Archaeological Services
University of Durham

Land at Alconbury Airfield, Hungtingdon, Cambridgeshire

geophysical surveys

on behalf of

CgMs Consulting

Report 1441
April 2006

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1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted on land at Alconbury Airfield near Huntingdon in Cambridgeshire.

1.2 The works were commissioned by CgMs Consulting and conducted by Archaeological Services in accordance with instructions supplied by CgMs and a Project Design provided by Archaeological Services.

Results

1.3 Most anomalies detected relate to modern services, drains and runway apparatus.

1.4 A series of parallel anomalies which are likely to reflect land drains have been detected in Areas 2, 3, 4 and 5.

2. Project background

Location (Figure 1)

2.1 The study area was located at Alconbury Airfield, near Huntingdon, Cambridgeshire (NGR: TL 295 768). The survey areas were located to the north, south and west of the NW – SE Instrument Runway, and covered approximately 30ha of the 48ha which were available for survey.

Development proposal

2.2 The surveys were carried out in advance of proposed redevelopment at Alconbury Airfield.

Objective

2.3 The principal aim of the surveys was to assess the nature, extent and potential significance of any surviving archaeological features within the proposed development area, so that an informed decision may be made regarding the nature, and scope of, any further scheme of archaeological works that may be required in advance of development.

Dates

2.4 Fieldwork was undertaken between the 27th March and 7th April 2006. This report was prepared between the 13th and 20th of April 2006.

Personnel

2.5 Fieldwork was conducted by Bryan Atkinson, Edward Davies, Natalie Swann and supervised by Graeme Attwood. This report was prepared by Sam Roberts, with illustrations by David Graham. The Project Manager was Duncan Hale.

Archive/OASIS

2.6 The site code is **AAC06**, for **A**lconbury **A**irfield, **C**ambridgeshire 20**06**. The survey archive is currently held by Archaeological Services. Archaeological Services is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-13999**.

3. Archaeological and historical background

3.1 Little is known of the archaeological background of the study area. RAF Alconbury was opened in 1938 and transferred to US airforce control in 1942, at which point the three runways were extended. After further runway extensions and general base expansion, the airfield ceased operations in 1995 and is currently in use as a vehicle distribution centre.

4. Landuse, topography and geology

4.1 At the time of survey the proposed development area comprised grassed areas in between and adjacent to runways and taxiways; these are currently used for storing and driving vehicles. Covered drains and service pipes traverse the area at intervals. The survey area is level, with a mean elevation of 40m OD.

4.2 The solid geology of the area comprises Oxford Clay and Kellaway Beds. Drift geology consists of a mixture of boulder clays and river gravels.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation* (David 1995); the Institute of Field Archaeologists Technical Paper No.6 *The use of geophysical techniques in archaeological evaluations* (Gaffney *et al*. 2002) and the Archaeology Data Service *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2001).

Technique selection

5.2 Geophysical surveying enables the relatively rapid and non-invasive identification of potential archaeological features within landscapes and can involve a variety of complementary techniques such as magnetometry, electrical resistivity, ground-penetrating radar and electromagnetic survey. Some techniques are more suitable than others in particular situations, depending on a variety of site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance it was known that modern features such as drains and service pipes would be present, and that archaeological features, such as ditches and pits, trackways, wall foundations and fired structures, might also be present.

5.4 Given the anticipated shallowness of possible archaeological targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate. This technique involves the use of a hand-held magnetometer to detect and record minute anomalies in the vertical component of the Earth’s magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 Of the 47.6ha available for survey, an area at the west end of the runway was surveyed in full, whilst a 50% sample of the remainder was surveyed using alternate 20m-wide transects. Due to the presence of large numbers of vehicles, and in an effort to reduce the adverse effect that such a large quantity of ferrous material would have on geomagnetic data, a buffer zone of 20m was imposed between the survey areas and vehicle storage areas. Maintaining the integrity of this buffer zone entailed two changes to the sampling strategy presented in our Project Design, with the northernmost transect in Area 5 being moved 20m south to form a 40m-wide transect, and one 60m-wide transect being surveyed in Area 1.

5.6 Survey transect baselines were established using known, fixed points. The positions of grid corners and baselines were then recorded using a Leica GS50 global positioning system (GPS). A 30m grid was used for data collection in Areas 1, 2 and 3, while a 20m grid was used for the sample transects in Areas 4 and 5.

5.7 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 fluxgate gradiometers with automatic datalogging facilities. A zig-zag traverse scheme was employed and data were logged in 20m or 30m grid units. The instrument sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 1600 or 3600 sample measurements per 20m or 30m grid unit.

5.8 Data were downloaded on-site into laptop computers for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.9 Geoplot v.3 software was used to process the geophysical data and to produce continuous tone greyscale images of the raw data. Given the length of the survey transects and the apparent lack of archaeological features in this instance, trace plots have not been constructed. Greyscale images and interpretations (at a scale of 1:1000) are presented in Figures 2-22. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla.

5.10 The following basic processing functions have been applied to each dataset:

Clip – clips, or limits data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic.

Zero mean traverse – sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities.

Destagger – corrects for displacement of anomalies caused by alternate zig-zag traverses.

Despike – locates and suppresses random iron spikes in gradiometer data.

Low pass filter – is useful for smoothing data or for enhancing larger weak features.

Interpolate – increases the number of data points in a survey to match sample and traverse intervals. In this instance the gradiometer data have been interpolated to 0.25 x 0.25m intervals.

Interpretation: anomaly types

5.11 Colour-coded geophysical interpretation plans are provided for each survey area. Two types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches.
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths.

Interpretation: feature types

5.12 Colour-coded geophysical and archaeological interpretation plans are provided for each survey area (Figures 2-22).

5.13 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments and in most cases have little or no archaeological significance. A sample of these are shown on the geophysical interpretation plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

Area 1

5.14 No features of likely archaeological significance have been detected in Area 1. A large dipolar magnetic anomaly on the southern edge of the survey area reflects the presence of Building 523, possibly a services sub-station, whilst a smaller dipolar magnetic anomaly towards the centre of the survey area corresponds to the location of a drain cover.

Area 2

5.15 A large and intense linear dipolar magnetic anomaly traversing the survey area reflects a gas main.

5.16 A concrete-capped drain or water pipe present in this area was detected as a dipolar magnetic anomaly, and other linear dipolar magnetic anomalies connected to this anomaly almost certainly reflect other drains/pipes not visible on the surface. Other linear dipolar magnetic anomalies were also detected, which may not belong to this network of pipes/drains, but which almost certainly reflect other modern services, pipes or drains.

5.17 A tarmac path crossing the survey area from east to west is detected in the eastern half of the survey area as a linear positive magnetic anomaly. In the western half its route appears to correspond to an underlying water pipe or drain.

5.18 A mass of dipolar magnetic anomalies at the west end of the survey area, situated at the extreme western end of the instrument runway, reflect the presence of lighting arrays and reflectors.

5.19 In the eastern corner of the survey area, a large concentration of dipolar magnetic anomalies is likely to reflect modern disturbance or a large amount of ferrous contamination within the soil in that area.

5.20 Apart from the strong dipolar magnetic anomalies detected pertaining to water pipes, gas mains and similar, a series of parallel, weak, positive linear magnetic anomalies on an northeast/southwest alignment, feeding into a northwest/southeast linear positive magnetic anomaly, almost certainly reflect the presence of land drains in the northwestern corner of the survey area.

Area 3

5.21 A series of chains of dipolar magnetic anomalies detected in the northeastern corner of Area 3 reflect the continuation of those service pipes and water pipes/drains detected in Area 2. A discontinuous chain of small dipolar magnetic anomalies traversing the area on a northeast/southwest alignment is likely to reflect a drain as it links two large discrete dipolar magnetic anomalies which correspond to drain covers.

5.22 An intense, linear dipolar magnetic anomaly detected along the western edge of the survey area reflects the course of the gas main also detected in Area 2.

5.23 Parallel, positive, linear magnetic anomalies on an northeast/southwest alignment almost certainly reflect a continuation of the land drains detected in Area 2.

Area 4

5.24 Weak, positive linear magnetic anomalies detected in the western part of Area 4 reflect soil-filled features. These are most likely to reflect the presence of further land drains.

5.25 No features of likely archaeological significance were detected. Linear dipolar magnetic anomalies reflect service pipes or drains, whilst concentrations of dipolar magnetic anomalies are likely to reflect higher levels of ferrous contamination within the topsoil. Larger discrete, dipolar magnetic anomalies reflect iron or concrete-capped drain covers.

Area 5

5.25 No features of likely archaeological significance have been detected in Area 5. Weak, positive linear magnetic anomalies on an northeast/southwest alignment are likely to reflect land drains. These are most clearly discerned in the central transect and towards the centre of Area 5.

5.26 Linear, dipolar magnetic anomalies criss-cross Area 5, reflecting modern drains, pipes and other utilities. An intense dipolar magnetic linear anomaly crossing the western end of Area 5 is likely to be an electrical cable as runway lighting arrays are located at its southerly end, whilst another intense dipolar magnetic linear anomaly further to the east reflects a gas main.

5.27 Other linear, dipolar magnetic anomalies reflect drains, whilst discrete dipolar magnetic anomalies detected relate to drain covers or runaway apparatus set up within the survey area. An increase in the concentration of small, discrete dipolar anomalies towards the eastern end of Area 5 reflects an increase in near-surface ferrous contamination in this area.

6. Conclusions

6.1 Geophysical surveys have been carried out on land at Alconbury Airfield, Cambridgeshire.

6.2 No features of likely archaeological potential were detected.

6.3 The majority of anomalies detected relate to modern services, storm drains and runway furniture.

6.4 A series of parallel anomalies in parts of Areas 2, 3, 4 and 5 are likely to reflect land drains.

7. Sources

David, A 1995 *Geophysical survey in archaeological field evaluation*, Research and Professional Services Guideline **1**, English Heritage

Gaffney, C, Gater, J & Ovenden, S 2002 *The use of geophysical techniques in archaeological evaluations*, Technical Paper **6**, Institute of Field Archaeologists

Schmidt, A 2001 *Geophysical Data in Archaeology: A Guide to Good Practice,* Archaeology Data Service, Arts and Humanities Data Service

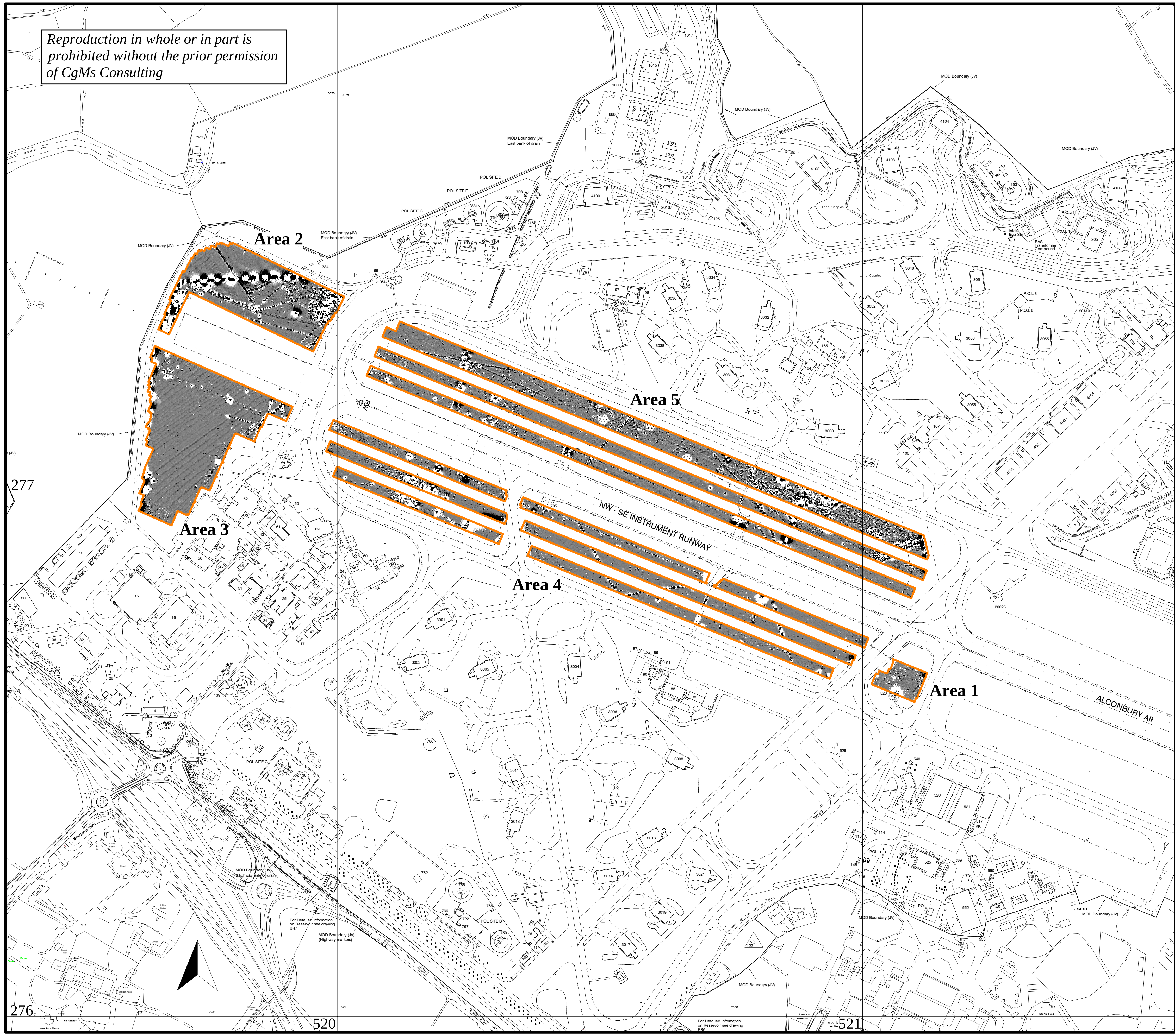

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Figure 1
Location of the survey areas

on behalf of
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0 300m
scale 1:7500 - for A3 plot

outline of survey area

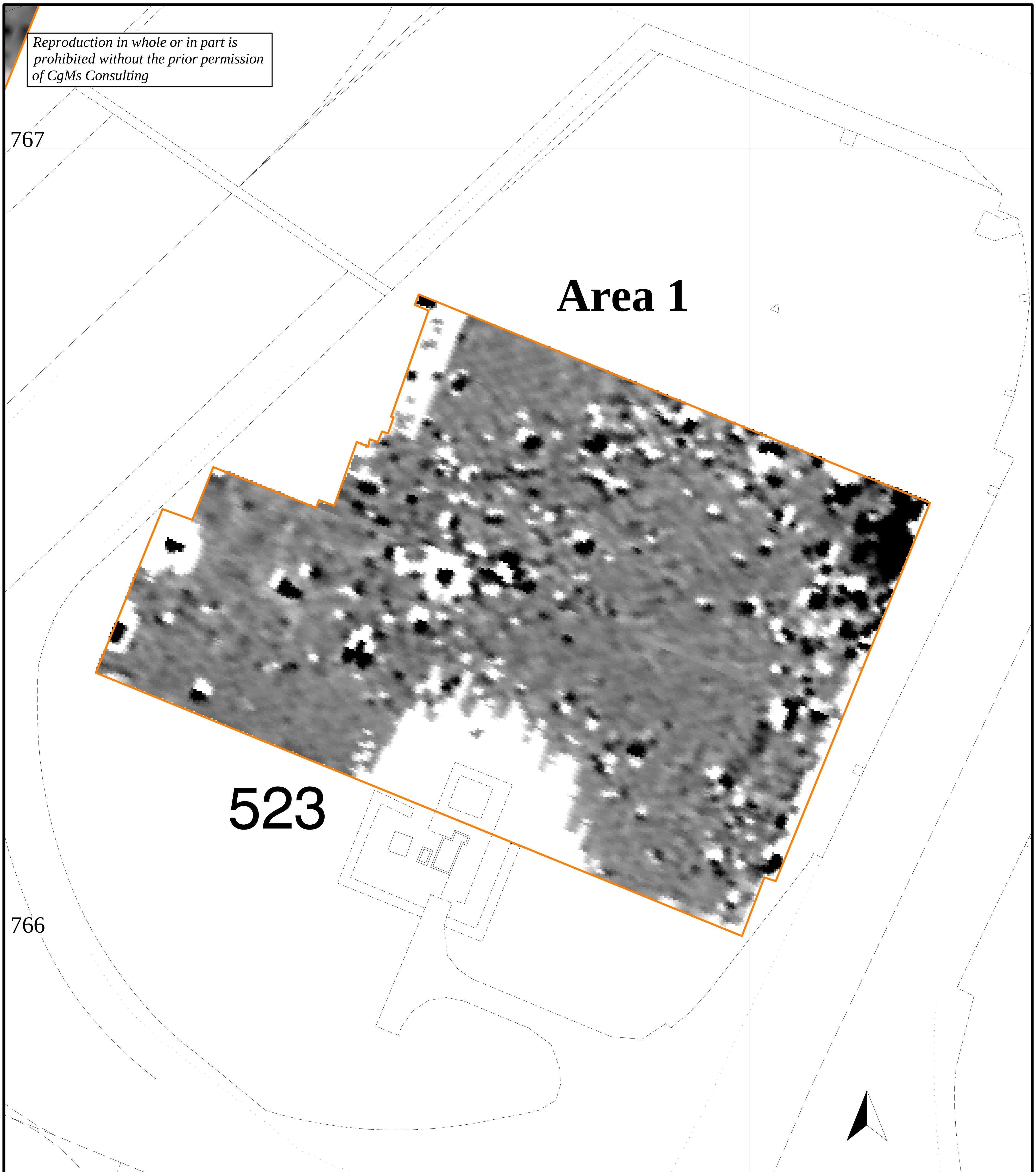

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Figure 2
Area 1, geophysical survey

on behalf of
CgMs Consulting

0 25m
scale 1:500 - for A3 plot

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

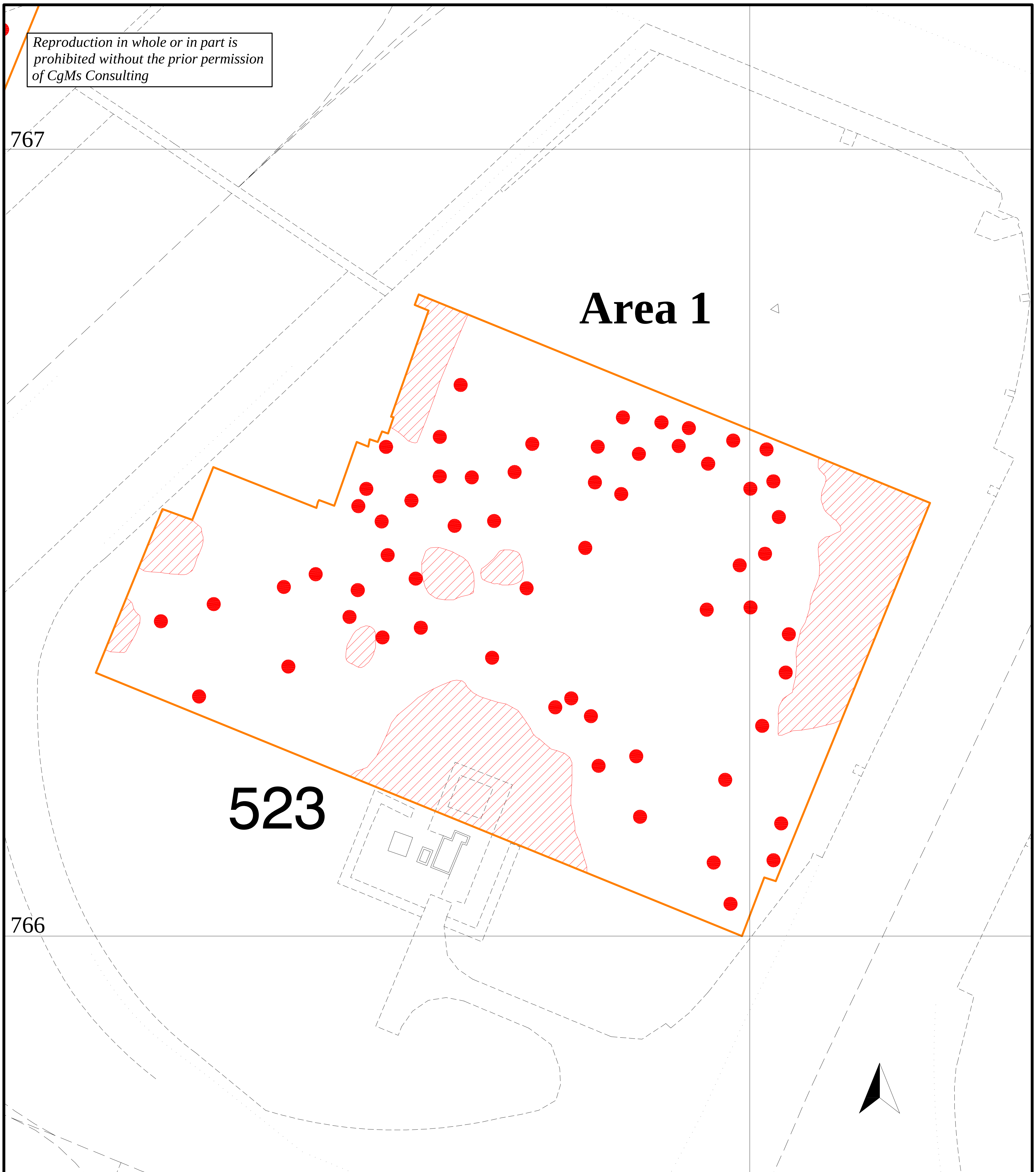

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Figure 3
Area 1, geophysical interpretation

on behalf of
CgMs Consulting

0 25m

scale 1:500 - for A3 plot

outline of survey area

positive magnetic anomalies

negative magnetic anomalies

dipolar magnetic anomalies

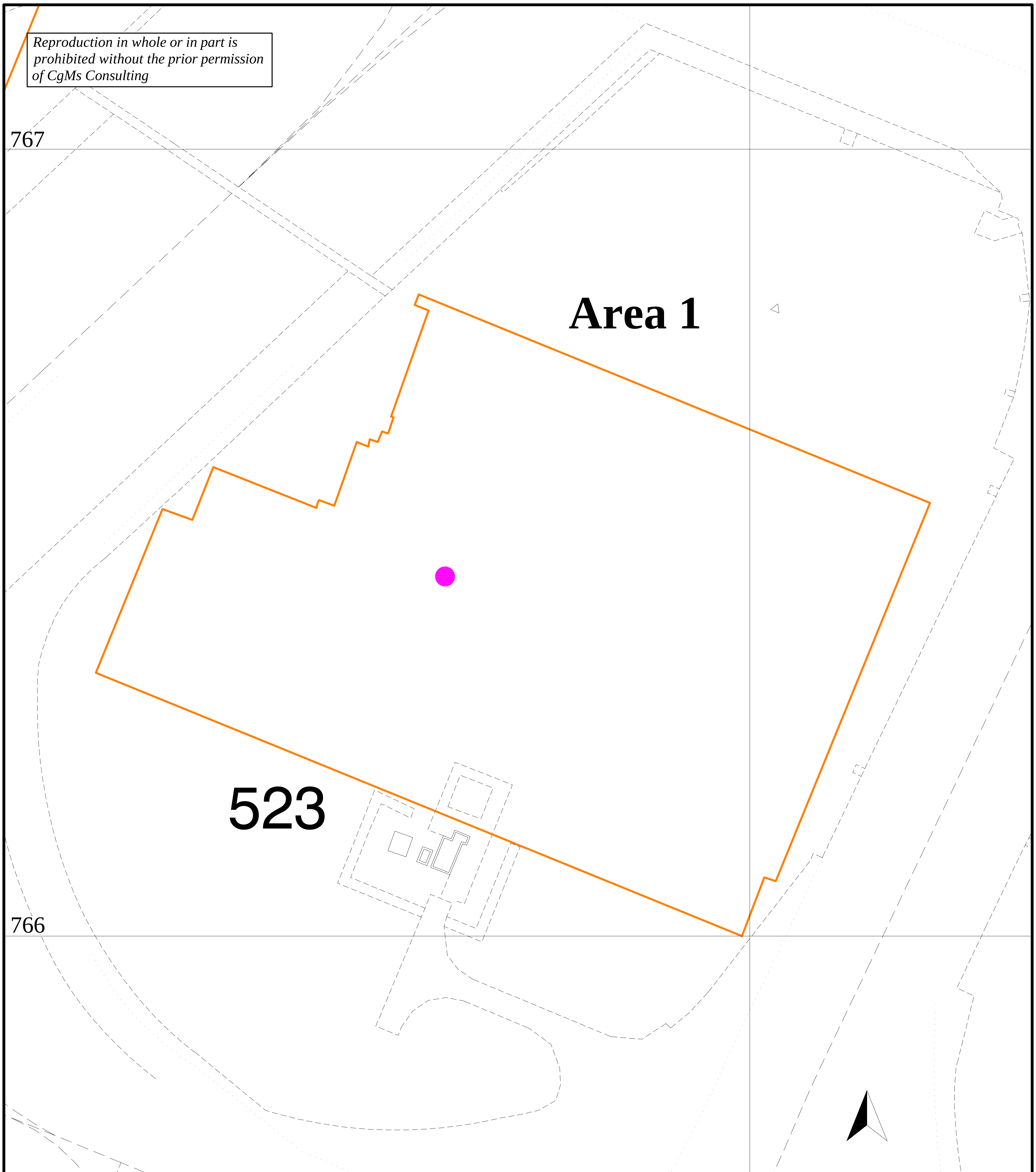

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Figure 4
Area 1, archaeological interpretation

on behalf of
CgMs Consulting

0 25m

scale 1:500 - for A3 plot

outline of survey area

soil-filled features

service pipes

drain cover

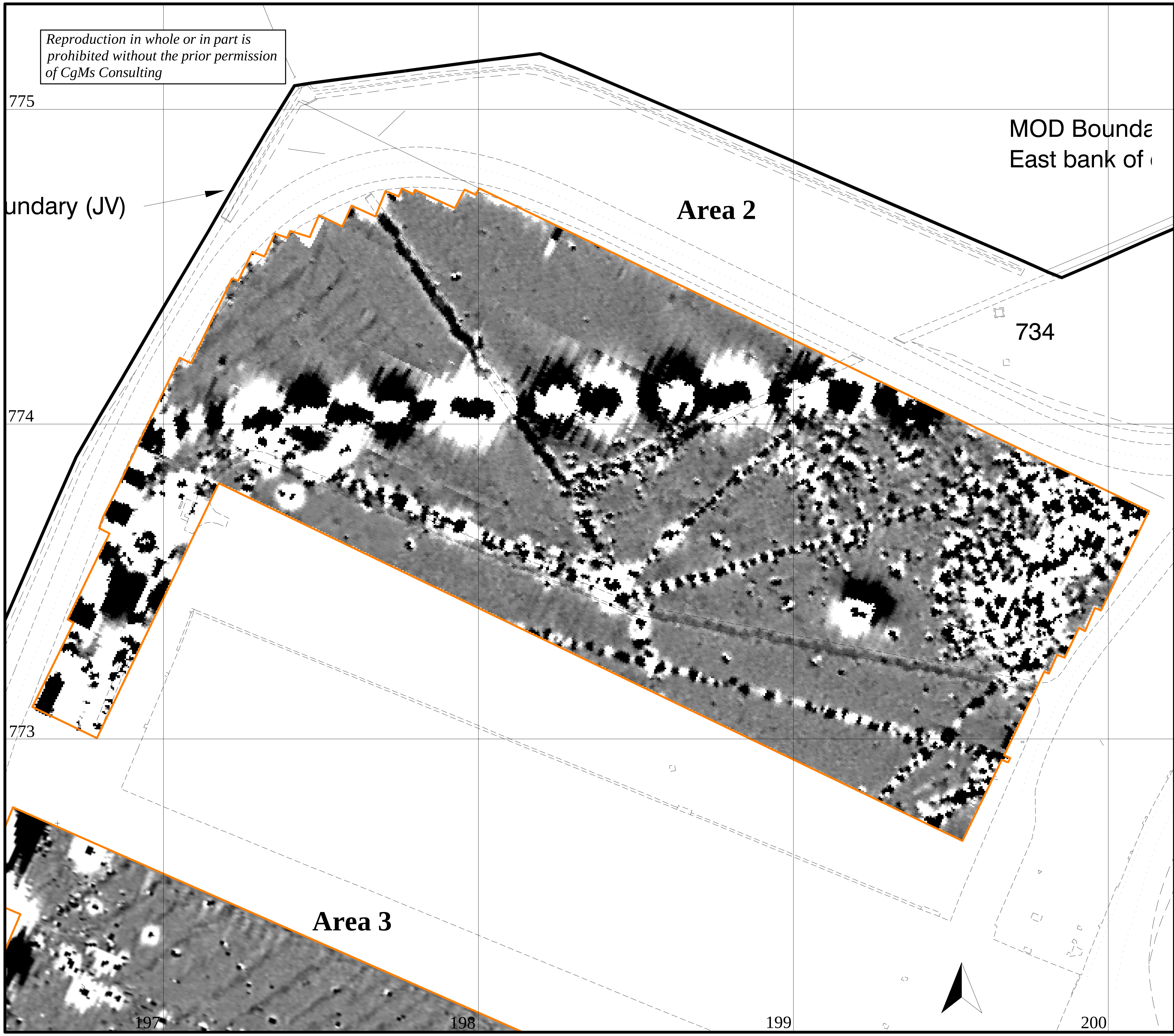

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Figure 5
Area 2, geophysical survey

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area

5.00
4.17
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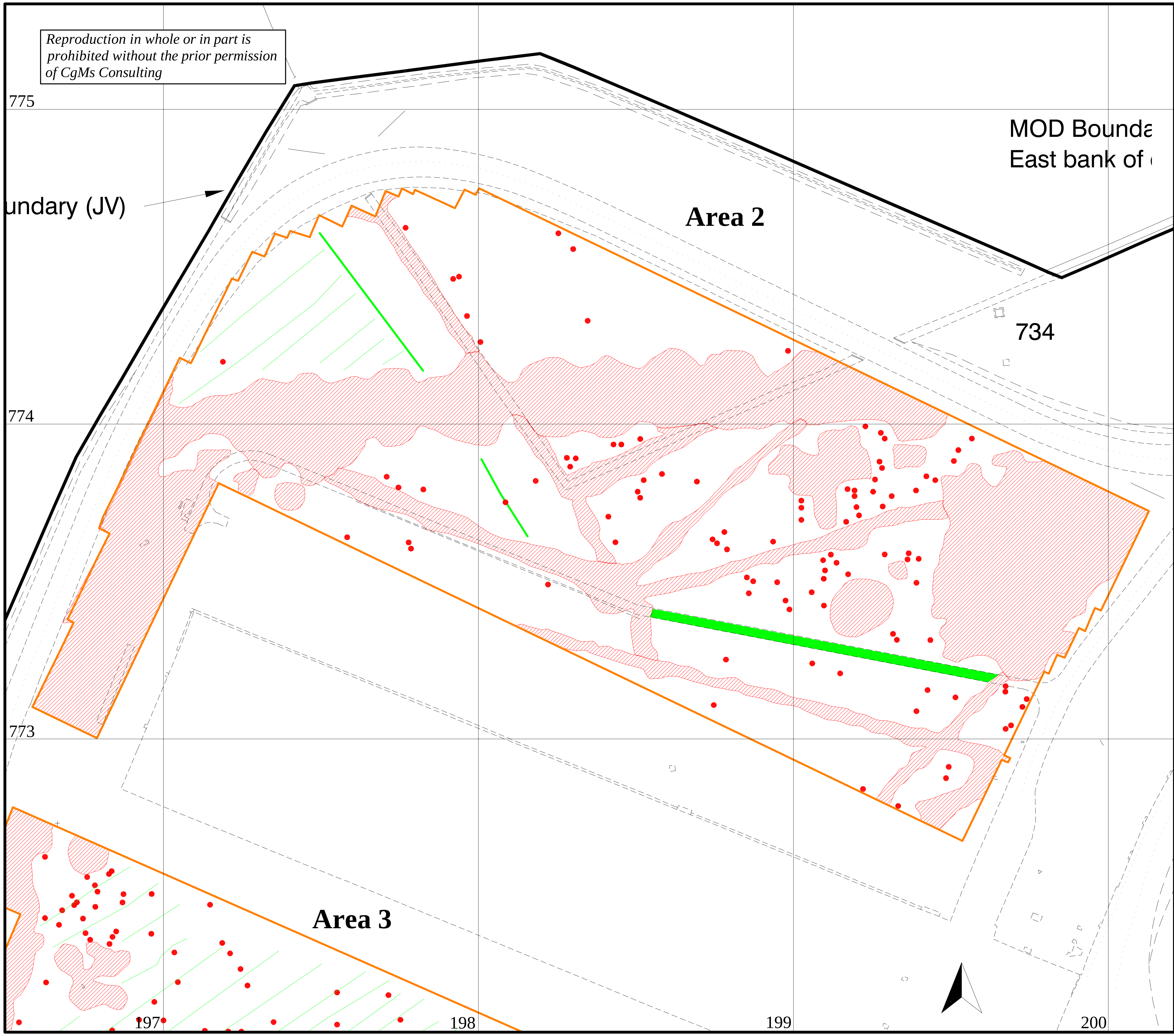

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Figure 6
Area 2, geophysical interpretation

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- positive magnetic anomalies
- negative magnetic anomalies
- dipolar magnetic anomalies

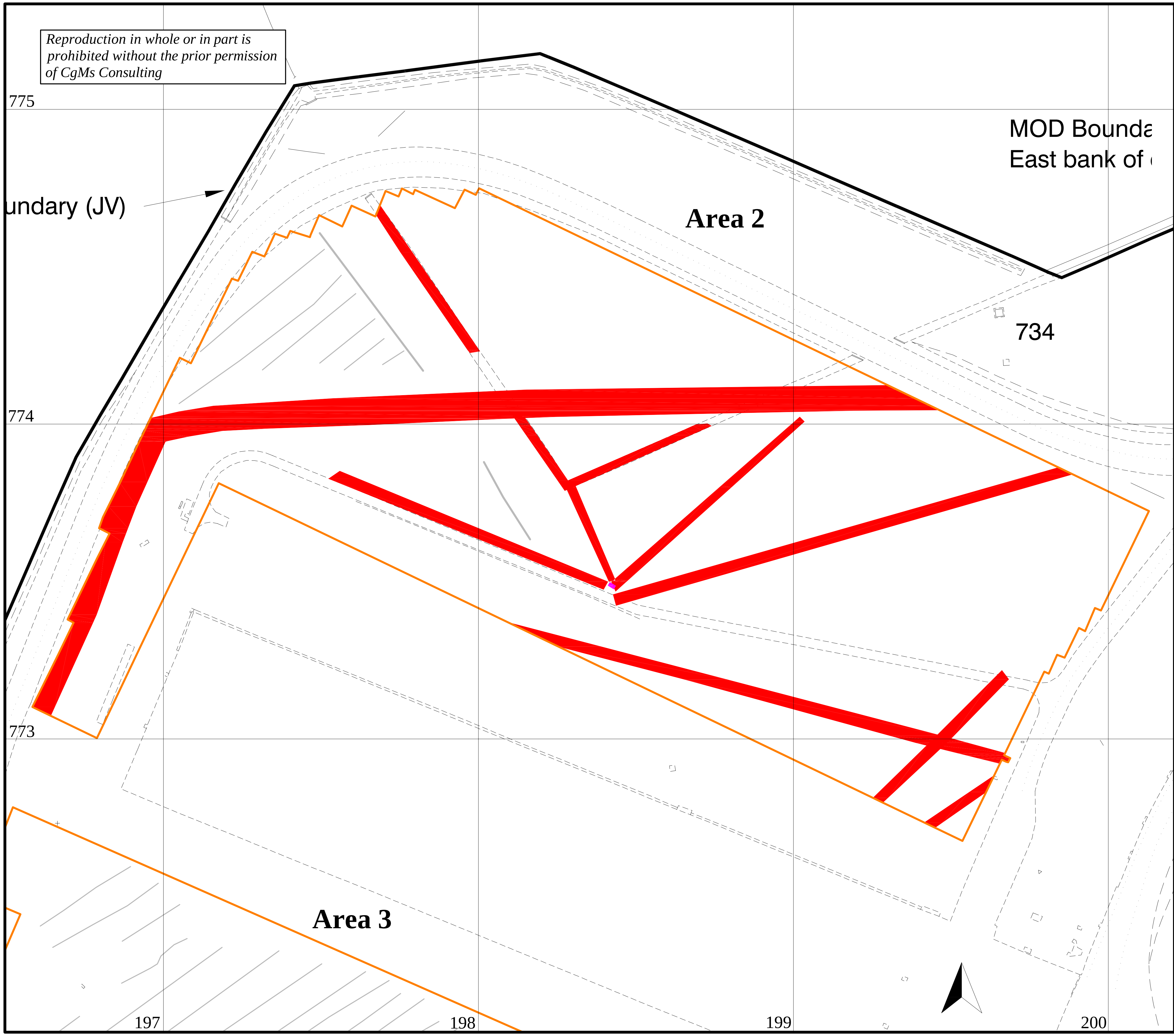

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Figure 7
Area 2, archaeological interpretation

on behalf of
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0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- soil-filled features
- service pipes
- drain/service cover
- probable land drains

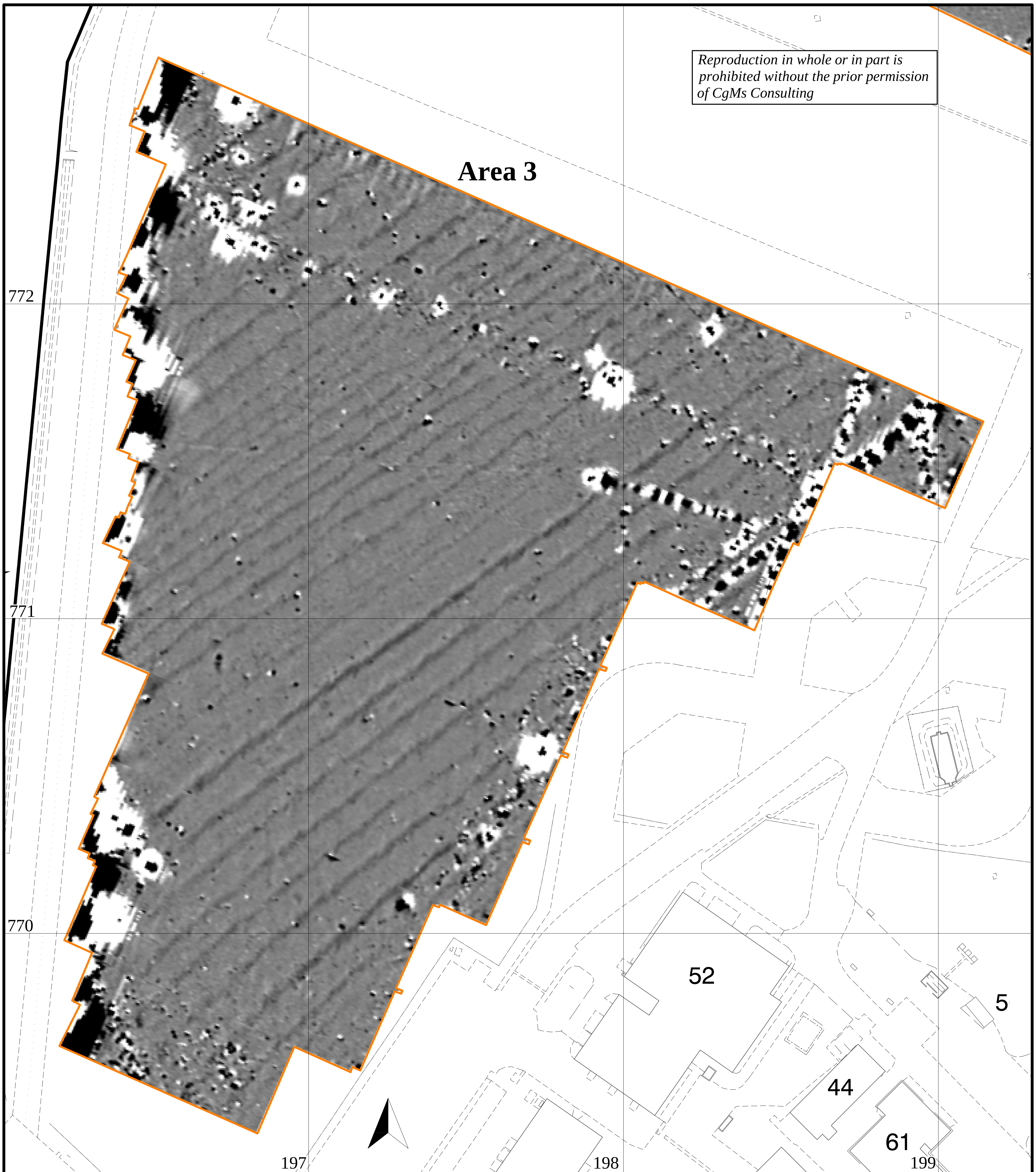

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Figure 8
Area 3, geophysical survey

on behalf of
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0 50m
scale 1:1250 - for A3 plot

outline of survey area

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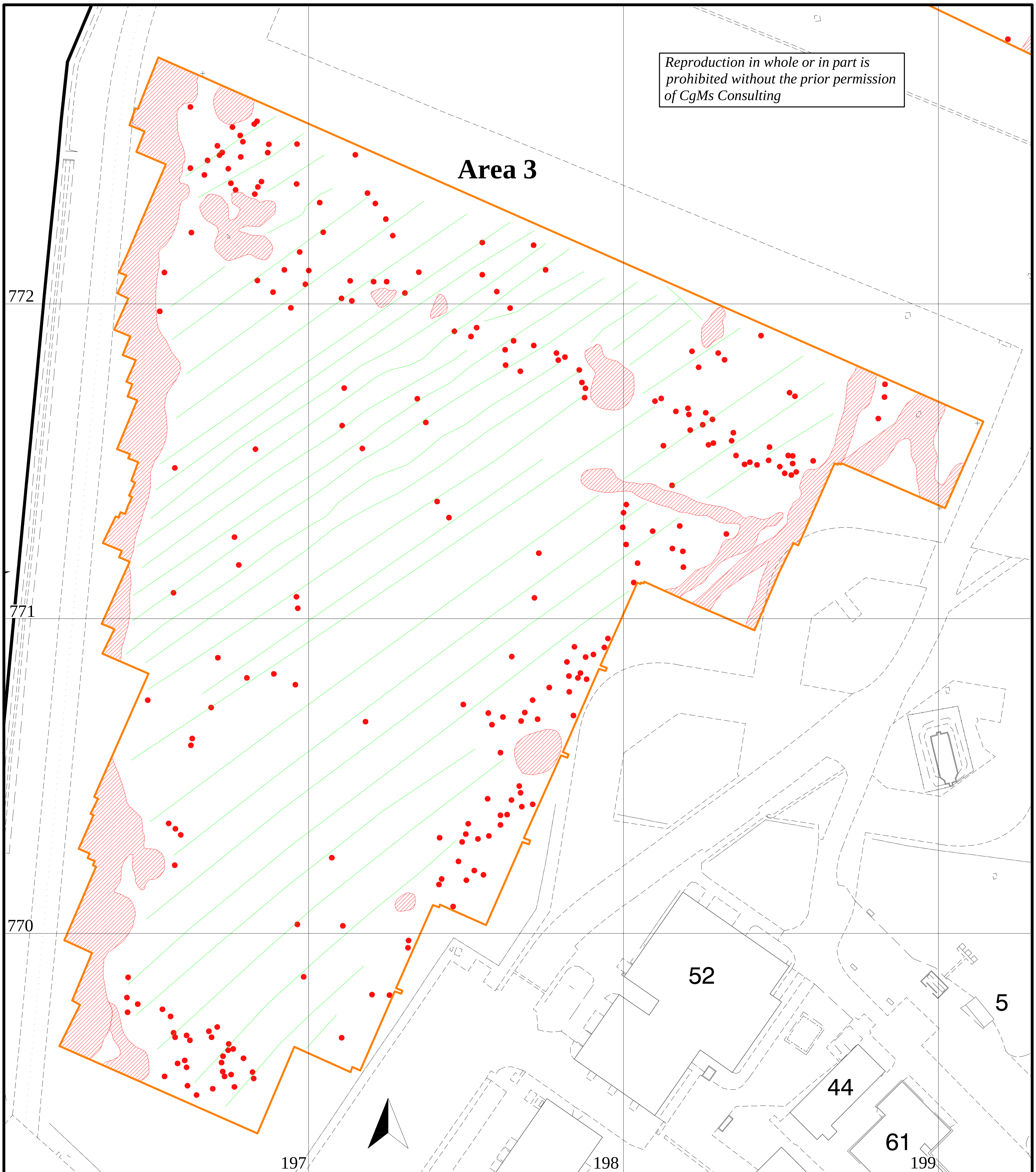

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Figure 9
Area 3, geophysical interpretation

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area
positive magnetic anomalies
negative magnetic anomalies
dipolar magnetic anomalies

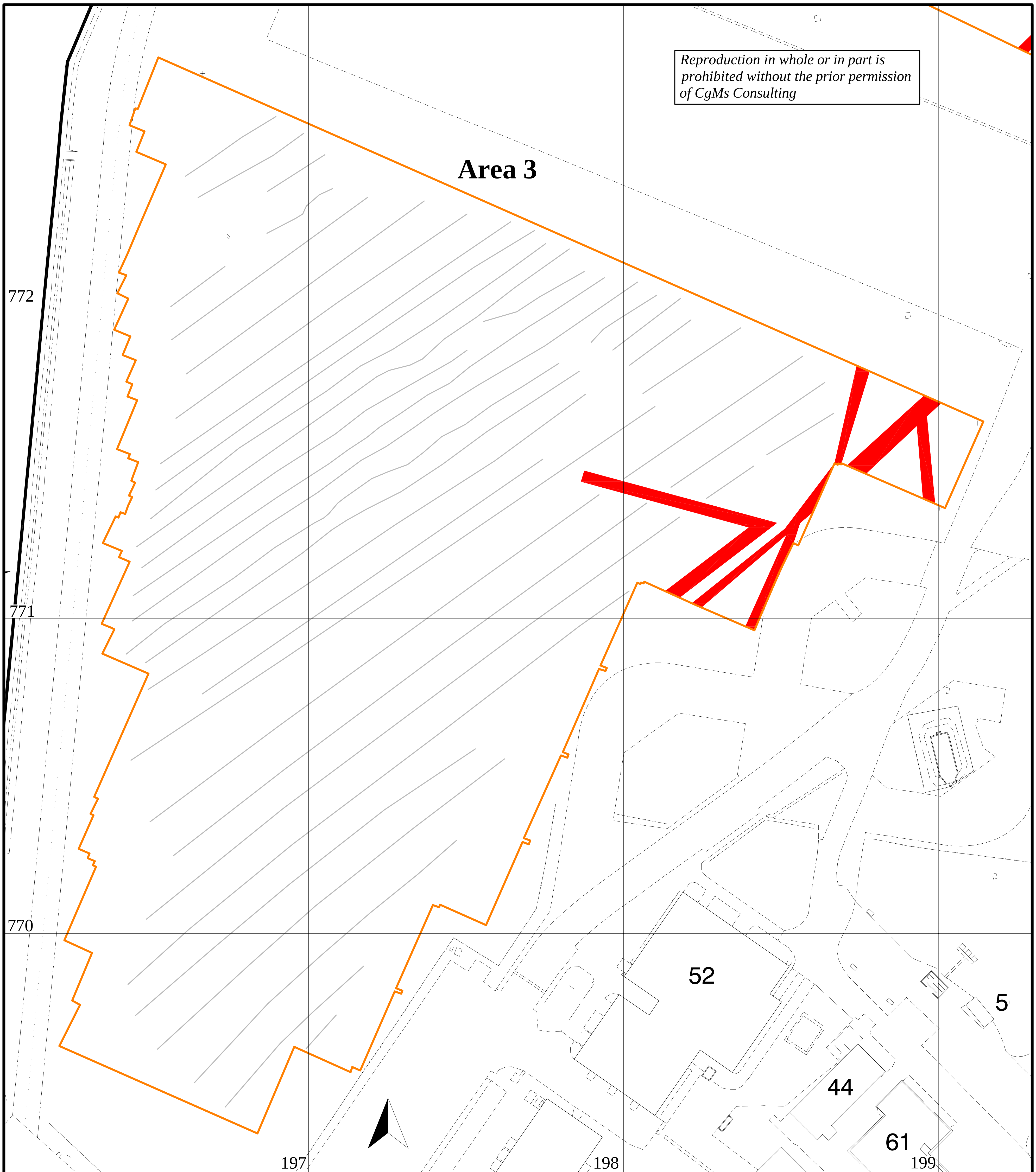

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Figure 10
Area 3, archaeological interpretation

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area

soil-filled features

service pipes

probable land drains

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0 50m
scale 1:1250 - for A3 plot

outline of survey area

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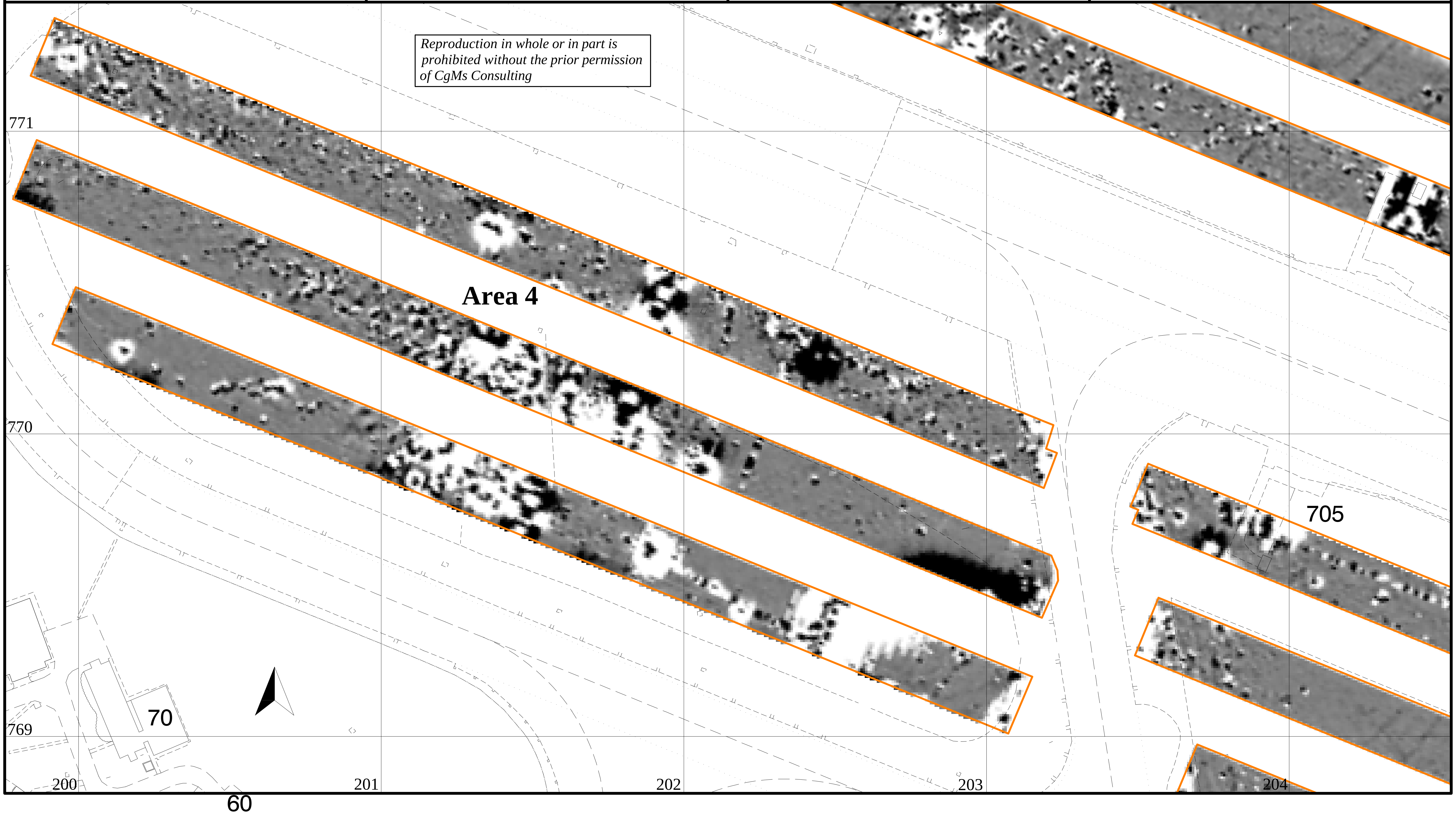
Figure 11
Area 4, geophysical survey



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0 50m
scale 1:1250 - for A3 plot

outline of survey area

positive magnetic anomalies

negative magnetic anomalies

dipolar magnetic anomalies

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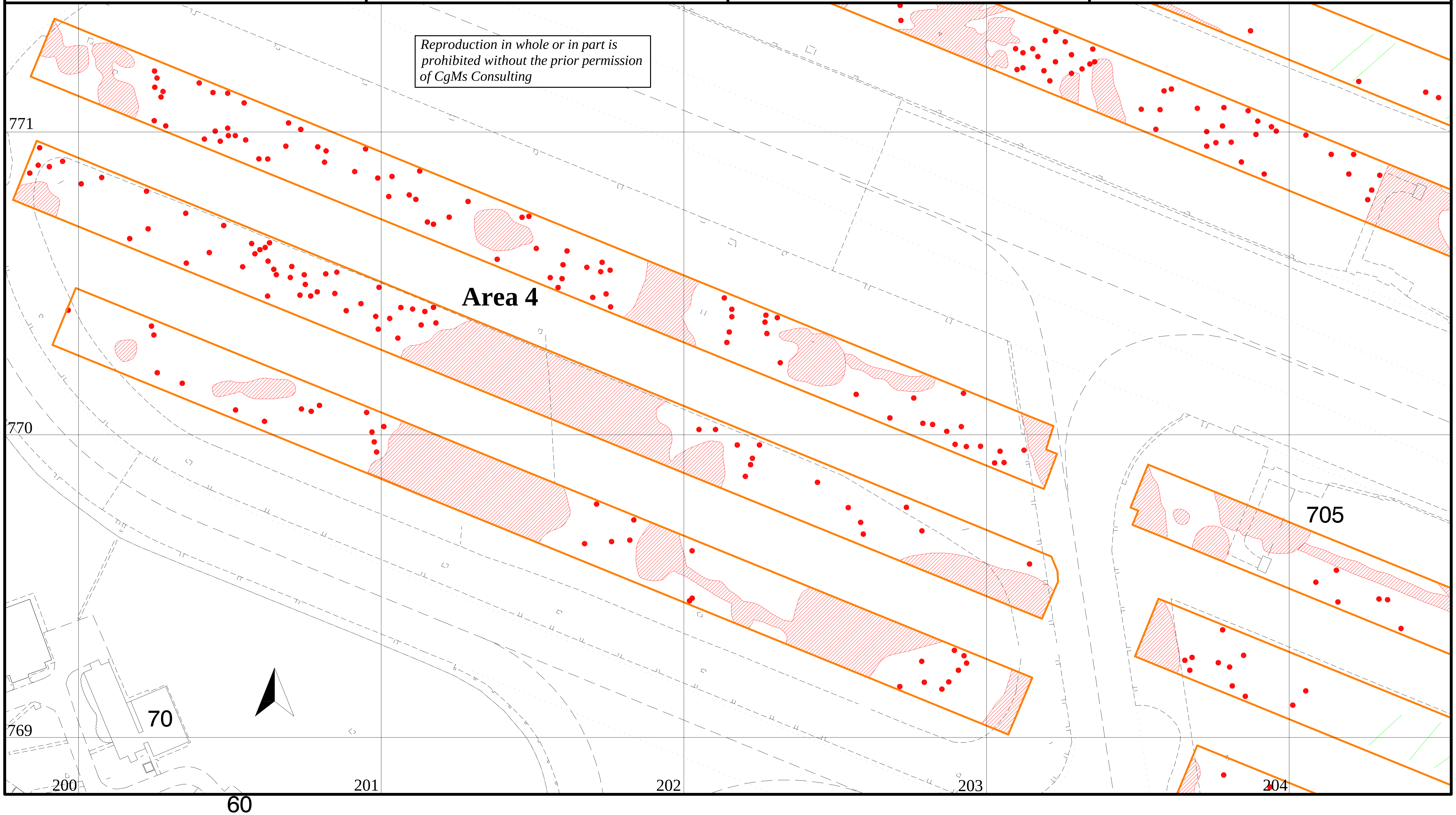
Figure 12
Area 4, geophysical interpretation



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0 50m
scale 1:1250 - for A3 plot

outline of survey area
soil-filled features
service pipes

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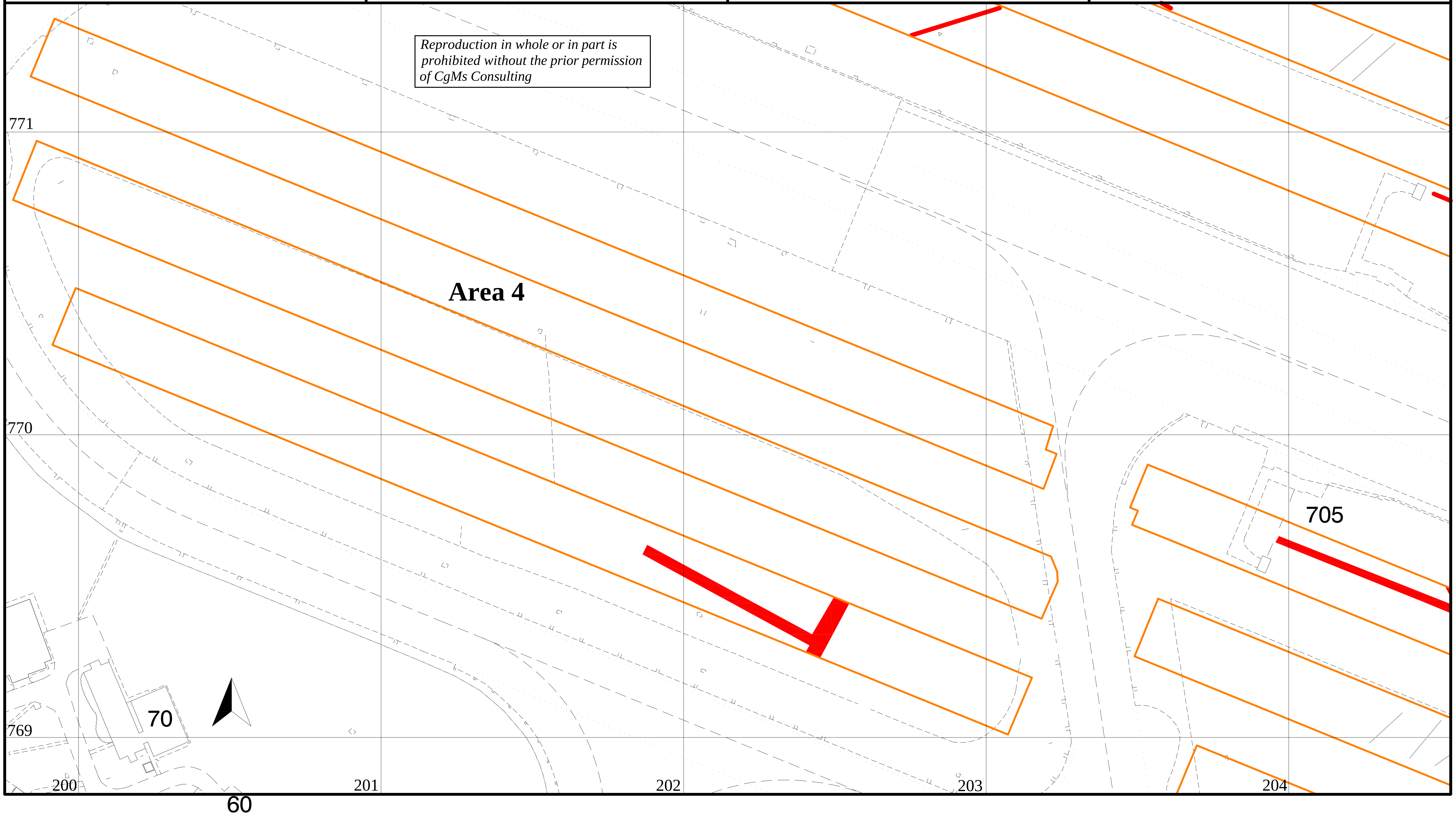
Figure 13
Area 4, archaeological interpretation



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scale 1:1250 - for A3 plot

outline of survey area

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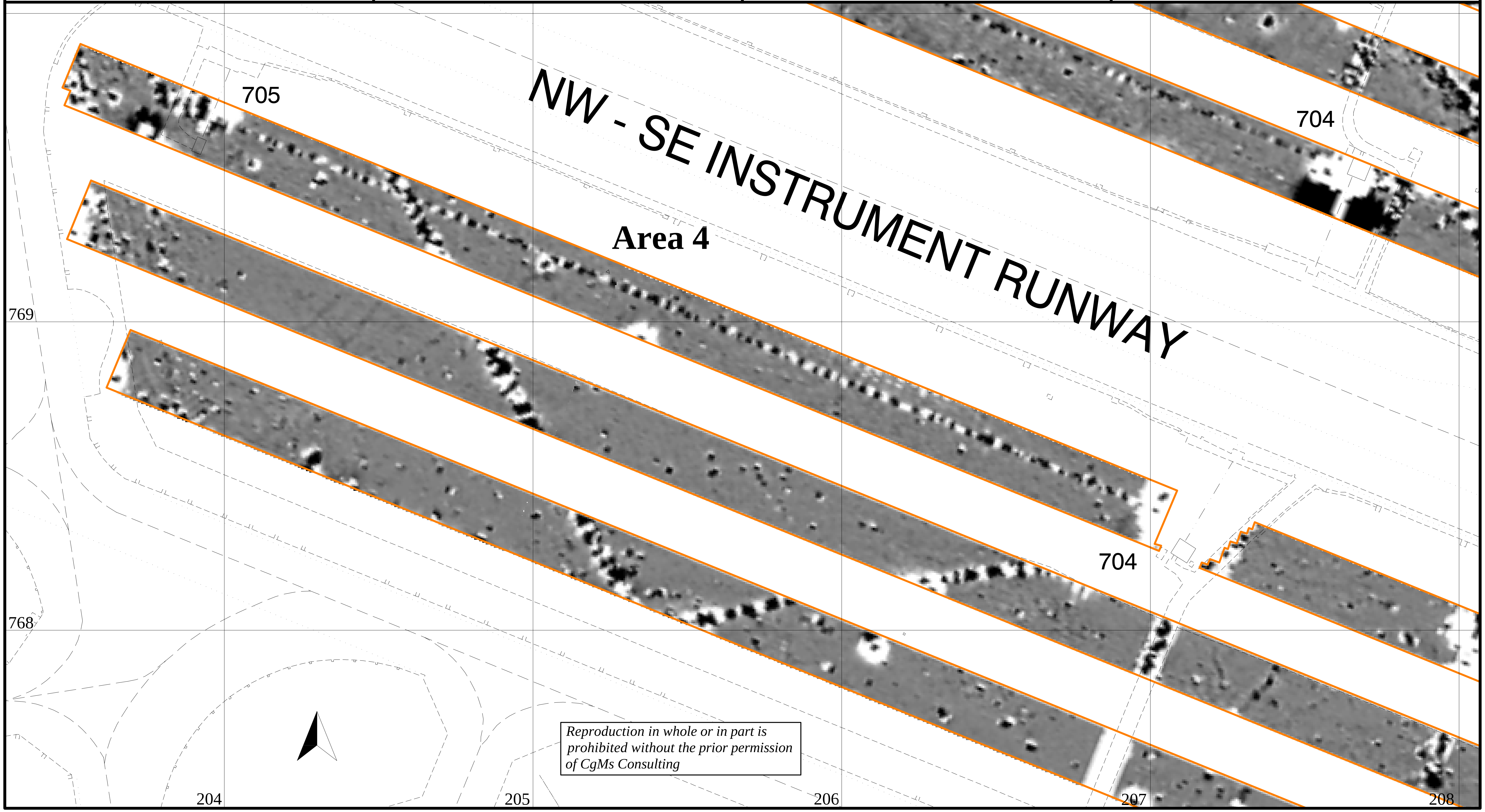
Figure 14
Area 4, geophysical survey



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0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- positive magnetic anomalies
- negative magnetic anomalies
- dipolar magnetic anomalies

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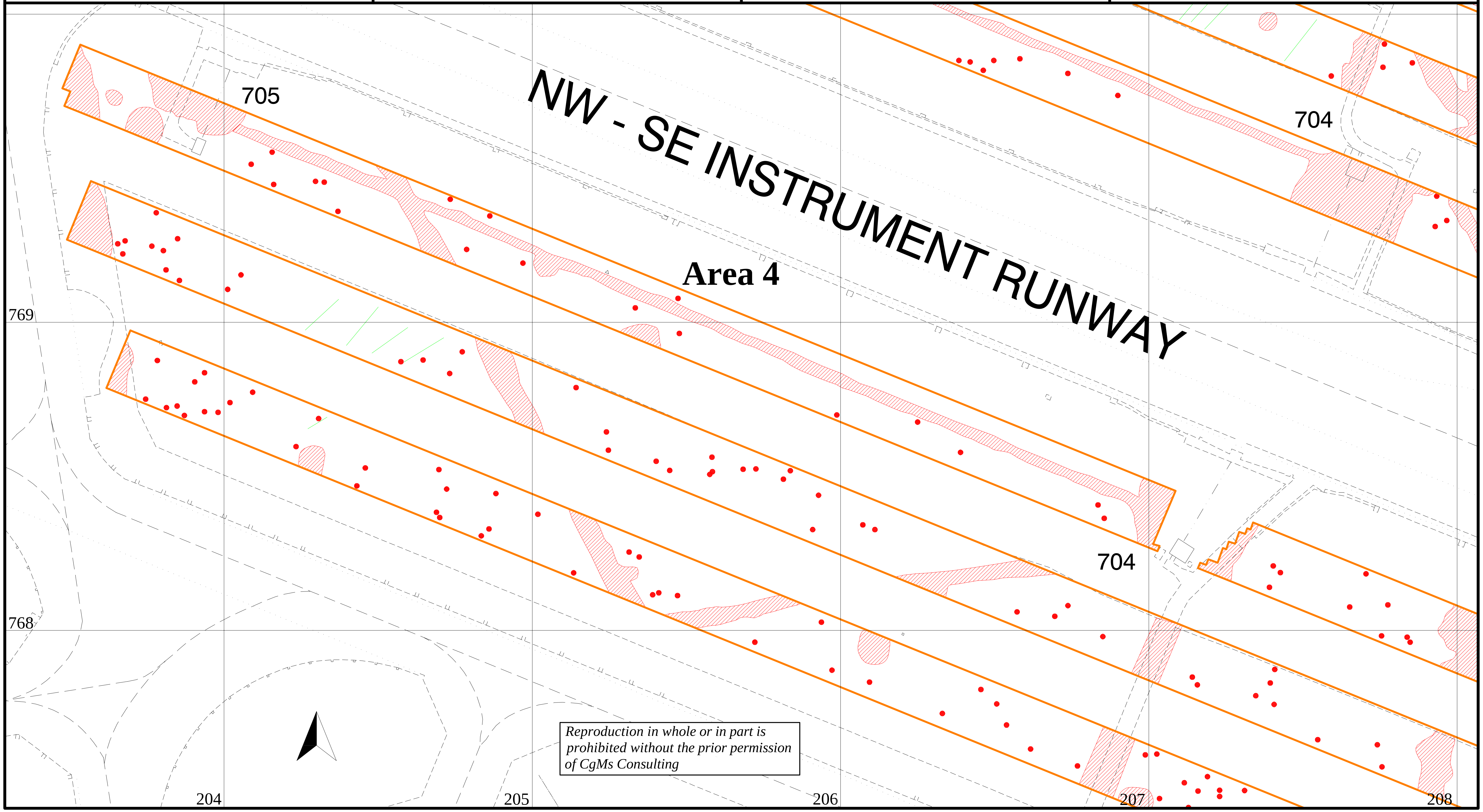
Figure 15
Area 4, geophysical interpretation



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0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- soil-filled features
- service pipes
- probable land drains

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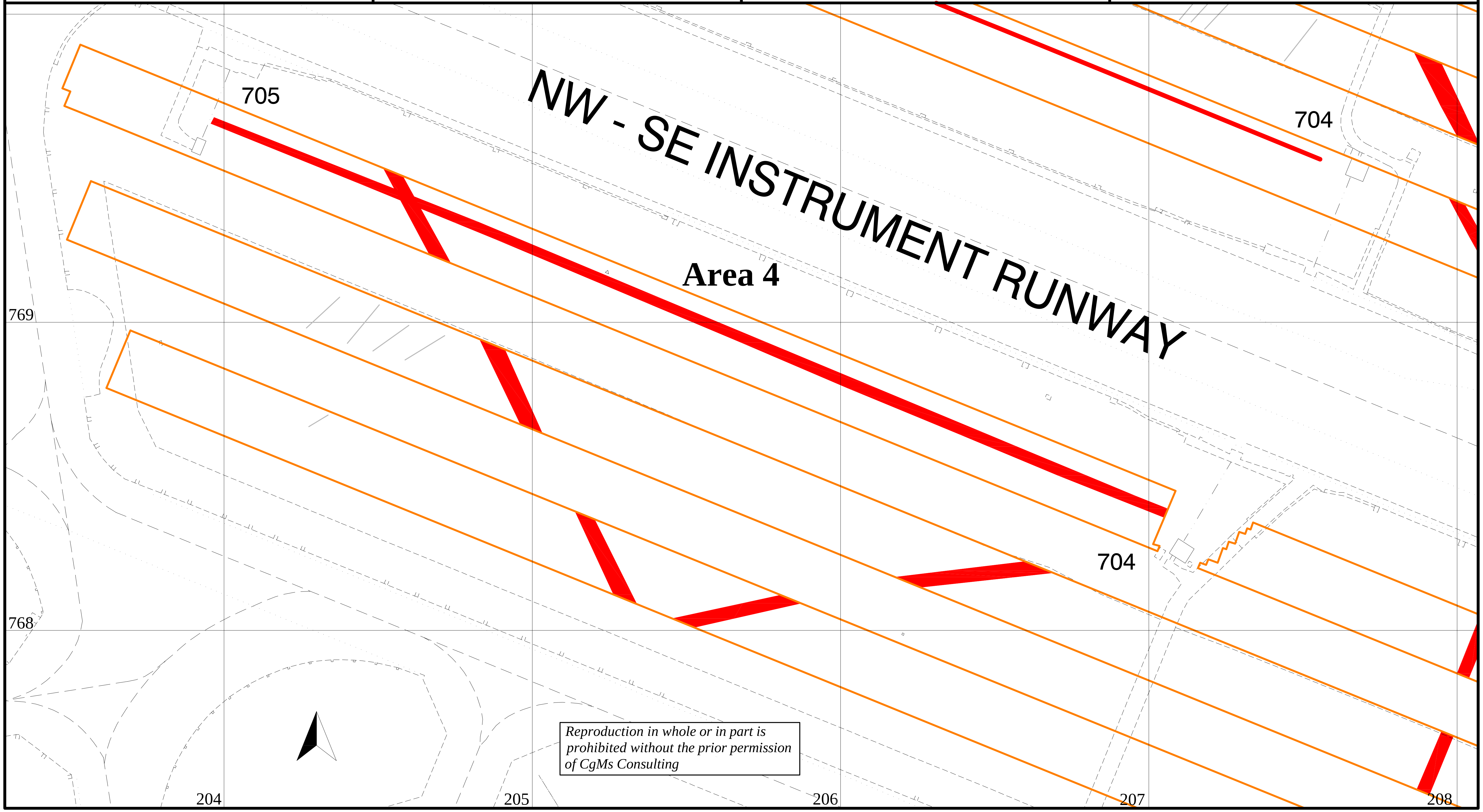
Figure 16
Area 4, archaeological interpretation



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0 50m
scale 1:1250 - for A3 plot

outline of survey area

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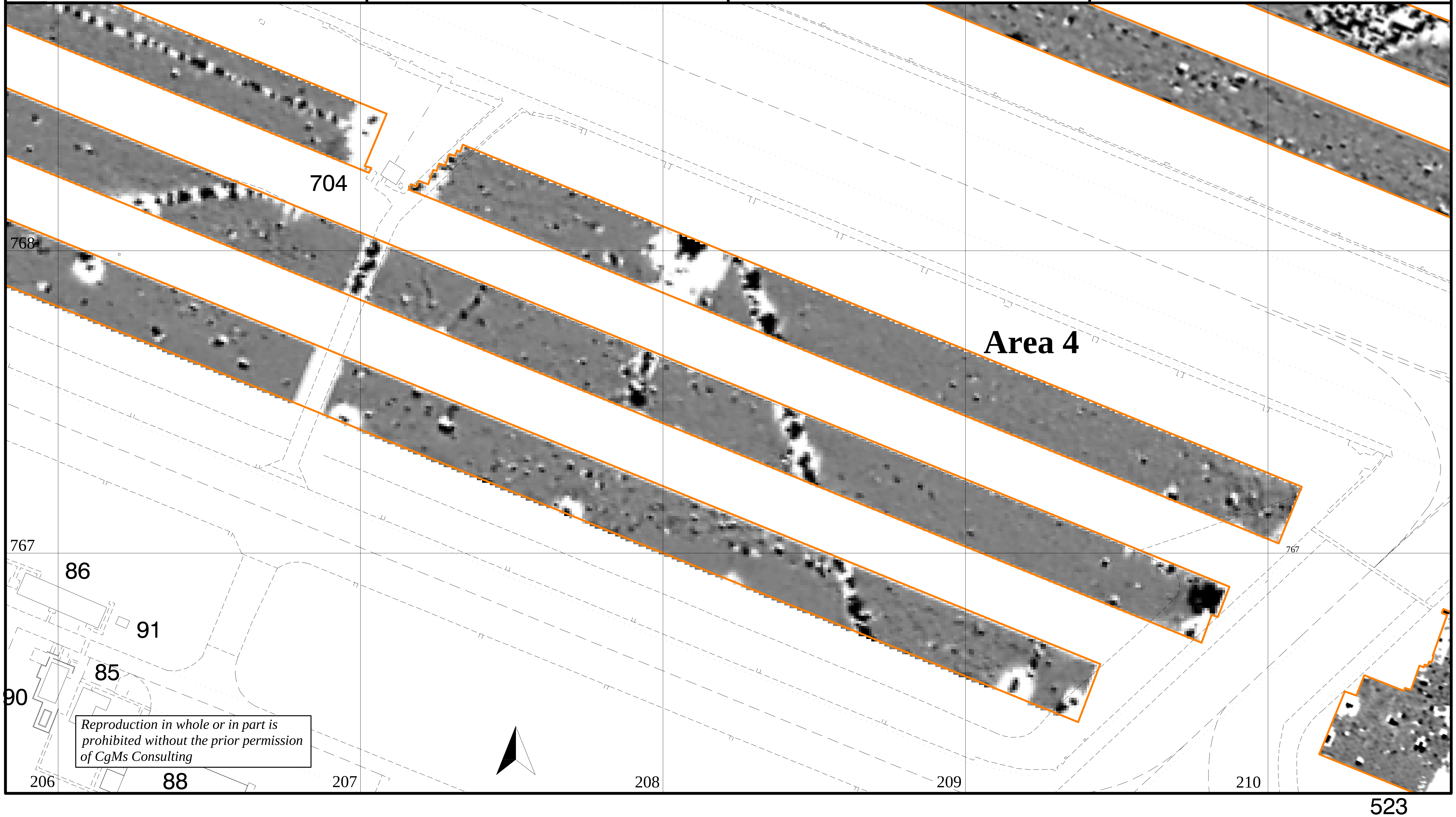
Figure 17
Area 4, geophysical survey



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0 50m
scale 1:1250 - for A3 plot

outline of survey area
positive magnetic anomalies
negative magnetic anomalies
dipolar magnetic anomalies

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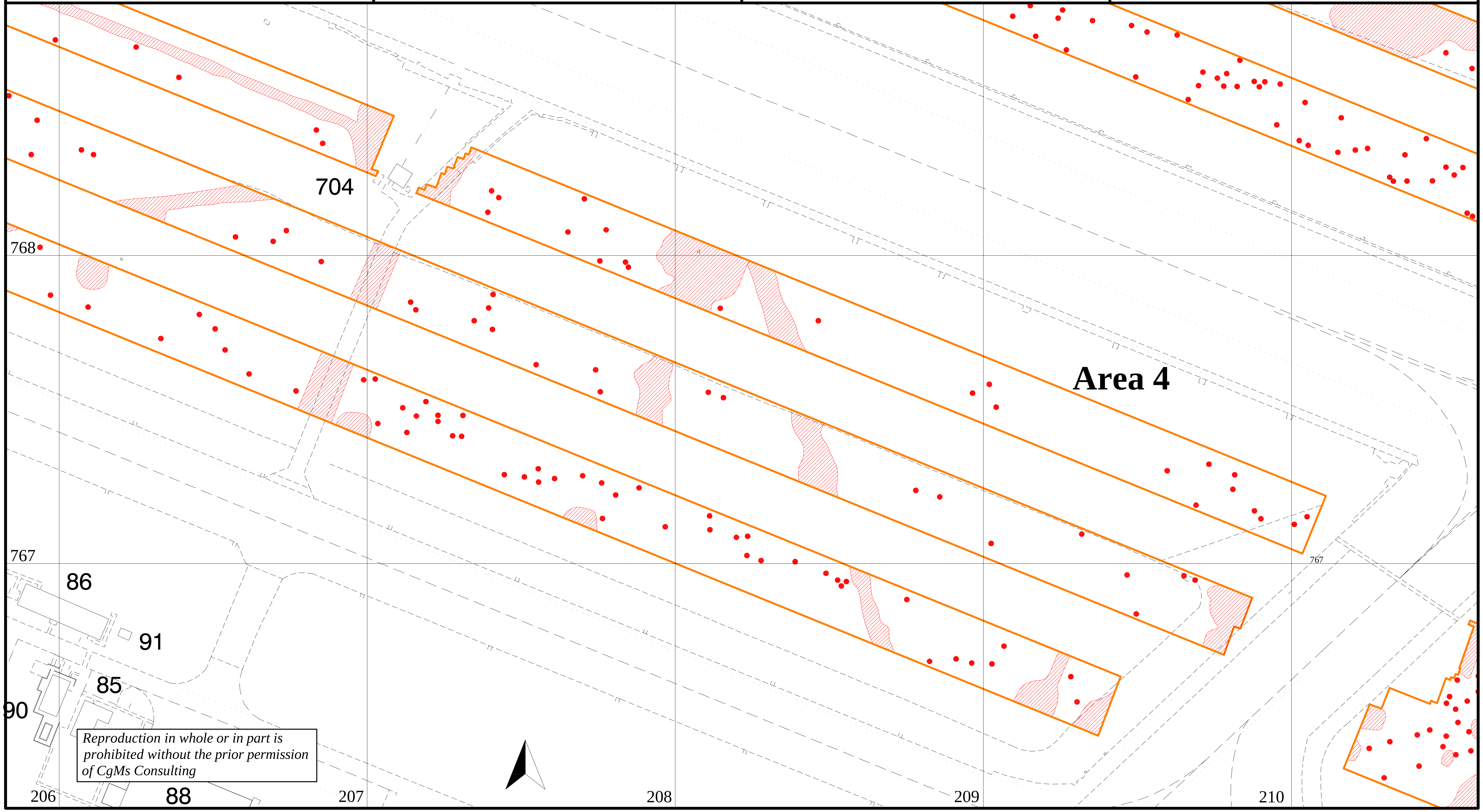
Figure 18
Area 4, geophysical interpretation



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0 50m
scale 1:1250 - for A3 plot

	outline of survey area
	soil-filled features
	service pipes

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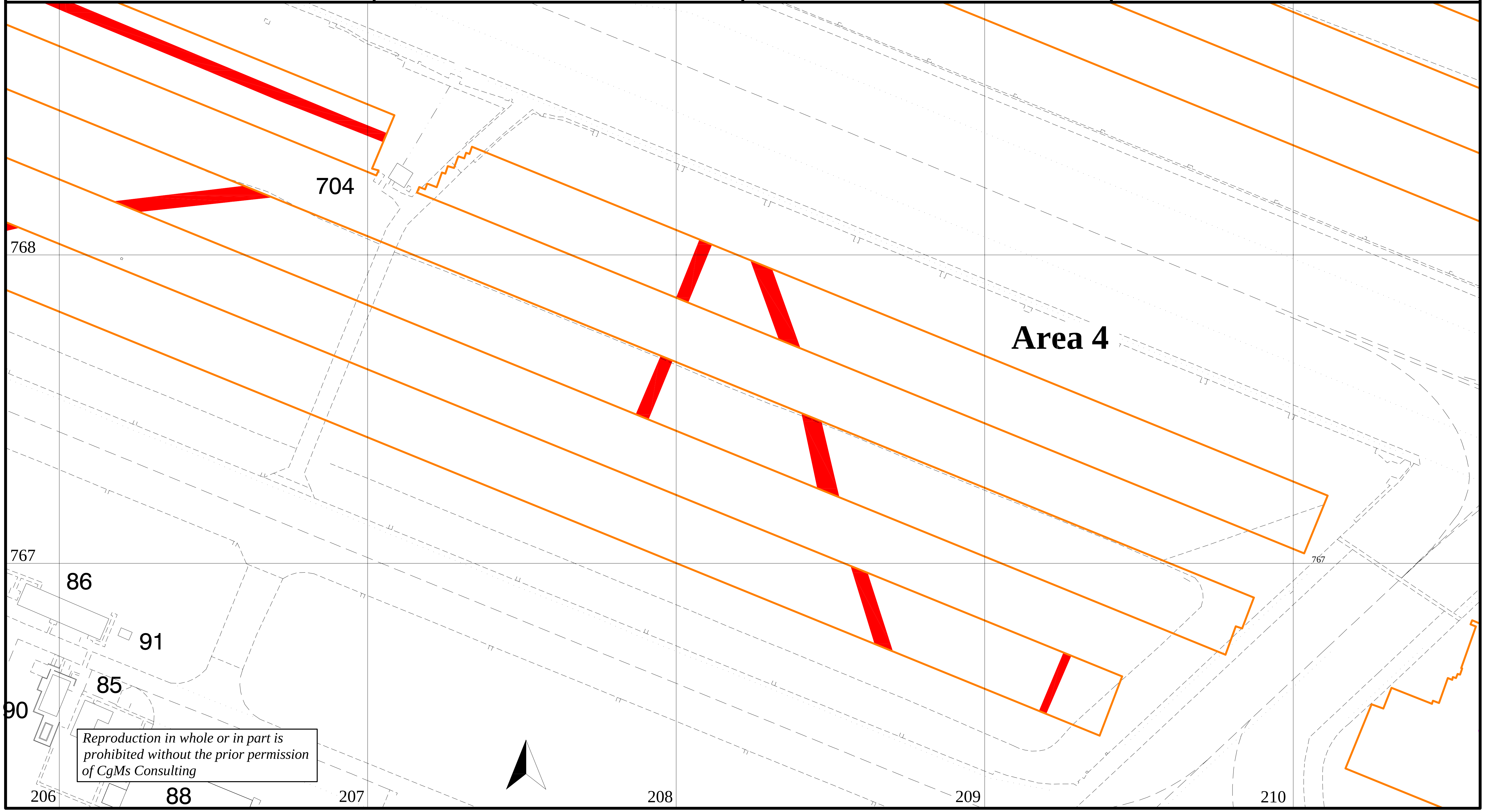
Figure 19
Area 4, archaeological interpretation



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0 50m
scale 1:1250 - for A3 plot

outline of survey area

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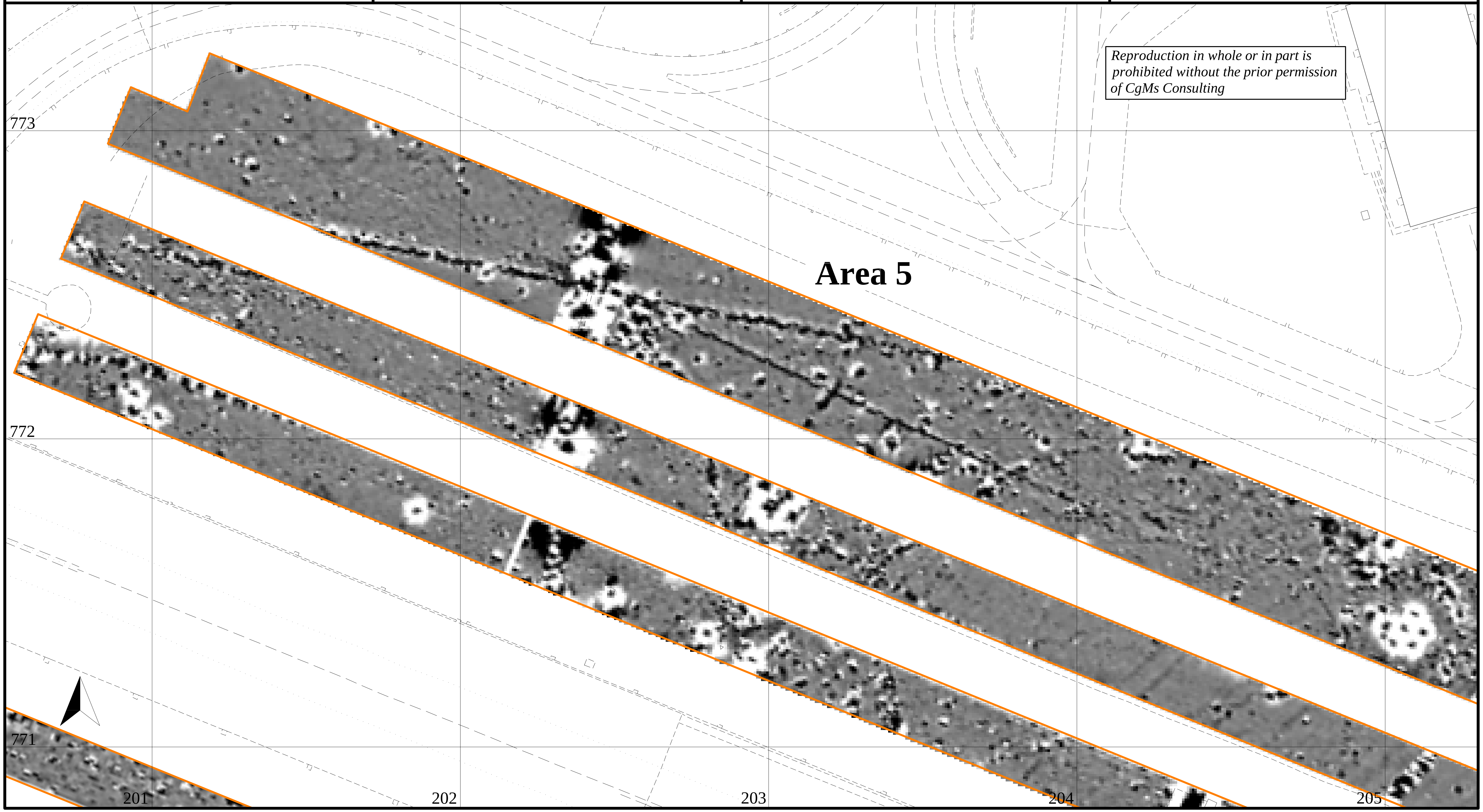
Figure 20
Area 5, geophysical survey



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0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- positive magnetic anomalies
- negative magnetic anomalies
- dipolar magnetic anomalies

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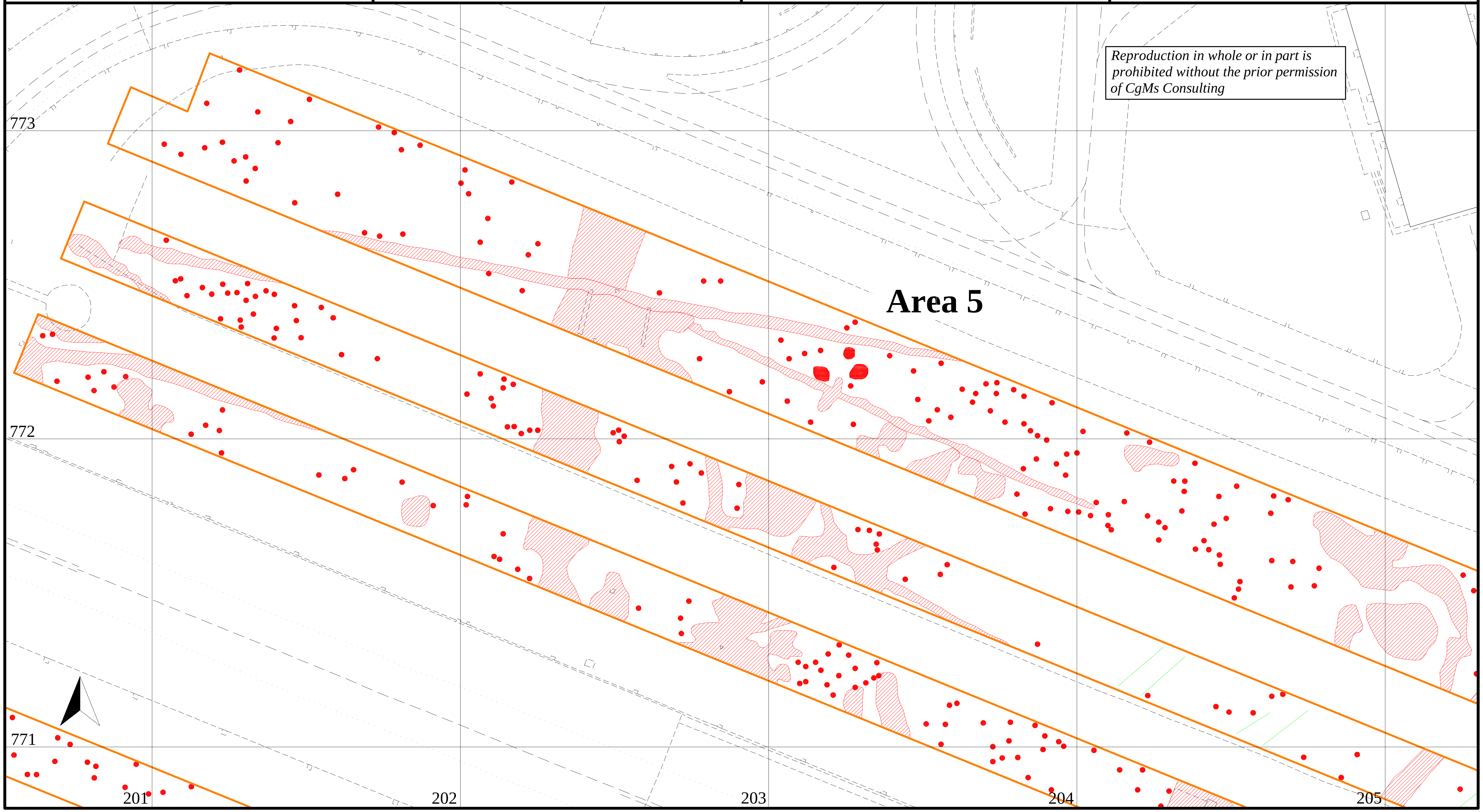
Figure 21
Area 5, geophysical interpretation



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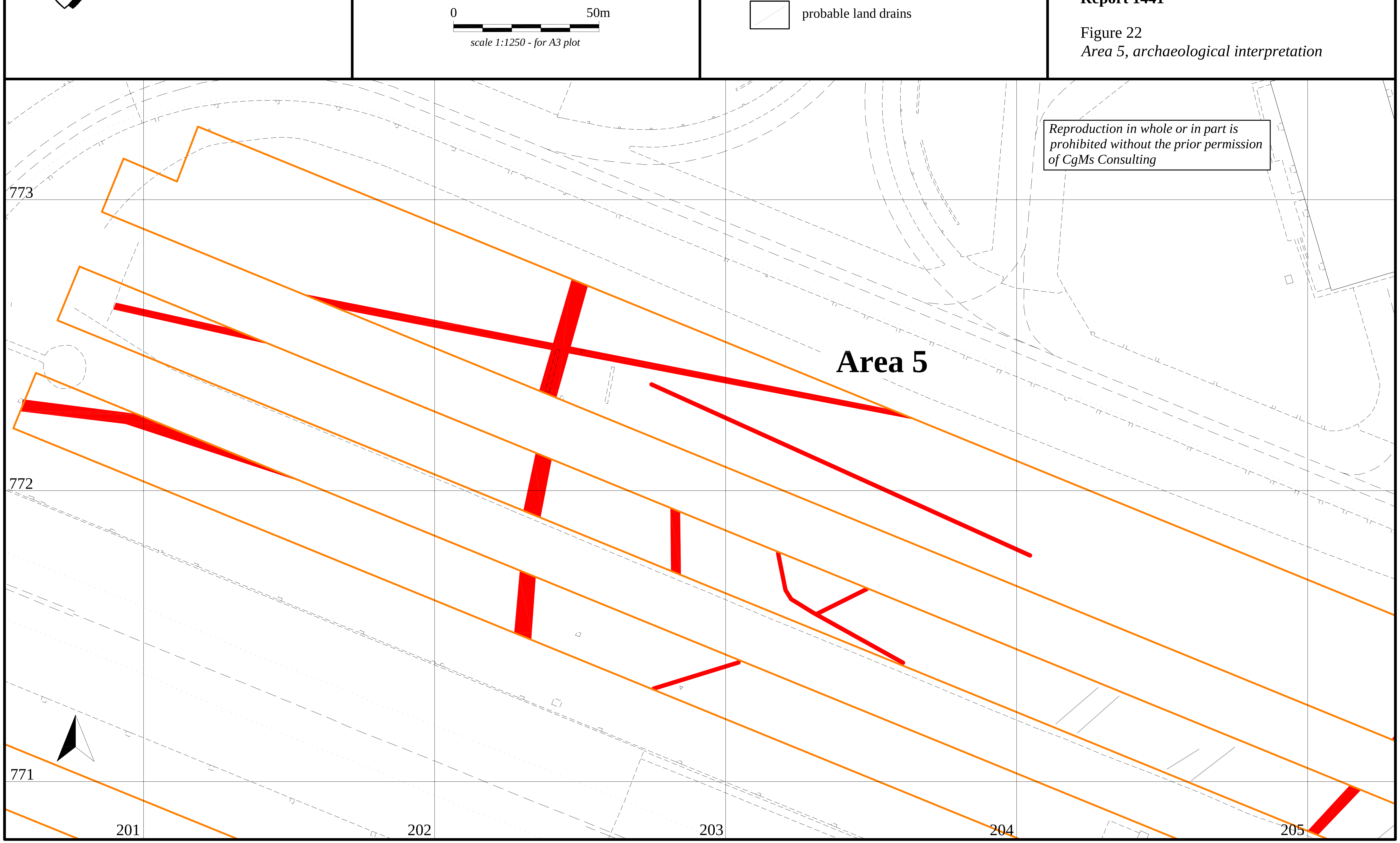

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Figure 22
Area 5, archaeological interpretation

Archaeological Services
University of Durham

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

Land at Alconbury Airfield, Huntingdon, Cambridgeshire

geophysical surveys

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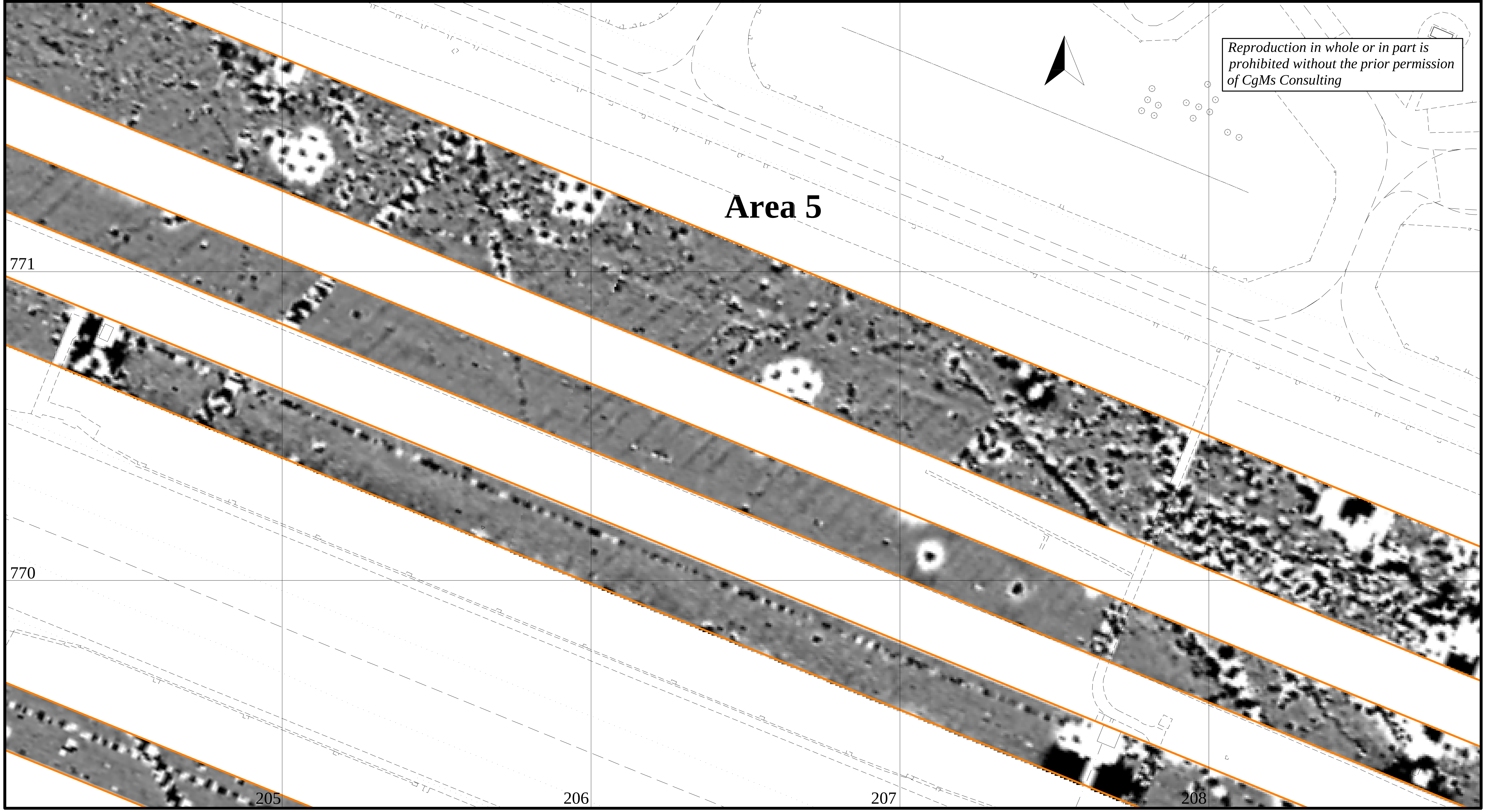
Figure 23
Area 5, geophysical survey



Archaeological Services
University of Durham

on behalf of
CgMs Consulting

outline of survey area

positive magnetic anomalies

negative magnetic anomalies

dipolar magnetic anomalies

Land at Alconbury Airfield, Huntingdon, Cambridgeshire

geophysical surveys

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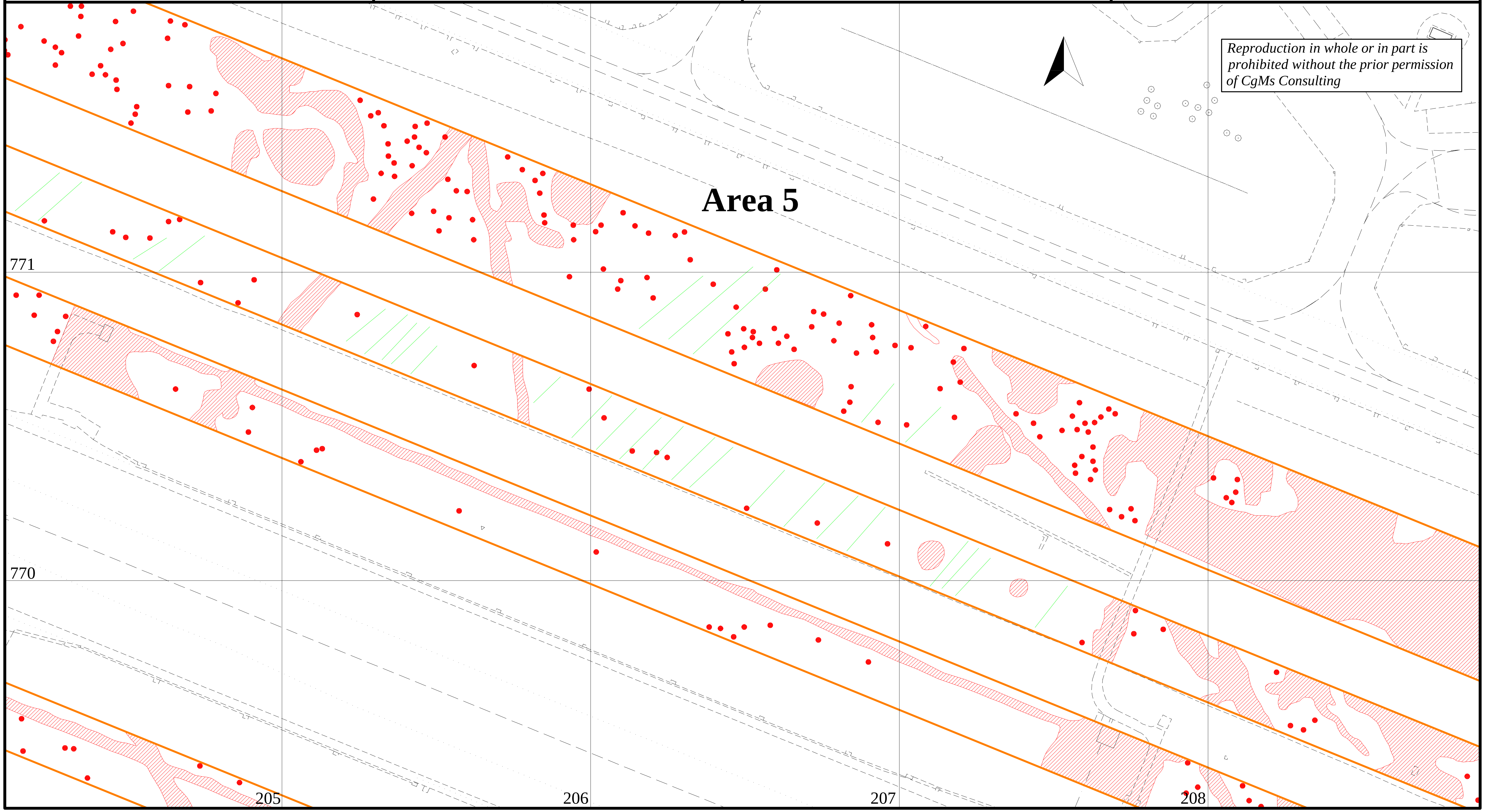
Figure 24
Area 5, geophysical interpretation



Archaeological Services
University of Durham

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area
soil-filled features
service pipes
probable land drains

Land at Alconbury Airfield, Huntingdon, Cambridgeshire

geophysical surveys

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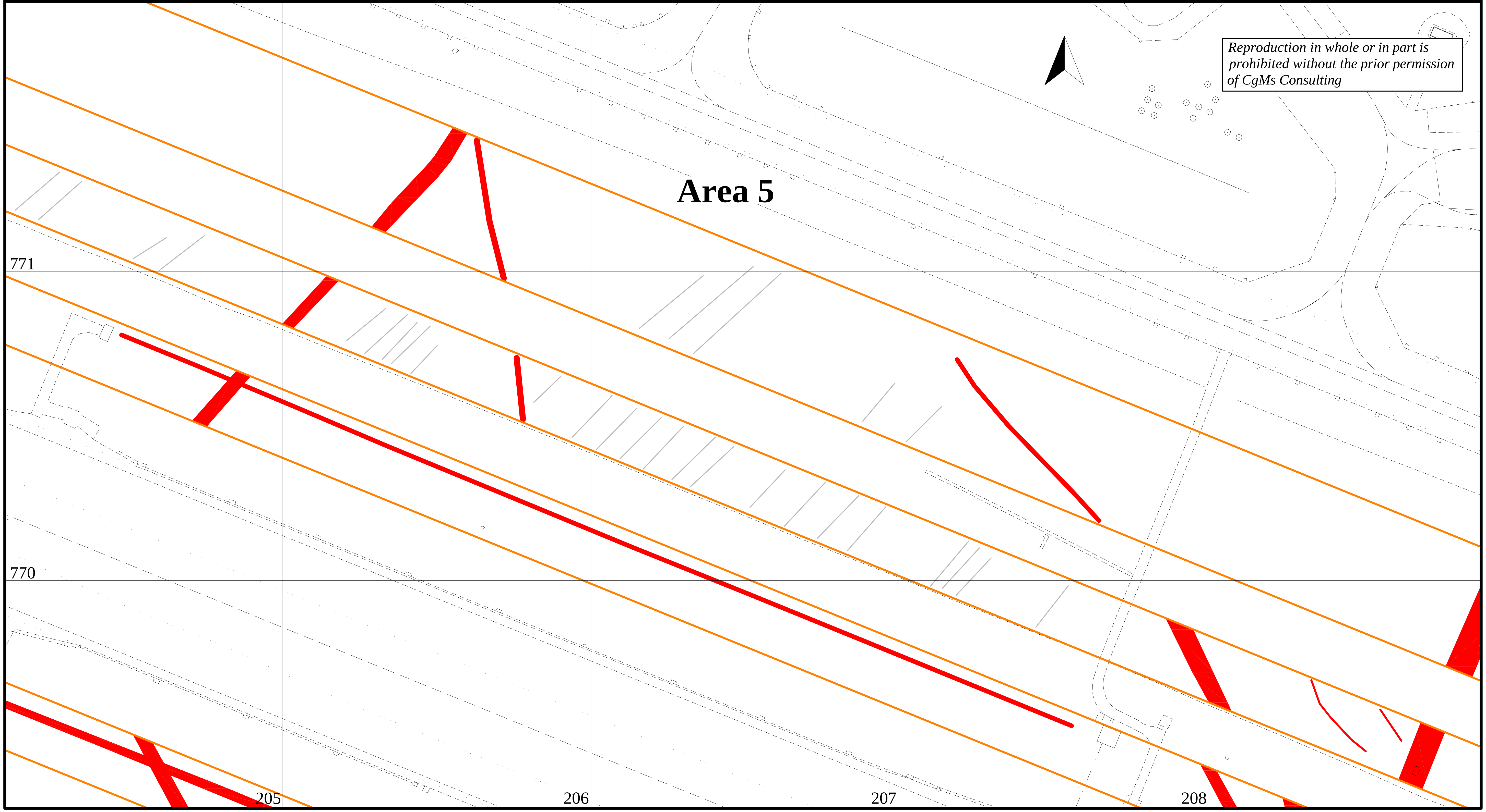
Figure 25
Area 5, archaeological interpretation



Archaeological Services
University of Durham

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area

5.00
4.17
3.33
2.50
1.67
0.83
0
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

Land at Alconbury Airfield,
Huntingdon, Cambridgeshire

geophysical surveys

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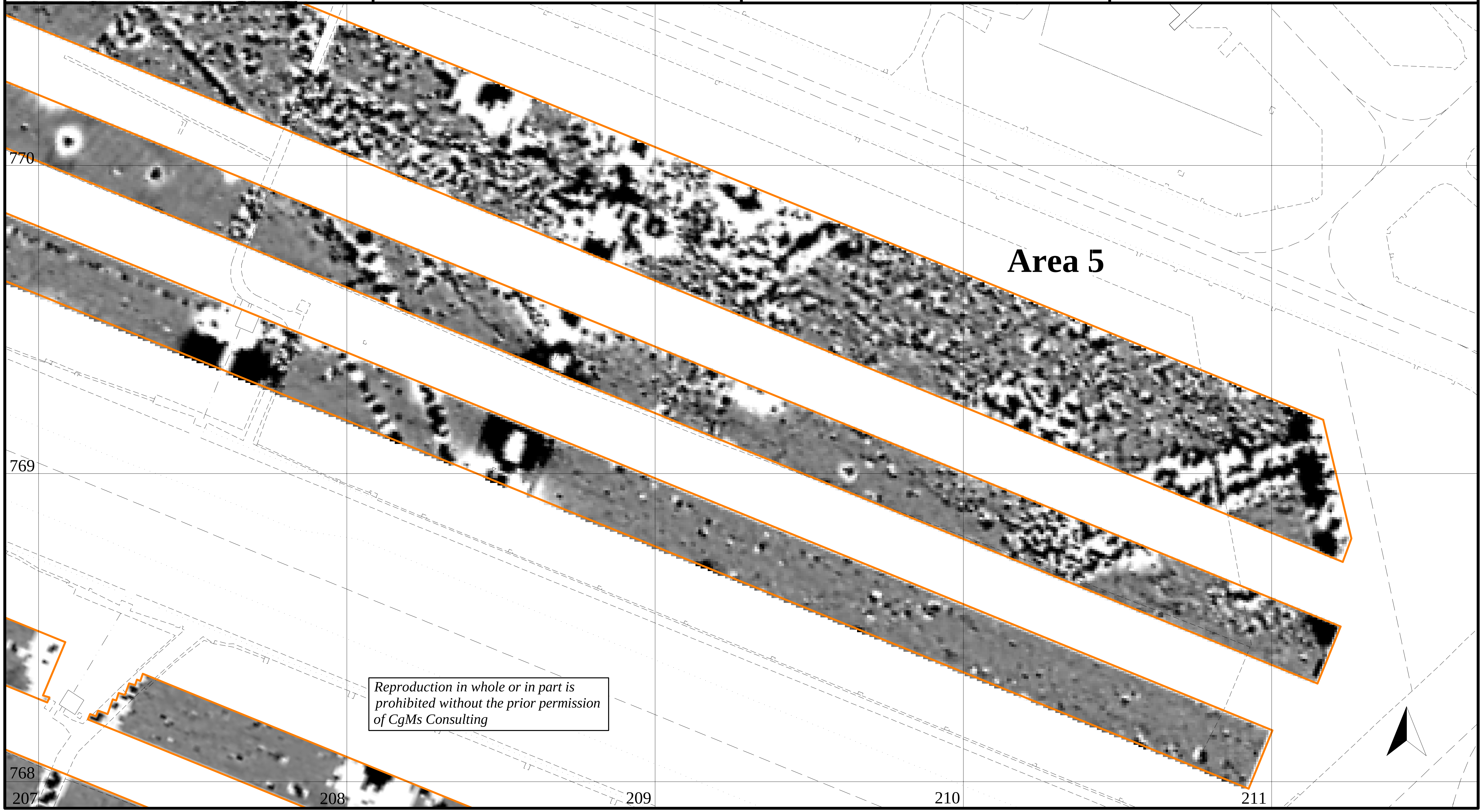
Figure 26
Area 5, geophysical survey



Archaeological Services
University of Durham

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

outline of survey area
positive magnetic anomalies
negative magnetic anomalies
dipolar magnetic anomalies

Land at Alconbury Airfield, Huntingdon, Cambridgeshire

geophysical surveys

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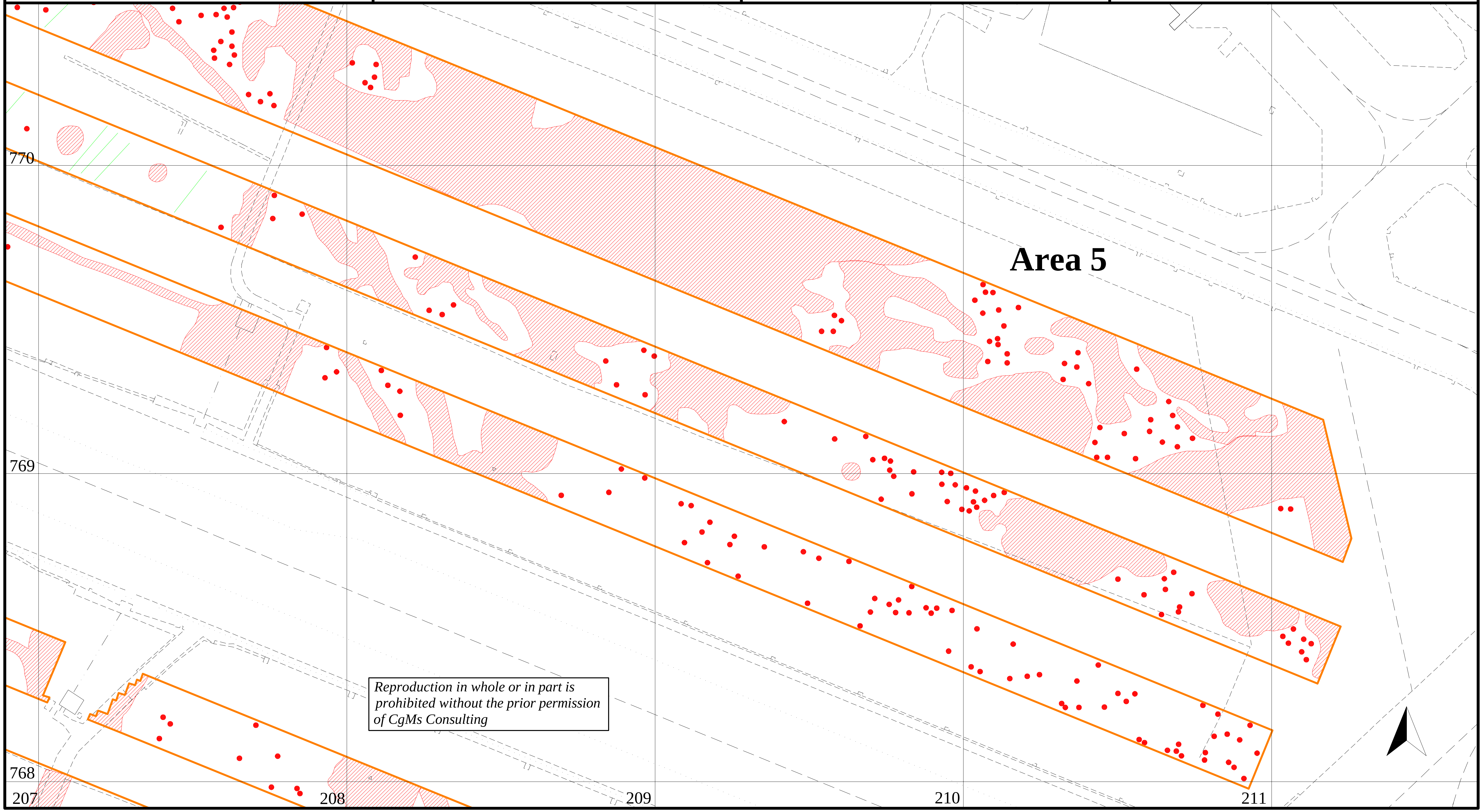
Figure 27
Area 5, geophysical interpretation



Archaeological Services University of Durham

on behalf of
CgMs Consulting

0 50m
scale 1:1250 - for A3 plot

- outline of survey area
- soil-filled features
- service pipes
- probable land drains

Land at Alconbury Airfield, Huntingdon, Cambridgeshire

geophysical surveys

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Figure 28
Area 5, archaeological interpretation