ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
Parsons Brinckerhoff

Withy End Farm
East Huntspill
Somerset

geophysical survey

report 2559
December 2010

Durham University

Contents

Figures

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1. Summary

The project

1.1 This report presents the results of geophysical surveys conducted in advance of proposed development at land to the south-east of With End Farm, East Huntspill, Somerset. The works comprised *c*. 13ha of geomagnetic survey over 11 areas.

1.2 The works were commissioned by Parsons Brinckerhoff and conducted by Archaeological Services Durham University.

Results

1.3 The majority of the anomalies detected are probably related to natural geomorphological phenomena, such as changes in the natural silting deposits and drainage of the Huntspill levels.

1.4 A small number of diffuse positive magnetic anomalies have been detected which could be soil-filled features of archaeological origin, but given their location on the Huntspill levels and the amorphous nature of these anomalies they are more likely to be natural features.

1.5 Services or land drains were detected in areas 1, 2a, 2b, 3a, 3c, 4, 5, 6 and 8.

2. Project background

Location (Figure 1)

2.1 The survey area was located on land around Withy End Farm, East Huntspill, Somerset (NGR centre: ST 33635 43377). Eleven surveys totalling *c*. 13ha were undertaken in 10 land parcels. To the north was Withy Pill Rhyne and the Huntspill River, to the east was the B3141 road, to the south was Black Ditch, Puriton Level and a factory and to the west was open farmland and the M5 motorway.

Development proposal

2.2 The proposed development is a wind farm, comprising 5 turbines, a control station and associated access tracks.

Objective

2.3 The principal aim of the surveys was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the development.

Methods statement

2.4 The surveys have been undertaken in accordance with instructions from the client and to current national standards and guidance (see para. 5.1 below).

Dates

2.5 Fieldwork was undertaken between 15th and 17th November 2010. This report was prepared for 9th December 2010.

Personnel

2.6 Fieldwork was conducted by Natalie Swan (Supervisor), Edward Davies and Richie Villis. The geophysical data were processed by Richie Villis. This report was prepared by Richie Villis with illustrations by Janine Watson, and edited by Peter Carne.

Archive/OASIS

2.7 The site code is **HWE10**, for East **H**untspill, **W**ithy **E**nd Farm 20**10**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (OASIS). The OASIS ID number for this project is **archaeol3-88879**.

Acknowledgements

2.8 Archaeological Services Durham University is grateful for the assistance of landowners and farmers, Mr Gordon J Boyer; Mr Arthur A J Bown; Mr Lionel M Baker; and Mr Stuart G Clatworthy, in facilitating this scheme of works.

3. Historical and archaeological background

3.1 A detailed desk-based assessment of the site has been carried out (Parsons Brinckerhoff 2010). The following is a summary of its results.

3.2 There are no known sites of archaeological significance within the proposed development area.

3.3 The Somerset Levels are known to have been occupied during the prehistoric, Romano-British and medieval periods. There are a number of important archaeological remains of these periods in the vicinity of the proposed development area. Investigations in the north-east corner of the proposed development area have revealed the remains of a Roman salt producing site.

3.4 Cartographic evidence indicates that the proposed development area has remained as undeveloped agricultural land from 1885 to the present day. The potential for a post-medieval archaeological resource to remain is considered unlikely.

3.5 There have been little or no archaeological investigations within the proposed development area. There is widespread evidence for prehistoric, Romano-British and medieval activity within the surrounding area. This activity indicates that an as yet unidentified resource has the potential to exist

4. Landuse, topography and geology

4.1 At the time of survey the proposed development area comprised nine fields of pasture and one ploughed arable field. Large concentrations of ferrous litter were noted at the east end of area 3c.

Area	Landuse	Topography	NGR
1	arable: ploughed pasture: cows at west	flat	ST 32999 43320
2a	pasture: sheep	flat with shallow ditches	ST 33347 43266
2b	pasture: sheep	flat with shallow ditches	ST 33338 43399
3a	pasture: sheep	flat with shallow ditches	ST 33398 43522
3b	pasture: sheep	flat with shallow ditches	ST 33400 43570
3c	pasture: sheep	flat with shallow ditches	ST 33494 43598
4	pasture: sheep	flat with shallow ditches	ST 33520 43436
5	pasture: cows	flat with shallow ditches	ST 33804 43540
6	pasture: cows	flat with shallow ditches	ST 33817 43244
7	pasture: cows	flat, rising at north to track	ST 34070 43600
8	pasture: cows	flat, rising at north to track	ST 34313 43505

4.2 The survey area occupied the Huntspill Level, just south of the Huntspill River. It was predominantly level with a mean elevation of approximately 6m OD.

4.3 The underlying solid geology of the area comprises Jurassic strata of the Blue Lias Formation and Charmouth Mudstone Formation, which are overlain by Tidal Flat Deposits of sands, clays and silts.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists (IfA) *Draft Standard and Guidance for archaeological geophysical survey* (2010); the IfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden

2002); and the Archaeology Data Service *Guide to Good Practice: Geophysical Data in Archaeology* (draft 2nd edition, Schmidt & Ernenwein 2010).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance it was considered likely that cut features such as ditches and pits might be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.

5.4 Given the anticipated shallowness of targets and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 A 30m grid was established across each survey area and tied-in to known, mapped Ordnance Survey points using a Trimble Pathfinder Pro XRS global positioning system with real-time correction.

5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval 0.25m and the traverse interval 1.0m, thus providing 3,600 sample measurements per 30m grid unit.

5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and interpretations are presented in Figures 2-8; the trace plots are provided in Figure 9. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to each dataset:

clip	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities
destagger	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
despike	locates and suppresses iron spikes in gradiometer data
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

Interpretation: anomaly types

5.10 Colour-coded geophysical interpretation plans are provided. Three types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches
negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

Interpretation: features

General comments

5.11 Colour-coded archaeological interpretation plans are provided.

5.12 Except where stated otherwise in the text below, positive magnetic anomalies are taken to reflect relatively high magnetic susceptibility materials, typically sediments in cut archaeological features (such as ditches or pits) whose magnetic susceptibility has been enhanced by decomposed organic matter or by burning.

5.13 Small, discrete dipolar magnetic anomalies have been detected in all of the survey areas. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. A sample of these is shown on the geophysical interpretation plans, however, they have been omitted from the archaeological interpretation plans and the following discussion.

Area 1

5.14 A relatively broad and diffuse curvilinear positive magnetic anomaly has been detected in the north of the survey area. This may reflect the presence of a soil-filled feature of archaeological origin, but it may also be natural in origin, such as a former stream channel.

5.15 A sub-circular positive magnetic anomaly, *c.* 10m diameter, has been detected in the south-east of the survey area. Anomalies like this can be caused by prehistoric ring ditches. In this instance, given the nature of the site, the lack of any associated features and the diffuse nature of the anomaly, this interpretation is considered unlikely.

5.16 Several other amorphous positive magnetic anomalies have also been detected in this area. These may be of archaeological origin, but given the natural formation of the Huntspill levels they could easily reflect geomorphological phenomena.

5.17 A number of negative magnetic anomalies have been detected in this area. Negative magnetic anomalies can be associated with the presence of sedimentary rocks or voids. These anomalies are likely to reflect geomorphological phenomena, probably caused by the formation of the natural subsoil.

5.18 Two linear chains of dipolar magnetic anomalies have been detected. One is aligned east/west across the north, and one aligned north/south in the east of the survey area. These correspond to the position of a former field boundary as recorded by the Ordnance Survey 1:10000 edition in 1979. This former boundary is recorded as an open drain, so the dipolar nature of the anomalies may reflect the infill of this ditch with ferrous or fired waste, such as brick rubble.

5.19 A very strong linear chain of dipolar anomalies has been detected aligned north-west/south-east in the west of the survey area. This almost certainly reflects the position of a ferrous service pipe.

Area 2a

5.20 A number of discrete diffuse positive magnetic anomalies have been detected in this area. These could reflect soil-filled features, but the diffuse nature of these features means they are unlikely to be of archaeological origin.

5.21 Negative magnetic anomalies and broad and diffuse weak dipolar magnetic anomalies have also been detected in this area. These are likely to reflect geological changes in the natural subsoil. The linear negative anomalies aligned north/south and east/west correspond to a series of broad and shallow ditches in the field. This is likely to be a system of drainage.

5.22 The dipolar magnetic anomaly detected at the north edge of the survey area reflects the position of a metal field boundary.

Area 2b

5.23 As in area 2a a number of diffuse negative and positive magnetic anomalies have been detected in this area. These are likely to be geological features.

5.24 Two linear negative magnetic anomalies have been detected aligned broadly north/south. These reflect the position of drainage ditches.

5.25 The dipolar magnetic anomaly detected at the south edge of the survey area reflects the position of a metal field boundary.

Area 3a

5.26 A series of parallel, linear, negative magnetic anomalies has been detected in this area. These anomalies correspond to the position of shallow drainage ditches on the ground.

5.27 The large and strong dipolar magnetic anomaly detected along the north and east edges of the survey area reflects the position of a metal field boundary.

Area 3b

5.28 The large discrete dipolar magnetic anomaly detected in the east of the survey area reflects the position of a metal feeding trough.

5.29 The dipolar magnetic anomaly detected along the south and east edges of the survey reflects the position of a metal field boundary.

Area 3c

5.30 Two parallel negative magnetic anomalies have been detected aligned broadly north/south. These reflect the positions of drainage ditches.

5.31 The dipolar magnetic anomaly detected at the west edge of the survey area reflects the position of a metal field boundary.

5.32 The concentration of strong dipolar magnetic anomalies detected at the east of the survey area reflects an area with a high concentration of ferrous litter around a gate.

Area 4

5.33 A series of parallel negative magnetic anomalies have been detected aligned broadly north/south. This reflects the position of drainage ditches.

5.34 The weak dipolar “texturing” of the data detected in this area is similar to that in area 2a. This almost certainly reflects a geomorphological phenomenon.

5.35 The linear dipolar magnetic anomaly and area of dummy readings in the south of the area reflects the position of a field boundary.

Area 5

5.36 A “texturing” of weak dipolar magnetic anomalies has been detected across the survey area. This is similar to the anomalies detected in areas 1, 2 and 4 and almost certainly reflects variation in the natural subsoil.

5.37 A north-west/south-east aligned negative magnetic anomaly has been detected in the north of the survey area. This is likely to reflect the position of a land drain.

5.38 Two chains of dipolar magnetic anomalies have been detected in this area. These are likely to reflect either land drains or other services.

5.39 The large and strong dipolar magnetic anomaly detected at the north-west edge of the survey area reflects the position of a corrugated iron dam in Withy Pill Rhyne to the north.

Area 6

5.40 As in other areas a number of diffuse negative magnetic anomalies have been detected in this area. These are unlikely to be of archaeological origin and are probably a reflection of drainage in the subsoil.

5.41 A chain of dipolar magnetic anomalies has been detected aligned north-east/south-west in the south-east corner of the survey area. This almost certainly reflects the position of a service.

5.42 The dipolar magnetic anomalies detected at the north edge of the survey area are likely to be a reflection of a high concentration of fired and ferrous waste in the northern field boundary ditch.

Area 7

5.43 The weak dipolar "texturing" of the survey data, probably geomorphologic in origin, has been detected in this area.

5.44 The dipolar anomalies at both the east and west edges of the survey area reflect areas of hard-standing around gates.

Area 8

5.45 A north-east/south-west aligned chain of dipolar magnetic anomalies has been detected in the east of the survey area. This almost certainly reflects the position of a service pipe, possibly a continuation of the service detected in area 6 to the south-west.

5.46 The high concentration of dipolar magnetic anomalies detected along the north-east edge of the survey area reflect the position of a track, with areas of hard-standing at the north-west end and a mound of dumped hard-standing and tarmac at the south-east end.

5.47 The discrete, strong dipolar magnetic anomaly detected at the north of the area reflects the position of a metal feeding trough.

6. Conclusions

6.1 Eleven geomagnetic surveys totalling *c.* 13ha were undertaken at land to the south-east of Withy End Farm, near East Huntspill, Somerset.

6.2 The majority of the anomalies detected are probably related to natural geomorphological phenomena, such as changes in the natural silting deposits and drainage of the Huntspill levels.

6.3 A small number of diffuse positive magnetic anomalies have been detected which could be soil-filled features of archaeological origin, but given their location on the

Huntspill levels and the amorphous nature of these anomalies they are more likely to be natural features.

6.4 Services or land drains were detected in areas 1, 2a, 2b, 3a, 3c, 4, 5, 6 and 8.

7. Sources

David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper **6**, Institute of Field Archaeologists

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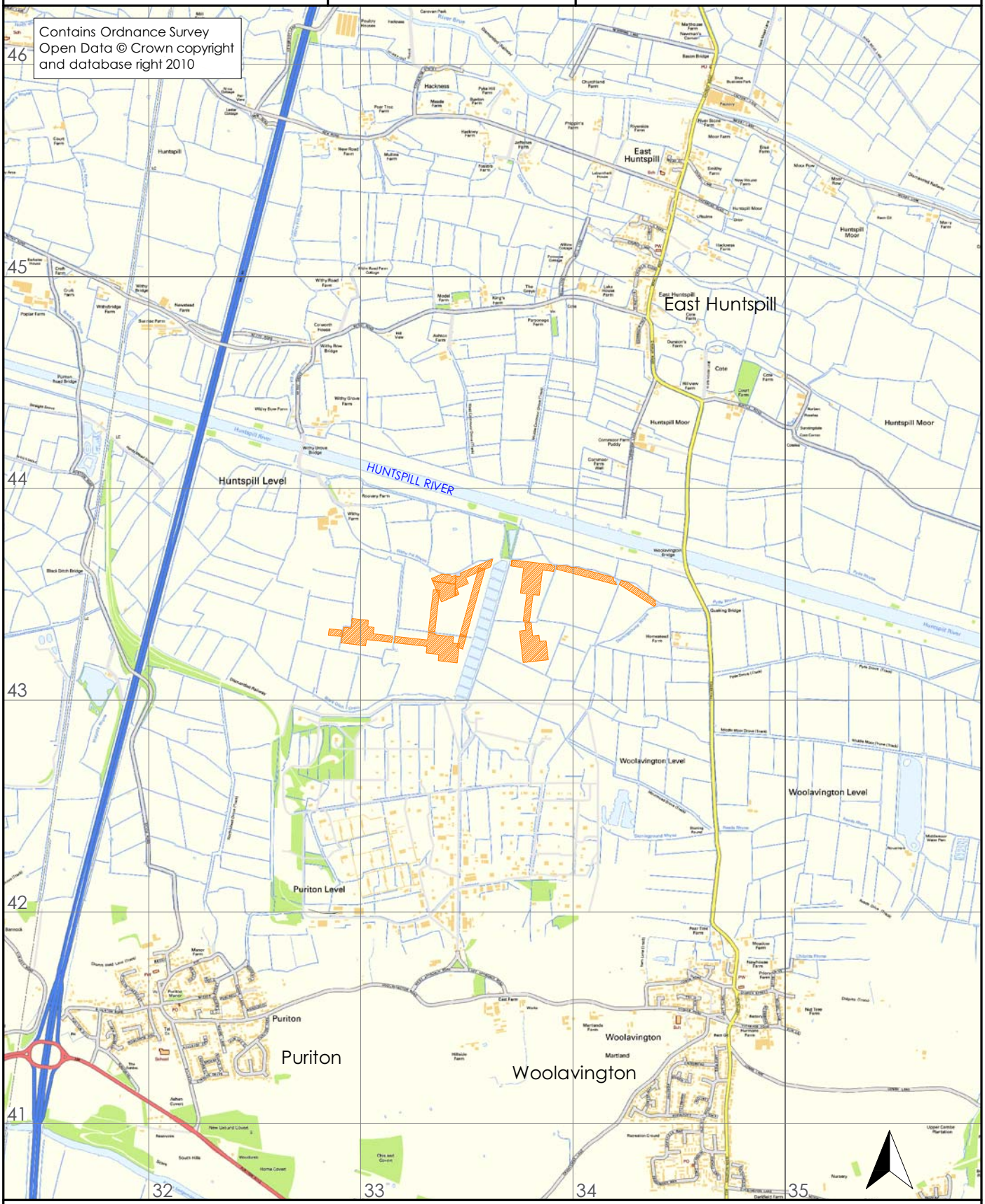
geophysical survey
report 2559

Figure 1: Site location



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magnetic survey
-5 nT 5

0 200m
scale 1:4000 for A3 plot

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East Huntspill
Somerset

geophysical survey

report 2559
Figure 2: Geophysical survey overview

Area 1
Area 2a
Area 2b
Area 3a
Area 3b
Area 3c
Area 4
Area 5
Area 6
Area 7
Area 8

Huntspill River
Withy Pill Rhyne (Drain)
Stuckingwell Rhyne (Drain)
Black Ditch (Drain)
Slurry Lagoon
Windpump
Sluice
Pond
Drain
Track
FB
ETL

438
436
434
432
430
330
332
334
336
338
340
342

Area 1

Area 2a

Area 2b

Area 3a

Area 3b

Area 3c

Area 4

magnetic survey

-5 nT 5

0 50m

scale 1:1000 for A1 plot

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East Huntspill
Somerset

geophysical survey
report 2559

Figure 3: Western area, geophysical survey

Area 1

Area 2a

Area 2b

Area 3a

Area 3b

Area 3c

Area 4

FB

Drain

Withy Pill Rhyne (Drain)

Pond

436

435

434

433

432

329

330

331

332

333

334

335

336

magnetic survey

dipolar magnetic anomaly

positive magnetic anomaly

negative magnetic anomaly

0 50m

scale 1:1000 for A1 plot

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East Huntspill
Somerset

geophysical survey
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Figure 4: Western area, geophysical interpretation

Area 1

Area 2a

Area 2b

Area 3a

Area 3b

Area 3c

Area 4

FB

Drain

Withy Pill Rhyne (Drain)

Pond

436

435

434

433

432

329

330

331

332

333

334

335

336

magnetic survey
possible soil-filled feature
geological feature
cattle feeder
service pipe
land drain
former field boundary

0 50m
scale 1:1000 for A1 plot

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East Huntspill
Somerset

geophysical survey
report 2559

Figure 5: Western area, archaeological interpretation

magnetic survey

-5 nT 5

Area 5

Area 6

Area 7

Area 8

Drain

Withy Pill Rhyne (Drain)

Stoningpound Rhyne (Drain)

FB

437

436

435

434

433

432

337 338 339 340 341 342 343 344

0 50m

scale 1:1000 for A1 plot

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East Huntspill
Somerset

geophysical survey
report 2559

Figure 6: Eastern area, geophysical survey

magnetic survey
dipolar magnetic anomaly
positive magnetic anomaly
negative magnetic anomaly

Area 5

Area 6

Area 7

Area 8

Drain
Withy Pill Rhyne (Drain)
Track
Stoningpound Rhyne
FB
Pond

437
436
435
434
433
432
337
338
339
340
341
342
343
344

0 50m
scale 1:1000 for A1 plot

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East Huntspill
Somerset

geophysical survey
report 2559

Figure 7: Eastern area, geophysical interpretation

Area 5

Area 6

Area 7

Area 8

Drain

Pond

Withy Pill Rhyne (Drain)

Track

Stoningpound Rhyne (Drain)

FB

437
436
435
434
433
432

337
338
339
340
341
342
343
344

magnetic survey
geological feature
service pipe
land drain
cattle feeder

0 50m
scale 1:1000 for A1 plot

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East Huntspill
Somerset

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Figure 8: Eastern area, archaeological interpretation

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Somerset

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Figure 9:
Trace plots of geomagnetic data