Substrata
Archaeological Geophysical Surveyors

An archaeological gradiometer survey

Land adjacent to Lyte Lane, West Charleton, Devon

Ordnance Survey (E/N): 275710,42650 (point)

Report: 140516

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Accompanying CD-ROM

1 Survey description and summary

Type of survey:	twin-sensor fluxgate gradiometer
Date of survey:	10 April 2014
Area surveyed:	1.5 ha
Lead surveyor:	Ross Dean BSc MSc MA MIfA

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

Location

Site:	Land adjacent to Lyte Lane, West Charleton
Civil Parish:	Charleton
District:	South Hams
County:	Devon
Nearest Postcode:	TQ7 2BP
NGR:	SX 757 426 (point)
Ordnance Survey E/N:	275710,42650 (point)
OASIS number:	substrata1-179324
Section 42 licence:	EH ref: AA/80463/5, Case No. SL00075772, Monument No. 1019788
Archive:	At the time of writing, the archive of this survey will be held by Substrata.

Summary
This report was commissioned by Oakford Archaeology on behalf of clients. It was prepared by Substrata as supporting information for a forthcoming planning application relating to the above site. The location of the site is shown in Figures 5 and 6. A Section 42 licence was granted for this work which took place over a Scheduled Monument (National Heritage List for England entry 1019778).

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

Fifty-four magnetic anomaly groups were identified as pertaining to archaeological deposits or structures. One group reflects an extant Late Neolithic to Bronze Age bowl barrow which is recorded in the Devon and Dartmoor Historical Environment Record (entry MDV63931) and is part of a Scheduled Monument (National Heritage List for England entry 1019778). It is one of three Late Neolithic to Bronze Age bowl barrows on a south-south-east to north-north-west alignment that form part of a wider round barrow cemetery which contains at least 12 barrows in all. Two other anomaly groups have broadly similar patterns and may represent ploughed-out barrows. Two groups may relate to deposits of strongly heated material and, as such, reflect past craft, industrial or funerary activities. A further two groups could relate to in-situ highly heated deposits such as those left by furnaces and kilns. Thirteen groups may indicate the presence of pits or large postholes although natural origins cannot be ruled out. One group probably reflects a Devon bank field boundary not recorded on any historical Ordnance Survey map. Two groups may represent a curvilinear bank-and-ditch structure. There is the possibility that one anomaly group represents a sub-circular structure. The remaining anomalies identified as potential archaeological deposits are linear and curvilinear anomalies that may relate to former fields or other enclosure boundaries not recorded on historical Ordnance Survey maps and likely to represent more than one phase of past land use.

2 Survey aims and objectives

Survey aims
1. Define and characterise and detectable archaeological remains on the site.
2. Inform any future archaeological investigation of the area.

Survey Objectives

1. Complete a gradiometer 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 site about the location and possible archaeological character of the recorded anomalies.

3 Standards

The standards used to complete this survey are defined by the Institute for Archaeologists (2011). The codes of approved practice that were followed are those of the Institute for Archaeologists (2008 and 2009) and Archaeology Data Service/Digital Antiquity Guides (undated). The document text was written using the house style of the Institute for Archaeologists (Institute for Archaeologists, undated).

4 Site description

Landscape

The survey area comprised part of one field on the western side of West Charleton. The area is bordered by field the rest of the field to the north, the village to the west, the A379 to the south and fields to the east (Figure 6).

The land sloped lies from approximately 50m O.D. at its northern side to 40m O.D. at its southern boundary (Figure 5)

Land use at the time of the survey

Agricultural.

Geology

The site is located on a solid geology of slate, siltstone and sandstone of the Devonian Meadfoot Formation. These typically comprise dark shales and siltstones with sporadic grey-brown sandstones and beds of decalcified shell debris. The upper part exhibits red coloration in places (British Geological Survey, undated).

The superficial geology was not recorded in the source used (ibid.).

5 Archaeological background

What follows is a short summary of information obtained from the National Heritage List for England and the Devon and Dartmoor Historic Environment Record (HER) within 500m of the proposed development site and relevant to the understanding of the gradiometer survey. Except where specifically cited, this information was obtained using the Heritage Gateway (English Heritage, undated 1). PastScape (English Heritage, undated 2) records were also consulted as, on occasion, the website has entries not yet placed in the HER.

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

Historical landscape characterisation

The proposed development site has been classified as

'Modern enclosures adapting post-medieval fields': Modern enclosures that have been created by adapting earlier fields of probable post-medieval date (Devon County Council, undated).

Heritage assets within a 500m radius of the survey area

There are four Scheduled Monuments close the proposed development site. Together they form a round-barrow cemetery which contained at least 12 barrows in all. Some of the barrows are no longer considered to be of national importance as they are ploughed flat. The remaining are recorded as groups of barrows in the National Heritage List for England and as entries in the Devon and Dartmoor Historic Environment Record (HER) and on the English Heritage PastScape website. A summary of the entries in the National Heritage List for England and the Devon and Dartmoor HER are provided below along with a reference to relevant PastScape entries.

Referring to the summaries provided below, the Scheduled Monument 1019788 has elements within the proposed site as detailed in HER entry MDV63931. HER entry MDV36922 is not known to relate to the barrow cemetery. National Heritage List Entry 1019789 and MER entry MDV63168 are included to complete the summary of the barrow cemetery although they lie just outside the 500m radius limit of this summary.

National Heritage List for England

List Entry Number 1019788: *Three bowl barrows 310m west of Home Farm, forming part of a round barrow cemetery.* This monument includes three Late Neolithic to Bronze Age bowl barrows, scattered across a south facing slope on a SSE to NNW alignment, with local views across the Kingsbridge Estuary to the east and west. The eastern mound measures 43m in diameter and survives up to 1.5m high with an encircling ditch 10m wide and 0.2m deep. The central mound measures 35m in diameter and up to 0.2m high, and the western barrow is 28m in diameter and up to 0.5m high. Both of these mounds have encircling quarry ditches which survive as buried features. The road surfacings are excluded from the scheduling, although the ground beneath is included.
Related HER entries: MDV63167, MDV63169
Western mound: NGR SX 75707 42684, HER MDV63931, PastScape Monument 1355876
Central mound: NGRSX 75867 42608, HER MDV63930, PastScape Monument 1355874
Eastern barrow: NGRSX 75968 42568, HER MDV36662, PastScape Monument 444479

List Entry Number: 1019789: *Bowl barrow 530m south east of Duncombe Court, forming an outlying part of a barrow cemetery*. This monument includes a large Late Neolithic to Bronze Age bowl barrow. It forms an outlier to a wider round barrow cemetery which contained at least 12 barrows in all. The barrow is located on a gentle north facing slope with wide local views to the north and west. It is composed of grey-brown soil with many blue slate fragments. It measures 30m in diameter, surviving up to 1.2m high. The surrounding quarry ditch is 9m wide and 0.2m deep. NGR SX 75805 43371 (point).
Related HER entries: MDV63167, MDV63169
HER MDV63168, PastScape Monument 1344547

List Entry Number: 1019790: *Bowl barrow 400m south of Home Farm, forming an outlying part of a round barrow cemetery*. This monument includes a bowl barrow forming an outlier to a round barrow cemetery of the Late Neolithic to Early Bronze Age, located on the northern edge of a hilltop overlooking a shallow valley with local views across the Kingsbridge estuary to the south and east. This barrow survives as an earthen mound 23m in diameter and up to 0.8m high with an encircling quarry ditch 8m wide and 0.15m deep. NGR SX 76196 42210 (point).
HER Number MDV63166, PastScape Monument 1344670

List Entry Number: 1019791: *Two bowl barrows 440m south east of Duncombe Court, forming part of a round barrow cemetery.* This monument includes two bowl barrows occupying a hilltop site with wide views to the north, west and south. The eastern barrow in this monument survives as a large mound 45m in diameter and up to 1m high, with a surrounding quarry ditch 12m wide and 0.2m deep. A smaller barrow to the west measures 25m in diameter and is up to 0.3m high. Its surrounding ditch is 5m wide, but is only visible on the east side, where it is 0.1m deep. On the west it survives as a buried feature. NGR SX 75541 43132 (point).
Related HER entries: MDV63167, MDV63169

HER MDV63616, PastScape Monument: 1344681

Devon and Dartmoor Historic Environment Record

HER Number MDV36662: *Bowl Barrow near Home Farm, East Charleton.* A possible barrow of Bronze Age date is visible on aerial photographs from the 1946 onwards and on LiDAR images between 1998-2008. The mound measures up to 30 metres across and is on average 1.3 metres in height although it has been spread by the plough, and the north and west sides have been cut by the road and a hedge respectively. Late Neolithic to Late Bronze Age - 3000 BC to 701 BC (Between). NGR SX 759 425 (point).
Scheduled Monument 1019788, National Monuments Record 444479, PastScape Monument 444479
Associated Monuments: MDV63616, MDV63166, MDV63167, MDV63168, MDV63169, MDV63930, MDV63931
Associated Events: EDV6127 - Rapid Coastal Zone Assessment Survey National Mapping Programme (NMP) for South-West England - South Coast Devon

HER MDV36922: *Linear Features south of West Charleton.* Complex of linear features recorded as a crop mark in 1984 to the south of West Charleton. Unknown date. NGR SX 754 422 (point).

HER MDV63166: *Bowl Barrow to South of East Charleton.* A Bowl barrow, visible on aerial photographs from the 1940's onwards and on LiDAR images of between 1998-2008, forming an outlier to a round barrow cemetery of the Late Neolithic to Early Bronze Age, located on the northern edge of a hilltop overlooking a shallow valley with local views across the Kingsbridge estuary to the south and east. Earthen mound 23 metres in diameter and up to 0.8 metres high with an encircling quarry ditch 8 metres wide and 0.15 metres deep. Late Neolithic to Late Bronze Age - 3000 BC to 701 BC (Between). NGR SX 761 422 (point).
Scheduled Monument 1019790, National Monuments Record 1344670, PastScape Monument 1344670,
Associated Monuments: MDV36662, MDV63167, MDV63168, MDV63616, MDV63930, MDV63931
Associated Events: EDV6127 - Rapid Coastal Zone Assessment Survey National Mapping Programme (NMP) for South-West England - South Coast Devon

HER MDV63167: *Shale Stone Spreads near West Charleton.* An archaeological field investigation was undertaken by Exeter Archaeology in March 2000 on a possible barrow cemetery in the fields to the east of West Charleton. Most of the shale stone spreads thought to be round barrows coincided with former field boundaries and could represent 19th and 20th century hedgebank clearance. Unknown date. NGR SX 756 431 (point).
Scheduled Monuments 1019788, 1019789, 1019791
Associated Monuments: MDV36662, MDV63168, MDV63616, MDV63169
Associated Events: EDV4008 (unnamed), EDV4009 (unnamed)

HER MDV63168: *Bowl Barrow near Duncombe Court, West Charleton*. Large Late Neolithic to Bronze Age bowl barrow which forms an outlier to a wider round barrow cemetery which contained at least 12 barrows in all. Located on a gentle north facing slope with wide local views to the north and west. It is composed of grey-brown soil with many blue slate fragments. It measures 30 metres in diameter, surviving up to 1.2 metres high. The surrounding quarry ditch is 9 metres wide and 0.2 metres deep. Late Neolithic to Late Bronze Age - 3000 BC to 701 BC (Between). NGR SX 758 433 (point).
Scheduled Monument 1019789, PastScape Monument: 1344547
Associated Monuments: MDV36662, MDV63166, MDV63167, MDV63169, MDV63616, MDV63930, MDV 63931

HER MDV63169: *Prehistoric Flint Scatter at West Charleton*. A total of 58 worked lithics were recovered from the survey area to the east of West Charleton including a leaf-shaped arrowhead, a knife, eight blades, four cores, three scrapers and 35 flakes. No relationship was established between the lithic scatters and the possible round barrows. Early Neolithic to Early Bronze Age - 4000 BC to 1501 BC (Between). NGR SX 756 431 (point).

Scheduled Monuments 1019788, 1019789, 1019791
Associated Monuments: MDV63167, MDV63168, MDV63616
Associated Event: EDV4010 (unnamed)

HER MDV63616: *Bowl Barrows near Duncombe Court, West Charleton*. Two bowl barrows occupying a hilltop site with wide views to the north, west and south. They form part of a round barrow cemetery which contained at least 12 barrows in all. The eastern barrow survives as a large mound, 45 metres in diameter and up to 1 metre high, with a surrounding quarry ditch 12metres wide and 0.2 metres deep. A smaller barrow to the west measures 25 metres in diameter and is up to 0.3 metres high. Its surrounding ditch is 5 metres wide but is only visible on the east side, where it is 0.1 metre deep. On the west it survives as a buried feature. Bronze Age - 2200 BC to 701 BC (Between). NGR SX 755 431 (point).
Scheduled Monument 1019791, PastScape Monument 1344681
Associated Monuments: MDV36662, MDV63166, MDV63167, MDV63168, MDV63169, MDV63930, MDV 63931
Associated Events: EDV6127 - Rapid Coastal Zone Assessment Survey National Mapping Programme (NMP) for South-West England - South Coast Devon

HER MDV63930: *Bowl Barrow near Home Farm, East Charleton*. One of three Late Neolithic to Bronze Age bowl barrows, scattered across a south facing slope on a south-south-east to north-north-west alignment, with local views across the Kingsbridge Estuary to the east and west. The barrows form part of a round barrow cemetery which contained at least 12 barrows in all. The central mound measures 35 metres in diameter and up to 0.2 metres high. It has an encircling quarry ditch which survives as a buried feature. Late Neolithic to Late Bronze Age - 3000 BC to 701 BC (Between). NGR SX 758 426 (point).
Scheduled Monument 1019788.
PastScape Monuments 1355874
Associated Monuments: MDV36662, MDV63166, MDV63168, MDV63616, MDV 63931

HER MDV63931: *Bowl Barrow near Home Farm, East Charleton*. One three Late Neolithic to Bronze Age bowl barrows, scattered across a south facing slope on a south-south-east to north-north-west alignment, with local views across the Kingsbridge Estuary to the east and west. The barrows form part of a wider round barrow cemetery which contained at least 12 barrows in all. The western mound is 28 metres diameter and up to 0.5 metres high with an encircling quarry ditch which survives as a buried feature. Late Neolithic to Late Bronze Age - 3000 BC to 701 BC (Between). NGR SX 757 426(point).
Scheduled Monument 1019788
PastScape Monument 1355876
Associated Monuments: MDV36662, MDV63616, MDV63166, MDV63168, MDV63930
Within proposed development area.

6 Results, discussion and conclusions

This survey was designed to record magnetic anomalies. The anomalies themselves cannot be regarded as actual archaeological features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeological features. The analysis presented below attempts to identify and characterise anomalies and anomaly groups that may pertain to archaeological deposits and structures.

The reader is referred to section 7.

6.1 Results

Figure 1 (this section) shows the interpretation of the survey and includes the anomaly groups identified as pertaining to archaeological deposits along with their numbers. Table 1 is an extract from a detailed analysis of the survey data provided in the attribute tables of the GIS project on the accompanying CD-ROM.

Figure 1 and Table 1 comprise the analysis of the survey data.

Plots of the processed data are provided in Figures 2, 3 and 4 (appendix 1).

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anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
1		possible positive	linear		anomaly group has a relatively high magnetic response and may relate to a service or archaeological feature	
2		possible positive	oval	pit		
3		possible positive	disrupted linear		anomaly group may reflect one or two linear archaeological deposits	
4		possible positive	disrupted linear			
5		possible positive	disrupted linear			
6		possible positive	disrupted linear			
7		possible positive	disrupted linear			
8		possible positive	oval	pit		
9		possible positive	linear			
10		likely positive	disrupted oval	barrow	anomaly group coincides with a barrow recorded as part of a Scheduled Monument	National Heritage List for England entry 1019778, Devon & Dartmoor HER MDV63931
11		possible positive	disrupted linear			
12		possible positive	disrupted oval	barrow	anomaly group similar to that coinciding with a known barrow	
13		possible positive	disrupted linear			
14		possible pos/neg/pos	disrupted linear	field boundary	anomaly group exhibits the characteristics of a Devon bank field boundary (earth bank with rubble flanks and flanking ditches) although a ditched lane remains a less likely possibility	
15		possible positive	disrupted linear			
16		possible positive	disrupted linear			
17		possible positive	multilinear			
18		possible positive	oval	pit		
19		possible positive	oval	pit		
20		possible positive	linear			
21		possible positive	disrupted oval			
22		possible positive	disrupted oval			
23		possible positive	disrupted oval			
24		possible positive	oval	pit		
25		possible positive	disrupted oval			
26		possible high contrast		industrial/craft/burnt deposits	anomaly groups may relate to ferrous deposits but this is unlikely; may relate to a barrow given location within a barrow cemetery	
27		possible high contrast		industrial/craft/burnt deposits	anomaly groups may relate to ferrous deposits but this is unlikely; may relate to a barrow given location within a barrow cemetery	
28		possible positive	disrupted linear			
29		possible positive	linear			
30		possible positive	linear			
31		possible positive	disrupted linear			
32		possible positive	disrupted linear			
33		possible positive	disrupted linear			
34		possible positive	oval	pit		
35		possible north-south high-low		in-situ burnt deposits	anomaly groups contrast and alignment suggest possible in-situ highly heated deposits	
36		possible positive	disrupted linear			
37		possible north-south high-low		in-situ burnt deposits	anomaly groups contrast and alignment suggest possible in-situ highly heated deposits	
38		possible positive	oval	pit		
39		possible positive	disrupted oval			
40		possible positive	disrupted oval	barrow	anomaly group similar to that coinciding with a known barrow	
41		possible positive	disrupted oval			
42		possible positive	oval	pit		
43	44	possible negative	disrupted curvilinear		anomaly group disrupted by relatively recent ploughing but together with 44 may indicate an archaeological structure/deposit	
44	43	possible positive	disrupted curvilinear		anomaly group disrupted by relatively recent ploughing but together with 43 may indicate an archaeological structure/deposit	
45		possible positive	disrupted linear			
46		possible positive	oval	pit		
47		possible positive	disrupted linear			
48		possible positive	disrupted linear			
49		possible positive	disrupted linear			
50		possible positive	sub-circular		anomaly group is disrupted by relatively recent ploughing but, on balance, exhibits a sub-circular shape	
51		possible positive	disrupted linear			
52		possible positive	oval	pit		
53		possible positive	linear			
54		possible positive	disrupted linear			

Table 1: data analysis

275700 m

N

42700 m

42600 m

survey area

Potential archaeology

certainty, anomaly type

likely positive (2)

possible positive

possible negative

possible high contrast

possible north-south high-low

0

50 m

[Coordinate System]
centre X: [Page Center X], centre Y: [Page Cente

Scale: 1:700 @ A3. Spatial Units: Meter. Do not scale off this drawing

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposit

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Figure 1: survey interpretation

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6.2 Discussion

Refer to Figures 1 (this section), 2, 3 and 4 (appendix 1).

Not all anomalies or anomaly groups identified in the survey dataset are necessarily discussed below. All identified anomaly groups are recorded in the GIS project on the accompanying CD-ROM. Those anomaly groups possibly representing archaeological deposits are included in the data analysis (Table 1).

General points
Anomalies though to relate to natural features were not mapped.

Recent man-made objects such as manholes, likely buried iron and steel objects, water management equipment or drains have not been mapped except where they comprise significant magnetic responses across the dataset.

Data collection along the field edges was restricted as shown in Figures 2 to 4 due to the presence of magnetic materials and objects in and adjacent to the field boundaries. Strong magnetic responses mapped close to the field boundaries are likely to relate to these items except where indicated otherwise in Figure 1.

There is a clear west-north-west to east-south-east trend across the data set which is likely to reflect recent ploughing (Figure 1).

Data relating to historical maps and other records
Anomaly group **10** coincides with, and is likely to reflect, an extant barrow (National Heritage List for England entry 1019778, Devon and Dartmoor Historical Environment Record entry MDV63931). It is one of three Late Neolithic to Bronze Age bowl barrows on a south-south-east to north-north-west alignment which form part of a wider round barrow cemetery which contained at least 12 barrows in all. This barrow is thought to be Late Neolithic to Late Bronze Age (see Section 5 and Figure 5).

Data with no previous provenance
Anomaly groups **12 and 40** have broadly similar patterns to that of group 10. Given this and the presence of a barrow cemetery, it is a strong possibility that these groups represent ploughed-out barrows although this can only be confirmed by further archaeological investigations.

Groups **26 and 27** may relate to deposits of strongly heated material and, as such, could be related to past craft, industrial or funerary activities. Alternatively, they may reflect relatively recent deposits of ferrous material but this is less likely.

Groups **35 and 37** have characteristics that indicate they could relate to in-situ highly heated deposits such as, for example, those left by furnaces and kilns. The possibility remains that they reflect relatively recent deposits of ferrous material with fortuitous anomaly alignments.

Groups **2, 8, 18, 19, 24, 34, 38, 42, 46 and 52** have tight, well defined positive magnetic responses which can indicate the presence of pits or large postholes although a natural origin cannot be ruled out. Groups **23, 25 and 41** are similar although larger anomaly groups and may represent larger pits.

Anomaly group **14** probably reflects a Devon bank field boundary not recorded on any historical Ordnance Survey map. Devon banks comprise an earthen bank with dry stone retaining flanks and ditches to each side. There is a lesser possibility that the group represents a ditch-flanked field lane or track.

Groups **43 and 44** together may represent a curvilinear bank-and-ditch structure.

Group **50** has been interpreted as a curvilinear or partially sub-circular anomaly pattern but, as can be seen in Figure 3, the group could comprise of an extension of group 44 combined with two adjacent features. On balance, the curvilinear interpretation was adopted.

The remaining anomalies identified as potential archaeological deposits are linear and curvilinear anomalies that may relate to former fields or other enclosure boundaries not recorded on historical Ordnance Survey maps and likely to represent more than one phase of past land use.

6.3 Conclusions

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

Fifty-four magnetic anomaly groups were identified as pertaining to archaeological deposits or structures. One group reflects an extant Late Neolithic to Bronze Age bowl barrow which is recorded in the Devon and Dartmoor Historical Environment Record (entry MDV63931) and is part of a Scheduled Monument (National Heritage List for England entry 1019778). It is one of three Late Neolithic to Bronze Age bowl barrows on a south-south-east to north-north-west alignment that form part of a wider round barrow cemetery which contains at least 12 barrows in all. Two other anomaly groups have broadly similar patterns and may represent ploughed-out barrows. Two groups may relate to deposits of strongly heated material and, as such, reflect past craft, industrial or funerary activities. A further two groups could relate to in-situ highly heated deposits such as those left by furnaces and kilns. Thirteen groups may indicate the presence of pits or large postholes although natural origins cannot be ruled out. One group probably reflects a Devon bank field boundary not recorded on any historical Ordnance Survey map. Two groups may represent a curvilinear bank-and-ditch structure. There is the possibility that one anomaly group represents a sub-circular structure. The remaining anomalies identified as potential archaeological deposits are linear and curvilinear anomalies that may relate to former fields or other enclosure boundaries not recorded on historical Ordnance Survey maps and likely to represent more than one phase of past land use.

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.

8 Acknowledgements

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

9 Bibliography

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Appendix 1 Supporting plots

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.

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.

275700 m

N

42700 m

42600 m

1

2

Processed data shade

nT

4

-4

0

50 m

275700 m

[Coordinate System]
centre X: [Page Center X], centre Y: [Page Cente

Scale: 1:700 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 2: shade plot of processed data

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Email: geophysics@substrata.co.uk
Web: substrata.co.uk

275700 m

N

42700 m

42600 m

1

2

Processed data contours

nT

< -8.00

-8.00 - -4.00

-4.00 - -2.00

-2.00 - -1.00

-1.00 - 1.00

1.00 - 2.00

2.00 - 4.00

4.00 - 8.00

> 8.00

0

50 m

275700 m

[Coordinate System]
centre X: [Page Center X], centre Y: [Page Cente

Scale: 1:700 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land adjacent to Lyte Lane, West Charleton, Devon
Ordnance Survey (E/N): 275710,42650 (point)
Report 140516

Figure 3: contour plot of processed data (+/- 8nT)

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

275700 m

N

42700 m

42600 m

1

2

Processed data contours 2

nT

< -32.00

-32.00 - -16.00

-16.00 - -8.00

-8.00 - -4.00

-4.00 - -2.00

-2.00 - 2.00

2.00 - 4.00

4.00 - 8.00

8.00 - 16.00

16.00 - 32.00

> 32.00

0

50 m

275700 m

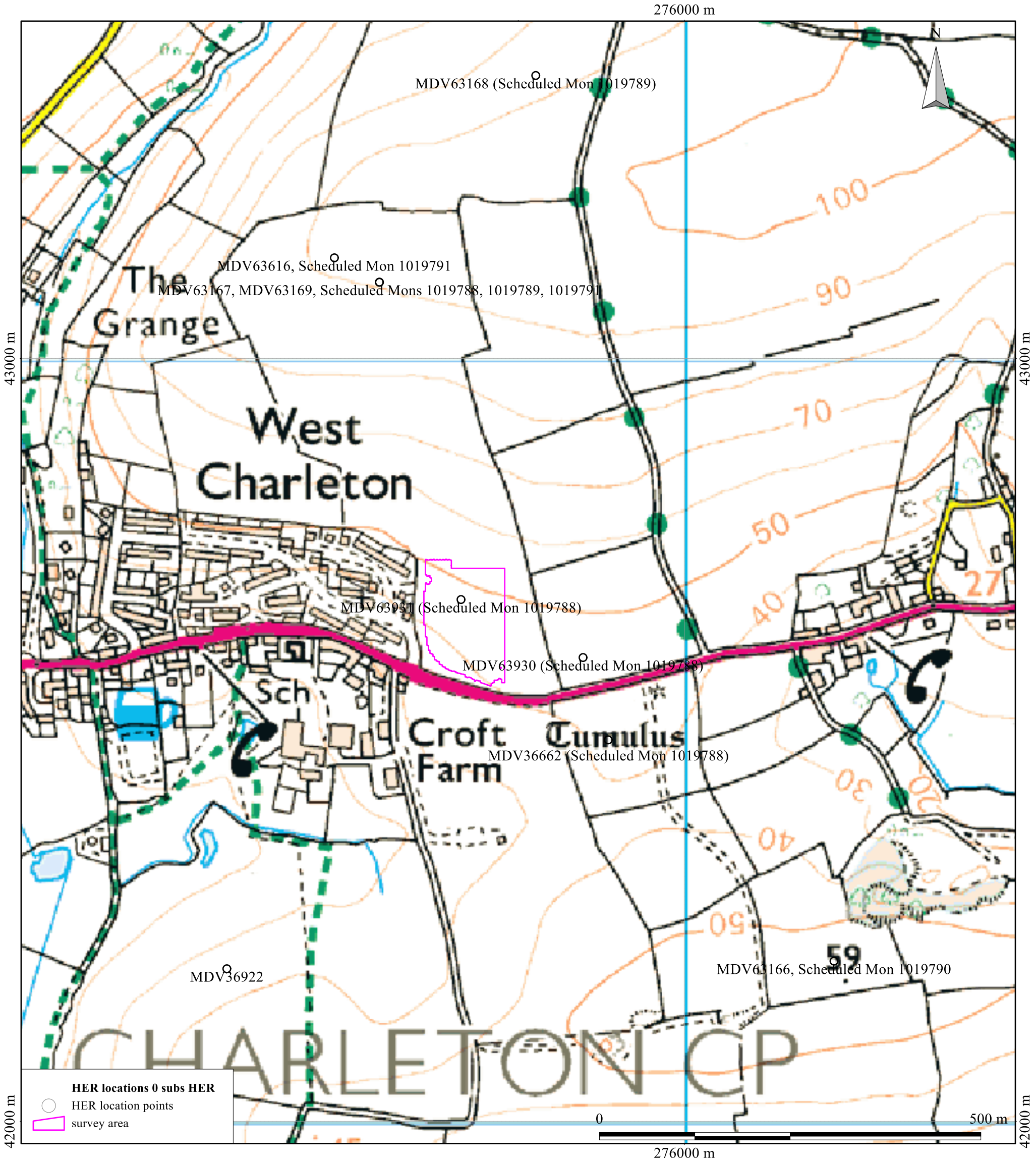
[Coordinate System]
centre X: [Page Center X], centre Y: [Page Cente

Scale: 1:700 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land adjacent to Lyte Lane, West Charleton, Devon
Ordnance Survey (E/N): 275710,42650 (point)
Report 140516

Figure 4: contour plot of processed data (+/- 32nT)

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



[Coordinate System]
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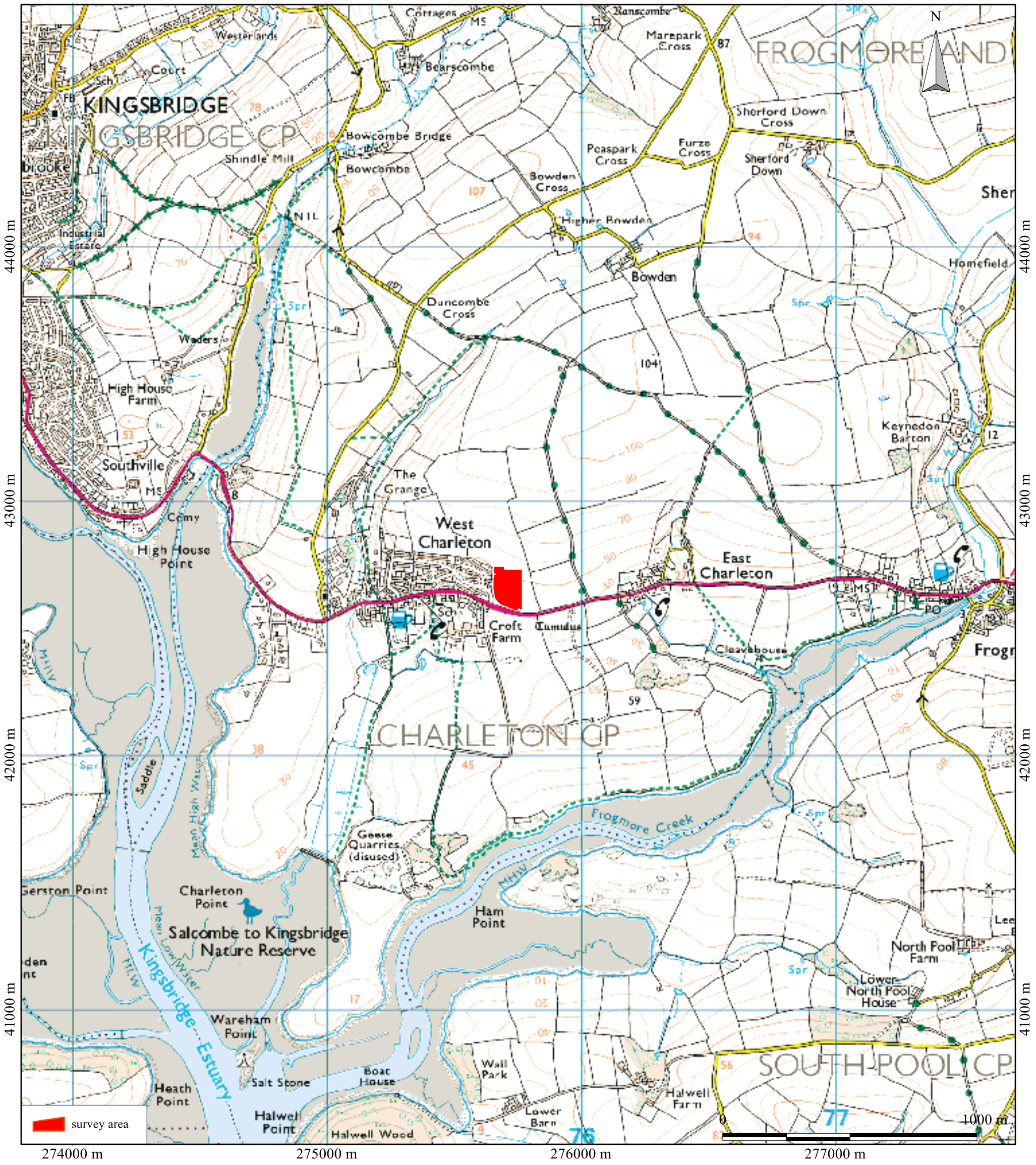
Scale: 1:5000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land adjacent to Lyte Lane, West Charleton, Devon
Ordnance Survey (E/N): 275710,42650 (point)
Report 140516

Figure 5: survey area and relevant HER entry locations (see section 5 in the accompanying report for HER entry summaries)

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



[Coordinate System]
centre X: [Page Center X], centre Y: [Page Cente

Scale: 1:15000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Land adjacent to Lyte Lane, West Charleton, Devon
Ordnance Survey (E/N): 275710,42650 (point)
Report 140516

Figure 6: location map

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
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Email: geophysics@substrata.co.uk
Web: substrata.co.uk

Appendix 2 Methodology Summary

<table>
<tr><th colspan="2">Table 2: methodology summary</th></tr>
<tr><td colspan="2">Documents
Survey methodology statement: Dean (2014)</td></tr>
<tr><td colspan="2">Methodology
1. The work was undertaken in accordance with the survey methodology statement. The geophysical (gradiometer) survey was undertaken with reference to standard guidance provided by the Institute for Archaeologists (2011) and Archaeology Data Service/Digital Antiquity Guides (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.</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td>Equipment
Instrument: Bartington Instruments grad601-2
Firmware: version 6.1</td><td>Data Capture
Sample Interval: 0.25-metres
Traverse Interval: 1 metre
Traverse Method: zigzag
Traverse Orientation: GN</td></tr>
<tr><td colspan="2">Data Processing, Analysis and Presentation Software
IntelliCAD Technology Consortium IntelliCAD 7.2
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</td></tr>
</table>

Appendix 3 Data processing

Table 3: gradiometer survey - processed data metadata
SITE Instrument Type: Bartington Grad 610 Units: nT Direction of 1st Traverse: 0 deg Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing. Dummy Value: 32702 PROGRAM Name: TerraSurveyor Version: 3.0.25.1
Stats Max: 127.90 Min: -127.53 Std Dev: 4.44 Mean: 0.20 Median: 0.00 Surveyed Area: 1.4642 ha Processes: 4 1 Base Layer 2 Clip at 4.00 SD 3 De Stagger: Grids: All Mode: Both By: -3 intervals 4 DeStripe Median Sensors: All Note: exporting the processed data from TerraSurveyor into Manifold GIS for analysis imposes an 'x matches y' interpolation on the data which is reflected in the processed data figures.

Appendix 4 Geophysical surveying techniques

1 Introduction

Substrata offers magnetometer and earth resistance surveying. We also provide other archaeology-specific geophysical surveys such as ground penetrating radar and resistivity. The particular method or combination of methods used depends on local soil conditions and the survey requirements. These methods are capable of delivering fast and accurate assessments of the archaeology of both large and small sites.

Further details can be found on our website at www.substrata.co.uk.

2 Magnetometer surveying

Standard magnetometer surveys are the workhorse of archaeological surveying when speed and cost-effectiveness are important. Identifiable archaeological features include areas of occupation, hearths, kilns, furnaces, ditches, pits, post-holes, ridge-and-furrow, timber structures, wall footings, roads, tracks and similar buried features.

Magnetometer surveying is used to detect and map small changes in the earth's magnetic field caused by concentrations of ferrous-based minerals within the soil and subsoil, and by materials buried beneath the surface. While most of these changes are too small to affect a compass needle, they can be detected and mapped by sensitive field equipment. During surveys the different magnetic properties of top-soils, sub-soils, rock formations and archaeological features are recorded as variations against a background value. Subsequently magnetic anomalies resulting from potential archaeology can be identified and interpreted.

Bartington grad601-2 gradiometers

A gradiometer is a type of magnetometer and is sensitive to relatively small changes in the earth's magnetic field. Our primary surveying instruments are Bartington Grad601-2 (dual sensor) fluxgate gradiometers with automatic data loggers. They are specifically designed for field use by archaeologists. The Bartington gradiometers provide proven technology in archaeological magnetic surveying and offer fast, accurate set-up and survey rates. They are sensitive to depths of between 0 and 1.5m below ground level, with optimum sensitivity at depths of 1m or less.

Multiple sensor arrays

A technique relatively new to commercial archaeological surveying but well understood in academic circles involves the use of multiple magnetometer sensors towed behind a quad bike or similar vehicle. With multiple sensors and the use of on-board GPS units, it is possible to achieve faster survey rates at competitive commercial rates when compared to the use of multiple instruments and the techniques discussed above provided the ground is suitable for the vehicle and array. Substrata is pleased to announce that we now offer this service on suitable larger sites

3 Earth resistance surveying

Earth resistance surveying is an excellent tool for detecting buried archaeology. Its relatively slow rate of survey compared to magnetometer surveys means that it usually employed in commercial surveys when a detailed understanding of buried building remains is required. This technique measures changes in the electrical resistance of the ground being surveyed. In practice, the recording of differences in the electrical resistance of near-surface deposits and structures allows the detection and interpretation of masonry and brick foundations, paving and floors, drains and other cavities, large pits, building platforms, robber trenches, ditches, graves and similar buried features.

Resistance to electrical current flow in the ground depends on the moisture content and structure of the soil and other materials buried beneath the surface. For example, the higher the moisture content of a soil, the less resistant it is to electrical current flow. A ditch completely buried beneath the present ground surface is likely to have an infill soil different to that surrounding the ditch in terms of compactness and composition. As a result, the soil filling the buried ditch will retain moisture in a different way to the surrounding soil which means it will

have an electrical resistance at variance with the surrounding environment. By passing a small current through the ground it is possible to detect, record, plot and interpret such changes in electrical resistance.

For earth resistance surveying Substrata uses the Geoscan Research RM15 series multi-probe resistance meters and purpose-built automatic data-loggers. The Geoscan MPX15 multiplexer is an integral part to the instrument configuration and facilitates multi-probe arrays which speed up survey area coverage rates and, if required, facilitate simultaneous multiple-depth data collection.

Appendix 5 English Heritage Geophysical Survey Database Questionnaire

ENGLISH HERITAGE

English Heritage Geophysical Survey Database Questionnaire

Survey Details

Name of Site: Three Bowl Barrows 310m west of Home Farm

County: Devon

NGR Grid Reference (Centre of survey to nearest 100m): SX 757 426 (point)

Start Date: 10 April 2014 **End Date: 23 May 2014**

Geology at site (Drift and Solid):
The site is located on a solid geology of slate, siltstone and sandstone of the Devonian Meadfoot Formation. These typically comprise dark shales and siltstones with sporadic grey-brown sandstones and beds of decalcified shell debris. The upper part exhibits red coloration in places (British Geological Survey, undated).

The superficial geology was not recorded in the source used (ibid.).

Known archaeological Sites/Monuments covered by the survey
(Scheduled Monument No. or National Archaeological Record No. if known)
National Heritage List Entry Number 1019788
Western mound: HER MDV63931, PastScape Monument 1355876
Central mound: HER MDV63930, PastScape Monument 1355874
Eastern barrow: HER MDV36662, PastScape Monument 444479
Related HER entries: MDV63167, MDV63169

Archaeological Sites/Monument types detected by survey
(Type and Period if known. "?" where any doubt).
Bowl Barrow: Late Neolithic to Bronze Age, extant, National Heritage List Entry Number 1019788, HER entry MDV63931
Two possible ploughed out barrows: ?
Two areas of highly heated material: ?
Two possible in-situ heated deposits: ?
Thirteen possible pits/large postholes: ?
One Devon bank field boundary (not mapped historically): ?
One possible curvilinear bank-and-ditch: ?
One possible sub-circular structure: ?
Thirty-one possible field and enclosure boundary elements: ?

Surveyor (Organisation, if applicable, otherwise individual responsible for the survey):
Substrata

Name of Client, if any: Oakford Archaeology

ENGLISH HERITAGE

Purpose of Survey:
Survey aims
1) Define and characterise and detectable archaeological remains on the site
2) Inform any future archaeological investigation of the area.

Location of:

a) Primary archive, i.e. raw data, electronic archive etc: CD-ROM and Cloud archive maintained by Substrata containing:
Report (Adobe PDF format),
Copies of report figures (Adobe PDF format)
Raw and processed grid & composite files (DW Consulting TerraSurveyor 3 formats)
Minimal processing data plots and metadata (Adobe PDF format)
GIS project, shape files and classification schema (GIS project (Manifold 8 '.map' file), GIS shape files (ESRI standard), GIS classification schema (Adobe PDF format)
AutoCAD version of the survey interpretation (AutoCAD DX)

b) Full Report: See a)

Technical Details

(Please fill out a separate sheet for each survey technique used)

Type of Survey (Use term from attached list or specify other): Magnetometer
Area Surveyed, if applicable (In hectares to one decimal place): 1.5 ha
Traverse Separation, if regular: 1m
Reading/Sample Interval: 0.25m
Type, Make and model of Instrumentation: Bartington grad601 dual
For Resistivity Survey:
Probe configuration:
Probe Spacing:
Land use at the time of the survey (Use term/terms from the attached list or specify other):
Grassland - Pasture

Additional Remarks (Please mention any other technical aspects of the survey that have not been covered by the above questions such as sampling strategy, non standard technique, problems with equipment etc.):