Archaeological Services & Consultancy Ltd

GEOPHYSICAL SURVEY:
BAYLHAM BARROW CEMETERY
BAYLHAM
SUFFOLK

for
Anglian Water Services Ltd.

Alastair Hancock BSc PgDip

May 2007

ASC: 915/BBC/02

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Site Data

ASC site code:	BBC	*Project no:*	915
County:	Suffolk		
District:	Baylham		
Village/Town:	Nr Baylham		
Parish:	Baylham CP		
NGR:	TM 1107 5272 (site centre)		
Extent of site:	*c.*11.7 ha		
Present land use:	Agricultural		
Development:	Water pipeline		
Extent of development:	tba		
Planning application ref/date:	na		
Client:	Black and Veatch Ltd on behalf of Anglian Water Services Ltd Thorpe Wood House Thorpe Wood Peterborough Cambridgeshire PE3 6WT		
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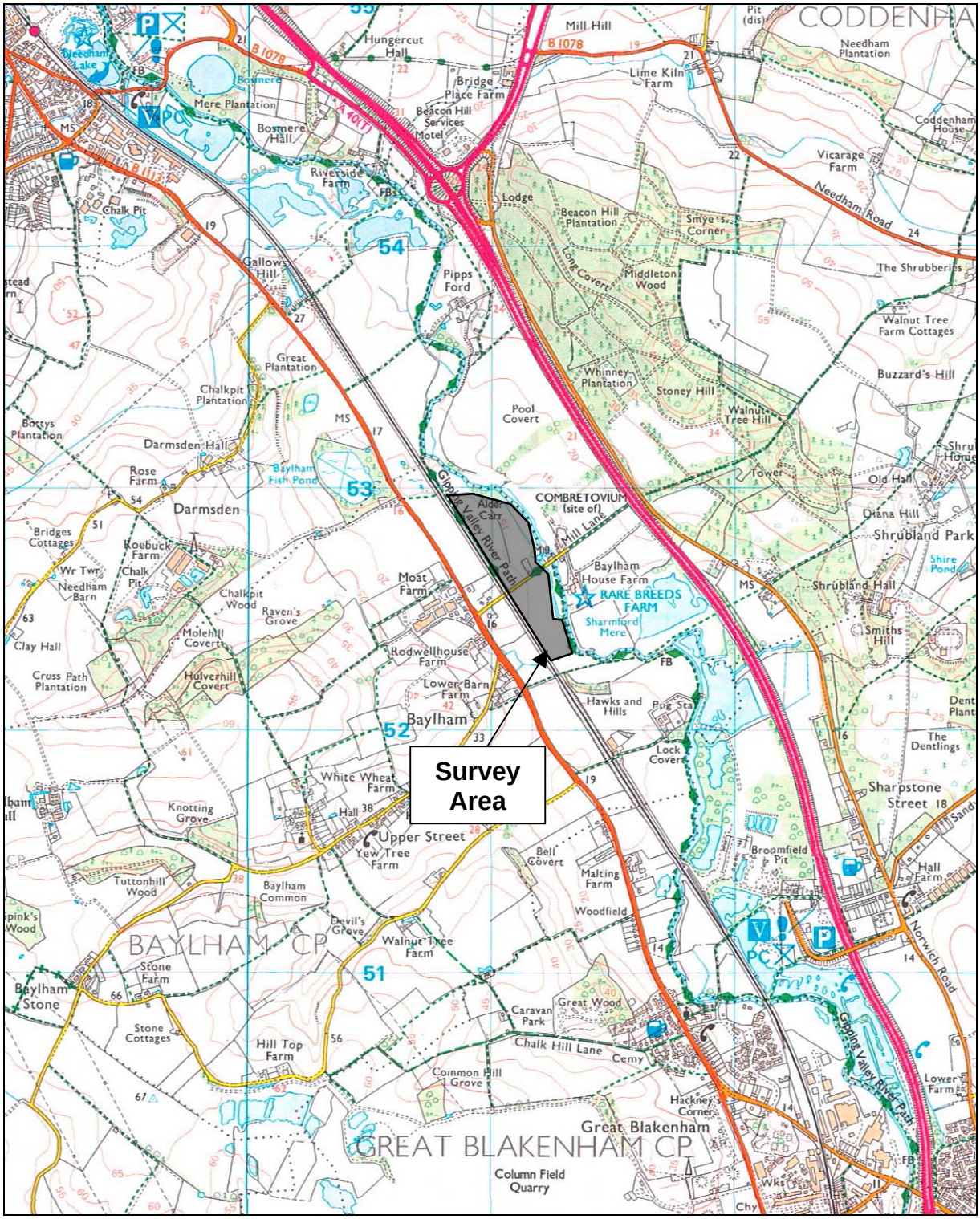


Figure 1: General location *(scale 1:25,000)*

Summary

Detailed magnetometer survey was carried out over 9 hectares of an 11.7 hectare site. The northern part of the survey defines the location of part of a large ring ditch previously identified from crop marks. Other magnetic anomalies indicating the presence of a trackway and possible enclosure or field system ditches are identified northeast, east and southeast of the ring ditch.

The presence of a smaller ring ditch, also identified from cropmarks in the southern part of the survey area, has not been substantiated by the magnetometer survey although short sections of two parallel ditches, which may define a trackway or small enclosure, are evident near its suggested location. A number of magnetic anomalies defining the location of superimposed palaeochannels are present at the southeast of the survey.

1. Introduction

1.1 *General*

Archaeological Services and Consultancy Ltd (ASC) was commissioned by *Anglian Water Services Ltd* to undertake geophysical survey over a parcel of land through which a section of a proposed water pipeline would pass (Fig 1). The *c.*11.7 hectares survey area, hereafter "site", lay immediately west of the River Gipping and *Combretovium* Roman settlement, which is designated a Scheduled Ancient Monument (SAM SF 89), and covered land containing parts of two ring ditches identified from cropmarks.

The work described in this report forms the initial phase of a programme of archaeological evaluation required to inform the route of the pipeline through the site and aid the design of an appropriate archaeological mitigation strategy. Fieldwork commenced on the 2nd May 2007 and was completed on the 10th May 2007. Prevailing weather conditions during the fieldwork were warm although frequently overcast with occasional showers.

1.2 *Planning Background*

The survey was requested by Anglian Water Services Ltd to fulfil their statutory obligations to the environment. The scope of the work was defined in a brief (Tipper 2007) prepared on behalf of the local planning authority (LPA), *Suffolk County Council,* by the Council's archaeological advisor (AA), *Suffolk Archaeological Service Conservation Team.*

1.3 *Proposed Development*

The proposed water pipeline will run for 9.5km between Stowmarket and Baylham. The survey described in this report examines a small area immediately west of the River Gipping toward the southern end of the route. The groundwork for the pipeline will consist of top and subsoil strip along a *c.*15m wide easement and subsequent excavation of a *c.*0.4m wide pipe trench. The exact methods of insertion of the pipe and its route will be informed by the results presented in this report and the results of further phases of archaeological evaluation.

1.4 *Location and Description*

The designated site was an irregularly shaped parcel of land comprising the greater part of three fields located in the Gipping Valley, *c.*3km northwest of Great Blakenham, Suffolk. The survey area covered *c.*11.7 hectares and was bounded at the southeast by a drain and by a drain and probable artificial channel of the River Gipping at the northeast. The northwestern limit was defined by a field boundary and the southwestern extent was delimited by railway embankment. The site was bisected by Mill Lane and the southern field was subdivided by an electrified stock fence. The majority of the site was set aside although the southern half of survey block 2 had been ploughed and contained a recently germinated cereal crop.

1.5 *Constraints*

The part of the site north of Mill Lane was subdivided by a field boundary and the area east of the boundary was covered by dense, knee high vegetation. The presence of this vegetation prevented safe survey and reduced the total site area to 9 hectares (Fig 2).

1.6 *Geology & Topography*

The soils of the area belong to the Ludford Association, which are described as *"deep well drained fine loamy, coarse loamy and sandy soils, locally flinty and in places over gravel"* (Soil Survey 1983 571x). Alluvial deposits are likely to be present near the river although none are noted by the Soil Survey. The underlying geology is glaciofluvial drift.

The survey area lies on the western side of the River Gipping and the northern part of the site is characterised as exhibiting a gentle southwest-northeast trending slope that descends from *c.*16m AOD to *c.*14m AOD at the river. The area south of Mill Lane descends relatively steeply from *c.*16m AOD atop a possible relict terrace at the northwest corner to *c.*14m AOD at the floodplain below.

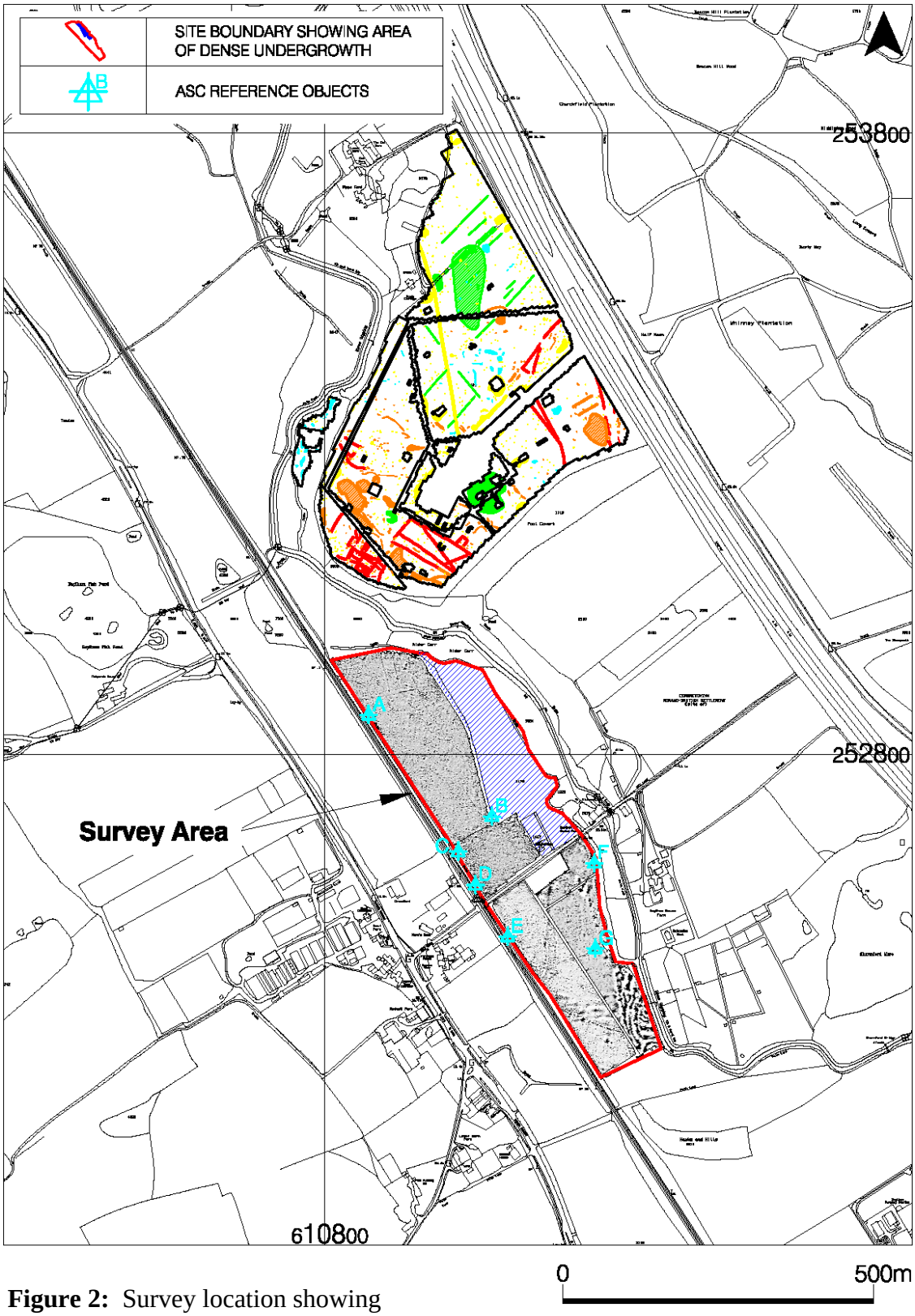


Figure 2: Survey location showing interpretation of earlier geophysical survey *(scale 1:10,000)*

2. Archaeological & Historical Evidence

2.1 *Introduction*

The local and regional settings of archaeological sites are factors that are taken into consideration when assessing the implications of development proposals. The survey area lies immediately east of a number of ring ditches identified from cropmarks and immediately west of a Scheduled Ancient Monument (SAM) that protects two Roman forts and an associated vicus. The following sections provide a summary of the relevant archaeological and historical background presented in a desk-top assessment examining the proposed pipeline (Rolfe 2006).

2.2 *Prehistoric - Iron Age (before AD43)*

Flint assemblages indicating exploitation of the Gipping Valley by Mesolithic hunter-gatherers have been recovered a few hundred meters east of the survey boundary (CDD006, CDD060, BRK104), at the southeast of the SAM (CDD009) and at more distant locations along the proposed pipeline route (CRM027, CRP007). Flint assemblages (CDD009, CDD017, CDD060, BRK104) dating to the later Neolithic period have also been recovered near the site.

The geophysical survey examines an area of land containing part, or all, of two ring ditches (BAY007, BAY012) identified from cropmarks and lies immediately east of the location of a number of other ring ditches also identified from cropmarks. The ring ditches form part of a larger northwest-southeast aligned linear barrow cemetery of suggested Bronze Age date, that runs for *c.*1.15km along the Gipping Valley. This area is currently unscheduled although it may contain nationally important archaeological remains.

Finds and archaeological features (CDD003, CDD009, CDD017) are recorded illustrating that an earlier Iron Age settlement underlies at least part of the later RB settlement protected by the SAM.

2.3 *Romano-British (AD43-c.450)*

The remains of two superimposed legionary forts lie immediately east of the survey area on the opposite side of the River Gipping and are suggested to have protected a river crossing. The forts and an associated civilian settlement (*vicus*) are statutorily protected as a Scheduled Ancient Monument (SAM SF89). The larger fort had three ditches and enclosed an area of over 4.45 hectares. A second smaller auxiliary fort lies in the south-western corner of the larger enclosure and covers an area of c.2.2 ha. The site has produced a number of notable finds, including a saddle-cloth weight, indicating the presence of cavalry, and a bronze statuette of Nero with silver and niello inlay which may have been deliberately broken.

A *vicus* eventually developed and this civilian settlement is known as *Combretovium*. A recent geophysical survey (Hancock 2007: Fig 2) at the north of the SAM has defined the locations of a possible Roman road, field system ditches, enclosure ditches, suggested settlement activity and possible funerary/ritual activity

2.4 *Anglo-Saxon (c.450-1066)*

Settlement features (BRK104) of this period are recorded a few hundred meters north of the site and a ring ditch and other finds (CDD057, CRM043) which may indicate funerary activity are noted c.500m north of the site. An Anglo-Saxon pot associated with fragments of a human skull (CDD003) has been recovered east of the survey area within the SAM, and two coins, a brooch and a hooked tag (CDD017) were found c.1km to the east.

2.5 *Medieval (1066-1500)*

The desk-top assessment notes a church (CRP004) listed in the Domesday Survey, and recovery of disparate finds dating to the medieval period along the proposed route of the pipeline although no sites or finds of this period are recorded within the survey area or its immediate environs.

2.6 *Post-Medieval (1500-1900)*

Metal detectorists have recovered a harness buckle, other buckles and a spoon bowl (SF 11414) of this period within the southern part of the survey area. Other notable features of this period include a lock (BAY035), a bridge (BAY028) and a possible 17th century watermill (BAY030) which lie immediately east of the survey area.

2.7 *Modern (1900-present)*

The 1st Edition Ordnance Survey map shows the survey area subdivided by a number of field boundaries that are no longer extant. It is probable that these boundaries were grubbed out during the latter half of the 20th century.

3. Aims, Methodology and Report Presentation

3.1 *Aims*

In line with the requirements of the *brief* (Section 2.3), the aims of the geophysical survey were:

- To provide information to construct an archaeological conservation strategy, dealing with the preservation, the recording of archaeological deposits, working practices, timetables and orders of cost.

3.2 *Methods*

The methods adopted for this project were those set out in the project design (Hancock 2007) and consisted of:

- A detailed magnetometer survey at a sample interval of 0.25m x 1.0m of *c.*11.7 hectares

3.3 *Standards*

The work conformed to the requirements of the *brief* (Tipper 2007), to the *project design* (Hancock 2007), to *Standards for Field Archaeology in the East of England* (Gurney 2003), to the relevant sections of the Institute of Archaeologists' *Standard & Guidance Notes* (IFA 2001) and *Code of Conduct* (IFA 2000a) and to MAP2 (EH 1991). The work also conformed to the relevant sections of ASC's own *Operations Manual,* to English Heritage geophysical survey guidelines (David 1995) and to IFA geophysical survey guidelines (Gaffney *et al* 2002). Data from the magnetometer survey was treated and archived in accordance with Archaeology Data Service guidelines (Schmidt 2003).

3.4 *Report Presentation*

3.4.1 A general site location plan incorporating the 1:25,000 Ordnance Survey mapping is presented in Figure 1. Figure 2 (1:10,000) shows the site and relative position of the geophysical survey blocks. The processed greyscale gradiometer data and accompanying interpretations are presented in Figures 3 to 6 at a scale of 1:1250. XY trace plots (1:1250) of the unprocessed "raw" gradiometer data are presented in Appendix 4.

3.4.2 Comprehensive technical details on the underlying principles of magnetic survey, the equipment used and general geophysical survey methodology are given in Appendix 1. Details on data processing and display are also given in Appendix 1. Survey location information is presented in Appendix 2 and the composition of the archive described in Appendix 3.

3.4.3 The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of ASC staff.

4. Geophysical Survey: Results and Discussion

4.1 *Non Archaeological Anomalies*

4.1.1 Discrete dipolar anomalies ("iron spikes" – Appendix 1) are identified distributed across all parts of the site. These "iron spike" anomalies are usually indicative of ferrous objects or other strongly magnetic material incorporated into the topsoil/subsoil and are often caused by modern cultural debris. Archaeological artefacts may manifest this type of anomaly and significant clusters associated with other substantiating evidence may be included in the discussion of archaeological anomalies.

4.1.2 Large areas of magnetic disturbance caused by ferrous or fired/heated material are identified in all four survey blocks although they are more prevalent adjacent to the railway line in Block 1 and on the higher ground near the railway line at the north of Block 2. The majority of these anomalies result from proximity of the survey blocks to ferrous components of the railway line, presence of wire strand fencing and accumulation of modern ferrous/fired detritus against field boundaries. An archaeological origin cannot be discounted for all of these anomalies as thermoremanent features such as kilns, furnaces or hearths may produce similar magnetic signatures.

4.1.3 Negative linear trends probably resulting from modern agricultural activity are identified in Blocks 1 and 2. The trend in Block 2 runs parallel with an electrified stock fence and was caused by a channel of shallower topsoil at the limit of a strip of recently ploughed ground. The trends in Block 1 also run parallel with an extant boundary and likely result from modern ploughing or compression of topsoil by agricultural vehicles.

4.1.4 Curvilinear areas of magnetic enhancement caused by modern agricultural activity are identified in all four survey blocks. The position of those identified in Blocks 2, 3 and 4 match the locations of since grubbed out field boundaries shown on 1st Ed. OS mapping. The origin of the short trend located at the southeast of survey Block 1 cannot be interpreted as definitively although the presence of significant ferrous/thermoremanent magnetic disturbance in this area suggests that relatively modern activity is the likely cause.

4.1.5 A large area of anomalous magnetic enhancement is present on the floodplain of the River Gipping at the southeast of Block 4. The strong and broad magnetic response of the curvilinear anomalies within this area are characteristic of those caused by geomorphological features, in this instance they result from the presence of superimposed palaeochannels.

4.1.6 Identified in Blocks 2, 3 and 4 are a number of discrete areas of magnetic enhancement. The broad, magnetically positive character of these anomalies and their position on the floodplain of the river suggests that they identify features resulting from the operation of geomorphological or other natural processes.

4.2 *Archaeological Anomalies: Block 1*

4.2.1 Block 1 has located a "ring ditch" (BAY 007) previously identified from cropmarks (Rolfe 2006). A little less than half of the ring ditch (**A**) lies within the site although enough is present to suggest a diameter of *c.*90m. The magnetic anomaly caused by the ditch fill is weak and it is unclear whether an apparent gap at the east of the anomaly defines an entrance or is the consequence of a lack of magnetic contrast between the ditch fill and the surrounding natural strata. The impressive projected diameter of this anomaly may indicate that it locates the ditch of a ritual monument or an enclosure rather than the ring ditch of a Bronze Age funerary monument.

4.2.2 Two north northwest – south southeast aligned parallel linear anomalies (**B**) are present at the north of the survey block. The anomalies are characteristic of those caused by infilled archaeological ditches and probably locate the flanking ditches of a trackway. A large discrete anomaly located toward the southern end of the eastern ditch may identify the position of an infilled pit. Two weakly positive curvilinear anomalies cross the proposed trackway and could define the positions of further infilled ditches. It is unlikely that the curvilinear ditches were contemporary with the trackway and it is suggested that they may predate it.

4.2.3 A west southwest – east northeast aligned linear positive anomaly (**C**) suggests the presence of an infilled archaeological ditch. The eastern part of anomaly **C** is strongly magnetic but the anomaly weakens as it progresses westward toward "ring ditch" **A**. It is tentatively suggested that Ditch **C** may be contemporary with trackway ditches (**B**) as they respect its position and it could post date the "ring ditch" **A** which it appears to cross.

4.2.4 Northwest – southeast aligned, weakly positive curvilinear anomaly (**D**) could define the position of an infilled boundary ditch. Two weak positive linear anomalies (**E**) may locate the flanking ditches of an entrance into an enclosure or field system bounded by **D**. Other magnetic anomalies indicating the presence of cut and infilled features are scarce east of **D**, and this could suggest that **D** defines the limit of a field system rather than an enclosure containing settlement activity.

4.2.5 Two large areas of magnetic disturbance resulting from human activity can be seen east of ditch **D**. The magnetic disturbance probably defines areas of made ground or intrusive activity associated with a relatively modern, partially infilled extraction pit which was observed in this area. The evidence summarised in this and the previous section indicates that attribution of an archaeological origin to anomalies **D** and **E** should remain tentative.

4.2.6 A weak positive rectilinear anomaly (**F)** is visible *c.*30m southeast of the southernmost limit of anomaly **D**. Anomaly **F** may define the position of an infilled enclosure ditch although a relatively modern agricultural origin cannot be discounted.

4.2.7 Disparate small discrete areas of magnetic enhancement with a possible archaeological origin are identified in Block 1. The presence of infilled archaeological ditches at the northern half of the block suggests that some of the discrete anomalies in this area will locate infilled archaeological pits although it is probable that some will be caused by infilled natural features or modern intrusive activity.

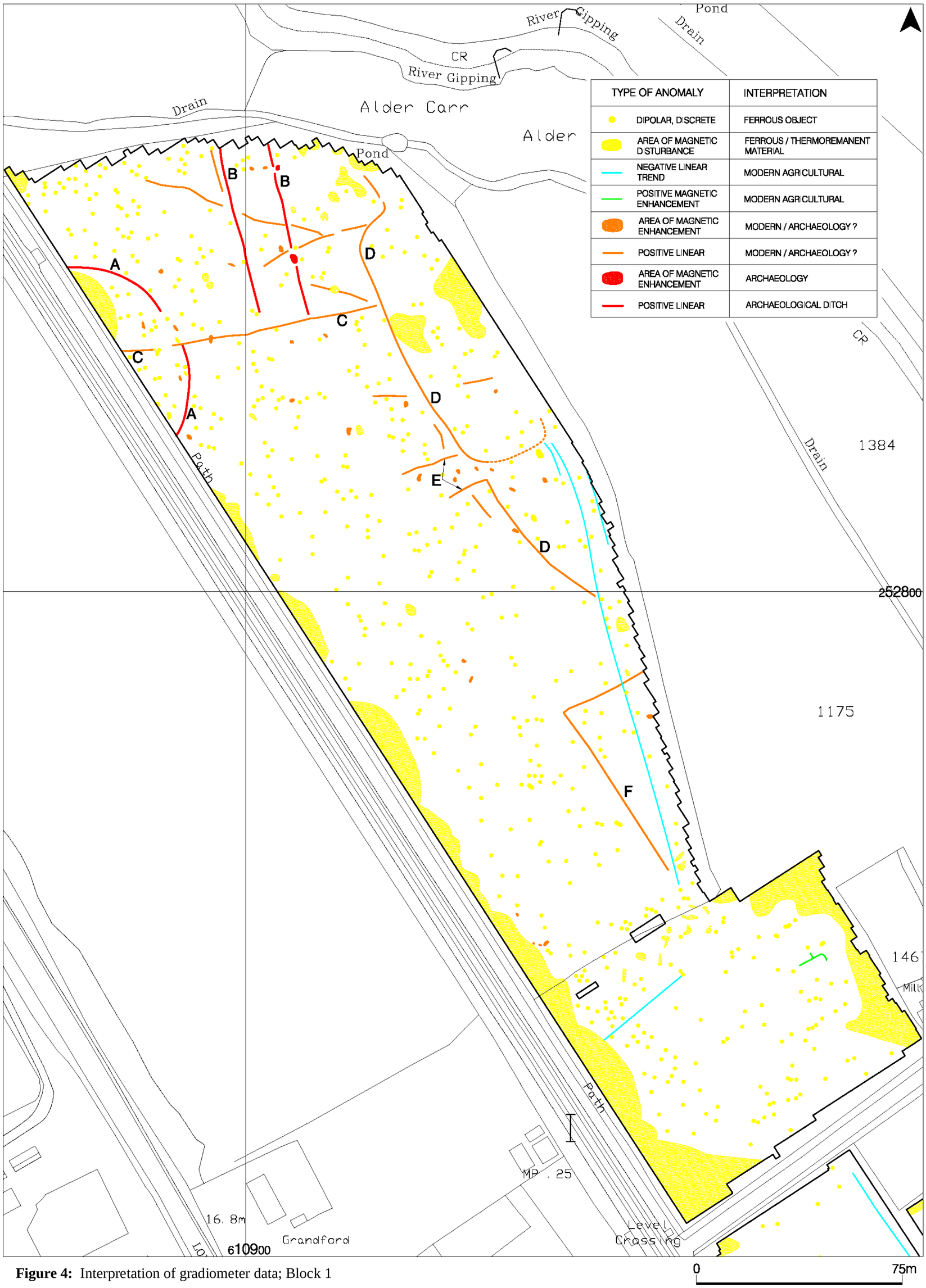
4.3 *Archaeological Anomalies: Blocks 2, 3 and 4*

4.3.1 Two parallel, weakly positive west southwest – east northeast aligned linear anomalies and a tentatively identified short section of a north - south aligned return are located next to the railway line at the northwest of Block 2. The "ring ditch" (BAY 012) of a possible Bronze Age barrow has been identified from cropmarks in this area (Rolfe 2006) but the identified anomalies are rectilinear in plan and are unlikely to define the position of a funerary monument of this period. The anomalies appear to locate infilled ditches of unknown antiquity and the presence of a trackway or small square enclosure is tentatively suggested.

4.3.2 Two small, discrete areas of magnetic enhancement that may be caused by infilled archaeological features are tentatively identified in Block 4. The anomalies may locate archaeological pits although their isolation and position on the floodplain of the river suggests that a geomorphological or modern origin is equally probable.

4.3.3 Other magnetic anomalies suggesting the presence of archaeological features are not identified in Blocks 2, 3 and 4.

Figure 3: Greyscale plot of gradiometer data; Block 1



TYPE OF ANOMALY	INTERPRETATION
DIPOLAR, DISCRETE	FERROUS OBJECT
AREA OF MAGNETIC DISTURBANCE	FERROUS / THERMOREMANENT MATERIAL
NEGATIVE LINEAR TREND	MODERN AGRICULTURAL
POSITIVE MAGNETIC ENHANCEMENT	MODERN AGRICULTURAL
AREA OF MAGNETIC ENHANCEMENT	MODERN / ARCHAEOLOGY ?
POSITIVE LINEAR	MODERN / ARCHAEOLOGY ?
AREA OF MAGNETIC ENHANCEMENT	ARCHAEOLOGY
POSITIVE LINEAR	ARCHAEOLOGICAL DITCH

Figure 4: Interpretation of gradiometer data; Block 1

Figure 5: Greyscale plot of gradiometer data; Blocks 2, 3 and 4

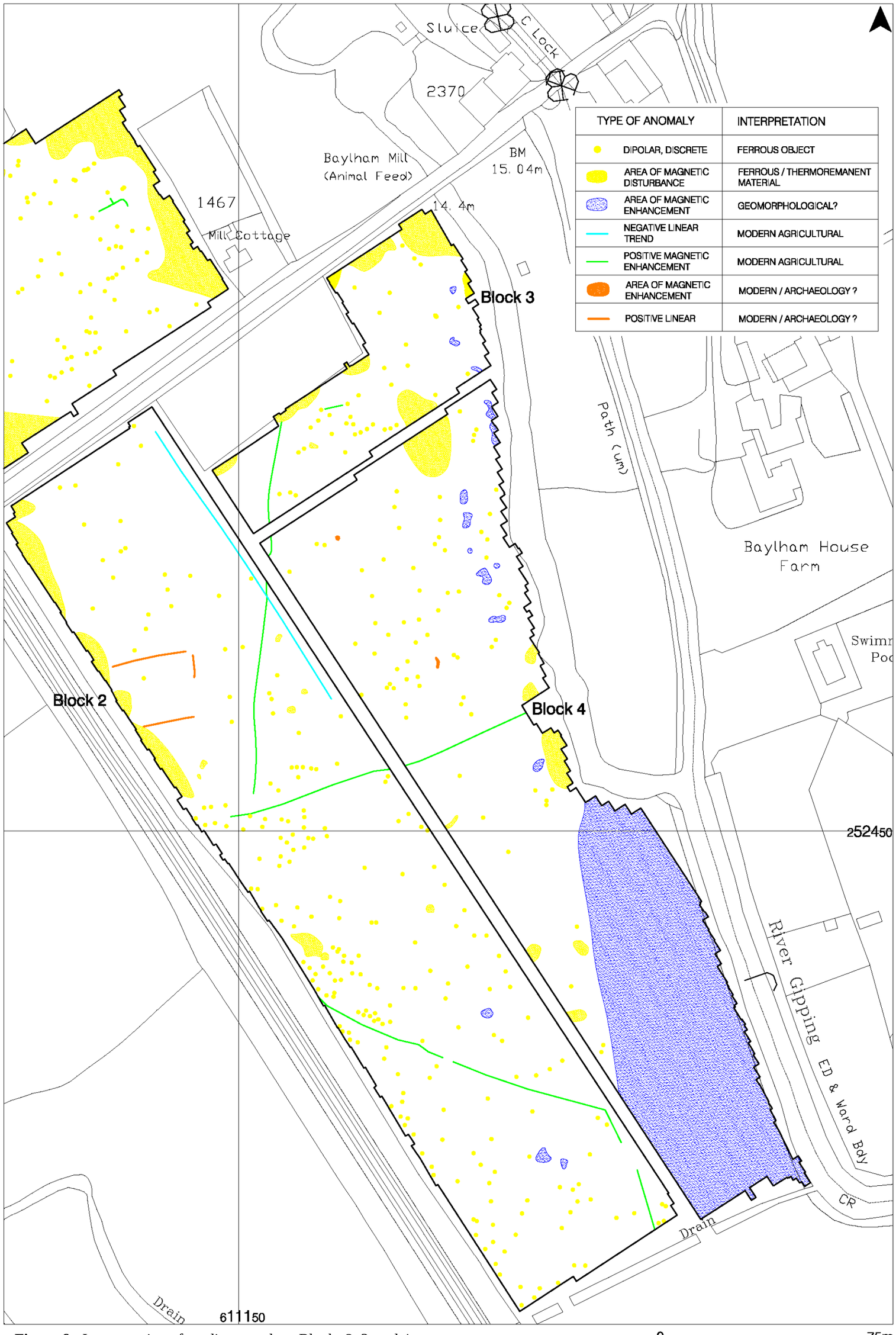


Figure 6: Interpretation of gradiometer data; Blocks 2, 3, and 4

5. Conclusions

5.1 The magnetometer survey has confirmed and successfully defined the position of a section of a large "ring ditch" (**A**) previously identified from crop marks. The ditch has been interpreted as defining the location of a Bronze Age barrow (Rolfe 2006) although a projected diameter of *c*.90m and a possible gap at the east of the ditch indicate that it may define an earlier ritual monument or a circular enclosure.

5.2 The survey has located previously unknown linear, curvilinear and rectilinear anomalies east, northeast and southeast of the "ring ditch". The anomalies are interpreted as defining the position of a trackway and possible enclosure/field system ditches of unknown date. One of the ditches appears to pass through the area enclosed by the "ring ditch" and this relationship suggests that at least two phases of past human activity may be present at the north of the survey area.

5.3 The orientation of possible trackway (**B**) at the north of Block 1 suggests that it may meet the western side of the river opposite Romano-British settlement features discovered at the eastern side of the river during an earlier geophysical survey (Hancock 2007: Fig 2).

5.4 Areas of strong magnetic disturbance are present adjacent to the railway line in Block 1 and could obscure smaller, weaker anomalies characteristic of archaeological features. Magnetic anomalies indicating the presence of ditches extending from the areas of disturbance into Block 1 are absent and the extent of any obscured archaeology is probably limited.

5.5 The presence of a small ring ditch identified from cropmarks at the south of the survey area has not been substantiated by the results of the geophysical survey. Weak positive linear anomalies are identified at the proposed location of the ring ditch and could define a trackway or small enclosure of unknown antiquity.

5.6 Magnetic anomalies defining the position of superimposed palaeochannels are present on the flood plain of the River Gipping at the southeast of the survey area. The palaeochannels may contain soil/sediment and other forms of environmental evidence from which Holocene climatic conditions and the type and scale of past human exploitation of this area could be inferred.

5.7 The summarised results suggest that the archaeological potential of the northern half of survey Block 1 should be regarded as high, reducing to medium at the south. The archaeological potential of the area surveyed south of Mill Lane (Blocks 2, 3 and 4) is regarded as low.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

6. References

Standards & Specifications

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7. Acknowledgements

The author is grateful to *Black and Veatch Ltd* and *Anglian Water Services Ltd* for commissioning this project. Jess Tipper of *Suffolk County Council Archaeological Service* is gratefully acknowledged for his advice. Bob Zeepvat BA MIFA edited the report.

Fieldwork

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Report

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Graphics

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Appendix 1: Magnetic Survey: Technical Information

1. Magnetic Susceptibility and Soil Magnetism

1.1 Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haematite. These minerals have a weak, measurable magnetic property termed ***magnetic susceptibility***. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. These effects are often observable by measuring the magnetic susceptibility of the topsoil, which can enable identification of areas where human occupation or settlement has occurred by virtue of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently fills features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

1.2 In general, it is a contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of the surrounding matrix, i.e topsoils, subsoils and rocks, into which these features have been cut that causes the most recognisable archaeological responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. Less magnetic material such as masonry or plastic service pipes that intrude into the topsoil may give a negative magnetic response relative to the background level.

1.3 An alternative method of enhancement to the magnetic properties of soil or archaeological features is through sustained heating. This can lead to the detection of features such as hearths, kilns or burnt areas through thermoremanent magnetism.

2. Types of Magnetic Anomaly

2.1 In the majority of instances anomalies are termed ***'positive'***. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as ***'negative'*** anomalies that, conversely, means that the response is negative relative to the mean magnetic background. Such negative anomalies are often very faint and are commonly caused by modern, non-ferrous, features such as plastic water pipes. Infilled natural features may also appear as negative anomalies on some geologies.

2.2 Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

2.3 It should be noted that some anomalies that are interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the origin of the anomaly.

2.4 The types of response mentioned above can be divided into five main categories which are used in the graphical interpretation of the magnetic data:

Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. This type of anomaly is characterised by very strong, 'spiky' variations in the magnetic background. A modern origin is usually assumed unless there is other supporting information.

Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. An agricultural origin, either ploughing or land drains is a common cause.

Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response (sometimes only visible on an X–Y trace plot) on two or three successive traverses. In neither instance is there the intense dipolar response characteristic of an area of magnetic disturbance or of an 'iron spike' (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post holes or by kilns, with the latter often being characterised by a strong, positive double peak response. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

3. Methodology

3.1 Gradiometer Survey

There are two main methods of using the fluxgate gradiometer for commercial evaluations. The first of these is referred to as ***scanning*** and requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10-15m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey. In favourable circumstances scanning may be used to map out the full extent of features located during a detailed survey.

The second method is referred to as ***detailed survey*** and employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.5m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

A Bartington Grad 601-2 fluxgate gradiometer was used for the detailed gradiometer survey. Readings were taken, on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids.

3.2 Data Processing and Presentation

The detailed gradiometer data has been presented in this report in X-Y trace and greyscale formats. The former option shows the 'raw' data with no processing other than grid biasing whilst in the latter the data has been selectively filtered to remove spurious errors such as striping effects and edge discontinuities caused by instrument drift and inconsistencies in survey technique caused by poor field conditions.

An X-Y plot presents the data logged on each traverse as a single line with each successive traverse incremented on the Y-axis to produce a 'stacked' plot. A hidden line algorithm has been employed to block out lines behind major 'spikes' and the data has been clipped at 5nT. The main advantage of this display option is that the full range of data can be viewed, dependent on the clip, so that the 'shape' of individual anomalies can be discerned and potentially archaeological anomalies differentiated from 'iron spikes'. ArchaeoSurveyor was used to create the X-Y trace plots.

ArchaeoSurveyor was used to process the data and produce the greyscale images and XY trace plots. All greyscale plots are displayed using a linear incremental scale.

Appendix 2: Survey Location Information

1. The geophysical survey blocks were established using a Pentax R-326EX total station. Survey block points were set out at 60m intervals with the total station and points at 20m intervals were set out as required using 100m tapes.

2. The survey grids were superimposed onto an Ordnance Survey digital map base. Overall there was a good correlation between the local survey and the digital map base and it is estimated that the average 'best fit' error is better than ±2m. It should be noted that Ordnance Survey 1:2500 mapping data have an error of ±1.9m at 95% confidence. This potential error must be considered if co-ordinates are measured off for relocation purposes from points other than those listed below or if anomalies are relocated using GPS technology.

Station	Easting	Northing
A (wooden stake)	610871.71	252863.07
B (wooden stake)	611069.67	252699.44
C (wooden stake)	611015.18	252643.06
D (wooden stake)	611042.90	252589.36
E (wooden stake)	611094.96	252506.16
F (wooden stake)	611234.52	252624.46
G (wooden stake)	611236.03	252487.18

ASC Ltd cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party or for the removal of any of the survey reference points.

Appendix 3: Geophysical Archive

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data; plot meshes, composites, report text (Word 2000), and graphics files (CorelDraw12 and AutoCAD 2006) files.
- a full copy of the report

At present the archive is held by ASC Ltd although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (*i.e*. available for consultation in the relevant Sites and Monument Record Office). An online OASIS form will be completed.

Appendix 4: XY Trace Plots of Raw Gradiometer Data (1:1250)

Figure 7: XY trace plot of raw gradiometer data; Block 1

Figure 8: XY trace plot of raw gradiometer data; Blocks 2, 3 and 4

Appendix 7: ASC OASIS Form

PROJECT DETAILS						
Project Name:	Geophysical Survey: Baylham Barrow Cemetery, Baylham, Suffolk					
Short Description:	Detailed magnetometer survey was carried out over 9 hectares of an 11.7 hectare site. The northern part of the survey has defined the location of part of a large "ring ditch" previously identified from crop marks. Other anomalies indicating the presence of a trackway and possible enclosures or field systems are present east, northeast and southeast of the "ring ditch". A smaller "ring ditch" identified from cropmarks in the southern part of the survey is not evident in the magnetometer data although short sections of two parallel ditches which may define a trackway or small enclosure are evident at its suggested location. Magnetic anomalies caused by the presence of palaeochannels are evident at the southeast of the survey.					
Project Type: (indicate all that apply)	DBA	FW	Geophys	Survey	Bldg Rec	Post-Exc
	WB	Strip&Rec	Trenching	Test pits	Exc	Other
Site status: (eg. none, SAM, Listed)	SAM		Previous work: (eg. SMR refs)		DBA	
Current land use:	Pasture and agricultural building		Future work: (yes / no / unknown)		Yes	
Monument type:	Ring ditch ? trackways, enclosures/field systems		Monument period:		BA, IA, RB?	
Significant finds: (artefact type & period)	Ring ditch? trackways, enclosures/field systems					
PROJECT LOCATION						
County:	Suffolk		OS reference: (to at least 8 figures)		TM 1107 5272 (site centre)	
Site address: (with postcode if known)	Baylham Barrow Cemetery, Nr Baylham, Suffolk					
Study area: (sq. m. or ha)	*c.*11.7 ha		Height OD: (metres)		*c.* 16m – 14m	
PROJECT CREATORS						
Organisation:	Archaeological Services & Consultancy Ltd					
Project brief originator:	J Tipper		Project design originator:		A Hancock	
Project Manager:	A Hancock		Director/Supervisor:		A. Hancock	
Sponsor / funding body:	Anglian Water Services Ltd					
PROJECT DATE						
Start date:	2nd May 2007		End date:		10th May 2007	
PROJECT ARCHIVES						
	Location (Accession no.)		Content (eg. pottery, animal bone, files/sheets)			
Physical:	None		None			
Paper:	ASC Ltd		Fieldwork report and Project Design			
Digital:	ASC Ltd		Report text, geophysical data, illustrations, basemap			
BIBLIOGRAPHY (Journal/monograph, published or forthcoming, or unpublished client report)						
Title:	Geophysical Survey: Baylham Barrow Cemetery, Baylham, Suffolk					
Serial title & volume:	Unpublished client report					
Author(s):	A Hancock					
Page nos	1 - 28		Date:		30th May 2007	