

Annex 18.3

Geophysical Survey Report

(GSB Prospection)



**GEOPHYSICAL SURVEY REPORT
2010/73**

**Able UK Ltd
Marine Energy Park**

Client:



Able UK Ltd

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Specialising in Shallow and Archaeological Geophysics

GSB Survey No. 2010/73

Able UK Marine Energy Park

| | |
|-------------------------|---|
| NGR | TA 17 18 (approximate centre) |
| Location | Killingholme marshes - fields between the Humber river and Rosper Road (North/South Killingholme). |
| County | Lincolnshire |
| District | North Lincolnshire (B) |
| Parish | North Killingholme & South Killingholme |
| Topography | Generally flat. |
| Current land-use | Mixed arable (recently seeded) and pasture. |
| Soils | Newchurch 2 association - 814c: stoneless mainly calcareous clayey soil prone to some flooding. (<i>Soils of England and Wales. Sheet 1, Northern England. Soil Survey of England and Wales. 1983</i>). |
| Geology | Marine Alluvium. |
| Archaeology | None identified within the study area. |
| Study Area | c.100ha |
| Survey Methods | Detailed fluxgate gradiometer survey: 50% sample of study area in 10m wide strips. |

Aims

To locate and characterise any anomalies of possible archaeological interest within the application area. The work forms part of a wider archaeological assessment being carried out by **AC archaeology** on behalf of **Able UK Ltd.**

Summary of Results*

Strong well defined anomalies in Field 1 form a complex of ditches and possible pits suggestive of a settlement site, with tentative responses in Field 5 possibly representing an extension of this site. No other definitive archaeological responses have been identified elsewhere in the survey, though a few isolated groups of anomalies are cautiously interpreted as possible archaeology. Numerous natural anomalies have been recorded, seemingly forming a broad band extending southwards from the River Humber. Anomalies relating to cultivation are also present; most of these seem likely to reflect recent agriculture, though one group may indicate former ridge and furrow.

Project Information

Project Co-ordinator: C Stephens
Project Assistants: J Adcock, G Attwood, D Shiel, J Tanner & E Wood
Date of Fieldwork: 26th October 2010 (commencement first phase)
 9th February 2011 (completion final phase)
Date of Report: 1st April 2011

***It is essential that this summary is read in conjunction with the detailed results of the survey.**

Survey Specifications

Method

The survey grid positioning was carried out using Trimble 5800 / R8 Real Time Kinematic (RTK) differential GPS or Topcon Hi-per Pro RTK differential GPS equipment. The geophysical survey areas are georeferenced relative to the Ordnance Survey National Grid by tying in to local detail and corrected to the OS digital mapping provided by the client. A copy of the results *in situ* on the mapping is provided in AutoCAD format on the Archive CD.

| Technique | Traverse Separation | Reading Interval | Instrument |
|--------------------------------------|---------------------|------------------|-----------------------|
| Magnetometer – Detailed (Appendix 1) | 1m | 0.25m | Bartington Grad 601-2 |

Data Processing

| | Magnetic | Resistance | GPR |
|--------------|----------|------------|-----|
| Tilt Correct | Y | - | - |
| De-stagger | Y | - | - |
| Interpolate | Y | - | - |
| Filter | N | - | - |

Presentation of Results

| | |
|--|--|
| Report Figures (Printed & Archive CD): | Location, data plots and interpretation diagrams on base map (Figures 1-10). |
| Reference Figures (Archive CD): | Data plots at 1:500 for reference and analysis. (see List of Figures). |
| Plot Formats: | See Appendix 1: Technical Information, at end of report. |

General Considerations

In general the ground conditions presented no hindrances to data collection, the land being flat, mostly free from obstructions and under either a young crop, set-aside or pasture. Two fields were unsuitable for survey due to the presence of widespread dense vegetation and a further two were excluded from the study due to ongoing access issues (see Figure 2).

The soils/geology of the area might be expected to produce variable magnetic results: while intensive settlement sites should yield readily detectable anomalies, peripheral features might be only weakly magnetic and some may lie beyond the limits of detectability. A high incidence of natural deposits might also be expected to impact on the data.

Results of Survey

1. Magnetic Survey

Anomalies common to all survey areas

- 1.1 Two classes of anomalies are found in all of the survey areas. To avoid repetition they are briefly described below but are not further discussed in the results unless considered particularly relevant.
- 1.2 The first group is classified on the interpretations as *Magnetic Disturbance/Ferrous*. These are strongly magnetic dipolar (positive/negative) responses, either concentrated in large zones or small scale isolated "iron spikes". These are commonly assigned a modern origin. The larger responses arise from a combination of buried and surface modern features such as steel pipes, wire fencing at the boundaries, adjacent buildings and similar. The "iron spikes" are attributed to small pieces of ferrous debris scattered in the topsoil.
- 1.3 The second group is categorised as *Uncertain Origin*. These are anomalies and trends whose magnetic signature admits to several possible explanations - natural soil variations, agricultural practices, deeply buried ferrous debris or (very tentative) archaeological deposits - but which display no obvious patterns which would support one of these more precise interpretations. Thus, for example, small pit type anomalies which are located within an area of definitive archaeological ditches might be interpreted as *?Archaeology*, while those existing in isolation are *Uncertain*; parallel linear trends are likely to be agricultural in origin, while those on different alignments are *Uncertain*.

Fields 1, 4 and 5 (Figures 3 & 4)

- 1.4 A concentration of generally strong well defined linear anomalies [A] in Field 1 form a pattern indicating a complex of archaeological features, possibly reflecting settlement activity. Covering an area of approximately 150m by 100m, the northern, eastern and western limits of this site appear to have been defined; the responses continue southwards to the boundary with Field 5, but since a portion of this Field 5 was not included in the evaluation area, the southern limits have not been accurately determined. That said, weaker linear anomalies [B] in Field 5 may be of archaeological interest, and might represent a southern extension of complex [A].
- 1.5 A number of *Uncertain* trends in the vicinity of [A] share a common alignment with the site and this would strengthen the argument for an archaeological origin for these, possibly representing associated, weakly magnetic peripheral features. However the incomplete patterns they form, and their very weak nature do not permit a more specific classification of *?Archaeology*.
- 1.6 A group of somewhat broad strong responses [C] form part of a rectilinear pattern that could suggest archaeological significance, but their proximity to the modern boundary track and associated disturbance makes this interpretation tentative. Similarly cautious is the archaeological classification of a few weaker trends in Field 4 that appear to form curving / sub-circular patterns.
- 1.7 Groups of parallel trends on two distinct alignments attest to at least two phases of cultivation activity in Fields 1 and 5. A few broader sinuous responses have been detected that are thought to be natural in origin.

Fields 3 and 6 to 9 (Figures 5 & 6)

- 1.8 The data from these fields present a weak "mottled" effect throughout, accompanied by groups of generally broad, strong, sinuous anomalies. These responses are usually associated with natural riverine deposits and this would seem to be the most probable cause here, given their location close to the river. The densest concentration of these is found in Field 3.

- 1.9 No anomalies of obvious archaeological interest have been identified in these fields.

Fields 10, 11 and 13 (Figures 7 & 8)

- 1.10 Weak anomalies and trends [D] in Field 10 form a rectilinear pattern which could support a tentative archaeological interpretation. More cautious is the archaeological classification of an isolated linear [E] (also in Field 10) and a group of possible curving responses [F] in Field 11. In both cases the interpretation is hampered by the 10m gaps in the data, although the fact that both anomaly groups are on different alignments to the prevailing cultivation trends might support the analysis offered.
- 1.11 A sinuous band of anomalies in Field 13 may reflect a former small watercourse and other natural responses have also been recorded in this field.
- 1.12 The increased amount of ferrous/magnetic disturbance recorded in Field 11 is likely to reflect debris associated with the extant farm buildings.

Fields 14 to 20 (Figures 9 & 10)

- 1.13 Faint parallel linear anomalies in Field 19 have a spacing that would suggest ridge and furrow, rather than modern cultivation, though the weak nature of the responses makes this interpretation tentative and the responses could simply reflect drainage features.
- 1.14 Bands of natural deposits occupy much of Fields 17 to 20 and extend some way into Fields 15 and 16.
- 1.15 No clear archaeological anomalies have been identified. A group of *Uncertain* anomalies and trends [G] in Field 16 form rectilinear patterns which might tend to suggest an archaeological origin, but they exist in isolation, close to numerous natural responses; as such, the balance might fall in favour of a natural origin also for [G].

| |
|-----------------------|
| 2. Conclusions |
|-----------------------|

- 2.1 A concentration of archaeological type responses has been detected in Field 1 forming a complex of ditches and possible pits that suggests a settlement site and there is tentative evidence for an extension of the complex into Field 5. No comparably definitive archaeological responses have been identified elsewhere in the survey.
- 2.2 A few other groups of responses have been classified as ?*Archaeology*, based on their apparent patterning, but their generally poor definition and/or weak nature makes this interpretation cautious. All of these lie within 600m of the site in Field 1.
- 2.3 Natural anomalies predominate in many of the fields in the eastern and southern parts of the study area. Viewed as a whole, these would tend to suggest a broad band of alluvial deposits meandering southwards from the river.

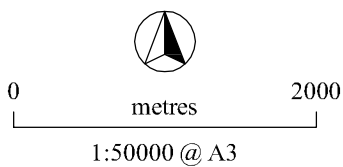
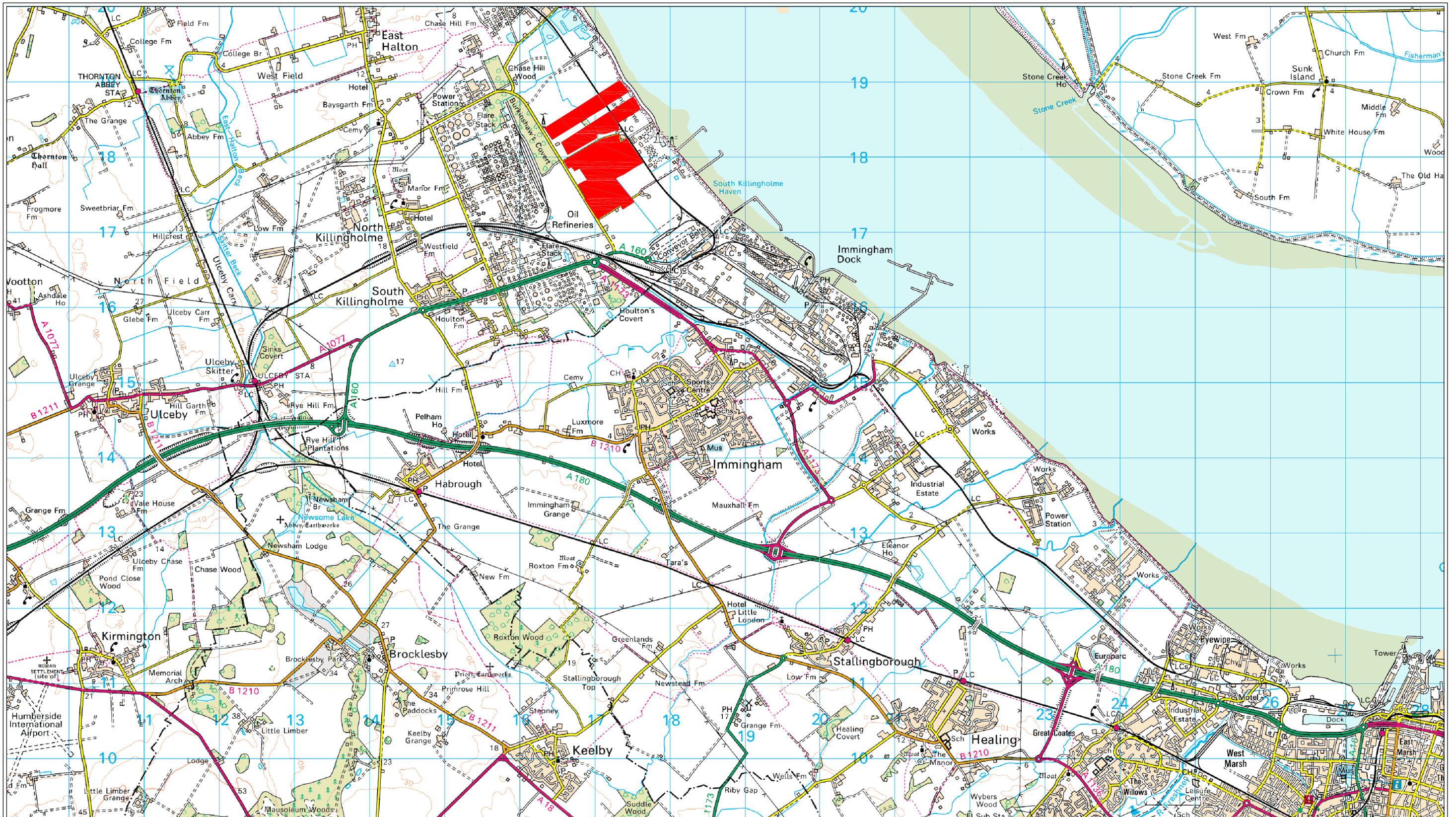
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Reference Figures on CD

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| Figure A19 | Fields 19 & 20: XY Trace Plot | 1:500 |
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 Location of Site

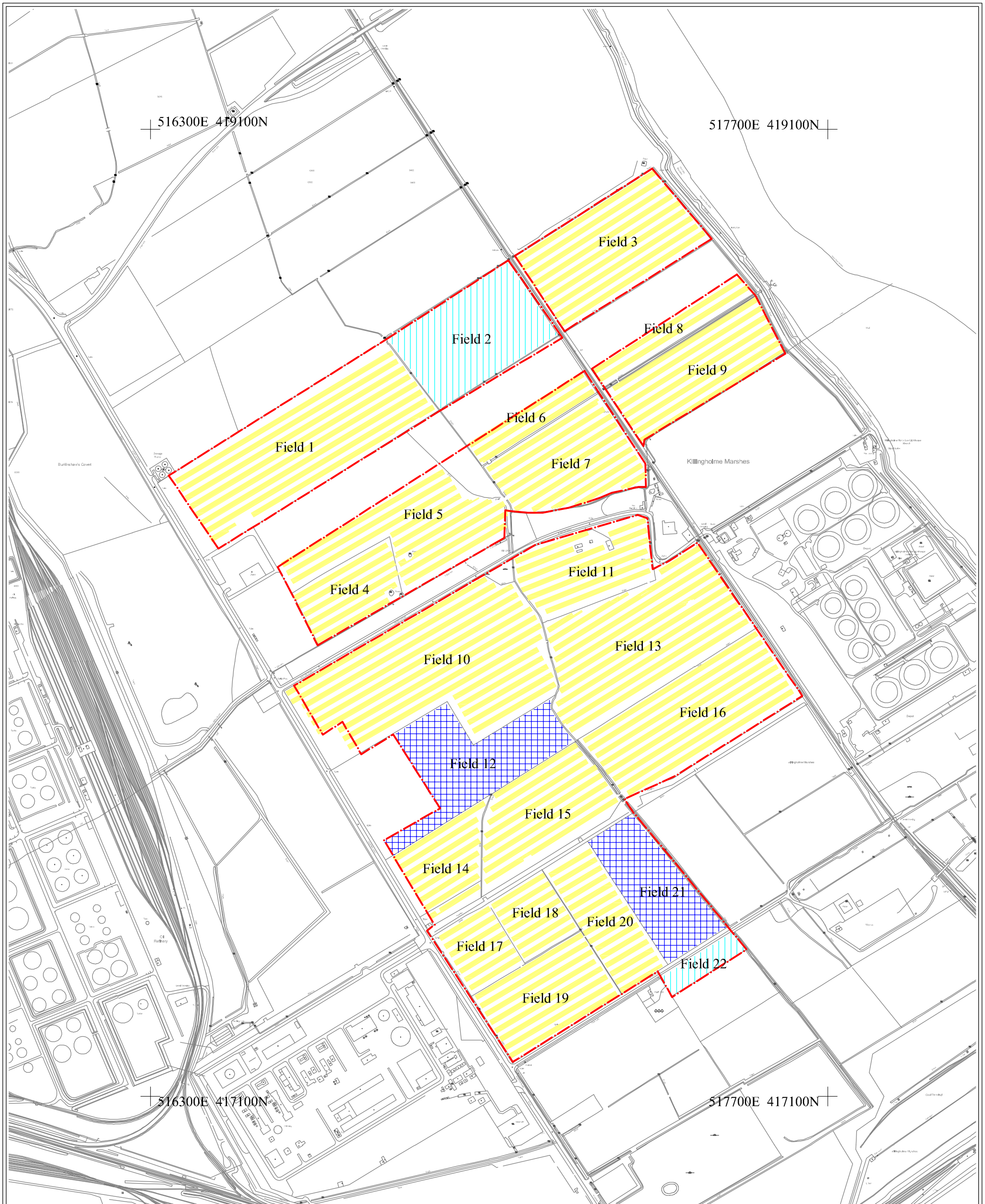
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Site Location Plan

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Figure 1



0 300
metres
1:7500 @ A3



Evaluation Area



Gradiometer Survey



Field Unsuitable for Survey



Field Excluded from Survey

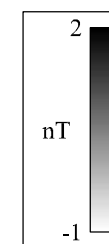
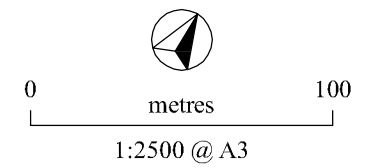
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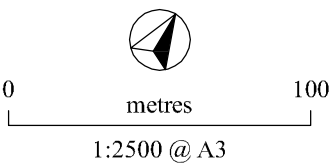
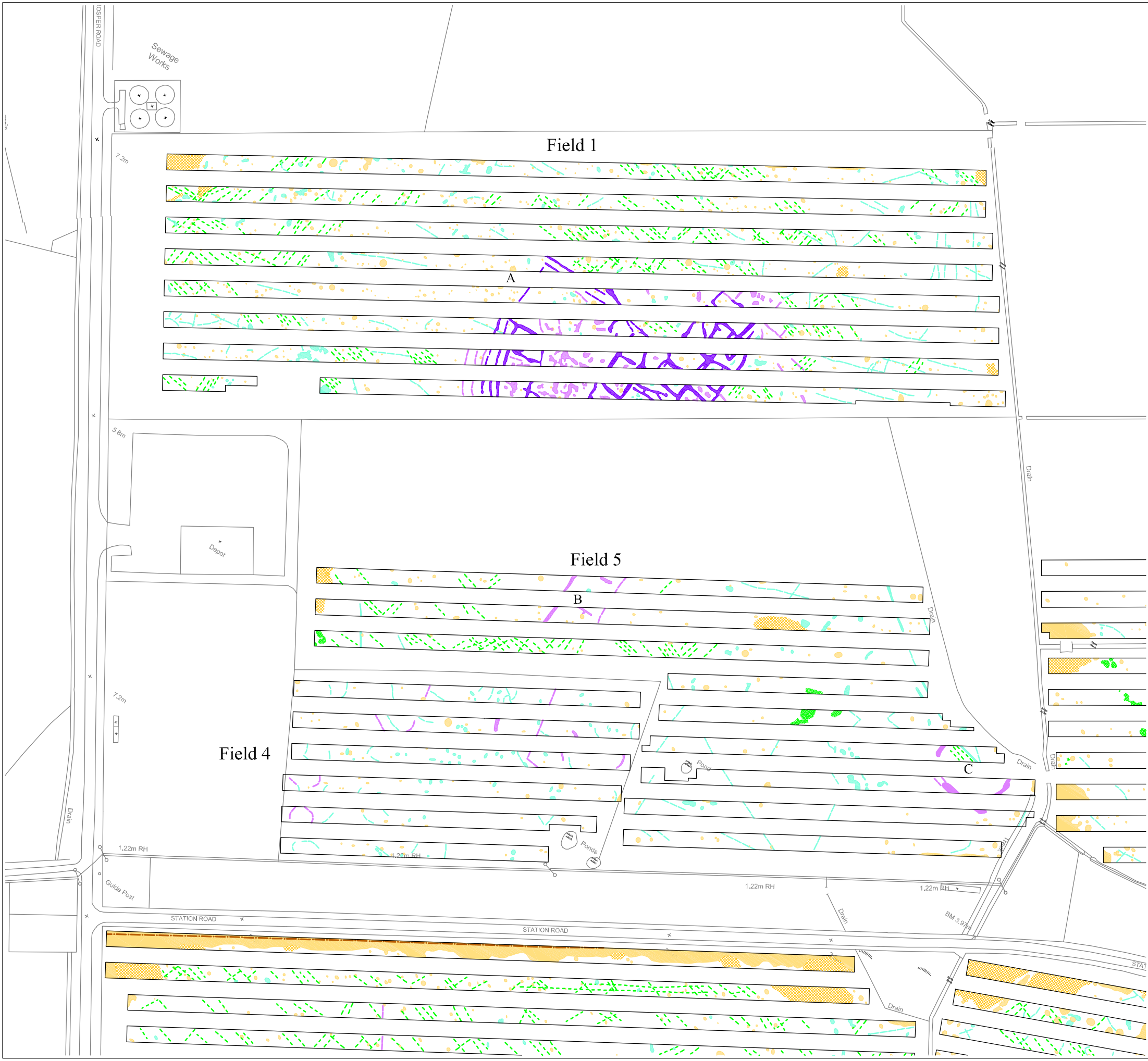
Location of Survey Areas








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Figure 2

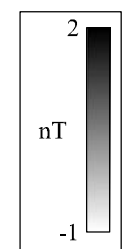
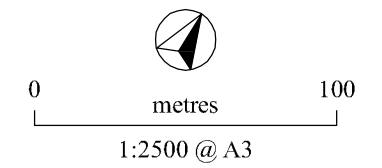
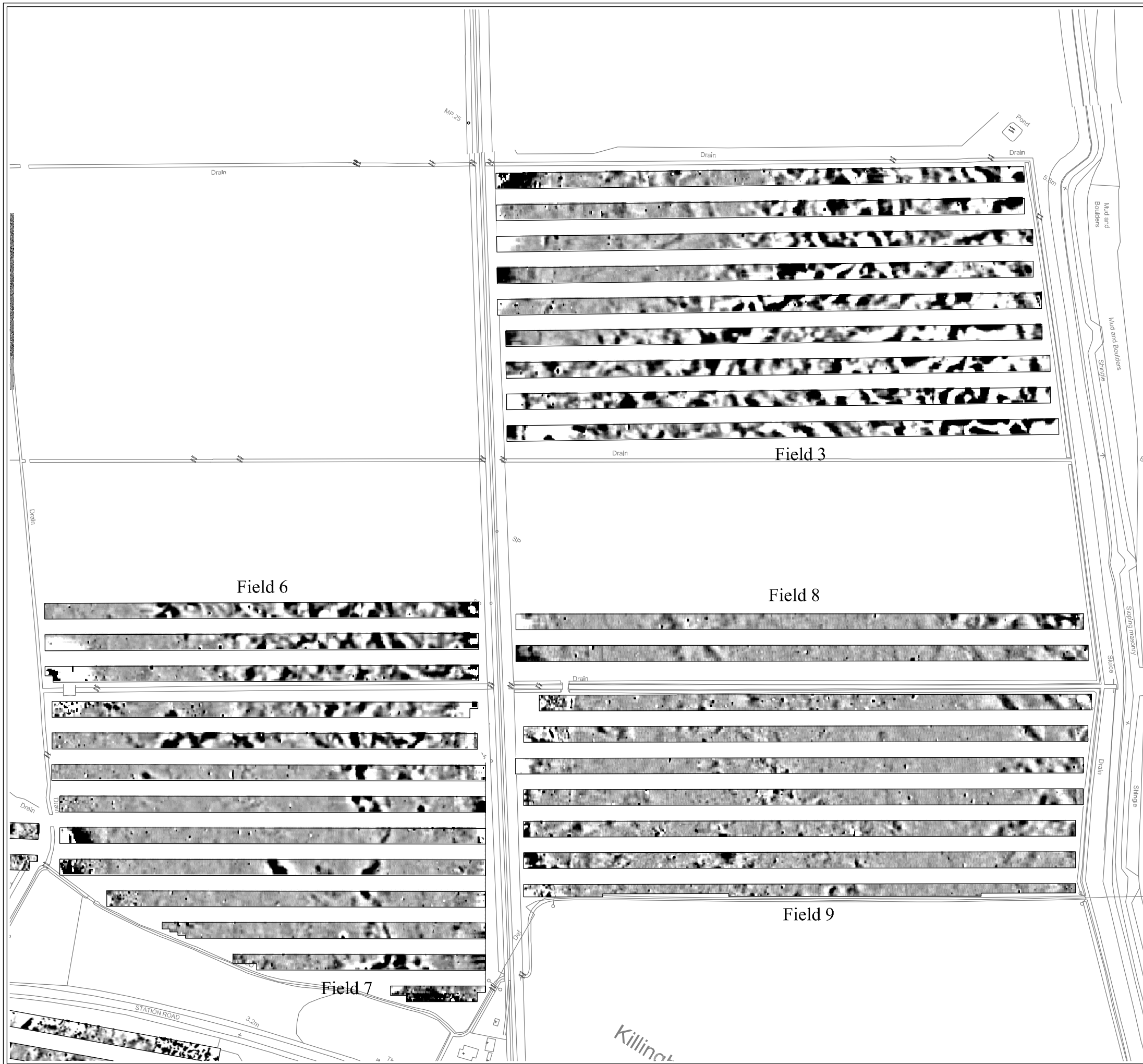


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| Figure 3 |

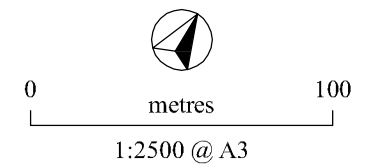
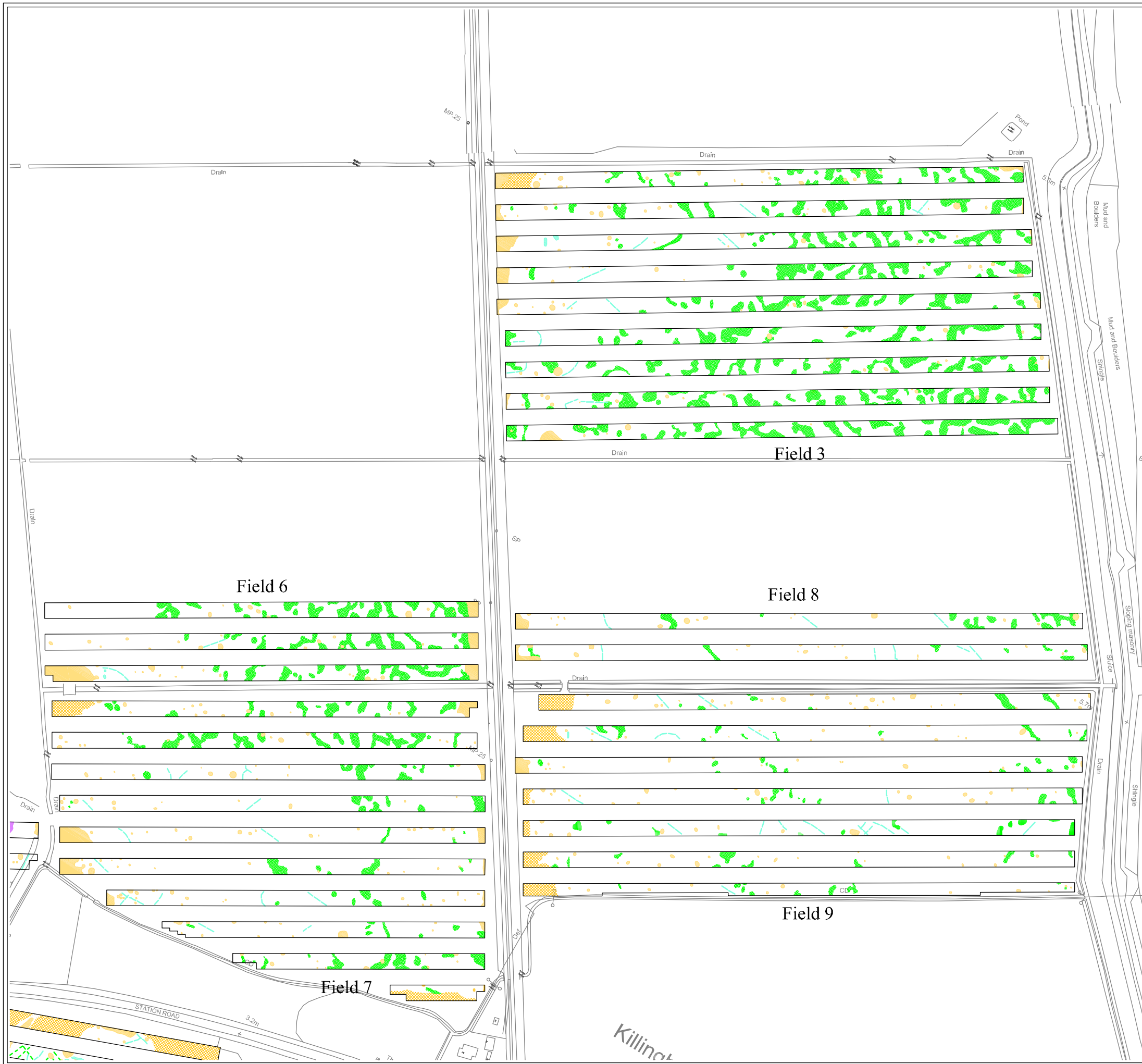





-  Archaeology (Discrete/Trend)
-  ?Archaeology (Discrete/Trend)
-  Ploughing
-  ?Natural
-  Uncertain Origin (Discrete/Trend)
-  Pipe
-  Magnetic Disturbance / Ferrous

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| Figure 4 |



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| Figure 5 |



-  ?Natural
-  Uncertain Origin
(Discrete/Trend)
-  Magnetic Disturbance /
Ferrous

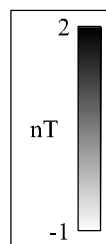
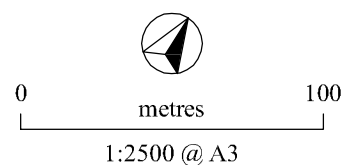
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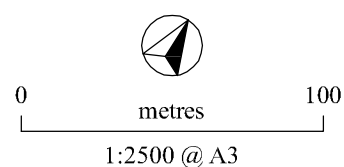
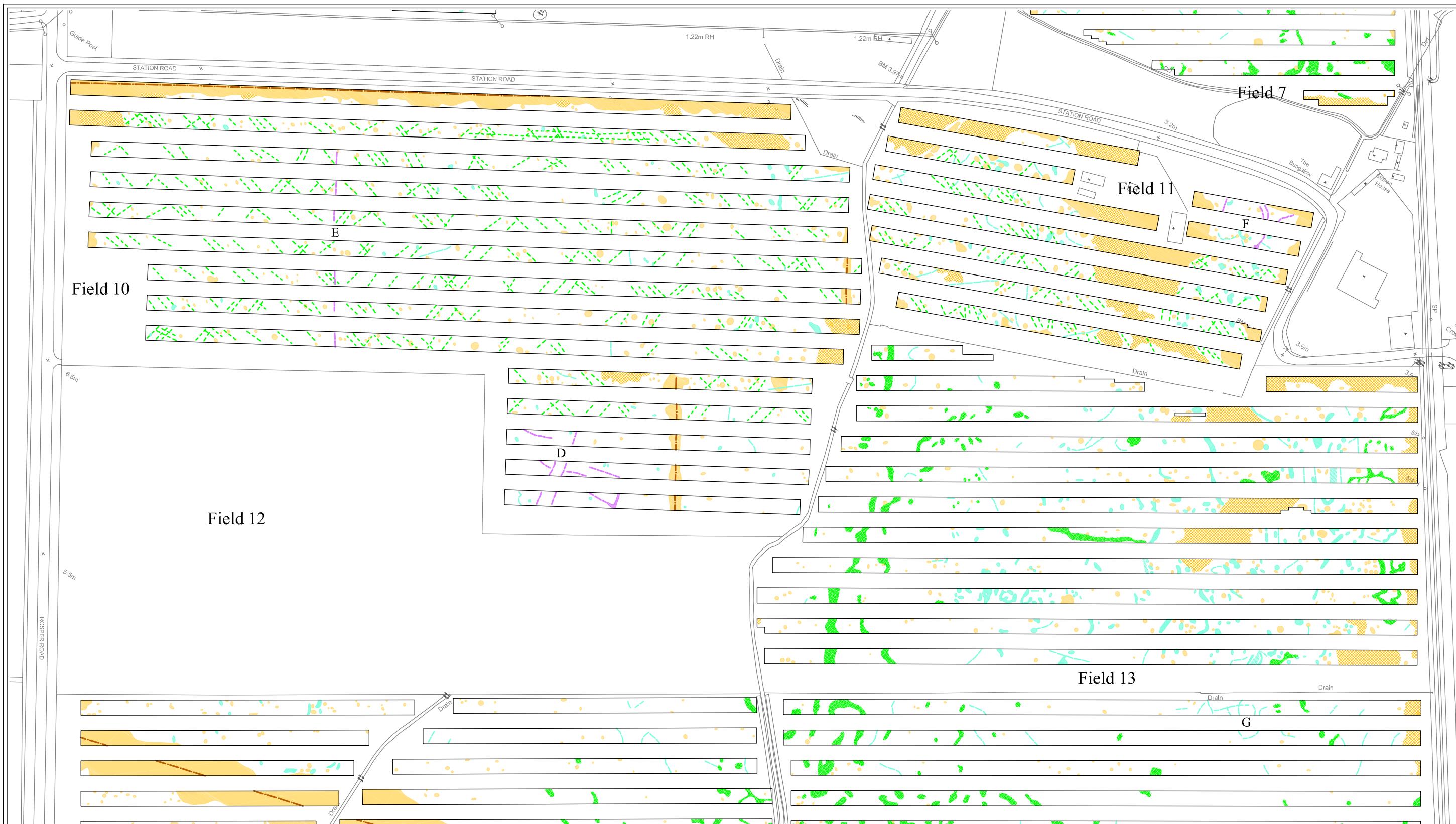
Summary Interpretation - Fields 3 & 6 to 9


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
Figure 6





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| Figure 7 |





 ?Archaeology
(Discrete/Trend)

 Ploughing

 ?Natural

 Uncertain Origin
(Discrete/Trend)

 Pipe

 Magnetic Disturbance /
Ferrous

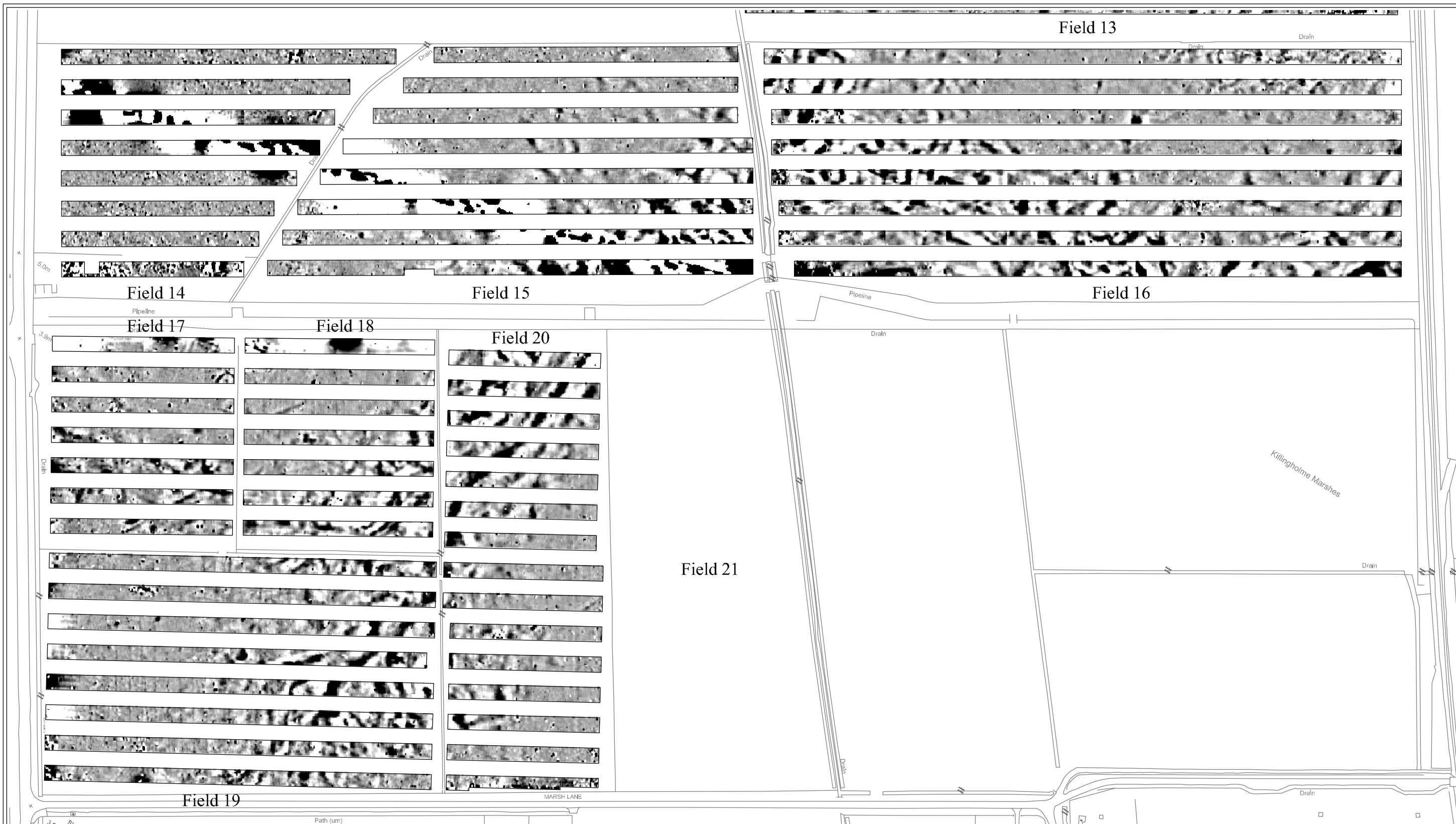
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Summary Interpretation - Fields 10, 11 & 13

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Figure 8



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Summary Greyscales - Fields 14 to 20

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Figure 9



Ridge & Furrow
Ploughing

?Natural
Uncertain Origin
(Discrete/Trend)

Pipe
Magnetic Disturbance /
Ferrous

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Summary Interpretation - Fields 14 to 20

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Figure 10