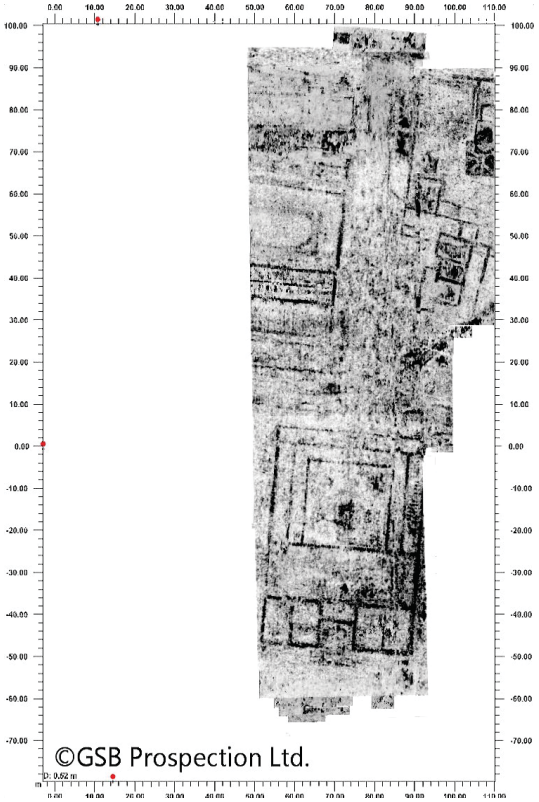
GEOPHYSICAL SURVEY REPORT G1252

Brancaster Roman Town
Norfolk



Client:

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GSB Survey Report No. 2012/52

Brancaster Roman Town, Norfolk

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Survey Personnel

Project Co-ordinators:	Jimmy Adcock BSc MSc & Emma Brunning BSc MIfA
Report Authors:	Jimmy Adcock BSc MSc & Dr John Gater MIfA FSA
Project Assistants:	Dr John Gater MIfA FSA

Dates

Fieldwork:	7 – 9 August 2012
Report:	11 July 2014

Report Approved: Dr John Gater MIfA FSA

Background Project Details

NGR	TF 782 440
Location	Brancaster lies on the north Norfolk coast some 12km east of Hunstanton; the Roman Fort lies on the eastern side of the village in fields immediately north of the A149.
HER/SMR	Norfolk
District	King's Lynn and West Norfolk (B)
Parish	Brancaster
Topography	Generally flat with some earthworks at fort ramparts.
Current Land Use	Pasture
Soils	Hunstanton (571r): deep well drained often reddish fine and coarse loamy soils. Some similar calcareous soils over chalk (SSEW 1983).
Geology	Ringstead sand and gravel overlying chalk of the Lewes Nodular, Seaford, Newhaven, Culver formation group (BGS 2013).
Archaeology	Brancaster (*Branodunum)* is the site of a Roman fort and settlement. The current best interpretation of the site is that a fort was constructed in the 2nd century around which settlement grew. In the first half of the 3rd century AD a new fort was built – one of the *Saxon Shore Forts* – which then underwent phases of remodelling and reordering throughout the Roman period (EH 2013).
Monument Number	SAM NF208 (fort); NH 1001, 1002, 1003,1004 (*vicus*);
Survey Methods	Magnetometer (fluxgate gradiometer) and ground penetrating radar (GPR).

Aims

To locate and characterise any anomalies of possible archaeological interest as stated within the project design (Mower 2012). The survey forms part of work done by **Channel 4's Time Team**.

Summary of Results

The magnetometer survey has worked extremely well, providing a detailed plan of the *vicus* to the east of the fort and other archaeological features to the north. The magnetic data from the fort itself compliment the radar results.

Incredibly detailed results have been achieved with the GPR survey and not only have very large structures including the *Principia,* a possible *Mansio,* and a granary been identified but also enlightening detail such as hypocaust systems, drainage routes, intact floor surfaces, pillar bases and buttresses.

Method

All survey grid positioning was carried out using Trimble R8 Real Time Kinematic (RTK) VRS Now dGPS equipment. The geophysical survey area is geo-referenced relative to the Ordnance Survey National Grid by tying in to local detail and corrected to the OS Mastermap provided by the client. Tie-in information has been lodged with Wessex Archaeology.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1m	0.25m
GPR	MALÅ MIRA (8-channel)	0.08m	0.08m

Data Processing

Data processing was performed as appropriate using both in-house and commercial software packages (Geoplot, Mala Rslicer) as outlined below.

Magnetic Data
Zero Mean Traverse, Step Correction (De-stagger) and Interpolation (on the Y axis).

GPR Data
De-wow, DC-shift, manual gain, bandpass filter, interpolation, Migration and amplitude enveloping.

Interpretation

When interpreting the results several factors are taken into consideration, including the nature of archaeological features being investigated and the local conditions at the site (geology, pedology, topography etc.). Anomalies are categorised by their potential origin. Where responses can be related to very specific known features documented in other sources, this is done so (for example: *Abbey Wall*, *Roman Road*). For the generic categories levels of confidence are indicated, for example: *Archaeology – ?Archaeology*. The former is used for a confident interpretation, based on anomaly definition and/or other corroborative data such as crop-marks. Poor anomaly definition, a lack of clear patterns to the responses and an absence of other supporting data reduces confidence, hence the classification *?Archaeology*. Details of the data plot formats and interpretation categories used are given in the Appendix: Technical Information at the end of the report.

All GPR interpretations are based on analysis of both raw and filtered depth-slice datasets as well as the original radargrams. Copies of the depth-slices can be found on the accompanying Archive CD for more detailed viewing.

General Considerations

The fields available for survey were all under pasture with no obstacles to hinder the work. That said, the ramparts of the fort remain as relatively large earthworks which may have introduced minor positional errors within the magnetic survey; however, these have been corrected for during processing.

Any depths referred to in the interpretation of GPR data *are only ever an approximation*. The conversion from delay time to depth depends upon the propagation velocity of radar waves through the ground; this can vary significantly both laterally and vertically on some sites. An average velocity of 0.063m/ns has been used after an iterative process of fitting hyperbolic curves to point-source reflections. Where there is a strong electromagnetic contrast, the GPR signal can be inter-reflected or reverberated, producing a delay in the reflection of the signal. This is termed ‘ringing’ and happens to some extent with all reflections, resulting in a greater apparent depth extent than actually exists. As a result, it is often not possible to detect the base of features; only the tops of buried deposits are detected with any kind of certainty (Annan 1997). Particularly strong ringing is often seen when buried metallic debris is encountered and this material is generally assumed to be of modern origins unless the site-type dictates otherwise.

1.0 Survey Results - Magnetometer Survey

1.1 Earlier unpublished work at Brancaster by English Heritage in 1973 and 1975 (EH 1975 report 1605 Old series) provided a tantalising glimpse of the potential that could be achieved by carrying out magnetic survey at the site. Ditches, pits and field systems, following a rectilinear pattern, were detected immediately to the west of the fort, on the site of the present housing estate. It is perhaps surprising therefore that, prior to this investigation, no further survey had been carried out, apart from an evaluation project to the east of the *vicus* (GSB 2006).

1.2 **Fort:** The main elements of the fort are clearly visible in the magnetic data. The defences, comprising banks and ditches, stand out in the east and west but unfortunately are obscured by modern field boundaries in the north and south. Gateways [**1**, **2, 3 & 4**] are visible at the cardinal points, some more clearly than others, and the courses of the internal roads are discernible but only the east-west route is conspicuous. Barrack blocks are apparent in the south-west quadrant but much more clearly in the south-east [**5**] where the lines of buildings are visible, with negative magnetic responses corresponding to the wall foundations. Similarly many of the rooms and the courtyard which make up the *Principia* [**6**] show as negative anomalies (due to the lack of magnetic material compared to the immediate surroundings). It is interesting to note the strong positive anomalies which presumably relate to magnetic deposits which have built up inside the individual rooms; in some cases these are likely to represent the sources of heat for the hypocaust system. The results correlate extremely well with the radar findings [**B** and **D**]. In the northern half of the fort the complexity of the magnetic responses is even greater, but buildings visible in the radar are not as clear magnetically. For example, the granary building's walls are at best poorly defined but more often absent in the data; this is likely to be a consequence of the lack of magnetically enhanced deposits which are present in and around the barracks and *Principia*. This interpretation could explain why many of the small buildings, including probable workshops, elsewhere in the fort are visible. The magnetic data from the three rooms at [**7**] match extremely well with the radar [**J** & **I**]; the clarity is such that the magnetic data even indicate the line of the flue into the hypocaust room [**I**]. Other anomalies which have been highlighted are those at [**8** & **9**] which could be large pits or areas of intensive burning and the responses [**10**] which correspond with the enigmatic radar results [**G**]. A line of four ferrous-like anomalies [**11**] is perplexing; it is uncertain whether they relate to the fort or to much more recent features.

1.3 **Vicus**: An area in the field to the east of the fort shows a complex of responses very similar to the earlier EH survey referred to in 1.1. The line of the east-west road which runs through the fort is apparent although it veers slightly southwards and there appear to be later features cutting through. The rectilinear pattern of ditches and presumed tracks indicates a formal layout to the majority of the *vicus* mapped by the survey. Overlapping and intercutting anomalies [e.g. **12**] suggest multi-phased activity. The data suggest a lack of pits throughout which is perhaps surprising given the nature of the settlement. The general results concur well with aerial photographs; clearly the *vicus* extends well beyond the area which was surveyed.

1.4 **North:** The density and complexity of the anomalies in this area is much less than compared with the *vicus* field. In the south-western extension of Area 1 there is a similar pattern of anomalies [**13**] as in Area 3 and in the EH survey in the housing estate to the south. The diminished magnetic response may be due to a phenomena referred to as a 'habitation effect' (Gaffney and Gater 2003) whereby the strength of magnetic responses decreases away from the core of activity. However, in this instance it is possible that a post-Roman deposition of alluvium is resulting in a weaker anomaly strength. In the northern half of the area there appears to be a separate double-ditched enclosure [**14**] with internal divisions which seems to have no direct association with the fort, apart from the fact it follows a very similar alignment. At [**15**] there is an unusual curving response which is difficult to interpret. In this context it could be of archaeological interest but the nature of the anomaly suggests a natural (alluvial) origin is perhaps more likely; hence the uncertain interpretation category.

2.0 Survey Results – Ground Penetrating Radar Survey

2.1 After the success of the magnetic survey, there were high hopes for the results of the GPR survey. Despite only covering a relatively small percentage of the whole site, they exceeded expectations revealing a wealth of detail indicating numerous structures, construction details and multi-phased elements of the fort. As the MIRA system and processing software were on loan for the Time Team projects, there was only a limited amount of processing and interpretation that could be carried out to produce this report. It therefore gives just a basic overview of what was found, highlighting some key features of note; it should provide an excellent basis for any further investigations in the future.

2.2 The survey area was chosen based on crop-marks which appeared to show the *Principia*. This building dominates the southern third of the data, with the walls and large rooms clearly visible and spanning a total of approximately 51m by 38m. Other features include: a possible monumental feature [**A**] within the central 20m-sided courtyard, plus two more similar features immediately to the north-east and north-west; a grid of very small reflectors [**B**], presumably the *pilae* within an extensive hypocaust system; potential structures [**C**] immediately outside the building complex; and one room (approximately 8m by 5m) with significantly greater depth extent (0.45m – 2.2+m) than the others (which, at the northern end of the *Principia,* peter-out at around 1.5m below ground level).

2.3 North of the *Principia* is a large range of buildings one of which [**E**] has the hallmarks of a large granary, 7m by at least 21m, with a central division or drain, floor pillars for air circulation and buttressed walls. On the north side of this, a large rectangular space [**F**] is around 18m north-south and could be as much as 40m east-west based on the magnetic data. What is unusual about this structure is the oval response that contracts towards the centre of the space with increasing depth, to reveal a smaller inner rectangle [**G**] approximately 10m by at least 18m and which extends down beyond 2.2m below ground level. The oval shape could be the effect of tip-lines within demolition material filling this feature rather than a response to a physical structure. There is also a strong magnetic response [**10**] coincident with the inner rectangle.

2.4 Further north again, beyond a range of buildings adjoining [**F**], is another large structure [**H**] with no obvious internal divisions – although this does not preclude their existence. It has a small porch-like extension on the north side but it is difficult to tell whether the structure is cruciform as the south side is masked somewhat by an area of increased response, perhaps demolition material.

2.5 On the eastern side of the survey area is a three-cell building although whether they are all contemporary is arguable. The southern-most room has a cross-flue hypocaust system [**I**] which, with depth, fades to reveal a semi-circular feature beneath it (from around 1.5m below ground level) that seems to extend off the southern side of the central room [**J**] and has a star-shaped response at its centre.

2.6 South of the three-celled structure is a large building [**K**] containing a number of rooms, three of which [**L, M, N**] appear to have intact floor surfaces at around 0.3m, 0.4m and 0.7m below ground level, respectively. This building is interesting as it lies on a slightly altered alignment from the majority of the other structures; most are aligned with the *Principia* and thus the Saxon Shore Fort phase of defences, where as [**K**] is in the same orientation as the *Vicus* to the east. One explanation could be that this is a relatively early *Mansio* that was built on the line of a pre-existing Roman road running through the original 2nd century fort, which was then subsumed within the larger fort construction, whose focus in the landscape, and thus orientation, was somewhat different.

2.7 Down the centre of the survey block runs one of the principle thoroughfares, leading to the *Principia* and along this can be seen a series of narrow linear anomalies [e.g. **O**], presumably drains. Some of these can be seen to branch off [**P**] towards the buildings down each side.

2.8 There are numerous other linear anomalies and zones of response that are undoubtedly further

structural elements but which are less clear in the data, due to variation in either preservation, overburden or construction, for which interpretation is accordingly more ambiguous. Examples include the rectilinear features up against the northern boundary [**Q**]; zones of increased response [**R**], possibly indicating metalling; the linear responses [**S**] and [**T**] which have markedly different orientations to the other features identified but which could be more drains or some such.

3.0 Conclusions

3.1 The results have confirmed the potential, first identified in the 1970s, of magnetometry in evaluating the *vicus* and fort at Brancaster. The survey has provided a dataset that compliments both the aerial photographs and the sample GPR survey.

3.2 The GPR survey results have been a revelation; Roman archaeology typically responds well to GPR but the combination of 'good' soils, excellent preservation and the multi-channel high-definition Mala MIRA system has produced a dataset of outstanding clarity. The work has identified the layout and depth extent of a number of buildings including the *Principia*, a granary, a potential *Mansio*, other extensive buildings as well as construction details such as buttresses, hypocaust systems, drains and floor surfaces. A curious, large sunken rectangular structure (with a strong associated magnetic response) has also been mapped and would appear to have layers of demolition material filling it.

References

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SSEW 1983	*Soils of England and Wales. Sheet 4, Eastern England*. Soil Survey of England and Wales. 1983.

GSB PROSPECTION Ltd

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton, Bradford, BD13 3HW

+44 (0)1274 835016

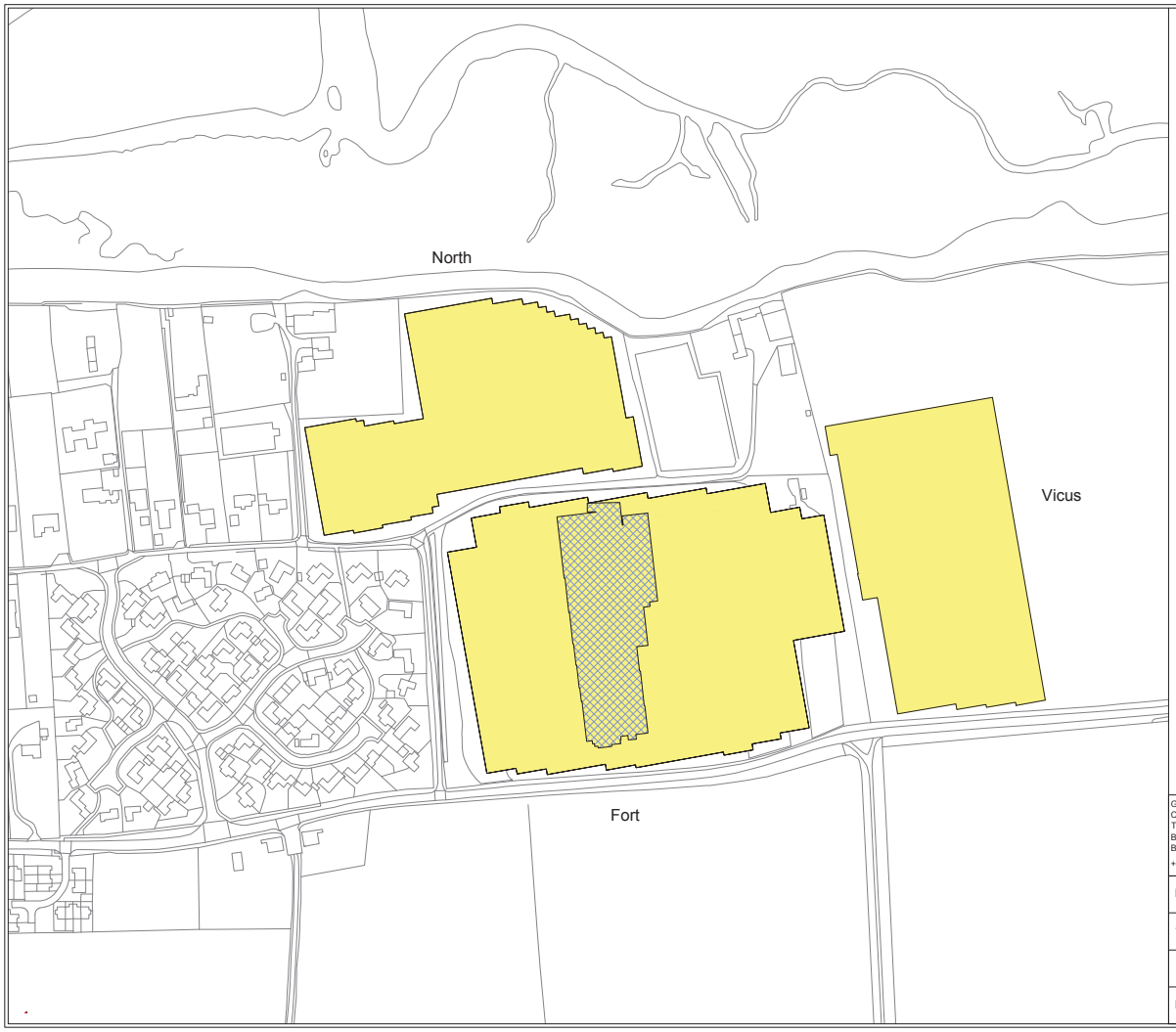
Site Location

Project: 1249 Brancaster Roman Fort

Title: Site Location

Drawn by: ELBrunning

Figure 1



N

0 metres 100

1:2500 @ A3

Gradiometer Survey

GPR Survey

GSB Prospection Ltd
Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

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Project: 1252 Brancaster Roman Fort

Title: Location of Survey Areas

Drawn by: ELBrunning

Figure 2

N

0 metres 80

1:2000 @ A3

5
nT
-2

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Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

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Project: 1252 Brancaster Roman Fort

Title: Magnetometer Survey - Greyscale Plot

Drawn by: ELBrunning

Figure 3

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Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

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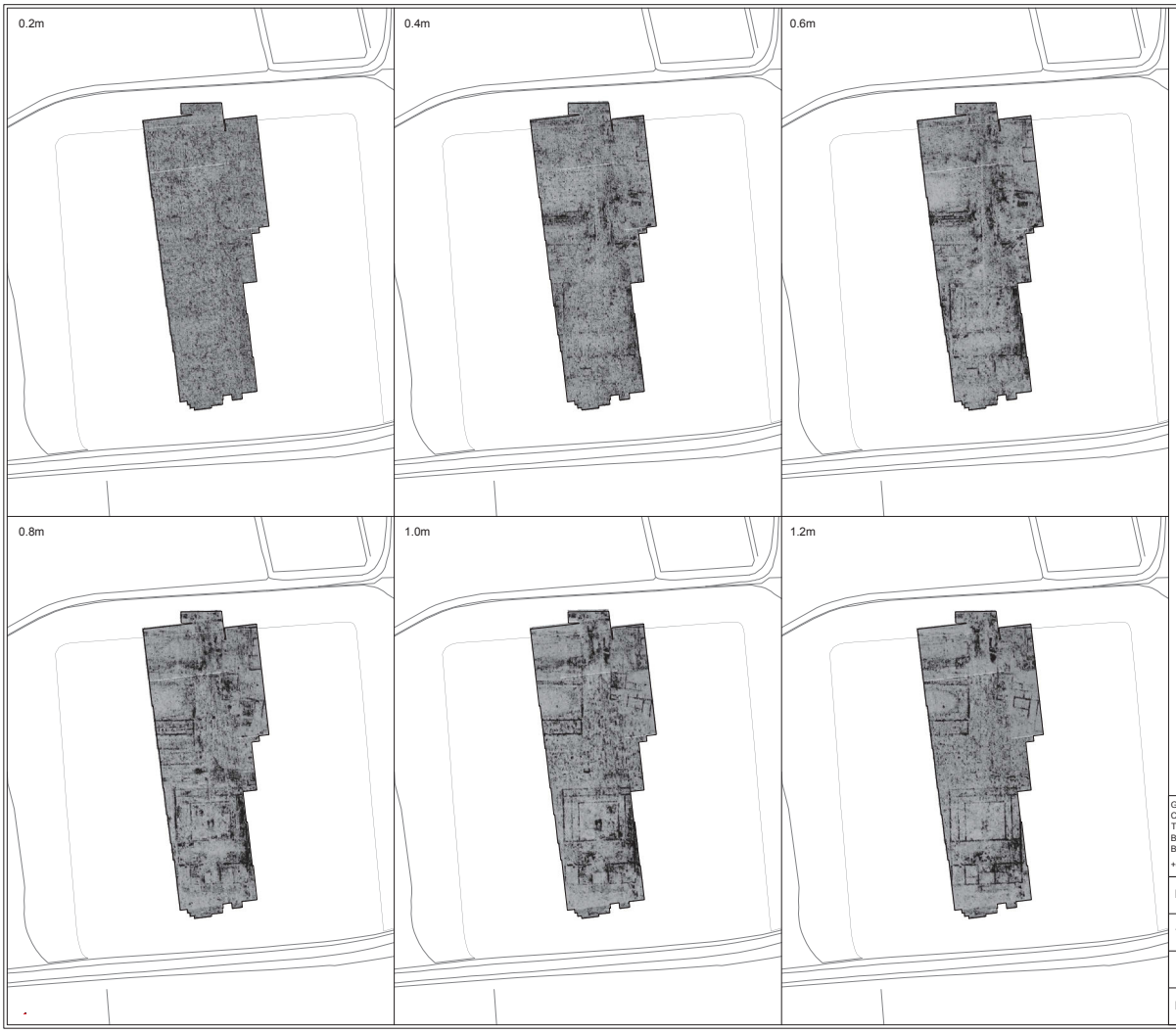
Project: 1252 Brancaster Roman Fort

Title: Magnetometer Survey - Interpretation Plot

Drawn by: ELBrunning

Figure 4



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Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

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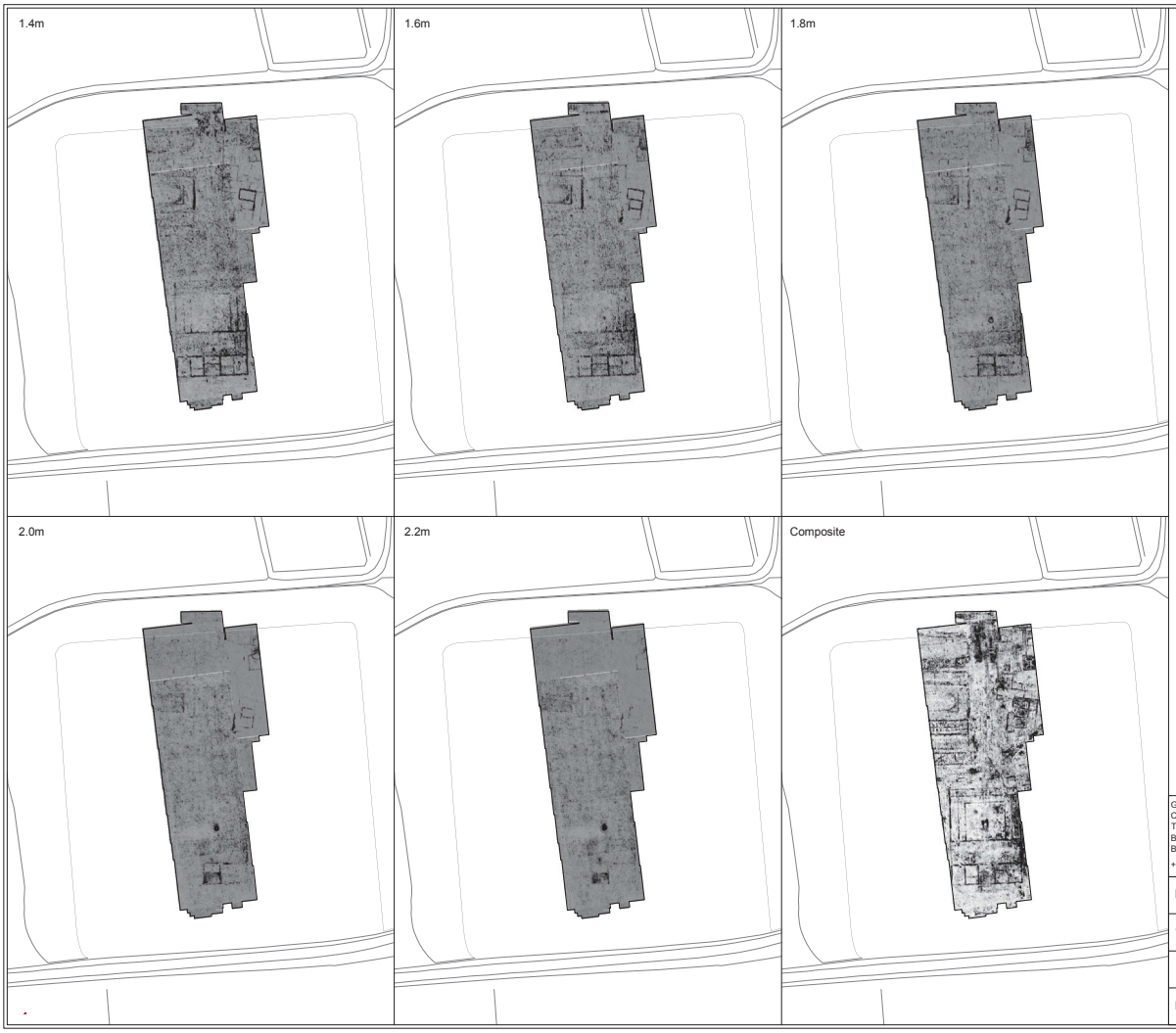
Project: 1252 Brancaster Roman Fort

Title: GPR Survey - Selected Time-slices

Drawn by: ELBrunning

Figure 5



N

0 metres 80

1:2000 @ A3

High

Amplitude

Low

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Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
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Title: GPR Survey - Selected Time-slices

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Figure 6

N

0 metres 40

1:1000 @ A4

High

Amplitude

Low

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Cowburn Farm, 21 Market Street
Thornton
Bradford
BD13 3HW
+44 (0)1274 835016

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sumo

Project: 1252 Brancaster Roman Fort

Title: GPR Survey - Annotated GPR

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Figure 7

Appendix - Technical Information: Magnetometer Survey

Instrumentation: Bartington *Grad*601-2 / GSB CARTEASY^{N} Cart system

Both the Bartington and CARTEASY^{N} instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted vertically, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method. The Bartington instrument can collect two lines of data per traverse with gradiometer units mounted laterally with a separation of 1.0m. The CARTEASY^{N} system has four gradiometer units mounted at 0.75m intervals across its frame – rather than working in grids, the cart uses an on-board survey grade GNSS for positioning. The cart system allows for the collection of topographic data in addition to the magnetic field measurements.

Data Processing

Zero Mean Traverse	This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.
Step Correction (Destagger)	When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.
Interpolation	When geophysical data are presented as a greyscale, each data point is represented as a small square. The resulting plot can sometimes have a 'blocky' appearance. The interpolation process calculates and inserts additional values between existing data points. The process can be carried out with points along a traverse (the x axis) and/or between traverses (the y axis) and results in a smoother greyscale image.

Display

XY Trace Plot	This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. The advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. The display may also be changed by altering the horizontal viewing angle and the angle above the plane.
Greyscale/ Colourscale Plot	This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.
3D Surface Plot	This is similar to the XY trace, but in 3 dimensions. Each data point of a survey is represented in its relative position on the x and y axes and the data value is represented in the z axis. This gives a digital terrain, or topographic effect.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, *Roman Road, Wall,* etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology	This term is used when the form, nature and pattern of the response are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.
?Archaeology	These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.
Increased Magnetic Response	An area where increased fluctuations attest to greater magnetic enhancement of the soils, but no specific patterns can be discerned in the data and no visual indications on the ground surface hint at a cause. They may have some archaeological potential, suggesting damaged archaeological deposits.
Industrial / Burnt-Fired	Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metal-working areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.
Old Field Boundary	Anomalies that correspond to former boundaries indicated on historic mapping, or which are clearly a continuation of existing land divisions.
Ridge & Furrow	Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases the response may be the result of more recent agricultural activity.
Ploughing	Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.
Natural	These responses form clear patterns in geographical zones where natural variations are known to produce significant magnetic distortions. Smaller, isolated responses which do not form such obviously 'natural' patterns but which are, nonetheless, likely to be natural in origin may be classified as *?Natural*.
Uncertain Origin	Anomalies which stand out from the background magnetic variation, yet whose form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *?Archaeology* and *?Natural* or (in the case of linear responses) *?Archaeology* and *?Ploughing*; occasionally they are simply of an unusual form.
Magnetic Disturbance	Broad zones of strong dipolar anomalies, commonly found in places where modern ferrous or fired materials (e.g. brick rubble) are present. They are presumed to be modern.
Ferrous	This type of response is associated with ferrous material and may result from small items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses similar to ferrous material.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix - Technical Information: Ground Penetrating Radar (GPR) Survey

Instrumentation: Mala MIRA (Multi Imaging Radar Array)

The Mala MIRA is a fully integrated system comprising an array of 400MHz antennas, an odometer wheel, battery and rugged laptop for system control and data-capture. The antennas are configured to collect 8 parallel lines of data, 0.08m apart, with each swathe of the machine. The acquisition software uses the integrated odometer to trigger the system, whilst recording a stream of 3D positional information from a separate robotic total station. The data are recorded in digital format and can be processed to produce depth slice maps, 2D sections or 3D cubes.

Data Processing

There are a wide range of GPR filters available and their application will vary from project to project. The most commonly used are:

Dewow	Removes low frequency, down-trace instrument noise
DC-Shift	Re-establishes oscillation of the radar pulse around the zero point)
Bandpass Filtering	Suppresses frequencies outside of the antenna's peak bandwidth thus reducing noise
Background Removal	Can remove ringing, instrument noise and minimize the near-surface 'coupling' effect
Migration	Collapses hyperbolic tails back towards the reflection source

Display

Radargram	Radar data comprise a record of reflection intensity against the time taken for the emitted energy to travel from the transmitter down to the reflector and back to the receiver. The resultant plot is effectively a vertical section through the ground along the line of the traverse, with time (depth) on the vertical axis, displacement on the horizontal axis and reflection intensity as a grey or colour scale.
Depth-Slice	If a number of radargrams are collected over a grid, or in conjunction with GPS data, it is possible to reconstruct the entire dataset into a 3D volume. This can then be resampled to compile 'plan' maps of response strength at increasing time offsets (typically converted to show approximate depth), thus simplifying the visualisation of how anomalies vary beneath the surface across a survey area.
Volume Plot	Rather than looking at discrete slices of data from the 3D volume, it is possible to strip away all reflections with intensity below a user-defined threshold, leaving just the strongest anomalies. This serves to create a rendered 3D model of the most substantial subsurface deposits which can then be rotated or enlarged/reduced to either animate the display or view it from any perspective.

Interpretation Categories

Wall/ Foundation / Vault / Culvert etc.	High amplitude anomaly definitions used when other evidence is available that supports a clear archaeological interpretation.
Archaeology	Anomalies whose form, nature and pattern indicate archaeology but where little or no supporting evidence exists. If a more precise archaeological interpretation is possible, for example the responses appear to respect known local archaeology, then this will be indicated in the accompanying text. As low amplitude responses are less obvious features it is unlikely that they would have a definitive categorisation.

?Archaeology	When the anomaly could be archaeologically significant, given its discrete nature, but where the distribution of the responses is not clearly archaeological. Interpretation of such anomalies is often tentative, exhibiting either little contrast or forming incomplete archaeological patterns.
Recent Historic	Responses showing clear correlation with earlier map evidence.
?Recent Historic	Responses relating to features not directly recorded on earlier maps but which appear to respect features that are. May form patterns suggestive of formal gardens, landscaping or footpaths.
Area of Anomalous Response	An area in which the response levels are very slightly elevated or diminished with respect to the 'background'. Where no obvious surface features or documentary evidence can explain this spread of altered reflectivity it is assumed to denote some kind of disturbance, though the origins could be of any age and either anthropogenic or natural. Possible explanations are changes in subsurface composition and groundwater ‘ponding’.
Landscaping	Anomalies which are clearly the result of artificial alterations to the topography or where documentary evidence records that such alterations have been made. These changes may be due to the levelling of a site, the introduction of consolidation material, the construction of features such as berms or raised lawns.
?Landscaping	Anomalies that would suggest a buried surface, the presence of consolidation material or ‘made’ ground but which lack evidence of such alterations at the surface and where no supporting documentary sources or local knowledge have been supplied.
Natural	Anomalies relating to natural sub-surface features as indicated by documentary sources, local knowledge or evidence on the surface.
?Natural	Responses forming patterns akin to subsoil/geological variations either attenuating or reflecting greater amounts of energy. An archaeological origin such as rubble spreads or robbed out remains cannot be dismissed.
Trend	An ill defined, weak or isolated linear anomaly of unknown cause or date.
Modern	Reflections that indicate features such as rebar and modern cellars correlating with available evidence (maps, communications with the client, etc.) or responses resulting from surface discontinuities, the effects of which may be seen to 'ring' down through radargrams and so incorrectly appearing in the deeper time-slices.
?Modern	Reflections appearing to indicate buried structures not of any great antiquity but where there is no supporting evidence. Also applies to responses which form patterns, or are at a depth which suggests a modern origin. An archaeological source cannot be completely dismissed.
Service	Reflections that indicate features such as drains, culverts, cables, pipes, conduits or tanks correlating with available evidence (maps, communications with the client, alignment of drain covers etc.).
?Service	Reflections appearing to indicate buried services (as listed above) but where there is no supporting evidence. The relative antiquity of features cannot necessarily be determined and they may still be related to the archaeological resource under investigation.

Where appropriate some anomalies will be further classified according to their form (high amplitude: stronger and well defined; increased amplitude: weaker and less well defined).

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sumo Survey Services

Tel: +44 (0)1274 835016
Fax: +44 (0)1274 830212
Email: gsb@gsbprospection.com
Web: www.gsbprospection.com

GSB Prospection Ltd. Registered in England, Registration Number: 4783292. VAT Registration Number: 516177841
Registered Office: Unit 8 Hayward Business Centre, New Lane, Havant, Hampshire, PO9 2NL