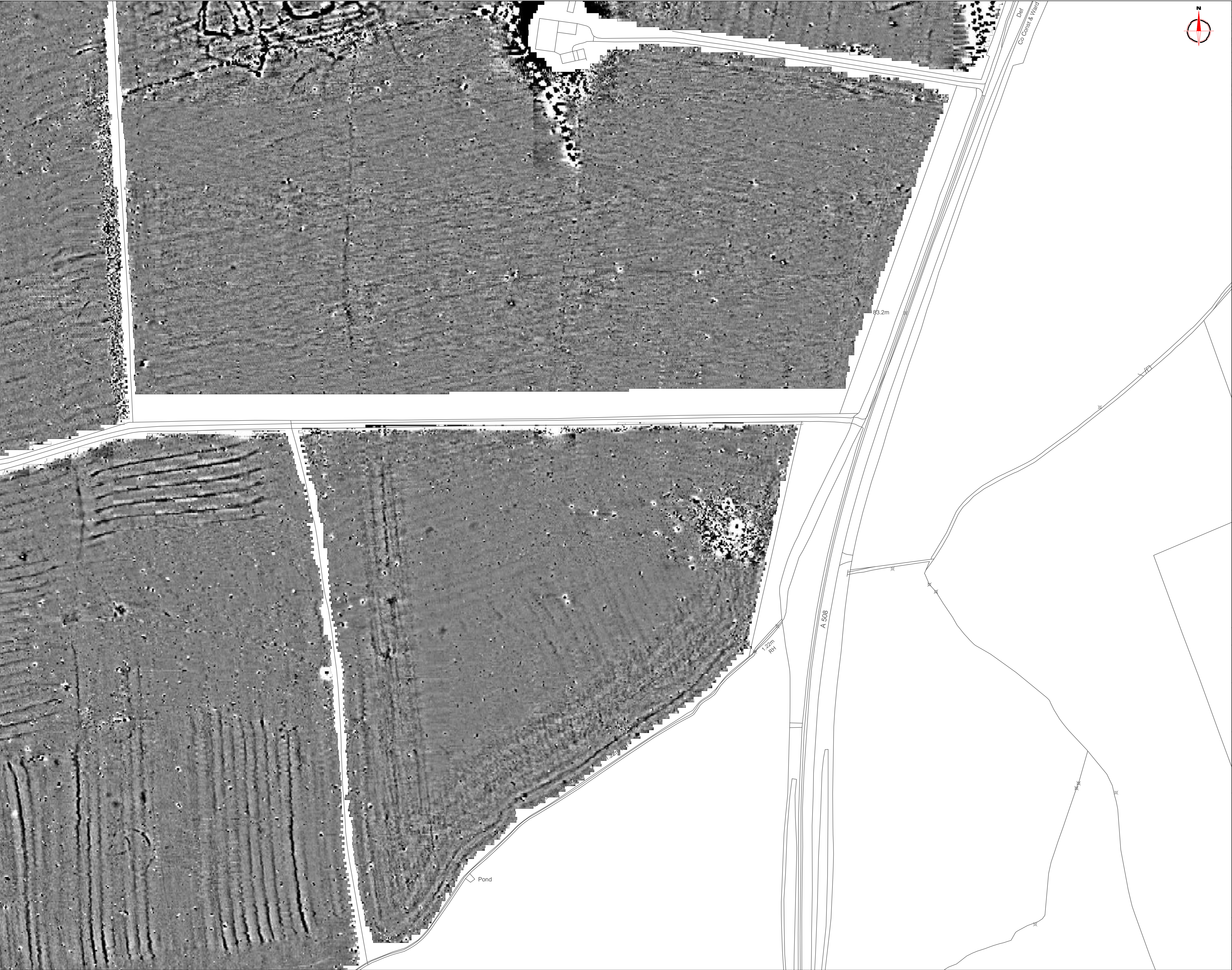
Amendments

Issue No.	Date	Description
-	-	-
-	-	-
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Plotting parameters

Maximum +2nT (black)
Minimum -2nT (white)

Job No.	J7118	Survey Date	AUG 14
Client			
CgMs CONSULTING LTD			
Project Title			
JUNCTION 15 OF M1, NORTHAMPTONSHIRE			
Subject			
PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - SOUTH WEST			
STRATASCAN™ GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk			
Scale			
1:1250			
Plot	A1	Checked by	DGE
Date	OCT 14	Issue No.	01
		Drawn by	TR
		Figure No.	12



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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Plotting parameters

Maximum +2nT (black)

Minimum -2nT (white)

Zero

Mean

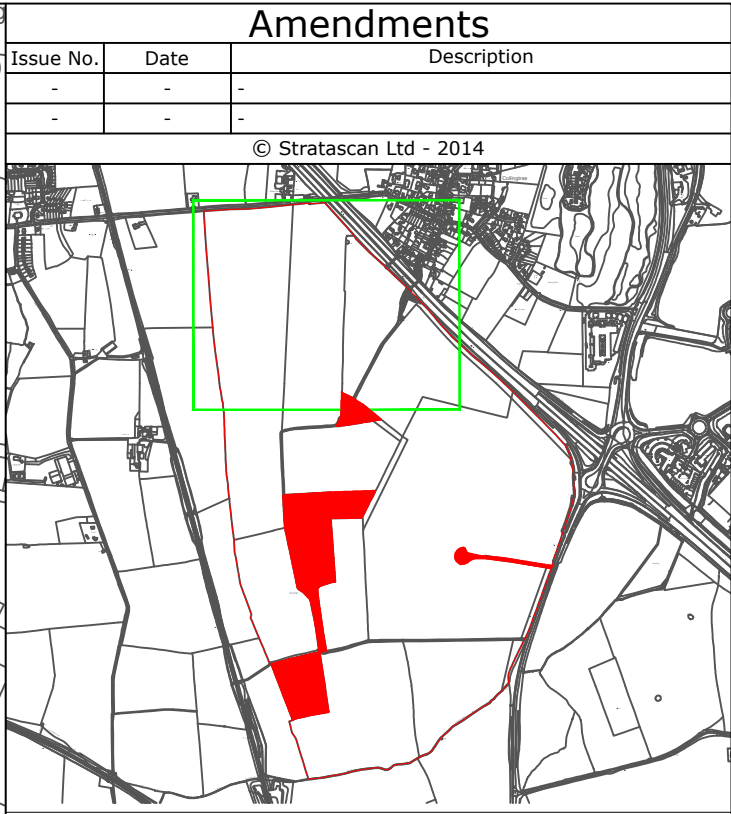
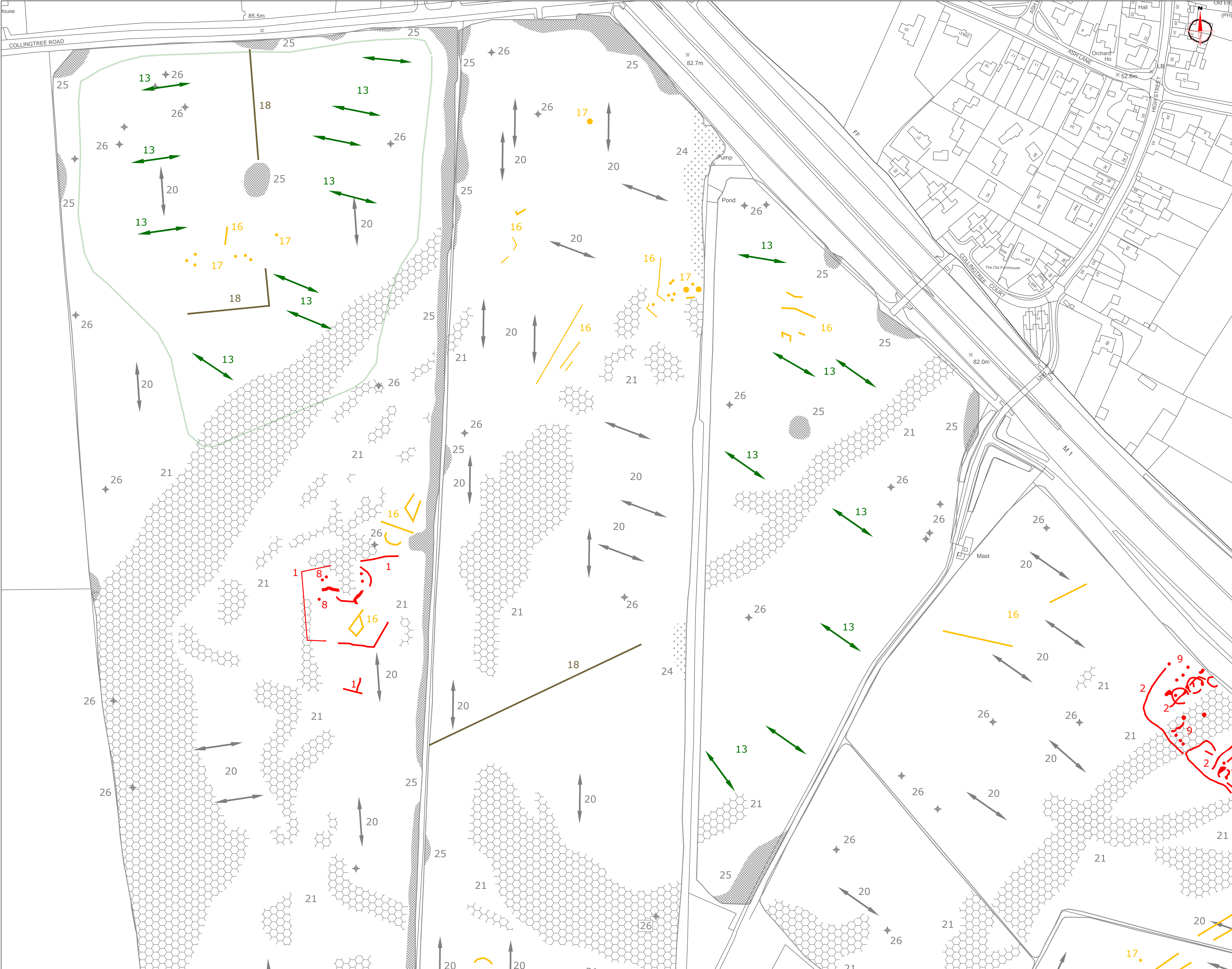
-2nT

+2nT

+2nT

-2nT

Job No.	J7118	Survey Date	AUG 14
Client	CgMs CONSULTING LTD		
Project Title	JUNCTION 15 OF M1, NORTHAMPTONSHIRE		
Subject	PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - SOUTH EAST		
<div>STRATASCAN™</div> <div>GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING</div> <div>VINEYARD HOUSE UPTON UPON SEVERN WR8 0SA</div> <div>T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk</div>			
<div><div>EUROPEAN GPR ASSOCIATION</div><div>SUMO GROUP MEMBER</div><div>IMS 150 years certified</div><div>IMS 150 years certified</div></div>			
Scale	0m 10 20 30 40 50 60 70 80m		
1:1250			
Plot	A1	Checked by	DGE
Date	OCT 14	Issue No.	01
		Drawn by	TR
		Figure No.	13



Amendments		
Issue No.	Date	Description
-	-	-
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KEY	
PROBABLE ARCHAEOLOGY	
	Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
	Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
	Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
	Linear anomaly likely to relate to a former field boundary not present on available mapping
	Scattered magnetic debris related to an enclosure present on available mapping pre-1900

POSSIBLE ARCHAEOLOGY	
	Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
	Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

OTHER ANOMALIES	
	Linear anomaly related to a former field boundary present on available mapping post-1900
	Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
	Linear anomaly - probably related to pipe, cable or other modern service
	Linear anomaly - possibly related to land drain
	Magnetic disturbance associated with nearby metal object such as service or field boundary
	Magnetic disturbance related to a former pond present on available mapping
	Scattered magnetic debris
	Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
	Magnetic spike - probable ferrous object

Job No.	Survey Date
J7118	AUG 14
Client	

CgMs CONSULTING LTD


Project Title
JUNCTION 15 OF M1,
NORTHAMPTONSHIRE

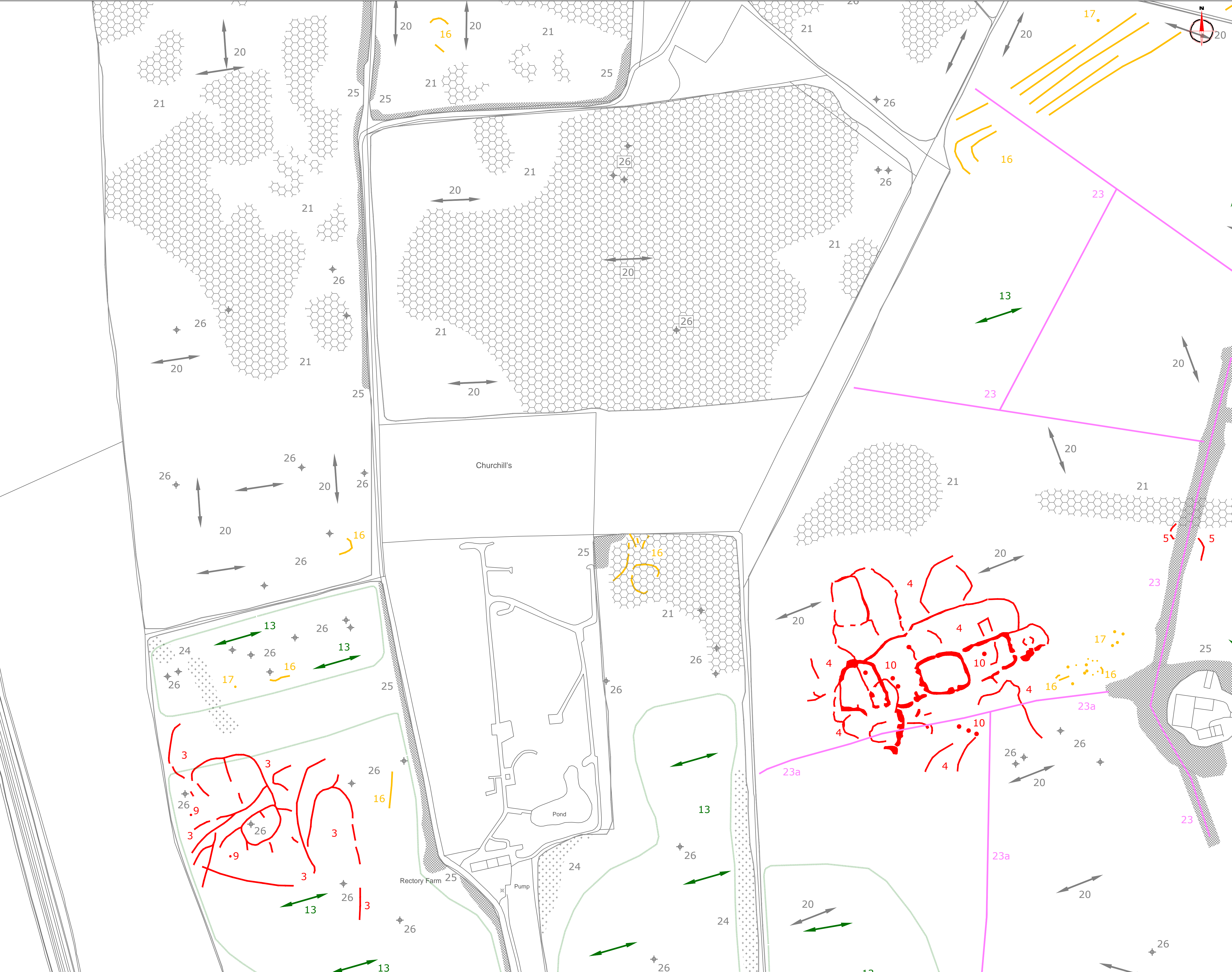
Subject
INTERPRETATION - NORTH

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UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
E: info@stratascan.co.uk
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Scale 1:1250		
		
Plot A1	Checked by DGE	Issue No. 01
Date OCT 14	Drawn by TR	Figure No. 15



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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KEY

PROBABLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
- Linear anomaly likely to relate to a former field boundary not present on available mapping
- Scattered magnetic debris related to an enclosure present on available mapping pre-1900

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

OTHER ANOMALIES

- Linear anomaly related to a former field boundary present on available mapping post-1900
- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Magnetic disturbance related to a former pond present on available mapping
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike - probable ferrous object

Job No. J7118

Survey Date AUG 14

Client

CgMs CONSULTING LTD

Project Title

JUNCTION 15 OF M1, NORTHAMPTONSHIRE

Subject

INTERPRETATION - WEST

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VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

Geophysical Association

sumo

SUMO GROUP MEMBER

ITMS

ITMS

Scale 1:1250

0m 10 20 30 40 50 60 70 80m

Plot A1

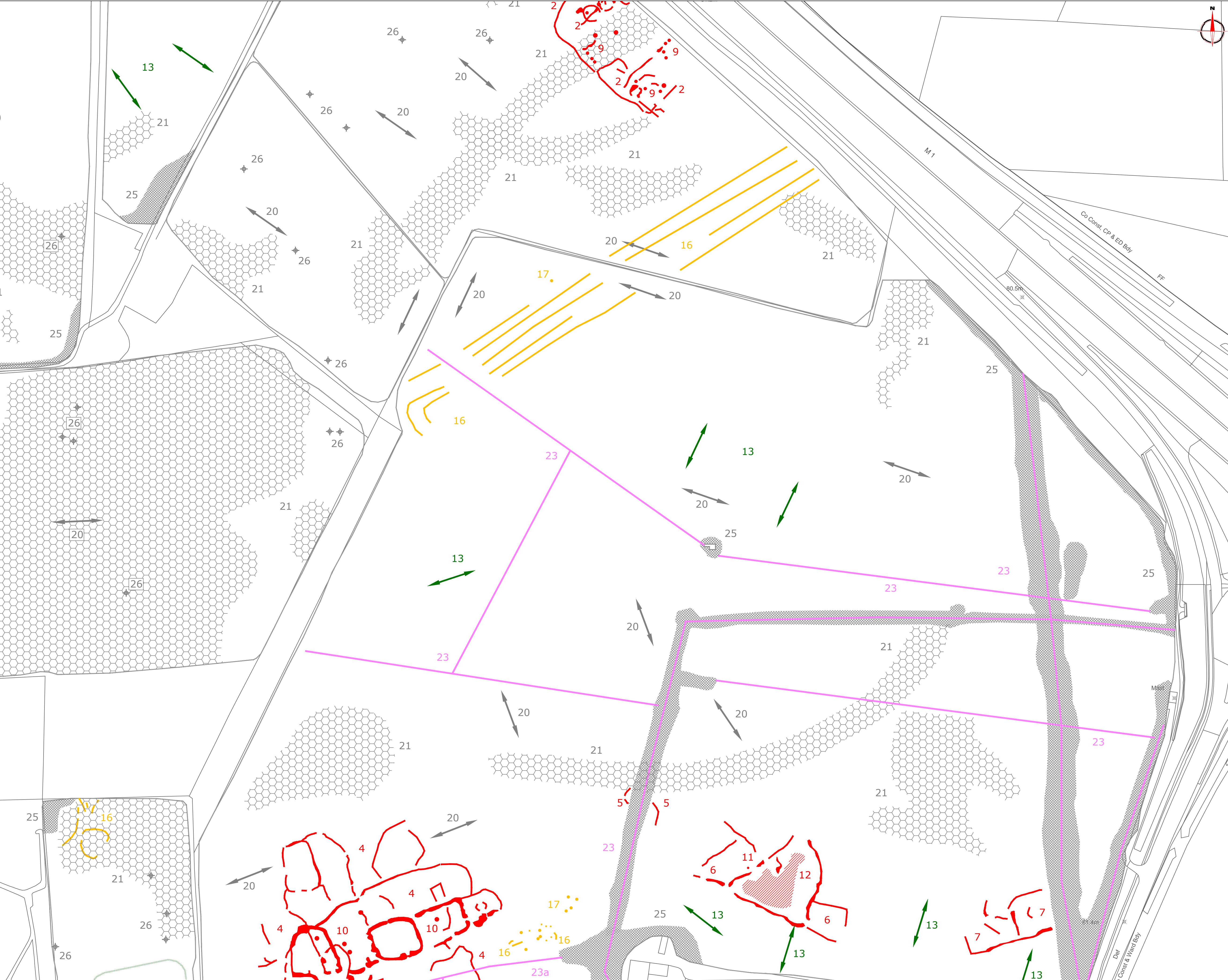
Checked by DGE

Issue No. 01

Date OCT 14

Drawn by TR

Figure No. 16



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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KEY

PROBABLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
- Linear anomaly likely to relate to a former field boundary not present on available mapping
- Scattered magnetic debris related to an enclosure present on available mapping pre-1900

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

OTHER ANOMALIES

- Linear anomaly related to a former field boundary present on available mapping post-1900
- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Magnetic disturbance related to a former pond present on available mapping
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike - probable ferrous object

Job No. J7118

Survey Date AUG 14

Client

CgMs CONSULTING LTD

Project Title

JUNCTION 15 OF M1, NORTHAMPTONSHIRE

Subject

INTERPRETATION - EAST

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T: 01684 592266 E: info@stratascan.co.uk www.stratascan.co.uk

EUROPEAN GPR ASSOCIATION

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ITMS ISO 14001 certified

Scale 1:1250

Plot A1

Date OCT 14

Checked by DGE

Drawn by TR

Issue No. 01

Figure No. 17



Amendments

Issue No.	Date	Description
-	-	-
-	-	-
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KEY

PROBABLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin
- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
- Linear anomaly likely to relate to a former field boundary not present on available mapping
- Scattered magnetic debris related to an enclosure present on available mapping pre-1900

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
- Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

OTHER ANOMALIES

- Linear anomaly related to a former field boundary present on available mapping post-1900
- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - possibly related to land drain
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Magnetic disturbance related to a former pond present on available mapping
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike - probable ferrous object

Job No. J7118

Survey Date AUG 14

Client

CgMs CONSULTING LTD

Project Title

JUNCTION 15 OF M1, NORTHAMPTONSHIRE

Subject

INTERPRETATION - SOUTH WEST

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VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
E: info@stratascan.co.uk
www.stratascan.co.uk

EUROPEAN GPR ASSOCIATION

SUMO GROUP MEMBER

ITS 150 years certified

ITS ISO 9001 certified

ITS ISO 14001 certified

Scale 1:1250

0m 10 20 30 40 50 60 70 80m

Plot A1

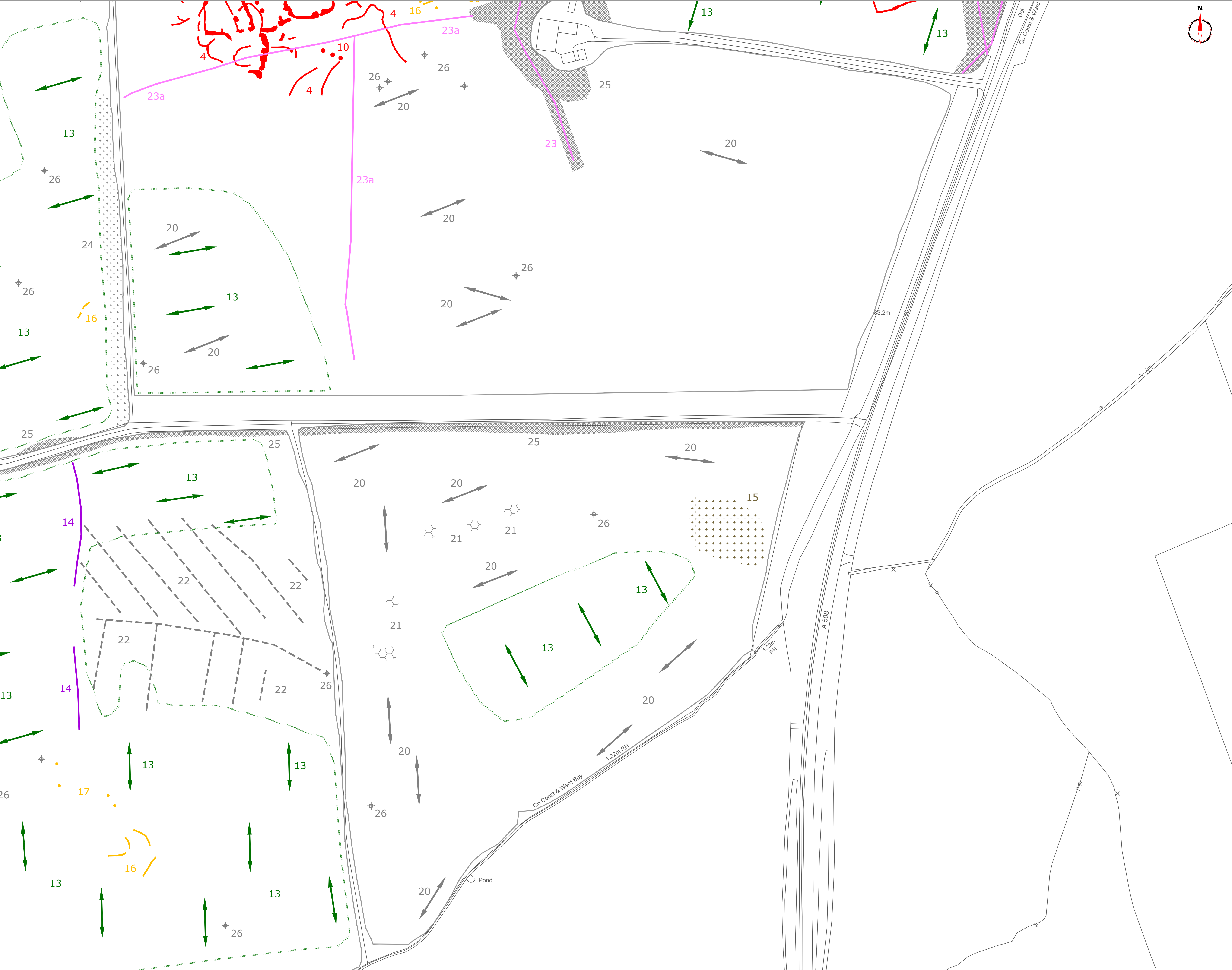
Checked by DGE

Issue No. 01

Date OCT 14

Drawn by TR

Figure No. 18



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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KEY

PROBABLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - probable cut feature of archaeological origin

Negative anomaly / weak negative anomaly - probable bank or earthwork of archaeological origin

Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow

Linear anomaly likely to relate to a former field boundary not present on available mapping

Scattered magnetic debris related to an enclosure present on available mapping pre-1900

POSSIBLE ARCHAEOLOGY

Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin

Negative anomaly / weak negative anomaly - possible bank or earthwork of archaeological origin

OTHER ANOMALIES

Linear anomaly related to a former field boundary present on available mapping post-1900

Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing

Linear anomaly - probably related to pipe, cable or other modern service

Linear anomaly - possibly related to land drain

Magnetic disturbance associated with nearby metal object such as service or field boundary

Magnetic disturbance related to a former pond present on available mapping

Scattered magnetic debris

Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin

Magnetic spike - probable ferrous object

Job No.

J7118

Survey Date

AUG 14

Client

Project Title

JUNCTION 15 OF M1,
NORTHAMPTONSHIRE

Subject

INTERPRETATION - SOUTH
EAST

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UPTON UPON SEVERN
WR8 0SA

T: 01684 592266
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Scale

0m 10 20 30 40 50 60 70 80m

1:1250

Plot

A1

Checked by

DGE

Issue No.

01

Date

OCT 14

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TR

Figure No.

19