

STENIGOT TO BENNIWORTH, LINCOLNSHIRE

Report on Archaeological Geophysical Surveys of Route of Proposed Water Main 2012-2013

A.D.H. Bartlett

Surveyed by:

**Bartlett-Clark Consultancy
25 Estate Yard, Cuckoo Lane,
North Leigh,
Oxfordshire OX29 6PW
01865 200864**

for:

**Cambridge Archaeological Unit
Department of Archaeology
Downing Street
Cambridge CB2 3DZ**

on behalf of:

Anglian Water Services Ltd

Stenigot to Benniworth Archaeological Geophysical Surveys of Proposed Water Main 2012-2013

Introduction

This geophysical surveys described in this report were carried out as part of an archaeological evaluation of the route of a proposed water main in the Lincolnshire Wolds.

The surveys were commissioned from Bartlett Clark Consultancy (BCC), Specialists in Archaeogeophysics of Oxford, by Cambridge Archaeological Unit (CAU) on behalf of Anglian Water Services. The fieldwork was done in two stages. The northern part of the route (fields 4-10 as labelled on figure 1) was surveyed in October 2012, with results as described in an initial report dated 7 December. Fields 1-3 were heavily ploughed at that time, and could not be surveyed until they were sown and cultivated in 2013. (Magnetometer surveys require the instrument to be carried evenly along closely spaced lines, which cannot be done on roughly ploughed land.) The remaining fieldwork, done on 10-11 April 2013, followed a revised line which intersects only the SE corner of field 3, and an alternative route in field 7. The present report includes results from both stages of the investigation.

The 2012 survey identified one site of clear archaeological significance on the northern alternative route (field 10), and produced findings of possible (but unconfirmed) archaeological relevance at one other location (field 6), as described below. The second survey did not produce any findings as conclusive as those in field 10, but identified ditch-like linear features in fields 2-3 and field 7.

The Proposed Route

Topography, geology and archaeology

The proposed route is 4.9km in length (including alternative alignments at the northern end), and is located about 10km SW of Louth, Lincolnshire. It extends across open farmland from 2km NE of Market Stainton (TF 244814) to 1km south of Ranby (TF 226775). It reaches a maximum elevation of c. 100m OD at its mid-point, and 60-70m at the northern and southern ends.

The southern half of the route is on a bedrock of Jurassic clay (Ampthill and Kimmeridge clay), beneath a boulder clay drift deposit. Magnetic susceptibility readings taken during the course of the survey were relatively high in the southern part of the route (mainly in a range $20-45 \times 10^{-5}$ SI in fields 1-3), which confirms that conditions here should be favourable for the magnetic detection of archaeological features. The northern part of the route is on Cretaceous Wealden group mudstone, and possibly lacking in boulder clay. The susceptibility readings were rather lower (6-20 SI), but still sufficient to permit effective magnetometer surveying.

A map supplied to us by Anglian Water (drawing no. WAT-05708) indicates a number of archaeological areas (probably cropmarks) as identified in the County Sites and Monuments Record. These are in the fields between and to the north of the two alternative alignments which were investigated at the northern end of the route.

Survey Methodology

The procedure employed for this investigation was a recorded magnetometer survey of a 24m wide strip along the route. The strip is centred on the pipe alignment where possible, but offset if necessary to avoid obstructions.

This method provides detailed direct evidence for the presence of any detectable archaeological sites or features which intersect the route, and has been used successfully as part of the archaeological assessment process on numerous previous pipeline projects. A full magnetometer survey of this kind meets the recommendations for linear geophysical investigation as set out in the revised English Heritage geophysical guidelines document (*Geophysical Survey in Archaeological Field Evaluation*, English Heritage, 2008), as well as the Institute of Field Archaeologists' Code of Conduct (2006).

Fieldwork Procedure

The survey was carried out using Bartington 1m fluxgate magnetometers, with readings plotted at 25cm intervals along transects 1m apart.

The survey was positioned in each field by reference to OS co-ordinates measured from the digital mapping supplied by the client, and located with a differential GPS system. The OS coordinates of detected features can be read directly from digital copies of the Autocad plans.

Presentation and reporting

The results are presented in sections as grey scale plots alongside corresponding interpretative plans in figures 2-9 (at 1:2000 scale), and as graphical or x-y trace plots at 1:1250 scale in figures 10-15. The graphical plots show the reading after minimal pre-processing (zero mean baseline correction and truncation of extreme values). We include these plots for comparison with the grey scale presentations, and because awareness of magnetic anomaly amplitudes and profiles is necessary in reaching a considered interpretation of the survey data. The narrow dipole anomalies which are characteristic of ferrous objects are also more readily identifiable in graphical than in grey scale plots. The grey scale plots have been subject to additional weak low pass filtering (not applied to the graphical plots) to control background noise levels.

Potentially significant features are indicated in the interpretation by coloured outlines, or broken lines. Broken lines are used to permit a simplified representation of complex features, or to represent features which are too fragmented to form a satisfactory outline.

Colour coding has been used to distinguish different effects. Magnetic anomalies of possible archaeological origin are outlined in red, and strong disturbances (which are likely to be of recent origin) in brown. Small background magnetic anomalies which may be of natural origin are indicated in light brown. Possible cultivation effects are shown in green, and ferrous anomalies and drains in shades of blue.

Results

Fields along the route have been numbered (1-10) from south to north for identification in this report. Reasonably complete coverage was obtained except for wooded areas near to fields 9 and 10, and various obstructions (carrots, beet, bales, manure) in field 10. The following comments run in sequence from south to north. [Letters used as feature labels start at J in the southern part of the route because A-H were used in the 2012 survey of the northern section.]

Field 1

The main findings are indistinct linear markings probably representing a combination of cultivation effects and land drains. These two types of feature are not always clearly distinguishable, but the linear markings (green) towards the south of field 1 (figure 2) could be ploughing effects, and the slightly more fragmented linear features (as labelled at J) could be drains. (Each section of clay pipe creates a small magnetic anomaly.)

The two possible pit-like features outlined in red at K are weak and indistinct, and not of any conclusive significance. A large pipe intersects the survey in the centre of field 1.

Fields 2-3

Findings here include a broad linear ditch-like feature (L-L) extending across both fields. There are also two possible narrower parallel ditches (M, N) in field 2. These are more distinct and are not aligned with the background cultivation effects (green). A few possible pit-like features are marked (in red), but there are no dense concentrations of such findings (as seen at H in field 10) to suggest that these fields are a focus of archaeological activity (although the ditches could be of archaeological origin).

Fields 4-5

The survey in both fields is intersected by linear markings which must represent a combination of cultivation effects and land drains.

A parallel pattern at the south of field 4 could indicate traces of ridge and furrow (or perhaps modern ploughing: green in interpretation), but this becomes less distinct in the centre of the field. The pattern is intersected in the northern half of the field by more

fragmented linear markings representing land drains. The drains follow varying alignments, as is also the case in field 5.

The stream which follows the eastern boundary of field 4 enters a culvert at the south of field 5, and re-appears at the southern boundary of field 6. The culvert has been detected as a strip of disturbed readings which cross the survey from A at the south of field 5 (as labelled on figure 4).

Fields 6-7

Both fields again contain cultivation effects and drains, but there are also distinct areas of disturbed readings (B and C) in field 6. A piece of grey Roman domestic ware was seen on the ground near B. The magnetic anomalies here include some features with rounded profiles (as seen in the graphical plot 10.1, and outlined in red). These may indicate silted pits of possible archaeological origin, but they are not associated with identifiable ditches or enclosures (of the kind seen in field 10) which would indicate this is an archaeological site. Other strong disturbances nearby could be recent (or possibly an indication of ancient industrial debris).

Disturbances at D in field 7 suggest the continuation of a former field boundary from the adjacent field corner. This is indicated by irregular disturbances in the 2012 survey, and possible linear and other features in the 2013 survey. There also appear to be numerous land drains, as seen in both surveys.

Field 8

The pipe route could not be fully surveyed at the south of the field because of piles of cut timber. The disturbed readings around E are difficult to account for, but show no regularity or continuity of plan to suggest they are archaeologically significant. The individual magnetic anomalies are also smaller than the pit-like features seen in field 6.

Broad weak magnetic anomalies, as at F, are of a kind often caused by silt deposition on wetland.

Field 9

A linear feature could indicate a former ditch or boundary at G, and there are possible cultivation effects towards the NE. High readings in the NE corner of the field could be modern disturbances around the field entrance.

Field 10

The field could not be surveyed in a single strip because of obstacles as noted on figure 8. The survey block at H had to be offset to the west of the line because of bales and a crop, but has detected a clearly defined complex rectilinear pattern which could represent ditches or enclosures. This block lies at the edge of one of the SMR archaeological areas as mentioned previously, and could indicate ancient settlement enclosures with internal features. Such findings are less evident in the remaining survey blocks in field 10, although some pit-like magnetic anomalies may be present (red outlines).

Conclusions

The survey has produced clear evidence for archaeological findings at a location consistent with a previously identified SMR archaeological area in field 10 at the north of the route. The survey plots appear to indicate a dense group of ditched enclosures and settlement features at the southern end of the field.

Other findings cannot be confirmed to be archaeologically significant on the survey evidence alone, but some may provide targets for further investigation. Disturbed readings (E) in field 8 could indicate recent ground disturbance. There are groups of magnetic anomalies near to a surface find of Roman pottery at B and C in field 6. These include possible pit-like features, but fail to form a coherent plan of the kind seen in field 10.

Linear markings could indicate traces of ridge and furrow (as well as drains) in fields 1-2 and 4-6. A group of disturbances may indicate a former field boundary, perhaps with other features, in field 7, and there are other possible former ditches in fields 2-3.

Report by:

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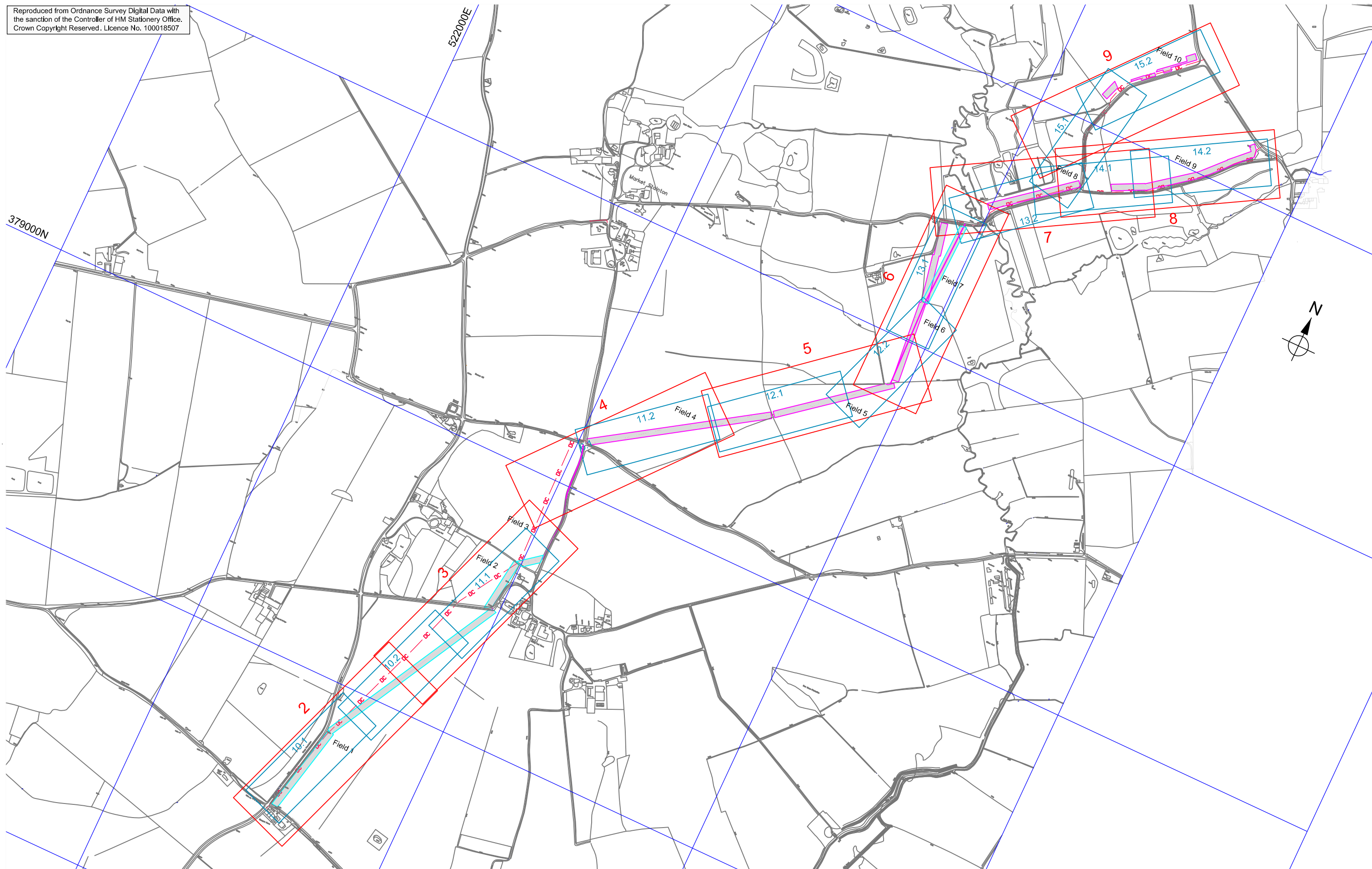
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7 December 2012

Revised: 30 April 2013

Fieldwork for the 2012 survey was carried out by R. Ainslie and S. Ainslie. The 2013 survey was done by C. Oatley and P. Heykoop.

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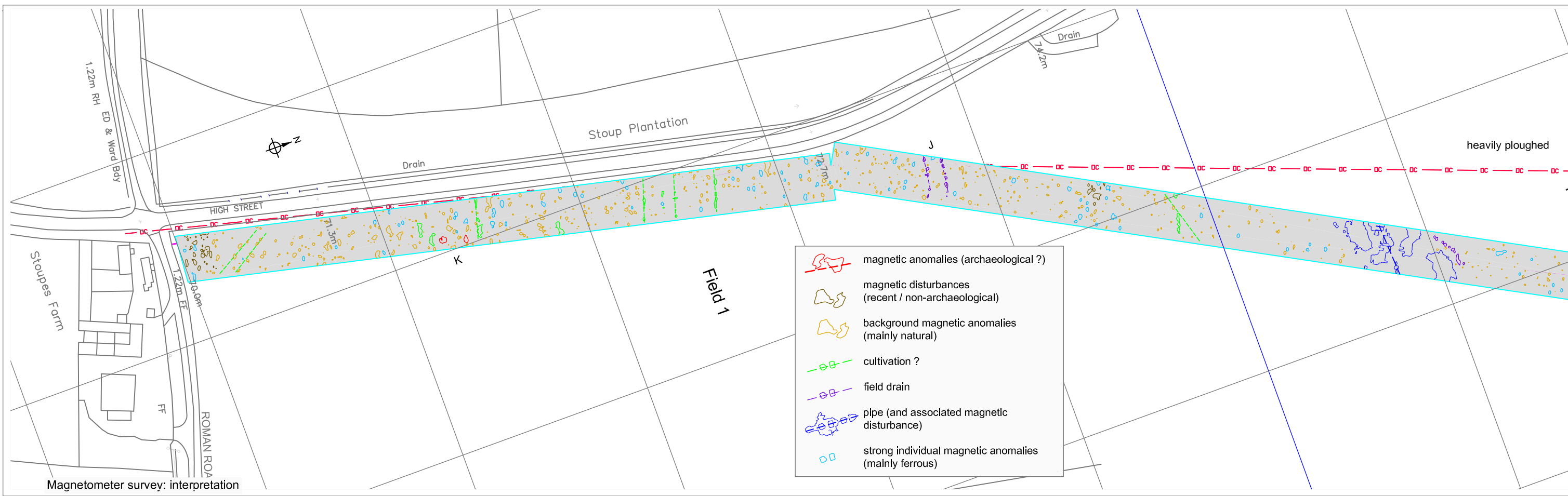
proposed pipe
(2012)

surveyed 2012
surveyed 2013

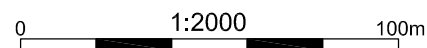
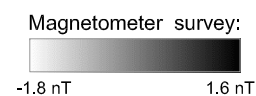
2
1:2000 survey plots (figures 2-8)
2
1:1250 survey plots (figures 9-12)

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STENIGOT TO BENNIWORTH, LINCOLNSHIRE
Proposed Water Main
Archaeological Geophysical Surveys 2012-13
Figure 1: Location of Magnetometer Survey (and figures 2-15)



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Figure 2: Magnetometer Survey
(grey scale plot with interpretation)

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heavily ploughed

Field 1

85.3m

Field 2

beet crop

ploughed

Field 3



99.0m

95.2m

Orchard House

The Stables

The Old Farm

Magnetometer survey

- magnetic anomalies (archaeological ?)
- magnetic disturbances (recent / non-archaeological)
- background magnetic anomalies (mainly natural)
- cultivation ?
- field drain
- pipe (and associated magnetic disturbance)
- strong individual magnetic anomalies (mainly ferrous)

heavily ploughed

Field 1

85.3m

Field 2

beet crop

ploughed

Field 3



99.0m

95.2m

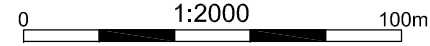
Orchard House

The Stables

The Old Farm

Magnetometer survey: interpretation

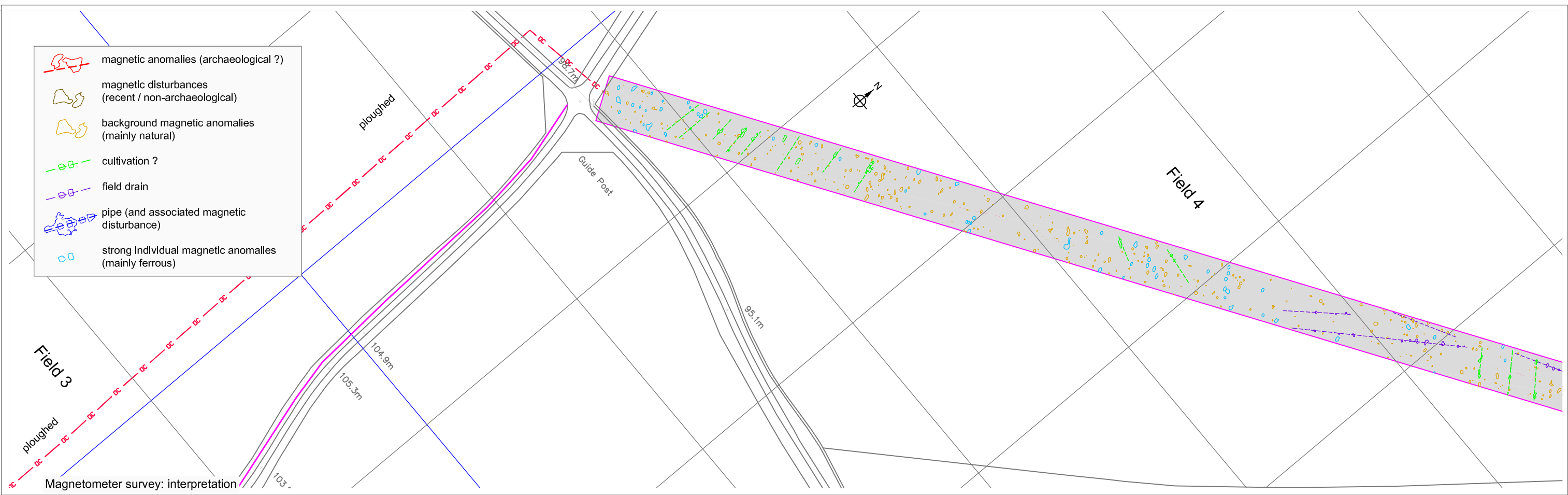
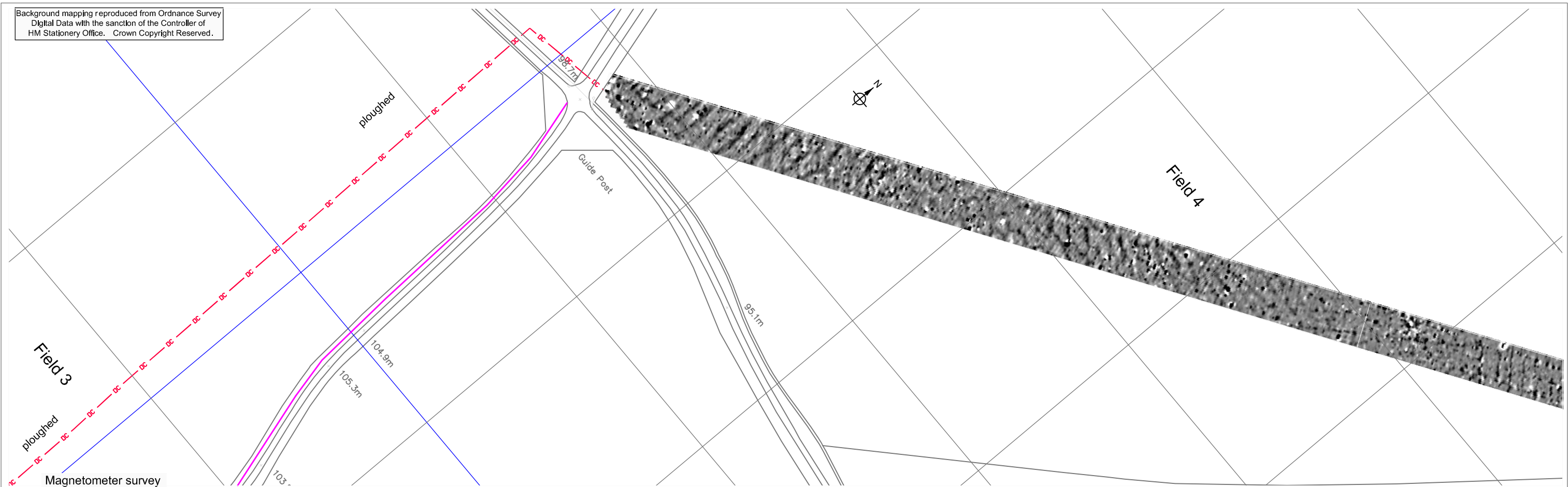
Magnetometer survey:



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Figure 3: Magnetometer Survey
(grey scale plot with interpretation)

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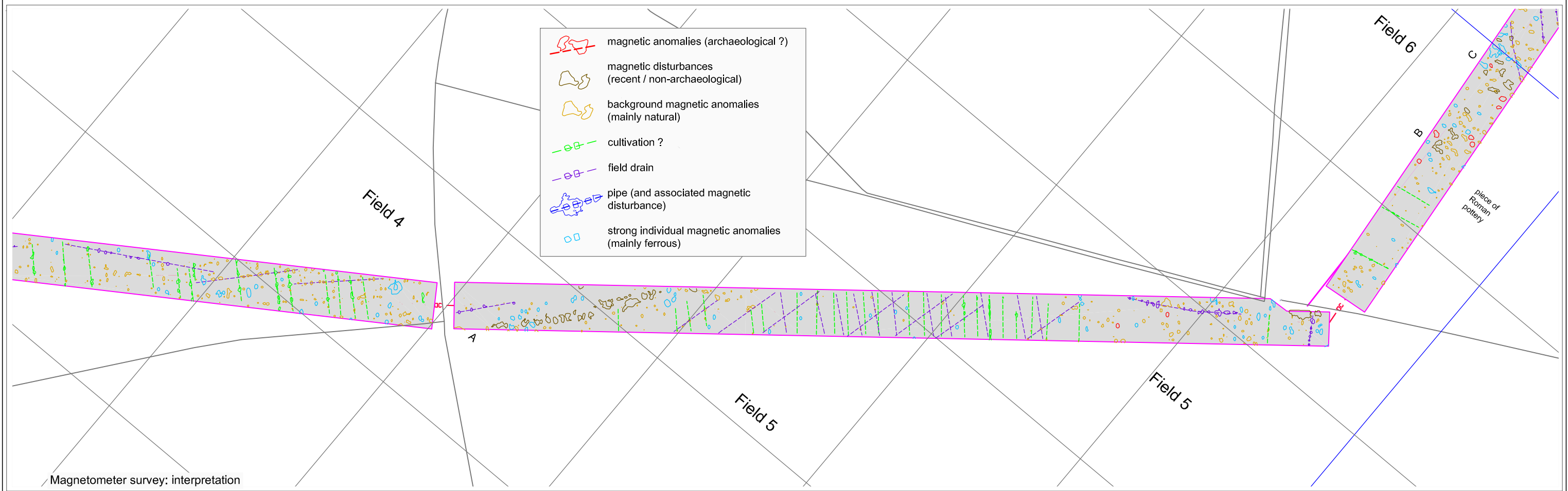
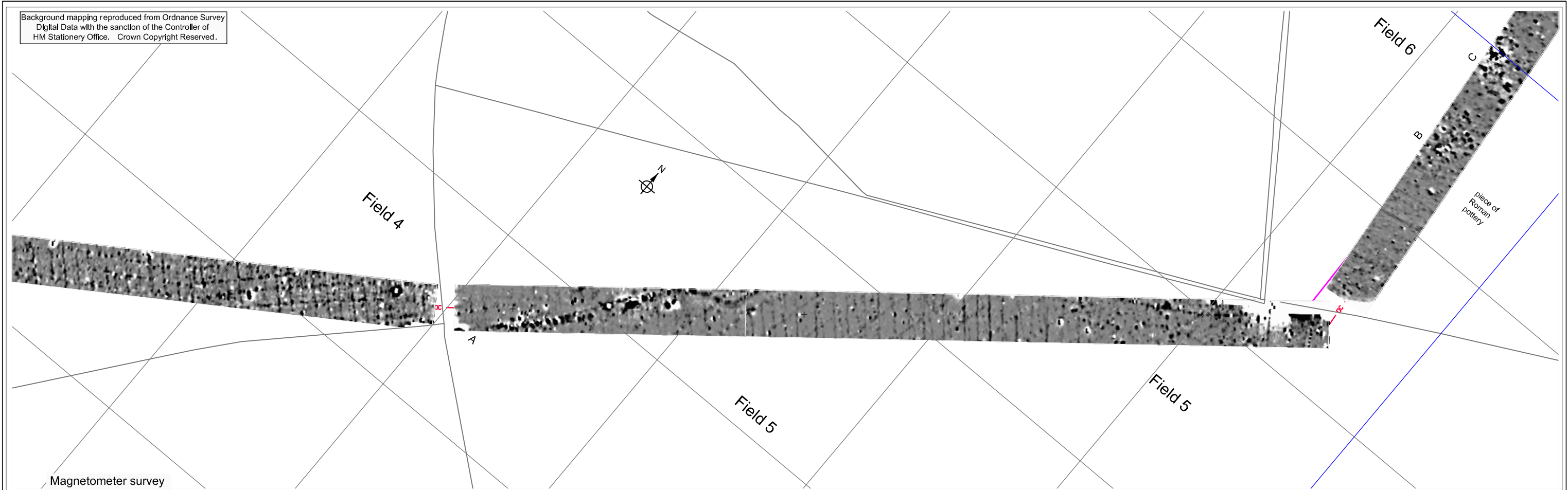
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Magnetometer survey:
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0 1:2000 100m

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Figure 4: Magnetometer Survey
(grey scale plot with interpretation)

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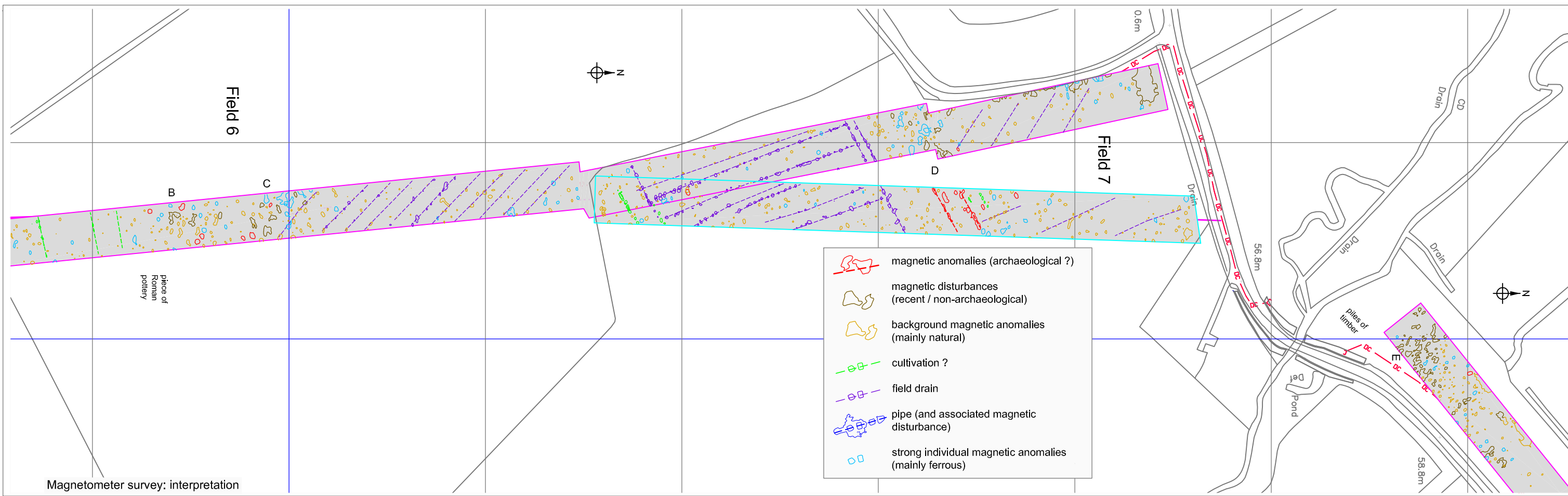


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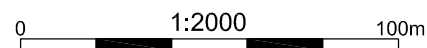
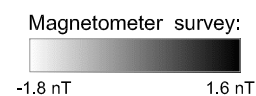
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Proposed Water Main
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Figure 5: Magnetometer Survey
(grey scale plot with interpretation)

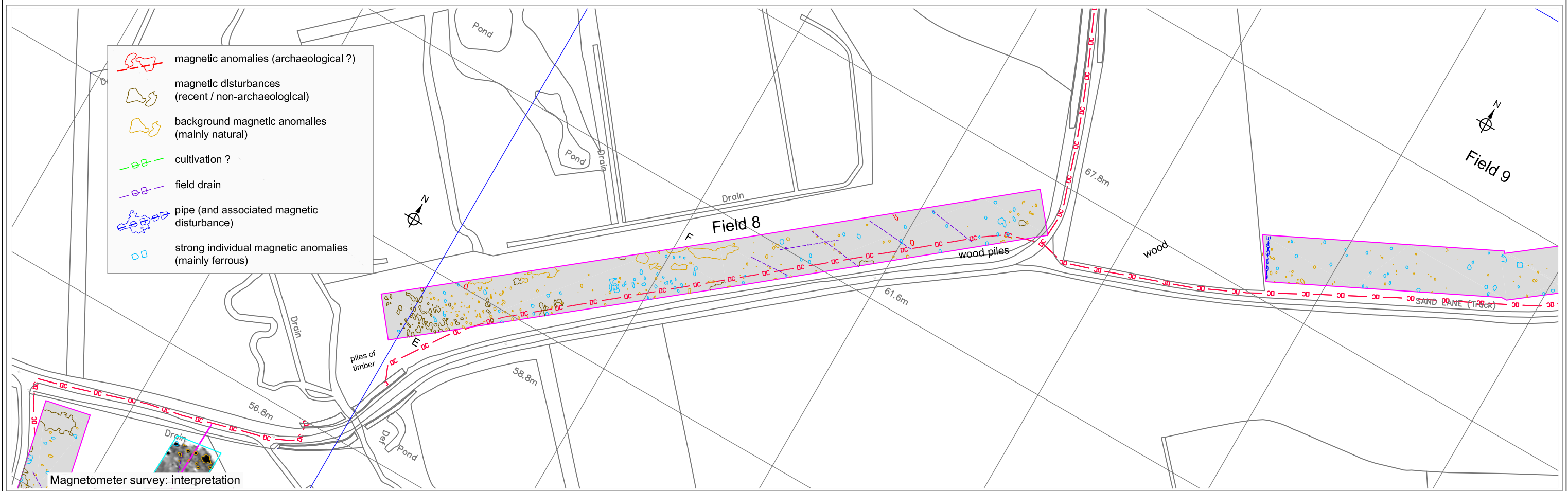
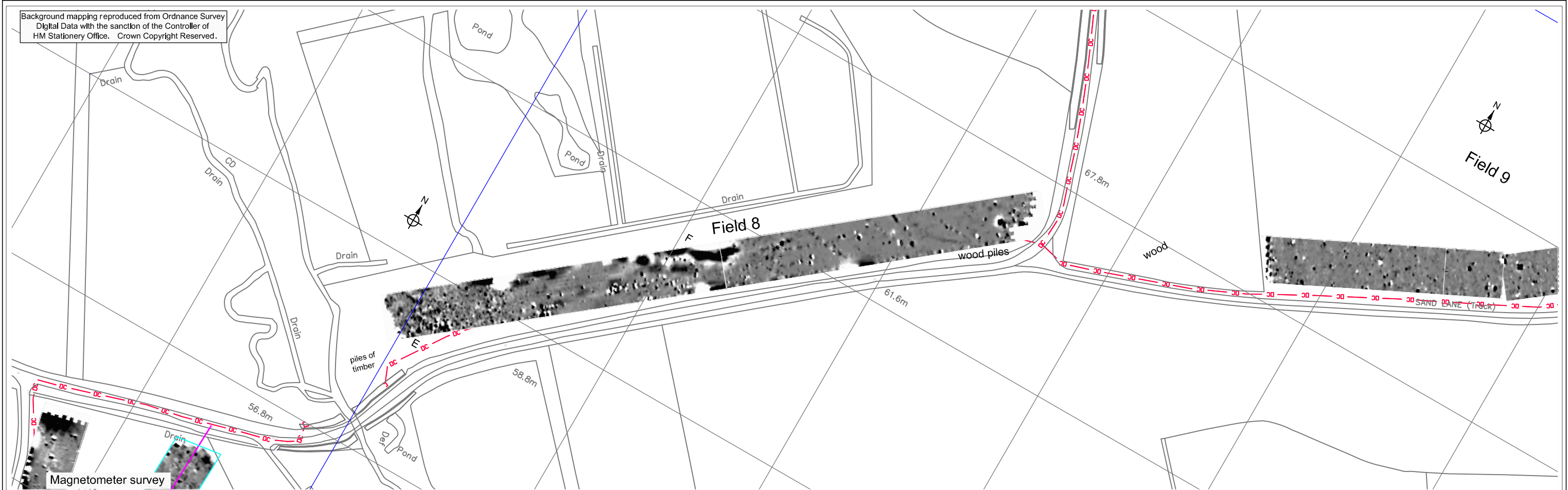
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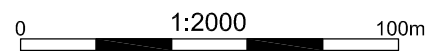
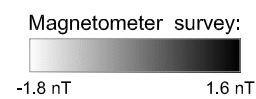


STENIGOT TO BENNIWORTH, LINCOLNSHIRE
Proposed Water Main
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Figure 6: Magnetometer Survey
(grey scale plot with interpretation)

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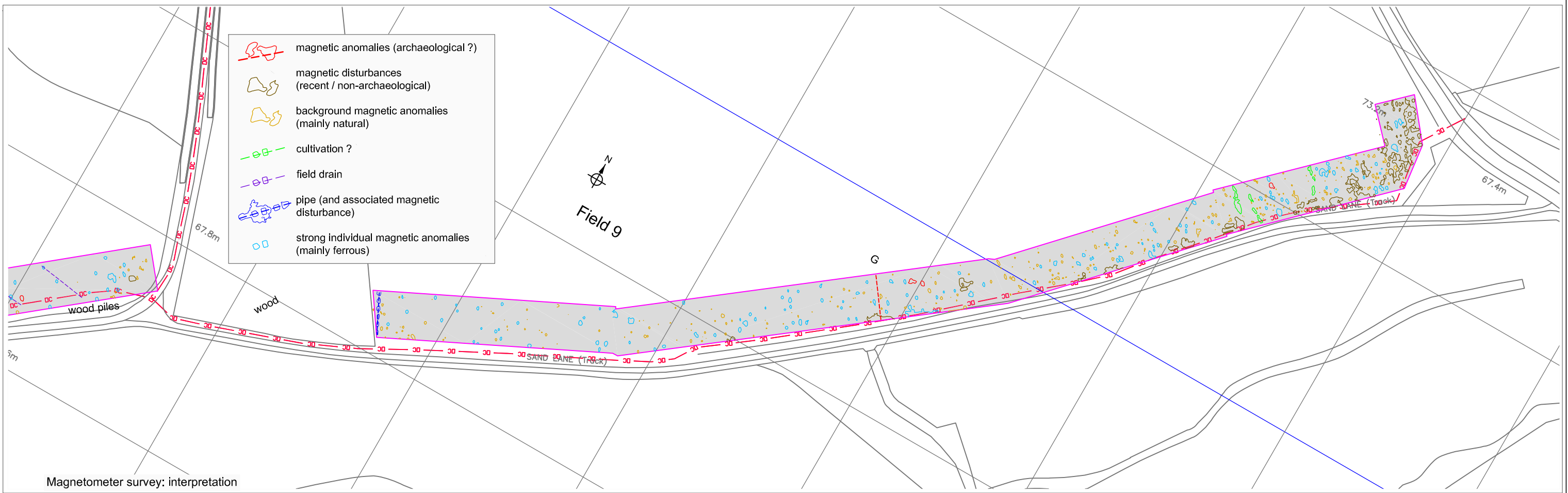
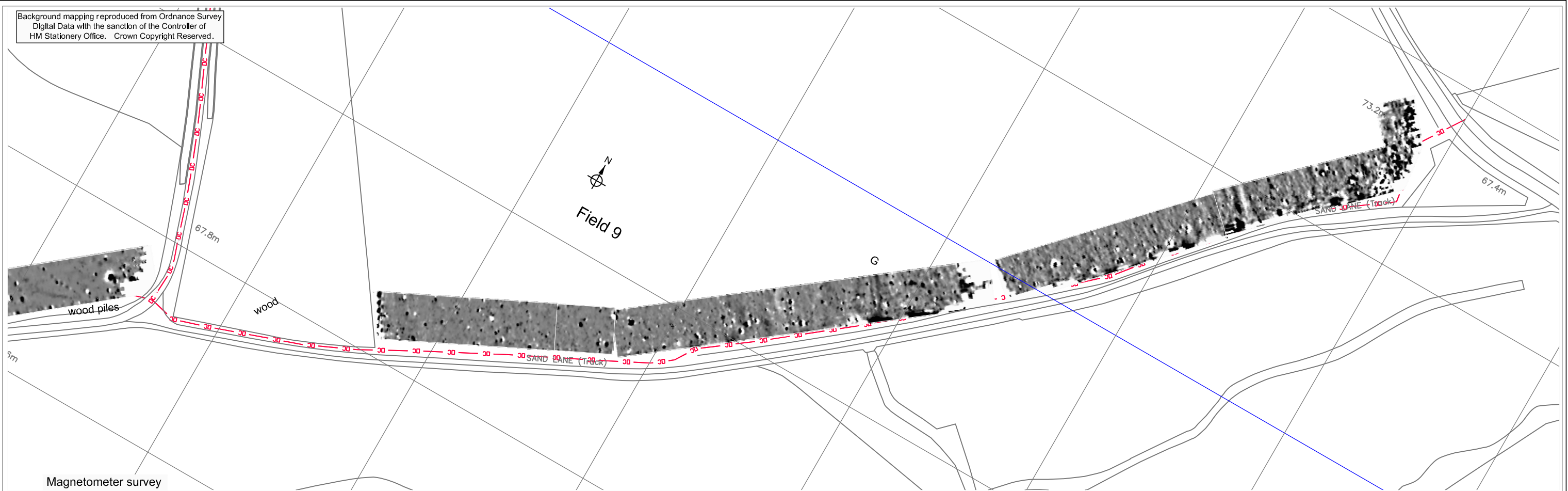


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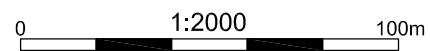
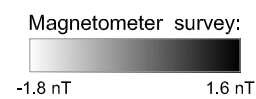


STENIGOT TO BENNIWORTH, LINCOLNSHIRE
Proposed Water Main
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Figure 7: Magnetometer Survey
(grey scale plot with interpretation)

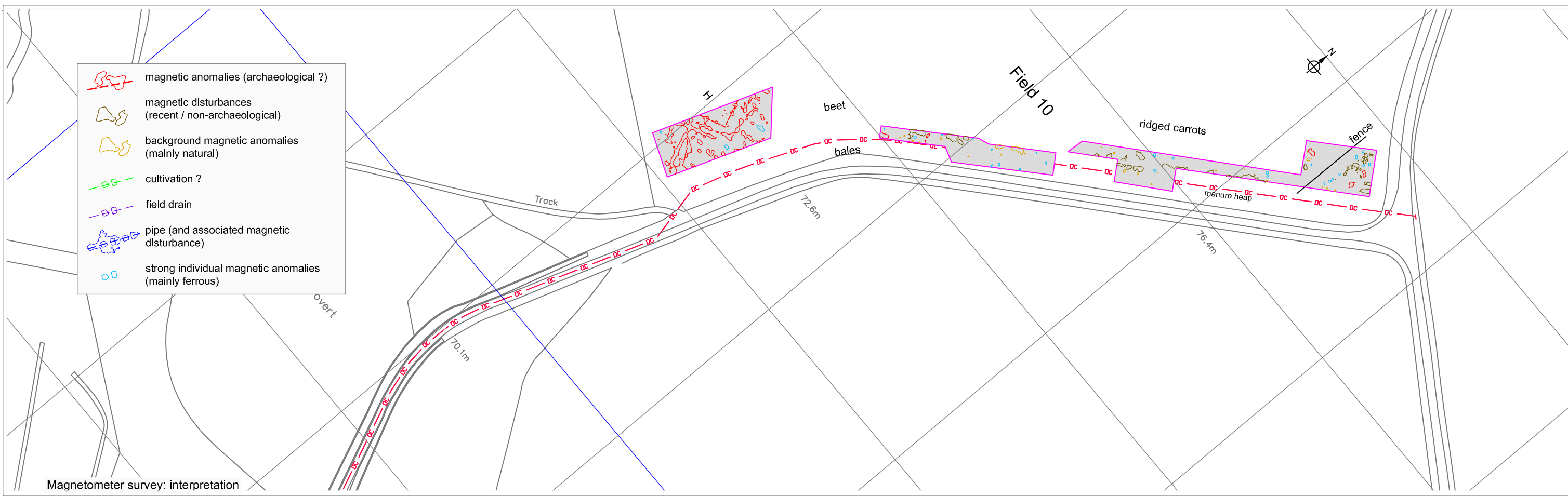
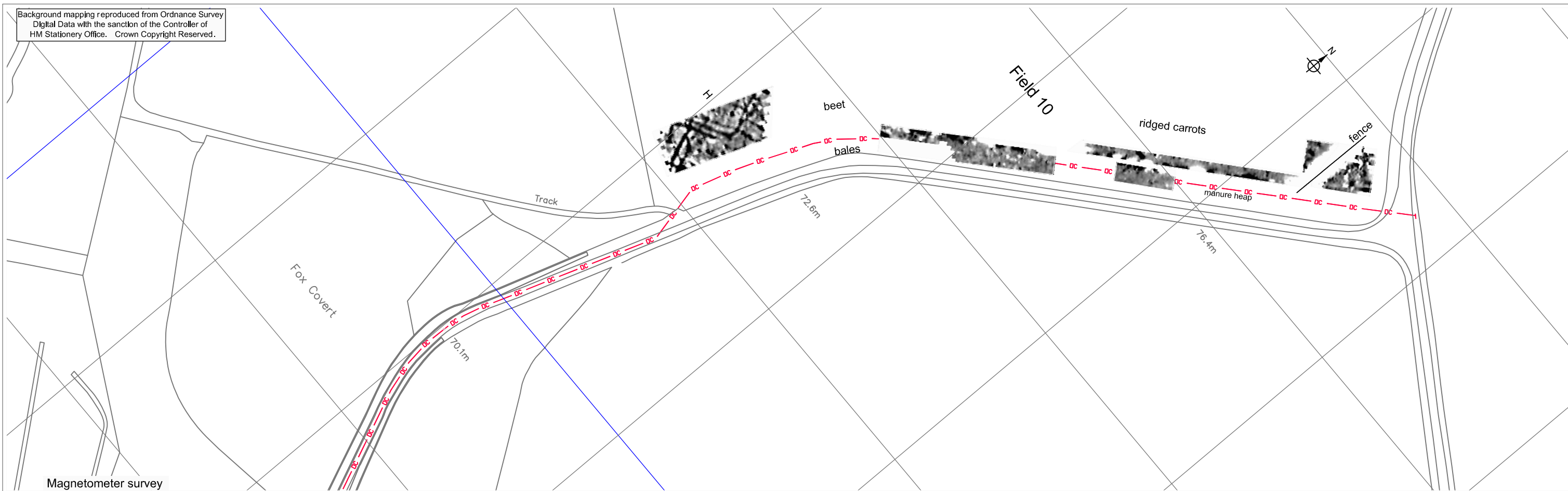
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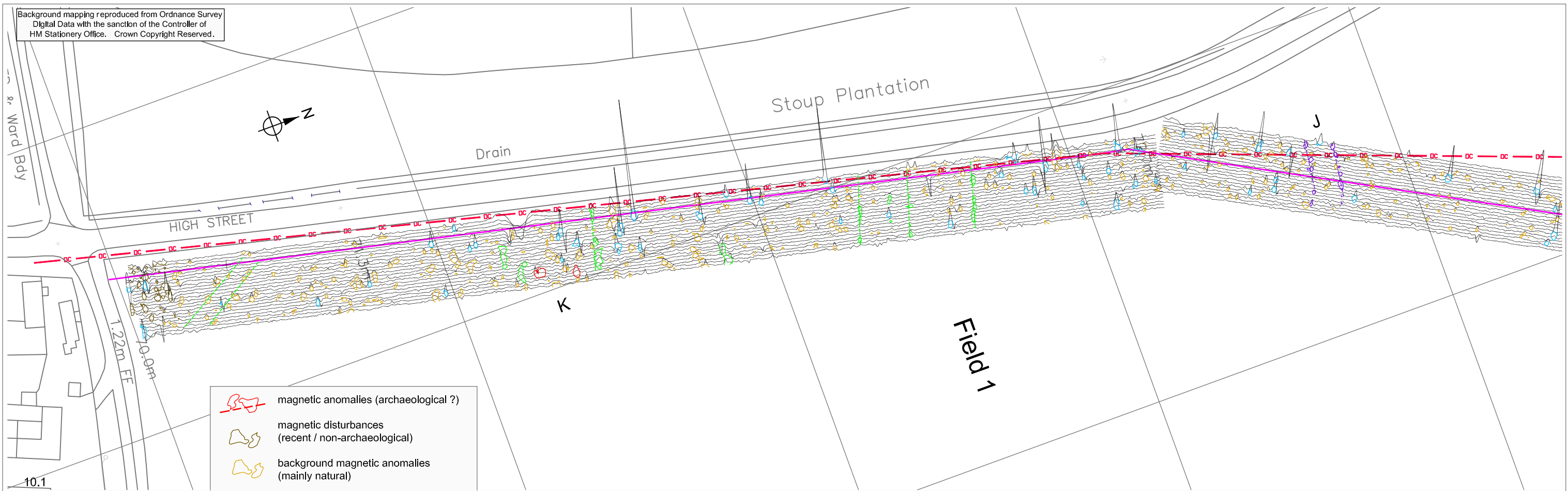
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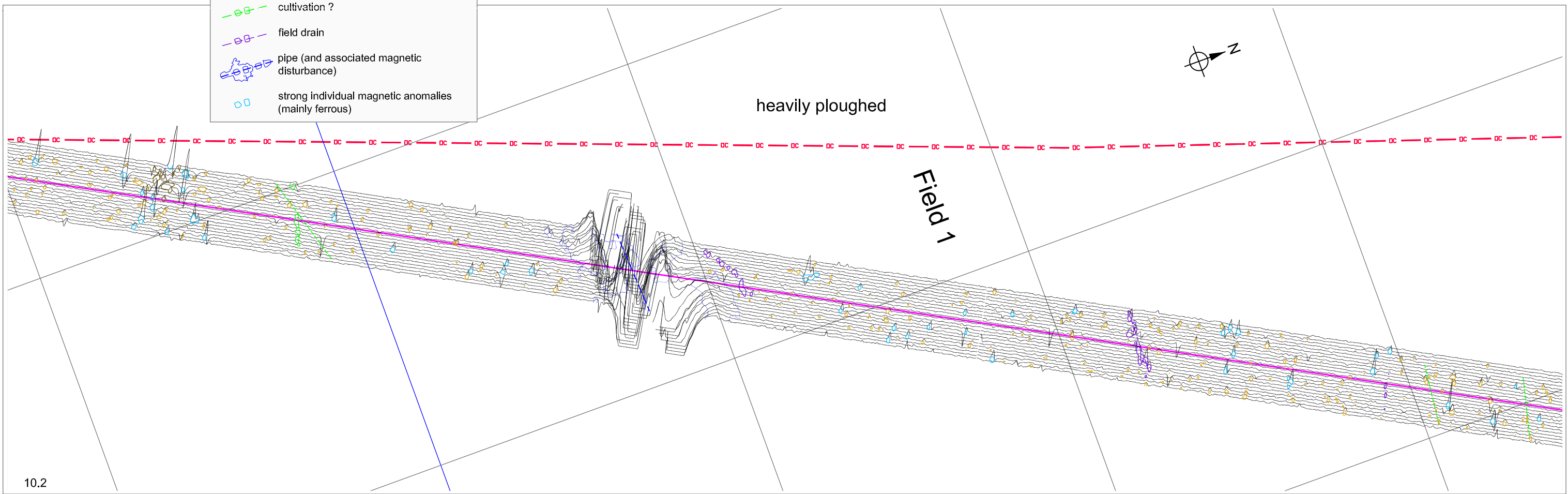
STENIGOT TO BENNIWORTH, LINCOLNSHIRE
Proposed Water Main
Archaeological Geophysical Surveys 2012-13
Figure 8: Magnetometer Survey
(grey scale plot with interpretation)



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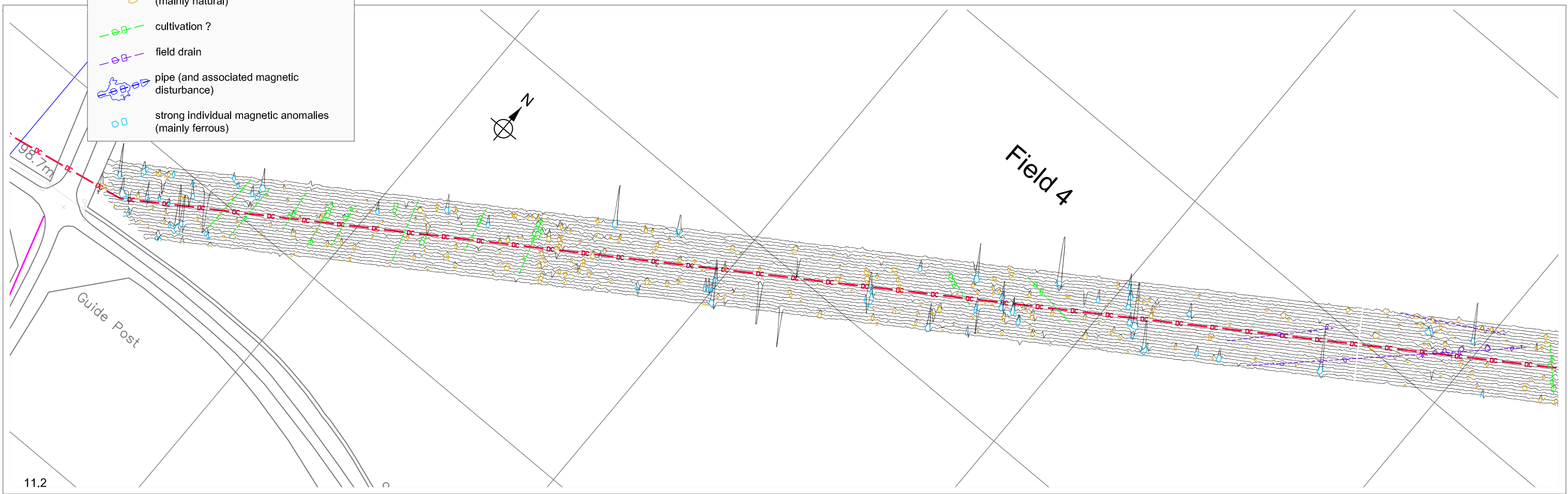
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- magnetic disturbances (recent / non-archaeological)
- background magnetic anomalies (mainly natural)
- cultivation ?
- field drain
- pipe (and associated magnetic disturbance)
- strong individual magnetic anomalies (mainly ferrous)



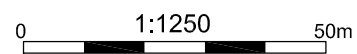
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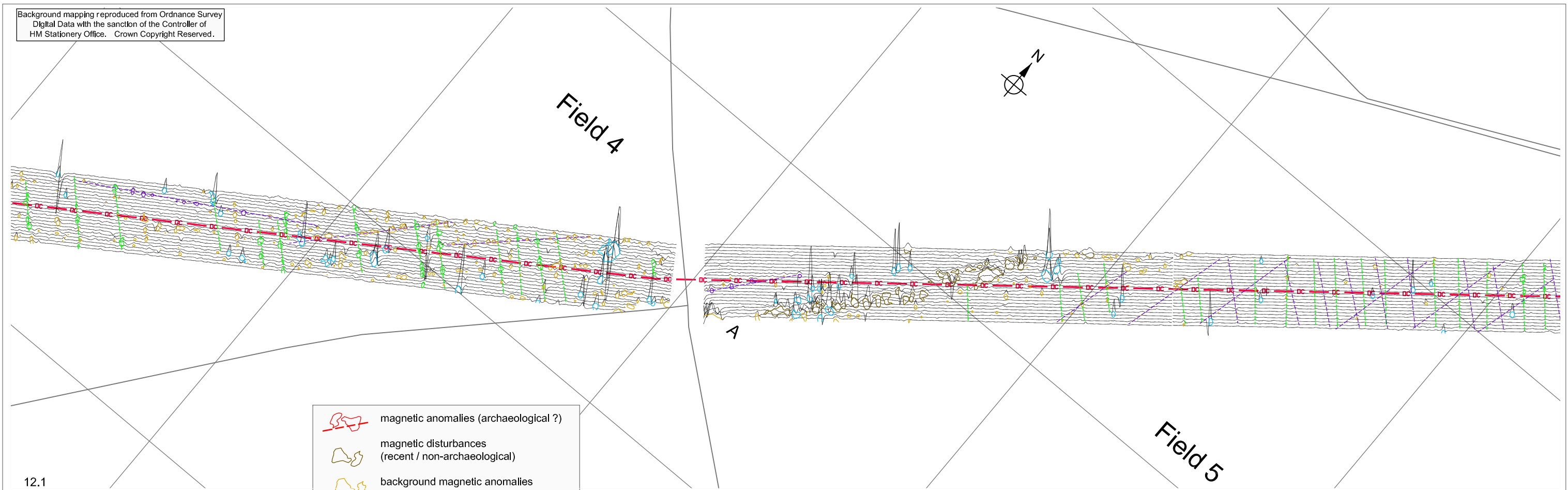
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Proposed Water Main
Archaeological Geophysical Surveys 2012-13
Figures 10.1, 10.2: Magnetometer Survey
(with interpretation)

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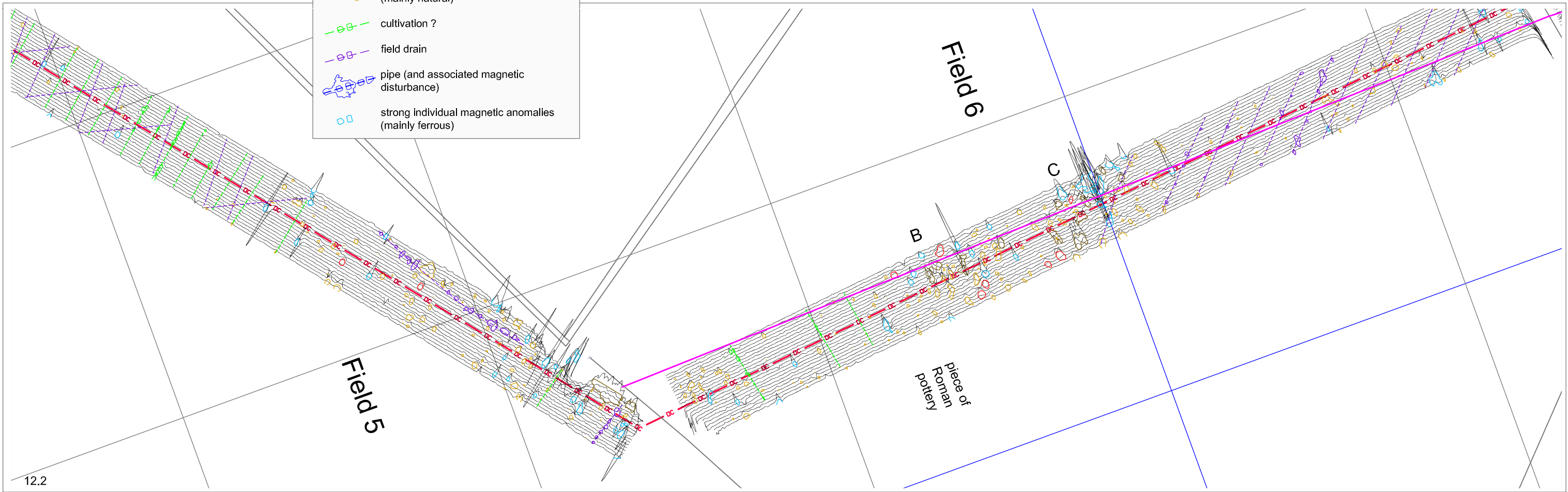
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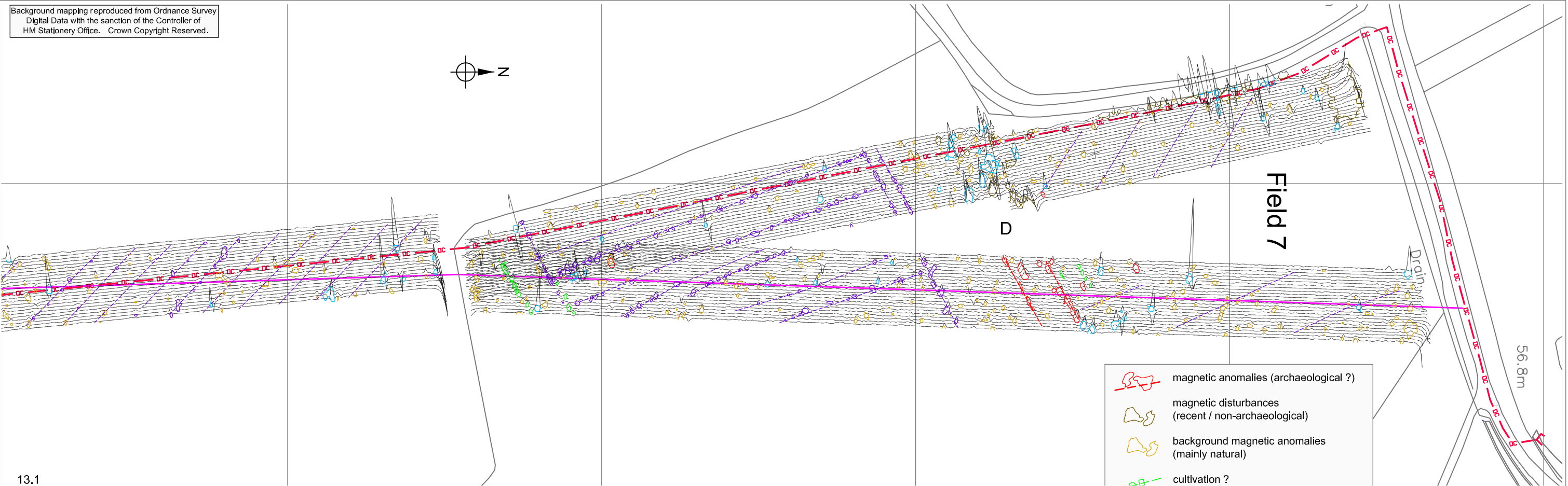
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Proposed Water Main
Archaeological Geophysical Surveys 2012-13
Figures 11.1, 11.2: Magnetometer Survey
(with interpretation)



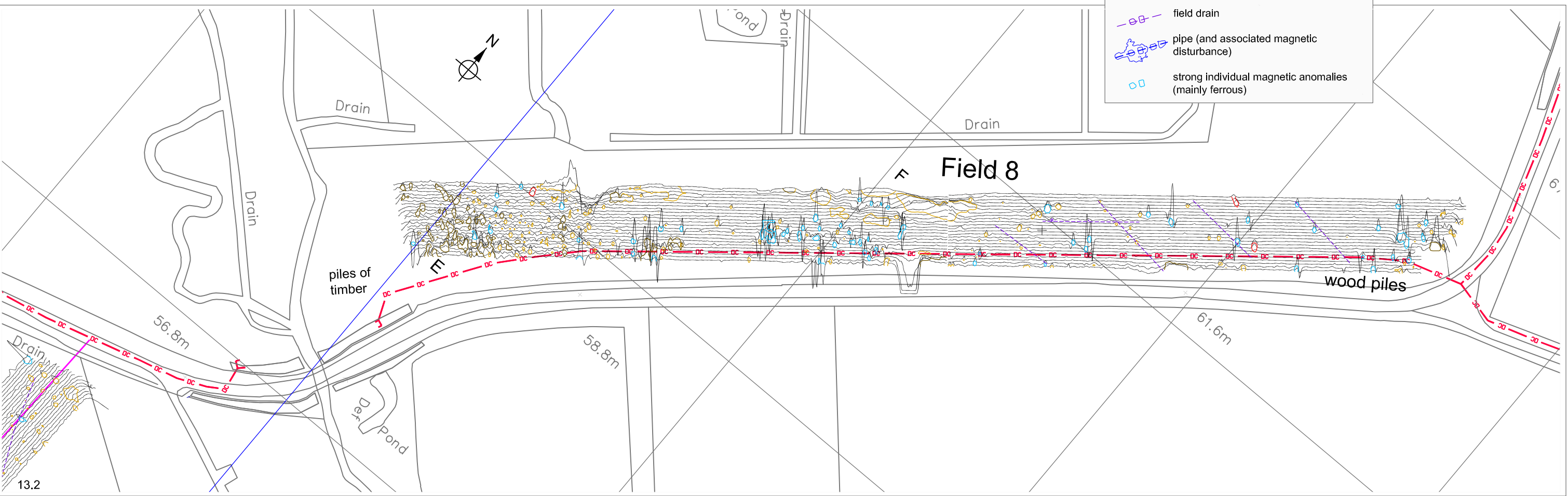
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- pipe (and associated magnetic disturbance)
- strong individual magnetic anomalies (mainly ferrous)



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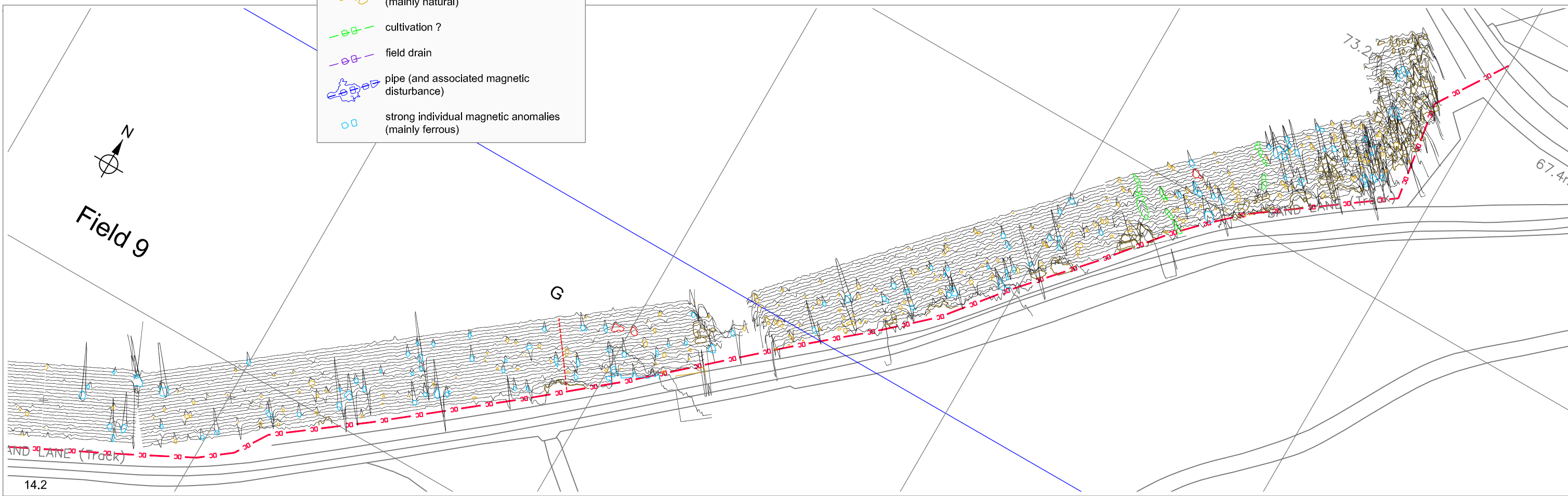
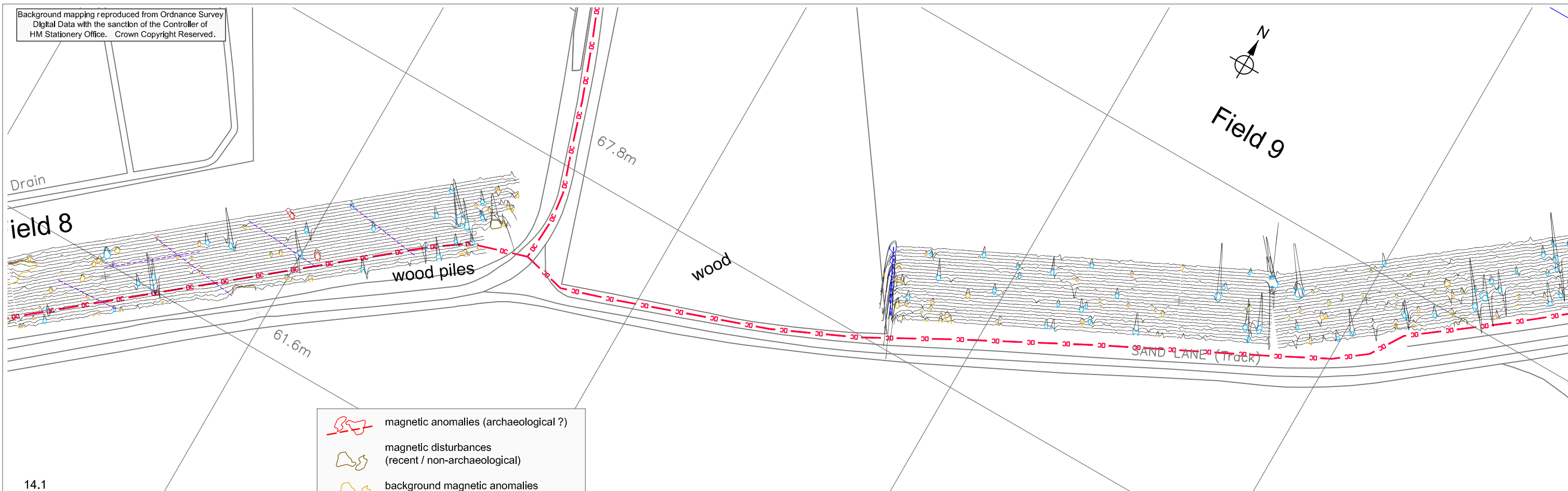


13.1



13.2

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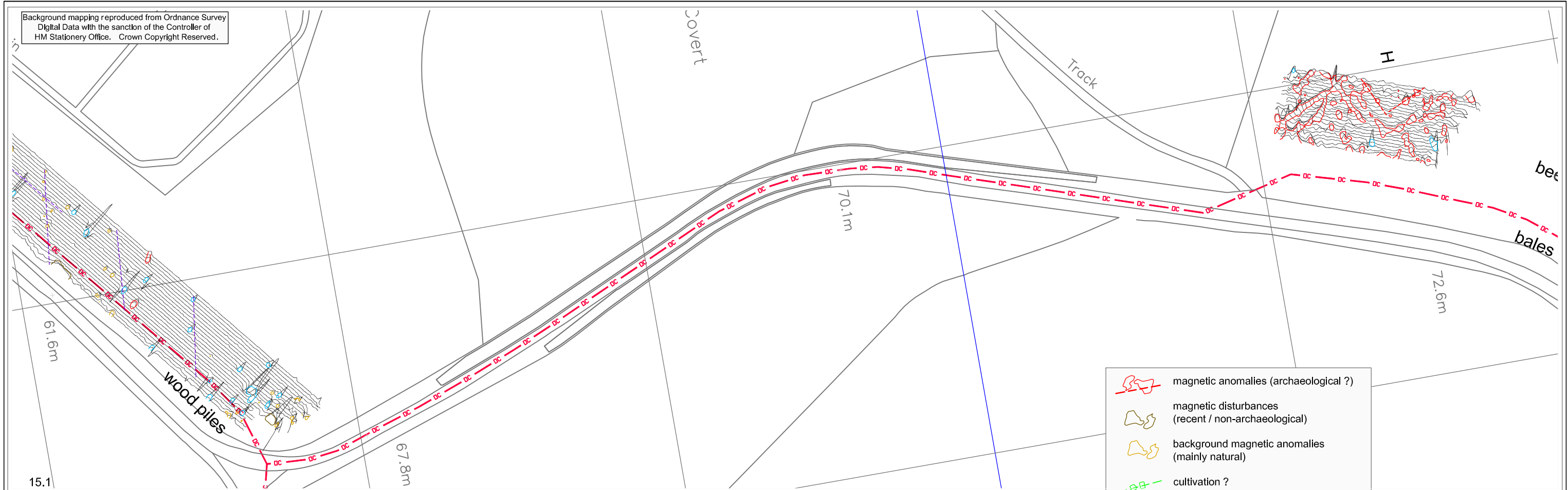


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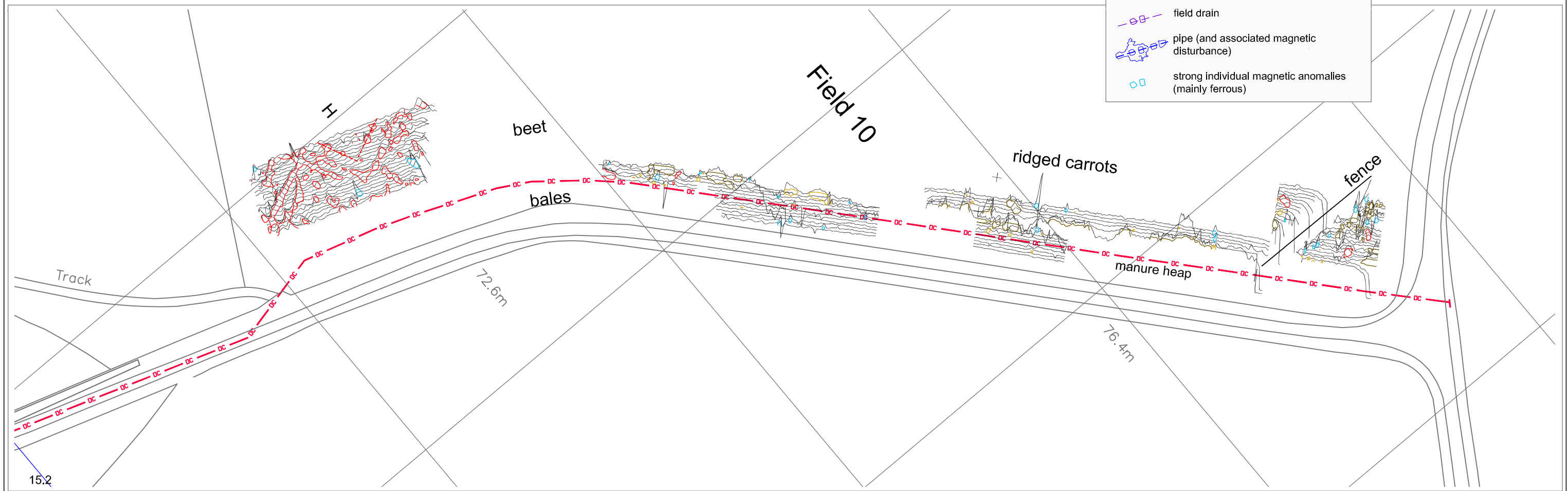
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Figures 14.1, 14.2: Magnetometer Survey
(with interpretation)

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- magnetic anomalies (archaeological ?)
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Figures 15.1, 15.2: Magnetometer Survey
(with interpretation)