Archaeological geophysical survey of the proposed Kent Medical Campus Bearstead Road, Maidstone Kent

March 2016

Report No. 16/58

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OASIS REPORT

PROJECT DETAILS	**Oasis No. molanort1-248393**	
Project name	Archaeological geophysical survey of the proposed Kent Medical Campus, Bearstead Road, Maidstone, Kent	
Short description	MOLA Northampton was commissioned to carry out a magnetometer survey on land north of Bearstead Road, Maidstone, Kent. The survey identified a group of possible archaeological anomalies, apparently representing pits and an L-shaped ditch, in the north-west of the survey area. Two other anomalies were interpreted as representing possible kilns. The survey also detected modern features including pipes and made ground.	
Project type	Geophysical survey	
Site status	None	
Previous work	DBA, Watching brief	
Current land use	Pasture	
Future work	Trial trench excavation	
Monument type/ period	Undated pits and ditch, post-medieval kilns	
Significant finds	None	
PROJECT LOCATION		
County	Kent	
Site address	Bearstead Road, Maidstone	
Study area	*c* 13.5ha	
OS Easting & Northing	TQ 785 570	
Height OD	*c* 55m - 70m aOD	
PROJECT CREATORS		
Organisation	MOLA Northampton	
Project brief originator	Kent County Council	
Project design originator	MOLA Northampton	
Director/Supervisor	John Walford	
Project Managers	John Walford and Claire Cogar	
Sponsor or funding body	DHA Planning	
PROJECT DATE		
Start date	14 March 2016	
End date	18 March 2016	
ARCHIVES	Location	Content
Physical	MOLA Northampton	None
Paper		Site survey records
Digital		Geophysical survey & GIS data
BIBLIOGRAPHY	Journal/monograph, published or forthcoming, or unpublished client report	
Title	Archaeological geophysical survey of the proposed Kent Medical Campus, Bearstead Road, Maidstone, Kent, March 2016	
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ABSTRACT

MOLA Northampton was commissioned to carry out a magnetometer survey on land north of Bearstead Road, Maidstone, Kent. The survey identified a group of possible archaeological anomalies, apparently representing pits and an L-shaped ditch, in the north-west of the survey area. Two other anomalies were interpreted as representing possible kilns. The survey also detected modern features including pipes and made ground.

1 INTRODUCTION

MOLA Northampton was commissioned by DHA Planning, on behalf of Kent Medical Campus, to conduct a magnetometer survey on *c* 13.5ha of land north of Bearstead Road, Maidstone, Kent (NGR TQ 785 570; Fig 1). The purpose of this survey was to identify and map any archaeological remains which may be affected by the proposed development of medical campus facilities or by associated landscaping. The fieldwork was undertaken from 14th to 18th March 2016.

2 BACKGROUND

2.1 Location, topography and geology

The survey area is an irregularly shaped block of pasture land bounded by Bearstead Road to the south, Pope's Wood to the east, Horish Wood to the north and Newnham Court Farm to the west. At the time of the survey it was divided into several fields and parts were further divided into irregularly-shaped blocks by belts of newt-proof fencing.

The survey area is bisected by a small stream valley which drains southwards towards the River Len. The base of the valley lies at *c* 55m aOD, from where the ground rises westwards to a maximum elevation of *c* 70m aOD. To the east of the stream the ground also rises but the topography is undulating with very irregular slopes.

The solid geology of the survey area comprises sands belonging to the Folkstone Formation. These are not overlain by superficial drift, except in the base of the stream valley where recent deposits of alluvium and head have been mapped (BGS 2016).

2.2 Historical and archaeological background

The survey area has been the subject of a historic environment assessment (Band and Dixon 2013) and two archaeological watching briefs (Anon 2008, Taylor 2012). Further archaeological works have been undertaken immediately adjacent to the survey area prior to the creation of Newnham Court Way and the construction of an initial phase of medical campus facilities (Birchenough 2011). The assessment concluded that the area had a low to moderate potential to contain archaeological remains of prehistoric to post-

medieval date. Similarly, the various phases of fieldwork to date have identified relatively sparse and dispersed archaeological remains.

A low level of Neolithic to Bronze Age to activity within the survey area is indicated by a background scatter of worked flints (Birchenough 2011, 1) and by the chance discovery of a flint axe in 1962 (Band and Dixon 2013, 26). Further worked flints and prehistoric pottery were observed during the present survey and are described in Appendix 1.

Trial trench evaluation and subsequent archaeological excavation immediately north of the survey area identified a small group of Iron Age postholes and ditches as well as a few Roman finds (Birchenough 2011; Band and Dixon 2013, 10-11). There is also a record of a Roman coin hoard having been discovered *c* 160m west of the site (Band and Dixon 2013, 11).

Approximately 200m to the west of the survey area stands the 15th-century, Grade II listed Newnham Court Farm. The only other buildings of historic note in the near vicinity are the un-listed 19th-century Gidd's Pond Cottages which stand alongside Bearstead Road on the southern edge of the survey area.

Several local field names recorded on historic maps refer to kilns (Band and Dixon 2013, 14) and a probable post-medieval kiln or hearth base made of re-used ceramic tiles was observed during the archaeological monitoring of a geological test pit slightly to the west of Gidd's Pond Cottages (Anon 2008). Post-medieval sand quarrying also occurred in the local vicinity, with a number of former pits recorded on historic editions of the Ordnance Survey (Band and Dixon 2013, 14).

3 METHODOLOGY

3.1 General comments

Two different survey methodologies were applied at Maidstone; traditional gridded survey with hand-held magnetometers and a newer technique employing a bank of cart-mounted magnetometers linked to an RTK GPS antenna. The two techniques produced comparable datasets, although the latter recorded data at an increased spatial precision and resolution. The amount of coverage achieved with the cart was limited to *c* 3.5ha, due to a mechanical failure which could not be adequately repaired on site.

Both survey techniques used the same key components; Bartington Instruments Grad601 magnetic gradiometers (Bartington and Chapman 2003) and a Leica Geosystems Viva GPS antenna. However, the instrument configurations, operational procedures and data processing routines varied for each technique, as described below. These variations notwithstanding, both techniques complied with the survey guidelines issued by Historic England and by the Chartered Institute for Archaeologists (HE 2015; CIfA 2014).

The data from both survey techniques has been converted into greyscale raster plots at a display range of +/-4nT and these have been combined into a single map image by positioning, scaling and rotating (geo-rectifying) each plot for display against the Ordnance Survey base mapping (Fig 2). The same plots are presented with an interpretive overlay in Figure 3, and plots of the raw data are presented in Figure 4.

3.2 Gridded survey

The majority of the survey, covering the western and central parts of the area, was undertaken according to the traditional gridded methodology.

An independent network of 30m grid squares was established across each block of land to be surveyed by this technique. These were set out with a tape measure and optical square and were tied in to the Ordnance Survey National Grid by measurement with the Leica Viva GPS. The gradiometers were carried at a brisk but steady pace through each grid square, collecting data along 1m spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3600 measurements per square.

The gridded survey data was processed using Geoplot 3.00v software. The striping (caused by slight imbalances between sensors) was removed using the 'Zero Mean Traverse' function and destaggering of the data was performed where necessary to correct errors arising from an uneven survey pace. The processed data was output in the form of greyscale raster images at a range of +4nT (black) to -4nT (white).

3.3 Cart survey

The cart survey covered the eastern field and a narrow belt of land around the northern edge of the central part of the survey area.

The cart is a two-wheeled, lightweight structure designed to be pushed by hand. It incorporates a bank of four vertically-mounted Grad601 magnetic sensor tubes, spaced at half-meter intervals along a bar aligned crossways to the direction of travel, and also incorporates a GPS antenna mounted on the central axis, 1.85m astern of the sensors. The magnetic sensors each output data at a rate of 6 readings per second and the GPS antenna outputs NMEA format data (GGA messages) at a rate of one position every two seconds. These various data streams are fed into a laptop computer where they are compiled into a single raw data file by MultiGrad601 logging software specifically designed for that purpose.

The cart was pushed along more or less straight and parallel traverses across each area to be surveyed, with logging being manually toggled on and off at the start and end of each traverse to avoid the collection of spurious data whilst turning. Traverse ends were marked with ranging poles to aid even coverage, and the evenness of coverage was further checked by monitoring the positional trace plotted in real time by the MultiGrad601 logging software. The average speed of coverage was *c* 1.5m/s and the effective data resolution thus approximated to 0.25m x 0.50m.

The raw survey data was initially processed with MLGrad601 software, which calculated an actual UTM co-ordinate for each data point by interpolating the GPS readings and applying offset corrections based on the array geometry and calculated heading direction. This produced an output file in XYZ format which could be imported into TerraSurveyor software for data visualization and further processing.

The raw XYZ data exhibited striping caused by slight mis-matches in the calibration of the individual magnetic sensors. This was removed in TerraSurveyor by applying the median destripe function to runs of data from each sensor. The data thus de-striped was interpolated to produce a greyscale raster image (range +/-4nT) and this was output with an associated world file for geo-rectification.

4 SURVEY RESULTS

The survey has detected a group of probable archaeological anomalies focussed on the high ground in the north-western part of the survey area. These comprise a cluster of small amorphous anomalies with typical intensities in the range of 2nT to 5nT, partially encompassed to the south and east by a weak linear anomaly with a rounded right-angled corner (Fig 3; A1-A2), and perhaps represent a cluster of pits enclosed by a boundary ditch. Whilst the various features lack any diagnostic elements that would reliably indicate their date, the discovery of prehistoric flints and pottery nearby (Appendix 1) suggests an early date might be possible.

Two anomalies in the survey data are probably indicative of former kilns. One, which lies immediately north-west of Gidd's Pond Farm, in the corner of a field, is circular in plan, *c* 5m in diameter and attains a maximum intensity of *c* 57nT at its centre (Fig 3; K1). The other which lies *c* 270m to the north, close to the northern edge of the survey area, is closer to a rectangular form, measures *c* 4m x 5m across, and attains a maximum intensity of *c* 72nT (Fig 3; K2). In each case the interpretation as a kiln rests on the size and regular shape of the anomaly and the presence of moderate magnetic enhancement without the extreme central peak values that are more typical of ferrous anomalies.

Two other groups of magnetic anomalies in the central part of the survey area are less diagnostic but could possibly represent fragmented patches of burnt soil or ceramic debris associated with kilns. Each one comprises an irregular cluster of relatively small and amorphous anomalies with intensities in the range of 10nT to 50nT (Fig 3; K3-K4).

Some linear anomalies correspond to former field boundaries of recent date. These generally take the form of chains of small magnetic dipoles which may indicate residual fencing material or other items of metallic rubbish accumulated along the former boundary.

A large pipeline is represented by an intense linear anomaly of alternating magnetic polarity which runs north-eastwards across the survey area from a point north of Gidd's Pond Farm (Fig 3, P1). A slighter and less intense anomaly of similar form apparently represents another pipe running on a broadly parallel alignment between the farm and an outlying yard and office building (Fig 3, P2), and a dipolar linear anomaly to the south of this (Fig 3; P3) could represent either a pipe or an electricity cable. Two other intense linear anomalies in the north-western field probably represent drains (Fig 3; P4-P5). There is also possible evidence for a pipe along the eastern edge of the survey area, but this is uncertain due to the complexity of the magnetic response in this area (Fig 3; P6).

A massive and intense dipolar anomaly to the south-west of the yard and office building represents a large buried iron or steel object (Fig 3; F1). Thirty metres to the south-west there is an even larger anomaly of composite, cellular form, which also appears to have a ferrous origin (Fig 3; F2). The specific causes of these anomalies are unknown but underground tanks, re-enforced concrete footings, or other modern objects of similar scale should perhaps be suspected. Elsewhere across the survey area there are numerous instances of much smaller dipolar anomalies, the great majority of which will represent relatively insignificant pieces of ferrous debris in the topsoil.

In some areas there are dense clusters of intermingled dipolar anomalies ('magnetic noise') indicating concentrations of ferrous debris or other magnetic materials. In many cases this will merely be superficial rubbish or residual scatters of weakly magnetic hardcore (eg brick rubble, slag, etc) but other cases may be indicative of extensive modern ground disturbance. For instance, the data from the small field north of Gidd's Pond Cottages is dominated by an incoherent mass of large anomalies that are very

likely to indicate a deposit of made ground (Fig 3; D1). There is a zone of weaker magnetic noise across the northern end of the field east of Newnham Court Way, coinciding with an area that is known to have been mechanically stripped and re-instated during construction works in 2013 (Fig 3; D2).

Various broad and magnetically subdued linear anomalies occur across the central part of the survey area. These are probably geological in origin, perhaps representing a combination of superficial erosion channels and outcrops of relatively iron-rich seams within the natural sand.

5 CONCLUSION

The survey has detected a group of probable archaeological features comprising pits and an L-shaped section of ditch located on the high ground in the north-western part of the survey area. It has also detected two probable kilns and two other areas which may contain burnt soil or ceramic debris. Nothing else of obvious archaeological interest has been detected. However, it should be remembered that certain types of small and ephemeral archaeological feature can be difficult targets for geophysical survey and larger remains can also escape detection should they lack suitable magnetic contrasts with the underlying substrate (HE 2015, 14-15).

Apart from archaeological features, the survey has detected a number of pipelines and other modern features and provides evidence for several areas of recently disturbed ground. The latter include one area that is known to have been stripped and re-instated and another which appears to have been built up with made ground.

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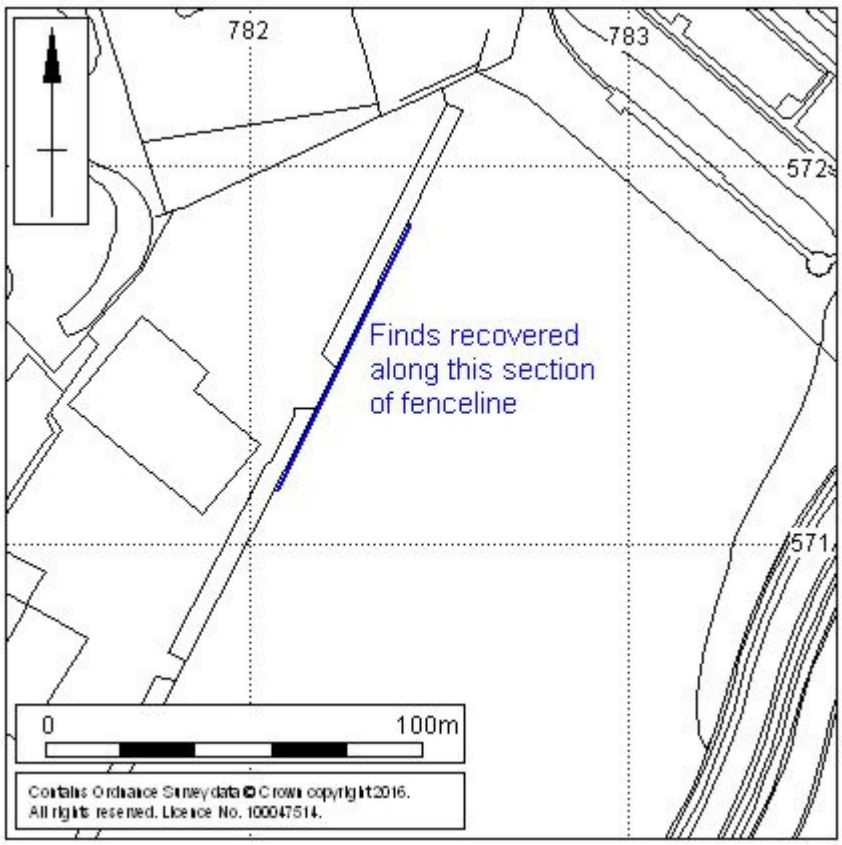
MOLA Northampton
15 April 2016

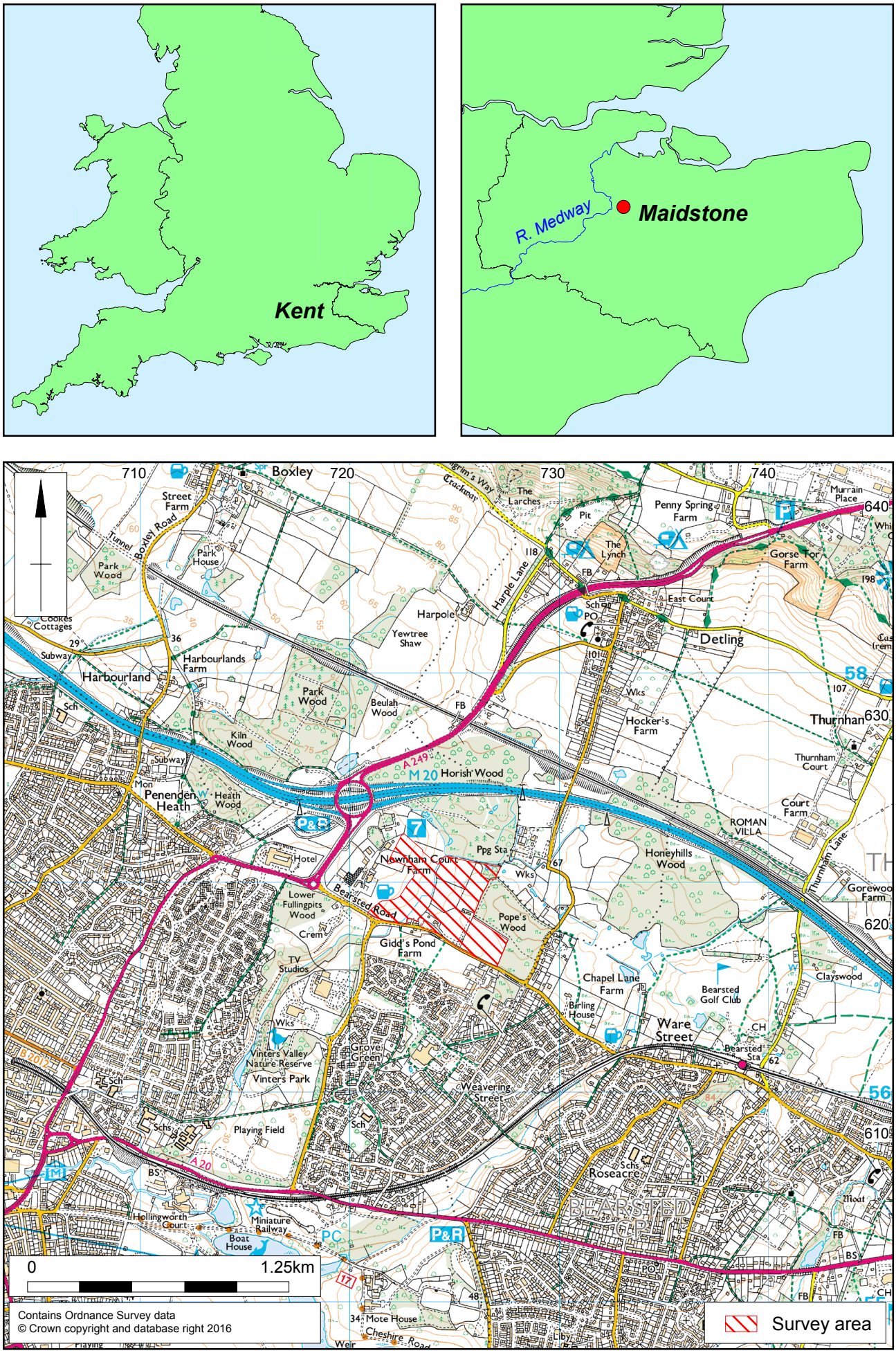
APPENDIX 1: SURFACE FINDS by Andy Chapman

A small collection of flint and pottery finds was recovered from a very narrow strip of bare earth at the base of the fence along the north-western edge of the survey area, as indicated on the map below.

There are five pieces of flint. This includes three blade-like flakes, 19mm, 21mm and 18mm wide by 24mm, 22mm (both broken) and 46m long. Two are in grey opaque flint with pale blue-grey surfaces patination and the other is in pale grey opaque flint. Two of these have evidently come from prepared cores with previous removals of blades. There is also an elongated but irregular flake in pale grey opaque flint and an irregular lump of burnt flint. The presence of three blades might suggest an early Neolithic date.

There is a single small sherd of pottery, 6mm thick and weighing 4g, with a grey core and inner surface and an orange-brown external surface, containing dense angular flint, which erupts through the surfaces. This sherd is probably from a hand-built vessel of prehistoric date. There is a second sherd of similar size in a grey fabric of possible Roman date.





Scale 1:25,000

Site location Fig 1

Scale 1:2500

Magnetometer survey results Fig 2

781
783
785
787
570
568
566

Pit / ditch?
Kiln / burnt soil?
Field boundary
Ferrous object
Pipe / drain / cable
Modern disturbance
Geology

P5
A1
P4
A2
K2
K3
Woodland
Saplings
Newnham Court Way
K4
Saplings
P6
P1
F1
K1
F2
P2
Gidd's Pond Farm
Gidd's Pond Cottages
Bearstead Road

Magnetic anomaly /nT
-4nT 0 +4nT
0 100m

Scale 1:2500

Magnetometer survey interpretation Fig 3

781
783
785
787
572
570
568
566
Saplings
Woodland
Newnham Court Way
Saplings
Bearstead Road
Magnetic anomaly /nT
-10nT 0 +10nT
0 100m

Scale 1:2500

Unprocessed magnetometer data Fig 4

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