GEOPHYSICAL SURVEY REPORT

STRATASCAN™

SUMO Survey Services
SUMO Group Member

Project name:

South East Canterbury, Kent

Client:

Archaeology South-East

October 2015

Job ref:

J8323

Report authors:

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GEOPHYSICAL SURVEY REPORT

Project name:
South East Canterbury, Kent
Client:
Archaeology South-East

Job ref:
J8323

Techniques:
Detailed magnetic survey – Gradiometry

Survey date:
10th August – 13th October 2015

Site centred at:
TR 165 562

Post code:
CT1 3EJ

Field team:
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1 SUMMARY OF RESULTS

A detailed gradiometry survey was conducted over approximately 228 hectares of mixed use agricultural land. Two areas of probable archaeology with various linear, point and amorphous anomalies appear in the north and centre of the site. Several more isolated features across the site are of possible archaeological origin.

A number of field boundaries and trackways cross the survey area, appearing on maps from 1888. Several more anomalies are probably associated with former field boundaries but do not appear on historic mapping. The line of a former railway crosses the southernmost field.

Areas of amorphous geological or pedological variation appear across the site and the remaining anomalies are all modern in origin and include land drains with associated disturbance and spikes, scattered debris; some of which is caused by 'green waste' fertilizer and general magnetic disturbance caused by nearby metallic objects

2 INTRODUCTION

2.1 *Background synopsis*

Stratascan were commissioned to undertake a geophysical survey of an area outlined for development under a new 'garden city' scheme. This survey forms part of an archaeological investigation being undertaken by Archaeology South-East.

2.2 *Site location*

The site is located south east of Canterbury and is bounded by the Canterbury-Dover Rail line to the north and the A2 to the south at OS ref. TR 165 562.

2.3 *Description of site*

The survey area is approximately 228 hectares of mixed agricultural use. The majority of the site is arable farmland, but several small areas were unsurveyable due to orchards, overgrown vegetation, car parks and buildings.

2.4 *Geology and soils*

The underlying geology is Margate Chalk Formation in the South western fields, Thanet Formation - sandstones in the centre, north and east of the site, and Seaford Chalk Formation along the eastern margin of the survey area (British Geological Survey website). The south and east of the site is overlain with Head deposits – clay and silt (British Geological Survey website).

The overlying soils are known as Coombe 1 and Hamble 1. Coombe 1 are typical brown calcareous earths consisting of fine silty soils over chalk. Hamble 1 are typical argillic brown earths consisting of fine silty or loamy soils over chalk (Soil Survey of England and Wales,

Sheet 6, South East England).

2.5 *Site history and archaeological potential*

A brief review of the Kent Environment Record (Pastscape, 2015), reveals that within 1km of the site there is evidence of settlement and industrial activity from at least the Bronze Age period, including quarry remains from the Bronze and Iron ages, buried Saxon items and a number of Medieval features including a cemetery and buildings with associated features. The site therefore has a medium potential for undiscovered archaeological remains.

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 Chartered 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. *Destripe* (Removes striping effects caused by zero-point discrepancies between different sensors and walking directions)
2. *Destagger* (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 'Abstraction and Interpretation of Anomalies' drawing for the site.

3 RESULTS

The detailed magnetic gradiometer survey conducted at Canterbury 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 A number of positive linear anomalies in the north-east of the site (Viewport 2). These are indicative of former cut features of archaeological origin and are likely to be related to an area of former settlement activity.

2 Two concentric linear anomalies near the centre of the site and an additional positive linear anomaly (Viewports 3 and 4). These are indicative of former cut features of archaeological origin and are likely representative of a former ditched enclosure.

3 A number of small discrete positive anomalies in the north-east of the site (Viewport 2). These are indicative of small former cut features such as backfilled pits and are associated with the settlement activity evidenced by Anomaly 1.

4 A small number of positive area anomalies in the north-east of the site. These are indicative of former cut features of archaeological origin and are likely to be related to the settlement activity evidenced through Anomalies 1 and 3.

3.2 Possible Archaeology

5 A number of positive linear anomalies in the north and south of the site (Viewports 2 and 8). These are indicative of former cut features of possible archaeological origin, though their exact origin cannot be determined with confidence.

6 A number of small discrete positive anomalies across the north-east and centre of the site (Viewports 2, 3, 4, 5 and 6). These are indicative of small former cut features, such as backfilled pits, and may be of archaeological or natural origin.

7 A small negative linear anomaly in the south of the site (Viewport 6 and 8) This is indicative of a former bank or earthwork and may be of archaeological or natural origin.

3.3 Medieval/Post-Medieval Agriculture

8 A number of closely spaced parallel linear anomalies across the site. These are related to modern agricultural activity, such as ploughing.

9 A number of positive linear anomalies across the survey area. These are related to former field boundaries visible on available OS mapping from 1888.

10 An area of scattered magnetic debris in Viewports 4, 5 and 7. This is related to a former field boundary present on available OS mapping from 1888.

11 A number of positive linear anomalies across the site. These are likely to be related to former field boundaries but are not present on available mapping.

12 A series of magnetic spikes in the south-west of the site (Viewports 5 and 7). These are likely to be related to a former field boundary that is not present on available mapping.

3.4 Other Anomalies

13 A large number of strong bipolar linear anomalies across the site. These are related to land drains.

14 Areas of magnetic disturbance across the site. These are related to the land drains evidenced through Anomaly 13.

15 A number of magnetic spikes across the site. These are likely to be related to the land drains evidenced through Anomalies 13.

16 Large areas of scattered magnetic debris in the west of the site (Viewports 5 and 7). These are likely to be related to modern 'green waste' fertilizers which have been spread across the fields.

17 A number of linear anomalies across the site (Viewports 1, 2, 3 and 5). These are of unknown origin but are likely to be related to modern activity.

18 Areas of scattered magnetic debris in the north and south of the site (Viewports 2 and 7). These are related to former track-ways that are visible on available OS mapping from 1888.

19 An area of scattered magnetic debris in the south-east of the site (Viewport 8). This is related to a former railway embankment visible on available OS mapping from 1888.

20 A number of areas of scattered magnetic debris across the site (Viewports 2, 4, 5, 7 and 8). These are likely to be modern in origin.

21 A number of areas of amorphous magnetic variation across the site. These are likely to be natural in origin.

22 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.

23 A number of magnetic 'spikes' (strong focussed values with associated antipolar response) indicate ferrous metal objects. These are likely to be modern rubbish.

4 DATA APPRAISAL & CONFIDENCE ASSESSMENT

Chalk geologies typically give a good response to magnetometer survey and sandstone gives a more variable response. Despite the mixed geologies in the survey area a large number and variety of anomalies have been detected across the site including a number of archaeological features. Some of these anomalies appear faint in a uniform background response, meaning it is not possible to completely discount weaker archaeological anomalies being masked by geological effects. Two of the western fields (Viewport 5) contain an abundance of 'green waste' fertilizer which creates a chaotic effect in the data. It is possible that underlying anomalies have been masked in these locations. However in the rest of the site it is likely that the survey has been effective in identifying any features of archaeological origin.

5 CONCLUSION

The survey conducted south east of Canterbury has revealed a number of probable and possible archaeological features. A large collection of probable cut features in the north east of the site could represent former settlement activity with some associated pits. Several weaker features in the same area are of possible archaeological origin but could also be agricultural in nature. A pair of concentric linear features in the centre of the site are probably associated with a former ditched enclosure and an isolated negative anomaly in the south of the site is possibly indicative of a former earthwork but could be natural or agricultural in origin.

Several linear anomalies and some scattered debris are associated with former field boundaries visible on OS mapping from 1888. The line of a former railway crosses the southernmost field and two former trackways appear in the north and south of the survey area. Several other linear features and one line of point anomalies are probably caused by former field boundaries but they do not appear on available historic mapping.

Areas of amorphous magnetic variation appear across the site and are caused by underlying geology or pedology. The remaining anomalies are all modern in origin and include land drains with associated disturbance and spikes which are widespread across the survey area, scattered debris; some of which is caused by ‘green waste’ fertilizer and general magnetic disturbance caused by nearby metallic objects.

6 REFERENCES

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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.

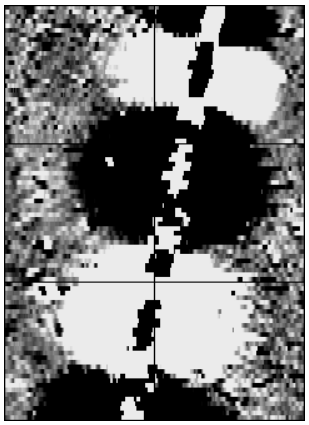
Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement 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.

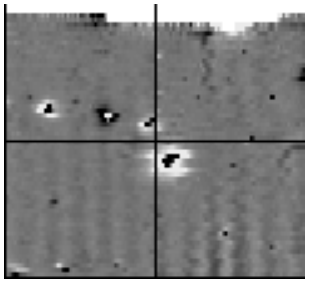
APPENDIX C – GLOSSARY OF MAGNETIC ANOMALIES

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

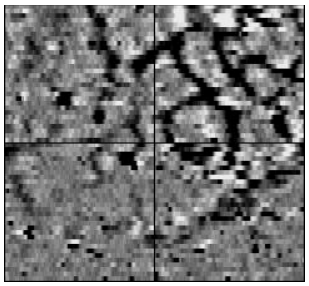


This consists of a single positive anomaly with an associated negative response. There should be no separation between the two polarities of response. These responses will be created by a single feature. The interpretation of the anomaly will depend on the magnitude of the magnetic measurements. A very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

Positive anomaly with associated negative response

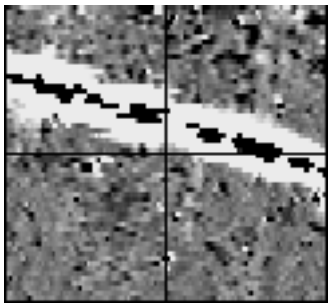
See bipolar and dipolar.

Positive linear



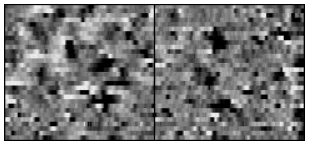
A linear response which is entirely positive in polarity. These are usually related to in-filled cut features where the fill material is magnetically enhanced compared to the surrounding matrix. They can be caused by ditches of an archaeological origin, but also former field boundaries, ploughing activity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

Positive linear anomaly with associated negative response



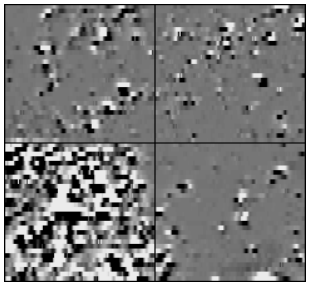
A positive linear anomaly which has a negative anomaly located adjacently. This will be caused by a single feature. In the example shown this is likely to be a single length of wire/cable probably relating to a modern service. Magnetically weaker responses may relate to earthwork style features and field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

Positive point/area



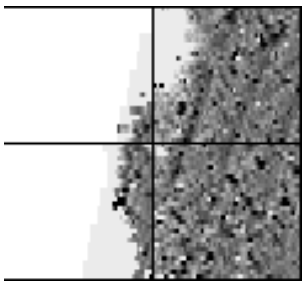
These are generally spatially small responses, perhaps covering just 3 or 4 reading nodes. They are entirely positive in polarity. Similar to positive linear anomalies they are generally caused by in-filled cut features. These include pits of an archaeological origin, possible tree bowls or other naturally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

Magnetic debris



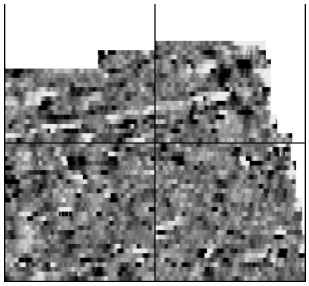
Magnetic debris consists of numerous dipolar responses spread over an area. If the amplitude of response is low (+/-3nT) then the origin is likely to represent general ground disturbance with no clear cause, it may be related to something as simple as an area of dug or mixed earth. A stronger anomaly (+/-250nT) 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

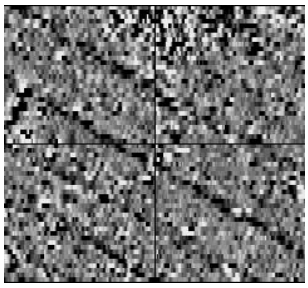


A linear response which is entirely negative in polarity. These are generally caused by earthen banks where material with a lower magnetic magnitude relative to the background top soil is built up. See also ploughing activity.

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).

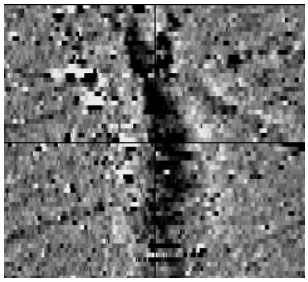
Strength of response

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 10m^2 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.

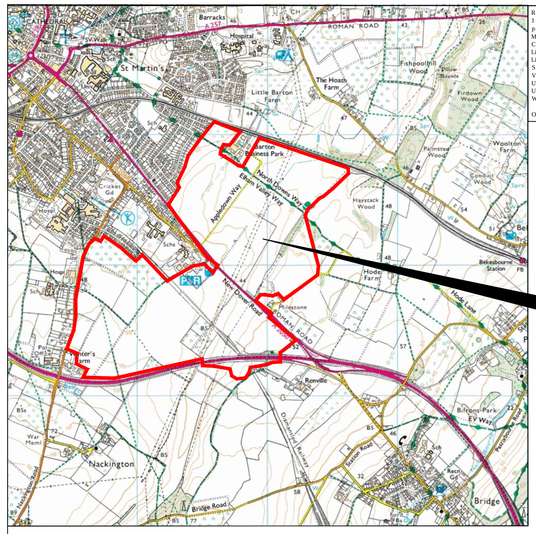
Thermoremanent response

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.



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Licence No: AL 50125A
Licencee:
Stratascan Ltd.
Vineyard House
Upper Hook Road
Upton Upon Severn
WR8 0SA

OS 100km square = TR

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Site centred on NGR TR 165 562

OS REFERENCING INFORMATION

1	616547.86, 157012.50	21	616667.86, 156352.50
2	616727.86, 157012.50	22	616667.86, 156082.50
3	616427.86, 156862.50	23	616607.86, 155932.50
4	616427.86, 156352.50	24	616607.86, 155632.50
5	616667.86, 156712.50	25	616667.86, 155512.50
6	616667.86, 156412.50	26	617087.86, 155512.50
7	616877.88, 156832.50	27	616547.86, 155332.50
8	616877.88, 156742.50	28	616727.86, 155332.50
9	617057.86, 156922.50	29	616787.86, 155242.50
10	617057.86, 156622.50	30	616787.86, 155152.50
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13	617147.86, 156652.50	33	615737.86, 155662.50
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19	616817.86, 156232.50	39	615707.86, 156022.50
20	616817.86, 155902.50	40	616067.86, 156022.50

Unsurveyable - Overgrown vegetation or trees

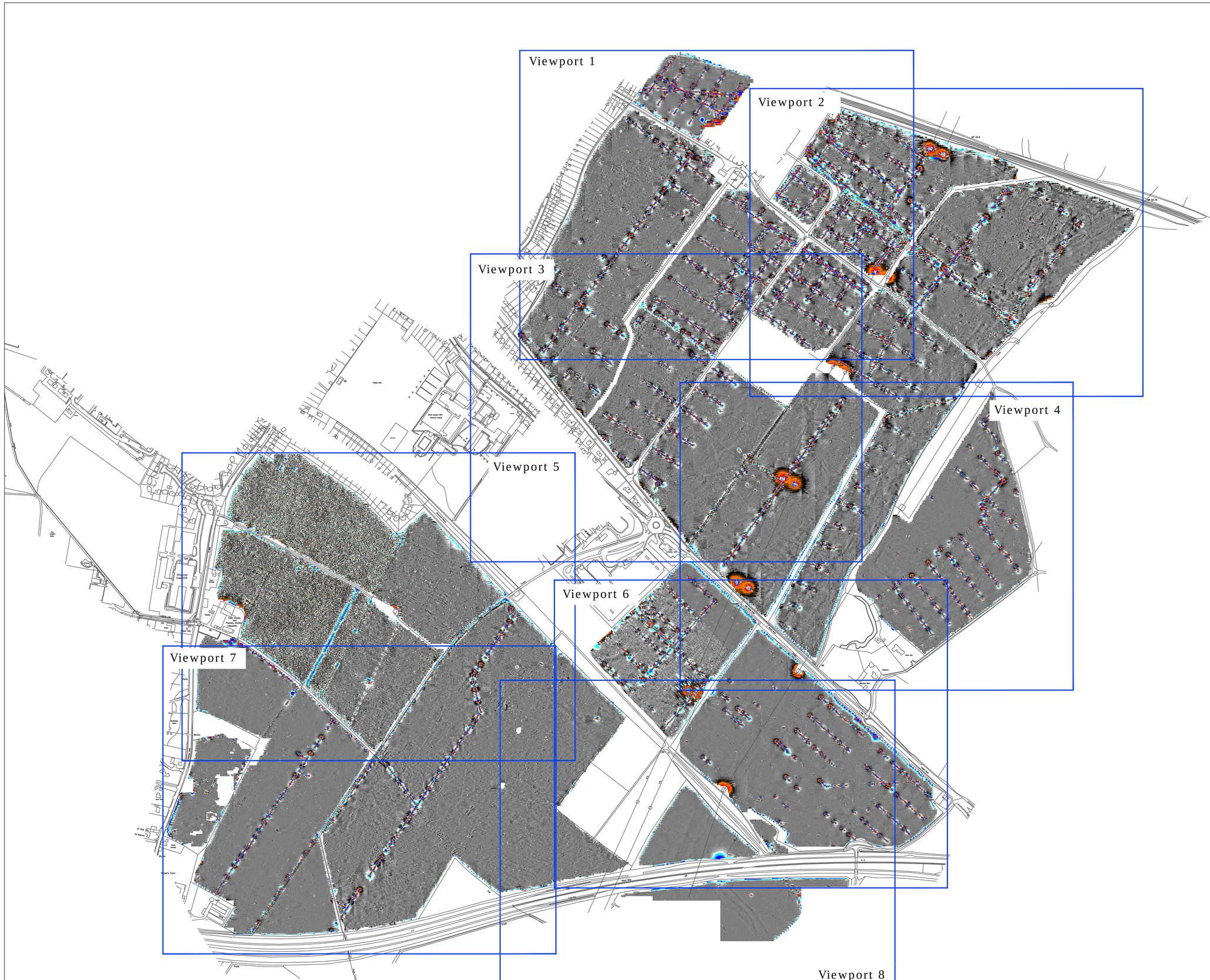
Unsurveyable - Orchards

Unsurveyable - Car parks or buildings

Job No.	8323
Survey Date	AUG 15
Client	ARCHAEOLOGY SOUTH-EAST
Project Title	GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT
Subject	SITE LOCATION, SURVEY AREA & REFERENCING

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 1:4000	0m 30 60 90 120 150 180m	
Plot A1	Checked by DGE	Issue No. 01
Date OCT 15	Drawn by JHS	Figure No. 01



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - OVERVIEW

STRATASCAN™
GEOPHYSICS FOR ARCHAEOLOGY AND ENGINEERING
VINEYARD HOUSE
UPTON UPON SEVERN
WR8 0SA
T: 01684 592266
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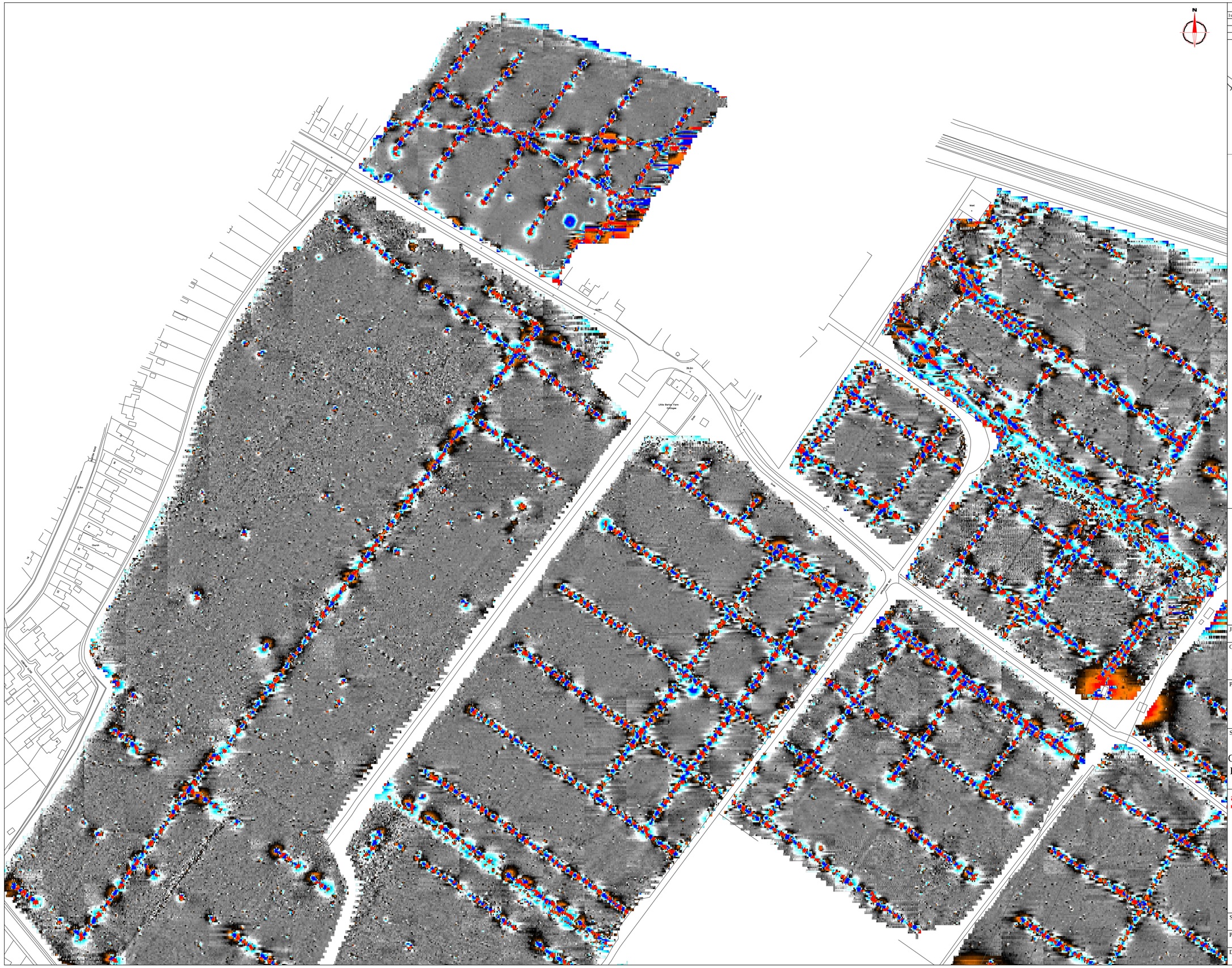
SUMO GROUP MEMBER

Scale 1:4000 (0m 30 60 90 120 150 180m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD	02



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 1

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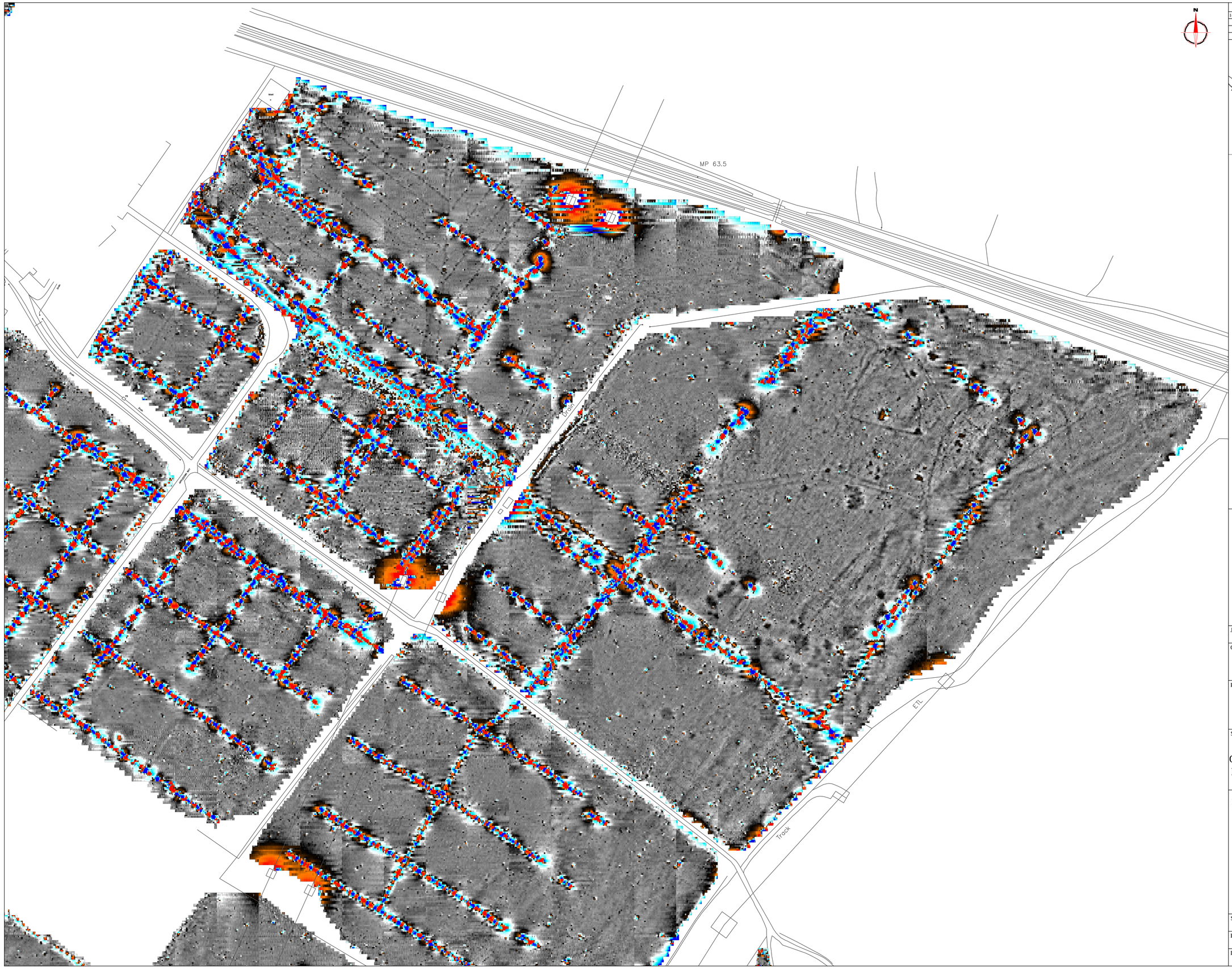
SUMO GROUP MEMBER

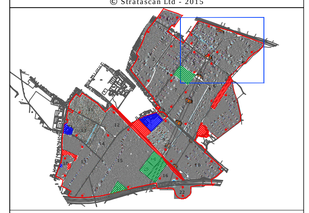
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	03



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client: ARCHAEOLOGY SOUTH-EAST

Project Title: GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject: COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 2

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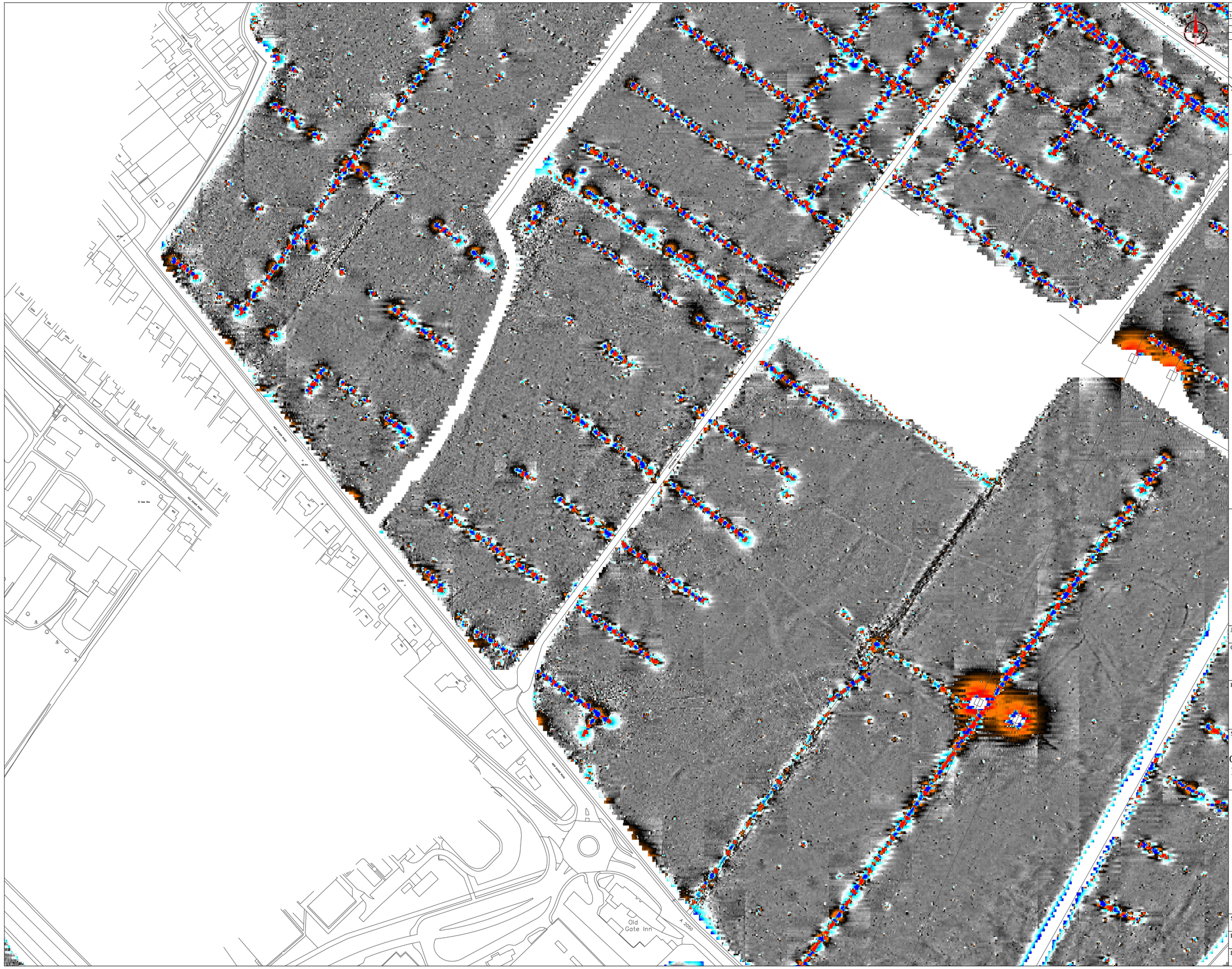
SUMO GROUP MEMBER

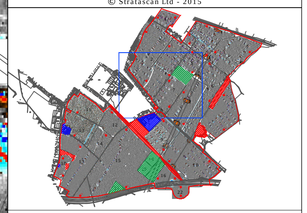
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	04



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 3

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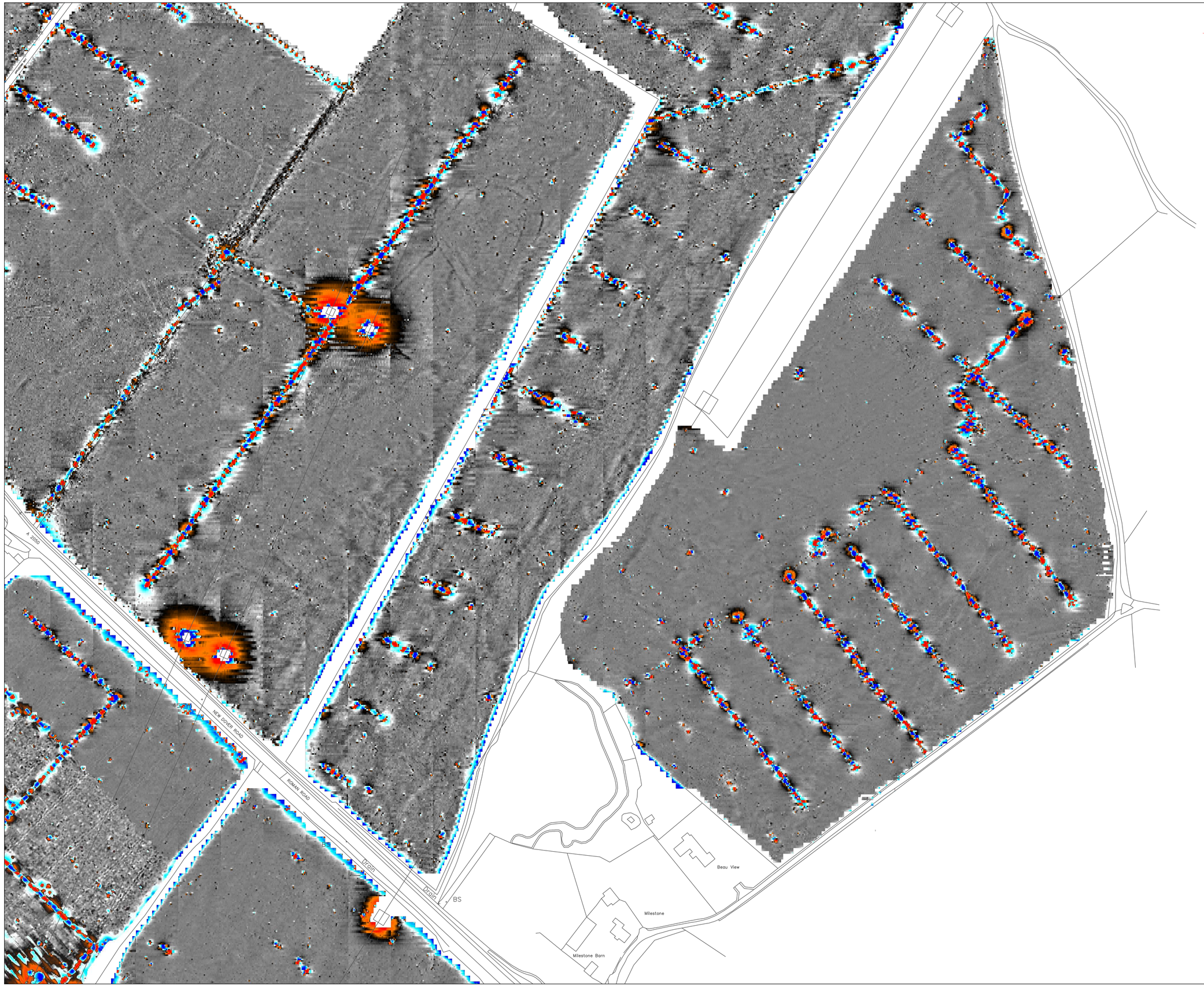
SUMO GROUP MEMBER

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 15	RD/JHS	05



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 4

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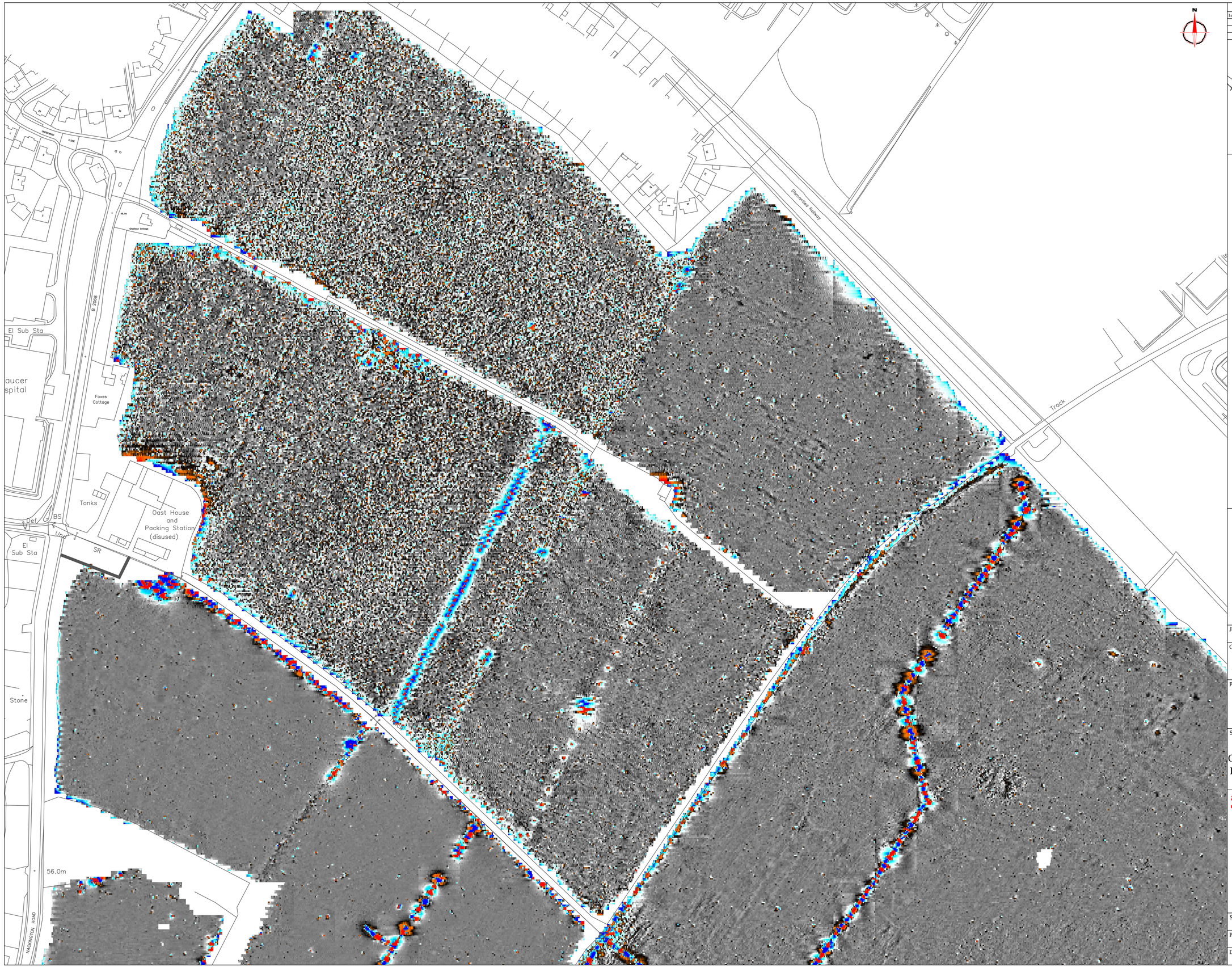
SUMO GROUP MEMBER

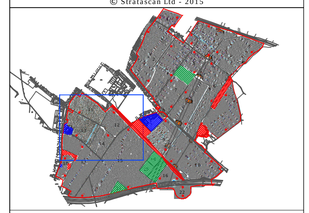
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	06



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 5

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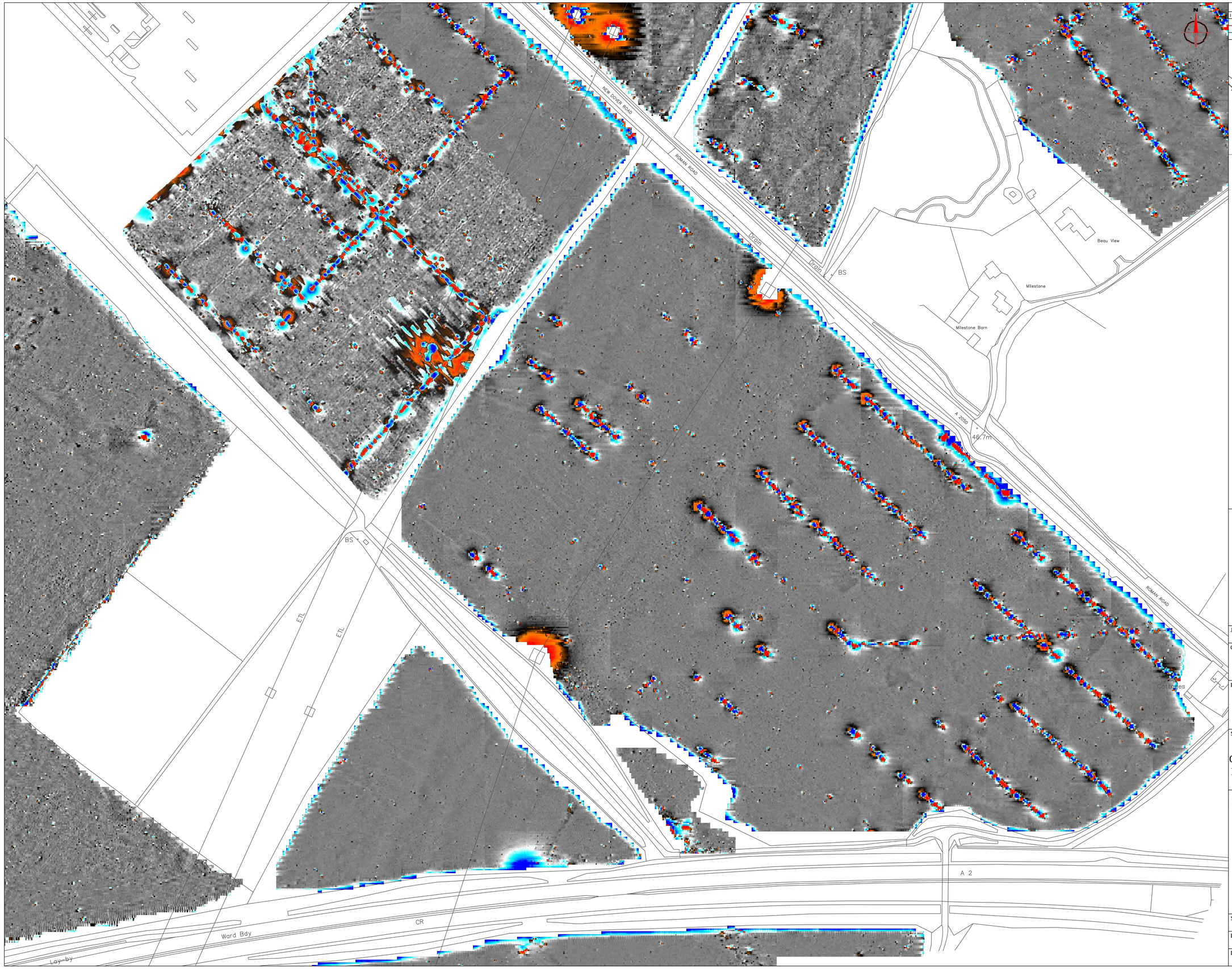
SUMO GROUP MEMBER

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 15	RD/JHS	07



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 6

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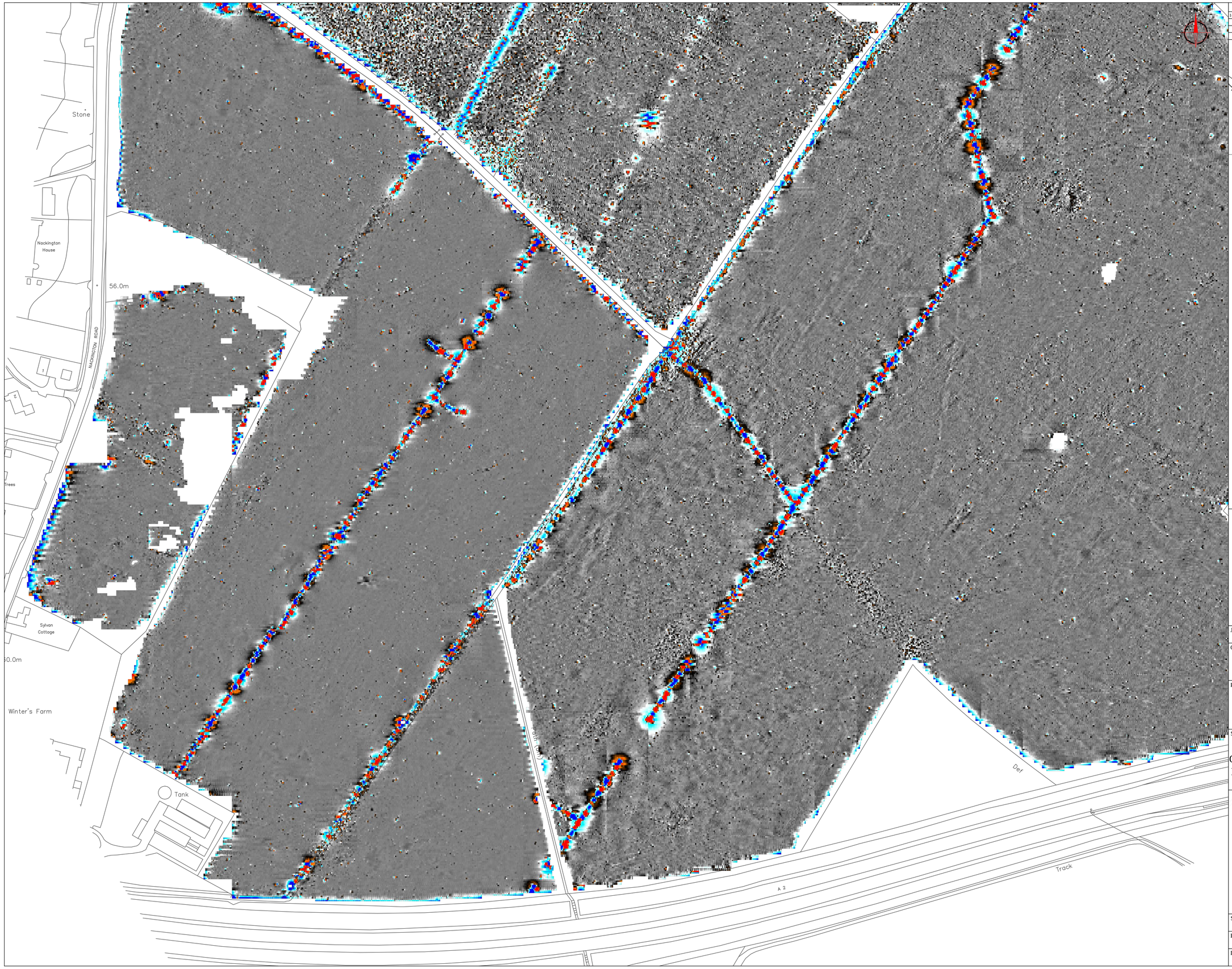
SUMO GROUP MEMBER

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 15	RD/JHS	08



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 7

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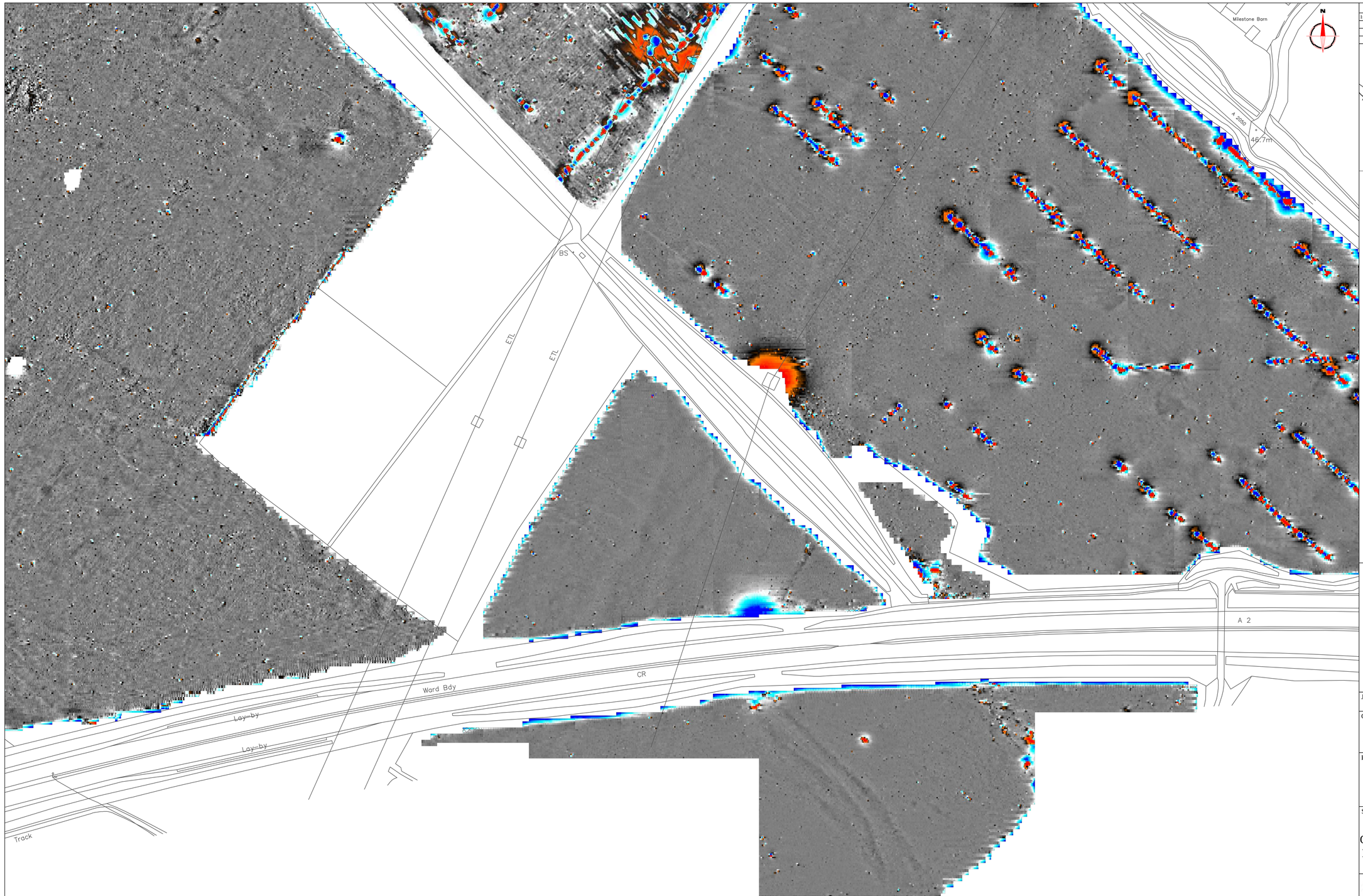
SUMO GROUP MEMBER

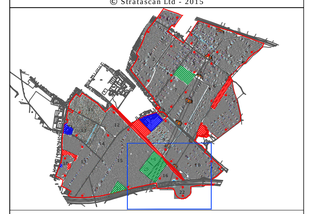
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	09



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



Plotting parameters

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

+100nT
+25nT
+3nT
-3nT
-25nT
-100nT

Job No.	Survey Date
8323	AUG 15

Client: ARCHAEOLOGY SOUTH-EAST

Project Title: GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject: COLOUR PLOT OF GRADIOMETER DATA SHOWING EXTREME VALUES - VIEWPORT 8

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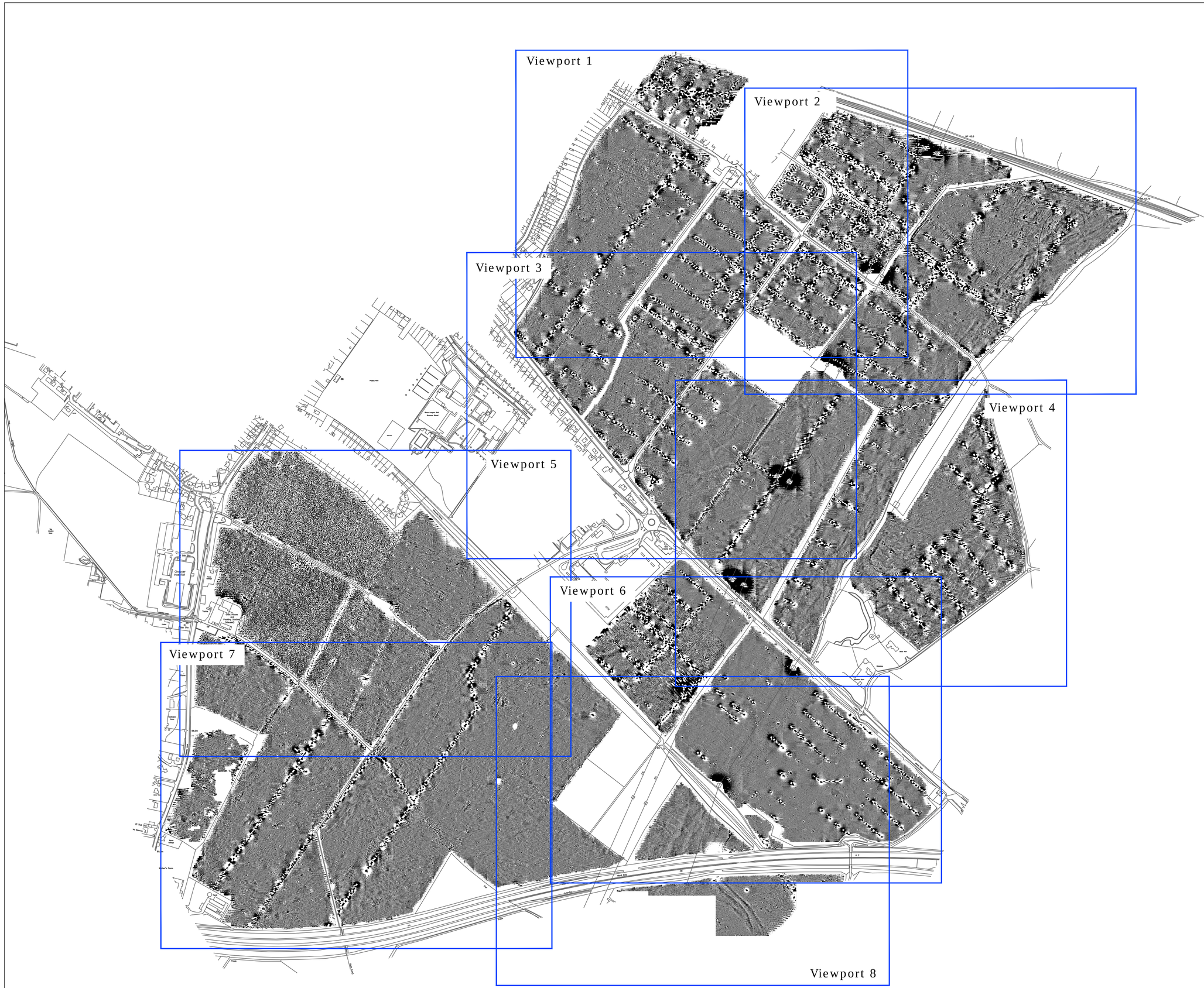
SUMO GROUP MEMBER

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 15	RD/JHS	10



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - OVERVIEW

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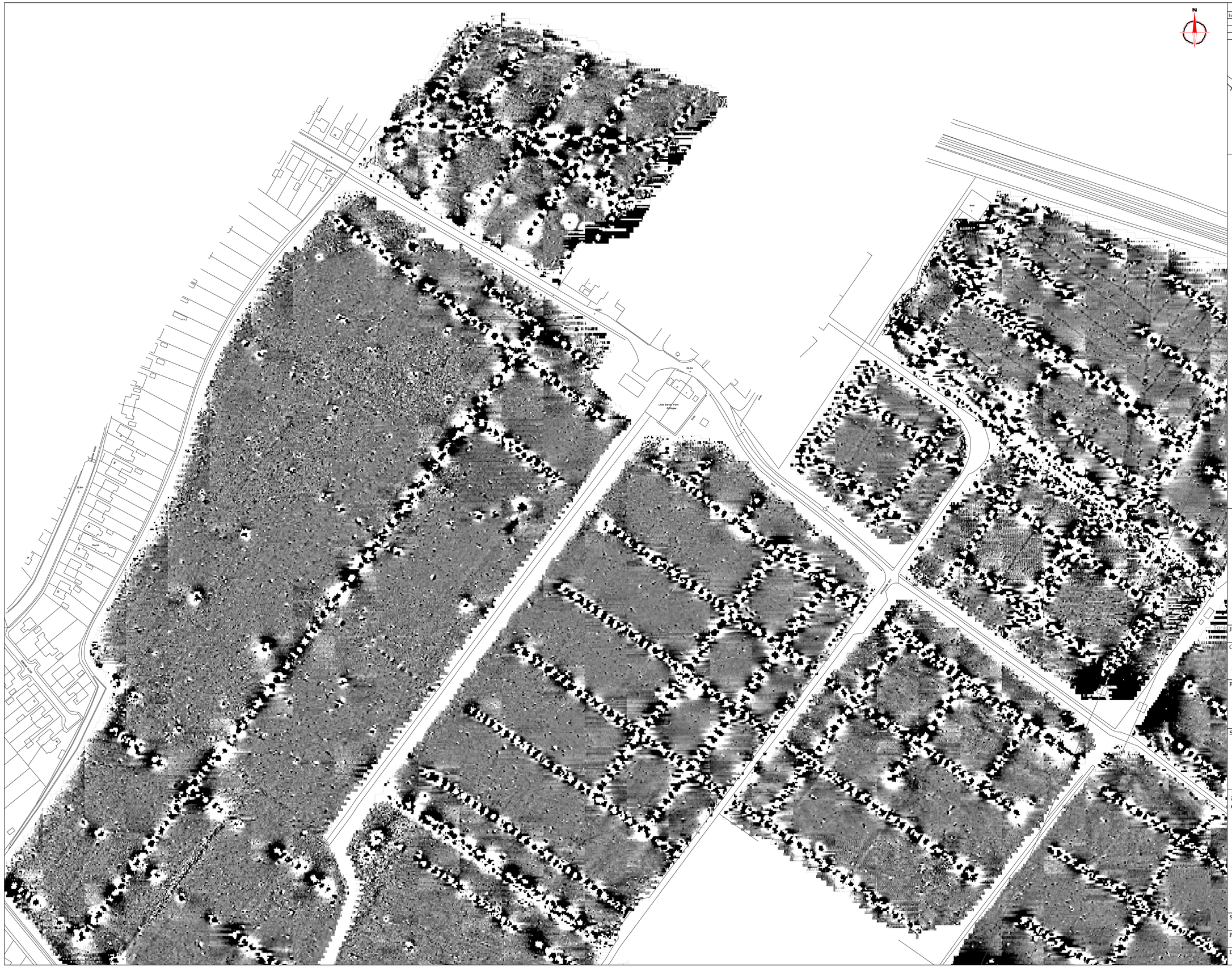
SUMO GROUP MEMBER

Scale 1:4000 (0m 30 60 90 120 150 180m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD	11



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 1

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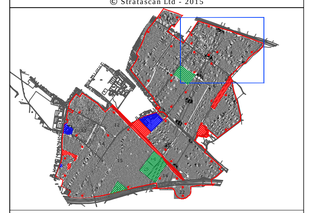
SUMO GROUP MEMBER

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 15	RD/JHS	12

Amendments

Issue No.	Date	Description
-	-	-
-	-	-



+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 2

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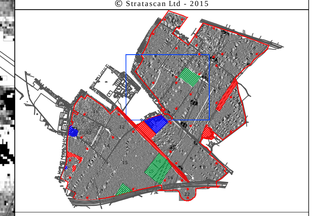
SUMO GROUP MEMBER

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 15	RD/JHS	13

Amendments

Issue No.	Date	Description
-	-	-
-	-	-



+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 3

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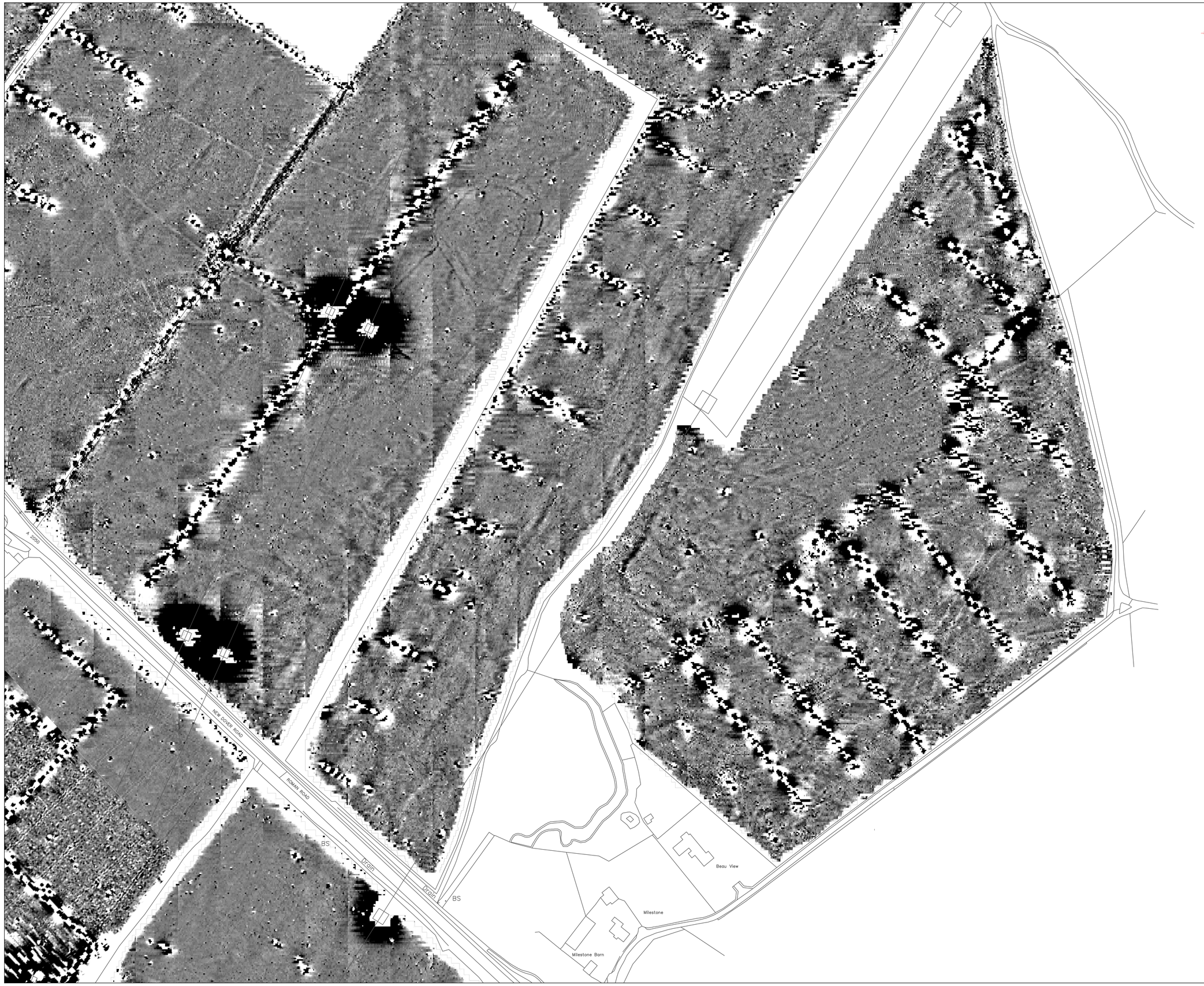
SUMO GROUP MEMBER

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 15	RD/JHS	14



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 4

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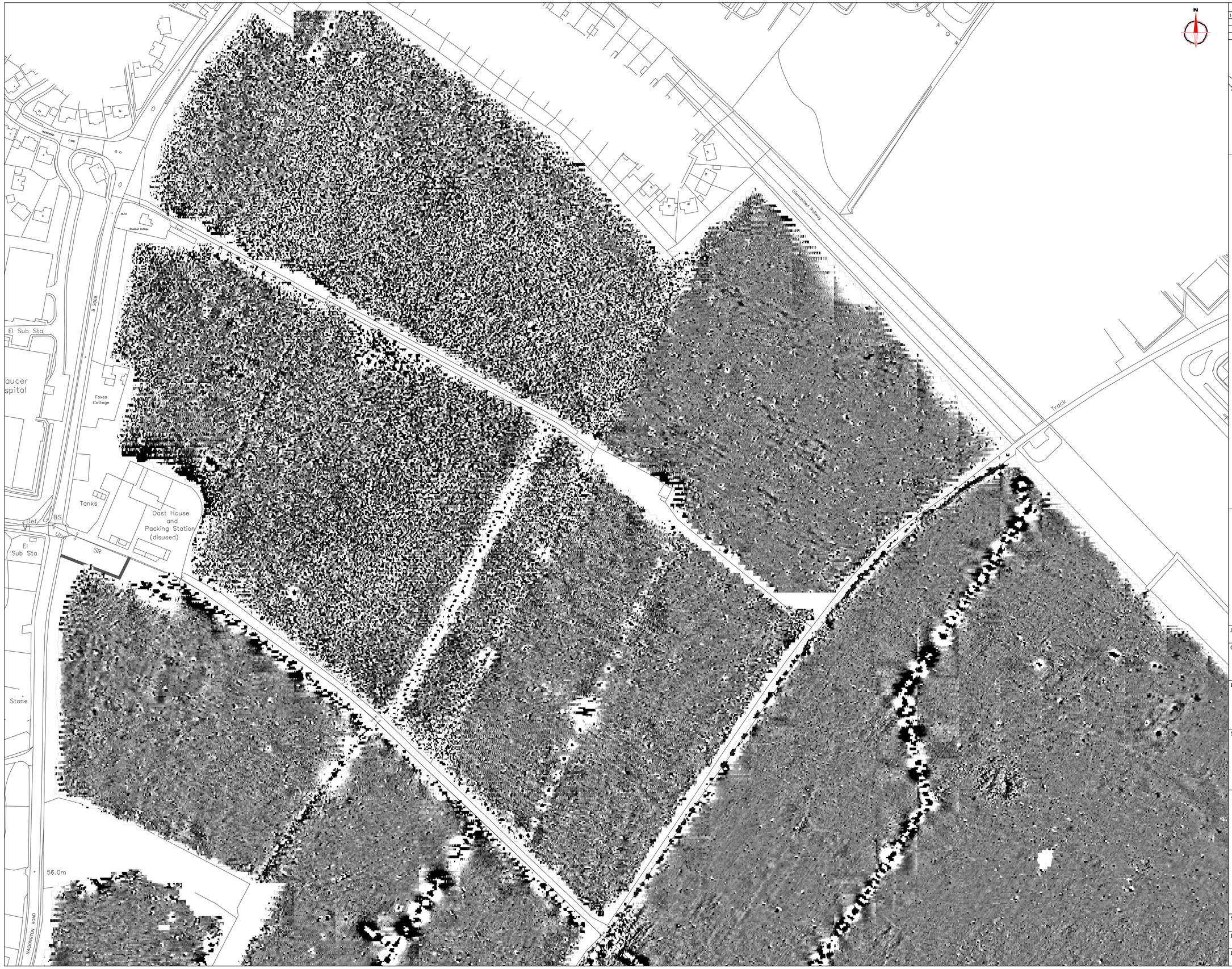
SUMO GROUP MEMBER

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 15	RD/JHS	15



Amendments

Issue No.	Date	Description
-	-	-
-	-	-

+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 5

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SUMO GROUP MEMBER

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 15	RD/JHS	16

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 6

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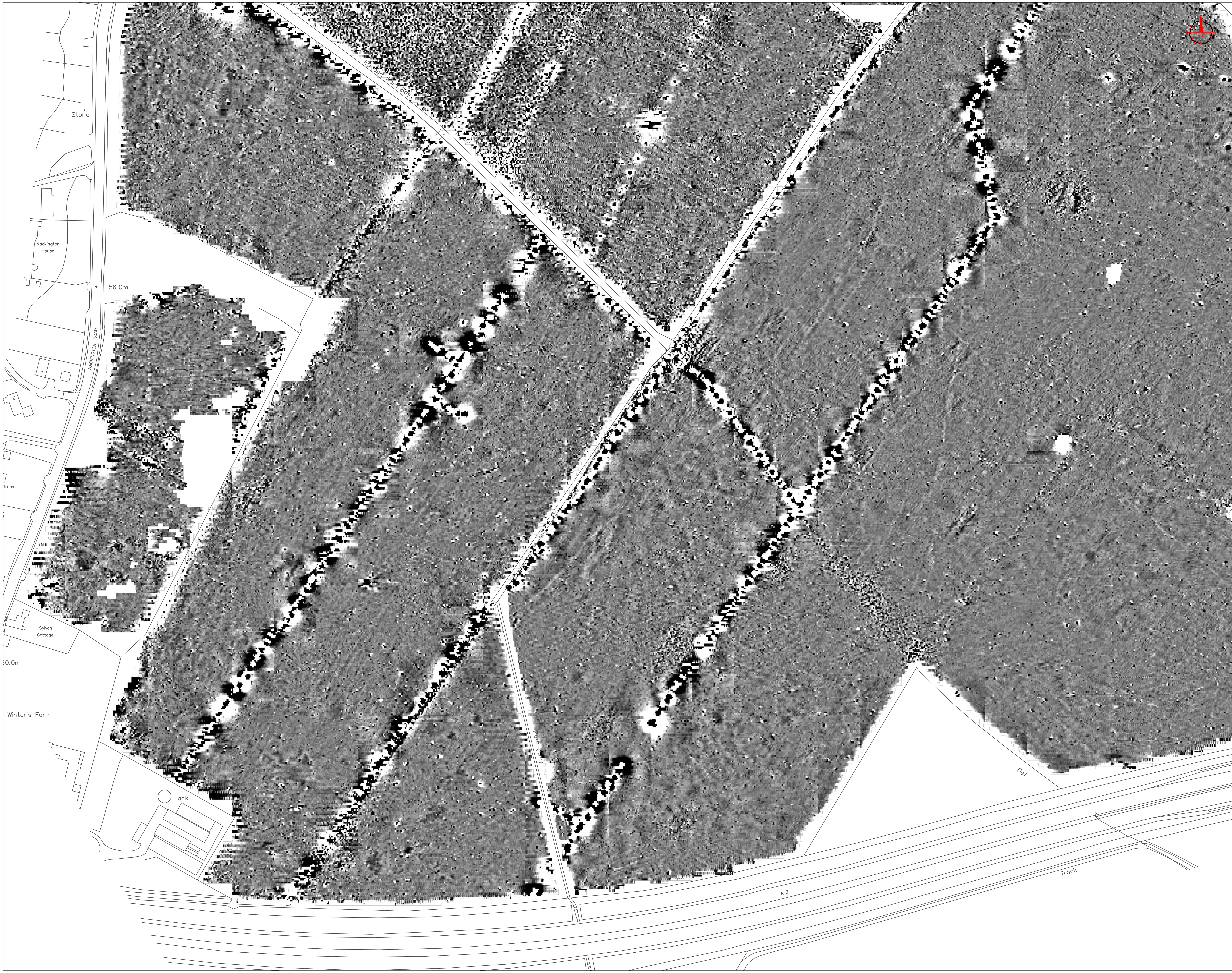
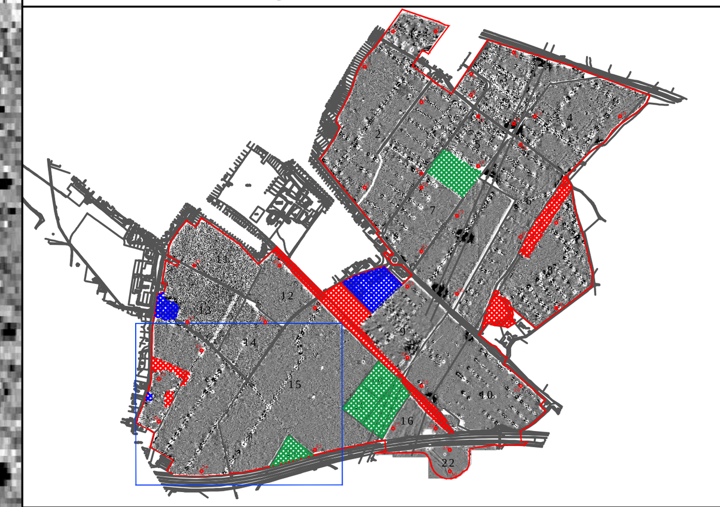
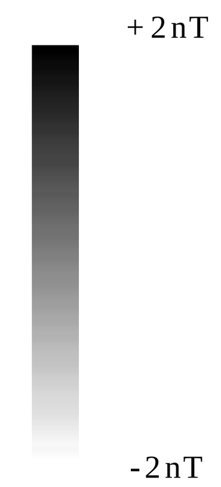
SUMO GROUP MEMBER

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 15	RD/JHS	17







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

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 7

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SUMO GROUP MEMBER

Scale 1:1250

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD/JHS	18

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

+2nT

-2nT

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

PLOT OF MINIMALLY PROCESSED GRADIOMETER DATA - VIEWPORT 8

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SUMO GROUP MEMBER

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 15	RD/JHS	19

Viewport 1

Viewport 2

Viewport 3

Viewport 4

Viewport 5

Viewport 6

Viewport 7

Viewport 8

Amendments

Issue No.	Date	Description
-	-	-
-	-	-

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

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

MEDIEVAL/POST-MEDIEVAL AGRICULTURE

- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - related to a former field boundary present on available mapping
- Linear anomaly - probably related to a former field boundary not present on available mapping
- Magnetic spike - likely related to a former field boundary not present on available mapping

OTHER ANOMALIES

- Linear anomaly - probably related to pipe, cable or other modern service
- Linear anomaly - related to land drain
- Linear anomaly - unknown origin, likely to be modern
- Magnetic disturbance related to modern track-way
- Magnetic disturbance associated with land drains
- Magnetic disturbance associated with nearby metal object such as service or field boundary
- Magnetic disturbance associated with former railway line and embankment
- Strong magnetic debris - possible disturbed or made ground
- Scattered magnetic debris - likely to be related to modern 'green waste' fertilizer
- Scattered magnetic debris - related to former track-way present on available mapping
- Scattered magnetic debris - related to former field boundary present on available mapping
- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - OVERVIEW

STRATASCAN™
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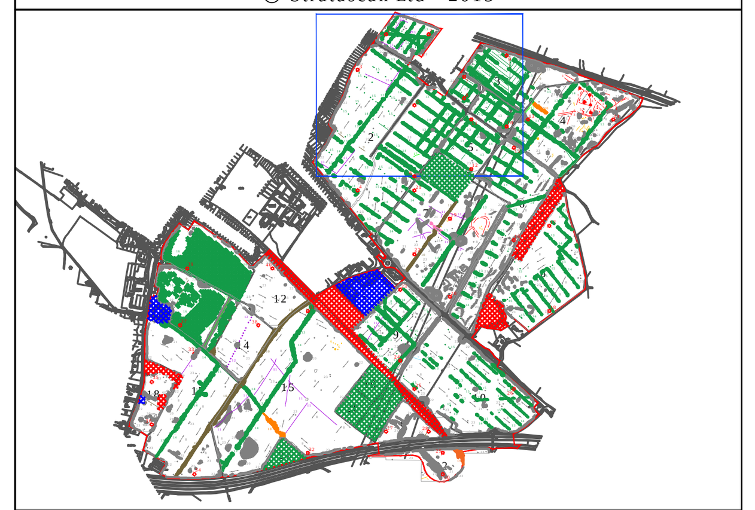
Scale 1:4000 (0m 30 60 90 120 150 180m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD	20

Amendments

Issue No.	Date	Description
-	-	-
-	-	-



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

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

MEDIEVAL/POST-MEDIEVAL AGRICULTURE

- Widely spaced curving parallel linear anomalies - probably related to ridge-and-furrow
- Closely spaced parallel linear anomalies - probably related to agricultural activity such as ploughing
- Linear anomaly - related to a former field boundary present on available mapping
- Linear anomaly - probably related to a former field boundary not present on available mapping
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- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 1

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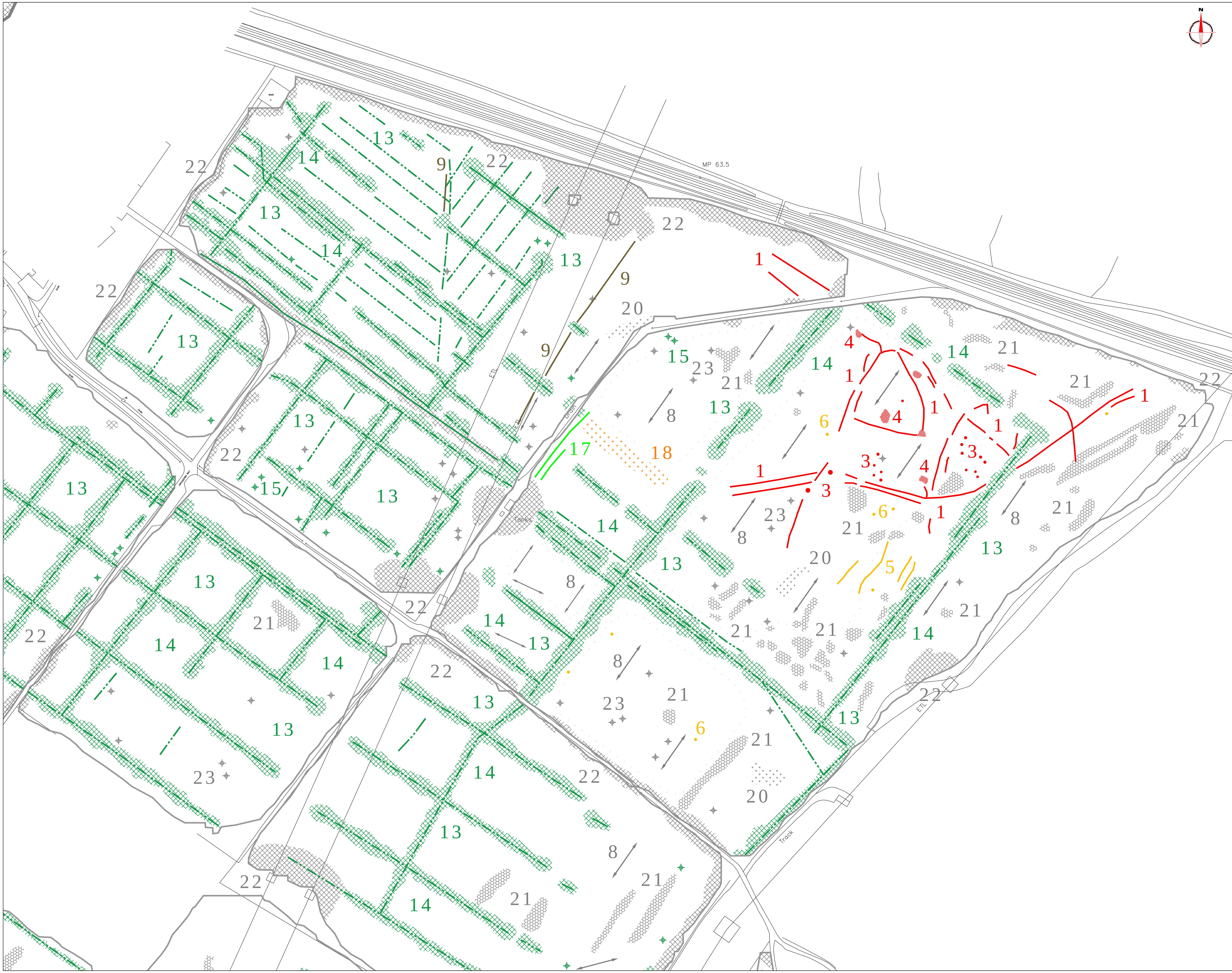
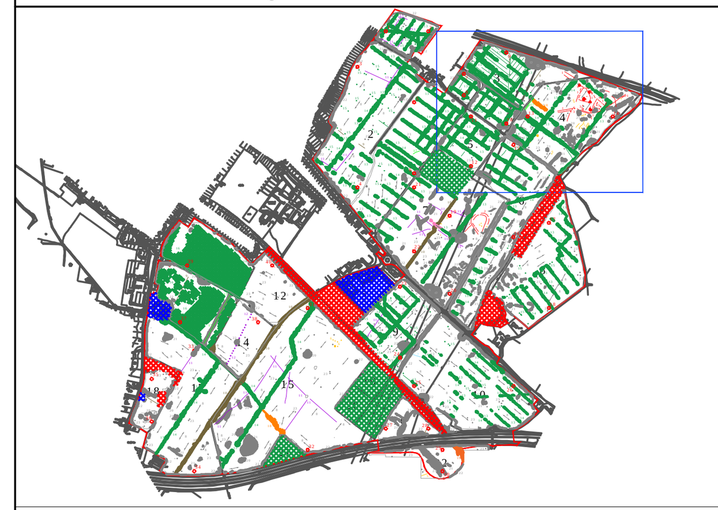
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD/JHS	21



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



PROBABLE ARCHAEOLOGY

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- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 2

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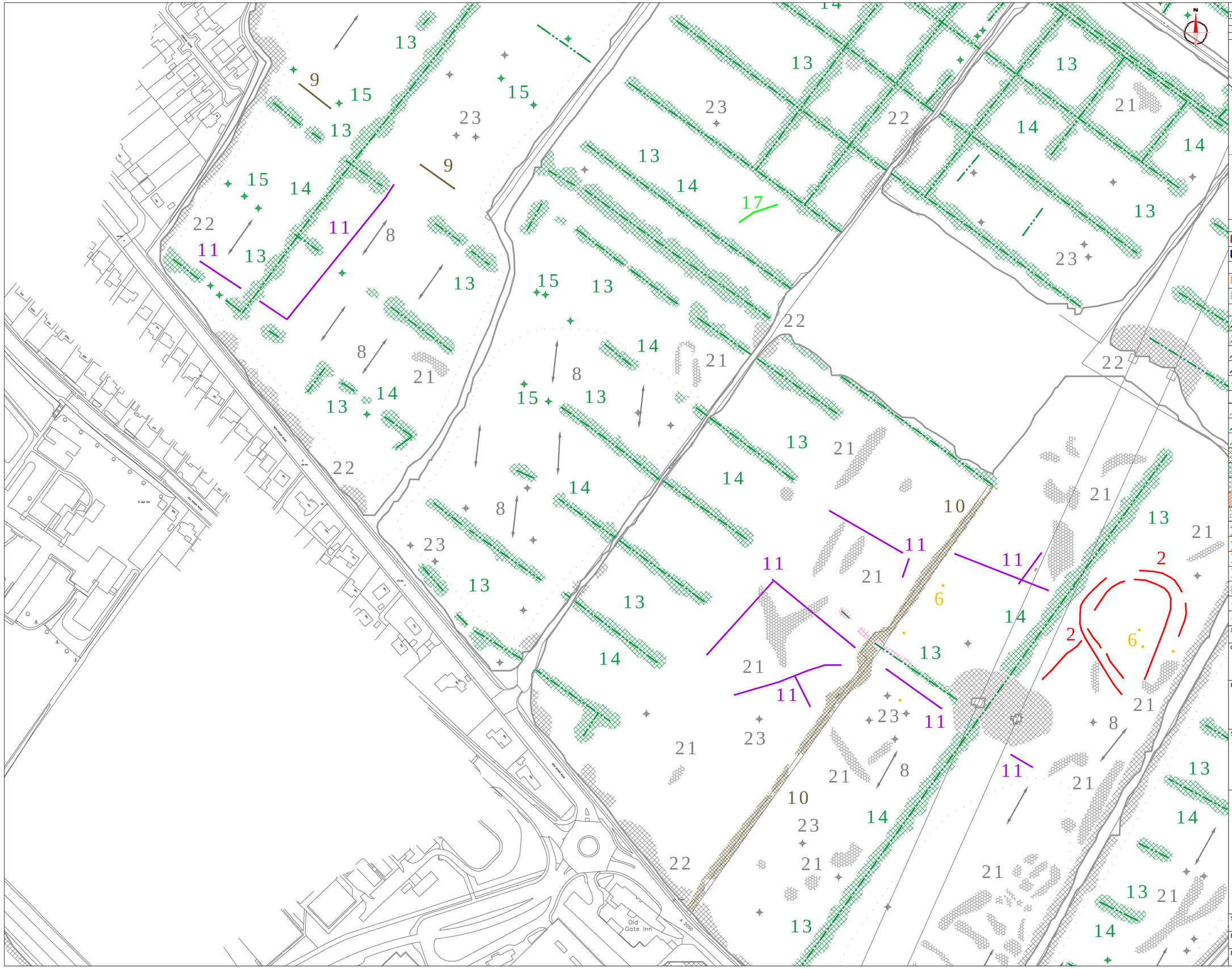
SUMO GROUP MEMBER

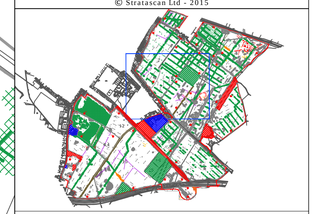
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD/JHS	22



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



PROBABLE ARCHAEOLOGY

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

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
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- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 3

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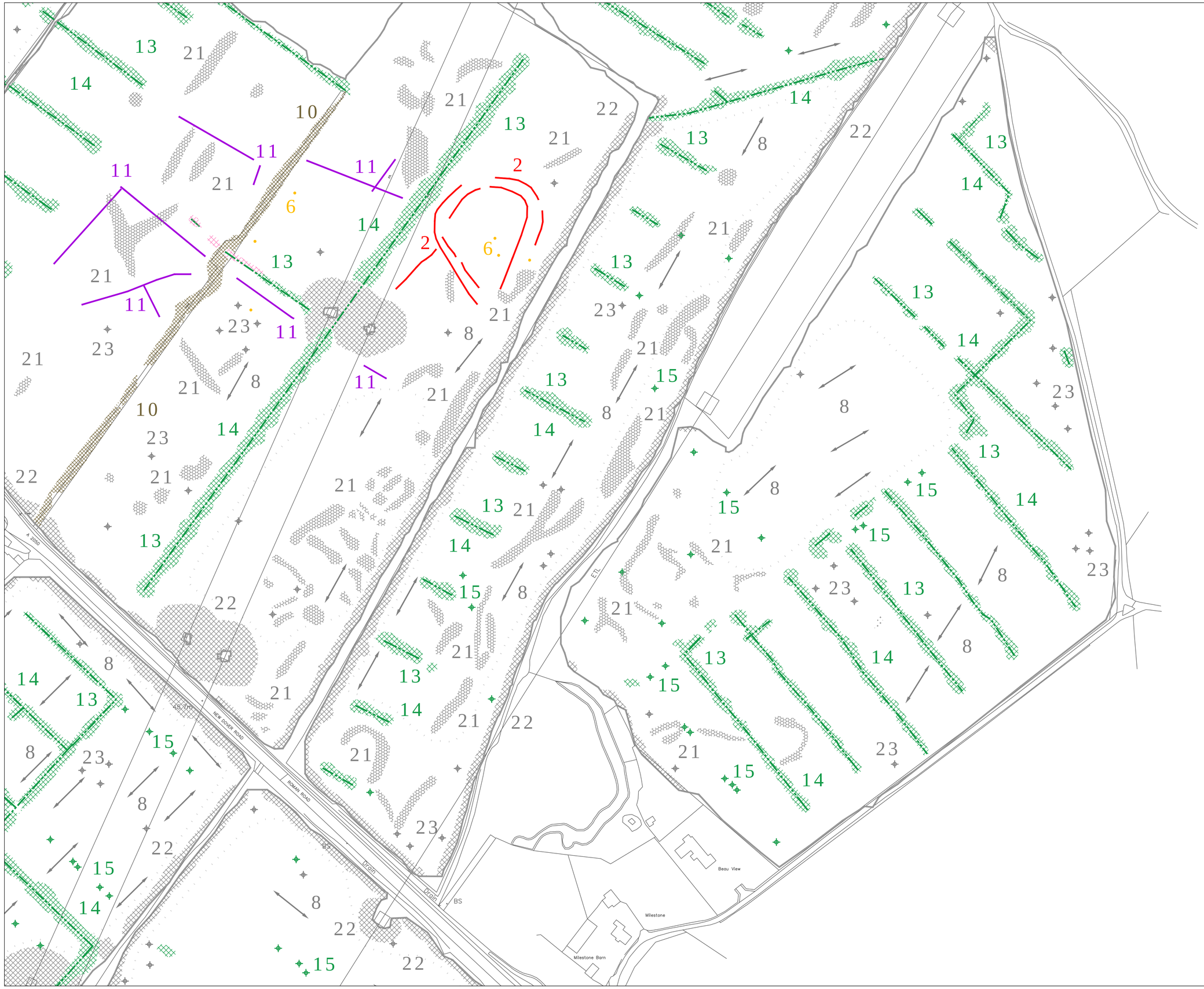
SUMO GROUP MEMBER

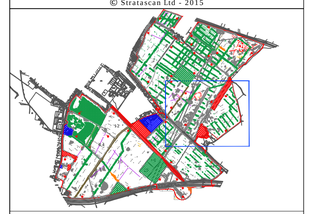
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD/JHS	23



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



PROBABLE ARCHAEOLOGY

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

POSSIBLE ARCHAEOLOGY

- Positive anomaly / weak positive anomaly - possible cut feature of archaeological origin
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- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 4

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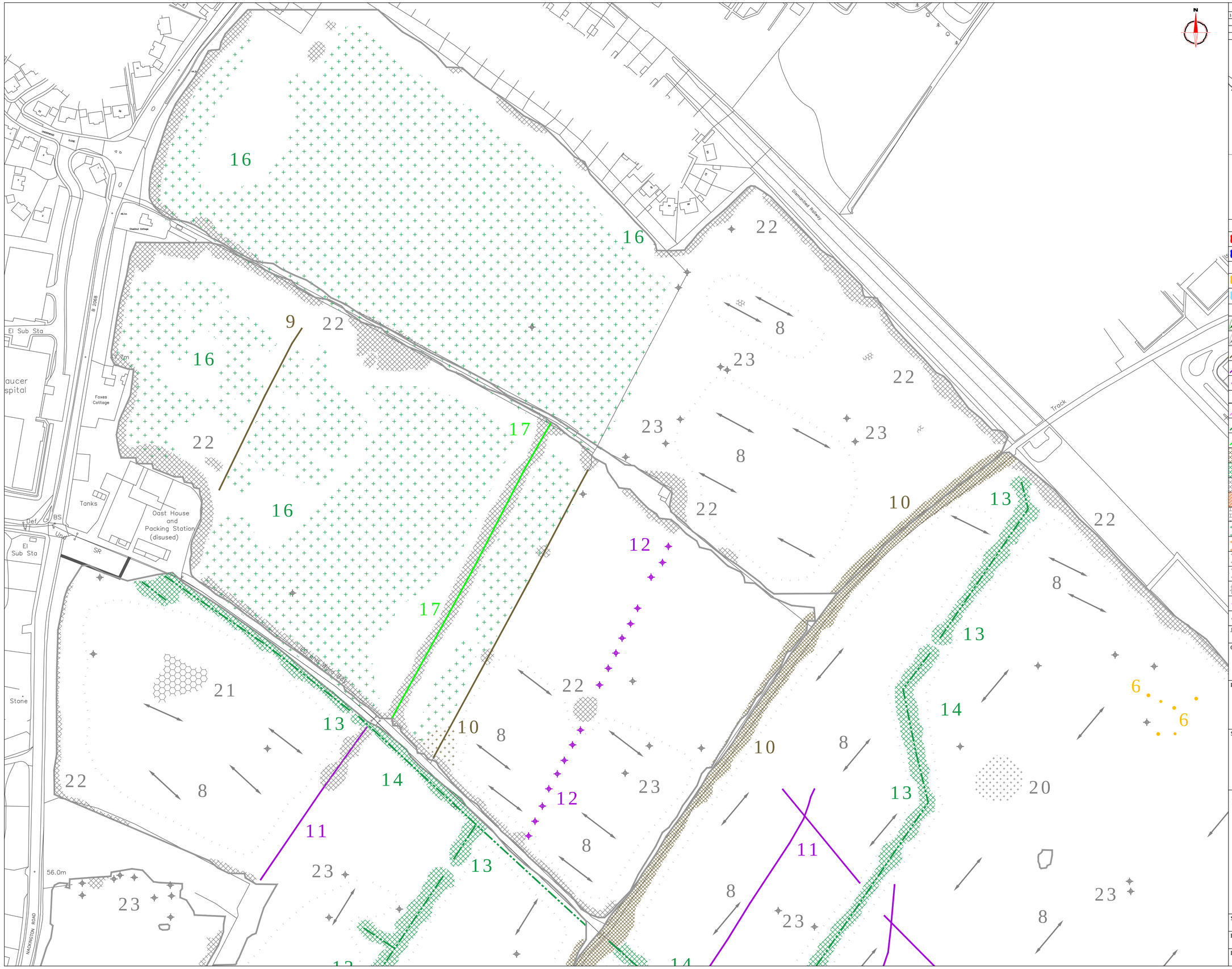
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	24



Amendments

Issue No.	Date	Description
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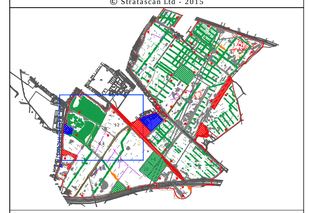
-	-	-



PROBABLE ARCHAEOLOGY

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

POSSIBLE ARCHAEOLOGY

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- Scattered magnetic debris
- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 5

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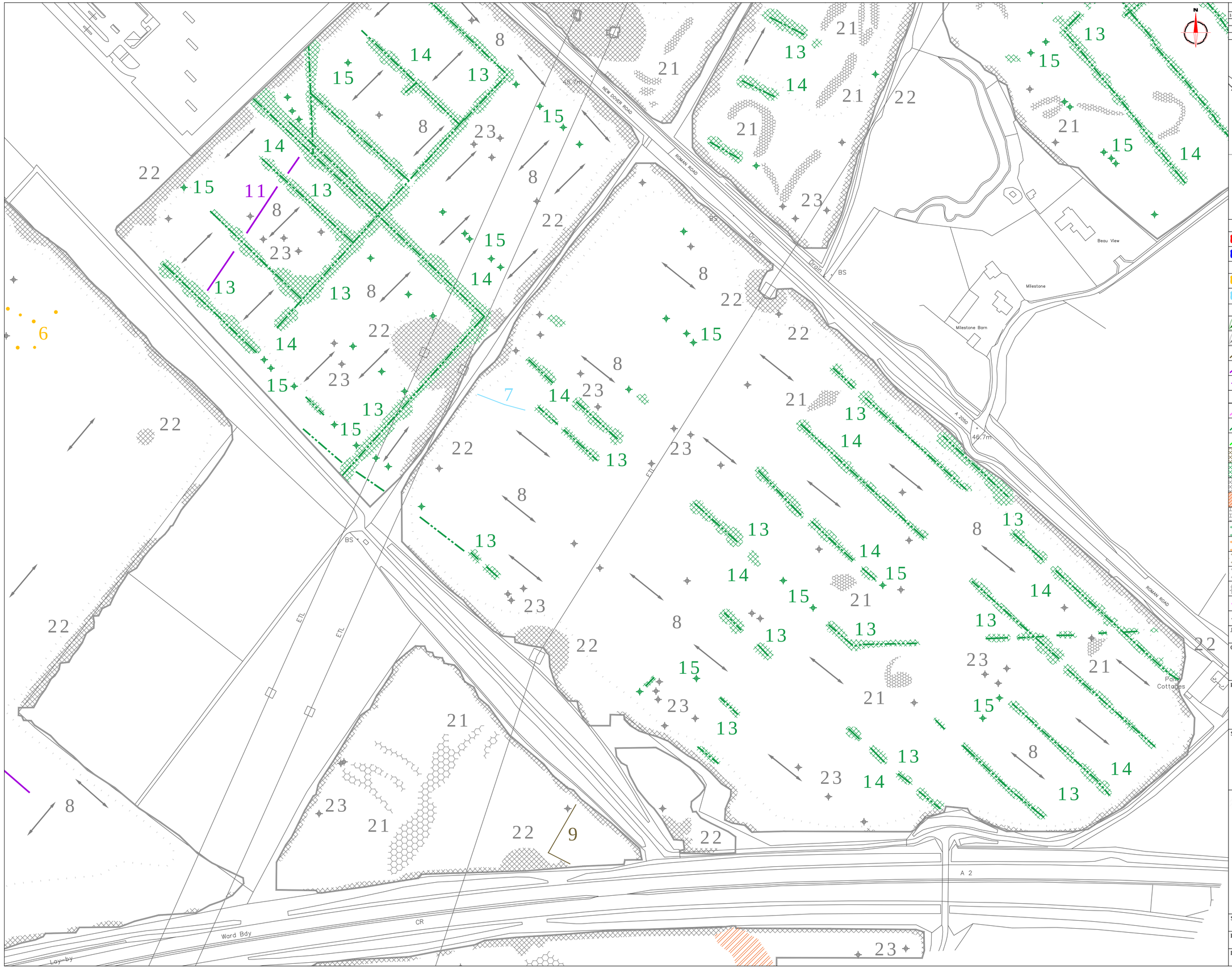
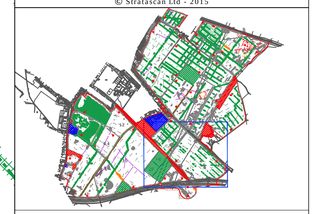
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	25



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



PROBABLE ARCHAEOLOGY

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POSSIBLE ARCHAEOLOGY

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- Area of amorphous magnetic variation - probable natural (e.g. geological or pedological) origin
- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 6

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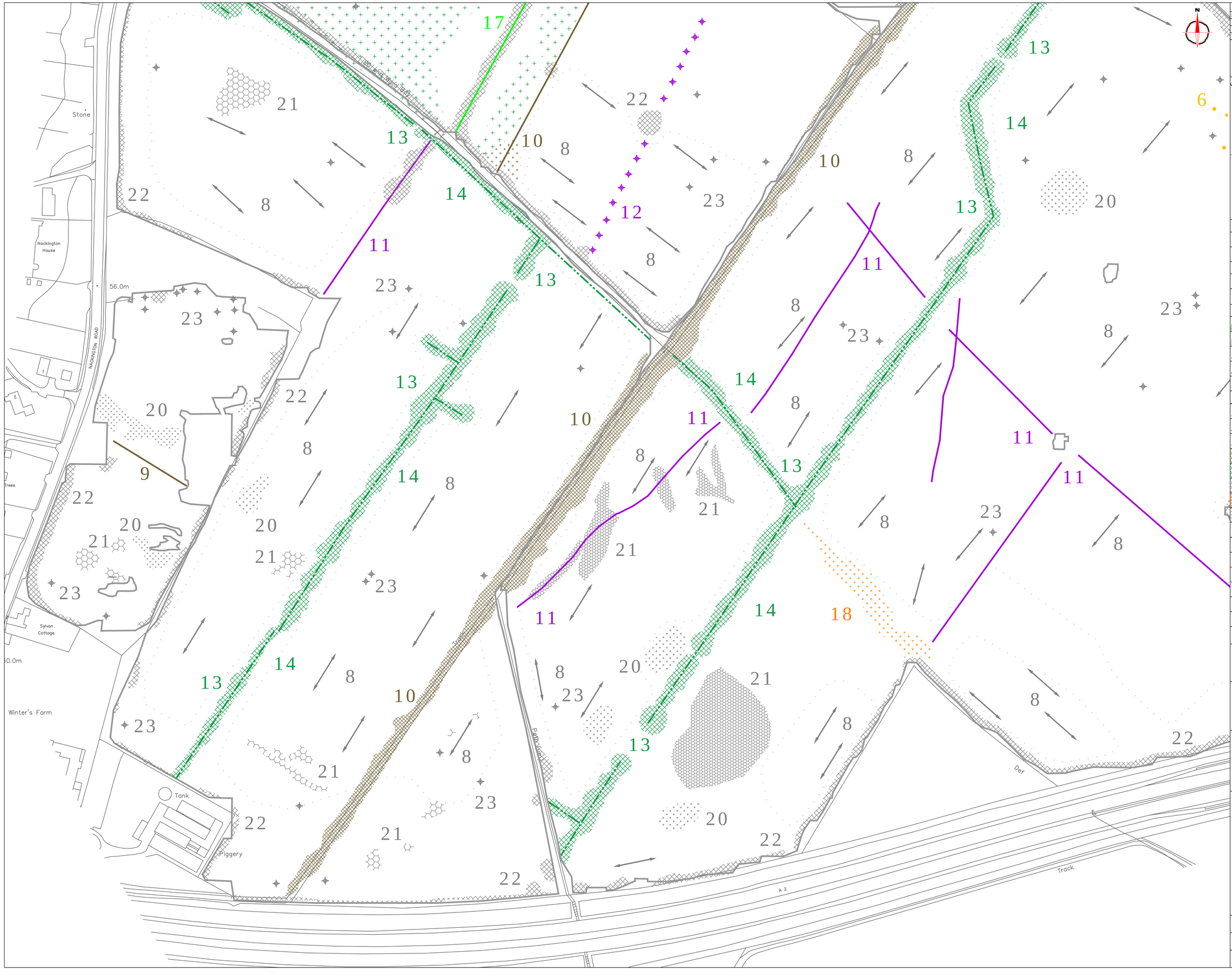
SUMO GROUP MEMBER

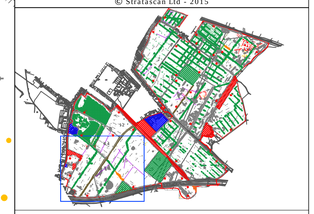
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	Drawn by	Figure No.
OCT 15	RD/JHS	26



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



PROBABLE ARCHAEOLOGY

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Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 7

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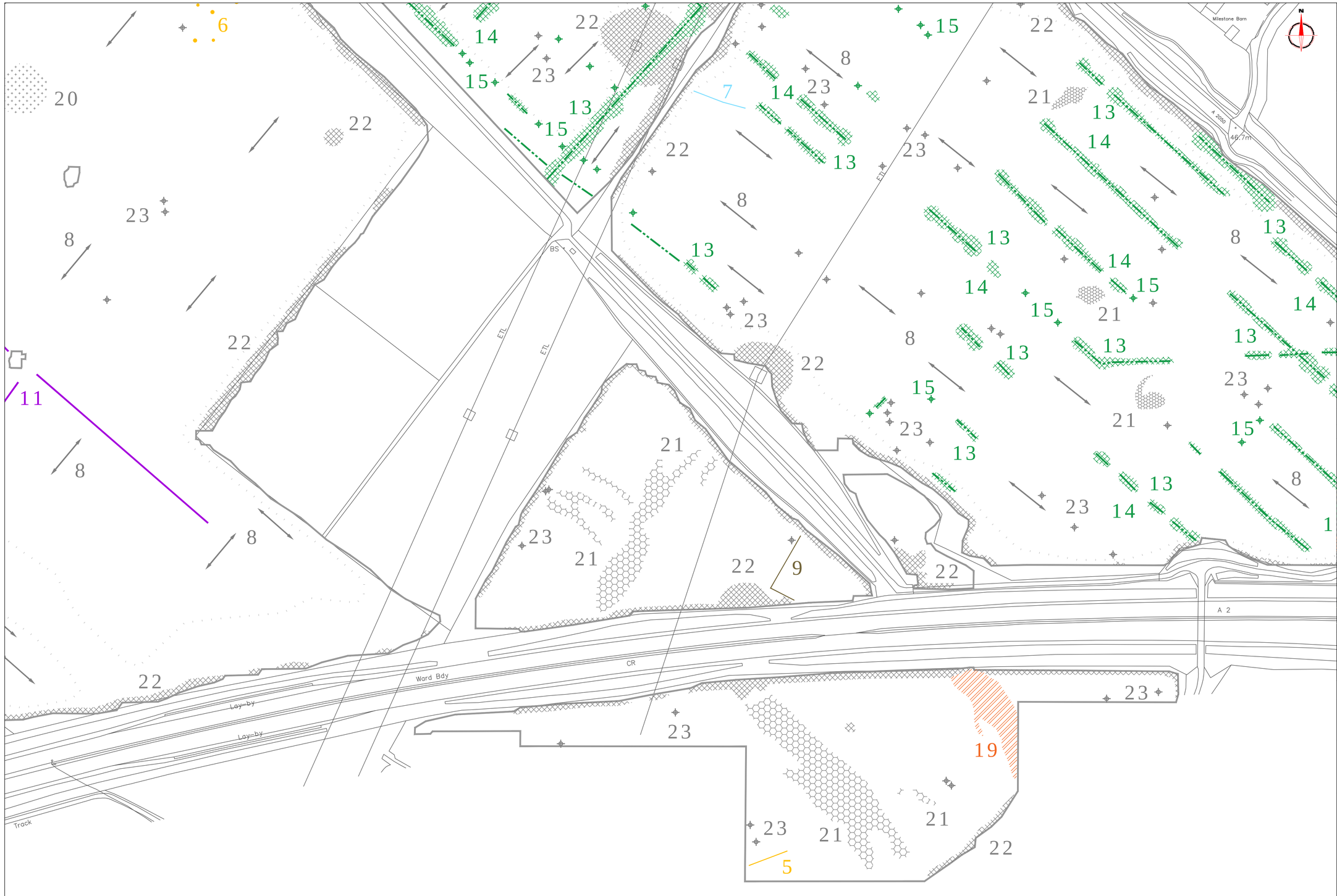
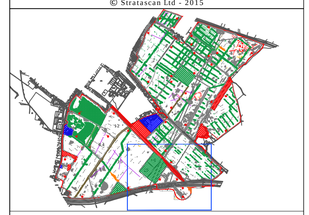
Scale 1:1250 (0m 10 20 30 40 50 60 70 80m)

Plot	Checked by	Issue No.
A1	DGE	01
Date	**Drawn by**	**Figure No.**
OCT 15	RD/JHS	27



Amendments

Issue No.	Date	Description
-	-	-
-	-	-



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- Magnetic spike related to land drains
- Magnetic spike - probable ferrous object

Job No.	Survey Date
8323	AUG 15

Client

ARCHAEOLOGY SOUTH-EAST

Project Title

GEOPHYSICAL SURVEY - SOUTH EAST CANTERBURY, KENT

Subject

ABSTRACTION AND INTERPRETATION OF GRADIOMETER ANOMALIES - VIEWPORT 8

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SUMO GROUP MEMBER

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 15	RD/JHS	28

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Topographic
Utility Mapping
UXO Detection
Void Detection

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