pre-construct geophysics LTD

ARCHAEOLOGICAL GEOPHYSICAL SURVEY

GRESLEY PARK
HERTFORDSHIRE

SITE CENTRED AT NGR 527100 225100

REPORT PREPARED FOR

COTSWOLD ARCHAEOLOGY

ON BEHALF OF PIGEON LAND LTD & HYTHE LTD

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Illustrations

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Non technical summary

A fluxgate gradiometer survey was undertaken at Gresley Park, Hertfordshire.

The survey detected only limited geophysical traces of clearly-defined archaeological remains, most notably in the form of a partially surviving ring ditch in the northern part of the site. The results suggest that this has been partially destroyed by later quarrying. Traces of one known quarry and probable further backfilled quarries were also detected, all within areas where superficial deposits are not recorded. A small number of potential isolated ditches were detected in the mid and southern regions, with possible sites containing burnt materials in the south-easternmost field.

Modern and recent responses include those induced by a recently removed field boundary, cultivation, buried services, landfill and electricity poles.

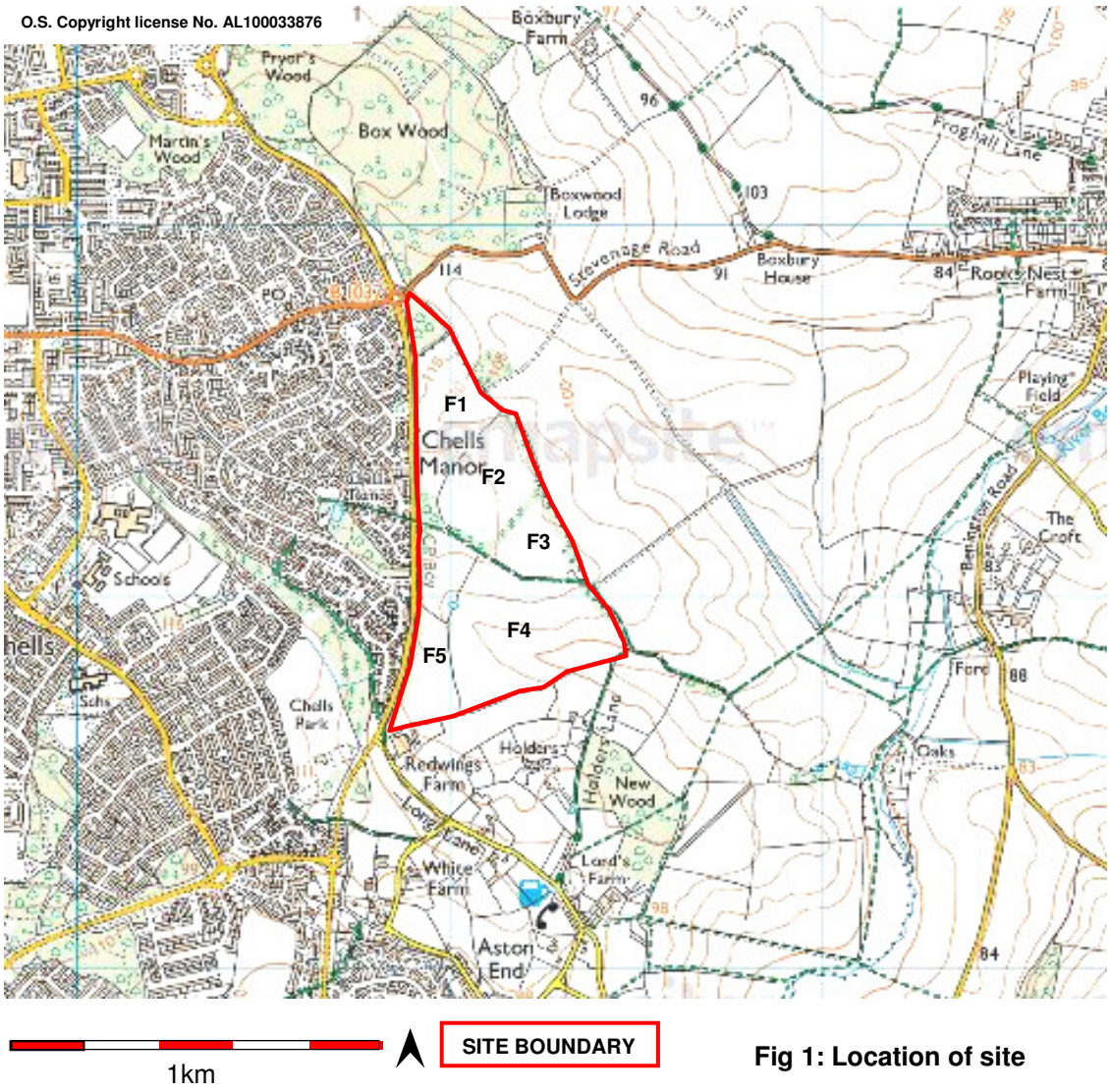


Fig 1: Location of site

1.0 Introduction

Acting on behalf of Pigeon Land Ltd & Hythe Ltd, Cotswold Archaeology commissioned a fluxgate gradiometer survey of land to the east of Gresley Way, Stevenage (site centred at NGR c.527100 225100).

The objective of the survey was to detect and precisely locate any potential buried archaeological features using non-intrusive techniques.

2.0 Location and description (Figs. 1 & 2)

The proposed c.37ha development lies to the immediate east of Stevenage, to the east of Gresley Way. It encompasses five irregularly-shaped arable fields (F1 – F5) and surrounding woodland belts. The fields were cropped with winter wheat at the time of survey

3.0 Geology and topography

The solid geology of the site consists of Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) - sedimentary bedrock formed approximately 84 to 94 million years ago during the Cretaceous Period in a local environment previously dominated by warm chalk seas[1].

No superficial deposits are recorded in the north of the site. Diamicton (Lowestoft Formation) predominates in the central and southern regions. This was formed up to 2 million years ago during the Quaternary Period in cold periods when Ice Age glaciers scoured the landscape and deposited moraines of till with outwash sand and gravel deposits from seasonal and post glacial meltwaters. A c.E-W aligned band of Head (Clay, Silt, Sand and Gravel) extends across the south-east part of the site (within F4). This was formed up to 3 million years ago in the Quaternary Period as material accumulated by down slope movements including landslide, debris flow, solifluction, soil creep and hill wash.

The ground level is undulated on a generally east/southeast facing slope (between c.118m AOD and c.98m AOD), with relatively broad valleys in F1 and F4.

4.0 Archaeological Context

Online sources[2] do not list any heritage assets within the proposed development zone, although the site lies in proximity to a number of known or suspected monuments, particularly within Box Wood, the southern edge of which lies just to the north of the site. Heritage assets within the wood include suspected Dene Holes (HHER No. 2906), a '*much disturbed mound in commanding position; possibly a prehistoric barrow, but also possibly a windmill mound*' (Scheduled Ancient Monument HT127, HHER No. 458) and possible remains of a deserted medieval settlement.

Cropmark enclosures within the area to the immediate east of F4 might relate to a possible Romano-British settlement (Pastscape Monument 365354),

5.0 Methodology

The survey methodology is based upon English Heritage guidelines: *'Geophysical Survey in Archaeological Field Evaluation'* (English Heritage, 2008).

5.1 Fluxgate Gradiometry is a non-intrusive scientific prospecting tool that is used to determine the presence/absence of some classes of sub-surface archaeological features (e.g. pits, ditches, kilns, and occasionally stone walls). By scanning the soil surface, geophysicists identify areas of varying magnetic susceptibility and can interpret such variation by presenting data in various graphical formats and identifying images that share morphological affinities with diagnostic archaeological remains.

The use of gradiometry should help to establish the presence/absence of buried magnetic anomalies, which may reflect sub-surface archaeological features, and may therefore form a basis for a subsequent scheme of archaeological trenching.

The detection of anomalies requires the use of highly sensitive instruments; in this instance the Bartington 601 Dual Fluxgate Gradiometer. This is accurately calibrated to the mean magnetic value of each survey area. Two sensors, mounted vertically and separated by 1m, measure slight, localised distortions of the earth's magnetic field, which are recorded by a data logger.

It should be noted that this technique only records magnetic variation (relative to natural background levels). As such, the magnetic response of archaeological remains will vary according to geology/pedology. Additionally, remains may be buried beyond the effective 1 - 2m range of the gradiometer (e.g. sealed beneath alluvium).

5.2 The survey was undertaken on 28th April - 6th May 2016. The zigzag traverse method of survey was used, with readings taken at 0.25m intervals along 1.0m wide traverses.

Each survey area was established by Global Positioning Satellite using a Leica GS015 RTK, within an accuracy of +/- 0.1m. Greyscale images of the survey results are geo-referenced on an Auto drawing of the site.

The data sets were processed using *Terrasurveyor V3.*

Raw data sets are presented as greyscale images on Figs. 6, 10, 14, 18 & 22 (clipped to +/- 10nT to enhance resolution). The 'Despike' function was applied to reduce the effect of extreme readings induced by metal objects, and 'Destripe' to eliminate striping introduced by zigzag traversing. The data sets were clipped to +/- 20nT and presented as stacked trace plots (Figs. 7, 11, 15, 19 & 23) and +/-2nT on greyscale images of the fully processed data (Figs. 2, 4, 8, 12, 16 & 20).

Greyscales of the processed data and interpretative images for the entire survey area are presented on Figs. 2 & 3 (1:5000).

Anomalies considered to represent modern ferrous-rich features and objects are highlighted as pink and/or blue on the interpretive images (Figs. 3, 5, 9, 13, 17 & 21). These are characterised magnetically as dipolar 'iron spikes', often displaying strong positive and/or negative responses, typically inducing a response in excess of +/-10nT. Examples include those deposited along existing or former boundaries (e.g. wire fencing), services and scatters of horseshoes, ploughshares, etc, across open areas. Ferro-enhanced (fired) materials such as brick and tile (sometimes introduced during manuring or land drain construction) usually induce a similar, though generally weaker, response. Concentrations of such anomalies will often indicate rubble spreads, such as would be used to backfill ponds or redundant ditches, or spreads of demolition materials of structures (brick and/or tile rubble).

On a cautionary note, fired clay associated with early activity (e.g. kilns, furnaces, tile spreads) has the same magnetic characteristics as modern brick/tile rubble. Therefore, the interpretation of such variation must consider the context in which it occurs.

The interpretation of geophysical survey results should only be regarded as an aid to establishing the true nature and origin of buried features. These can only be fully established by intrusive investigation.

6.0 **Results and discussion** (Figs. 2 - 23)

6.1 **Field 1** (Figs. 2 – 7)

The survey recorded traces of a c.25m diameter circular ditch in the mid eastern part of the field (Figs. 3 & 6: highlighted red). The results suggest that its north-western edge has been partially truncated by later quarrying/collapsed Dene Hole, with similar remains to its immediate north-east (highlighted yellow). This interpretation is further enhanced by the existence of a known former chalk pit (Fig. 3: inset[3]) to the immediate west of the field/site, with an almost certain (unmapped) easterly, continuation into the site (highlighted yellow). A further known pit was situated on land to the immediate east of the field (*ibid*).

Elsewhere, it is likely that most, if not all, weaker responses signify natural features, such as palaeochannels or soil filled natural depressions in the upper geology (greenscale). Whereas it is conceivable that potential pits might lie within this field (and other parts of the site), it has not been possible to fully differentiate natural and anthropogenic responses with reference to the survey results in isolation. With that in mind, discrete anomalies within the confines of the circular enclosure are more likely to be of natural origin.

The course of a former track[3] (dotted yellow line, see also Fig. 3) partially follows that of a probable palaeochannel in the mid part of the field, although the survey did not identify magnetic variation that clearly relates to the track. The latter once extended between the current field access and the mid-eastern boundary.

Stronger variation (pink and blue) is probably exclusively indicative of modern ferrous-rich materials and objects, with stronger discrete anomalies (typically) including miscellaneous debris contained within the ploughsoil (e.g. ploughshares, horseshoes and fragments of brick/tile, the latter possibly imported within manure). Such responses were also recorded in F2 – F5.

6.2 **Field 2** (2, 3, 8 – 11)

The majority of distinctive, albeit relatively weak, variation reflects natural features, including a sinuous palaeochannel in the south-east corner (Figs. 3 & 9: greenscale). Of particular interest is the distinct natural variance in the northern part of the field and F1 (where superficial deposits are unrecorded/non existent) in comparison to generally more muted variation in the mid and southern parts of the site where glacial deposits prevail and the underlying chalk bedrock is presumably more deeply buried (defined as sand and gravel by the BGS).

An irregularly-shaped zone of weak variation in the southern region probably signifies a soil-backfilled chalk quarry, albeit not depicted on sourced historic maps[3] (yellow).

Stronger variation (pink & blue, as discussed above) also includes extreme readings induced by a buried service that extends across the south-western corner of the field (blue line).

6.3 **Field 3** (Figs. 2, 3, 12 – 15)

The survey recorded two isolated linear trends that have been tentatively flagged as potential sections of ditches (Figs. 3 & 13: dotted red lines). However, given that a substantial number of stronger anomalies (pink and blue) lie along the course of the easternmost example, this (at least) might be of relatively recent origin, such as a field boundary (albeit not shown on historic maps).

It is likely that the majority of variation elsewhere is of natural origin, with the noticeable interface of glacial and unrecorded deposits in the northern part of the field (greenscale).

A buried service extends along the southern edge of the field, presumably an eastern continuation of the service at the south-eastern corner of F2 (pink and blue/blue line).

6.4 **Field 4** (Figs. 2, 3, 16 – 19)

It is likely that magnetically distinct and predominately curvilinear trends in the north-eastern region are natural responses, including probable palaeochannels (Figs. 3 & 17: greenscale).

A group of anomalies recorded adjacent to the mid eastern boundary are more enigmatic; a potential archaeological origin as pits should not be discounted (broadly within area circled).

More isolated and magnetically stronger anomalies within this general vicinity exhibit some potential as sites containing burnt materials (red dots), including one example that was recorded to the immediate north-east of an electricity pole (EP). However, it is highly likely that strong responses registered in closer proximity to the pole directly relate to it (similarly for those recorded around two other poles situated to the east and west).

Widespread, distinctive and seemingly random natural variation was also registered in the central area. A c.E-W aligned probable curvilinear palaeochannel extends across the southern part of the field at the base of a shallow valley (broadly also corresponding to the narrow band of Head (see Section 3); the results suggest that two land drains extend along its eastern side (dotted purple line). Other linear anomalies are also considered to be of agricultural origin, possibly cultivation (dotted orange lines).

6.5 **Field 5** (Figs. 2, 3, 20 – 23)

For the most part, distinct variation recorded in the southern half of the field is of probable natural origin (Figs. 4 & 21: greenscale). However, one ditch-type linear anomaly was detected in this area (dotted red line). Other linear anomalies possibly signify cultivation, possibly residual remains of ridge and furrow (dotted orange lines).

The survey recorded residual remains of a recently removed field boundary[3] (yellow line).

A strip of strong variation, broader in the north-west part of the field, undoubtedly reflects modern landfill (pink and blue).

7.0 Conclusions

The survey detected only limited geophysical traces of clearly-defined archaeological remains, most notably in the form of a partially surviving ring ditch in the northern part of the site. The results suggest that this has been partially destroyed by later quarrying. Traces of one known quarry and probable further backfilled quarries were also detected, all within areas where superficial deposits are not recorded. A small number of potential isolated ditches were detected in the mid and southern regions, with possible sites containing burnt materials in the south-easternmost field.

Modern and recent responses include those induced by a recently removed field boundary, cultivation, buried services, landfill and electricity poles.

These were recorded against a backdrop of natural variation that is generally more pronounced in the northern part of the site where drift deposits are not recorded.

8.0 Acknowledgements

Pre-Construct Geophysics would like to thank Cotswold Archaeology for this commission.

9.0 References

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

[1]http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html, 1:50,000. British Geological Survey, Keyworth

[2]http://www.heritagegateway.org.uk/

[3]http://maps.nls.uk/geo/explore/

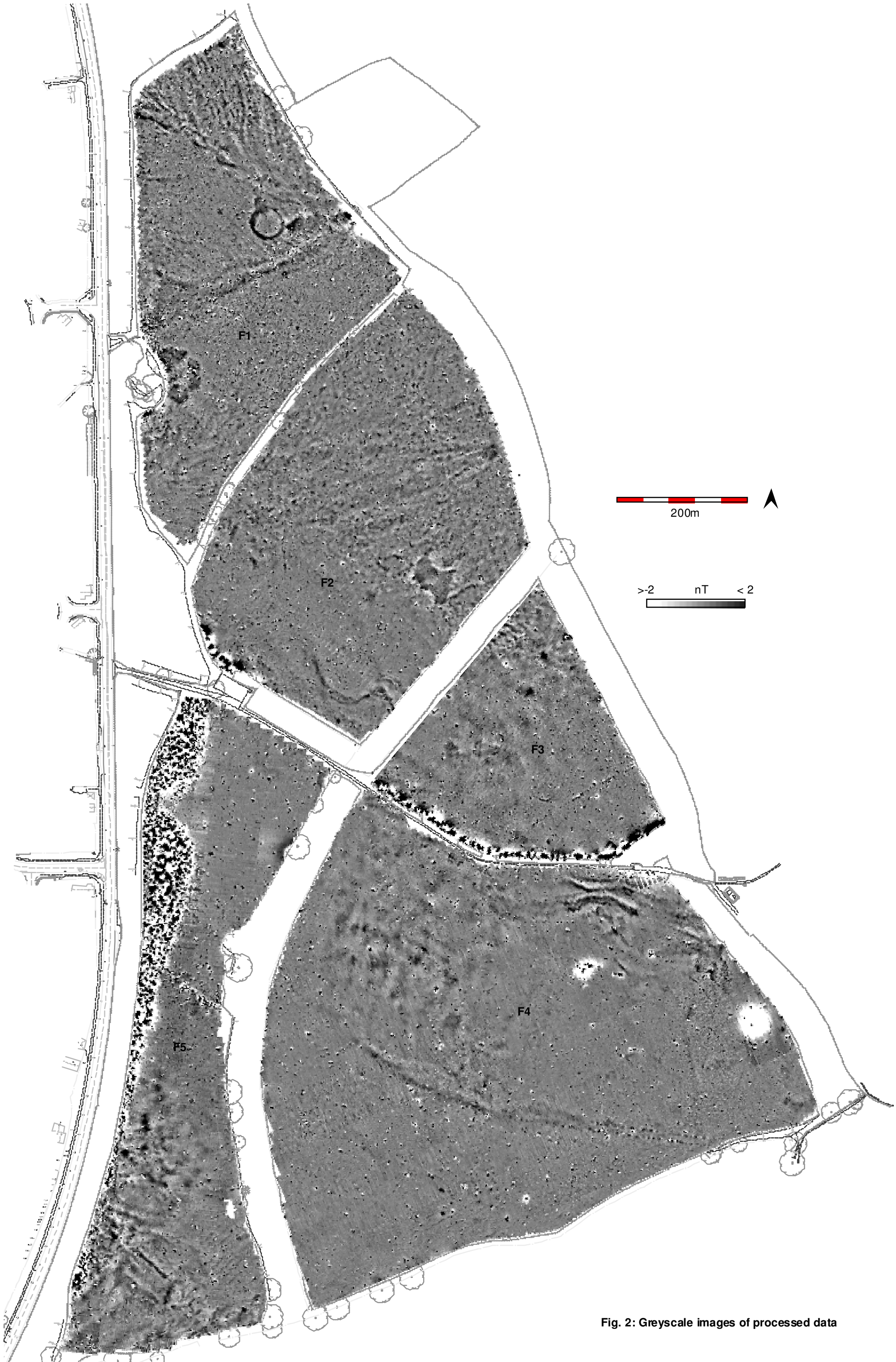


Fig. 2: Greyscale images of processed data

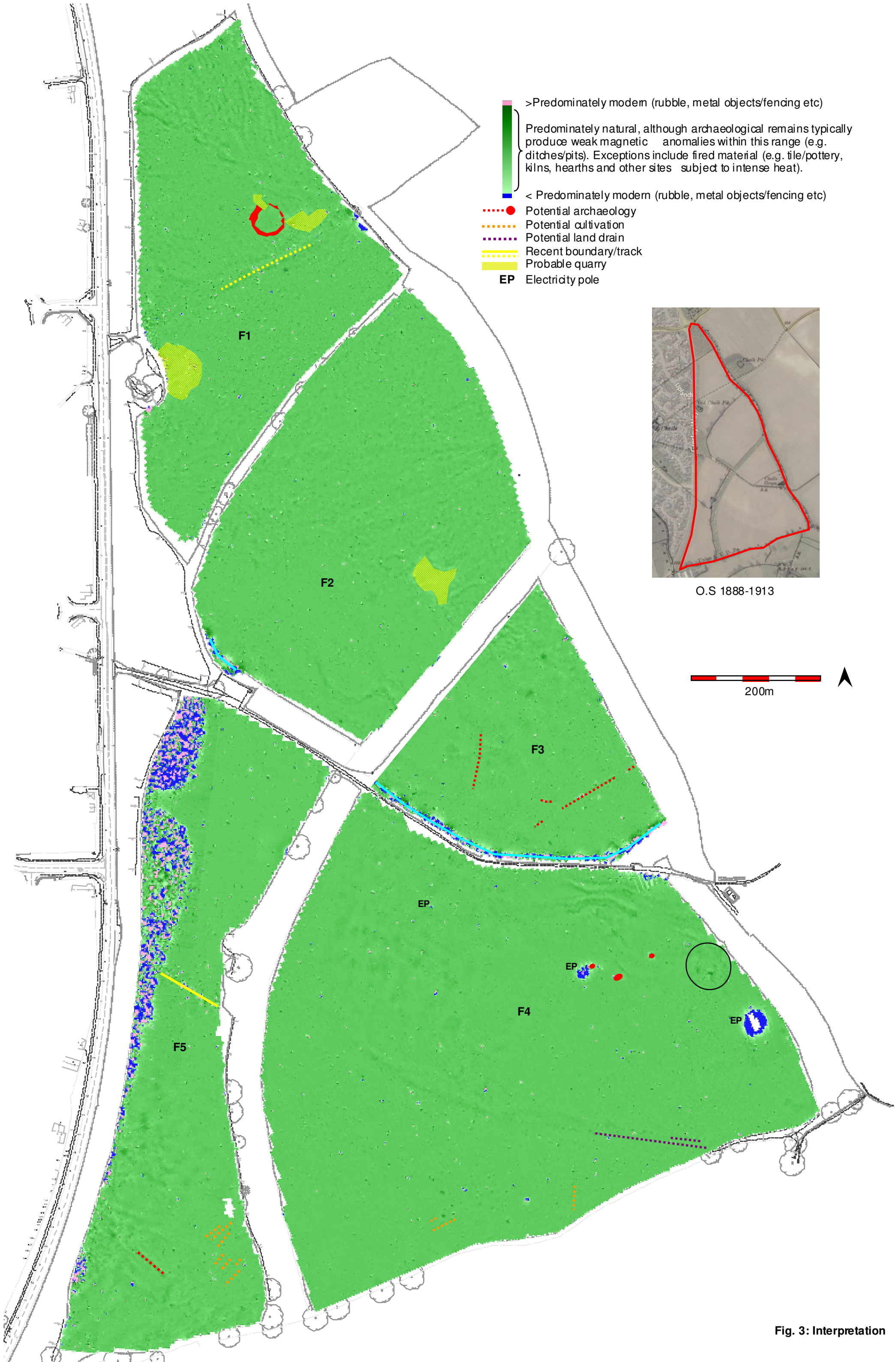


Fig. 3: Interpretation

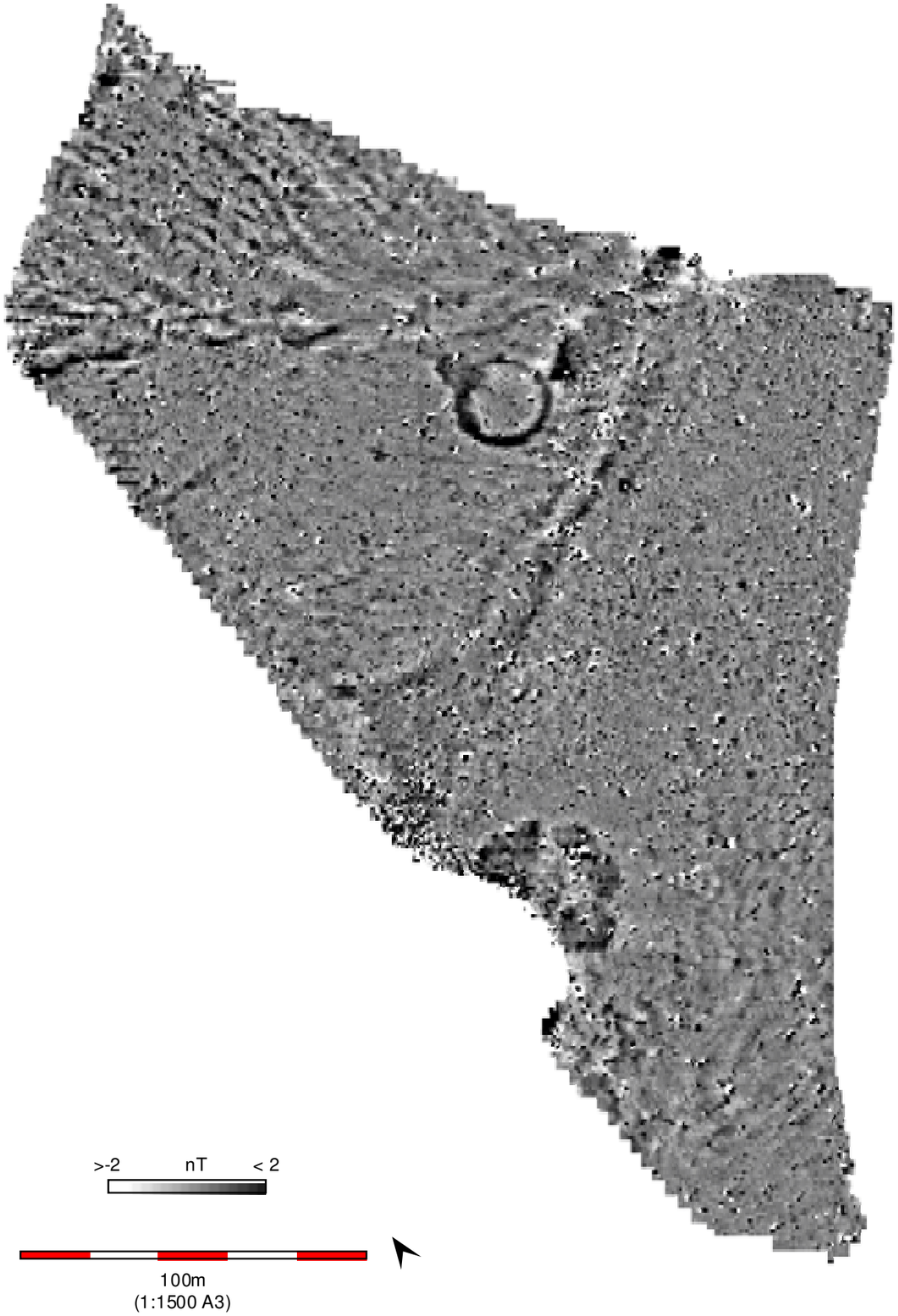


Fig. 4: F1 - Greyscale image of processed data

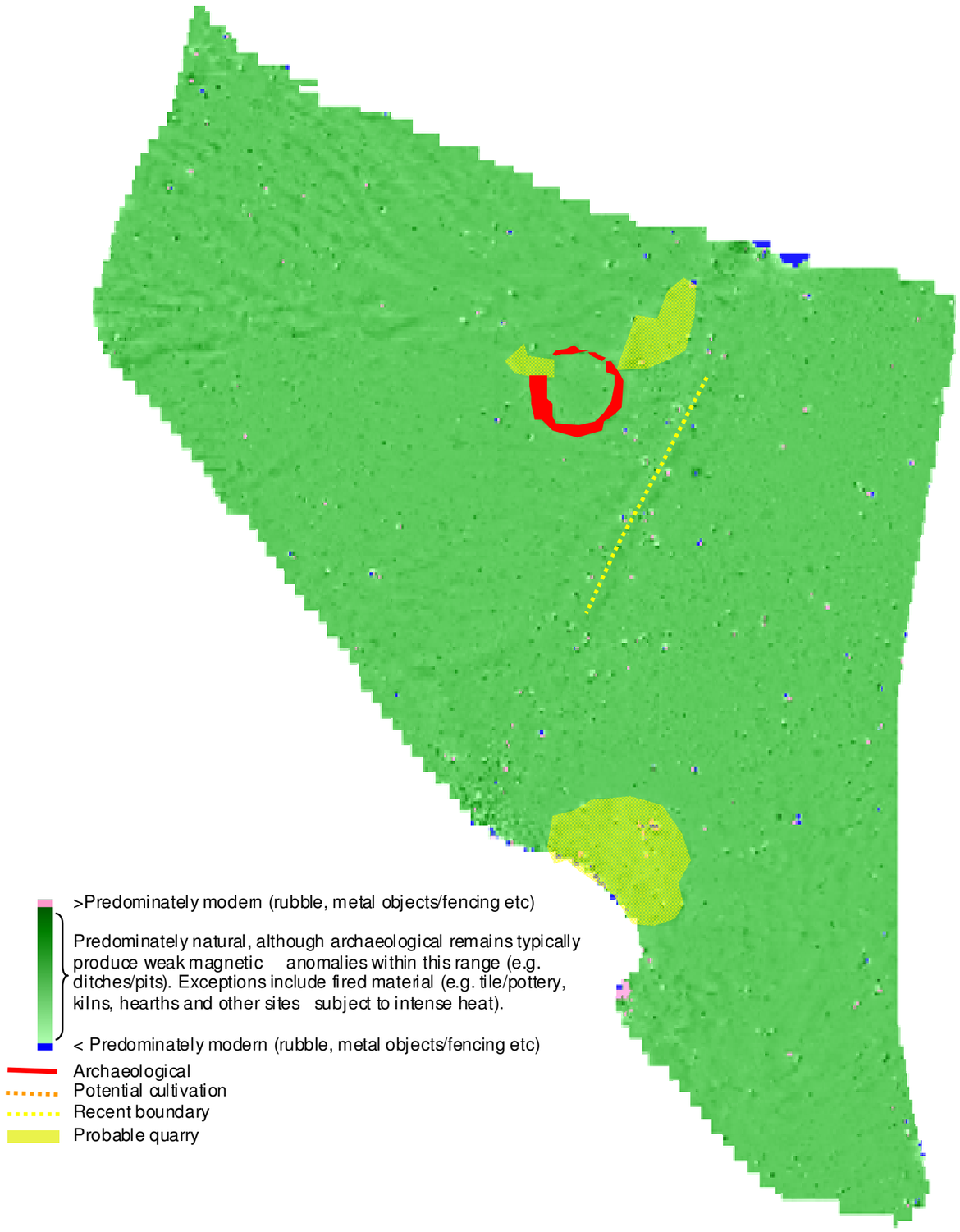


Fig. 5: F1 - Interpretation

Fig. 6: F1 - Greyscale image of unprocessed data

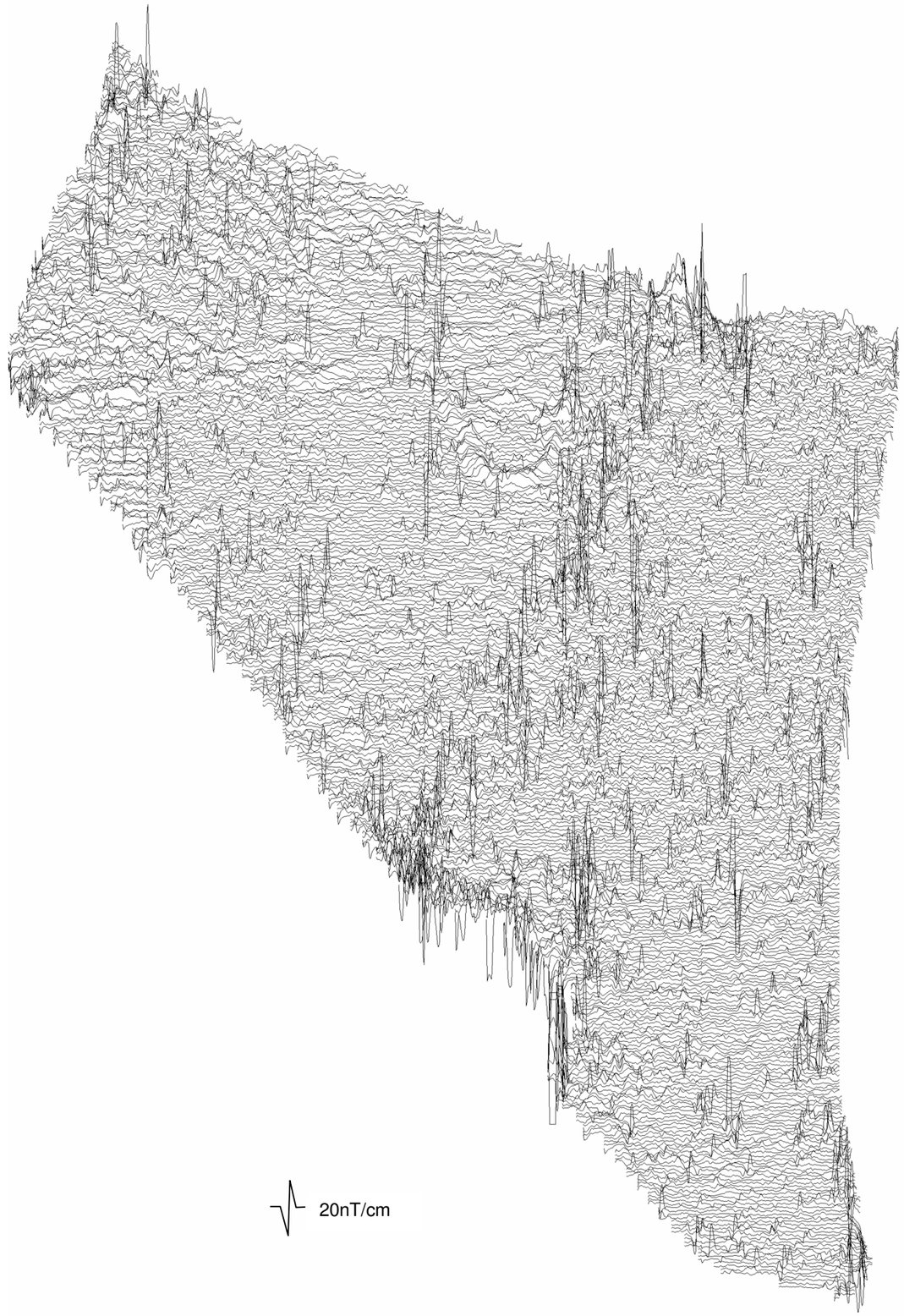


Fig. 7: F1 – Trace plot image

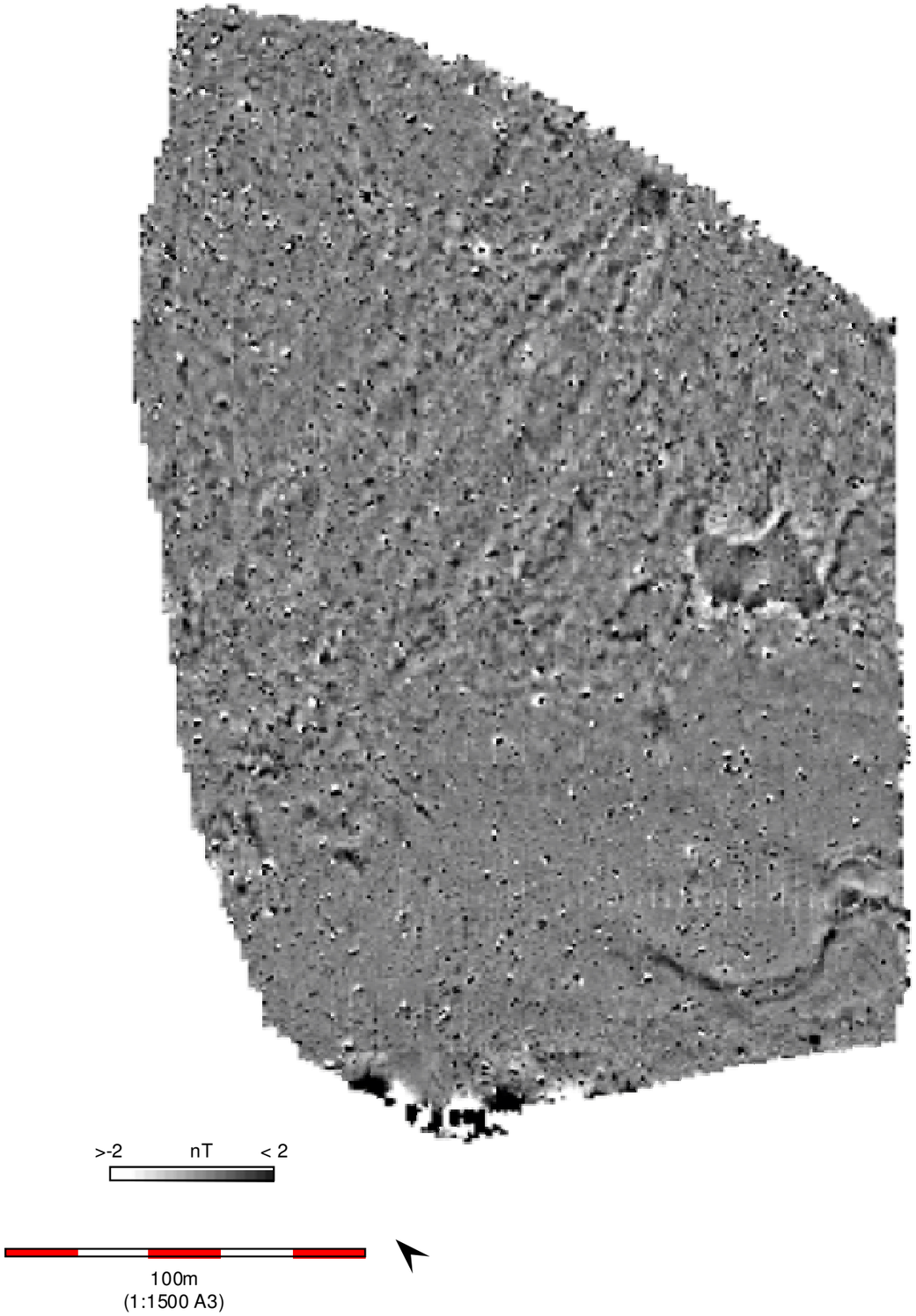


Fig. 8: F2 - Greyscale image of processed data

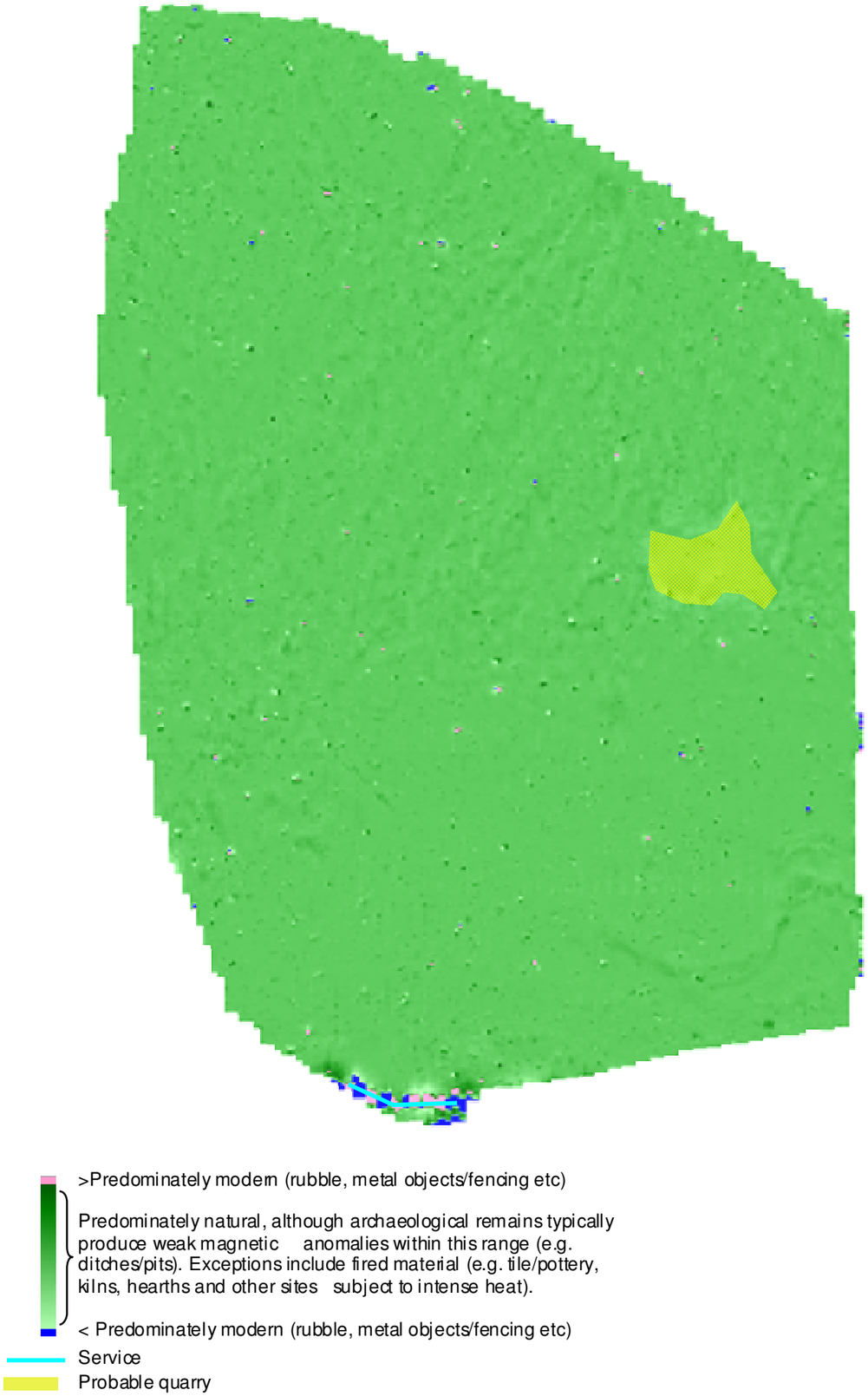


Fig. 9: F2 - Interpretation

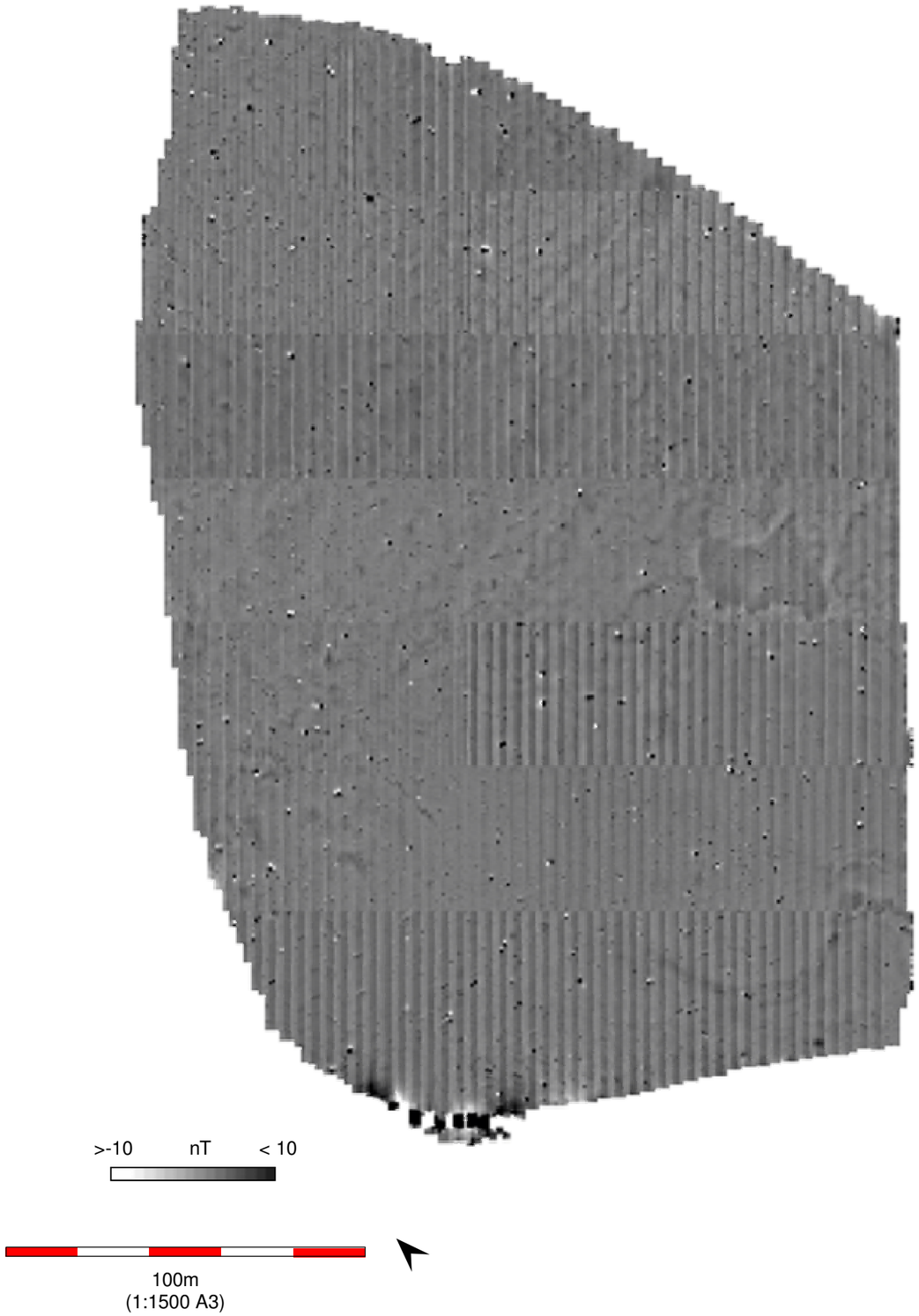


Fig. 10: F2 - Greyscale image of unprocessed data

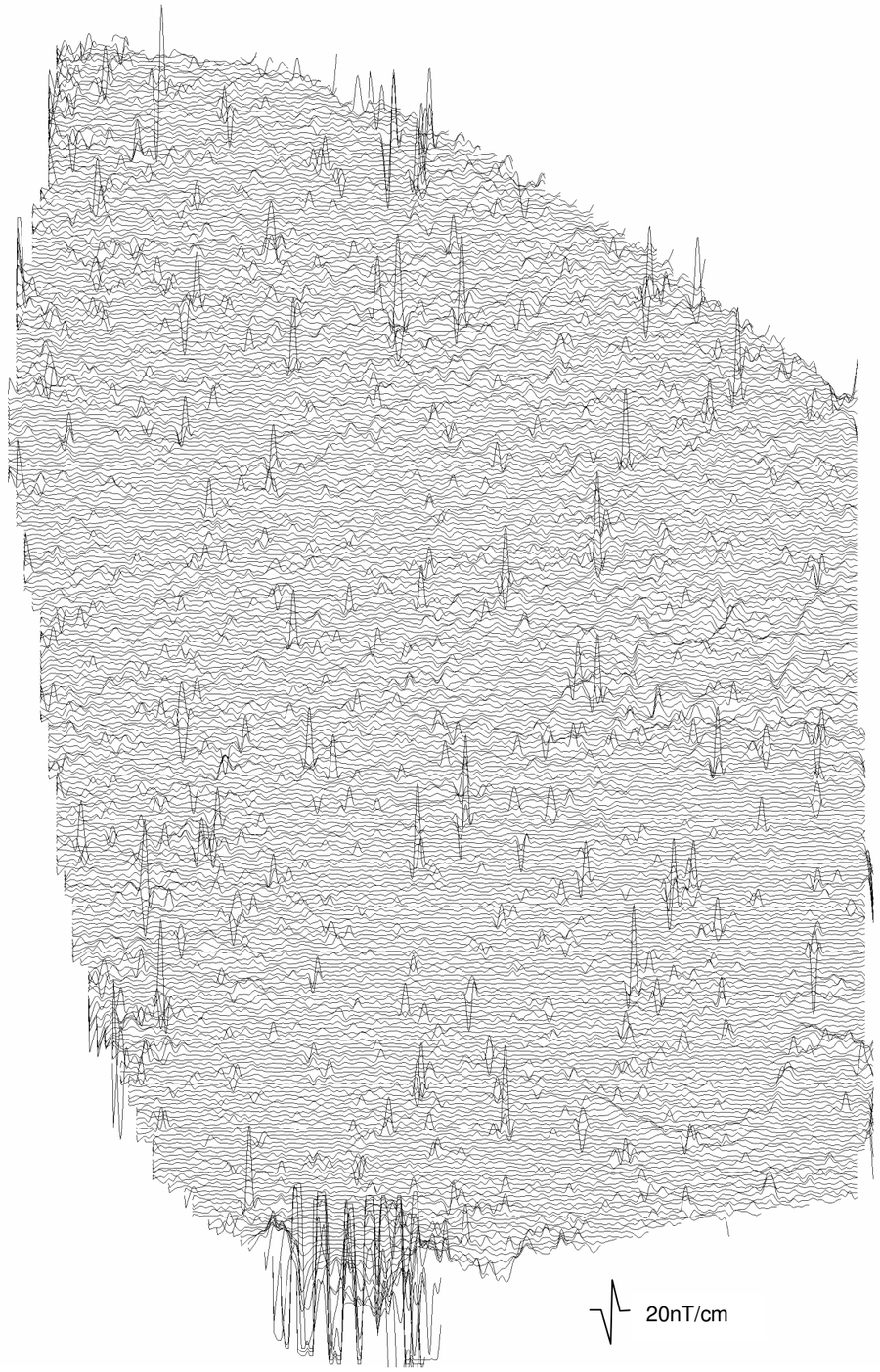


Fig. 11: F2 – Trace plot image

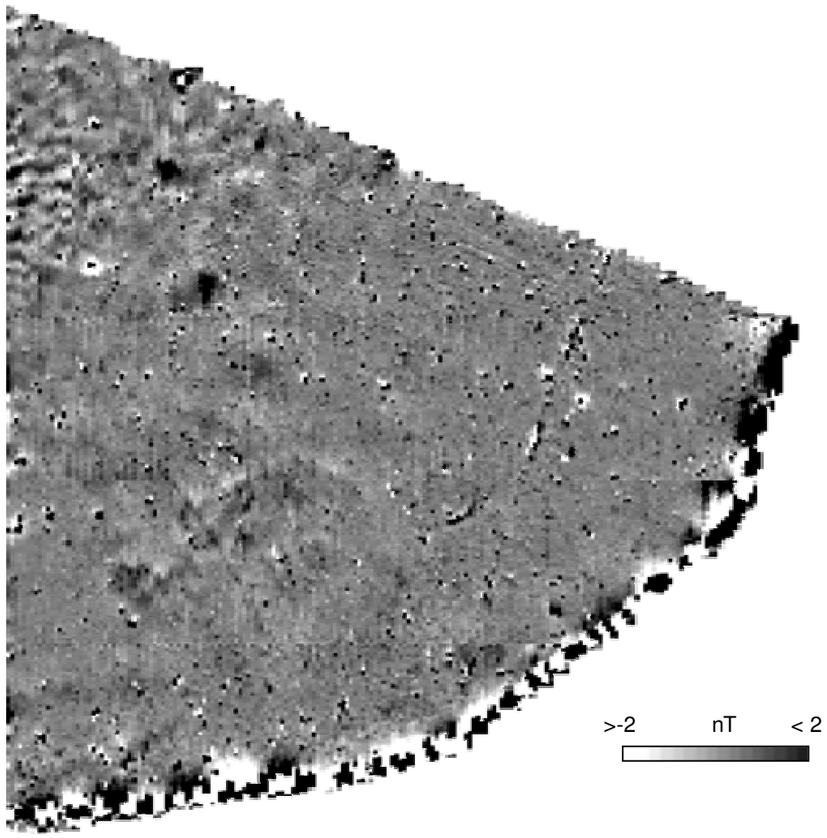
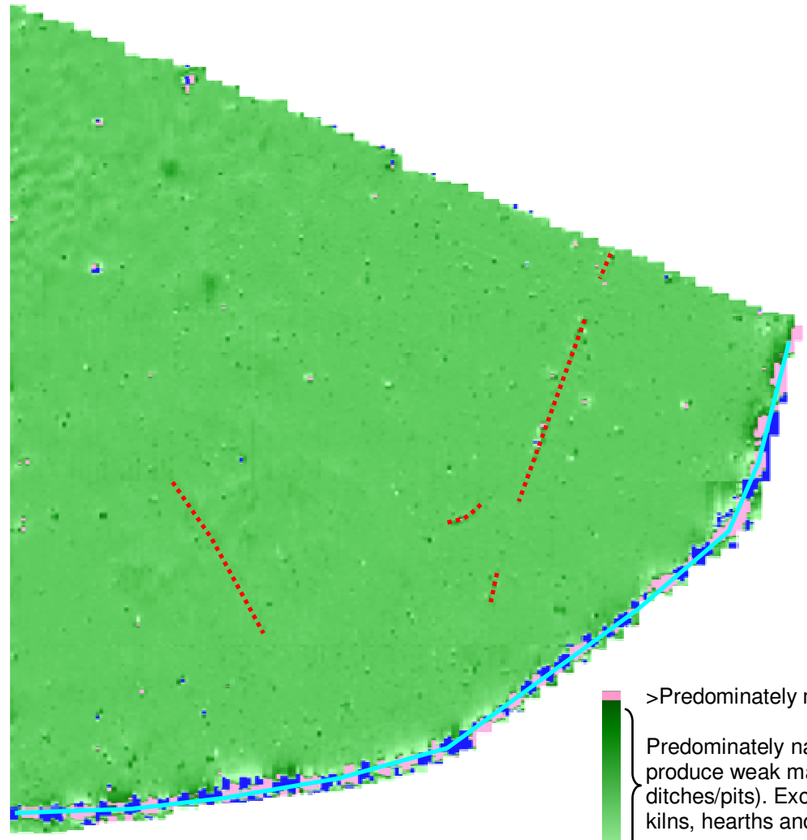


Fig. 12: F3 - Greyscale image of processed data



>Predominately modern (rubble, metal objects/fencing etc)

Predominately natural, although archaeological remains typically produce weak magnetic anomalies within this range (e.g. ditches/pits). Exceptions include fired material (e.g. tile/pottery, kilns, hearths and other sites subject to intense heat).

< Predominately modern (rubble, metal objects/fencing etc)

Potential ditch

Service

Fig. 13: F3 - Interpretation

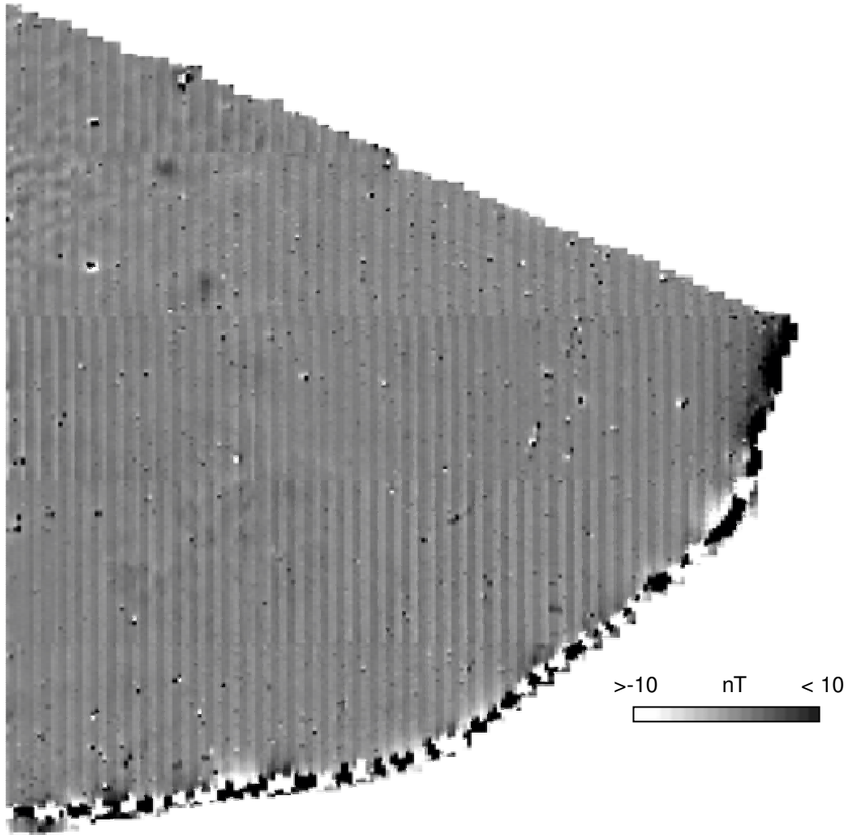
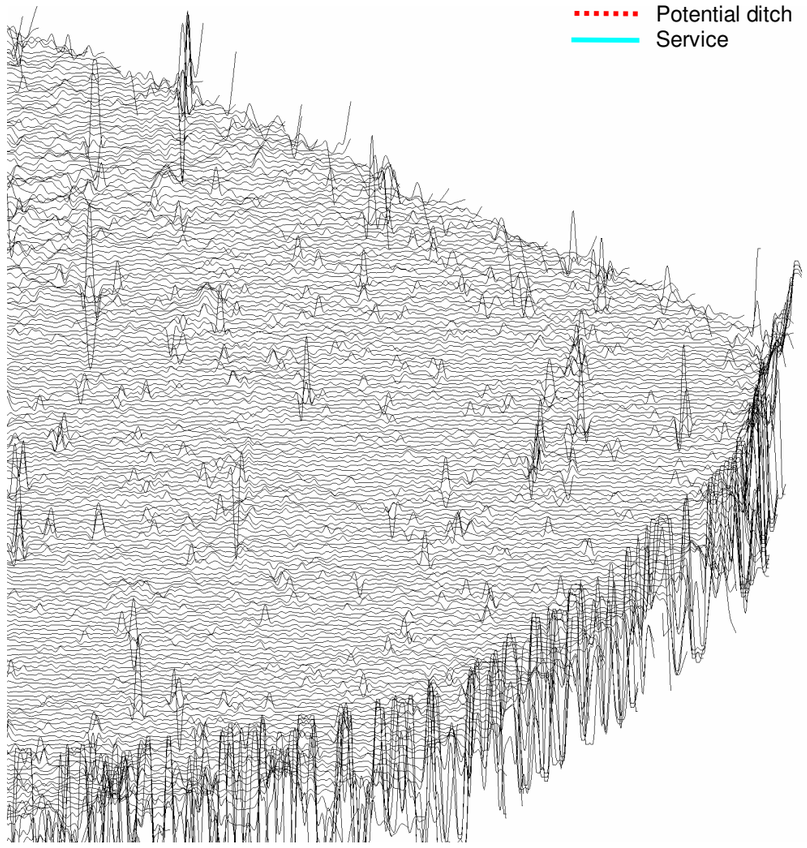


Fig. 14: F3 - Greyscale image of unprocessed data



20nT/cm

100m
(1:1500 A3)

Fig. 15: F3 – Trace plot image

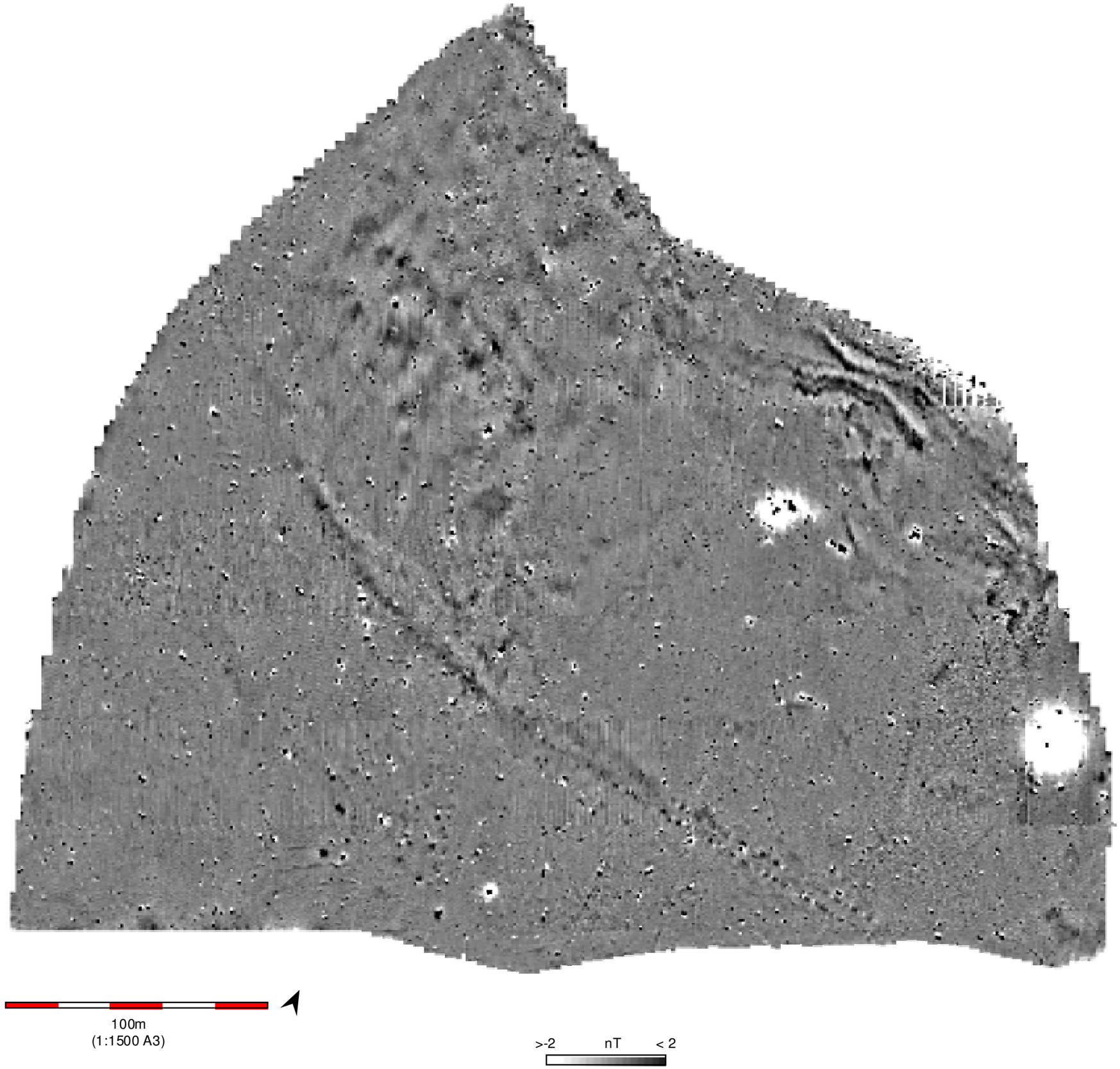


Fig. 16: F4 - Greyscale image of processed data

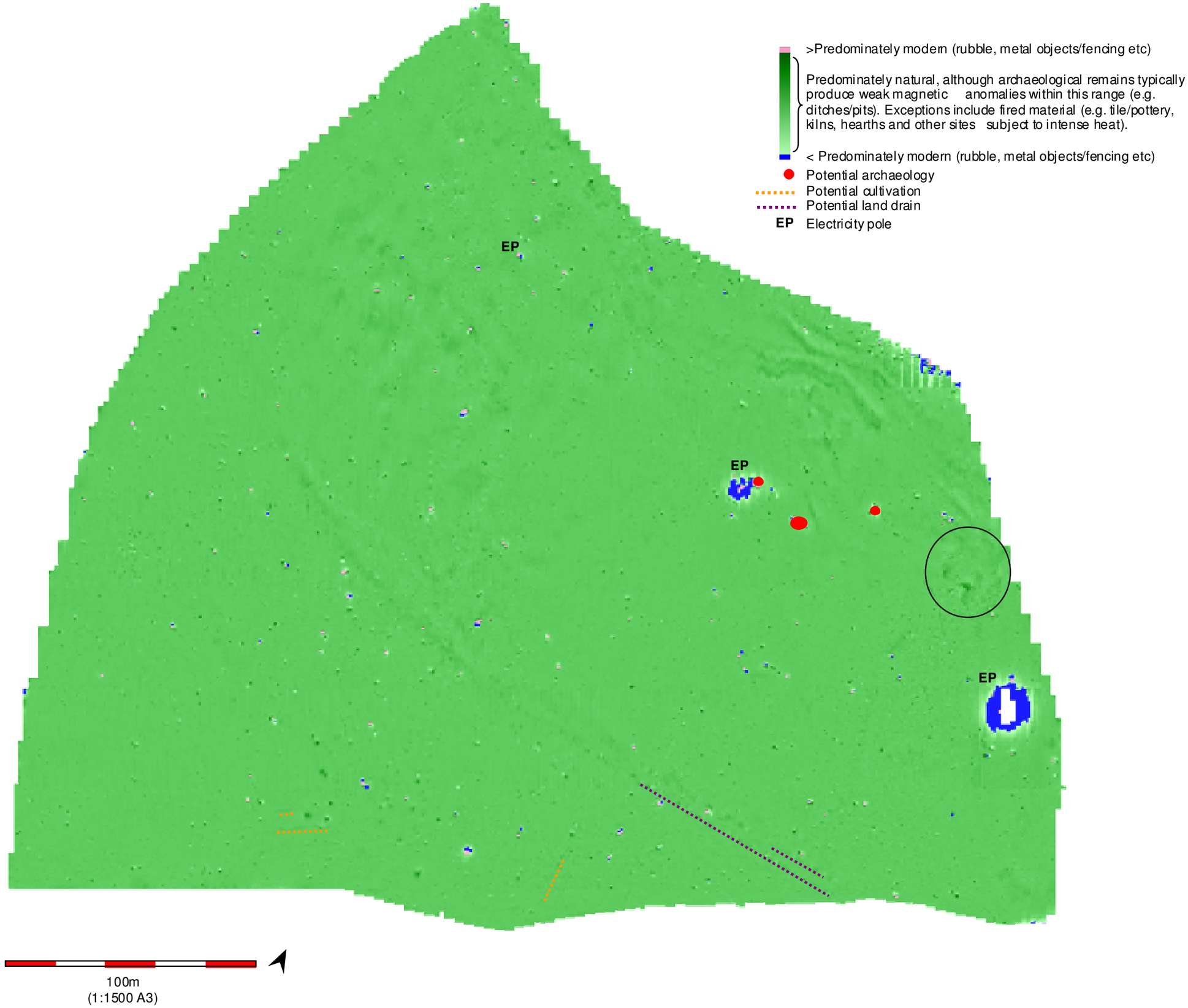


Fig. 17: F4 - Interpretation

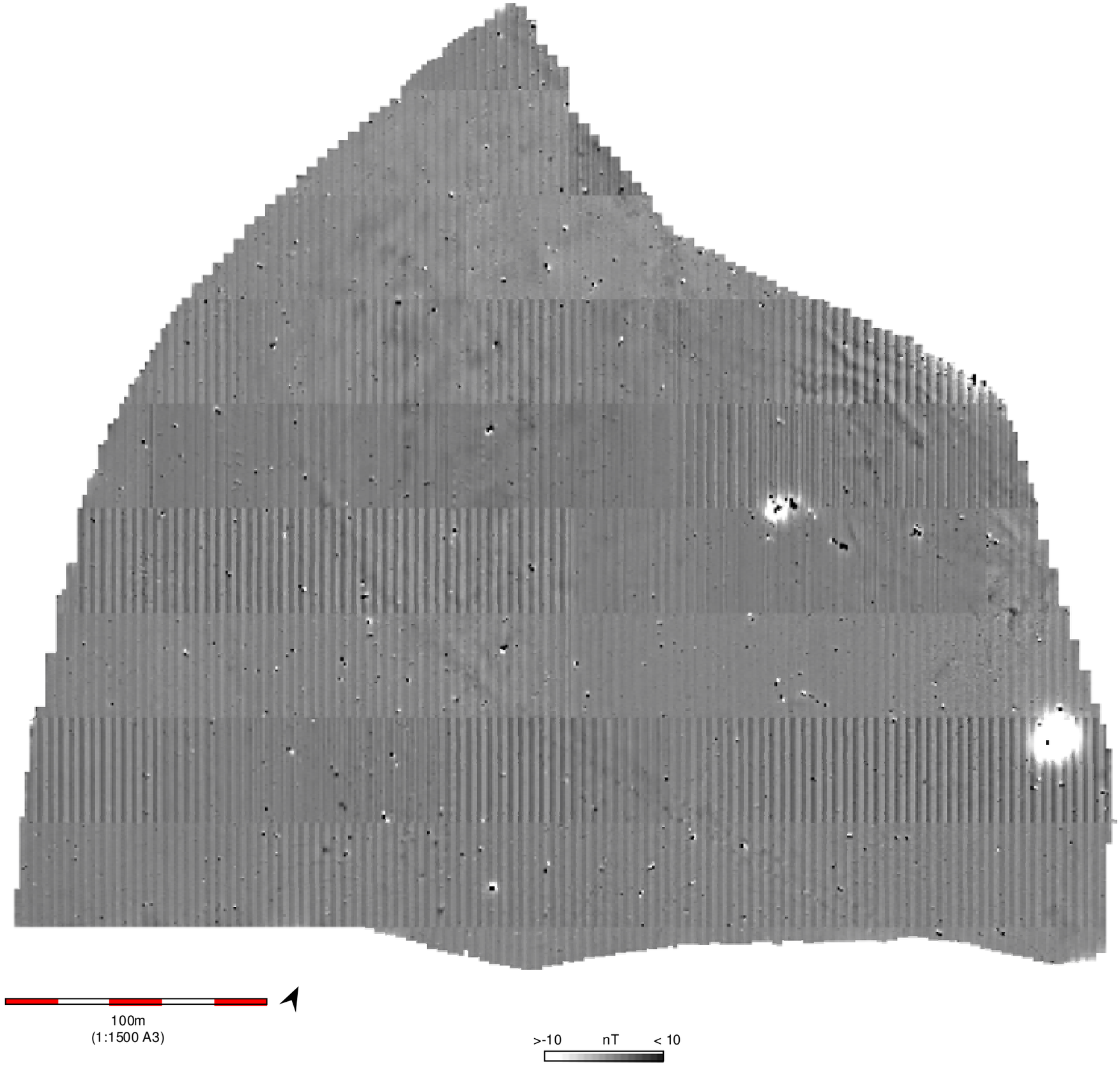


Fig. 18: F4 - Greyscale image of unprocessed data

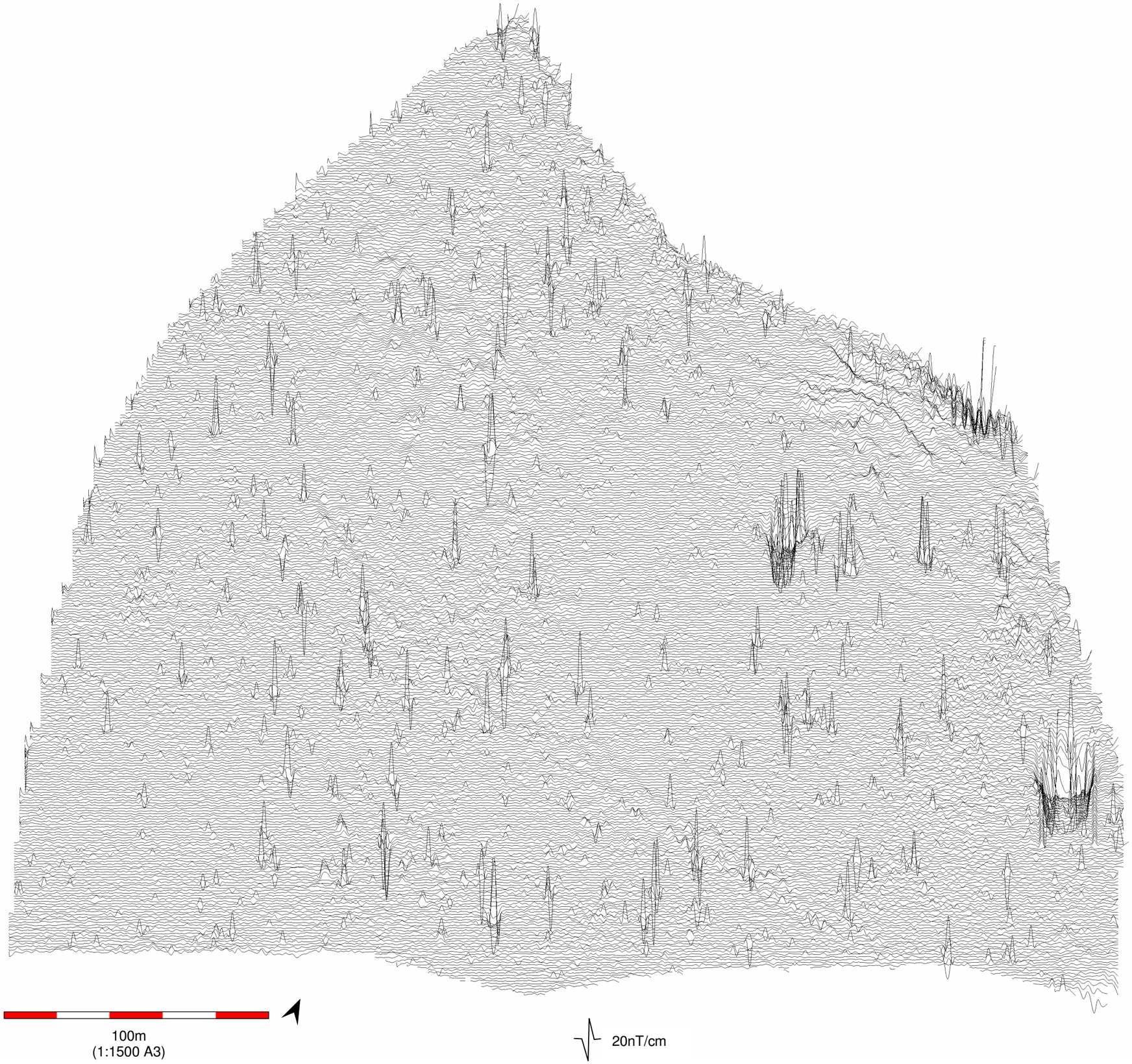


Fig. 19: F4 – Trace plot image

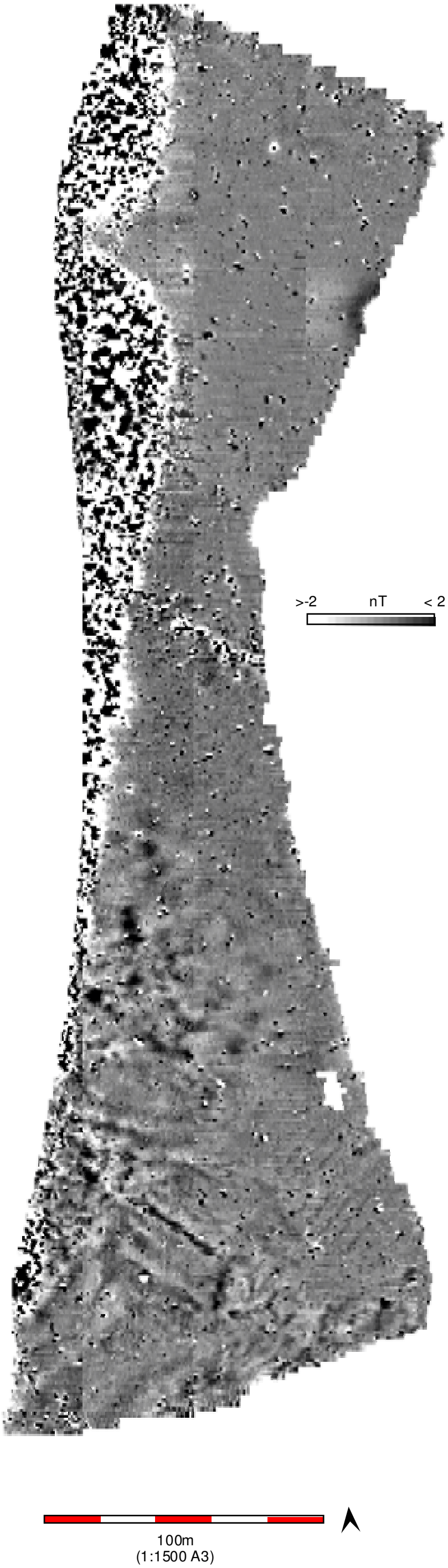


Fig. 20: F5 - Greyscale image of processed data

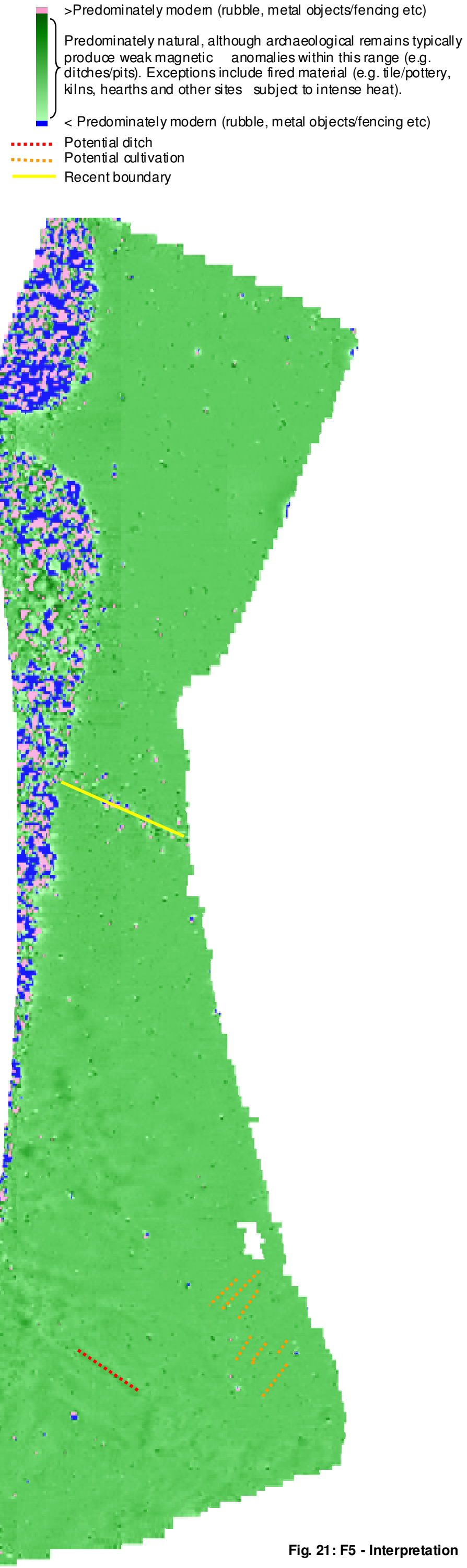
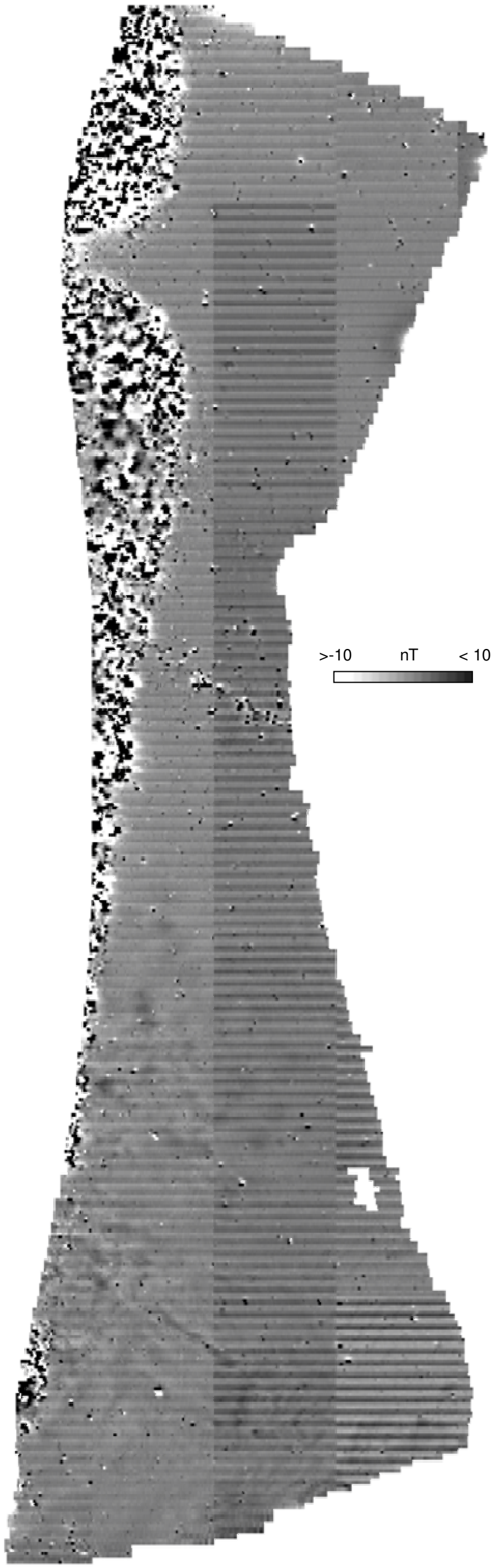
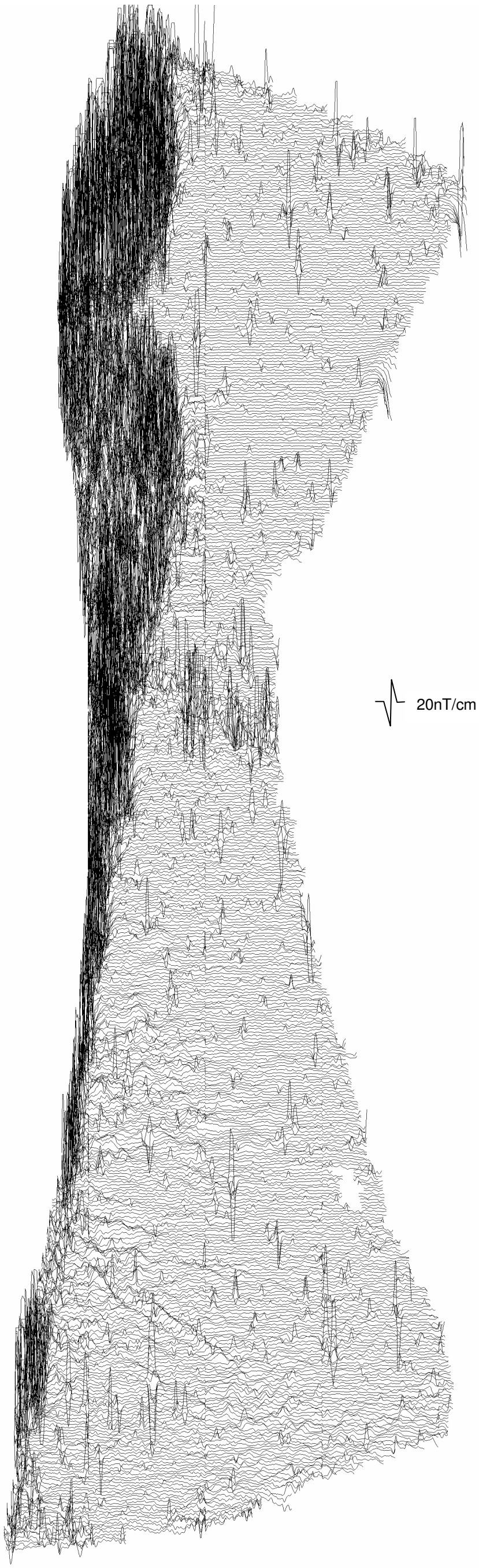


Fig. 21: F5 - Interpretation





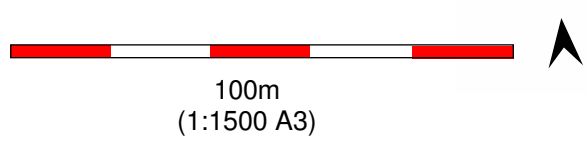


Fig. 22: F5 - Greyscale image of unprocessed data

Fig. 23: F5 – Trace plot image