

**ROTSEA WIND FARM, HUTTON CRANSWICK  
EAST RIDING OF YORKSHIRE**

**Report on Archaeological Geophysical Surveys  
May and September 2013**

**A.D.H. Bartlett**

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Headland Archaeology project number: RTSW11, 007  
Planning reference number: (to be determined)  
SMR Casework number: ”

## **Rotsea Wind Farm near Hutton Cranswick, East Riding of Yorkshire**

### **Report on Archaeological Geophysical Surveys, 2013**

#### **Introduction**

This report describes a geophysical survey undertaken in two stages during 2013 as part of an archaeological field evaluation of the proposed wind farm site at Rotsea near Hutton Cranswick in the East Riding of Yorkshire (NGR: site centre 505500, 451000). The purpose of the survey was to test for evidence of archaeological sites or remains and provide supporting information for the Environmental Impact Assessment for the project.

The survey was commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford by the Edinburgh office of Headland Archaeology (UK) Ltd on behalf of RES. Fieldwork for the first stage of the survey was undertaken on 21-23 May 2013, and an initial report was subsequently prepared. The survey was located to cover areas as specified on a plan supplied by Headland Archaeology. These include rectangular blocks of c. 1.3ha around the proposed turbine locations and associated areas of hard standing, as well as a 40m wide strip along the access track from the west connecting to other working areas and compounds. The field at the east end of the site (containing Turbine 3 and part of the access track) was found on arrival at the site to be under a rape crop, and could not be surveyed; the remaining fields were planted with wheat. The coverage achieved by the survey was therefore 8.85ha.

A second stage of fieldwork has now been undertaken to complete the survey of the proposed development. This was done on 9-11 September 2013, and covered the previously unsurveyed areas together with an extended sample area at the Turbine 1 site, and an alternative access track. This revised report includes the combined results from both stages of the survey.

The investigation has produced a number of positive findings, including one clearly defined archaeological site (within the proposed site of Turbine 1), and other possible (but less clearly interpretable) findings at two locations on the access track to the west of Turbine 1.

#### **The Site**

The location and condition of the site are described, and the archaeological background is reviewed, in the Written Scheme of Investigation for the project which was prepared by Headland Archaeology [1]. The following notes are reproduced or summarised from this document.

### *Location and geology*

The proposed development is located on low lying agricultural land immediately to the south-east of Hutton Cranswick. The site is located on the plain of Holderness, a flat or gently undulating plain north of the River Humber.

The superficial geology of the area consists of areas of till overlain by more limited patches of sand and gravel, the latter often protruding as slightly elevated 'islands' within areas of alluvium or peat. The majority of the inner study area occupies an area of till 'dry land' which, before artificial drainage, was bounded by the extensive peat-covered 'carrs' of Rotsea Carr to the east, and Watton Carrs to the south, which would have been flooded for much of the year. A band of alluvial deposits up to 300m wide is also mapped along Rotsea Drain, a tributary of the River Hull which crosses the site from south-west to north-east. Sand and gravel deposits are found only in limited areas to the east of Rotsea Drain (data from British Geological Survey: <http://www.bgs.ac.uk>).

### *Archaeological Background*

The earthwork known as Rotsea medieval settlement and field system (Scheduled Monument: SM-1005212) is located to the east of the development. Following consultation with English Heritage, the monument has been excluded from the development area and a substantial avoidance zone created: the nearest turbine (Turbine 3) would lie roughly 500m from the edge of the scheduled area.

Ten heritage assets have been identified within the inner study area (see WSI figure 1 inserted in Illustration 8 of this report). Five of these (HA2, 3, 4, 5 and 10) are cropmarks recorded in the English Heritage Archive and/or the Humber SMR. The remaining five were identified in the course of the desk-based assessment and include Scurf Dyke (HA8), a drainage channel thought to date from the medieval period; the site of a building shown on an 18<sup>th</sup> century estate plan (HA9); and three farms shown on the First Edition Ordnance Survey map (HA1, 6 and 7).

Cropmark sites HA2, 3 and 10 may be of Iron Age or Romano-British date. None of them is particularly diagnostic, however, and this identification is tentative. HA2 appears to be a double-ditched trackway which runs approximately parallel with Rotsea Drain. HA10 comprises a possible rectilinear enclosure recorded by English Heritage's National Mapping Programme (NMP) and, nearby, a group of three possible enclosures is noted on the map sheet of the Humber SMR. HA3 is another group of curvilinear cropmark features marked on the Humber SMR map sheet, but not verified by the Humber SMR or recorded by the NMP. Stray finds of Middle and Late Bronze Age metalwork have also been recorded from the Inner Study Area and its environs.

HA4 comprises an area of cropmarks forming a rectilinear grid-like arrangement, aligned with the field system shown on the 1<sup>st</sup> edition OS map. The features are likely to represent the remains of post-medieval cultivation.

The magnetometer survey area therefore intersects cropmark sites 3 and 4, and lies close to site 2. Other previously recorded archaeological features (HA5-10) lie outside and to the south of the survey area.

## **Survey Procedure**

The method used for the investigation was a recorded magnetometer survey, with readings collected along transects 1m apart using Bartington 1m fluxgate gradiometers, and plotted at 25cm intervals along each transect. The results of the survey are presented as grey scale plots (illustrations 2-4), and as graphical (x-y trace) plots at 1:1250 scale in illustrations 5-9.

The XY trace plots are used to display initial data which is effectively unprocessed apart from baseline corrections which are required for intelligibility. The grey scale plots are subject to weak low pass filtering to adjust background noise levels, but no more intrusive processing is applied to the magnetometer data. Comparison of the trace and grey scale plots allows the detected magnetic anomalies to be examined in profile and plan respectively.

An interpretation of the findings is shown superimposed on illustrations 5-9 (which permits the interpreted outlines to be compared with the underlying data), and is reproduced separately to provide a summary of the findings (illustrations 10-12). Colour coding has been used in the interpretation to distinguish different interpretations.

Features of possible archaeological interest are shown in red, and non-archaeological (mainly geological) disturbances in light brown. Recent disturbances are in a dark brown, and strong magnetic anomalies which are likely to represent ferrous objects are in blue. Possible cultivation effects are shown in green, and a pipe and a few possible land drains are also marked.

The magnetometer survey was supplemented by occasional background magnetic susceptibility readings. Susceptibility information provides an indication of the strength of magnetic response to be expected from the site, and can be of help when interpreting the magnetometer survey, as commented on below.

### *Survey location*

The survey grid was set out and tied to the OS grid (to c. 10cm accuracy) using a differential GPS system. The plans are therefore geo-referenced, and OS co-ordinates of map locations can be read from the AutoCAD version of the plans which can be supplied with this report.

## **Results**

Fields along the route have been numbered for reference (1-6) from west to east, as indicated on the enclosed plans.

### *Field 1*

Only a narrow strip of the proposed survey area lies within field 1. The response here is dominated by strong magnetic anomalies of a kind likely to be caused by a pipe immediately to the south. Similar disturbances along the edges of the survey blocks suggest a pipe might extend along the track and field boundaries between fields 2-3 and 4-5.

### *Fields 2-5*

Findings include parallel linear markings (shown in green in the interpretation) which are visible in the grey scale plot, particularly towards the west of field 2 (labelled A in figure 8). These could be a cultivation effect of uncertain date. Other (weaker) cultivation effects are seen in field 3 (B), and to the west of field 5 (C). Those at C are narrower, and perhaps relate to current rather than past cultivation.

Various broad weak and irregular magnetic anomalies (outlined in brown, as at D) were detected towards the east of field 2, and are seen also in fields 3 and 4, as well as at the Turbine 2 site in field 6. The anomalies around D and F in fields 2 and 5 lie within the area of alluvial soil in the vicinity of Rotsea Drain, as indicated on the Headland plan (inset in illustration 8). Similarly broad magnetic anomalies are commonly seen in wetland locations, and appear to relate to natural variations in the depth or distribution of silt deposits on alluvial ground. The magnetic susceptibility readings taken during the survey also gave particularly high values in the areas where these (probably natural) magnetic anomalies are most concentrated. Readings of  $>100 \times 10^{-5}$  SI were obtained at locations D and F, compared with a background level of c. 20 elsewhere in the survey and such variations are again suggestive of changes in the underlying geology or geomorphology. Exceptionally high susceptibility values have been seen in surveys on fenland sites elsewhere, and can relate to the presence of alluvial soil.

Other features, which may not be natural, are also visible at these locations. They include ditch-like linear features (indicated in red) at G in field 2 and H in field 5. These features lie close to and within the cropmark site (3) as indicated on the Headland plan. The cropmarks here include curvilinear features of possibly Iron Age/Romano-British date, as previously noted. It is possibly that individual pit-like features have also been detected (as at J), but this is difficult to confirm against a background of natural magnetic activity.

### *Field 6*

Additional clusters of broad irregular magnetic anomalies suggest the presence of areas of alluvial soil (as mentioned above) to the west of the field (around K, where they extend across the initial and extended surveys), and within the Turbine 2 survey area (L). An isolated linear feature at the Turbine 2 location could be a land drain (M).

Broad natural magnetic anomalies are less prevalent within the Turbine 1 survey area than at Turbine 2, or near to the drain at K. Turbine 1 is perhaps therefore on an area of gravel rather than alluvial or clay subsoil. Findings here include a complex system of rectilinear ditched enclosures alongside a broad ditched trackway (N). This could perhaps represent a continuation of the IA/RB trackway identified as cropmark 2 on the Headland plan

(although it may be offset slightly to the east). The trackway continues to the north through the extended survey area, where it appears to divert to the east around a circular feature (O). This could mean that the later track respects an earlier (Bronze Age ?) barrow.

Additional rectilinear enclosures are visible within the extended survey area to the east of the track. Clusters of pit-like features within the enclosures suggest this is likely to be a settlement site. There may be cultivation markings in the less active eastern half of the Turbine 1 survey area, and there is some indication that the area containing anomalies that may be associated with an Iron Age/Romano-British enclosure has also been ploughed through on the basis of faint northwest-southeast striations in the data here. To the north of the possible enclosure complex two parallel curvilinear positive responses (P) could indicate the line of an earlier channel. These may continue through the alternative access route, but are less clearly defined.

Findings from the Turbine 3 site (not covered by the initial survey) include additional areas of probably natural wetland magnetic anomalies (comparable to those at L at the Turbine 2 site, and outlined in brown). A few magnetic anomalies at the east of the survey have distinct pit-like rounded profiles in the graphical plot (and so are outlined in red), but they are near to watercourses, and natural pit-like features are sometimes seen in such locations.

A sequence of disturbed readings at Q could perhaps indicate a former field boundary. A land drain appears to terminate at a group of disturbed readings at R.

## **Conclusions**

The survey has produced findings of potential archaeological significance at locations which correspond broadly to the cropmark evidence. A number of ditch-like linear features (G and H) lie close to and within cropmark site 3, where curvilinear cropmark features are recorded. These possible ditches are seen against a background of broad natural magnetic anomalies of a kind typically associated with alluvial soil.

An additional clearly defined complex system of rectilinear enclosures containing occupation features was detected on a non-alluvial soil within both the initial and extended Turbine 1 survey areas. The enclosures are located next to a double-ditched trackway (N), which may represent a continuation of the IA/RB trackway represented by cropmark site 2. The extended survey also appears to have detected a round barrow at O. The findings here have the potential represent a substantial and well-preserved archaeological site in the western half of the Turbine 1 survey area. The eastern part of the extended survey area appears to be free of archaeological findings.

The fieldwork for this project was done by P. Cottrell and P. Heykoop.

**Report by:**

A. Bartlett BSc MPhil

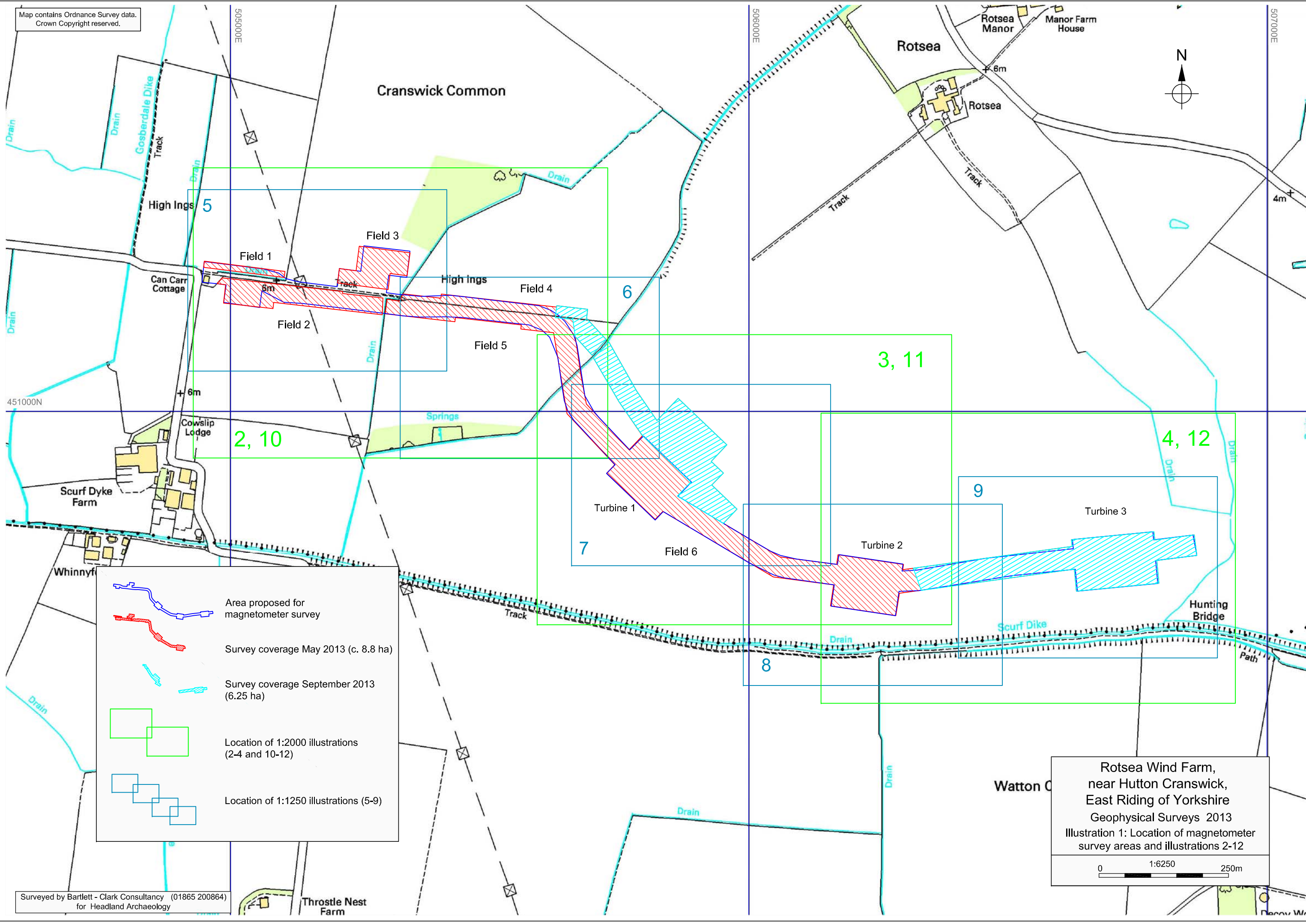
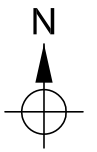
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North Leigh  
Oxfordshire  
OX29 6PW






01865 200864

**Reference:**

- [1] Rotsea Wind Farm near Hutton Cranswick, East Riding of Yorkshire. Written Scheme of Investigation for a Fluxgate Gradiometer Survey. Headland Archaeology Ltd. Report RTSW11, 007 for RES. 15 May 2013.

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-  Area proposed for magnetometer survey
-  Survey coverage May 2013 (c. 8.8 ha)
-  Survey coverage September 2013 (6.25 ha)
-  Location of 1:2000 illustrations (2-4 and 10-12)
-  Location of 1:1250 illustrations (5-9)

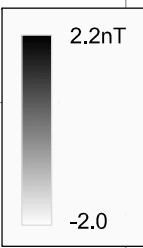
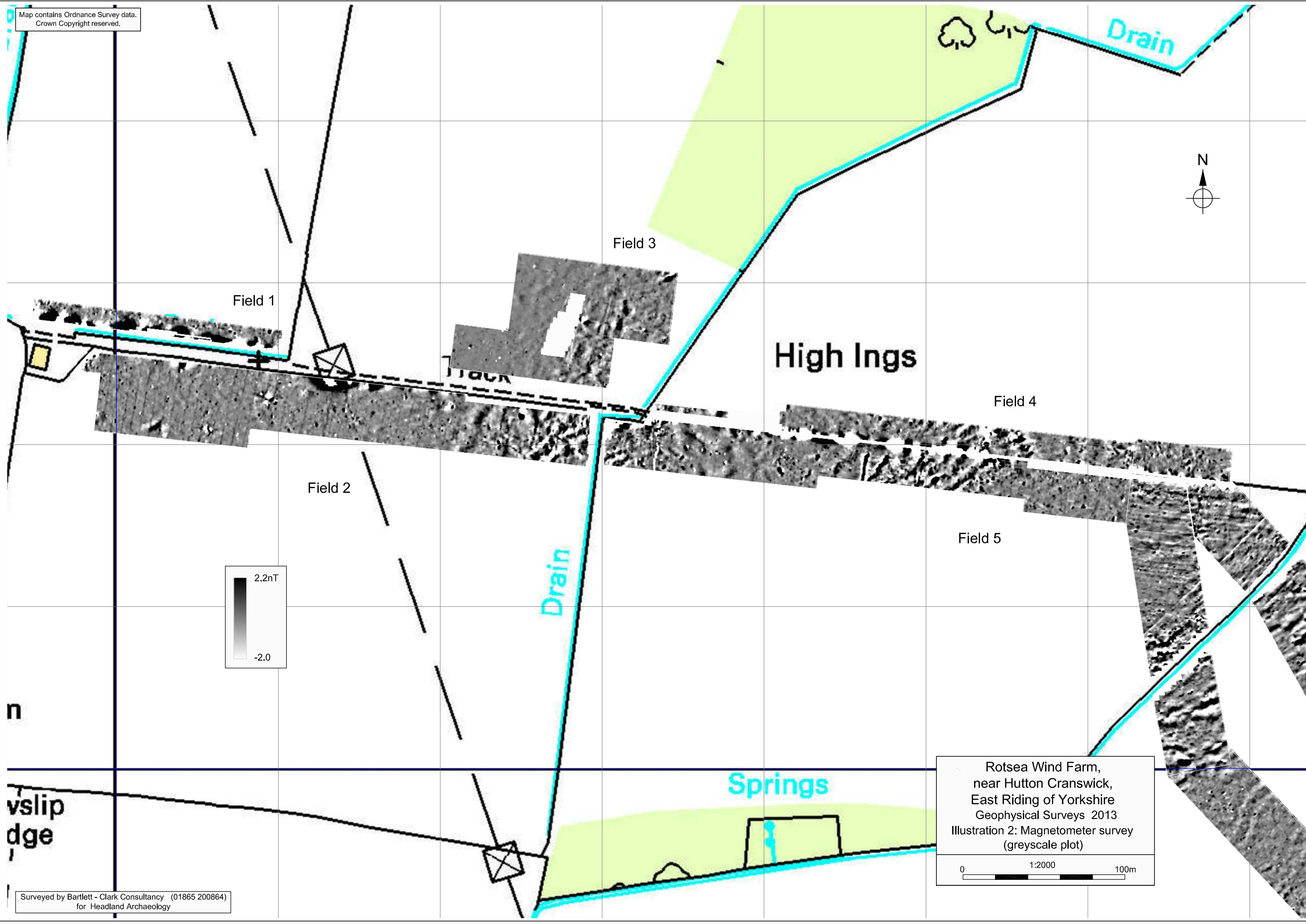
**Rotsea Wind Farm,  
near Hutton Cranswick,  
East Riding of Yorkshire**  
Geophysical Surveys 2013  
Illustration 1: Location of magnetometer  
survey areas and illustrations 2-12

0      1:6250      250m

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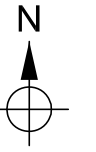


Rotsea Wind Farm,  
near Hutton Cranswick,  
East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 2: Magnetometer survey  
(greyscale plot)

0 1:2000 100m

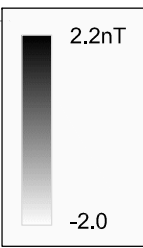
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Geophysical Surveys 2013  
Illustration 3: Magnetometer survey  
(greyscale plot)

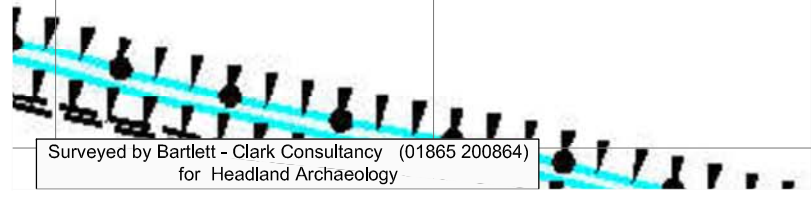
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Turbine 1

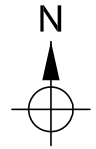
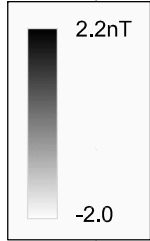
Field 6

Turbine 2



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Field 6

Turbine 2

Turbine 3

Hunting  
Bridge

Scurf Dike

Drain

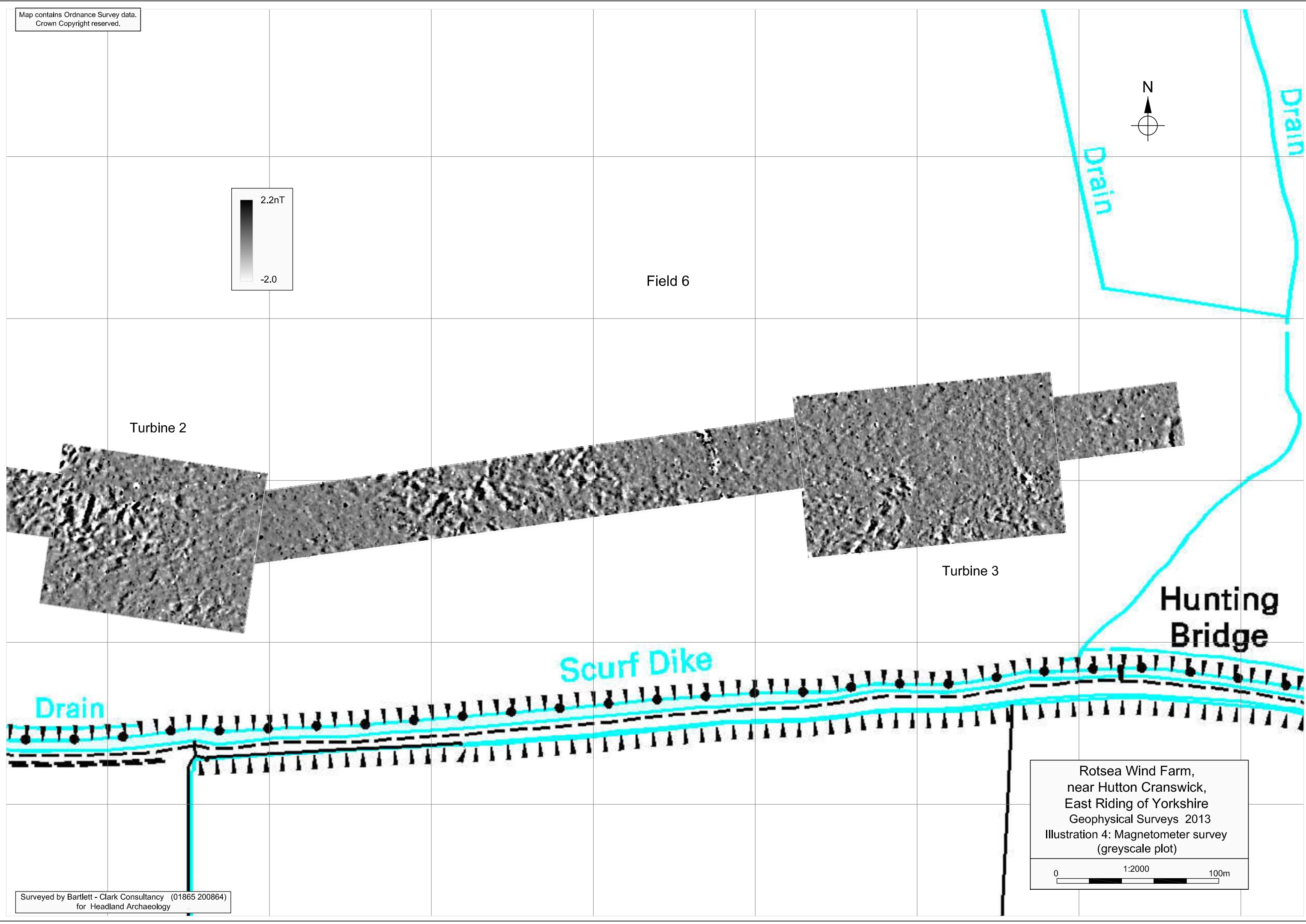
Drain

Drain








Rotsea Wind Farm,  
near Hutton Cranswick,  
East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 4: Magnetometer survey  
(greyscale plot)

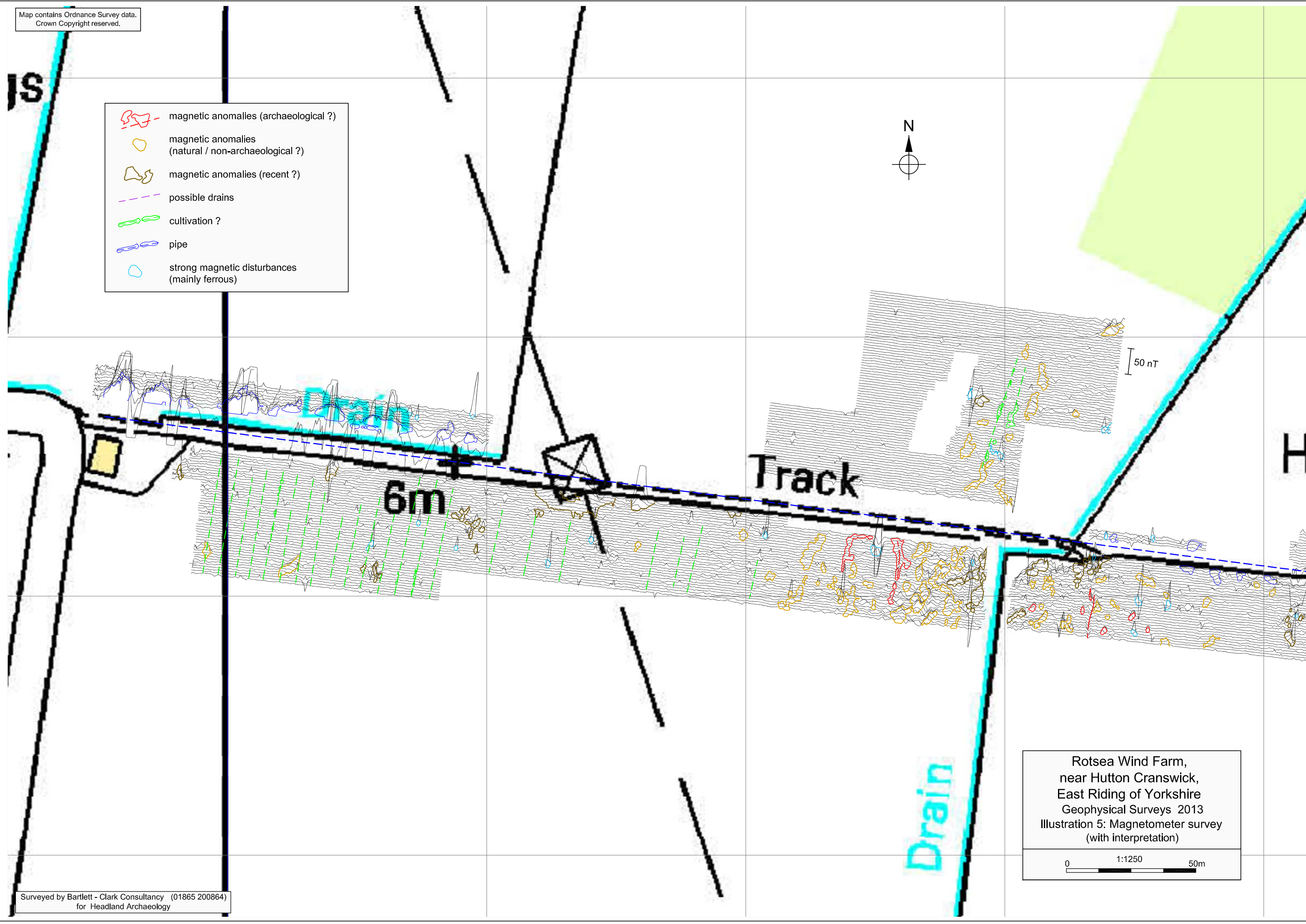
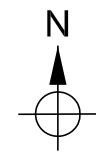
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-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)



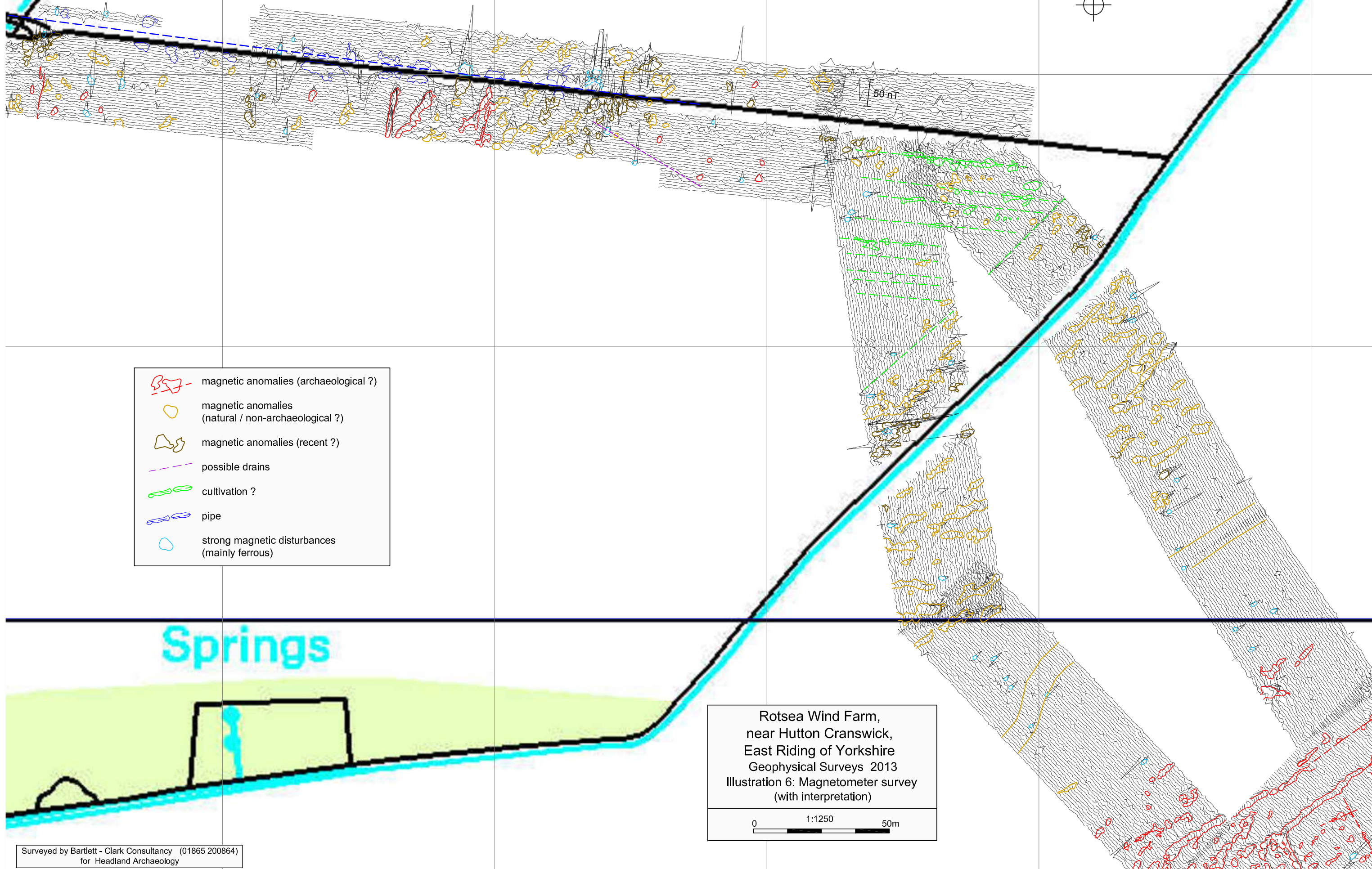
50 nT








Rotsea Wind Farm,  
near Hutton Cranswick,  
East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 5: Magnetometer survey  
(with interpretation)

0 1:1250 50m

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# High Ings



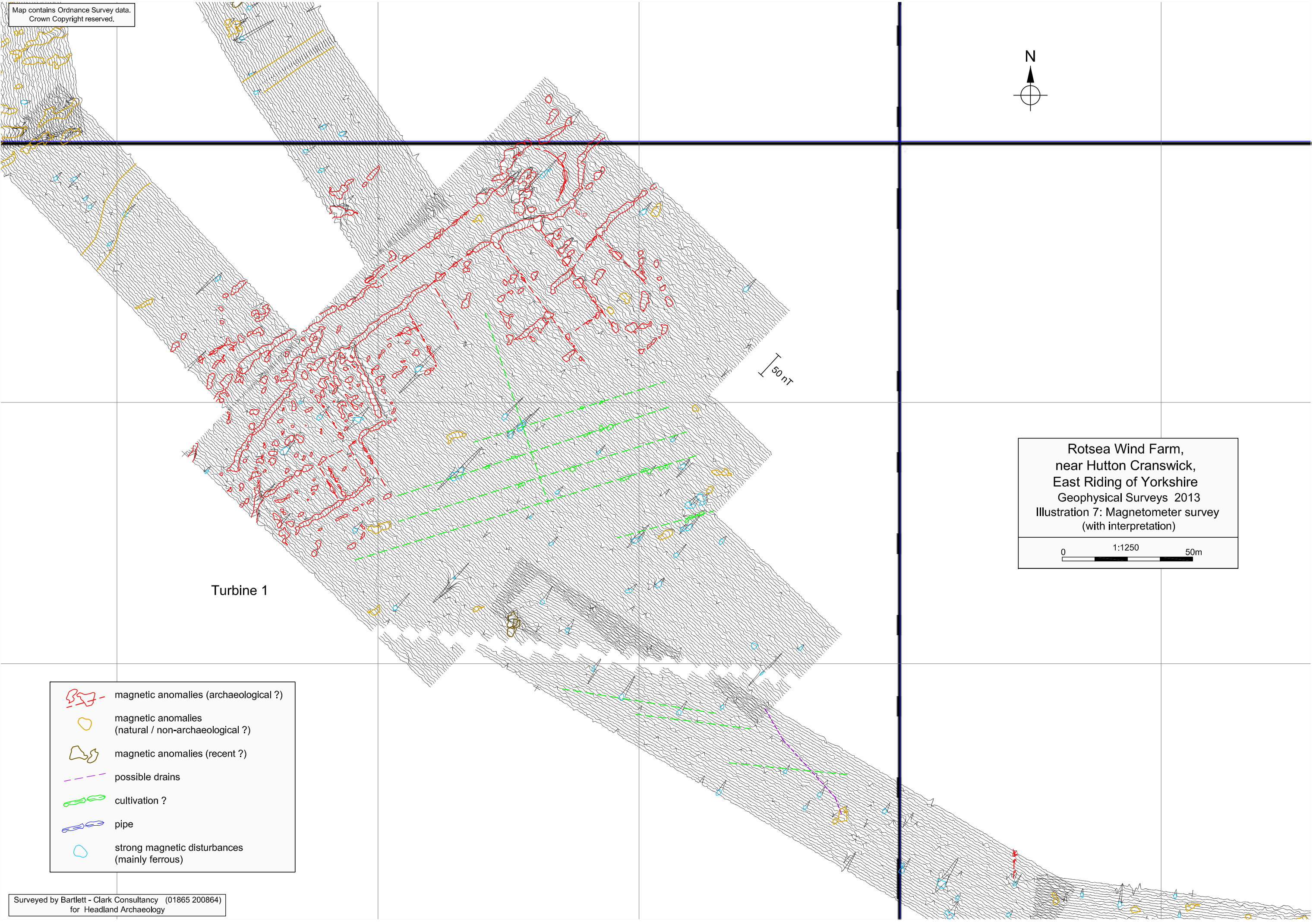
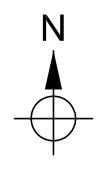
-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)

# Springs

Rotsea Wind Farm,  
near Hutton Cranswick,  
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Geophysical Surveys 2013  
Illustration 6: Magnetometer survey  
(with interpretation)








0 1:1250 50m

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Rotsea Wind Farm,  
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East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 7: Magnetometer survey  
(with interpretation)

0 1:1250 50m








-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)

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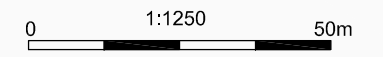
Turbine 2

-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)

50 nT








Drain

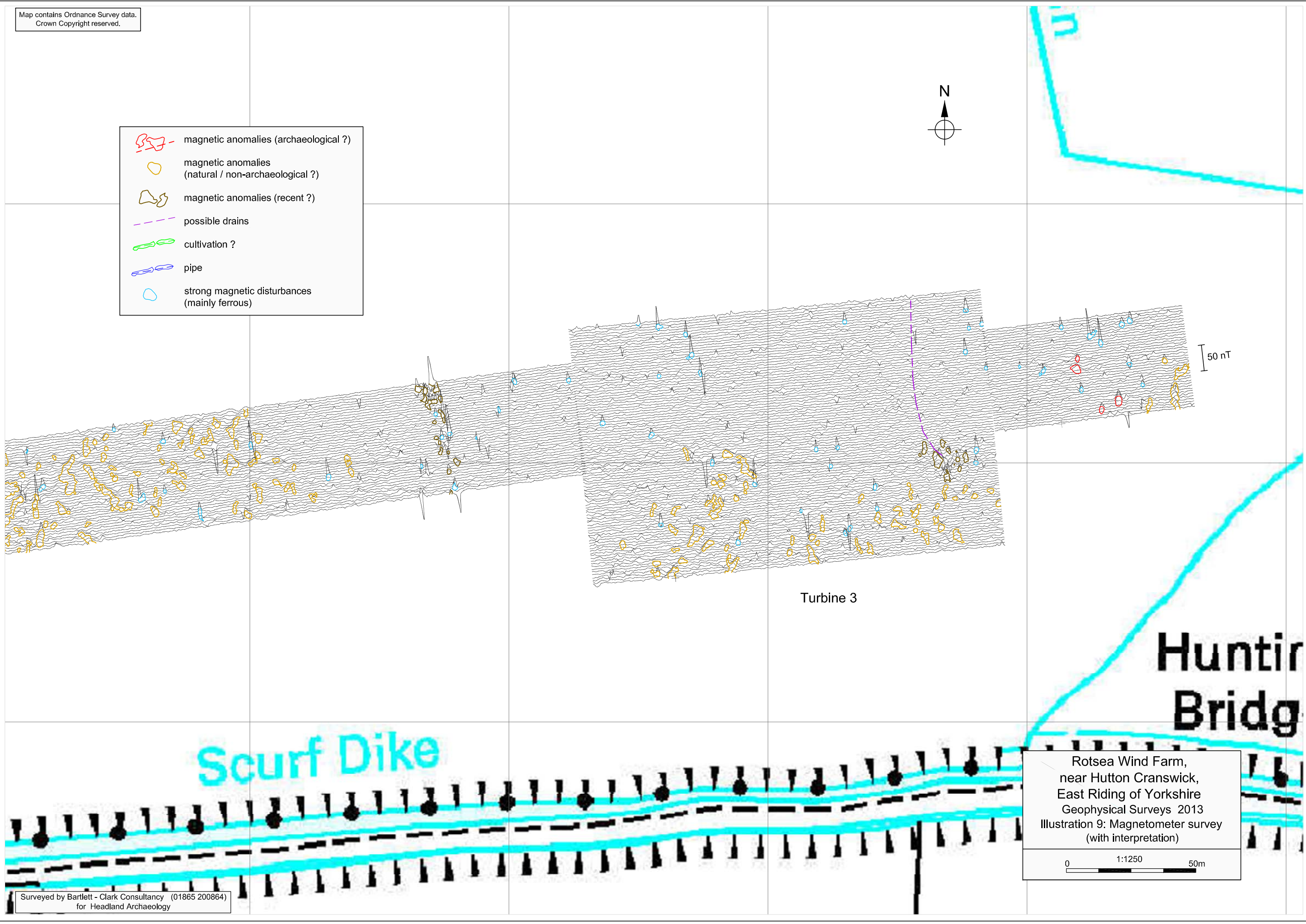
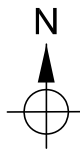
Rotsea Wind Farm,  
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Illustration 8: Magnetometer survey  
(with interpretation)



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-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)



Turbine 3

Huntin  
Bridge

Scurf Dike








Rotsea Wind Farm,  
near Hutton Cranswick,  
East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 9: Magnetometer survey  
(with interpretation)

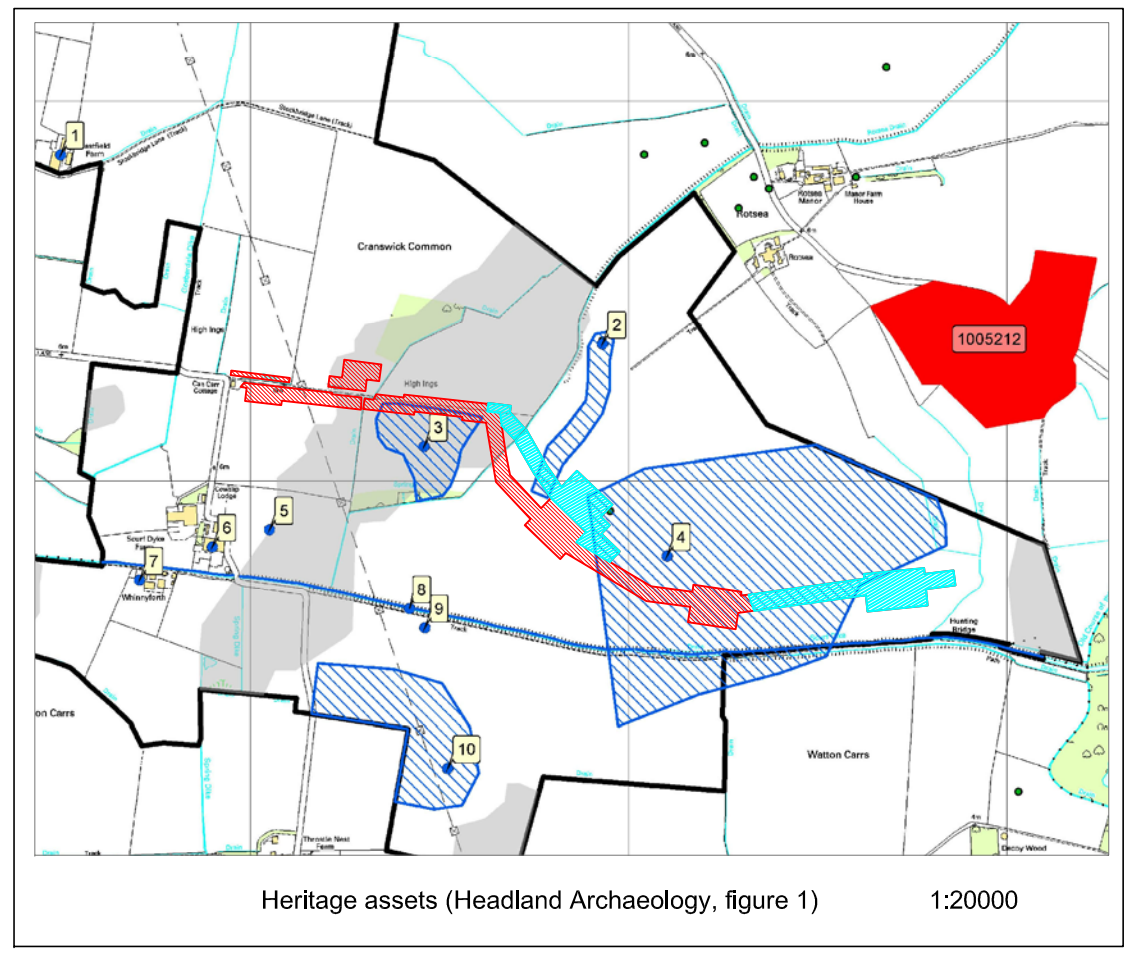
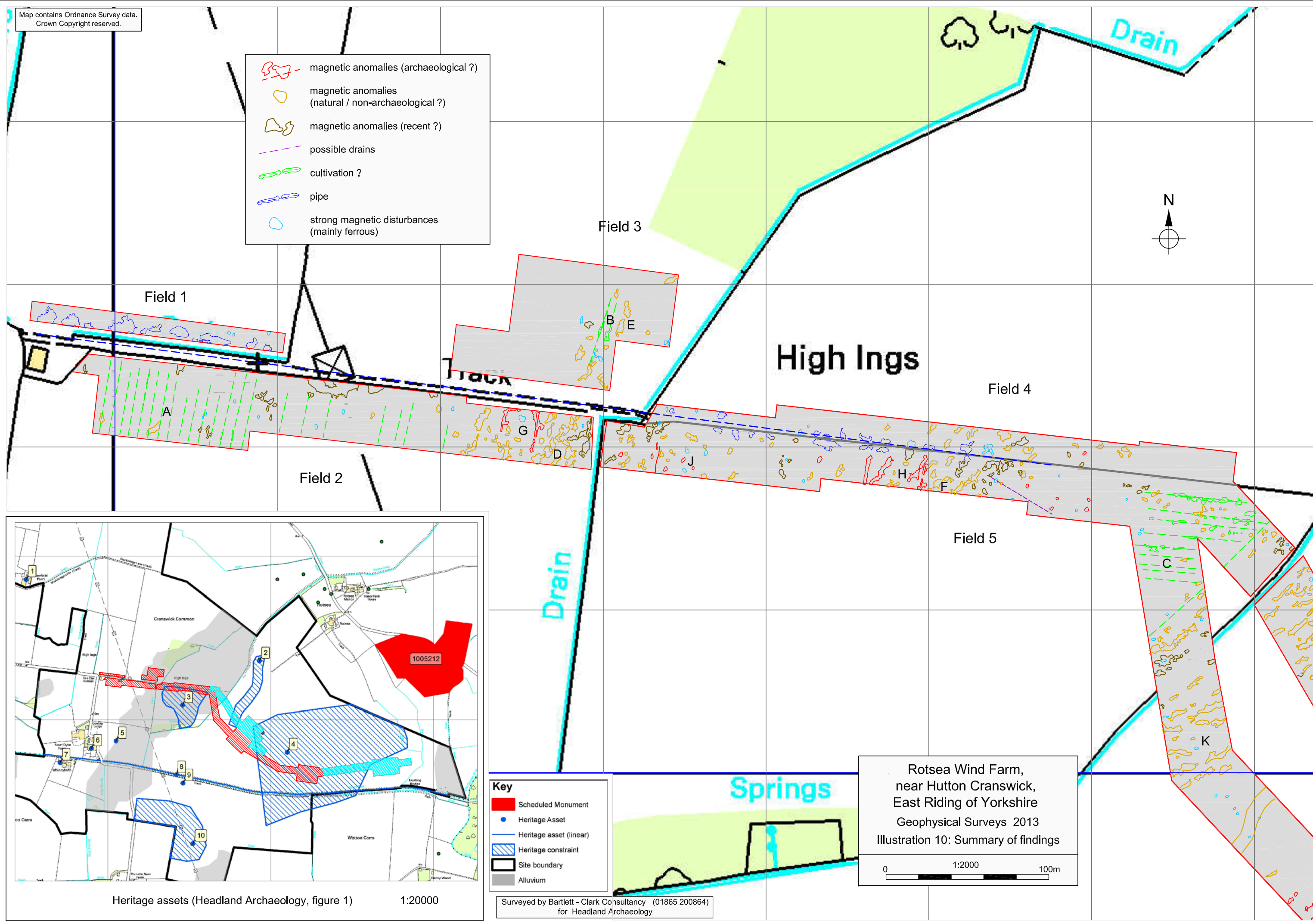
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


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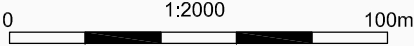
-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)



- Key**
-  Scheduled Monument
  -  Heritage Asset
  -  Heritage asset (linear)
  -  Heritage constraint
  -  Site boundary
  -  Alluvium

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Illustration 10: Summary of findings



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Rotsea Wind Farm,  
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East Riding of Yorkshire  
Geophysical Surveys 2013  
Illustration 11: Summary of findings

0 1:2000 100m

- magnetic anomalies (archaeological ?)
- magnetic anomalies (natural / non-archaeological ?)
- magnetic anomalies (recent ?)
- possible drains
- cultivation ?
- pipe
- strong magnetic disturbances (mainly ferrous)

Turbine 1








Field 6

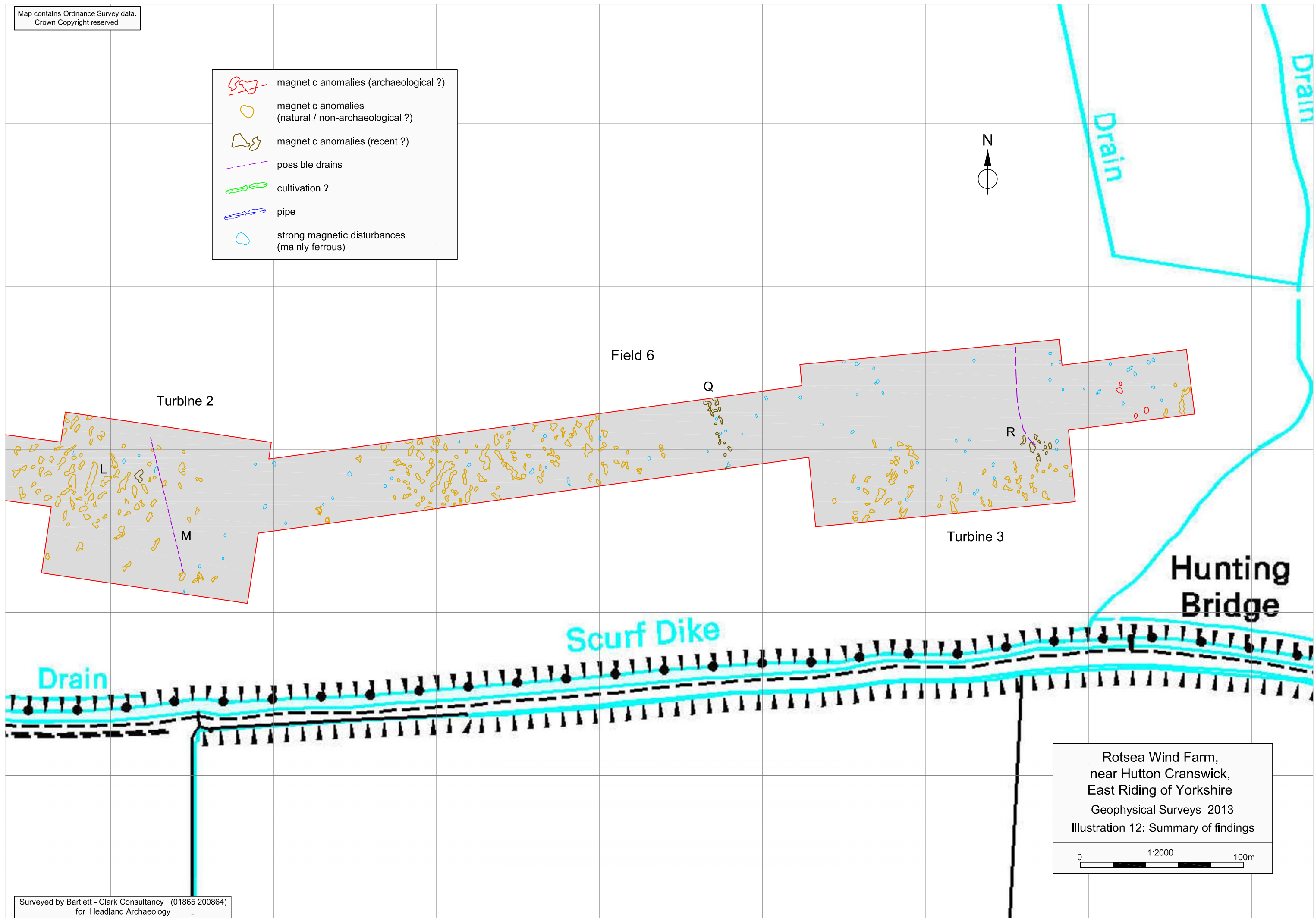
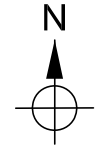
Turbine 2

L

M

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-  magnetic anomalies (archaeological ?)
-  magnetic anomalies (natural / non-archaeological ?)
-  magnetic anomalies (recent ?)
-  possible drains
-  cultivation ?
-  pipe
-  strong magnetic disturbances (mainly ferrous)



Field 6

Turbine 2

Turbine 3

Hunting Bridge

Scurf Dike

Drain

Drain

Rotsea Wind Farm,  
near Hutton Cranswick,  
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Geophysical Surveys 2013  
Illustration 12: Summary of findings

0 1:2000 100m

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