LAND AT BRYN HIR, TENBY

ARCHAEOLOGICAL ASSESSMENT & GEOPHYSICAL SURVEY



Prepared by Cambria Archaeology For Pembrokeshire County Council



CAMBRIA ARCHAEOLOGY

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LAND AT BRYN HIR, TENBY ARCHAEOLOGICAL ASSESSMENT & GEOPHYSICAL SURVEY

Bу

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LAND AT BRYN HIR, TENBY ARCHAEOLOGICAL ASSESSMENT & GEOPHYSICAL SURVEY

REPORT NUMBER 2005/46

May 2006

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As part of our desire to provide a quality service we would welcome any comments you may have on the content or presentation of this report

LAND AT BRYN HIR, TENBY ARCHAEOLOGICAL ASSESSMENT

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LAND AT BRYN HIR, TENBY ARCHAEOLOGICAL ASSESSMENT

SUMMARY

Proposals by Pembrokeshire County Council to develop a large area of open land (centred on NGR SN12680173) to the north of Tenby required a programme of archaeological assessment and geophysical survey.

The proposed development site contained a circular enclosure, Howell's Castle (PRN 3673), which will be excluded from the final development. It also contained the standing remains of a mid-19th century settlement, Sperricomb (PRN 49345) and trackways (PRNs 56482 and 56483) that may have medieval or earlier origins. This assessment has also revealed an earlier (pre-1740) settlement in Upper Windmill Park (PRN 56481).

Geophysical survey undertaken across the site has revealed a number of features of probable archaeological origin including former enclosures, land boundaries, pits and agricultural features.

An archaeological field evaluation has been suggested to try to characterise the buried archaeological resource, including the features recorded during the geophysical survey and the settlement at Upper Windmill Park. Standing building recording has also been suggested for Sperricomb.

INTRODUCTION

Pembrokeshire County Council are taking forward plans to develop land at Bryn Hir, Tenby (NGR SN12680173). The land has been identified in the Local Plan for development since at least the 1980s, although earlier attempts at development have been unsuccessful. The proposed development area lies in an area of known archaeological potential and it contains several known archaeological sites within its boundaries.

Pembrokeshire County Council commissioned Cambria Archaeology to undertake an archaeological desk-based assessment and geophysical survey of the proposed development site during February and March 2006.

The scope and aims of the assessment

This project was aimed at providing enough information on the archaeological resource of the area in order to assess the likely impacts of the proposals on that resource and to identify areas requiring further archaeological works. To achieve those aims a desk-based assessment and a geophysical survey were carried out. The results from these elements have been combined in this report to provide an overview of the archaeological potential of the site and to make suggestions for further archaeological investigation.

Report outline

This report describes the physical environment of the area before summarising the archaeological resource and the results of the geophysical survey of the development site. The likely impacts of the proposals are discussed and recommendations for further archaeological works are given.

Abbreviations used in this report

All sites recorded on the county Historic Environment Record (HER) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR). References to cartographic and documentary evidence and published sources will be given in brackets throughout the text, with full details listed in the sources section at the rear of the report.

THE ASSESSMENT AREA

The proposed development site

The Bryn Hir development site occupies c.10ha (c.25 acres) of farmland centred on NGR SN12700175. The plot is irregular and defined by existing roads and tracks on its east and west side and by the Lady Hill housing development and an existing field boundary on its south side. The north end is formed by an existing field boundary (Fig. 1).

The site is divided into three areas by Sperricomb Lane, which enters the site from the northwest and runs southeast to a point at NGR SN12710168 before turning northeast and running to the northeast edge of the site. Another lane, Blind Lane, runs south from the point at which Sperricomb lane changes direction.

All three areas are currently under pasture, but have been ploughed in the past.

Figure 1: Location plan of proposed development area. Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. Crown Copyright. All rights reserved. Licence No.100043738.

THE ARCHAEOLOGICAL RESOURCE

There are a number of archaeological interests within the proposed development area. These range from a prehistoric enclosure (PRN 3673), through trackways of probable medieval date, deserted post-medieval and early modern settlements (PRN 49345) and buried features identified in the geophysical survey.

Some of these sites were previously recorded in the regional HER (PRNs 3673 and 49345) and some were identified during the course of this study and the geophysical survey.

Archaeological sites previously recorded in the HER

Four archaeological sites were previously recorded in the HER. Two of the sites (PRNs 3673 and 3669) are in fact the same site, but represent later re-use of an earlier site (see below for details).

PRN	SITE NAME	SITE TYPE	PERIOD	NGR
3673	Howell's Castle	Hillfort?	Iron Age	SN12710184
3669	Howell's Castle	Occupation site	Medieval	SN12710184
49345	Sperricomb	Cottage	Post-medieval	SN12610176
46295	Slippery Back	Hollow Way	Medieval?	SN12840172
			Post-medieval?	

Table 1: Previously recorded sites within the proposed development area

Howell's Castle (PRN 3673)

Howell's Castle is a circular enclosure of possible Iron Age or Medieval date. The enclosure consists of a bank and outer ditch and it has been heavily ploughed.

A small-scale excavation carried out in the 1950s revealed a *c*.2m deep outer ditch and the remnants of a clay bank. Pottery from the excavation suggested a medieval date, although some sherds may have been earlier. (information from the Ordnance Survey card SN10 SW4 – copy held in the county HER).

The bank survives as a low earthwork, c.0.5m high (Plate 1). Geophysical survey across the enclosure has shown that as well as the bank and outer ditch there was also a small inner ditch and that the entrance was on the southwest side (Fig. 3 and see Appendix 1).

Sperricomb (PRN 49345)

Sperricomb was constructed on the southwest side of Sperricomb Lane sometime between 1811 and 1840. It consisted of a stone-built cottage with an enclosed garden. The cottage survives as a roofless and overgrown ruin that is becoming unstable (Plate 2). All of the interior dividing walls and fittings had been removed. Parts of the exterior of the cottage were slate clad and the interior retained some of the plaster wall finish.



Plate 1: View north across the low earthwork bank of Howell's castle.



Plate 2: The standing remains of the mid-19th century cottage, Sperricomb.

Archaeological sites identified by this assessment

Three new archaeological sites were identified during this assessment.

PRN	SITE NAME	SITE TYPE	PERIOD	NGR
56481	Upper Windmill Park	Cottage	Post-medieval	SN12760173
56482	Sperricomb Lane	Trackway	Medieval?	SN12580189
			Post-medieval?	SN12710168
				SN12790178
56483	Blind Lane	Trackway	Medieval?	SN12710168
			Post-medieval?	SN12710138

Table 2: New archaeological sites within the proposed development area.

Upper Windmill Park (PRN 56481)

A building was shown in a small enclosure alongside the south side of Sperricomb Lane on a survey of lands belonging to Tenby undertaken in 1740 at the north end of a field called Upper Windmill Park. The annotation on the survey map described the field as 'Upper Windmill Park with houses and garden', therefore the building shown must have been the houses referred to. This suggests that the building shown on the map was a stylised impression of a small row (two?) of small cottages. The building is shown as, single storey, rectangular and with a gabled roof.

The building was shown on plan of Tenby Corporation lands in 1811 and again on the St. Mary's parish tithe map of 1840 or 1841, but it does appear to have been unroofed by that time. The building was not shown on the Ordnance Survey 1st edition map of the area that was published in 1888, although, a small enclosure shown in the north corner of Upper Windmill park may have been associated with it.

The life span of the building is unknown. Map evidence shows that it pre-dated 1740 and that it had apparently been abandoned sometime between 1811 and 1840.

There are no above ground traces of the building, although remains of a stonebuilt structure are present on the north side of the lane (Plate 3). It is not certain at preset whether these remains are part of or associated with the former houses.

Sperricomb Lane (PRN 56482)

Sperricomb Lane southeast runs from the A487 to a point at NGR SN12710168, before it turns northeast and leaves the proposed development area at the southern of a new housing development.

The lane is shown, but unnamed on the 1740 survey of Tenby land and on the survey of Tenby Corporation land published in 1811. The name Sperricomb Lane was first shown on the Ordnance Survey 1st edition map of 1888, although the name Sperricomb, written as Spiricum, was given to this general area on the 1740 survey. The name may be derived from 'reed comb' (Charles 1992, 562-3).

The lane formed part of a network of roads and tracks that led north from Tenby, which were superseded by the construction of the A487 sometime during the mid to late 19th century. It is probable that the network had medieval or earlier origins. The lane is still in use by local pedestrians (Plate 4).

Blind Lane (PRN 56843)

Blind Lane was shown on the 1740 plan of Tenby town lands, and along with Sperricomb Lane probably formed part of the medieval or earlier system of roads and tracks leading north from the Tenby area.

The lane survives as a metalled track with overgrown hedges on either side. The lane is still used by walkers and locals.



Plate 3: Overgrown masonry in the hedge of Sperricomb lane. This may be the remains of a structure associated with the houses in Upper Windmill Park.



Plate 4: View northwest along Sperricomb Lane, with the remains of Sperricomb on the left.



Figure 2: Location of known archaeological sites (red squares) and sites identified during this assessment (purple square and lines). Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. Crown Copyright. All rights reserved. Licence No.100043738.

SUMMARY OF GEOPHYSICAL SURVEY

The geophysical report is included in full as Appendix 1, but it is worth summarising the results here as they directly affect the recommendations for further archaeological works.

Archaeological features identified during the geophysical survey

The geophysical survey identified a number of features of probable archaeological significance as well as features that may have geological or geomorphological origins. A test area centred on the Howell's Castle enclosure (PRN 3673) was surveyed to assess the susceptibility of the site to geophysical survey. The test returned superb results and the survey was extended to the whole of the proposed development area.

The main features identified were the below ground remains of the bank and ditch of Howell's Castle (Fig. 3, No. 1), a series of trackways leading past the east side of Howell's Castle (Fig. 3, No. 2), former land divisions (Fig. 3, Nos. 3, 5 and 8), enclosures (Fig. 3, Nos. 4, 5 and 6) and a number of pits (Fig. 3, Nos. 1, 3, 7 and 8).



Figure 3: Plot of features identified during the geophysical survey and the locations oif those features recommended for archaeological field evaluation. See Appendix 1 for a description of the features.

POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON THE ARCHAEOLOGICAL RESOURCE

Impact on the standing remains

Sperricomb (PRN 49345)

It is hoped that the remains of Sperricomb will survive the development and could be sold and renovated (Philip Williams *pers comm.*). If so the development will be beneficial for Sperricomb, although the presence of an unstable structure within the development boundary may still result in some works taking place, including possible demolition if it cannot be renovated.

Upper Windmill Park (PRN 56481)

Any surviving remains around the site of Upper Windmill Park could be lost during development, although this area could be excluded from development and left as open space.

Sperricomb Lane (PRN 56482)

Sperricomb Lane may be affected by the development, although it could retained and used for pedestrian traffic only.

Blind Lane (PRN 56483)

Blind Lane forms the western boundary for part of the development site and should remain unaffected.

Impact on the buried archaeological resource

Howell's Castle (PRN 3673/3669)

The Howell's Castle enclosure is to be excluded from the development area, although possible associated features will be affected. The former trackways (Fig. 3, No. 2) recorded during the geophysical survey extend into the proposed development area and will be partially removed. Other features recorded outside the enclosure entrance will also be affected (Fig. 3, No. 3).

Upper Windmill Park (PRN 56481)

Any surviving buried remains of the houses that stood at Upper Windmill Park will be destroyed during development unless this area can be left as open space within the final development plans.

Other features

All of the features recorded by the geophysics are vulnerable to development. At present it is not clear what the features represent, although many do appear to be archaeological in origin.

It is not possible to fully assess the likely impacts of development on the buried archaeological resource.

SUGGESTED FURTHER ARCHAEOLOGICAL WORKS

The assessment and survey have revealed that there are extensive archaeological features across the development. However, in some cases it has not been possible to retrieve enough information to fully assess the likely impacts of the proposed development and further archaeological works have been suggested.

The suggested further works consist of two elements: 1) recording the surviving structures of Sperricomb (PRN 49345) and Upper Windmill Park (PRN 56481) and; 2) archaeological field evaluation.

The scope and extent of any further works should be approved by the archaeological advisor to the LPA prior to their commencement.

Standing building recording

Sperricomb (PRN 49345)

The standing remains of Sperricomb should be recorded by drawing and photographic survey in order to establish the character, development and structural detail of this small 19th century settlement.

Upper Windmill Park (PRN 56481)

Any standing remains associated with Upper Windmill Park should be recorded by drawing and photographic survey in order to establish the character, development and structural detail of this pre 18th century settlement. This site will also require archaeological field evaluation in order to establish its extent and to define a buffer zone to protect it from development.

Archaeological field evaluation

Archaeological field evaluation will be targeted at a number of the features identified by the geophysical survey and on the site of Upper Windmill Park (PRN 56481).

The principal features to be investigated will be the possible enclosures, the features clustered around the south edge of Howell's Castle (PRN 3673) and various other features of uncertain origins (see Fig. 3 for the locations of the features to be evaluated).

SOURCES

Published sources

Charles B G 1992 *The place-names of Pembrokeshire*. Aberystwyth. The National Library of Wales.

APPENDIX 1: GEOPHYSICAL SURVEY REPORT

ARCHAEOLOGICAL SURVEYS

GEOPHYSICAL SURVEY REPORT

Bryn Hir, Tenby, Pembrokeshire

Magnetometer survey

for

Cambria Archaeology

David Sabin and Kerry Donaldson

February 2006

Ref no. 129

ARCHAEOLOGICAL SURVEYS

Bryn Hir, Tenby, Pembrokeshire

Magnetometer survey

for

Cambria Archaeology

Report and fieldwork by David Sabin and Kerry Donaldson

Survey date - February 2006

Ordnance Survey Grid Reference - SN 126 017

Archaeological Surveys 2, Westway Close, Castle Combe, Wiltshire, SN14 7QZ Tel. 01249 782234 FAX 0871 661 8804 Email: <u>info@archaeological-surveys.co.uk</u> Web: <u>www.archaeological-surveys.co.uk</u>

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SUMMARY

A magnetometry survey was carried out at Bryn Hir, Tenby across approximately 10ha of pasture. Although lying outside the main study area an earthwork feature was targeted in order to provide an assessment of the effectivity of magnetometry on the local geology and soils. The survey conditions proved excellent and revealed that the earthwork is associated with an outer and possibly inner ditch and a number of pits. Outside the immediate vicinity of the earthwork feature, within the main study area, there are a number of linear and discrete features that may represent land boundaries and pits respectively. A possible rectilinear enclosure, probably associated with former land boundaries, was located within the study area to the southwest and to the west a faint rectilinear with possible associated curvilinear was revealed. Other features of note include a series of probable former trackways running adjacent to the earthwork feature. Many anomalies cannot be characterised with any certainty and it is likely that there is a widespread response to variation in the underlying geology.

INTRODUCTION

Survey background

1.1.1 Archaeological Surveys was commissioned by Cambria Archaeology on behalf of Pembrokeshire County Council to undertake a geophysical survey of an area of land at Bryn Hir, Tenby in Pembrokeshire. This survey formed part of an assessment of any potential archaeology that may be affected by any potential future development.

Survey objectives

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin. An initial trial survey was to be carried out across a known earthwork within the northern part of the survey area however the earthwork falls outside of the study area. The results from the trial area would be used to assess the effectivity of magnetometry within the study area.

Site location

1.3.1 The site is located at Bryn Hir, Tenby at OS grid reference SN 126 017.

Site description

- 1.4.1 The geophysical survey covers approximately 10ha of agricultural land, currently used for pasture, split into four separate survey areas, see Figure 02.
- 1.4.2 Area 1 forms the northern and central section of the site. An earthwork feature is located on high ground with land sloping down towards the north, west and south. Although the earthwork has been included as trial area it falls outside the main study area. To the east a number of houses sit on slightly higher land. Trackways bounded by hedgerows form the south western and south eastern boundaries. The north western boundary is formed by a hedgerow running alongside the A478, the northern boundary is a hedgerow separating fields. Areas adjacent to the hedgerows at the field margins are not well defined due to unchecked growth. Several footpaths run through the area and it is used extensively by local dog walkers.
- 1.4.3 Area 2 lies within the western section of the site. Its western boundary is formed by a hedgerow adjacent to the A478, a hedgerow and post and wire fence forms the south eastern boundary and a hedge separates the site from a trackway to the northeast. To the north lies Area 3 separated from Area 2 by a hedge with a dilapidated cottage and garden to the north. The site slopes down to the west and south.

- 1.4.4 Area 3, lying immediately to the north of Area 2, slopes down to the north where it is bounded by a hedgerow separating the area from the A478. A trackway with hedge and bank form the north eastern boundary.
- 1.4.5 Area 4 is formed by a package of land off the south eastern corner of Area 1 and separated from it by a trackway and mature hedges. The northern end of the area slopes up to houses but much of the land is flat although there is an abrupt slope down to a rough field margin and hedgerow along the eastern side. To the west the area is separated from a housing estate by a wide hedgerow with a number of mature trees. Field margins are generally not well defined with areas of bracken and bramble etc. grading into the hedges. Similar to Area 1, several footpaths run through the site and are used extensively by dog walkers.



1.4.6 It should be noted that during the survey Areas 1 and 4 were continuously used by members of the public for exercise and dog walking. In the interests of health and safety, survey was stopped short of footpaths where it was considered a potential risk of tripping may occur.

Site history and archaeological potential

1.5.1 No specific information was made available to Archaeological Surveys however the site contains a substantial earthwork within Area 1.

Geology and soils

- 1.6.1 The underlying geology is sandstone or shale associated with the Upper Carboniferous period (BGS 2001), no drift deposits are mapped (BGS 1977).
- 1.6.2 The overlying soils across much of the site are from the Neath association and are typical brown earths (Soil Survey of England and Wales 1983).
- 1.6.3 Prior to survey it was uncertain as to whether the underlying geology and soils were conducive to magnetic survey. Surveys carried out on similar geologies in other parts of the UK have produced good results.

METHODOLOGY

Technical synopsis

- 2.1.1 Detailed magnetometry records localised magnetic fields that can relate to former human activity. Alteration of iron minerals present within topsoil is related to activities such as burning and the break down of biological material. These minerals become weakly magnetic within the Earth's magnetic field and can accumulate in features such as ditches and pits that are cut into the underlying subsoil. Mapping this magnetic variation can provide evidence of former settlement and land use. Additional technical details can be found in Appendix A.
- 2.1.2 The localised variations in magnetism are measured as sub-units of the tesla which is a SI unit of magnetic flux density. These sub-units are nanoteslas (nT) which are equivalent to 10-9 tesla (T).

Equipment details, configuration and surveying

- 2.2.1 The detailed magnetic survey was carried out using a Bartington Grad601-2 gradiometer. This instrument effectively measures a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally. The instrument is extremely sensitive and is able to measure magnetic variation to 0.1 nanoTesla (nT). All readings are saved to an integral data logger for analysis and presentation.
- 2.2.2 Data was collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids giving 3600 recorded measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 1995).
- 2.2.3 The survey grids were set out using a Topcon GTS212 total station and CSI Wireless dGPS (differential Global Positioning System). The dGPS was used to establish and reference a baseline orthogonal to the Ordnance Survey National Grid using the OSGB36 datum. Positional accuracy achievable using dGPS is considered as submetre as correction signals are received either from ground-based beacons or a geostationary satellite. A number of parameters are constantly monitored by the system in order to achieve best accuracy.
- 2.2.4 The orientation of survey grids to OS National Grid was chosen because of generally poorly defined field margins and curving field boundaries. Data quality within greyscale plots is also maintained as no rotation of the graphics is required.

Data processing and presentation

- 2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger is analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display.
- 2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data is always analysed and displayed in the report as processing can modify anomalies. The following schedule sets out the processing used in this survey.

Image processing

- Clipping of the raw data at ±50nT to improve greyscale resolution
- Clipping of processed data at either ±10nT to enhance low magnitude anomalies
- Clipping of trace plots at ±100nT in order to minimise strong readings obscuring low magnitude responses

• Destagger to enhance linear anomalies

2.3.3 An abstraction and interpretation is offered for geophysical anomalies located by the survey. A brief summary of each anomaly with an corresponding reference number is set out in list form within the results (Section 3), to allow a rapid assessment of features within each survey area. Where further interpretation is possible or where a number of possible origins should be considered, further more detailed discussion is set out in Section 4.

RESULTS

General overview

- 3.1.1 The detailed magnetic survey was carried out over a total of 4 survey areas covering an area of approximately 10ha. The data indicates relatively enhanced magnetic susceptibilities within the soil contrasting well with the low susceptibility of the underlying rock.
- 3.1.2 Anomalies have been abstracted using MapInfo and allocated separate identification numbers. Where possible similar anomalies have been grouped under one identification number in the listing below and reference to the appropriate abstraction and interpretation plot should be made.
- 3.1.3 A number of separate categories that reflect the range and type of likely causative features are used to group anomalies within the listings below:

Anomalies with an archaeological origin (associated with enclosure or earthwork)

(Positive linear anomalies abstracted are plotted in red and pink, negative are in blue)

The category is used in association with the known earthwork site in Area 1 and a possible enclosure within Area 2. It includes positive linear, curvilinear, area and discrete anomalies and may relate to cut features such as ditches and pits. The negative area anomaly associated with the enclosure may be a response to less enhanced material within a bank.

Anomalies associated with possible former trackways

(Positive linear anomalies abstracted are plotted in light brown)

Anomalies within this category generally have a strong response and may be associated with former trackways. Although no period of formation can be inferred, their close proximity to the earthwork in Area 1 may be significant.

Anomalies with an uncertain origin

(Positive anomalies abstracted are plotted in orange)

The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to

archaeologically significant features but equally relatively modern features, geological/pedological anomalies and agricultural features should be considered.

Anomalies with a possible geological origin

(Positive anomalies abstracted are plotted in yellow)

The category applies to positively enhanced anomalies whose patterns suggest a geological origin. It is difficult to distinguish these anomalies from other uncertain features and this should be borne in mind with any interpretation. It is likely that the nature of the underlying geology is conducive to the formation of magnetic anomalies.

Anomalies with an agricultural origin

(Anomalies abstracted are plotted in green)

Where confidence is high that anomalies have been caused by agricultural features this category is applied. The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries.

Anomalies with a modern origin

(Anomalies abstracted are plotted in magenta)

The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables etc. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance – such disturbance can effectively obscure low magnitude anomalies if they are present. Magnetic debris often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material (occasionally magnetic debris may be associated with kilns, furnace structures or hearths and may therefore be archaeologically significant).

3.1.4 Area 1 (including trial survey area) (*Figures 3-6.*)

Anomalies with a probable archaeological origin

(1) – Anomaly (1) is a positive curvilinear response, approximately 47m in diameter which forms a penannular feature with an 'entrance' to the southwest. This anomaly has a relatively high magnitude, generally between 12nT and 35nT which suggests a response to the magnetically enhanced fill of a ditch. It surrounds anomaly (2) and indicates the presence of an outer ring-ditch to the visible earthwork in the field.

(2) – A negative area anomaly correlates with an earthen bank within the field. The negative response suggests that this bank is composed of material less magnetically enhanced than the surrounding soil. It is possible that this is an incomplete circle with an 'entrance' that corresponds to that seen in anomaly (1). (4) – This anomaly can be seen as two semi-circular responses within anomaly (2). There appears to be two breaks within the response causing the semi-circular appearance, one to the southwest, corresponding with those seen in anomalies (1 & 2) and one opposite to the northeast. It is possible that the positive response is caused by enhanced material within an internal ditch but this is uncertain.

(18-21) – Several discrete positive responses can be seen within Area 1 with the majority clustered in and around anomalies (1, 2 & 4) and it is possible that these relate to pits.

(7 & 35) – Positive linear anomaly (7) appears to extend from the western field boundary towards the 'entrance' within anomaly (1). It is possible that this relates to a cut feature and it may be associated with anomalies (1-4) although this is not certain.

Anomalies with an uncertain origin

(e.g. 5, 8, 33-58) – Area 1 contains many positive linear anomalies with an uncertain origin. It is possible that in the north of the site anomalies (37) to (41) are associated with one another to form one feature. It is also possible that several situated within and to the southwest of anomalies (1, 2 and 4) may be associated with the bank and ditch feature. However the low magnitude, irregular pattern and indistinct form of many of these responses does not allow an accurate determination of their origin. It should be considered that underlying geological conditions may be responsible for some of these anomalies.

(35 and 46) – Positive linear anomaly (35) is located in the north of the site and has a relatively enhanced response possibly suggesting the fill of a cut feature. It is parallel to negative linear anomaly (46) although it is not possible to ascertain if they are associated

Anomalies associated with possible former trackways

(24) – A series of positive linear anomalies can be seen in the south-eastern part of Area 1. These anomalies have a moderate magnitude, generally 10nT to 45nT which suggests that they may be associated with features such as former trackways that have in-filled with moderately enhanced material.

Anomalies associated with possible former boundaries

(30) – Two positive linear anomalies flank a negative linear anomaly in the north of the site. It is possible that these are responses to a former bank with flanking ditches and relate to a removed land boundary.

Anomalies with a possible geological origin

(43 to 45) – Three parallel positive linear anomalies are located in the west of Area 1 and their form suggests that they are a response to features with a geological origin.

Anomalies with a modern origin

(42) – A strong dipolar linear anomaly extends across the centre of the site and is a response to a modern service or pipeline.

3.1.5 Area 2 (*Figures 7-10.*)

Anomalies with a possible archaeological origin

(75 & 78) – Positive linear anomaly (75) can be seen extending southwestwards from the current north-western land boundary of Area 2. Anomaly (78) is more apparent as a negative linear anomaly with double flanking positive anomalies and this extends to the southsoutheast from an existing land boundary. It is therefore possible that this set of anomalies relate to a bank with flanking ditches and relates to the line of a former boundary.

(79) – This positive rectilinear anomaly extends from anomaly (78) and towards the north-western field boundary forming a rectilinear enclosure with a possible opening or entrance way to the south-southeast.

Anomalies with an uncertain origin

(81) – A positive linear anomaly extends across much of Area 2 and is approximately parallel with the north-western land boundary and agricultural linear anomalies seen within the area (90). Although of uncertain origin it is possible that it has been caused by former agricultural activity.

(82 to 90) – Several positive linear anomalies can be seen predominantly in the east of the site. It is not possible to accurately define their origin and it may be possible that they are responses to geological features.

Anomalies with an agricultural origin

(98) – A series of parallel linear anomalies extend across the survey area. Parallel with the north-western and south-eastern land boundaries they are likely to have been caused by agricultural activity.

3.1.6 Area 3 (*Figures 11-14*)

Anomalies with an uncertain origin

(62 & 63) – These positive anomalies appear as a curvilinear (62) and rectilinear (63) feature. Although this may suggest an archaeological origin the form and extent of these anomalies do not allow for confident interpretation as such. They are therefore of uncertain origin.

Anomalies with an agricultural origin

(65) – A series of linear anomalies can be seen within the site and are likely to be responses caused by agricultural activity.

3.1.7 Area 4 (Figures 15-19)

Anomalies with an uncertain origin

(110) – Close to the northern edge of the survey area is an "L" shaped positive linear anomaly. Although of uncertain origin, the shape of this anomaly may suggest that it is a response to the fill of a cut feature with an anthropological origin.

(e.g. 114 to 118) – Area 4 contains several positive linear anomalies which have been difficult to accurately define. It is possible that they relate to features with a geological origin, however archaeology cannot be completely ruled out.

Anomalies with an agricultural origin

(128) – A number of linear anomalies can be seen extending from north to south within the site and are parallel with the eastern and western field boundaries. It is likely that these are responses to features caused by agricultural activity and relate to a former ploughing trend.

Anomalies with a possible geological origin

(102 - 107) – There are several positive linear anomalies and an apparent curvilinear anomaly (102) in the north of the site. Although some of these are relatively enhanced and do appear to form a circular feature, their shape is amorphous and it is possible that they relate to geological, fluvial or pedological features.

Anomalies with a modern origin

(119) – This relates to an area of magnetic disturbance in the western part of the site and correlates to an area of modern burning.

(120 to 123) – Strong discrete dipolar anomalies are likely to be responses to ferrous material within the topsoil.

DISCUSSION

Area 1

4.1.1 The earthwork feature within Area 1 falls outside the study area but has been included as a useful assessment of the effectivity of magnetic survey on the local geology and soils. This assessment has clearly demonstrated that magnetic survey is highly effective. Positive anomalies of over 30nT were associated with the feature with high contrast against surrounding areas. The high contrast would tend to suggest the soil is able to form a relatively high magnetic susceptibility whereas the underlying solid geology or subsoil has a much lower level of natural magnetic susceptibility. A number of anomalies appear to be associated with the underling geology and

possibly form in cracks or fissures, the exact process of enhancement associated with these features cannot be clearly determined.

- 4.1.2 A number of other anomalies include linear responses that may represent early land divisions or be associated with agricultural activity. These include a linear response that appears to extend to the west from the earthwork feature and a possible parallel ditch boundary within the north of the area on a similar orientation. There are also a number of pit-like responses close to the possible entrance of the earthwork feature with some large examples further away to the southwest, north and northwest.
- 4.1.3 A series of linear responses extend from the southern edge of the survey area and pass immediately adjacent to the earthwork feature along its eastern side. These have been interpreted as trackways and suggest a long period of use with migration of the route, presumably due to periods of poor surface conditions, that has resulted in convergence or superimposition. From the nature of the response of these features close to the edge of the ring-ditch associated with the earthwork, it would seem likely that they were formed well after the ring ditch had silted up.

Area 2

4.2.1 A small rectilinear enclosure within the survey area appears to utilise field boundaries. It would appear that the extant field boundaries separating the site from Area 3 to the north may have continued across Area 2 to the southwest and southeast. There are few characteristics associated with this feature that allow a period of use to be inferred.

Area 3

4.3.1 Few anomalies within the area can be confidently abstracted or interpreted although there does appear to be a poorly defined rectilinear and curvilinear feature close to the north western boundary. Any assessment of these results should consider the possible archaeological potential of these features but any further interpretation is not possible based on the geophysical evidence.

Area 4

4.4.1 The area contains a great deal of patterning and areas of amorphous response which are generally typical of natural features. There is a 'dendritic' element to anomalies close to the north eastern boundary suggesting an in-filled fluvial feature. It should be considered that the extensive natural variation may conceal features of archaeological origin.

CONCLUSION

- 5.1.1 Magnetometry survey has proved an effective technique for the location and assessment of archaeological features. An earthwork feature targeted as part of a trial to the effectivity of magnetic survey across the whole site proved high levels of magnetic susceptibility and strong contrast both necessary for good surveying conditions. The earthwork feature has been proved to be associated with an outer ditch with a possible second internal ditch and a number of pits.
- 5.1.2 Other features of possible significance within Area 1 include linear features that may represent land division, a small number of large pits and a series of trackways. Area 2 revealed a rectilinear enclosure associated with former field boundaries. Area 3 has a poorly defined rectilinear and possible curvilinear feature. Area 4 was dominated by a natural response and anomalies are generally of uncertain origin.

REFERENCES

British Geological Survey, 1977, *Geological Survey Ten Mile Map, South Sheet, First Edition (Quaternary), Scale 1:625 000.*

British Geological Survey, 2001, Solid Geology Map, UK South Sheet, 1:625 000 scale, 4th edition.

English Heritage, 1995, Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No 1.

Soil Survey of England and Wales, 1983, Soils of England and Wales, Sheet 5 South West England.

APPENDIX A – BASIC PRINCIPLES OF MAGNETIC SURVEY

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with remagnetisation by the Earth's magnetic field on cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with the surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength of magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.



3

Archaeological Surveys

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Area 4 - Abstraction and interpretation



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Archaeological Surveys

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General location map

Scale 1:50 000







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Area 1 - Traceplot







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Area 1 - Abstraction and interpretation



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Area 2 - Raw magnetometry data

Scale 1:1000

+50nT -50nT



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Area 2 - Traceplot







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Area 2 - Abstraction and interpretation

- Positive linear anomaly possible ditch associated with enclosure



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Area 3 - Raw magnetometry data

Scale 1:1000

+50nT



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Area 3 - Traceplot







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Area 3 - Abstraction and interpretation







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Area 4 - Traceplot





Referencing points set to OSGB36 eastings and northings

A - 212720, 201990 B - 212720, 201720 C - 212540, 201840 D - 212540, 201660 E - 212810, 201720 F - 212810, 201420

Survey start at NW corner of grids heading E on first traverse



Archaeological Surveys

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Referencing