

**FAIRLOP QUARRY,  
LONDON BOROUGH OF REDBRIDGE**

**Report on Archaeological Geophysical Survey 2011**

**A.D.H. Bartlett**

**Surveyed by:**

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**for:**

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**on behalf of:**

**Brett Lafarge Ltd**

## **Fairlop Quarry, London Borough of Redbridge**

### **Report on Archaeological Geophysical Survey 2011**

#### **Introduction**

This report describes a geophysical survey carried out as part of an archaeological evaluation of a proposed gravel extraction site adjacent to the existing Fairlop Quarry at Aldborough Hatch in the London Borough of Redbridge. The survey was commissioned by Phoenix Consulting Archaeology Ltd on behalf of Brett Lafarge Ltd, and fieldwork was done between 31 March and 4 April 2011. The survey has detected a limited number of subsurface features and disturbances, some of which relate to previously identified cropmarks, but not all of which are likely to be of archaeological interest.

#### **The Site**

The following notes are reproduced in part from the Written Scheme of Investigation for the survey, which was supplied to Phoenix Consulting Archaeology by Bartlett Clark Consultancy on 29 March 2011.

##### *Location and Topography*

The survey covers four blocks of land located on farmland immediately to the north of Aldborough House Farm, and to the SW of the existing quarry workings. The size and location of the proposed survey areas (as indicated in blue on the attached location plan (figure 1)) was specified following discussions between the developers and English heritage in 2009. Coverage of these areas is intended to provide a representative sample of the larger proposed extraction area (as indicated by a broken outline on figure 1), and to include a number of cropmarks. The actual survey coverage (as outlined in red) extends beyond the specified boundaries in places (because it is easier for us to work to a rectilinear grid than to survey irregular areas), and amounts in total to 11.5 ha.

The site is on an underlying geology of London Clay covered by River Terrace gravels. Gravel sites in the Thames valley usually respond well to magnetometer surveys, as has been seen in previous comparable investigations. There is a possibility, as noted in the WSI, that gravel soils may sometimes contain naturally magnetic stones which give rise to increased background noise levels in the survey data. This effect (when observed) is localised, and is difficult to predict on the basis of background geology. It has not been strongly apparent in previous surveys of geologically comparable sites we have done at sites near London (Thurrock, Windsor), but has been seen in some (but not all) surveys of gravel extraction sites along the Ouse valley in Bedfordshire and Cambridgeshire. The background noise level in the present survey was found to be towards the higher end of the previously observed range. We have therefore in the interpretation attempted to

indicate the density of small background anomalies (which are likely to be natural, and are outlined in light brown in figure 5), as well as stronger magnetic anomalies which may be caused by ferrous debris (blue), and to distinguish both from potential archaeological features (red). The presence of small background disturbances does not preclude the identification of possible archaeological findings, but it does mean that weak or marginal features may be more difficult to identify than would usually be the case.

### *Archaeological background*

The site has previously been the subject of a Desk Based Assessment by Archaeological Solutions Ltd in 2007, and an Aerial Photographic Assessment by Air Photo Services in 2008. The 2007 report concludes that there is potential for Bronze Age archaeological activity, which is well documented in the area. There are also cropmark ring ditches in the SE corner of the site. There is said to be a moderate potential for Iron Age or early modern remains, but a lower potential for earlier prehistoric, Roman or Saxon findings. It is mentioned that remains of a medieval or later moat or gardens associated with the former Aldborough Hall could be present to the east of the extant Aldborough Hatch Farm in the south of the site, but no such findings are described in the aerial photography report.

Findings mentioned in the 2008 aerial photography report, in addition to the three ring ditches, include two pairs of short parallel ditches nearby, other ditches thought to be post-medieval field boundaries in the SW of the assessment area, and other ditches, drains and quarry pits. There is a linear feature dated to 1942 in the north of the site, as well as various periglacial features and soil marks.

The boundaries of the proposed extraction area have been drawn to exclude the ring ditches and the possible moated site, although various cropmarks are present within the area. The survey coverage is extended to the south across the proposed extraction boundary so that the ring ditches are included in the survey

.

### **Survey Procedure**

Magnetometer readings were collected using Bartington 1m fluxgate gradiometers, and are plotted at 25cm intervals along transects 1m apart. The results of the survey are shown as a grey scale plot at 1:2000 scale in figure 2, and as a graphical (x-y trace) plot at 1:1250 scale in figures 3-4. An interpretation of the findings is shown superimposed on the graphical plots (so that the interpretation can be compared with the underlying readings), and is also reproduced separately to provide a summary of the findings in figure 5.

The survey plots show the magnetometer readings after minimal processing which includes adjustment for irregularities in line spacing caused by variations in the instrument zero setting, and slight linear smoothing. The readings in the grey scale plot have additionally been subjected to weak 2D low pass filtering, which is applied to reduce

background noise levels.

Colour coding has been used in the interpretation to distinguish different effects. Magnetic anomalies which appear to show possible archaeological characteristics are outlined in red (or indicated by red broken lines). Background geological disturbances are indicated in a light brown, and stronger (perhaps recent) disturbances in a darker brown. Weak linear cultivation effects are in green, and ferrous objects (identifiable as narrow spikes in the graphical plots) are in blue.

The survey grid was set out and located at the required national grid co-ordinates by means of a differential GPS system. OS co-ordinates of map locations can be read from the AutoCAD (.dwg) version of the plans which can be supplied with this report.

The magnetometer survey was supplemented by a background magnetic susceptibility survey with readings taken at 30m intervals using a Bartington MS2 meter and field sensor loop. A plot of the readings is inset in figure 5.

Susceptibility readings can provide a broad indication of previously occupied or disturbed areas in which burning associated with past human occupation has enhanced the magnetic susceptibility of the topsoil, although the readings may be affected by a number of non-archaeological factors, including geology and land use.

The magnetometer responds to cut features such as ditches and pits when they are silted with topsoil, which usually has a higher magnetic susceptibility than the underlying natural subsoil. It also detects the thermoremanent magnetism of fired materials, notably baked clay structures such as kilns or hearths, and so responds preferentially to the presence of ancient settlement or industrial remains. It is also strongly affected by ferrous and other debris of recent origin.

## **Results**

The four survey areas have been numbered from west to east for reference in this report (as indicated in figures 1 and 5). [Area 3 is subdivided into paddocks by electric fences.] We describe the findings from the four areas in turn.

### *Area 1*

This block samples the NW field within the extraction area. The area appears to be free of cropmarks, and the survey also failed to detect any interpretable features. The plots show only a uniform background spread of magnetic anomalies, most of which are likely to be natural. There is additionally a scatter of ferrous debris, but with no particular concentrations within the survey area.



## *Area 2*

This area contains various linear cropmarks, which the Aerial Photographic Assessment suggests may be post-medieval land divisions. (These have been traced on figure 5 in grey.) There are also less regular cropmark features (shown in brown) which may be periglacial fissures.

The main finding from the survey is a strong linear disturbance (labelled A on figure 5) which does not correspond to a cropmark. This feature contains strong magnetic anomalies, but they are not located at regular intervals, as would be expected for a pipe. The feature could be a former trench or boundary ditch containing modern debris in the fill. It is intersected by a group of strong (and partly ferrous) magnetic anomalies at B. A disturbance of this kind could represent an infilled pond or pit also containing modern debris.

Various linear markings are visible to the east of A. These include a short ditch-like anomaly at C and a more extended weak linear feature at D. This corresponds to, but is longer than, a cropmark. A further linear feature at E may represent a continuation of (but does not directly correspond to) another cropmark. An apparent cropmark enclosure between D and E (as indicated in grey on figure 5) was not detected.

## *Area 3*

This area, as with area 1, appears to lack both cropmarks and archaeologically significant magnetic anomalies. The main findings are a large buried ferrous object at F, and a strong linear disturbance which might represent a pipe (or perhaps a former boundary) at G. There are various other (probably recent) disturbances near corners and boundaries.

## *Area 4*

This area is reported to contain three cropmark ring ditches, one of which (H) is reasonably clearly visible in the grey scale magnetic plot (figure 2), and was detected at a position which compares well with the cropmark. The two other circles (as marked in grey on figure 5) do not appear to have been detected.

Other findings include strong magnetic anomalies at J which correspond to a short linear cropmark. These could represent (recent ?) magnetic debris in a pit or trench (perhaps similar to A). A possible weak enclosure-like feature at K intersects but does not correspond to an irregular cropmark. Other curving (and perhaps natural) cropmarks were not detected (as also in area 2). A linear feature at L does not correspond to a cropmark, but could be a ditch or drain. A ditch-like feature was clearly detected at the same location as a cropmark to the east of the survey at M. The magnetic anomalies labelled N and P both correspond to cropmarks, and perhaps represent silted or infilled pits. Strong anomalies at each location suggest the fill could include recent debris.

A weak overall east-west linear pattern is visible in the grey scale plot in area 4 in the direction indicated by green broken lines in figure 5. The orientation of these markings

differs slightly from parallel linear markings shown on the cropmark plan (grey lines on figure 5).

#### *Magnetic susceptibility readings*

The magnetic susceptibility readings taken during the survey are sufficiently high (mean = 31) to suggest that conditions at the site should be favourable for the magnetic detection of archaeological features. The readings, however, show only local and random variations, with no distinct areas of raised values as might occur in the presence of a substantial ancient settlement or industrial site.

### **Conclusions**

The survey has detected a limited number of features of potential archaeological origin, but (as is suggested also by the susceptibility data) there are no groups or concentrations of findings of a kind which could indicate a large or significant archaeological site. There is a relatively high level of (small scale) background magnetic activity caused by naturally magnetic stones in the gravel, but this should not prevent the identification of any substantial or regular archaeological features which are present.

Findings include linear features (C, D, E) which could indicate traces of ditched enclosures (or perhaps more recent drains) in area 2, and additional ditch-like features (L, M, and more doubtfully K) in area 1. Other findings in area 1 include one of the cropmark ring ditches (H), and pit-like features (possibly containing recent debris) at J, N, P. There do not appear to be any archaeologically significant findings in areas 1 and 3.

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22 April 2011

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

## Fairlop Quarry Geophysical Survey

### Appendix : Inventory of Selected Findings

This list notes the more significant findings from this magnetometer survey. The grading (1-4) given alongside each entry refers to the reliability of the geophysical evidence rather than the archaeological significance of the findings.

- Grade 1: Distinct magnetic anomalies of probable archaeological origin.
- Grade 2: Magnetic anomalies possibly including natural or recent disturbances, but which could in part be archaeologically significant.
- Grade 3: Weak or isolated features; not necessarily archaeologically significant.
- Grade 4: Magnetic anomalies of probably non-archaeological origin.
- 

This summary list includes only selected magnetic findings, particularly those which may be of potential archaeological interest, or which may require further investigation for their significance to be established. Magnetic disturbances which may be mentioned in the text or indicated on plans are not necessarily included if they appear to be of natural or non-archaeological origin.

#### Feature

#### Grade

A	Linear sequence of magnetic disturbances. Perhaps a ditch or drain containing recent debris in fill.	2 or 4
B	Group of strong magnetic anomalies intersecting A: perhaps infilled pit or pond ?	4
C	Short ditch-like feature near other linear features.	2-3
D	Weak linear magnetic anomaly: possible ditch or drain.	2-3
E	Similar to D, but weaker.	3
F	Large buried ferrous object.	4
G	Strong linear disturbance: perhaps pipe or recently backfilled ditch ?	4
H	Circular magnetic anomaly corresponds to cropmark ring ditch.	1

J	Group of strong disturbances corresponding to short linear cropmark.	2 or 4
K	Irregular linear marking. (Perhaps a trace of an enclosure, but very weak ?)	2-3
L	Distinct linear feature: ditch or drain ?	2
M	Strong ditch-like linear feature corresponds to cropmark.	1
N, P	Pit-like features correspond to cropmarks, but perhaps contain recent debris ?	2

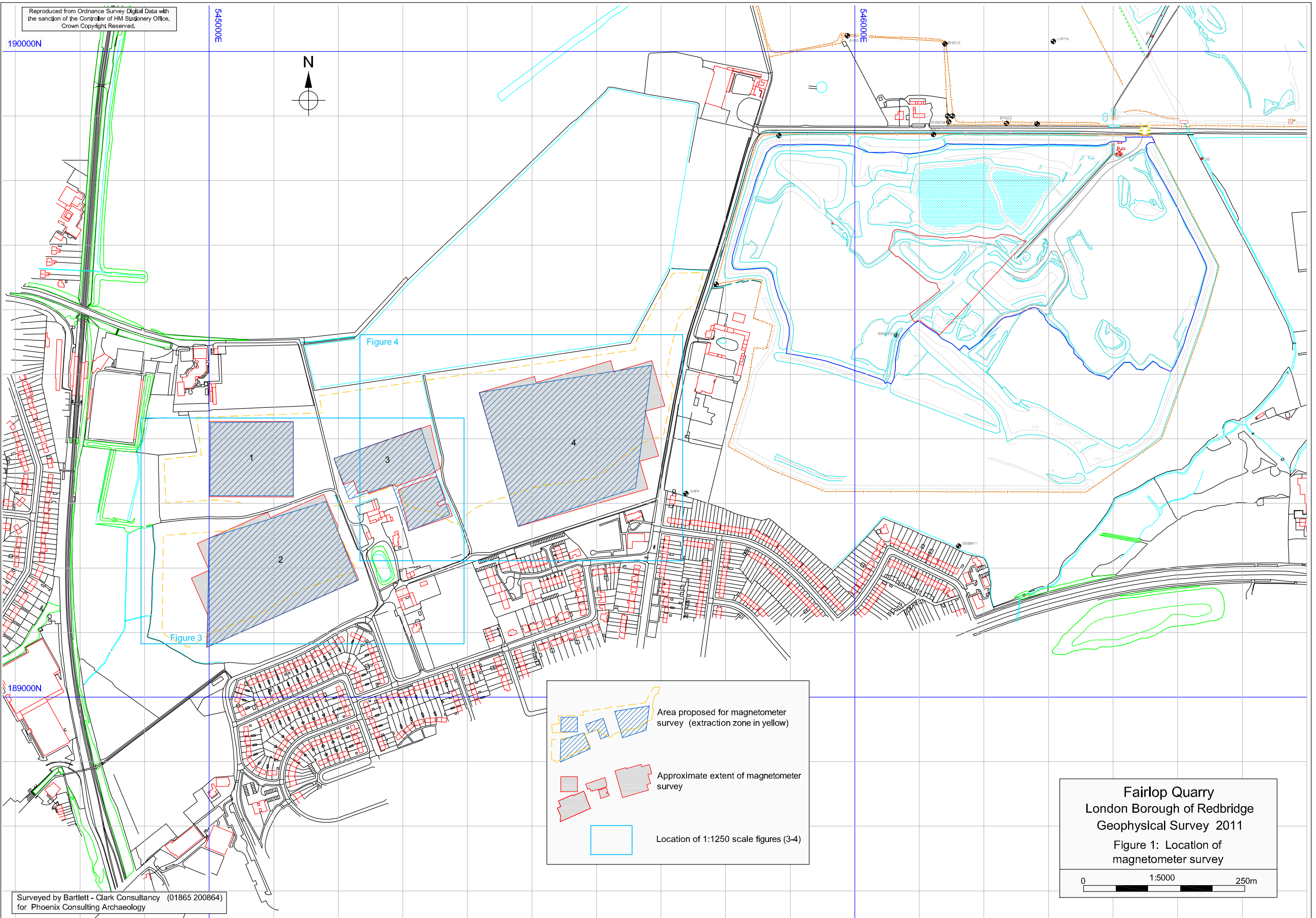
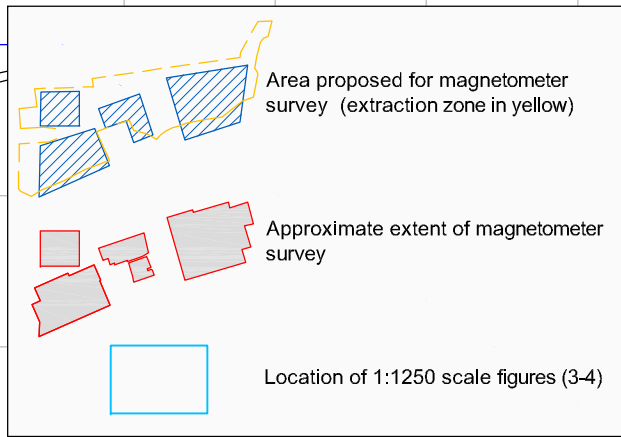
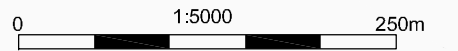


Figure 4

Figure 3



Fairlop Quarry  
London Borough of Redbridge  
Geophysical Survey 2011  
Figure 1: Location of  
magnetometer survey











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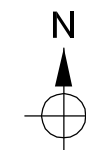


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-  magnetic anomalies (archaeological ?)
-  magnetic disturbances (recent / non-archaeological)
-  background magnetic activity (natural / non-archaeological ?)
-  cultivation ?
-  strong (ferrous) magnetic anomalies
-  pipe (and associated magnetic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

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80 nT



horse paddocks

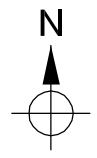
fam equipment







electric fence

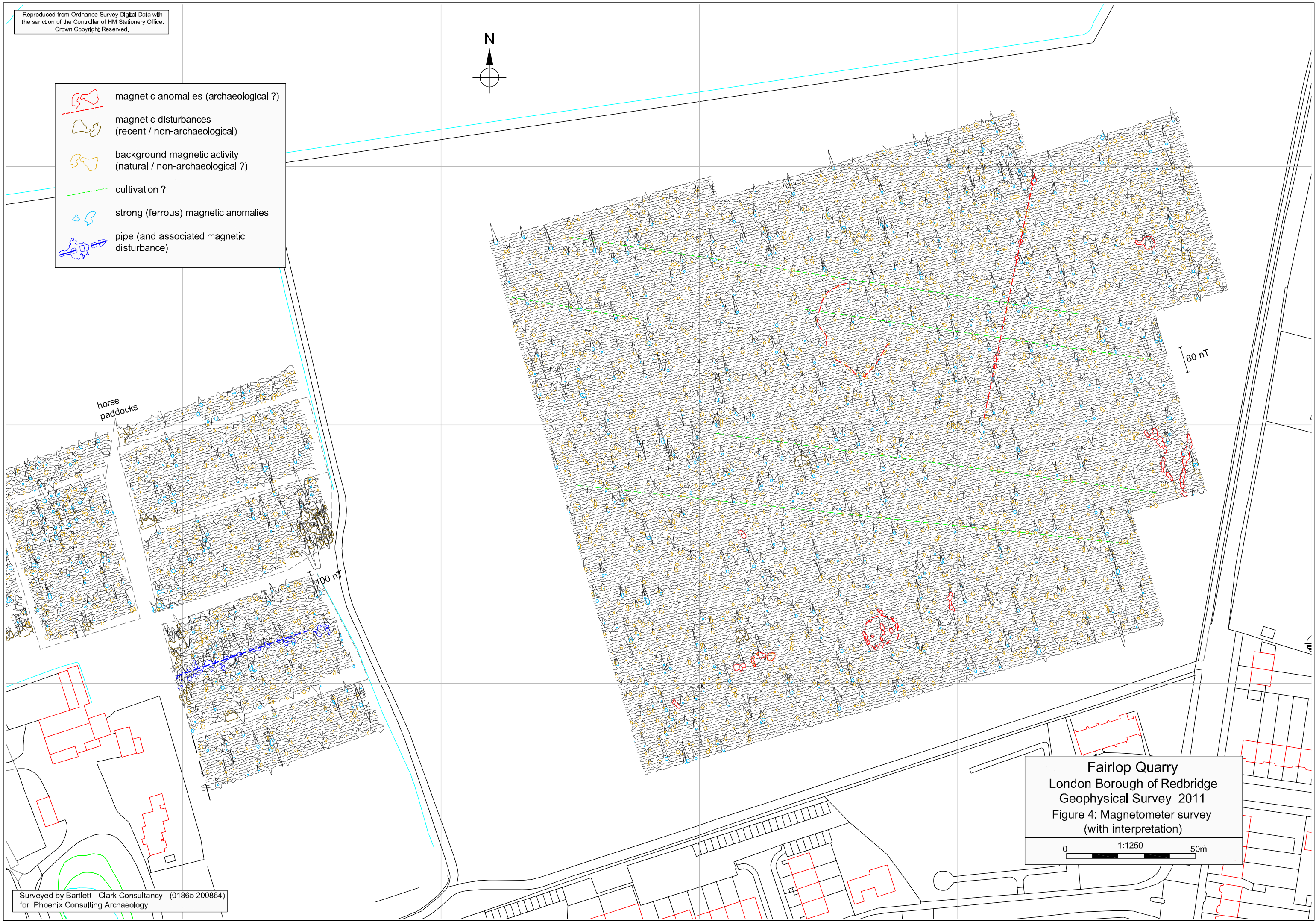
Fairlop Quarry  
London Borough of Redbridge  
Geophysical Survey 2011  
Figure 3: Magnetometer survey  
(with interpretation)

0 1:1250 50m





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



horse  
paddocks

100 nT

80 nT

**Fairlop Quarry**  
London Borough of Redbridge  
Geophysical Survey 2011  
Figure 4: Magnetometer survey  
(with interpretation)

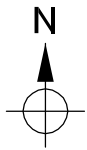
0 1:1250 50m



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

- cropmarks
- (from report by Air Photo Services, 2008)



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for Phoenix Consulting Archaeology

50 x 10<sup>-5</sup>SI  
(volume susceptibility  
readings)

10

Magnetic susceptibility survey 1:6250

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Geophysical Survey 2011  
Figure 5: Summary of findings

0 1:2000 100m