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Land at Semington Road, Berryfield, Melksham, Wiltshire

Geophysical Survey (Magnetic)

by Dan Bray and Tim Dawson

Site Code: SRB14/130

(ST 9028 6251)

Land at Semington Road, Berryfield, Melksham, Wiltshire

Geophysical Survey (Magnetic) Report

For Mark Chard & Associates

by Daniel Bray and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code SRB 14/130

November 2014

Summary

Site name: Land at Semington Road, Berryfield, Melksham, Wiltshire

Grid reference: ST 9028 6251

Site activity: Magnetometer survey

Date and duration of project: 28th October - 5th November

Project manager: Steve Ford

Site supervisor: Daniel Bray

Site code: SRB 14/130

Area of site: 7.7ha

Summary of results: A range of magnetic anomalies were recorded by the geophysical survey of which only two, both in the eastern field, are likely to be archaeological in origin. The remaining anomalies represent the ridge and furrow farming system that is visible as earthworks across the site and a series of features that are plotted on 19th and 20th century maps. The latter includes field boundaries, footpaths, buildings and the line of the Wiltshire and Berkshire canal.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Report edited/checked by:	Steve Ford✓ 25.11.14
	Andrew Mundin✓ 18.11.14

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Land at Semington Road, Berryfield, Melksham, Wiltshire
A Geophysical Survey (Magnetic)

by Daniel Bray and Tim Dawson

Report 14/130b

Introduction

This report documents the results of a geophysical survey (magnetic) carried out on a parcel of land to the east of Semington Road, Berryfield, Melksham, Wiltshire (ST 9028 6251) (Fig. 1). The work was commissioned by Mr Mike Robinson of Strutt & Parker LLP, 269 Banbury Road, Oxford OX2 7LL on behalf of Mark Chard & Associates.

A planning application is to be made to Wiltshire County Council for the construction of new housing on the site. A geophysical survey was requested in order to further inform the determination of the application once made. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012) and the County's policies on archaeology. The field investigation was carried out to a specification approved by Ms Rachel Foster, Assistant County Archaeologist at Wiltshire County Council. The fieldwork was undertaken by William Attard, Daniel Bray, Rebecca Constable and Anna Ginger between 28th October and 5th November 2014 and the site code is SRB 14/130.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site consists of three sub-rectangular fields and an adjacent house on the eastern side of Semington Road to the east of the village of Berryfield and south of Melksham. The site is centred on NGR ST 9028 6251, covers a total area of 7.7ha and is at a height of *c*.37m above Ordnance Datum. At the time the fieldwork the entire site was under long pasture (Pls. 1–4). The house in the north-western corner of the proposal area lies within fenced grounds which extend across half of the width of the western field and were not surveyed. The fields are bounded by mature hedgerows on all sides and internally except for the western edge where the field is divided from the neighbouring houses by wooden post-and-rail fencing. Beyond the site lies a sewage farm to the south, housing to the west, a caravan park to the north and fields to the north and east. The ground across the whole site slopes gently downhill from north to south with the underlying geology recorded as First River Terrace deposits for the majority of the area with a band of Oxford Clay along the southern edge (BGS 1965). The conditions at

the time of survey were overcast with sunny spells although the ground did not fully dry out from overnight dews.

Site history and archaeological background

A desk-based assessment was undertaken for the proposal site (Dawson 2014) which provides an in-depth study into the site's history and archaeological potential. In summary, Melksham lies to the west of the chalkland massif forming the Marlborough Downs, an area of great archaeological significance including (at some distance) to the east, a World Heritage Site centred on Avebury. Rather less is known of the gravel and clay areas in which the site lies. The historic core of the town has seen very little archaeological work, most of which has concentrated on the medieval town with little earlier evidence coming to light (McMahon 2004). There is a single heritage asset located on the site - the course of the disused Wiltshire and Berkshire Canal - although ridge and furrow earthworks identified through aerial photography also suggest that the site was used as farmland in the medieval period. The HER lists a series of earthworks to the west which may be a medieval field system, again indicating the agricultural use of the area during this period, as well as several parchmarks for what appear to be prehistoric ring ditches and enclosures on the gravel to the north-west. While these would suggest that the landscape in which the proposal site lies has high archaeological potential, evaluation trenching immediately to the east along the line of the A350 uncovered no archaeological deposits. Cartographic evidence shows that, aside from the construction and later removal of the canal, the site has undergone very little change since the early 19th century which raises the possibility that any buried archaeological deposits have been well preserved.

Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. Individual grids were laid out for the three fields, each orientated along the fields' long axes. The only obstruction to the survey grid was a thick stand of trees in the northern end of the western field which prevented survey taking place in the area they covered.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both English Heritage (2008) and the Institute for Archaeologists (2002, 2011).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for fast yet detailed survey of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seem from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble GeoXH 6000 handheld GPS system with sub-decimetre accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of

archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	Effect
Clip from -3.00 to 3.00 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.
De-stagger: all grids, both by -1 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

Once processed, the results are presented as a greyscale plot shown in relation to the site (Fig. 3), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.22.01, producing as a .DXF plot and exported to QGIS (v 2.4.0), with the final figures produced as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyor in portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is rotated to orientate it to north and combined with grid and site plans in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

The magnetic anomalies recorded by the survey can be divided into three broad categories: those that are likely to be of archaeological origin, those that are the result of 19th-20th century ground disturbance and those caused by agricultural activity.

There are two lengths of positive linear anomaly located in the northern end of the eastern field **[Fig. 4: 1, 2]**. This type of anomaly are commonly associated with buried cut features such as ditches and may be archaeological in origin. The first is an 11m long strong positive anomaly with a slight westward curve towards its northern end **[1]** while the second is either a weak, fragmentary linear anomaly broken up by the ridge and furrow or a series of discreet positive anomalies (representing e.g. pits) which follows a much straighter south-west - north-east course for its 30m length **[2]**.

Several strong positive and negative linear anomalies were recorded in the western and central fields which align with footpaths and boundaries noted on 19th century maps in the desk-based assessment (Dawson 2014). A pair of anomalies cross the southern half of the western field **[3]**. The northern of the two has a very strong positive and negative magnetic signature (Fig. 3) and is aligned with a field boundary that is plotted on the 1838 tithe map for Melksham (Dawson 2014: Fig 5.). The southern linear anomaly is significantly weaker and appears to correspond to a footpath that is shown on Ordnance Survey maps between 1886 and 1924 as crossing the field linking the road to the west with a drawbridge over the canal. The same maps show the footpath continuing across the central field where weak negative linear anomaly **[4]** is plotted. This anomaly is crossed almost at right-angles by another negative anomaly with a weak positive response running parallel to it **[5]**. Together these link the centre of the field's northern border with the centre of the southern edge but they do not appear to match any features shown on historic maps. The completely straight form of the anomalies suggest that they might represent a buried pipeline although if this is the case then it is probably ceramic or plastic rather than metallic.

There are several further patches of magnetic disturbance around the perimeter of the western and central fields with the most significant area being along the boundary between the two. This large area of mixed strong negative and positive responses most likely represent the location of the former canal that once ran along the path of this hedgerow. It is unclear, however, whether the ground has been disturbed as a result of the canal's construction or during its demolition. The remaining areas of magnetic disturbance are most likely caused by ferromagnetic elements to the fences and hedgerows that border the site in these locations. Several strong discreet bipolar and dipolar magnetic responses were noted in all three fields which probably indicate the presence of buried ferrous objects. Similarly, patches of scattered strong magnetic anomalies most likely point to buried metallic or construction debris. The is almost certainly the case for the patch of debris in the eastern field which corresponds to the position of a building on historic maps up until 1924.

The survey recorded a series of negative linear anomalies running parallel along the long axes of the fields in a regular pattern across all three areas **[6, 7, 8]**. The negative response indicates a buried earthwork type feature which in this case corresponds to the ridge element of the ridge and furrow method of farming that was evident on the ground surface across the entire site.

Conclusion

The geophysical survey of the three fields at Semington Road, Berryfield was undertaken successfully with a range of magnetic anomalies being recorded. The majority of these relate to the ridge and furrow earthworks that

cover the site or the site of the Wiltshire and Berkshire Canal that used to cross the site until it was demolished in the second half of the 20th century. Other anomalies correspond directly to features such as field boundaries and footpaths that are shown on 19th and 20th century maps of the area. Several areas of magnetic disturbance were recorded, probably a result of above ground ferromagnetic elements in the fences and hedgerows that bordered and subdivided the site. Only two small linear anomalies were identified that may indicate the presence of buried archaeological features. Both of these were in the northern end of the eastern field and probably represent ditch-type features.

References

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Appendix 1. Survey and data information

Programme
Name: TerraSurveyor
Version: 3.0.25.1

West Field
Raw data
Direction of 1st Traverse: 107.9369 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 480 x 340
Survey Size (meters): 120 m x 340 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 18.13
Mean: -0.26
Median: 3.53
Composite Area: 4.08 ha
Surveyed Area: 1.9493 ha

Source Grids: 77
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8 Col:1 Row:4 grids\65.xgd
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65 Col:5 Row:3 grids\02.xgd
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77 Col:5 Row:15 grids\14.xgd

Processed data
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3 Despike Threshold: 1 Window size: 3x3
4 Clip from -3.00 to 3.00 nT

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.60
Mean: -0.07
Median: 0.02

Central Field
Raw data
Direction of 1st Traverse: 105.0566 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 640 x 320
Survey Size (meters): 160 m x 320 m
Grid Size: 20 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 33.31
Mean: 0.51
Median: 2.95
Composite Area: 5.12 ha
Surveyed Area: 2.4132 ha

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3 De Stagger: Grids: All Mode: Both By: -1 intervals
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Stats
Max: 3.00
Min: -3.00
Std Dev: 1.73
Mean: -0.03
Median: 0.02

East Field
Raw data
Direction of 1st Traverse: 84.1686 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 560 x 260
Survey Size (meters): 140 m x 260 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.75
Mean: 0.00
Median: 0.01
Composite Area: 3.64 ha
Surveyed Area: 2.2918 ha

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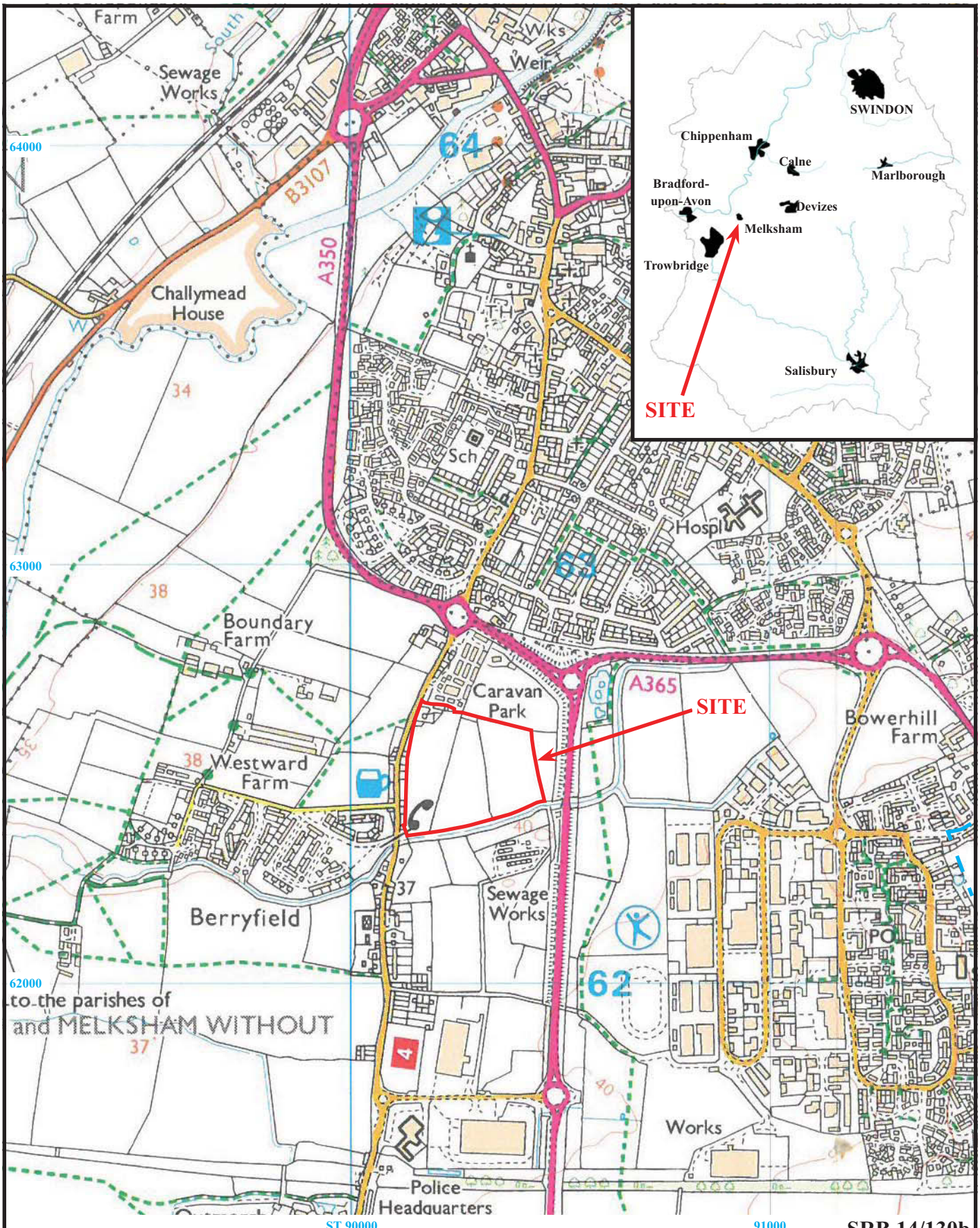
78 Col:6 Row:10 grids\78.xgd
79 Col:6 Row:11 grids\79.xgd

Processed data

Processes: 5
1 Base Layer
2 DeStripe Median Sensors: All
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 Clip from -3.00 to 3.00 nT
5 Despike Threshold: 1 Window size: 3x3

Stats

Max:	3.00
Min:	-3.00
Std Dev:	0.75
Mean:	0.00
Median:	0.01

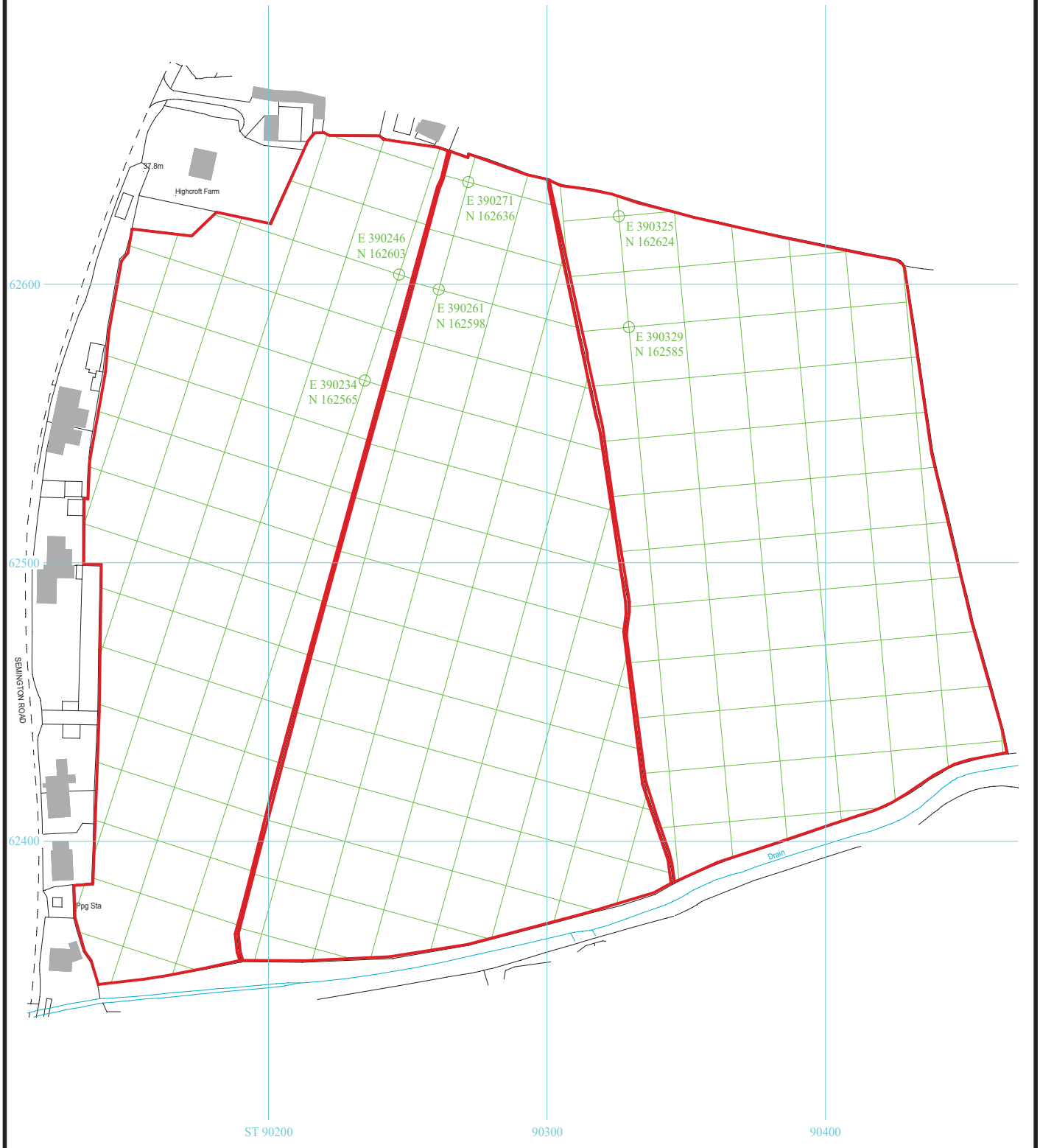


SRB 14/130b

Land at Semington Road, Berryfield, Melksham, Wiltshire, 2014
Geophysical Survey (Magnetic)

Figure 1. Location of site within Berryfield and Wiltshire.

THAMES VALLEY ARCHAEOLOGICAL SERVICES



SRB 14/130b

N

Land at Semington Road, Berryfield, Melksham, Wiltshire, 2014 Geophysical Survey (Magnetic)

Figure 2. Survey grid layout with georeferencing coordinates.

0 100m

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N

Land at Semington Road, Berryfield, Melksham, Wiltshire, 2014
Geophysical Survey (Magnetic)

Figure 3. Plot of minimally processed gradiometer data.

0m 100m

+3 nT

-3 nT

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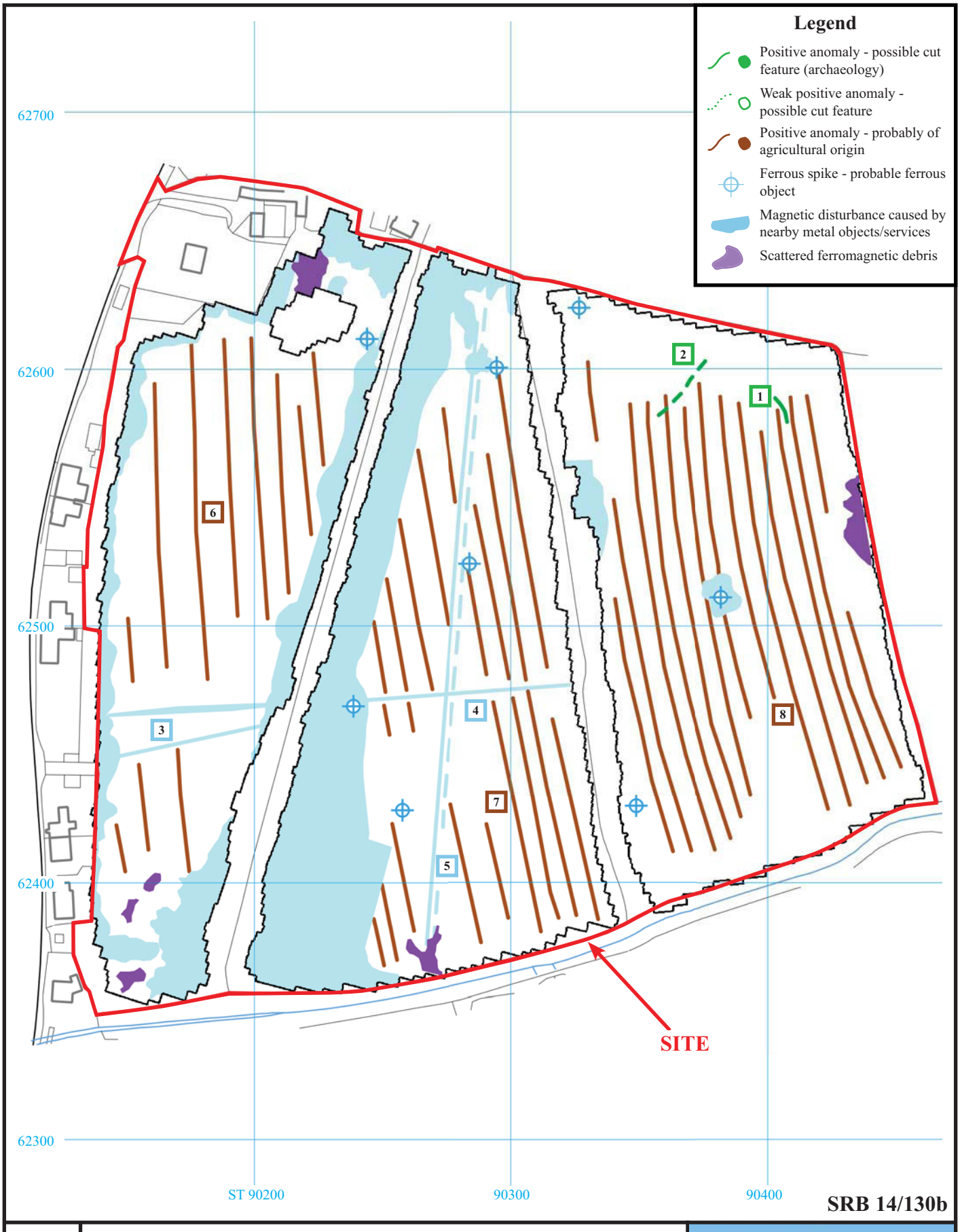

N

Land at Semington Road, Berryfield, Melksham, Wiltshire, 2014
Geophysical Survey (Magnetic)

Figure 4. Interpretation plot.

0m 100m

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Plate 1. Western field, looking south.

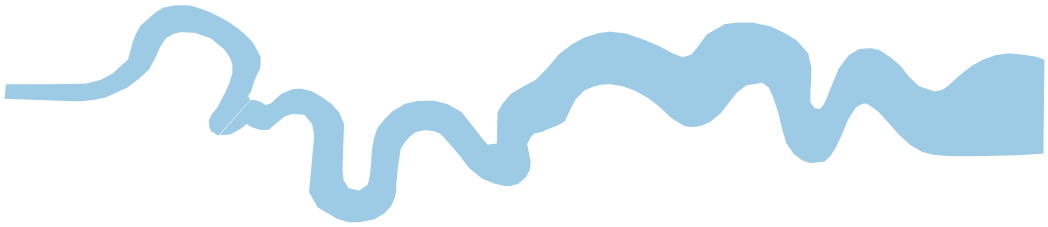
Plate 2. Earthworks relating to the canal along eastern boundary of western field, looking east.

Plate 3. Central field showing ridge and furrow earthworks, looking south-west.

Plate 4. Eastern field showing ridge and furrow earthworks, looking north.

TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
Iron Age	BC/AD 750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC



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