WHITE ROSE CCS FACILITY
DRAX, NORTH YORKSHIRE

Report on Archaeological Geophysical Surveys
2012 - 2013

A.D.H. Bartlett

Surveyed by:

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

For:

Headland Archaeology (UK) Ltd
13 Jane Street
Edinburgh
EH6 5HE

On behalf of:

Drax Power Ltd

White Rose CCs Facility, Drax, North Yorkshire

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Introduction

This report describes a geophysical investigation undertaken in stages during 2012 and 2013 as part of a programme of archaeological evaluations of proposed development sites adjacent to Drax Power Station. The 2012-13 surveys investigated land which may be used for the construction of the proposed White Rose CCS facility.

The surveys were commissioned from Bartlett Clark Consultancy, Specialists in Archaeogeophysics of Oxford by the Edinburgh office of Headland Archaeology (UK) Ltd on behalf of Drax Power Ltd. Plans showing findings from the initial 2012 survey have previously been supplied to Headland Archaeology Ltd. Results from both the 2012 and the two 2013 surveys are now included in the present report.

The Site

Location and geology

The survey covers an area of arable farmland south of the River Derwent at Drax Abbey Farm. The fields are centred approximately at NGR SE 670283, and extend to the north and east of Drax Power Station. Fields within the survey area have been numbered (1-6) for reference on the attached plans (Illustrations 1-14).

It was originally proposed to undertake a survey of fields 3-6 in September 2012, but much of the area was under crops, and only fields 4 and 6 could be surveyed. Additional fieldwork was done in May 2013, when the proposed coverage was extended to include fields 1 and 2. These were under a rape crop, and the survey was therefore completed on 2-4 October 2013. The coverage achieved by the surveys amounts to 39.4ha in total.

The site is on an underlying geology of Lacustrine clays and silts above Triassic sandstone, and includes areas of alluvial deposits in the northern part of the survey area. Clay soils are not necessarily highly responsive to magnetometer surveys, but in this case the detection of various ditch-like features and cultivation effects suggests that conditions are reasonably favourable for a survey of this kind. This was indicated also by magnetic susceptibility readings taken during the survey. The values increase from c. 10 (x 10^{-5} SI) in the southern half of field 5 to c. 20+ at the north of the field and in adjacent areas. This variation is likely to indicate a change in soil composition from clay to silt or sand, but the readings throughout are comparable to those commonly encountered at sites where productive magnetometer surveys have been undertaken. There remain possibilities, however, that magnetic anomalies may be weakened by leaching on wetland soils, or that findings may be obscured if archaeological features are buried at depth beneath alluvium. Characteristically

broad and irregular magnetic anomalies are also commonly seen in wetland locations, and appear to relate to natural variations in the depth or distribution of silt deposits on alluvial ground. These are visible at various locations in the survey plots, and are indicated by light green outlines in the interpretation (Illustrations 12-14).

Archaeological Background

The site is of potential archaeological interest in part because the survey areas are near to the site of a former Augustinian Priory, which is a Scheduled Ancient Monument. (The extent of the Scheduled site is shown in red on the plan inset in Illustration 1). Various previous archaeological investigations and assessments have been undertaken at the Priory site and in the surrounding area since 1998.

The more recent investigations have included a geophysical survey done by Headland Archaeology in 2009 at the site of the proposed Ouse Renewable Energy Plant immediately to the west of the Priory (in fields C and D as labelled on Illustration 1). The survey detected linear features possibly indicating a trackway, and other likely to be modern plough furrows. There were also areas of disturbed readings of possible archaeological interest immediately north of the Carr Dike. The survey results were investigated during trenching in 2009. The report [2] mentions finds of Roman pottery in the vicinity of field 3, but no additional evidence of Roman activity was obtained. The priory site is described as situated on an island surrounded by low-lying ground prone to flooding, which was drained from the 17th C. Peat deposits were identified beneath silt near to the Carr Dike, and a clay subsoil elsewhere in fields B, C, D.

Trenching in fields C and D confirmed that one of the magnetic anomalies corresponded to patches of cinder and fired clay, and another was a large clay-filled feature. Medieval building rubble was found in a ditch identified from a soil mark.

A further geophysical survey of carbon capture pipeline routes by West Yorkshire Archaeological Services in 2013 overlapped with the present survey in fields 3 and 4, and covered a linear corridor around the site. This survey also detected ditch-like linear features, and various possible cultivation effects.

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 at 1:2000 (Illustrations 2-5), and as graphical (x-y trace) plots at 1:1500 scale in Illustrations 6-11.

The x-y 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 6-11 (which permits the interpreted outlines to be compared with the underlying data), and is reproduced separately to provide a summary of the findings (illustrations 12-14). Colour coding has been used in the interpretation to distinguish various categories of findings.

Features of possible archaeological interest are shown in red, and minor non-archaeological (mainly geological) disturbances in light brown. Recent disturbances are in a blue/purple, and strong magnetic anomalies which are likely to represent ferrous objects are in blue. Possible cultivation effects are shown in green, and weak irregular magnetic anomalies indicating alluvial soil are in a light green. Pipes and land drains are also marked.

The magnetometer survey was supplemented by background magnetic susceptibility readings taken at intervals across the site. 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 (with Omnistar or VRS correction). 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

The survey findings appear to include drains, ditches, trackways and cultivation effects, but (as in the previous surveys mentioned above) there are only minor magnetic disturbances which may indicate archaeological features or remains. We comment on the results by fields from north to south.

Fields 1-2

Much of field 1, and the northern part of field 2, is occupied by irregular natural magnetic anomalies of the kind commonly seen on alluvial ground. One similarly sized magnetic anomaly is stronger than others (A, as outlined in red and labelled in Illustration 12), and so could be a pit or hollow containing an increased depth of silt, or magnetically enhanced fill. Linear markings (B, C) in field 1 are likely to be land drains. There also appears to be a complex system of convergent drains around D in field 2. A strongly magnetic pipe creates a band of out-of-range readings (as indicated by a blue broken line) across both fields. Parallel linear markings (visible in the grey scale plot, and marked in green in the interpretation) in the eastern half of field 2 are likely to be caused by modern ploughing.

A scatter of disturbed readings (around E) is visible in the south east corner of field 2. The small magnetic anomalies here are typical of those caused by modern debris or disturbances (as may occur if hardcore is spread around a field entrance). The disturbances at E,

however, are near to the priory site, and the possibility therefore arises that a scatter of medieval tile or similar debris could contribute to the observed response. (A few of the magnetic anomalies have therefore been outlined in red to signify this possibility.)

Fields 3-4

These fields lie immediately to the west and south of the priory site. The main finding in field 3 is a distinct branching ditch-like feature at F (Illustration 13). This is not as straight as the drains noted previously, and aligns with a field boundary to the south. It is probably therefore a former ditch containing strongly magnetic debris (brick, tile ?) in the fill.

There are various disturbances (as at G in Illustration 13) which may be of recent origin, although it remains possible (as at E in field 2) that any medieval debris which is present could add to the effect. There are more such disturbances in field 4, although only those to the north of the field at H are near to the priory site.

A distinct curving ditch-like feature (J) intersects field 4, and does not appear to relate to current field boundaries. A north-south linear sequence of disturbances at K is stronger and more variable than the drains noted in fields 1-2, and could perhaps indicate a former trackway.

Fields 5-6

Alluvial deposits appear to extend from field 4 into the northern parts of fields 5 and 6. There is a possible pipe, together with other probably recent disturbances in the north west corner of field 5 (L). Another large pipe (blue) runs across and along the eastern side of field 5.

Findings in both fields otherwise include drains and cultivation effects as seen previously, together with possible fragmentary ditch-like linear features (M, N) in the southern part of field 5. An area of disturbances to the south of the survey (O) could indicate a former track or boundary, but it shows less continuity than at K in field 4.

Conclusions

The survey findings includes pipes and drains as well as other magnetic activity, much of which is likely to be of natural or recent origin. The possible exceptions may include a large pit-like feature at A in field 1. (Other possible pit-like features are minor and dispersed.) There are also groups of small magnetic anomalies at locations close to the priory site (E in field 2; G in field 3; H in field 4). These may be recent, but it is not impossible that scatters of medieval tile or similar debris could contribute to the magnetic response.

Field 4 is intersected by a distinct curving ditch-like feature (J), and a possible former track at K. There are short ditch-like features (M, N) in field 5, and disturbances (O) which may indicate a former track or boundary at the southern end of field 5.

Report by:

A. Bartlett BSc MPhil

Bartlett-Clark Consultancy
Specialists in Archaeogeophysics
25 Estate Yard
Cuckoo Lane
North Leigh
Oxfordshire OX29 6PW

01865 200864
email: bcc123@ntlworld.com

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The fieldwork for the surveys was done variously by P. Cottrell, P. Heykoop, C. Oatley, N. Paveley and R. Organ.

References:

[1] Ouse Renewable Energy Plant: Drax near Selby, North Yorkshire. Fluxgate Gradiometer Survey (Fields C and D). Headland Archaeology Ltd. Project Code: Drax08. September 2009.

[2] Ouse Renewable Energy Plant: Drax near Selby, North Yorkshire. Archaeological Evaluation (Trial trenches in Fields C and D). Headland Archaeology Ltd. Project Code: Drax08. November 2009.