

An archaeological magnetometer survey

Land at Westonzoyland Sedgemoor, Somerset

Centred on NGR (E/N): 335680,134890 (point)

Report: 1610WES-R-1

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Website: substrata.co.uk

GIS project, shape files and classification schema

For an overview of Substrata, our archaeological geophysical surveying techniques and the results we obtain.

1 Survey description and summary

1.1 Survey

Type: twin-sensor fluxgate gradiometer

Date: 6 December 2016
Area: Surveyed area: 1.9ha
Lead surveyor: Mark Edwards BA

Author: Ross Dean BSc MSc MA MIfA

1.2 Clients

Oakford Archaeology, 44 Hazel Road, Exeter, Devon EX2 6HN

1.3 Location

Site: Land at Westonzoyland

Village & Civil Parish: Westonzoyland
District: Sedgemoor
County: Somerset
Nearest Postcode: TA7 0ET

NGR: ST 357 349 (point) NGR (E/N): 335680,134890 (point)

1.4 Archive

OASIS number: substrat1-273362

Archive: At the time of writing, the archive of this survey will be held by

Substrata. Depending on local authority policy, an archive of the unprocessed data may be deposited with the Archaeological Data

Service

1.5 Introduction

This report presents the results of an archaeological magnetometer survey at the above site. It has been prepared for Oakford Archaeology on behalf of clients. The survey area location is shown in Figure 1.

1.6 Summary

The magnetic responses across the survey area were sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses.

Eleven magnetic anomaly groups were mapped as representing possible archaeological deposits or features. One group may represent a filled pit or a spread of archaeological material. Three groups together may represent double curvilinear deposits typical of a former track or possibly a double-ditched enclosure. The remaining groups are most likely to represent linear and disrupted linear deposits, such as former ditches or banks, of unknown period and from one or more phases of past land management.

2 Survey aims and objectives

2.1 Aims

To establish the presence or absence, extent and character of any archaeological features and deposits within the survey area.

2.2 Survey objectives

- 1. Complete a magnetometer survey across agreed parts of the survey area.
- 2. Identify any magnetic anomalies that may be related to archaeological deposits, structures or artefacts.
- 3. Within the limits of the techniques and dataset, archaeologically characterise any such anomalies or patterns of anomalies.

- 4. Accurately record the location of the identified anomalies.
- 5. Produce a report based on the survey that is sufficiently detailed to inform any subsequent development on the survey area about the location and possible archaeological character of the recorded anomalies.

3 Standards

The standards used to complete this survey are defined by the Chartered Institute for Archaeologists (2014a) and Historic England (2010). The codes of approved practice that were followed are those of the Chartered Institute for Archaeologists (2014b) and Archaeology Data Service (undated a).

4 Site description

4.1 Landscape and land use

The Somerset Levels have a distinctive landscape consisting of peat moorland formed around raised rock islands capped with sand deposits. The survey area is located on Sowy Island on which the villages of Westonzoyland, Middlezoy and Othery are situated (Historic England, undated).

The survey area comprises one field of agricultural land one the eastern side of the village of Westonzoyland as shown in Figure 1. It is bound to the north by Upper Liney Farm and agricultural land, to the east by agricultural land which borders Manor Farm and the disused Westonzoyland Airfield, to the south by agricultural land and housing, and to the east by Liney Road. The topography of the site is relatively flat and lies at less than 10m AOD.

4.2 Geology

The bedrock is from the Triassic Mercia Mudstone Group which comprise dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite are widespread and sandstones are also present (British Geological Survey, undated).

The superficial deposits are sand and gravel from the Quaternary Burtle Formation. The sands are fine-grained and quartzose, with beds of comminuted shell. The gravels are composed of chalk flint, quartz, sandstone, cherts, rounded lumps of red, green and grey Triassic mudstones and Liassic fossils, are marine in origin with a few interbedded palaeosols and freshwater sands (ibid).

5 Archaeological background

5.1 Historic landscape characterisation

Within the survey area: 'Military Site'

To the west, north and south: 'Settlement, post Tithe Map (c.1840)'

(Archaeology Data Service, undated b).

5.2 Table 1 provides a summary of information obtained from the Somerset Historic Environment Record (HER) within 500m of the proposed development area and thought relevant to the understanding of the magnetometer survey. Except where specifically cited, this information was obtained using the Heritage Gateway (Historic England, undated a).

The reader is advised that this summary should not be used outside the context of this report and is referred to the Somerset HER for informed provision of the record.

The historic battlefield of Sedgemoor (1685) lies to the north of the area. Historic assets from the prehistoric through to the Second World War lie close to the survey area; those thought relevant to the understanding of the geophysical survey data are summarised in Table 1. Archaeological remains of various periods, including Bronze Age burial mounds, lie within the

extent of the Second World War airfield at Westonzoyland. Westonzoyland airfield was first used in 1926 and the site was closed in 1958. The airfield was enlarged and improved in 1943 (Historic England, undated).

A number of sand quarry pits exist around Westonzoyland. These may have originated in the Medieval or Post-medieval periods. Their presence demonstrates the exploitation of the sand deposits of the Burtle Beds. Post-medieval stack stands are also present. Often used in wetland areas for temporary storage of crops, these are found throughout the peat moor areas surrounding Sowy island (Truscoe, undated).

6 Results, discussion and conclusions

6.1 Scope and definitions

This survey was designed to record magnetic anomalies. A magnetic anomaly is a local variation in the Earth's magnetic field. Such variations can result from variations in the magnetism of underlying solid geology, superficial geology and other near-surface deposits including those altered and created by past human activities. Near-surface artefacts can also create magnetic anomalies.

The terms 'archaeological deposit', 'structure' and 'feature' refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity, excluding recent land maintenance and farming.

Magnetic anomalies cannot be regarded as physical archaeological deposits, structures or features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits, structures and features.

The reader is referred to section 7.

6.2 Results

Figure 2 shows the interpretation of the survey data. It includes the anomaly groups identified as possibly relating to archaeological deposits along with their identifying numbers. Table 2 is an extract of the detailed analysis of the survey data sourced from the attribute tables of the GIS project provided in the project archive.

Figure 2 and Table 2 comprise the analysis of the survey data.

Figure 3 is a plot of processed data as specified in Table 3. Figure 4 is a plot of unprocessed data.

6.3 Discussion

6.3.1 General points

Discussion scope

Not all anomalies or anomaly groups identified in Table 2 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held the survey archive.

Data collection

Data collection along the survey area edges and internal field boundaries was restricted as shown in the figures due to the presence of magnetic materials within and adjacent to boundaries. Strong magnetic responses mapped close to the boundaries are likely to relate to these materials except where otherwise indicated in Figure 2 and Table 2.

Surveying was restricted in the north east and south east of the survey area by barns with a significant steel content in their construction which produced a strong magnetic response masking any response from the surrounding ground.

Anomaly characterisation and mapping

There are a number of anomaly groups that could be interpreted as relating to large postholes or pits although most will have natural origins. Anomalies of this sort are only mapped as potential archaeology if they are clustered in groups or otherwise form recognisable patterns.

Anomalies thought to relate to natural features and recent man-made objects such as manholes, water management equipment, drains, cables and other services were only

mapped where they comprised significant magnetic responses across the dataset that needed clarification.

Numerous dipole magnetic anomalies are scattered across the data set. These are likely to represent recent ferrous objects. They are only mapped if they could influence the analysis of anomaly groups thought to have an archaeological origin.

Data trends

The clear parallel, linear trends visible in the data are likely to represent past cultivation strips of unknown date. They are visible as faint earthworks on the ground.

6.3.2 Data relating to historic maps and other records

No magnetic anomaly groups correspond with objects and features recorded on historic maps or in other records.

6.3.3 Data with no previous archaeological provenance

Anomaly group 1 represents either a filled hollow or a surface. If the associated feature is a hollow then an archaeological origin such as a large pit must be considered. If it is a surface then the floor of a hut circle or spread of material from a sub-circular archaeological feature are possible origins.

Groups 4, 5 and 6 may represent a parallel double curvilinear deposits such as those from former by tracks with flanking ditches or from field lanes between enclosures. It is possible that they represent part of a double-ditched enclosure. The southwestern 'tail' of this anomaly group has a similar trend to the cultivation ridges mentioned in Section 6.3.1. On balance, the responses from the anomaly group are stronger than those of the cultivation ridges and so the anomaly group is interpreted as shown in Figure 2. The same is also true of southern sections of anomaly group 7.

The remaining groups have characteristics typical of anomalies represents disrupted linear and curvilinear deposits, such as former ditches and banks, of unknown period and more than one phase of past land management.

6.4 Conclusions

Eleven magnetic anomaly groups were mapped as representing possible archaeological deposits or features. One group (1) may represent a filled pit or a spread of archaeological material. Three groups (4, 5 and 6) together may represent double curvilinear deposits typical of a former track or possibly a double-ditched enclosure. The remaining groups are most likely to represent linear and disrupted linear deposits, such as former ditches or banks, of unknown period and from one or more phases of past land management.

7 Disclaimer and copyright

The description and discussion of the results presented in this report are the authors, based on his interpretation of the survey data. Every effort has been made to provide accurate descriptions and interpretations of the geophysical data set. The nature of archaeological geophysical surveying is such that interpretations based on geophysical data, while informative, can only be provisional. Geophysical surveys are a cost-effective early step in the multi-phase process that is archaeology. The evaluation programme of which this survey is part may also be informed by other archaeological assessment work and analysis. It must be presumed that more archaeological features will be evaluated than those specified in this report.

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8 Acknowledgements

Substrata would like to thank Marc Steinmetzer of Oakford Archaeology for commissioning us to complete this survey.

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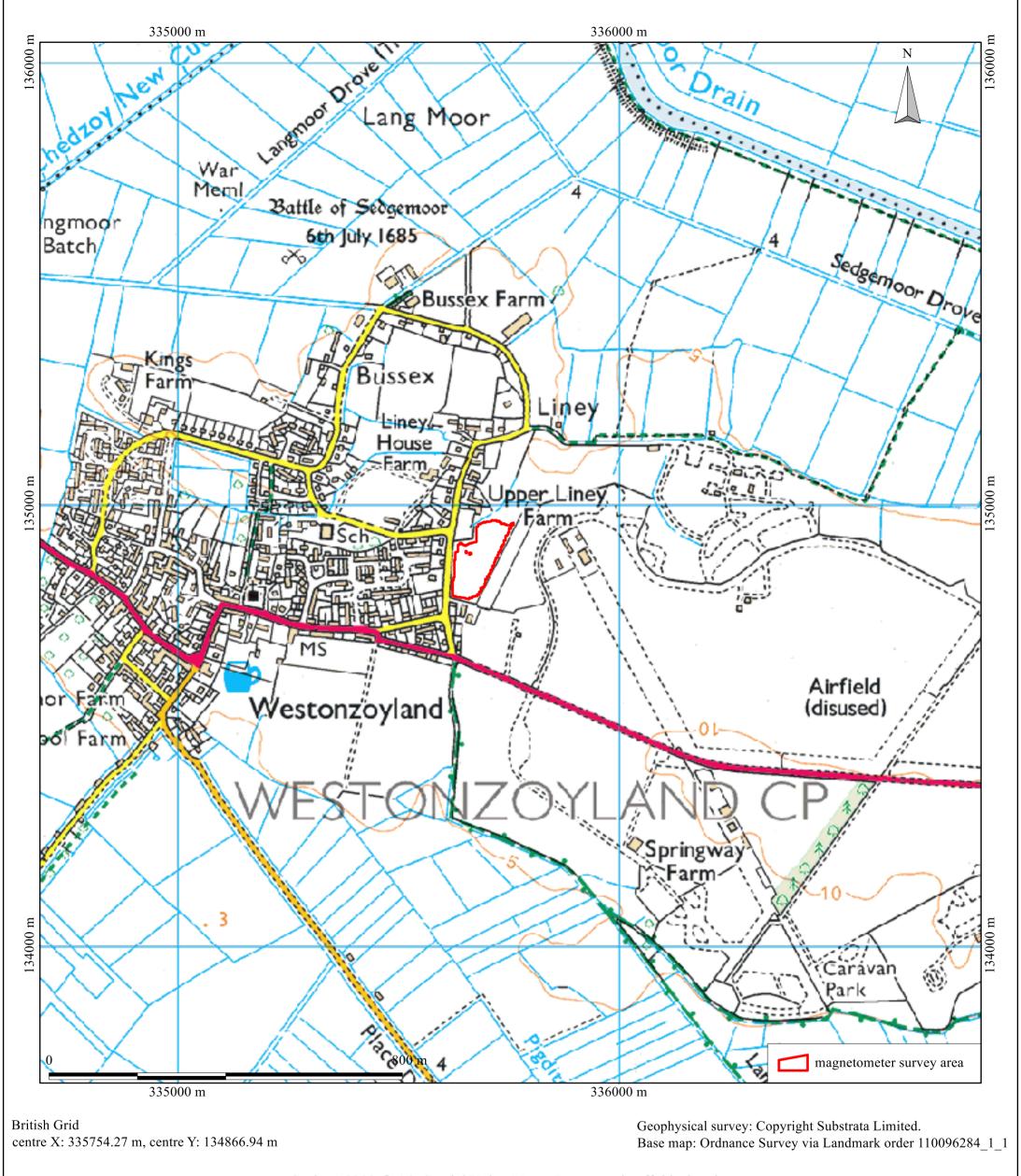
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Appendix 1 Figures

General Guidance

The anomalies represented in the survey plots provided in this appendix are magnetic anomalies. The apparent size of such anomalies and anomaly patterns are unlikely to correspond exactly with the dimensions of any associated archaeological features (see Section 6.1).

A rough rule for interpreting magnetic anomalies is that the width of an anomaly at half its maximum reading is equal to the width of the buried feature, or its depth if this is greater (Clark, 2000: 83). Caution must be applied when using this rule as it depends on the anomalies being clearly identifiable and distinct from adjacent anomalies. In northern latitudes the position of the maximum of a magnetic anomaly will be displaced slightly to the south of any associated physical feature.



Scale: 1:8000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey Land at Westonzoyland, Sedgemoor, Somerset Centred on NGR (E/N): 335680,134890 (point)

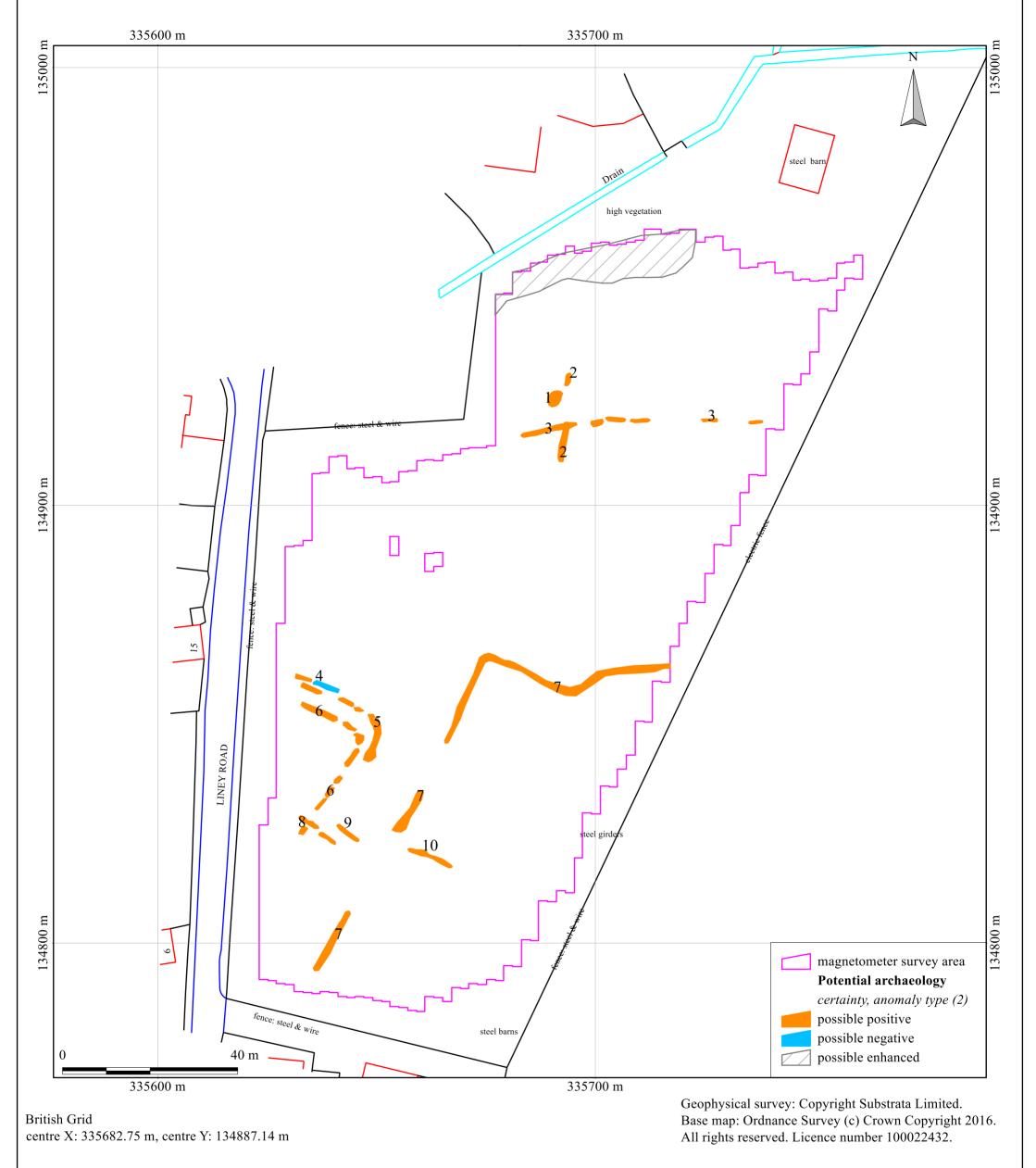
Report: 1610WES-R-1

Figure 1: location map

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Scale: 1:800 @ A3. Spatial Units: Meter. Do not scale off this drawing

Notes:

- 1. All interpretations are provisional and represent potential archaeological deposits.
- 2. 'Anomaly type' is a description of the magnetic anomaly. See the report text or GIS for an archaeological characterisation.
- 3. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
- 4. Representative; not all instances are mapped.
- 5. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

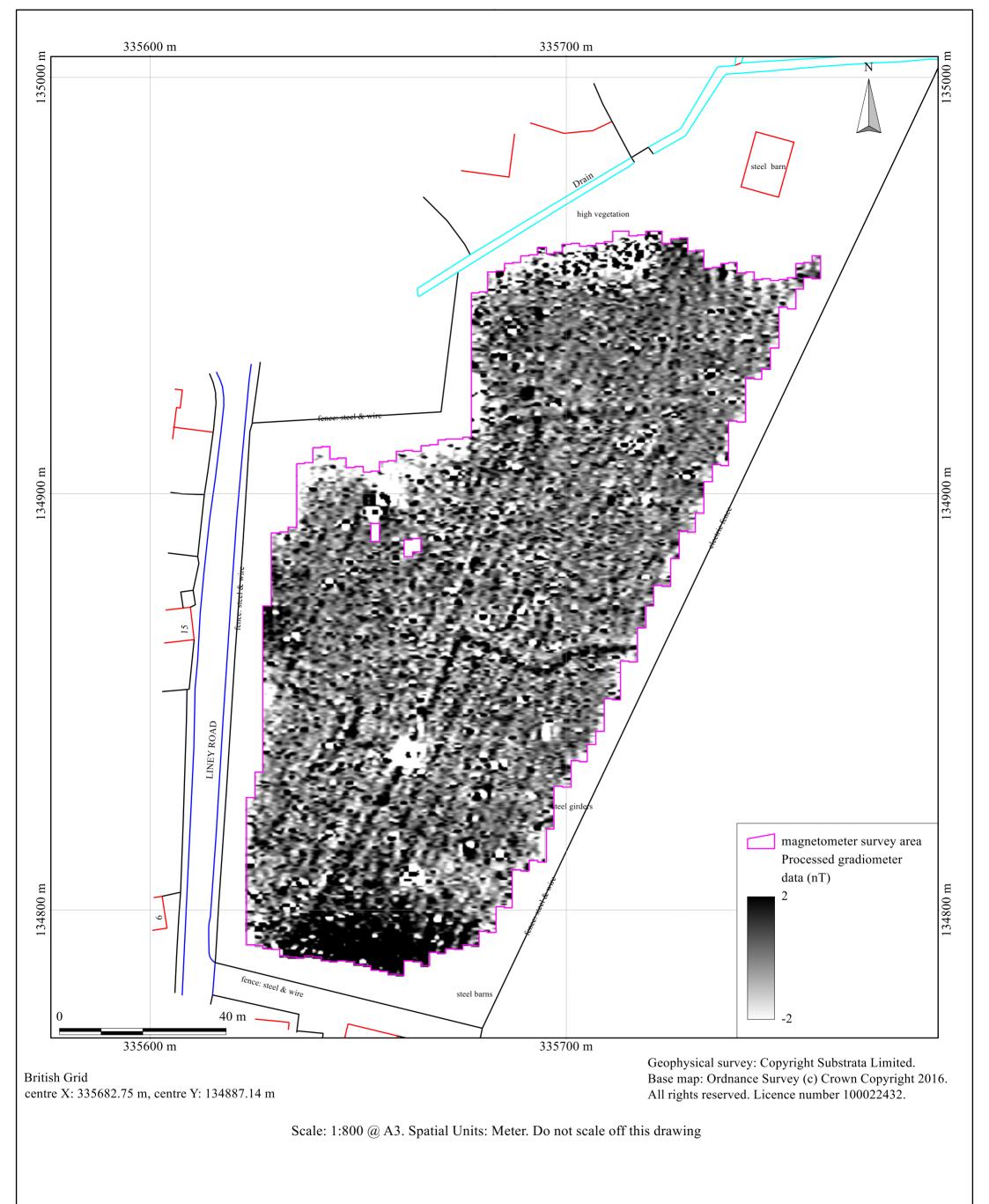
An archaeological magnetometer survey Land at Westonzoyland, Sedgemoor, Somerset Centred on NGR (E/N): 335680,134890 (point) Report: 1610WES-R-1

Figure 2: survey interpretation

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An archaeological magnetometer survey Land at Westonzoyland, Sedgemoor, Somerset Centred on NGR (E/N): 335680,134890 (point)

Report: 1610WES-R-1

Figure 3: shade plot of processed data

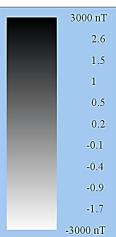
Substrata Limited Office 1, 5 Mill Street Bideford, Devon EX39 2JT Tel: 01273 273599

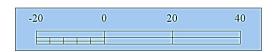
Email: geophysics@substrata.co.uk

Web: substrata.co.uk









Processes: 1 1 Base Layer Instrument Type: Units: Bartington Grad 601

nT

Direction of 1st Traverse: 0 deg Collection Method:

ZigZag 2 @ 0.00 m spacing. 32702 Sensors:

Dummy Value: Grid Size: $30\ m \ x\ 30\ m$ X Interval: 0.25 m Y Interval: 1 m

Stats

Max: 3000.00 -3000.00 Min: Std Dev: 81.07 Mean: 0.31 Median: 0.20

PROGRAM

TerraSurveyor Name: 3.0.31.0 Version:

Figure 4: shade plot of unprocessed data

Appendix 2 Tables

County: Somerset
District: Sedgemoor
Parish: Westonzoyland
Source: Heritage Gateway
Site centre: 335680,134890

HER number	grid reference	designations type	period	description	distance (m) from site centre	bearing (GN) from site centre
11905			Earlier Roman, Iron age, Bronze age	The ring ditch is semi-circular in shape and measures 21m in diameter. The ditch is up to 3m wide. It could indicate the site of a Bronze Age round barrow, or a Bronze Age, Iron Age or Early Roman roundhouse. If a barrow, it is possibly part of a Bronze Age barrow cemetery.	448	151
12793	ST360347	Farmstead, Cursus, Mortuary enclosure, Enclosure	Uncertain, Medieval, Neolithic	Aerial photographs taken in 1997 clearly show what appears to be three sides of a narrow rectilinear enclosure, possibly a neolithic cursus or mortuary enclosure. The enclosure may contain a small, subcircular feature, though this is less clear.	372	121
12794	ST362346	Cropmark enclosure, Westonzoyland Airfield	Uncertain	Aerial photographs taken in 1997 clearly show a sub rectangular enclosure. This is the approximate site of the enclosure around Weston windmill in the former open field as shown on Tithe Map of 1836. It could not be observed during a recent survey of aerial photographs.	595	119
18910	ST354353	Trackway	Uncertain, Post medieval, Medieval, Prehistoric	A probable trackway, possibly of Prehistoric or Medieval date, is visible on aerial photographs as a cropmark to the north of Bussex. The trackway is defined by two parallel, curving, ditches, 82m in length, extending from ST 3547 3528 to ST 3549 3535. The ditches are oriented southwest-northeast and are situated up to 9m apart.	496	326
18911	ST354352	Sand pit	Post medieval, Medieval	A probable Medieval or Post Medieval sand pit is visible as a cropmark on aerial photographs in Bussex to the north of Westonzoyland.	418	318
18912	ST358352	Quarry, Sand pit, Sand and gravel extraction site	Post medieval, Medieval	Twenty-four Medieval or Post Medieval probable sand pits or small sand quarries are visible as cropmarks on aerial photographs to the north of Liney.	332	21
18913	ST357352	Quarry, Sand and gravel extraction site	Post medieval, Medieval	A probable Medieval or Post Medieval sand quarry is visible as a cropmark on aerial photographs to the north of Liney.	311	4
27003	ST353353	Drain	Medieval	The Bussex rhyne played an important part in the Battle of Sedgemoor and was a physical barrier that determined the course and outcome of the battle.		317
28548	ST353348	Watching brief	2010	several possible features may represent remains associated with settlement dating from the late pre-Roman Iron Age	391	257
30218	ST353347	Excavation	1986	Evidence for late iron age and Roman settlement was uncovered.	425	243

Table 1: Historical Environment Entries thought relevant to geophysical survey

Site:

An archaeological magnetometer survey Land at Westonzoyland, Sedgemoor, Somerset Centred on NGR (E/N): 335680,134890 (point) Report: 1610WES-R-1

anomaly	associated	anomaly characterisation	anomaly form	additional archaeological	comments
group	anomalies	certainty & class		characterisation	
1	1	possible positive	oval	large pit or surface	
2	2	possible positive	disrupted linear		
3	3	possible positive	disrupted curvilinear		
2	1 5	possible positive & negative	linear		anomaly groups are part of an apparent return and, along with group 5, may relate to a former ditched track or double ditched enclosure
4	5	possible positive	disrupted return	ditched track or double-ditched boundary	anomaly groups are part of an apparent return and, along with group 6, may relate to a former ditched track or double ditched enclosure
(5	possible positive	disrupted return	ditched track or double-ditched boundary	anomaly groups are part of an apparent return and, along with group 5, may relate to a former ditched track or double ditched enclosure;
					the NNE to SSW element of this anomaly group may reflect cultivation traces rather than a linear deposit but, on balance,
	7	possible positive	disrupted return		they are considered as representing a continuation of the return element and therefore represent potential archaeological deposits
8	3	possible positive	disrupted linear		
Ģ	9	possible positive	linear		
10)	possible positive	linear		
1		possible enhanced	irregular	rubble or landfill	anomaly group could represent recent deposits or a filled-in former quarry

Table 2: data analysis

Documents

Survey methodology statement: Dean (2016)

Methodology

- 1. The work was undertaken in accordance with the survey methodology statement. The geophysical (magnetometer) survey was undertaken with reference to standard guidance provided by the Chartered Institute for Archaeologists (2014) and Archaeology Data Service (undated).
- 2. The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system.
- 3. Data processing was undertaken using appropriate software, with all anomalies being digitised and geo-referenced. The final report included a graphical and textual account of the techniques undertaken, the data obtained and an archaeological interpretation of that data and conclusions about any likely archaeology.

Grid

Method of Fixing: DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates.

Composition: 30m by 30m grids

Recording: Geo-referenced and recorded using digital map tiles.

DGPS used: Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.

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$\mathbf{L}_{\mathbf{q}}$	uı	7111	CHIL

Instrument: Bartington Instruments grad601-2

Firmware: version 6.1

Data Capture

Sample Interval: 0.25m Traverse Interval: 1 metre Traverse Method: zigzag Traverse Orientation: GN

Data Processing, Analysis and Presentation Software

IntelliCAD Technology Consortium IntelliCAD 8.0

DW Consulting TerraSurveyor3

Manifold System 8 GIS

Microsoft Corp. Office Excel 2013

Microsoft Corp. Office Publisher 2013

Adobe Systems Inc Adobe Acrobat 9 Pro Extended

Table 3: methodology summary

SITE

Instrument Type: Units: Bartington Grad-601 gradiometer

nTDirection of 1st Traverse: see below Collection Method:

ZigZag 2 @ 1.00 m spacing. 32702 Sensors:

Dummy Value:

PROGRAM

TerraSurveyor Name: 3.0.31.0 Version:

Stats		Processes: 8
Max:	14.47	1 Base Layer
Min:	-14.21	2 Clip at 1.00 SD
Std Dev:	2.77	3 De Stagger: Grids: All Mode: Both By: -1 intervals
Mean:	0.14	4 DeStripe Median Sensors: Grids: All
Median:	0.07	5 Edge Match (Area: Top 30, Left 0, Bottom 59, Right 119) to Right edge
		6 Edge Match (Area: Top 30, Left 480, Bottom 59, Right 599) to Left edge
		7 Interpolate: Match X & Y Doubled.
		8 Clip at 3.00 SD

Table 4: processed data metadata