

pre-construct geophysics_{LTD}

ARCHAEOLOGICAL GEOPHYSICAL SURVEY

**FORMER ELLOUGH AIRFIELD
BECCLES, SUFFOLK**

CENTRED ON NGR 645200 287650

**REPORT PREPARED FOR
COTSWOLD ARCHAEOLOGY
ON BEHALF OF
LARK ENERGY LTD
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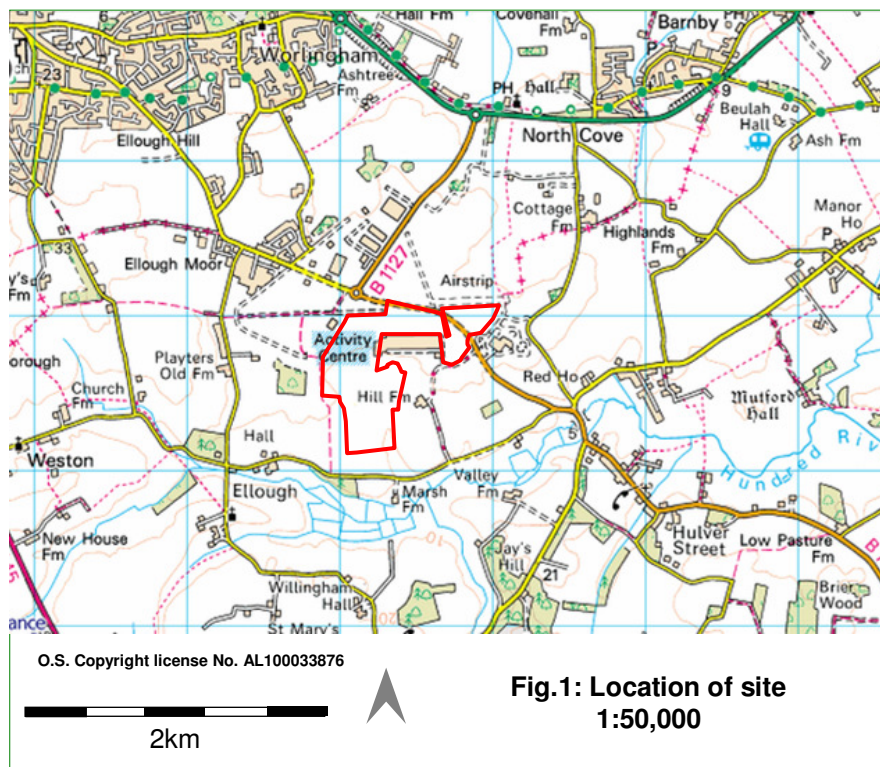
Non-technical summary

A fluxgate gradiometer survey was undertaken on land at former Ellough Airfield, Suffolk. The site is proposed for the development of a solar farm.

The majority of recorded magnetic variation clearly or probably relates to airfield activity and former field boundaries, roadways and farm buildings, including probable debris associated with former farm buildings etc. Airfield features include roads/tracks and building remains in the southern half of the site, with runways, taxiways and dispersal areas in the northern and eastern regions.

Elsewhere a small number of discrete and linear anomalies display some potential as ditches and pits. Possible ditches were recorded in the southern and eastern areas and two large potential pits were detected in the mid western part of the site (Field 5).

Elsewhere, a number of zones of weak variation probably reflect natural processes, land drains and potential cultivation.



1.0 Introduction

Acting for Lark Energy Ltd, Cotswold Archaeology commissioned a fluxgate gradiometer survey on land at former Ellough Airfield, Beccles, Suffolk (centred on NGR: 645200 287650). The site is proposed for the development of a solar farm.

The fieldwork and reporting was carried out in accordance with a written scheme of investigation (WSI), produced by Cotswold Archaeology (Stratford, 2012).

This report also incorporates information that has been selectively extracted from the WSI and Chapter 5 of an Environmental Statement (ES), produced by Cotswold Archaeology (CA, 2012).

2.0 Location and description (Figs. 1 – 2)

The site is formed by two land parcels totalling 55ha in area and comprises land formerly occupied by Ellough Airfield (RAF Beccles) located to the north, east and west of the Bernard Matthews turkey farm site (Fig. 2). Area A is a c. 5ha area of grass to the north of Benacre Road. Area B is a c. 50ha area which includes open farmland to the north, formerly part of the airfield runway complex, and further farmland to the south with extant hedgerows. Survey was not required in Area A

3.0 Geology and topography

The underlying solid geology of the site comprises sand of the Crag Group. Superficial deposits over the site comprise diamicton of the Lowestoft Formation and Head clay, silt, sand and gravel (BGS online viewer).

The magnetic response of archaeological remains within these geologies is variable (English Heritage, 2008).

The vast majority of the site is predominantly flat, lying at a height of approximately between 22-23m Above Ordnance Datum (AOD). Within the southern portion of the site (the southern part of Area B), the ground begins to fall away to the Hundred River.

4.0 Archaeological context (Extract from the WSI) (Fig. 3: illustration extracts from the ES)

The findings of the ES are summarised in the WSI:

'A desk-based assessment to inform an Environmental Statement assessing the potential of the site has been completed (CA 2012), the results of which are summarised below. No World Heritage Sites or sites included on the Tentative List of Future Nominations for World Heritage Sites (July 2010) are situated within the site or its vicinity. There are no Scheduled Monuments, Listed Buildings, Registered Battlefields or Registered Parks and Gardens within or adjacent to the site. The site does not lie within or adjacent to a Conservation Area and there are no locally significant non-designated buildings within the site boundary.

Medieval remains relating to a kiln on the former Potters Farm complex have been recorded from excavation and evaluation within the Bernard Matthews site. Buried archaeological remains of medieval boundaries may survive on site.

Evidence suggests that the entirety of the proposed development site was occupied by RAF Beccles. Buried archaeological remains of airfield infrastructure may survive on site. The evidence suggests there is little potential that significant archaeological remains survive within the site. While medieval features associated with the former farmstead at Potters Farm have been recorded within the Bernard Matthews site, the remains appear to have been localised and are unlikely to extend into the wider site. However, there is the potential for the survival of remains relating to medieval field boundaries and agricultural activity, though such evidence

may have been subject to truncation during the construction and decommissioning of the airfield. Any surviving below ground evidence of medieval date is considered to be a receptor of potentially **Low** sensitivity.'

5.0 Methodology

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

5.1 Gradiometry is a non-intrusive scientific prospecting technique; used to determine the presence/absence of some classes of sub-surface archaeological remains (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, measured in units of nanoTesla (nT), in various graphical formats and identifying images that share morphological affinities with diagnostic archaeological remains.

The technique records anomalous magnetic variation within buried archaeological and other remains; therefore an absence of magnetic variation would predispose detection by gradiometry.

5.2 The survey was undertaken using Bartington Grad-601 Dual Fluxgate Gradiometers between 12th and 20th November 2012. The zigzag traverse method was used, where readings were taken at 0.25m intervals along 1.0m wide traverses.

The survey was fixed using Differential Global Positioning Satellites employing a Topcom GSR-1; greyscale images have been geo-referenced to an Autocad drawing of the site.

The data sets were processed using *ArcheoSurveyor V.2.0*. Raw data was de-striped to eliminate slight variations caused by zigzag traversing and clipped to reduce the distorting effects of extremely high or low readings induced by metal objects/features.

The results were plotted as trace, greyscale and interpretive images (Figs. 4 – 27).

5.3 Character, interpretation and presentation of anomalies (Figs. 7, 11, 15, 19, 27)

Potential archaeological remains are highlighted as red on interpretive images; cultivation as dotted orange lines; known or suspected recent boundaries as yellow; land drains as purple lines; airfield features as dotted black lines and suggested examples of natural responses as green.

Anomalies considered to reflect modern ferrous-rich features and objects are highlighted in blue on the interpretive images. These are characterised magnetically as dipolar 'iron spikes', often displaying strong positive and/or negative responses. 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 brick and tile (sometimes introduced during manuring or land drain construction) usually induce a similar, though predominately weaker response. Concentrations of such anomalies will often indicate rubble spreads, such as would be used to backfill ponds or redundant ditches, or indicate the blurred footprints of demolished structures.

6.0 Results and discussion (Figs. 2 - 27)

6.1 F1 & F2 (Figs. 2 – 7)

The survey recorded:

- a) Zones of relatively strong magnetic variation that clearly (or probably) correspond to former airfield features (Fig. 7: highlighted blue/black dotted lines, also as depicted on inset & Fig 2). These include a roadway (1) and two sub-rectangular areas (2 & 3) that contained structures, as depicted on Fig 2 & Fig. 7: inset. The footprints of three buildings in zone '2' are clearly apparent as rectilinear anomalies on the greyscale image (Fig. 6), whilst zones of less well defined variation at the eastern edge of F1 also indicate probable building remains (anomalies 4 & 5).
- b) A number of magnetically weak linear anomalies in the northern and southwestern regions that could, conceivably, indicate buried ditches (red lines: 6 & 7).
- c) Probable natural responses (examples highlighted green).
- d) A random scatter of strong anomalies that almost certainly signify modern ferrous-rich debris, either airfield or agriculture related (highlighted as blue, e.g. metal objects such as ploughshares, horseshoes or fragments of brick/tile etc). Such anomalies were recorded in all areas across the site.

6.2 F3 (Figs. 2, 3, 8 – 11)

The survey recorded:

- a) Strong readings along and adjacent to partially removed road (Fig. 11: 8 – black dotted lines, also as depicted on inset & Fig 2). Other, isolated examples probably indicate remains of airfield features (circled – dashed lines).
- b) A number of weak linear anomalies, possibly indicative of cultivation (dotted orange lines).
- c) Probable natural responses (examples highlighted green).

6.3 F4 & F5(South) (Figs. 2, 3, 12 – 15)

The survey recorded:

- a) Areas of high and moderate variation in F4 that correspond to former airfield features (Fig. 15: 9 – 11, highlighted blue/ black dotted lines, also as depicted on inset & Fig 2).
- b) Magnetic traces of a former boundary, as depicted on historic O.S. Maps (yellow line, also as depicted on inset & Fig 2).
- c) Probable natural responses (examples highlighted green).

6.4 F5 (North) (Figs. 2, 3, 16 – 19)

The survey recorded:

- a) Traces of an airfield taxiway and adjacent dispersal points in the central part of the survey area (Fig. 19: 12 – black dotted lines. see also inset and Fig. 2). A linear anomaly that is perpendicular to the western components of 12 is possibly associated with the airfield or, alternatively, with cultivation (13). Two large pit-like anomalies were detected in the mid-northern elements of the dispersal areas (highlighted red). It is possible that these might indicate archaeological remains.

- b) Former boundaries as depicted on historic maps (yellow lines), including traces of a track (14) that extended south from former Elloughmoor Farm and the northern, southern and eastern boundaries of a narrow field that lay to the east of the farm (15 - 17). Anomaly groups 18 & 19 (dotted yellow lines) correspond to features (possibly buildings) that are also shown on early maps (19 recorded only on the Tithe Map of 1846). The results suggest a similar feature (20, albeit unrecorded on historic maps) may have existed to the east of 18 and to the immediate south of 15. Linear features within the area bounded by 15 & 16 probably date from the same period, possibly as further boundaries (dotted yellow lines). Other, magnetically weak, anomalies possibly indicate cultivation (dotted orange line) or natural (highlighted green)
- c) Zones of relatively strong variation over former Elloughmoor Farm buildings (21, highlighted blue, see also inset and Fig. 2). Other probable near surface rubble spreads were detected elsewhere; all are considered to be of recent origin, possibly associated to airfield activity.
- d) Strong readings in close proximity to the western and northern field boundaries (highlighted blue).

6.5 F6 (West) (Figs. 2, 3, 20 – 23)

The survey recorded:

- a) Traces of former runway edges and other probable airfield features (Fig 23: black dotted lines).
- b) Former boundaries, including those associated with former Potters Farm (22), as depicted on historic maps (yellow lines, see also inset & Fig. 2). Closely spaced parallel examples correspond to former roads/tracks (23 & 24). Similarly, a zone of magnetic variation adjacent to a former boundary also reflects a feature depicted on early maps (25). Probable near surface rubble was also recorded to the immediate east of former Potters Farm (26). Strong readings were also recorded at other points along the southern edge of the field (highlighted blue). Elements of these reflect boundary fencing or probable near surface modern rubble.
- c) Probable natural responses (highlighted green).

6.6 F6 (East) (Figs. 2, 3, 24 – 27)

The survey recorded:

- a) A group of potential ditches at the mid western edge of the area (Fig. 27: solid red lines). A N-S aligned linear anomaly to their immediate south possibly indicates a further potential ditch (dotted red line). Other linear anomalies in the area are more likely to signify drains, given that they appear to relate to an existing pond (purple lines). Another possible drain was recorded close to the south-eastern boundary.
- b) A south-easterly continuation of former road 24 across the eastern part of the site (yellow lines). Strong readings were recorded along the course of a former boundary in the western part of the site (yellow line).
- c) Residual traces of the edges of a former runway and, in the southern region, curvilinear anomalies that mark the junction of the runway and a taxiway (black dotted lines).

7.0 Conclusions

The majority of recorded magnetic variation clearly or probably relates to airfield activity and former field boundaries, roadways and farm buildings, including probable debris associated with Elloughmoor and Potters Farms. Airfield features include roads/tracks and building remains in the southern half of the site, with runways, taxiways and dispersal areas in the northern and eastern regions.

Elsewhere a small number of discrete and linear anomalies display some potential as ditches and pits. Possible ditches were recorded in the southern and eastern areas and two large potential pits were detected in the central part of Field 5

Elsewhere, a number of zones of weak variation probably reflect natural processes.

8.0 Acknowledgements

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

9.0 References

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

Cotswold Archaeology 2012 *Land at Former Ellough Airfield, Beccles* Environmental Statement, Chapter 5. Cotswold Archaeology.

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

Stratford, E. 2012. *Land at Former Ellough Airfield*. Written Scheme of Investigation for a Geophysical Survey. CA Project: 3929.

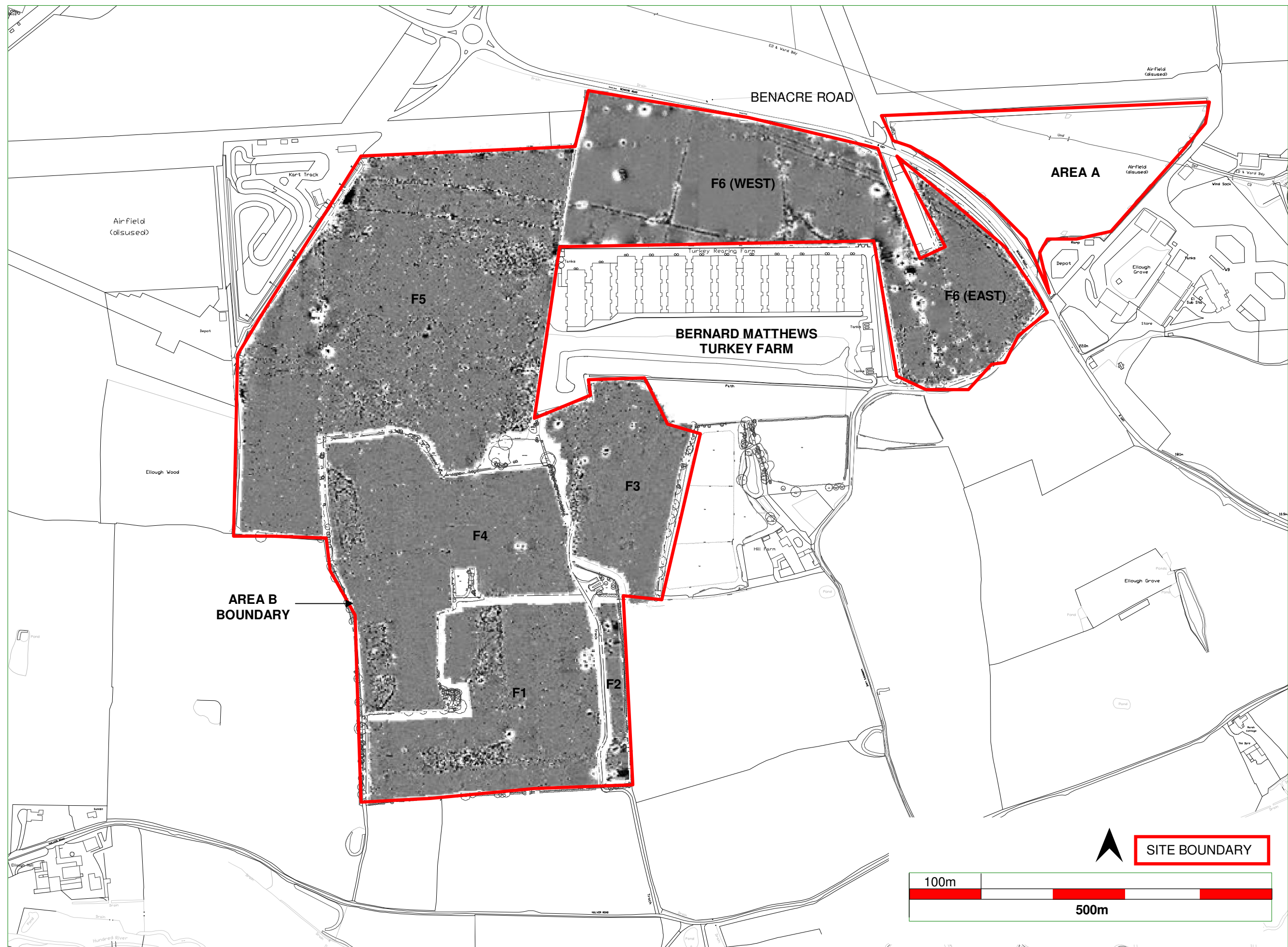


Fig. 2: Location of site and survey

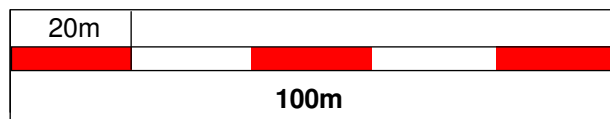
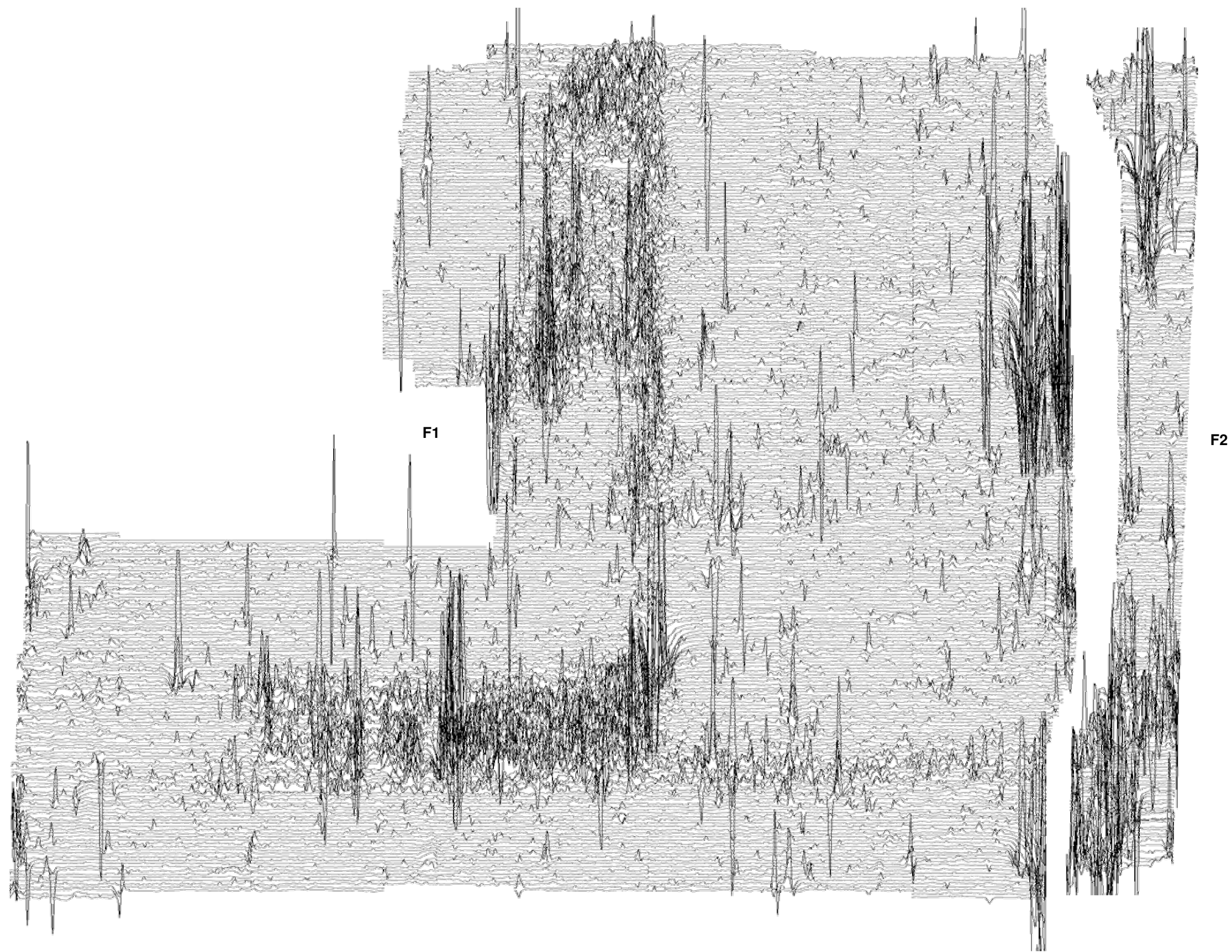


Fig. 4: F1 – F2 Trace plot images
Data clipped to +/-100nT

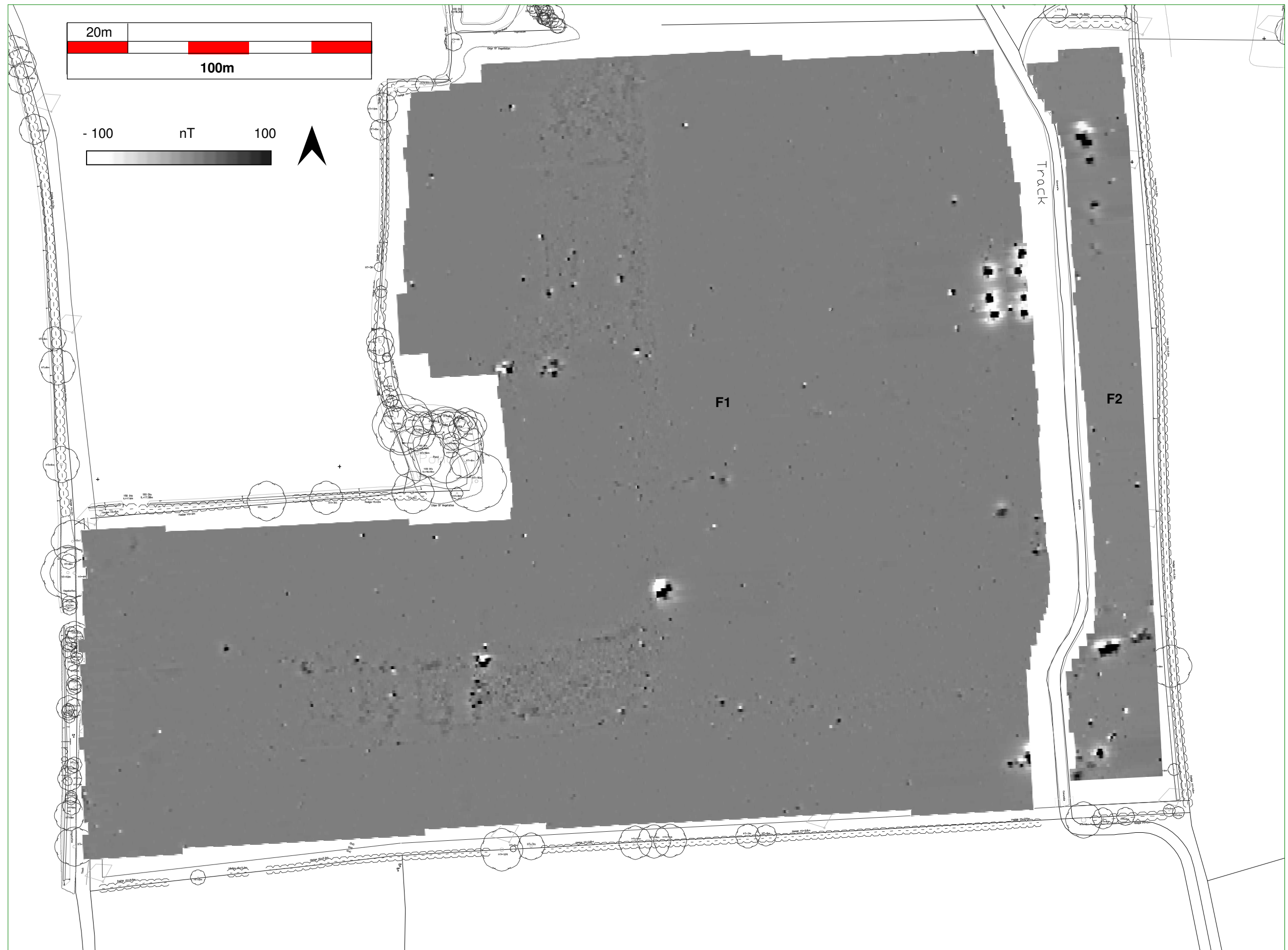


Fig. 5: F1 – F2 Greyscale images
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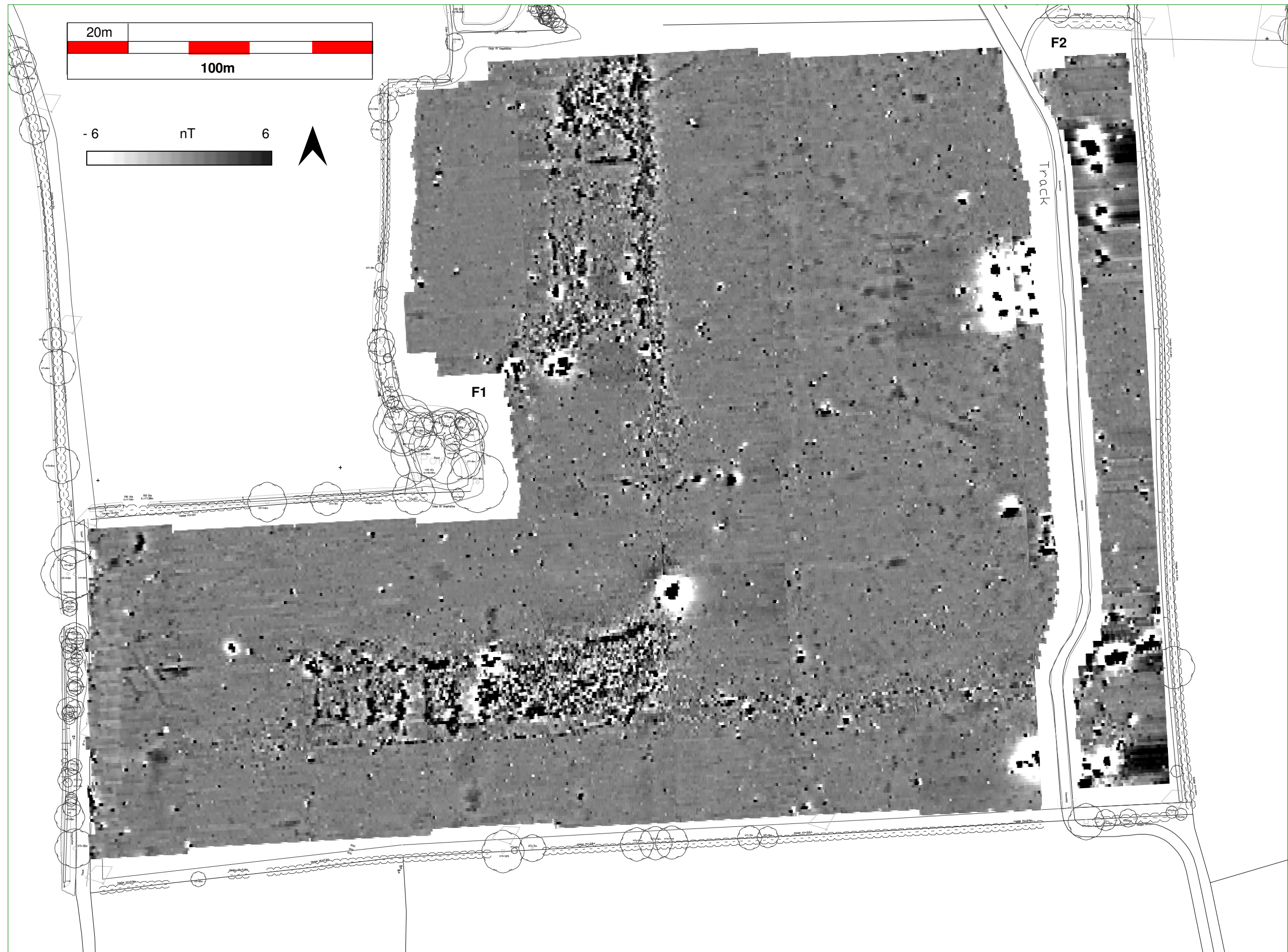


Fig. 5: F1 – F2 Greyscale images
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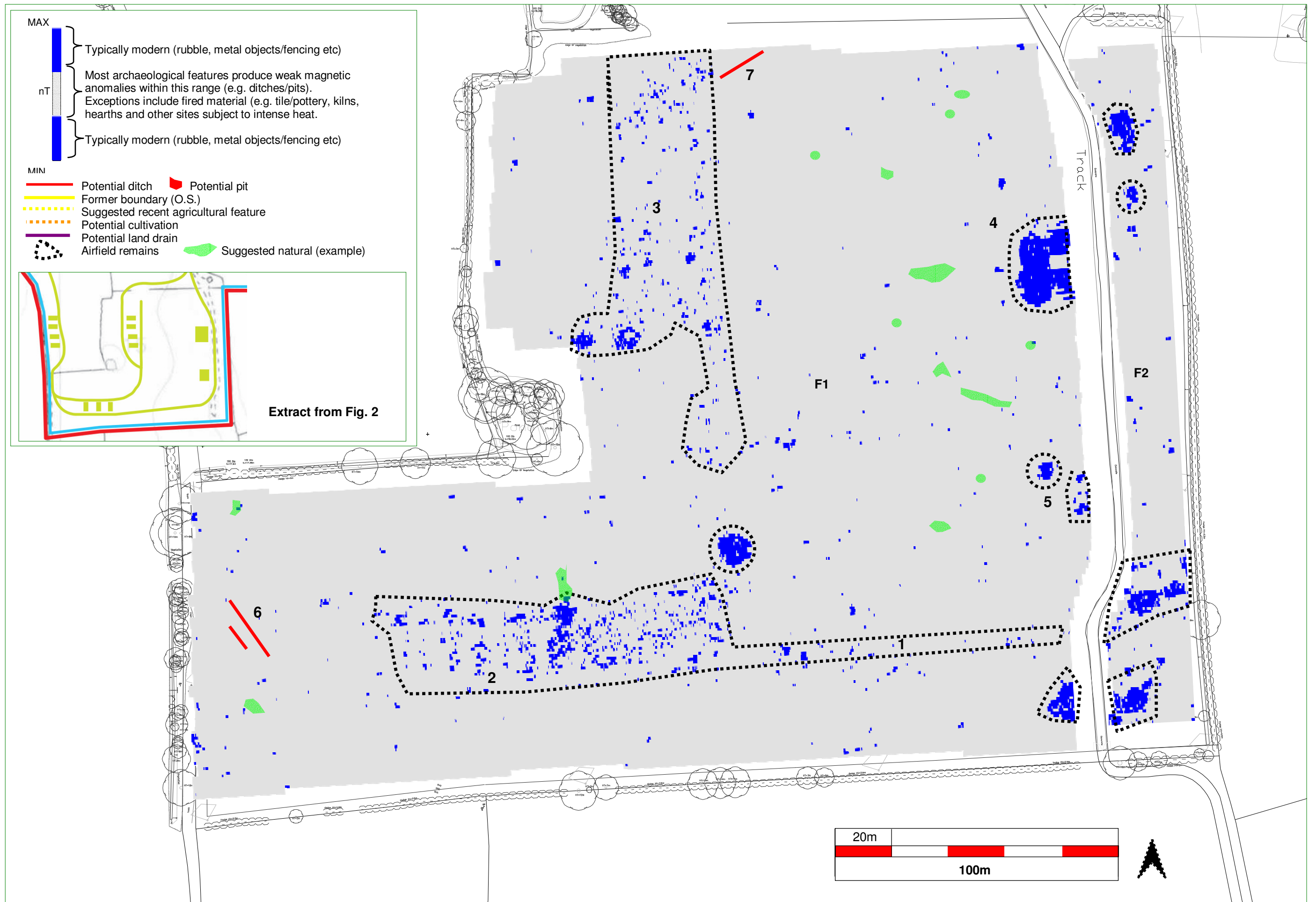


Fig. 7: F1 – Interpretive images
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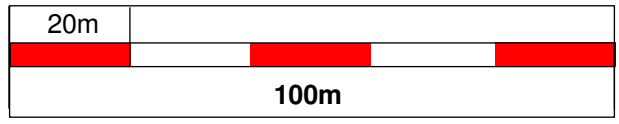
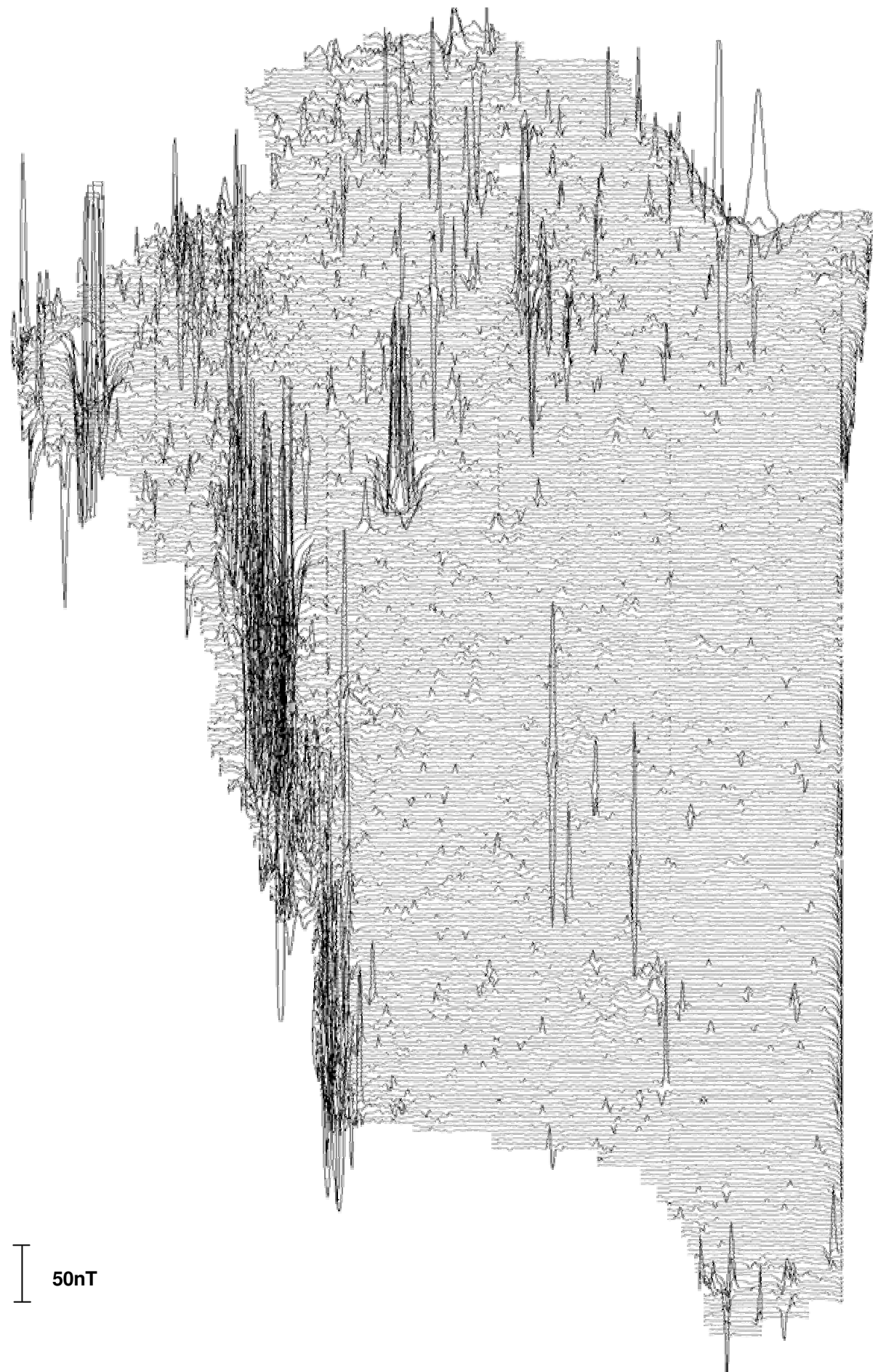


Fig. 8: F3 Trace plot image
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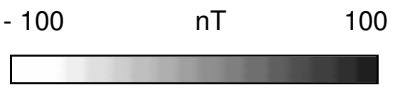
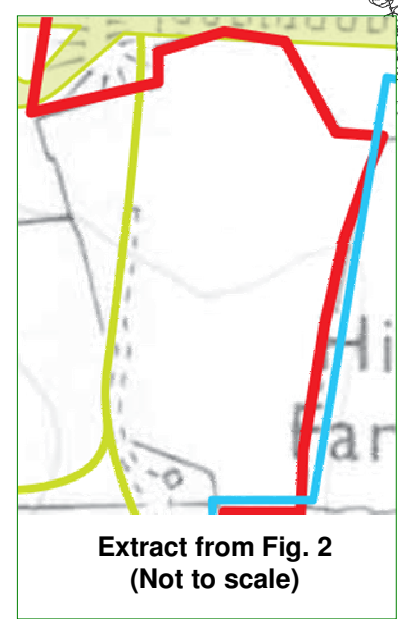
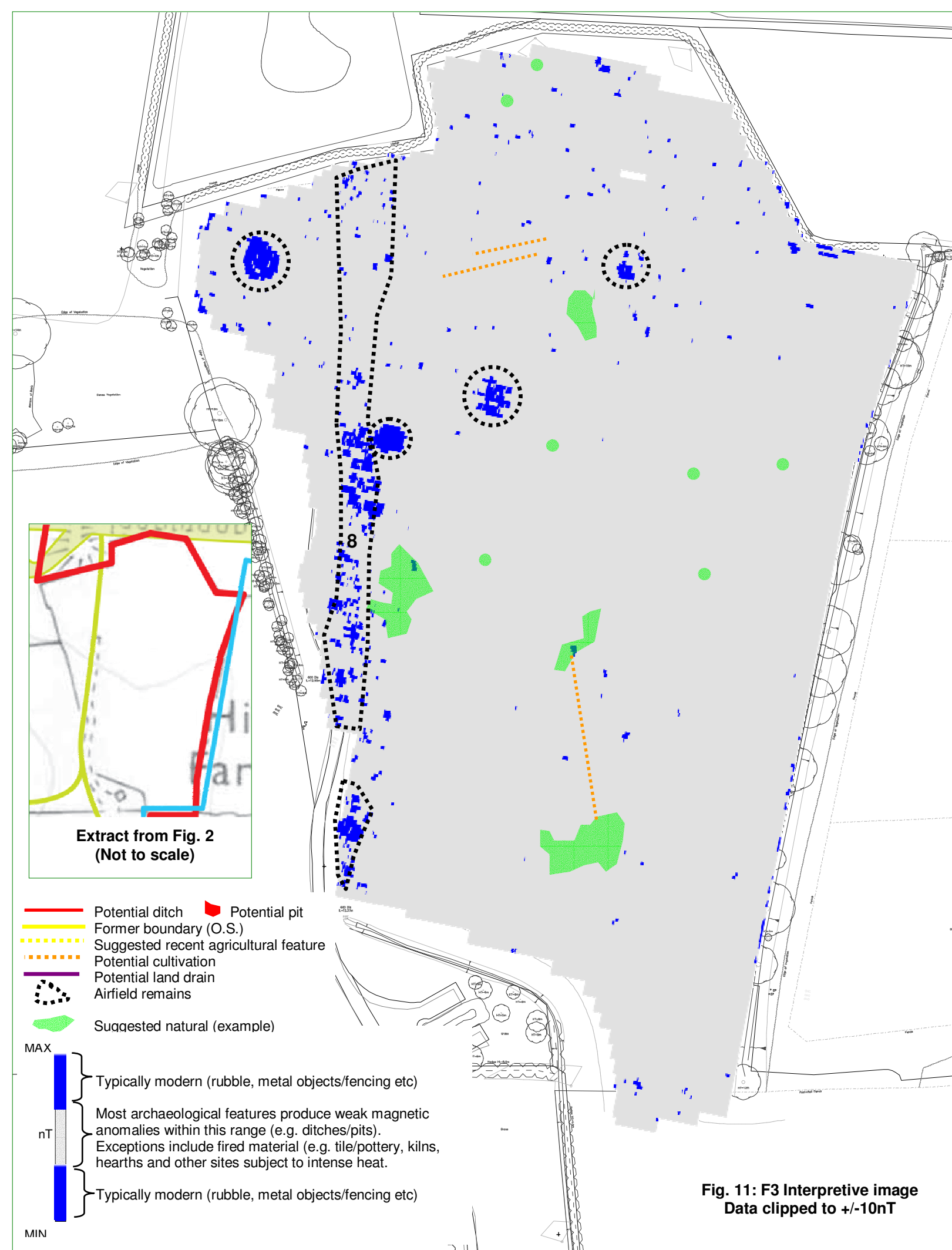
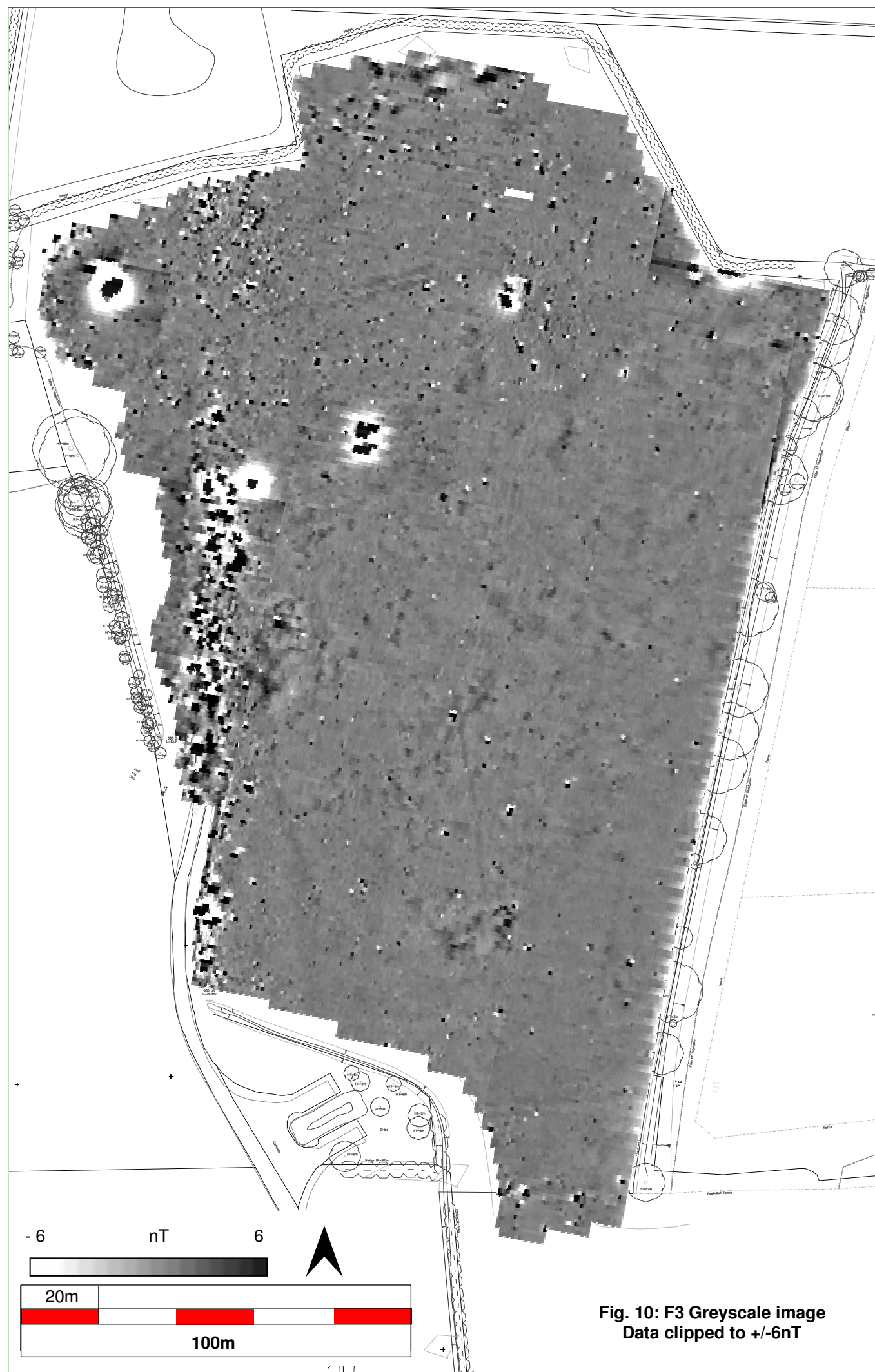
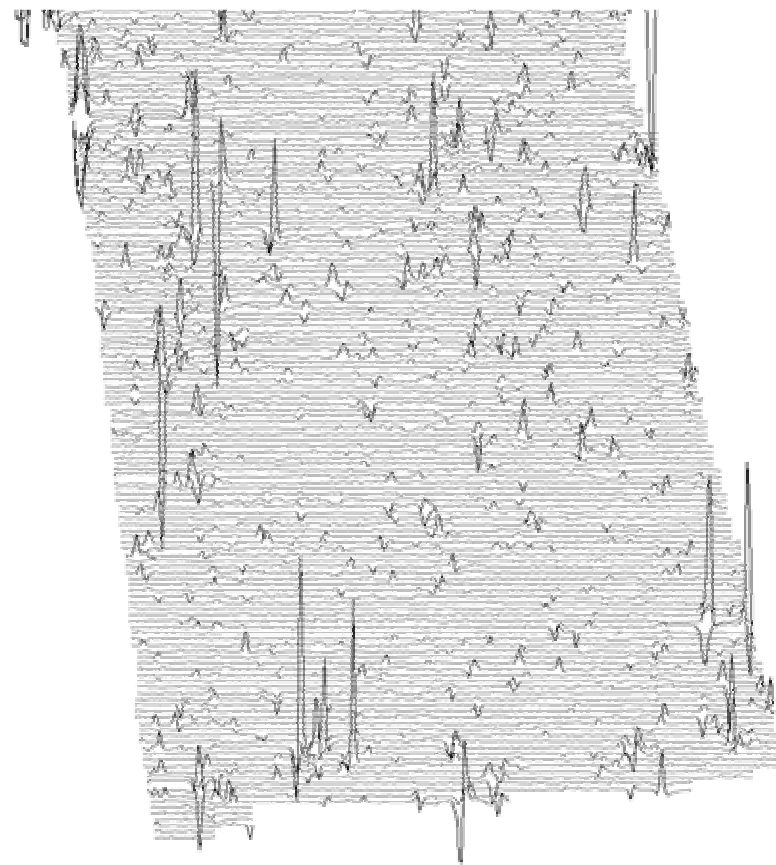
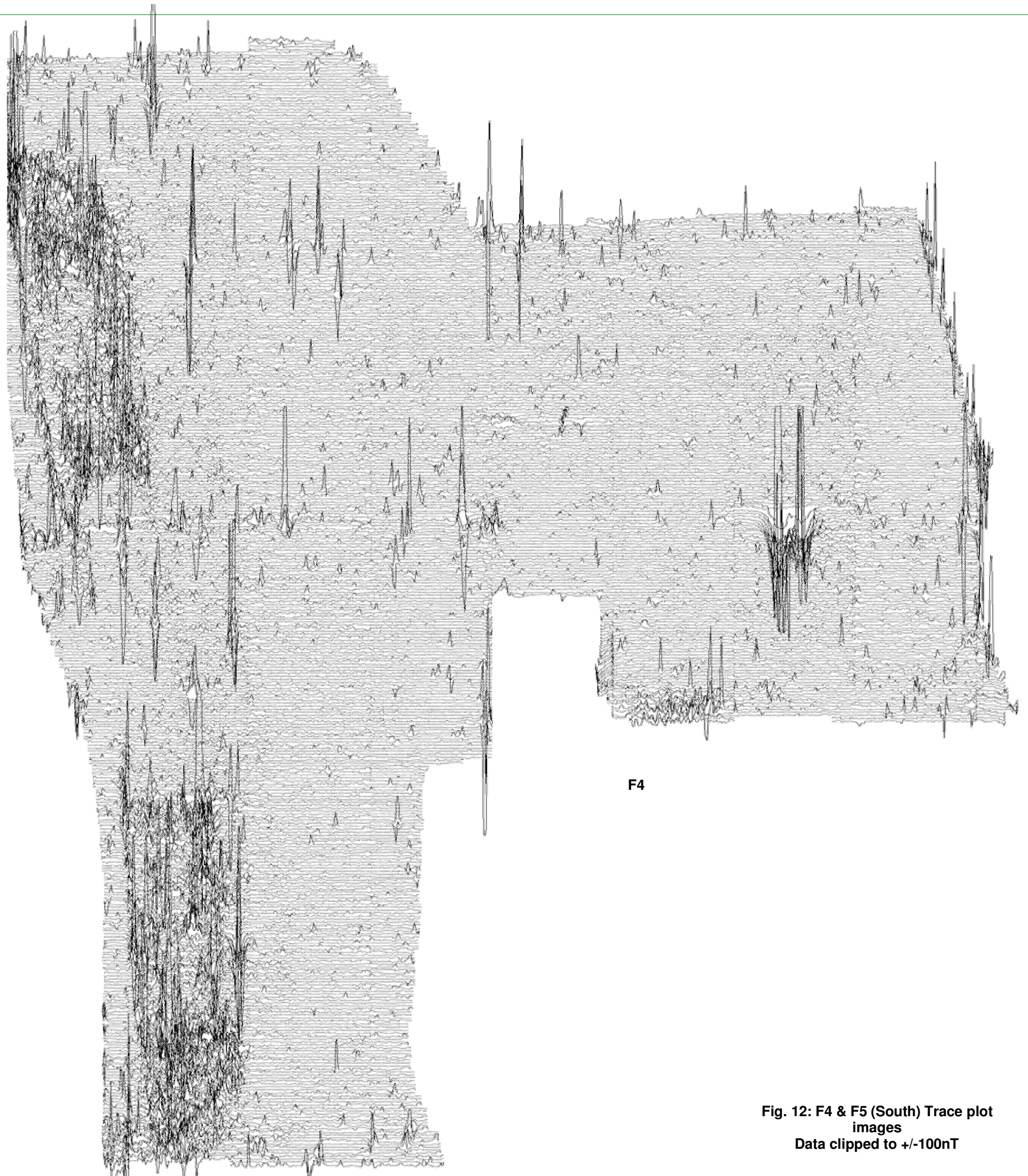
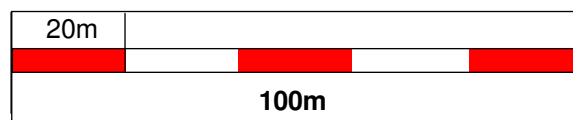


Fig. 9: F3 Greyscale image
Data clipped to +/-100nT





F5 (South)



F4

Fig. 12: F4 & F5 (South) Trace plot images
Data clipped to +/-100nT

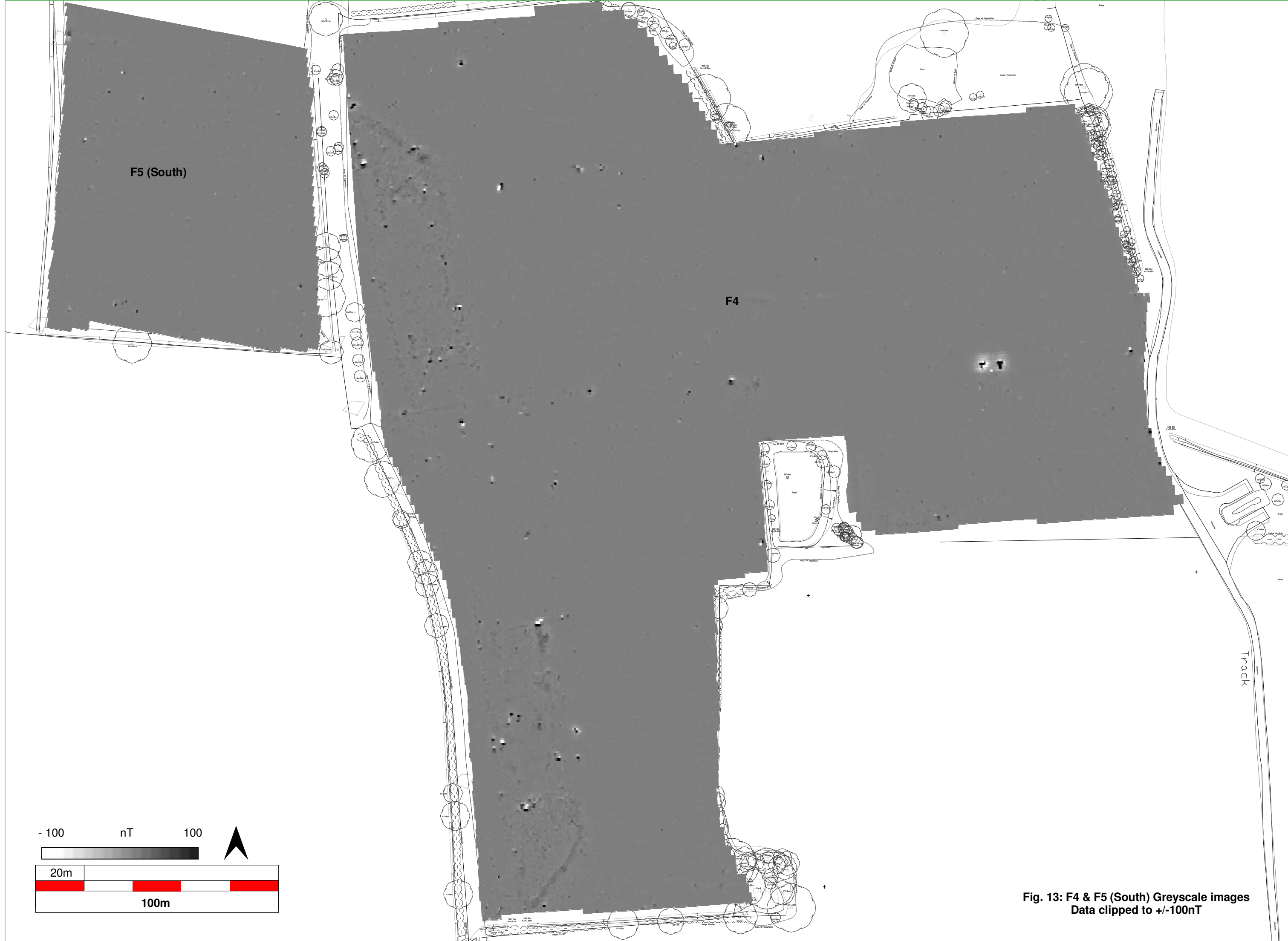


Fig. 13: F4 & F5 (South) Greyscale images
Data clipped to +/-100nT



Fig. 14: F4 & F5 (South) Greyscale images
Data clipped to +/-6nT

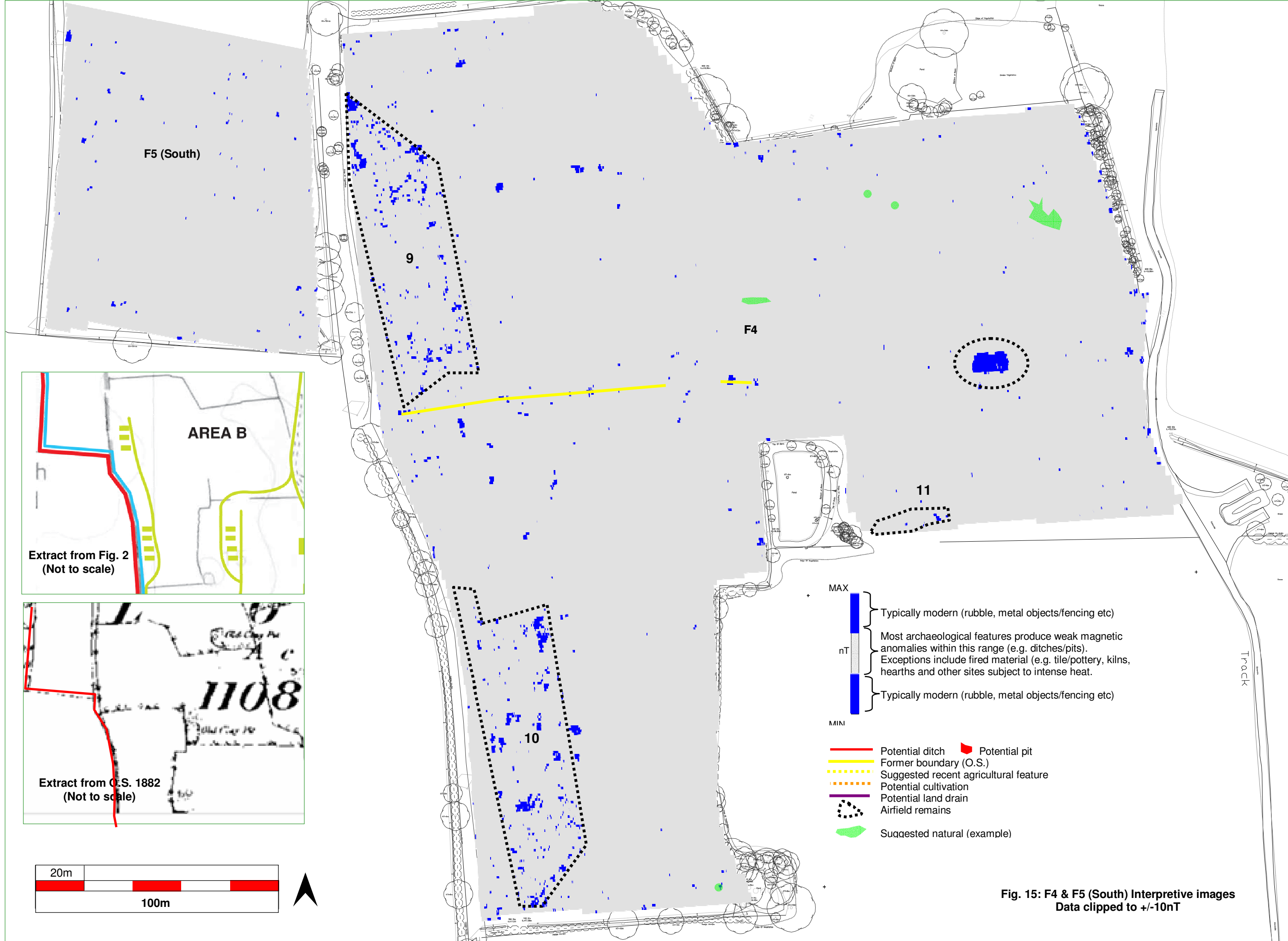


Fig. 15: F4 & F5 (South) Interpretive images
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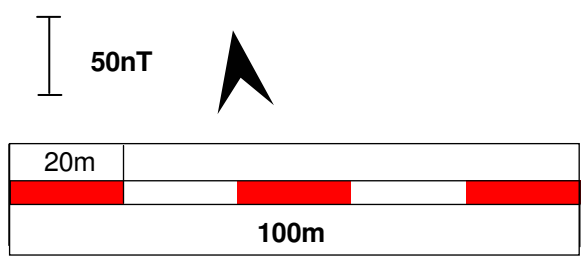
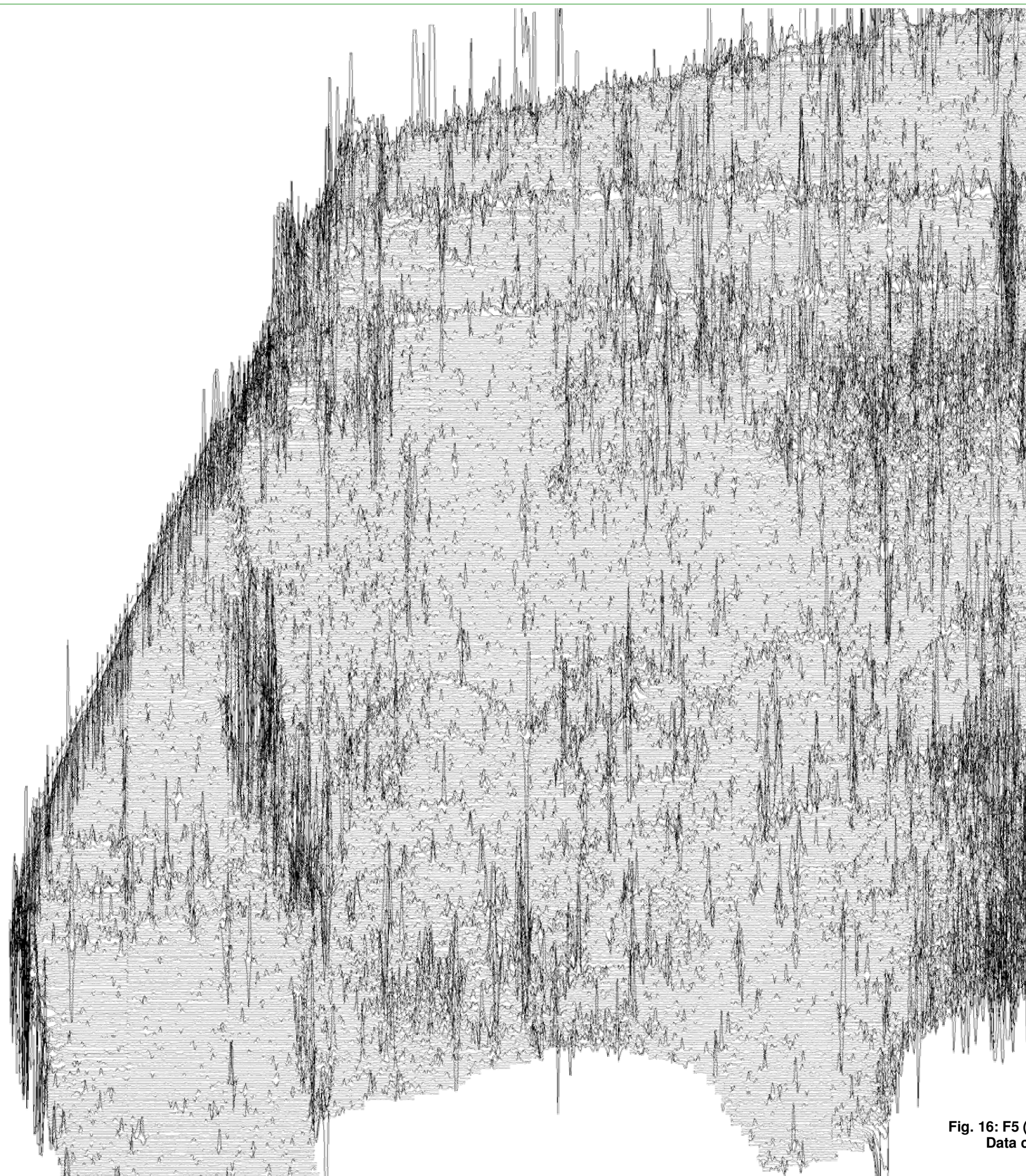


Fig. 16: F5 (North) Trace plot image
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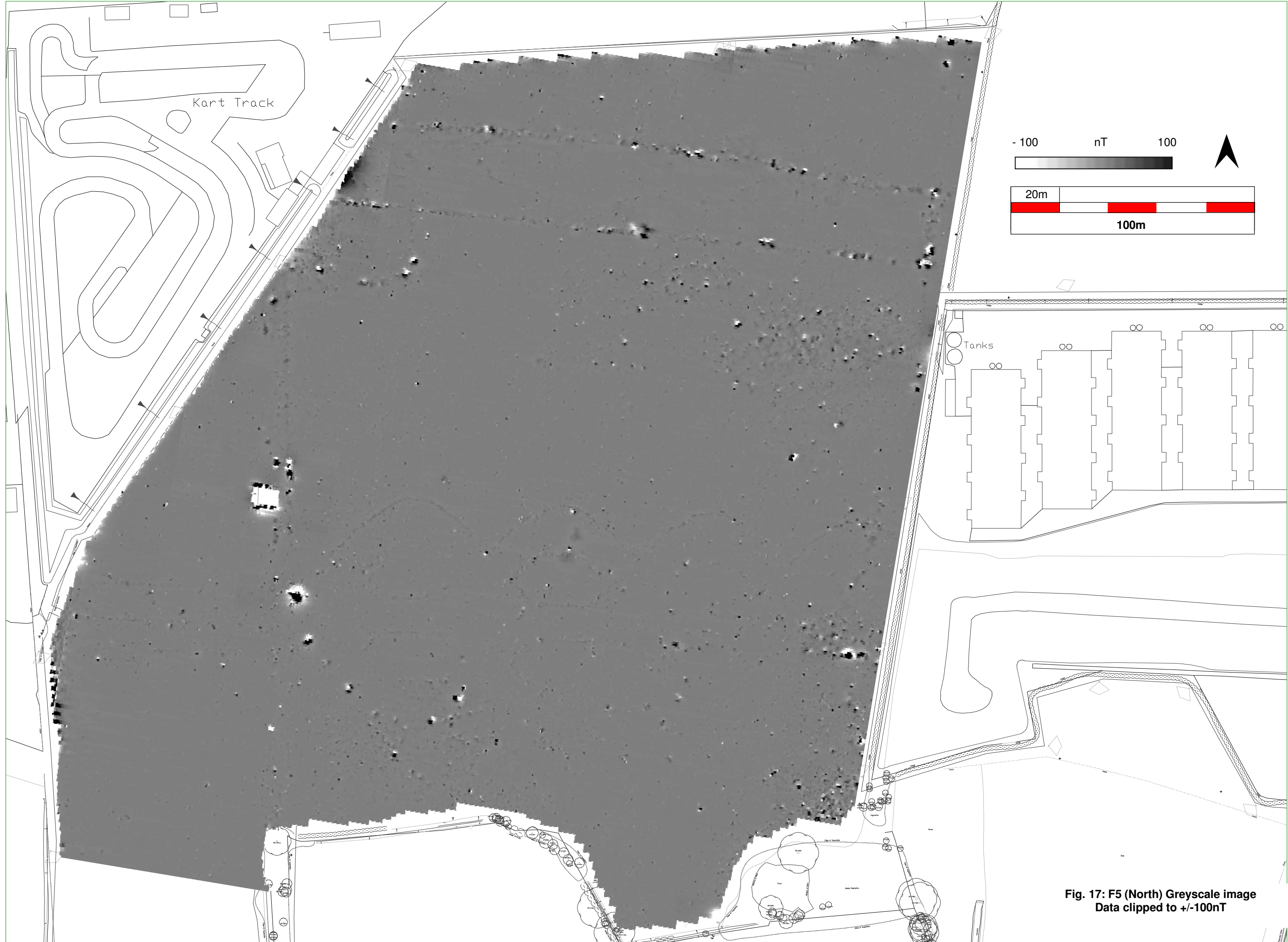
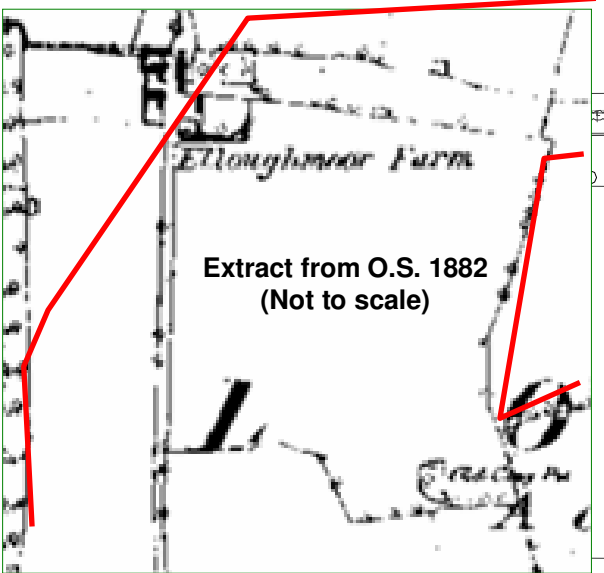
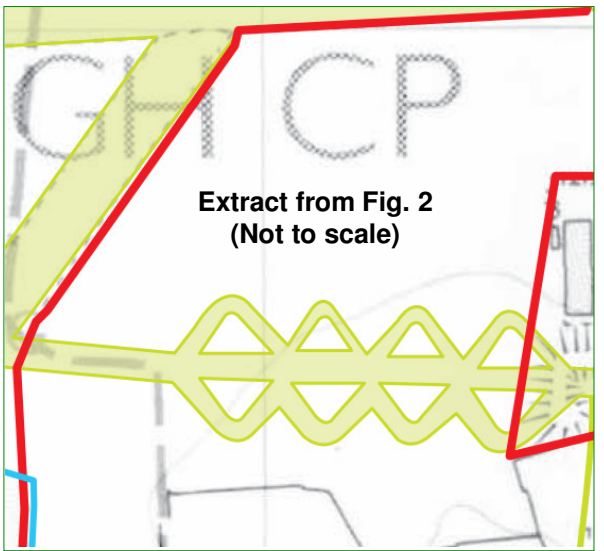
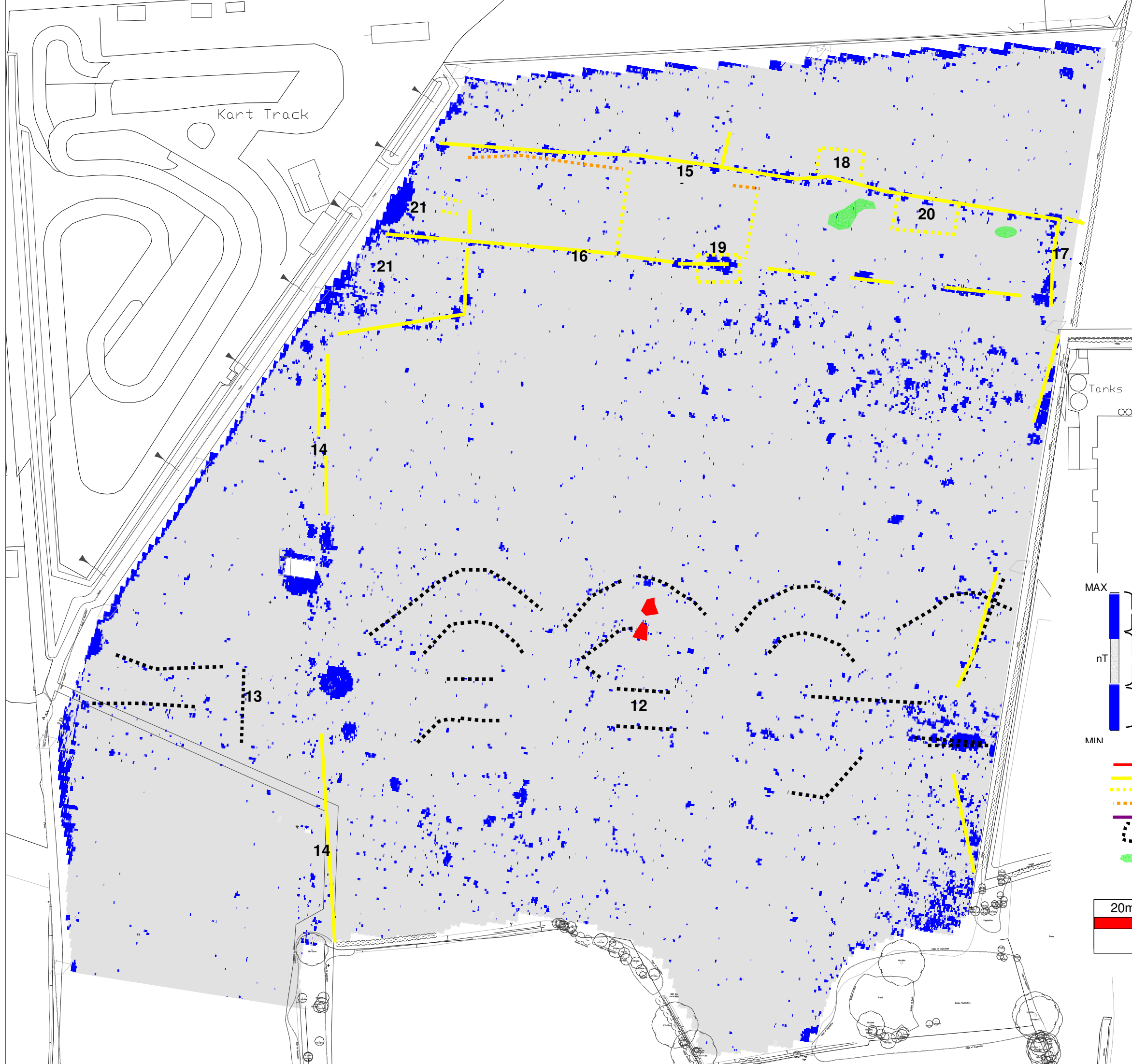


Fig. 17: F5 (North) Greyscale image
Data clipped to +/-100nT



Fig. 18: F5 (North) Greyscale image
Data clipped to +/-6nT



- MAX
- Typically modern (rubble, metal objects/fencing etc)
- nT
- Most archaeological features 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).
- MIN
- Typically modern (rubble, metal objects/fencing etc)
- Potential ditch
 - Former boundary (O.S.)
 - Suggested recent agricultural feature
 - Potential cultivation
 - Potential land drain
 - Airfield remains
 - Suggested natural (example)
 - ▲ Potential pit

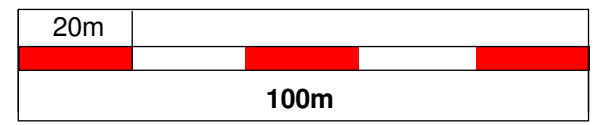


Fig. 19: F5 (North) Interpretive image
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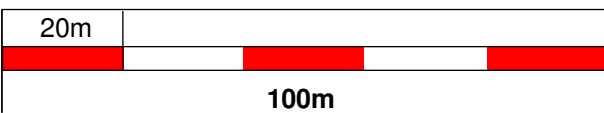
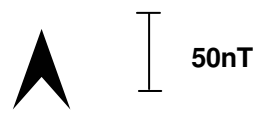
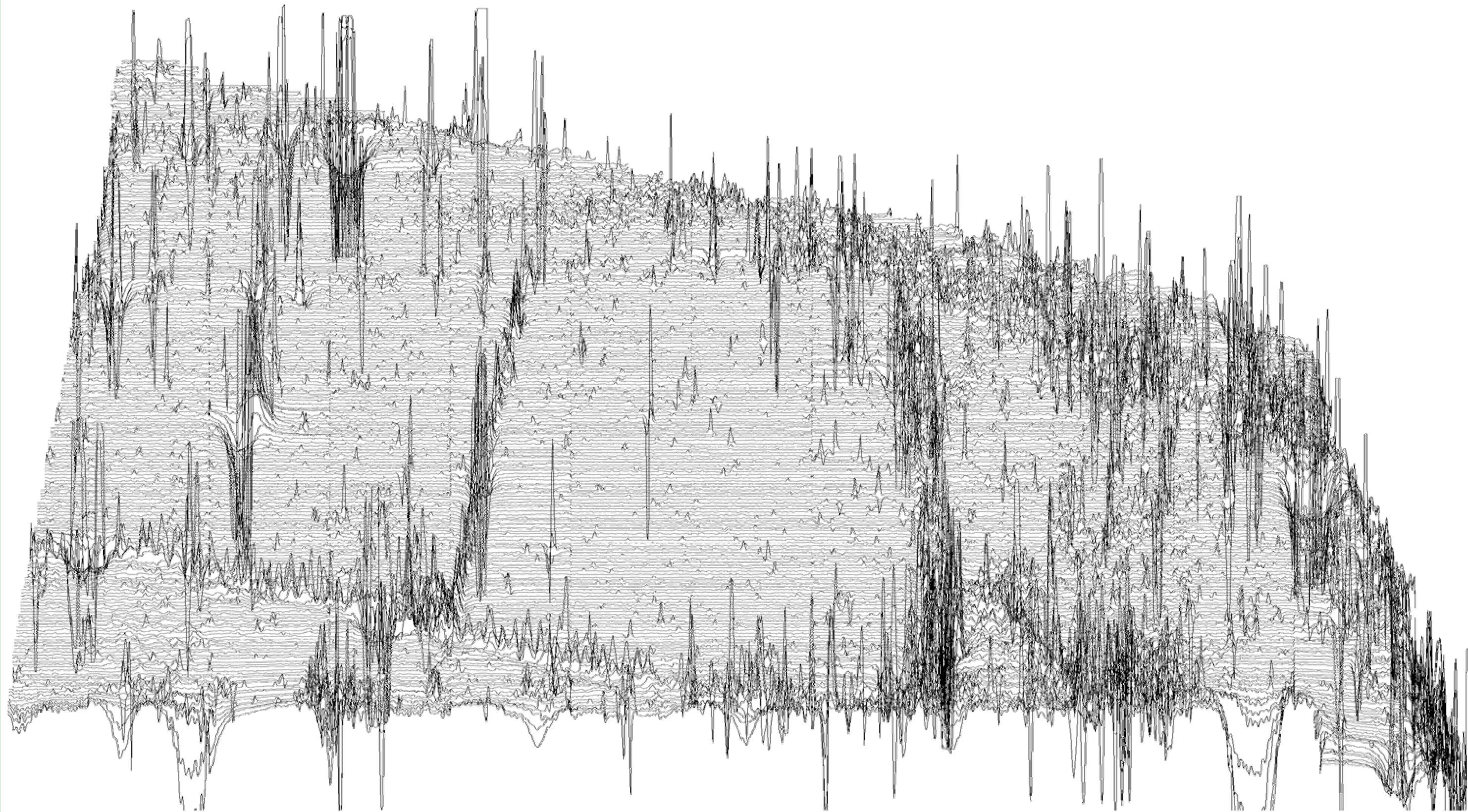


Fig. 20: F6 (West) Trace plot image
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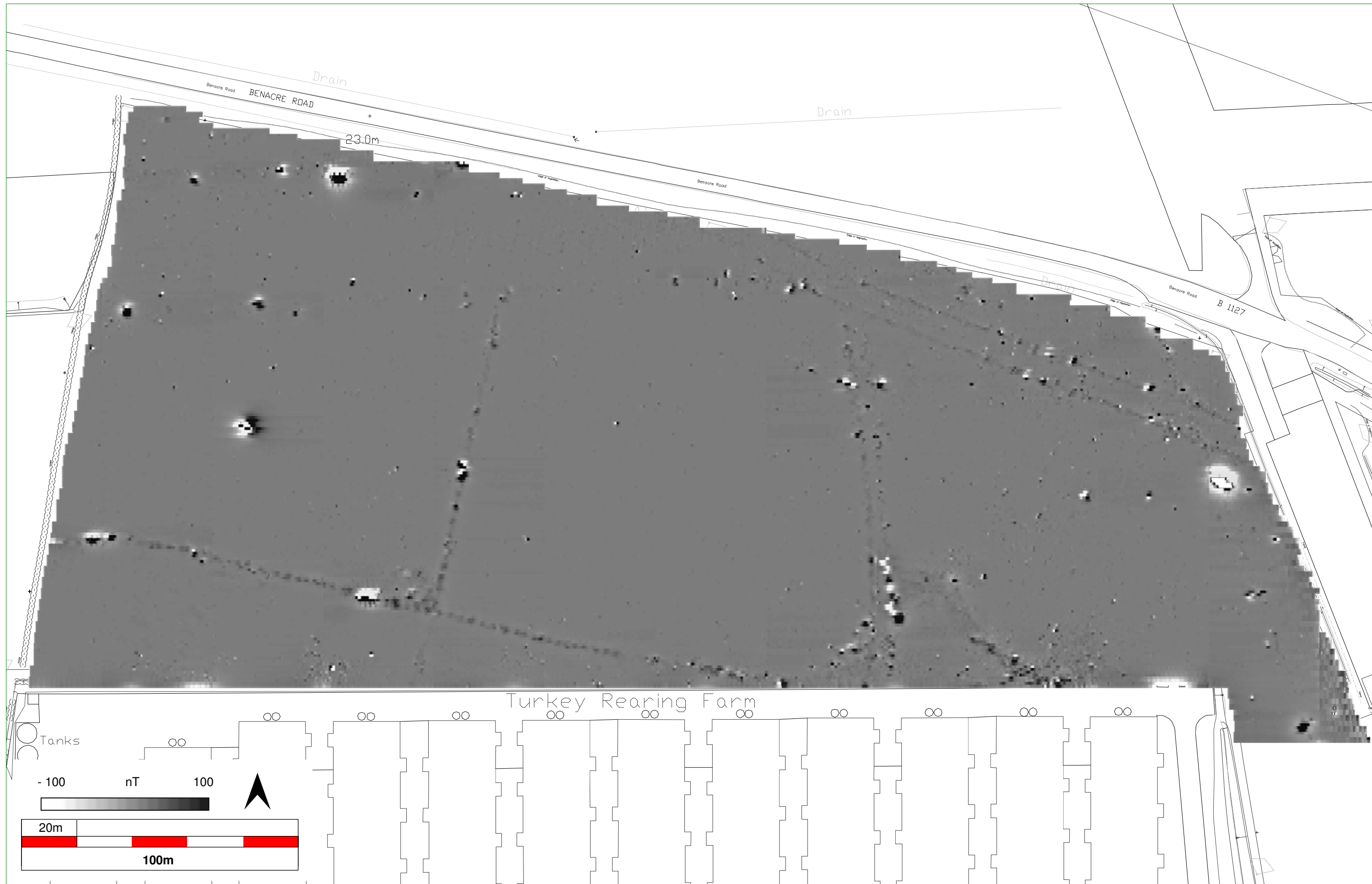


Fig. 21: F6 (West) Grayscale image
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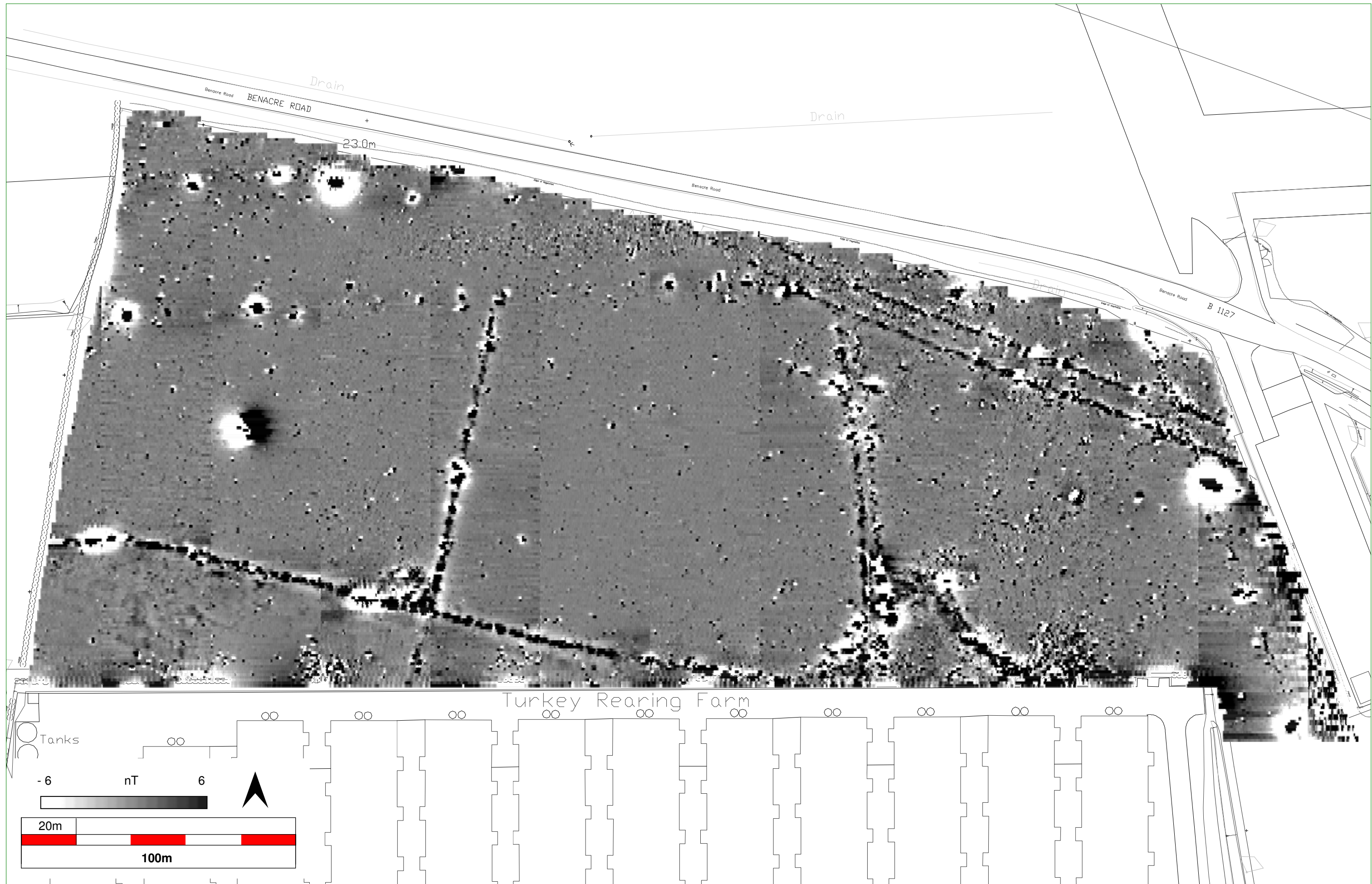


Fig. 22: F6 (West) Greyscale image
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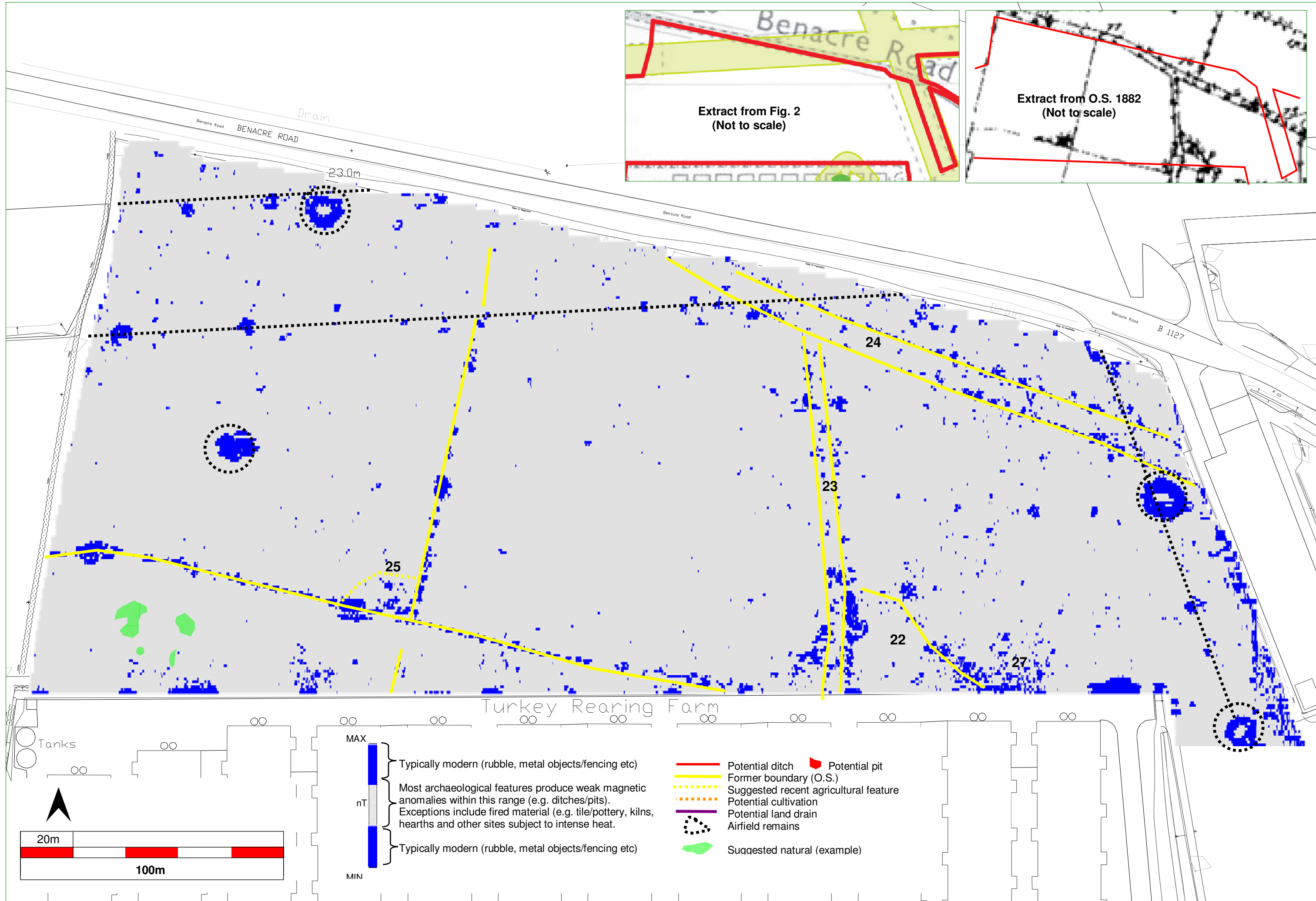


Fig. 23: F6 (West) Interpretive image
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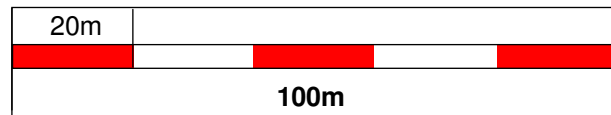
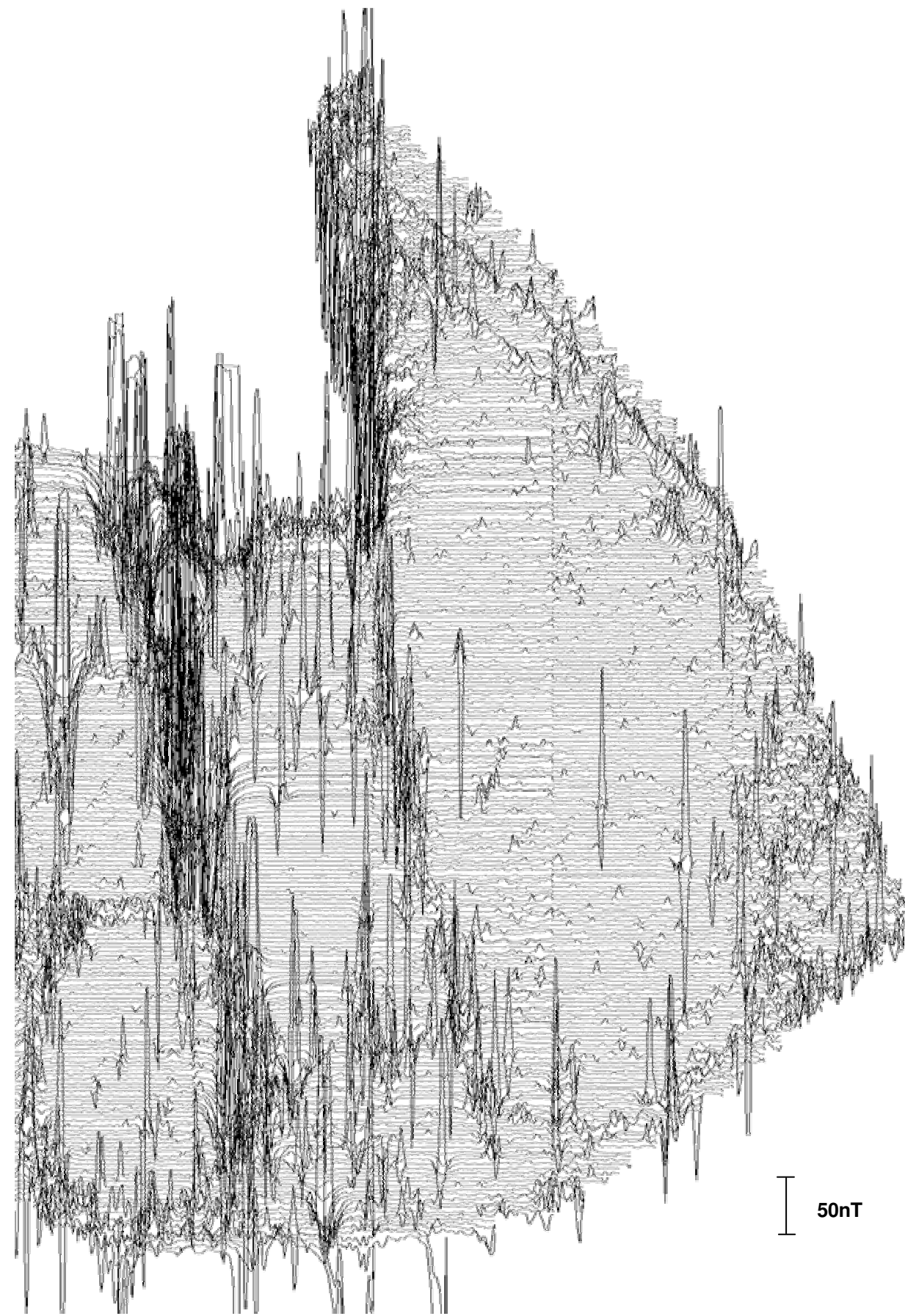


Fig. 24: F6 (East) Trace plot image
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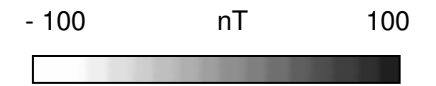
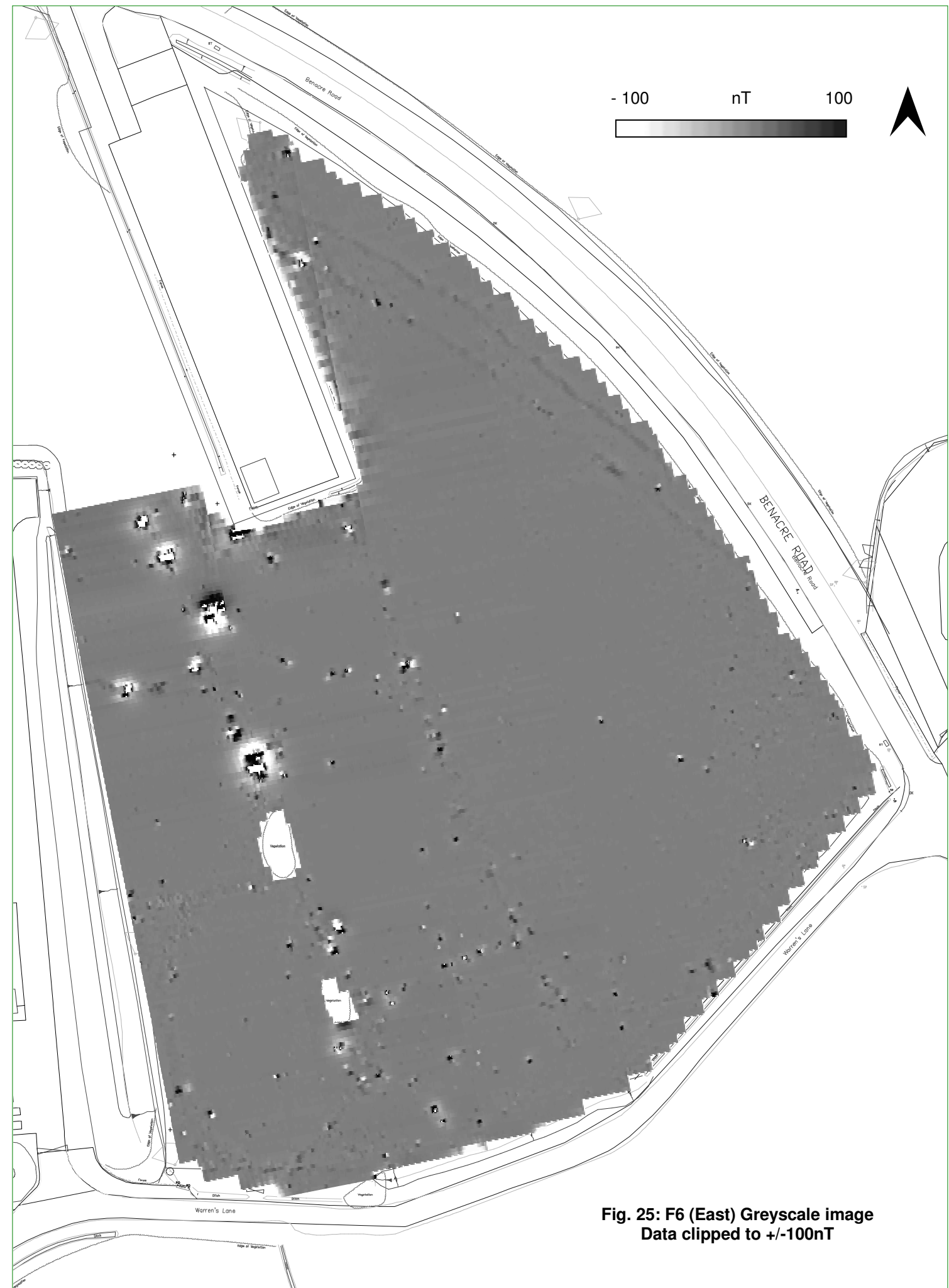


Fig. 25: F6 (East) Greyscale image
Data clipped to +/-100nT

