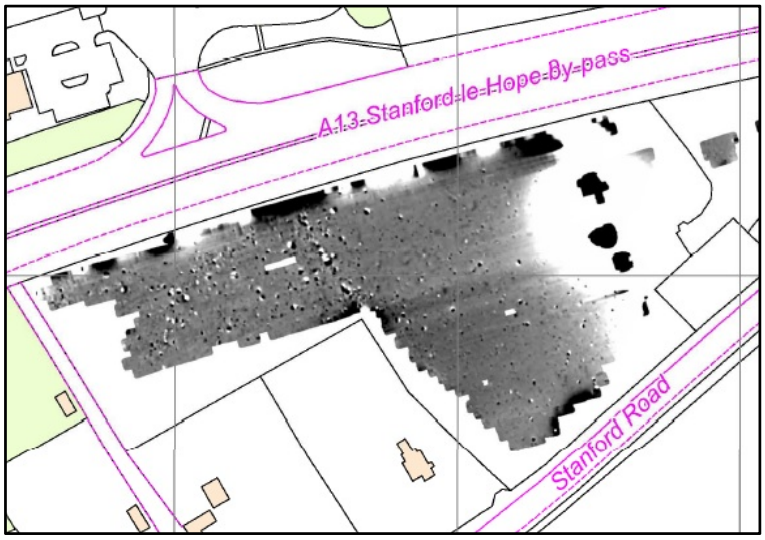

Archaeological geophysical survey alongside the A13, Orsett to Stanford le Hope, Essex November 2017

Report No: 17/133

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OASIS REPORT

PROJECT DETAILS	**Oasis No. molanort1-303133**	
Project name	Archaeological geophysical survey alongside the A13, Orsett to Stanford le Hope, Essex	
Short description	MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey alongside the A13 between Orsett and Stanford le Hope, Essex. The survey detected a few linear ditches, most of which are thought to have defined post-medieval field boundaries. Nothing of earlier date could be conclusively identified, although there were two minor anomalies for which an archaeological interpretation was tentatively suggested.	
Project type	Geophysical survey	
Site status	None	
Previous work	None known	
Current land use	Arable and pasture	
Future work	Trial trench excavation	
Monument type/ period	Undated ditch	
Significant finds	None	
PROJECT LOCATION		
County	Northamptonshire	
Site address		
Study area	*c* 9.8ha	
OS Easting & Northing	TQ 669 819	
Height OD	*c* 10m - 30m aOD	
PROJECT CREATORS		
Organisation	MOLA Northampton	
Project brief originator	Richard Havis, Essex County Council	
Project design originator	Andrew Copp, AECOM	
Director/Supervisor	Graham Arkley	
Project Managers	Mo Muldowney and John Walford	
Sponsor or funding body	AECOM on behalf Thurrock Council	
PROJECT DATE		
Start date	27th November 2017	
End date	30th November 2017	
ARCHIVES	Location	Content
Physical	N/A	
Paper	MOLA Northampton	Site survey records
Digital		Geophysical survey & GIS data
BIBLIOGRAPHY	Journal/monograph, published or forthcoming, or unpublished client report	
Title	Archaeological geophysical survey alongside the A13, Orsett to Stanford le Hope, Essex, November 2017	
Serial title & volume	MOLA Northampton Reports 17/133	
Author(s)	John Walford	
Page numbers	5	
Date	12th December 2017	

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ABSTRACT

MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey alongside the alongside the A13 between Orsett and Stanford le Hope, Essex. The survey detected a few linear ditches, most of which are thought to have defined post-medieval field boundaries. Nothing of earlier date could be conclusively identified, although there were two minor anomalies for which an archaeological interpretation was tentatively suggested.

1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by AECOM, on behalf of their client Thurrock Council, to undertake an archaeological geophysical survey of a series of land parcels alongside the A13 between Orsett and Stanford le Hope in Essex (NGR TQ 669 819; Fig 1). This survey formed part of a package of archaeological evaluation in advance of the widening of the A13 and was intended to identify and map any archaeological remains which may be affected by the proposed works.

The areas to be surveyed had been specified in a written scheme of investigation (WSI) prepared by AECOM for Thurrock Council (Copp 2017) with subsequent amendments to allow for issues relating to survey methodology, land access and ground conditions. The total extent of land actually covered by the survey was 9.8ha. The fieldwork took place from 27th to 30th November 2017.

2 BACKGROUND

2.1 Topography and geology

The survey was targeted on a series of land parcels lying along a 3km stretch of the A13 between the A128 'Orsett Cock' junction in the west and the A1014 'Manorway' junction in the east (Fig 1). The original survey strategy envisioned the coverage of several rectangular sample areas within each of these parcels (Copp 2017, fig 2) but this was later modified to aim for total coverage. However, the original area numbering has been retained so each of the actual survey areas is equivalent to a set of numbered 'areas'.

Survey Areas 1-4 and 12 had to be excluded from the survey due to access issues and Areas 13-14 due to dense scrub cover. The other areas, which were surveyable, fell into four discrete sets; Areas 5-7 and 8-11 lying to the south of the A13 on either side of the westbound Stanford le Hope service station, Areas 17-19 to the south of the A13 immediately west of Stanford le Hope, and Areas 15-16 and 20-23 to the north of the A13 in fields to the east of Horndon House (Fig 1).

The land parcels alongside the A13 were in mixed use at the time of the survey. Those containing Areas 5-7, 15-16 and 20-23 were under arable cultivation whereas those containing Areas 8-11 and 17-19 were vacant grass fields with stands of weeds. Areas 8-11 were also partly obstructed by derelict caravans and other objects.

The western half of the survey area (Areas 5-11) lies at around 30m aOD on a very gentle north-facing slope. Further east the land surface drops gradually away, so that Areas 17-19 lie between the 10m and 15m contours and much of Areas 15-16 and 20-23 lie below 10m aOD. The solid geology of the entire survey area comprises Lambeth Group sediments (formerly named Woolwich and Reading Beds). These are overlain in places by patches of alluvium, head and river gravels (BGS 2017).

2.2 Historical and archaeological background

The WSI for this survey (Copp 2017) provides a detailed archaeological background to this project. It quotes Essex County Council's view that the site has a 'high archaeological potential' due to its favourable location above the Thames Estuary in an area where many archaeological sites are known.

Archaeological remains are known at a number of locations on and along this stretch of the A13. The most substantial site lies at the Orsett Cock junction, where cropmarks and excavation have revealed middle Iron Age remains, a late Iron Age to Roman enclosure and early Saxon grübenhauser (Carter 1998). Other excavation just east of the junction revealed a continuation of the Roman and Saxon remains and also a small ring ditch and cremations of Bronze Age date (Milton 1987). Linear cropmarks, suggestive of a field system, extend further east from this locality, almost as far as Area 5 of the present survey (Carter 1988, fig 2). Further east again, between survey Area 8 and the westbound service station, is the site of a ring ditch or small circular enclosure that was excavated in the late 1980s (Essex HER MEX28709).

Three Roman findspots are recorded close to the Manorway junction at the east end of the survey area. A burial was found in a gravel pit north-east of the junction (MEX17716), a Roman pot was found on the line of the carriageway, also north-east of the junction (MEX17868), and waterlogged timbers and pottery were found just south-west of the junction where the A13 crosses Hassenbrook Stream (MEX18145).

3 METHODOLOGY

The survey was undertaken with a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform designed to be pushed by hand. As operated by MOLA it incorporates a bank of six vertically-mounted Bartington Grad601 magnetic gradiometers, spaced at half-metre intervals along a bar aligned crossways to the direction of travel, and also incorporates a Leica Geosystems GS16 GPS antenna mounted on the central axis, 1.02m astern of the sensors. The magnetic sensors each output data at a rate of 8Hz (eight readings per second) and the GPS antenna outputs NMEA format data (GGA messages) at a rate of one position every second. These 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 propelled along straight and parallel traverses across each of the survey areas, with data 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 up to *c*2m/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 visualisation 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 destripe function to runs of data from each sensor. Some difficulties were encountered in processing the data from Area 19 as this was dominated by strong magnetic halos which limited the effectiveness of the de-striping function.

The processed data is presented in this report as greyscale raster plots, rotated and scaled for display against the Ordnance Survey base mapping (Figs 2, 4, 6 & 8). A wider than usual display range of +/-10nT was chosen for the plots in this instance because this reduced the masking effects of the many magnetic halos that were detected. The same data plots are presented with interpretive overlays in Figures 3, 5, 7 and 9 and plots of the unprocessed survey data are presented in Figures 10 to 13.

4 SURVEY RESULTS

4.1 **Area 5-7** (Figs 2-3)

At the western end of this dataset, there is a dense cluster of small dipolar anomalies ('magnetic noise') which indicates a concentration of ferrous debris in the ploughsoil. Such debris would typically be associated with a residual patch of hardcore or with rubble from a demolished agricultural building. Similar dipolar anomalies are much more sparsely distributed through the rest of the data, indicating a typical background scatter of minor ferrous debris.

Approximately 150m eastwards into the dataset there are three positive linear anomalies aligned perpendicular to the A13. The central of these corresponds to a former field boundary which was depicted on various historic Ordnance Survey maps from 1867 to the mid-1970s. The anomaly to its east has a similar alignment and character but does not correspond to anything mapped by the Ordnance Survey so may represent a ditch pre-dating the 1867 map. The anomaly to the west is somewhat stronger but has a fluctuating intensity. Whilst it could be interpreted as another ditch it more closely approximates to a typical anomaly from a modern field drain.

In between the central and eastern linear anomalies, there is a short right-angled anomaly with a rounded corner. This probably represents a ditch, and possibly one of archaeological origin, but the evidence is too slight to be conclusive. To its south there are two small positive anomalies which could represent pits.

One hundred metres further to the east there is a weak negative linear anomaly aligned perpendicularly to the A13. Such anomalies can relate to drains or service trenches but can also be encountered at a boundary between differently cultivated parts of a field. It is unclear which interpretation should apply in this case, but the feature has been depicted as a service trench on Figure 3 so as to err on the side of caution.

In the south-eastern part of this dataset there is a network of positive linear anomalies. One is aligned east-west, six others join it from the south and one other joins it from the north. Considered individually, these anomalies could be interpreted as ditches but their overall configuration is more strongly suggestive of a set of modern field drains.

At least two modern services have produced intense magnetic anomalies in the south-eastern part of the dataset. One, which runs alongside the A1013, is represented by a

linear anomaly of alternating polarity with similarly alternating halos. The other is represented by a positive anomaly with negative halos running north to south through the data.

Much of the data from Areas 5-7 exhibits weak, amorphous background patterning, and some small, weak positive anomalies are also present in certain locations. This patterning and the other anomalies are most likely to be geological in origin although there is a low possibility that a few of the strongest and more clearly defined anomalies could represent pits.

4.2 **Areas 8-11** (Figs 4-5)

In the western side of this dataset there are many small dipolar anomalies indicative of minor pieces of ferrous debris. A number of these form a distinct line, aligned roughly north-north-west, indicating where such debris is concentrated in the backfill of a former field boundary ditch. Further dipoles of ferrous origin are present, in lower numbers, to the east.

Four large, very intense positive anomalies, set in a massive negative halo, indicate where a gas pipe runs from north to south across this survey area. The smaller positive and negative halos alongside the A13 probably arise from fences or other roadside infrastructure.

The small, weakly positive anomalies of irregular form which occur sporadically throughout this dataset are thought to be geological in origin.

The easternmost part of the Areas 8-11 land parcel was overgrown and obstructed so that only two small pieces of data could be collected. These reveal nothing of note.

4.3 **Areas 17-19** (Figs 6-7)

The data from these areas are dominated by intense magnetic anomalies and halos arising from gas and water pipes and from the adjacent A13. Many small ferrous dipoles, similar to those noted in the preceding areas, are also present.

Only one small anomaly of possible archaeological interest has been detected. This comprises a very short, right-angled linear anomaly with a slight swelling towards its centre, located in the north-west corner of Area 19. There is a low possibility that this could represent a corner of a ditch of indeterminate date.

4.4 **Areas 15-16 and 20-23** (Figs 8-9)

The data from these areas contains various linear anomalies, three of which correspond to former field boundaries recorded on historic Ordnance Survey maps. The southern of these is highlighted by a dense linear scatter of dipolar anomalies indicating ferrous debris in the backfilled ditch. Similar concentrations of ferrous dipoles are apparent where the survey was carried through gaps in two current field boundaries.

In the northern part of the dataset, adjoining the B1007, there is a positive linear anomaly of slightly sinuous form which is aligned north to south. This is likely to represent a ditch of indeterminate date. It cannot be correlated with any field boundary depicted by the Ordnance Survey but there is a possibility it could represent a boundary pre-dating the earliest Ordnance Survey mapping.

Two very weak linear anomalies of alternating magnetic polarity are present in this dataset. One lies alongside the northbound slip road of the A13 and the other extends

west-north-west from the southern of the former field boundaries. Such anomalies are very characteristic of ceramic field drains.

At the northern end of this dataset there is a north-south aligned negative linear anomaly similar to the example previously described in Areas 5-7. Once again, this could either relate to a service trench or be the product of recent cultivation but the former interpretation has been indicated on the interpretation plot (Fig 9) as a matter of caution.

Small magnetic dipoles of ferrous origin are present throughout the dataset and two larger ferrous anomalies are also present. One of the latter, which comprises two large dipoles end to end, possibly represents a length of metal pipe. The other is of obscure significance.

Some small positive anomalies at the road-side edge of the data are the result of momentary magnetic interference from passing vehicles. As they are of no significance, they have not been highlighted on the interpretation plot.

5 CONCLUSION

The magnetometer survey has detected minimal evidence for archaeological remains within the areas of investigation. There are a small number of anomalies that appear to represent backfilled ditches, but these are typically aligned on similar axes to the current pattern of fields and most, if not all, would be best interpreted as former field boundaries of post-medieval date. Two much smaller anomalies cannot be so easily attributed to former field boundaries and may relate to earlier archaeological features. However, in each case the anomaly is so small and isolated that a confident interpretation is impossible.

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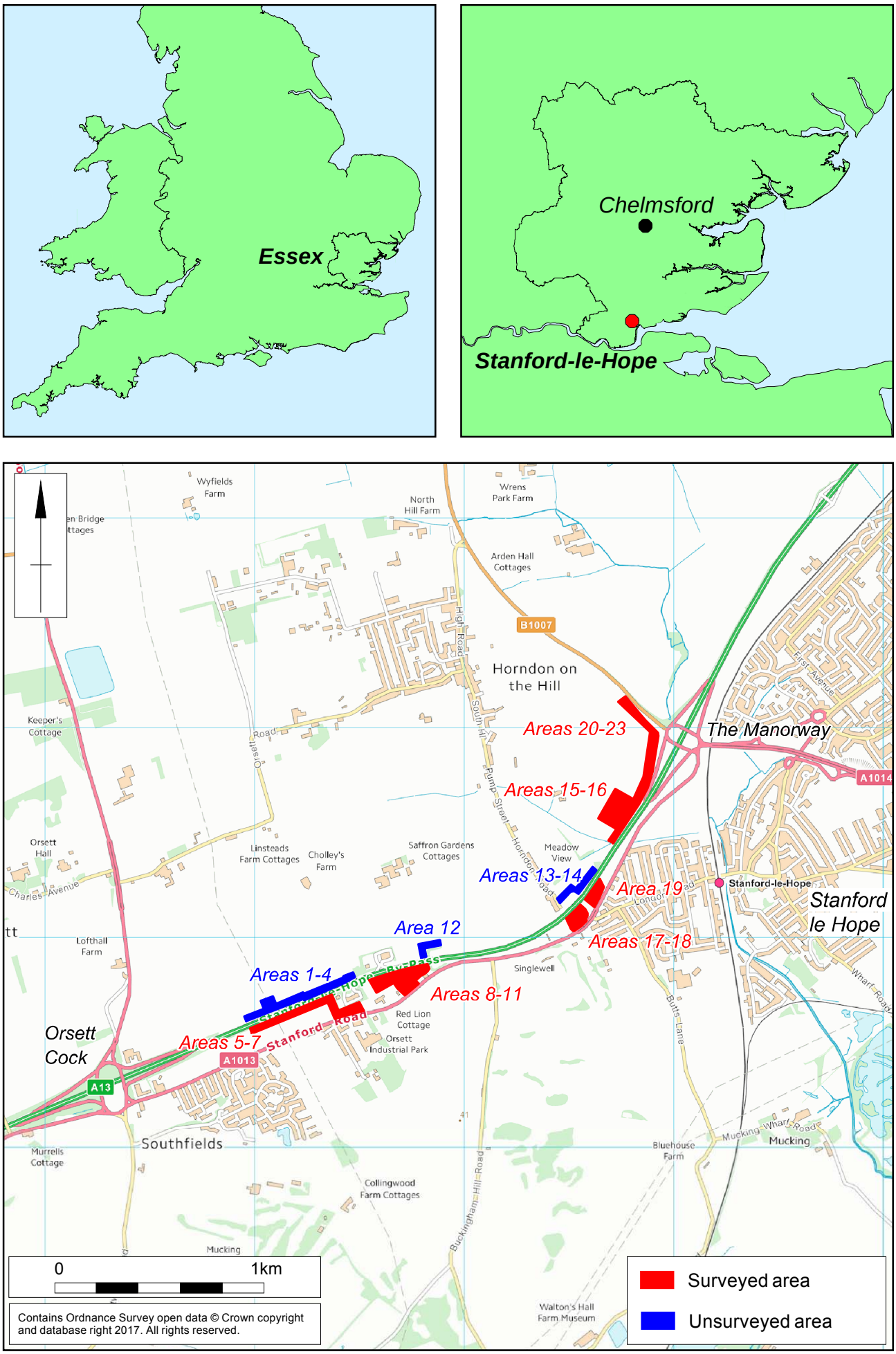
MOLA
12th December 2017



Scale 1:25,000

Site location Fig 1

660
662
664
666
816
A13 Stanford-le-Hope Bypass
Stanford Road
Sandown Road
Inset: detail of Area 7. Scale: 1:2000.
Magnetic anomaly /nT
-40nT 0 +40nT

Magnetic anomaly /nT
-10nT 0 +10nT
0 100m

Scale 1:2000

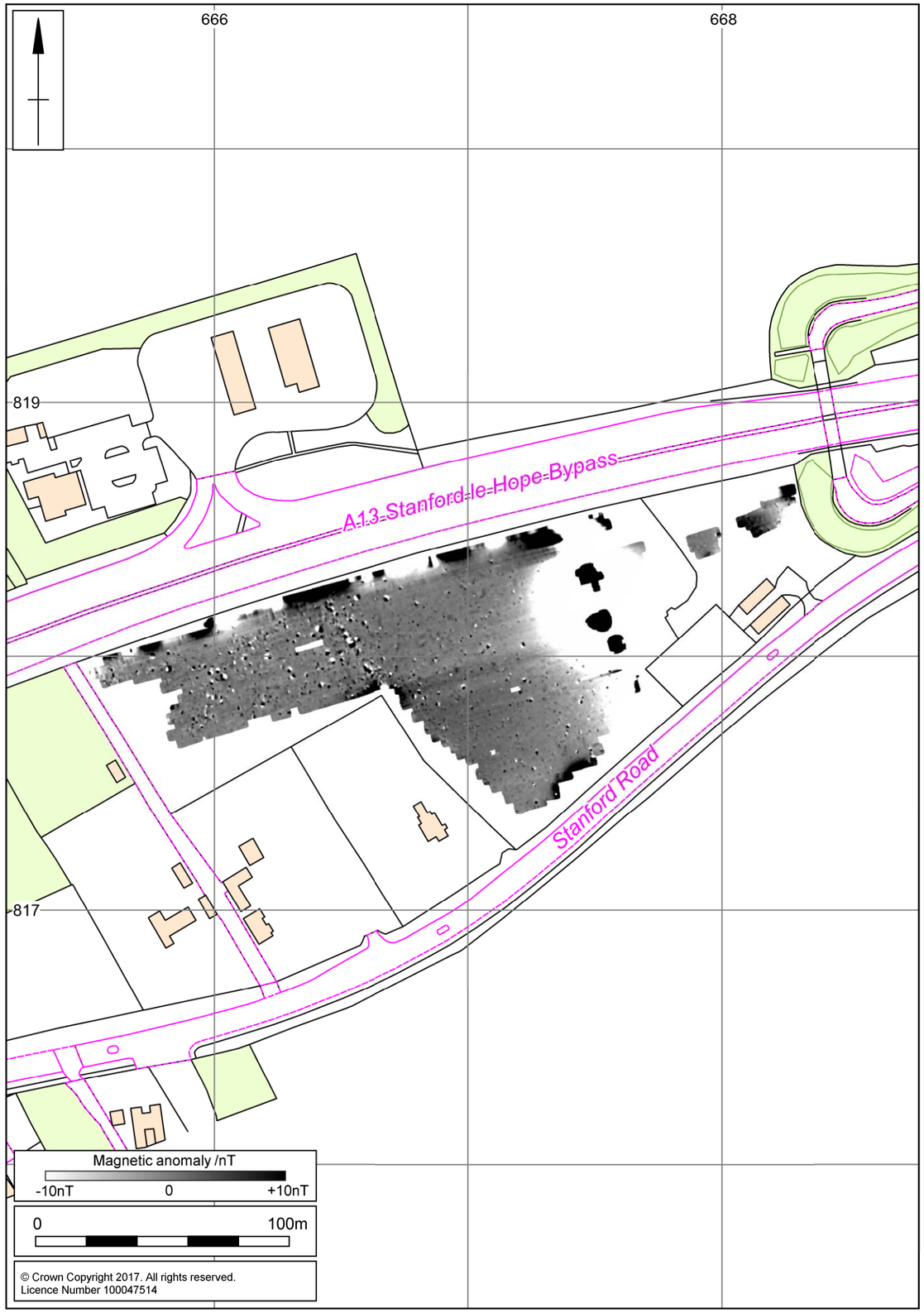
Magnetometer survey results (Areas 5-7) Fig 2

660
662
664
666
816
A13 Stanford-le-Hope Bypass
Stanford Road
Sandown Road

Magnetic anomaly /nT
-10nT 0 +10nT
0 100m
Possible archaeology
Former field boundary
Ferrous debris / object
Pipe / cable
Field drain

Scale 1:2000

Magnetometer survey interpretation (Areas 5-7) Fig 3



Scale 1:2000 Magnetometer suvey results (Areas 8-11) Fig 4

Scale 1:2000 Magnetometer suvey interpretation (Areas 8-11) Fig 5

Scale 1:2000 Magnetometer suvey results (Areas 17-19) Fig 6

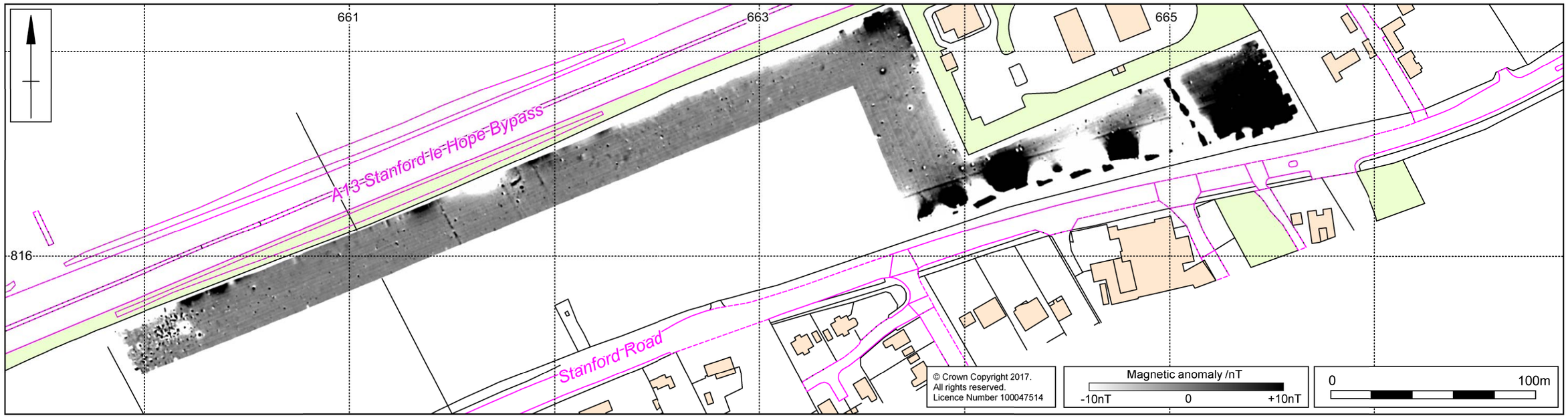
Scale 1:2000 Magnetometer suvey interpretation (Areas 17-19) Fig 7

Scale 1:2000

Magnetometer survey results (Areas 15, 16, 20-23) Fig 8

Scale 1:2000

Magnetometer survey interpretation (Areas 15, 16, 20-23) Fig 9



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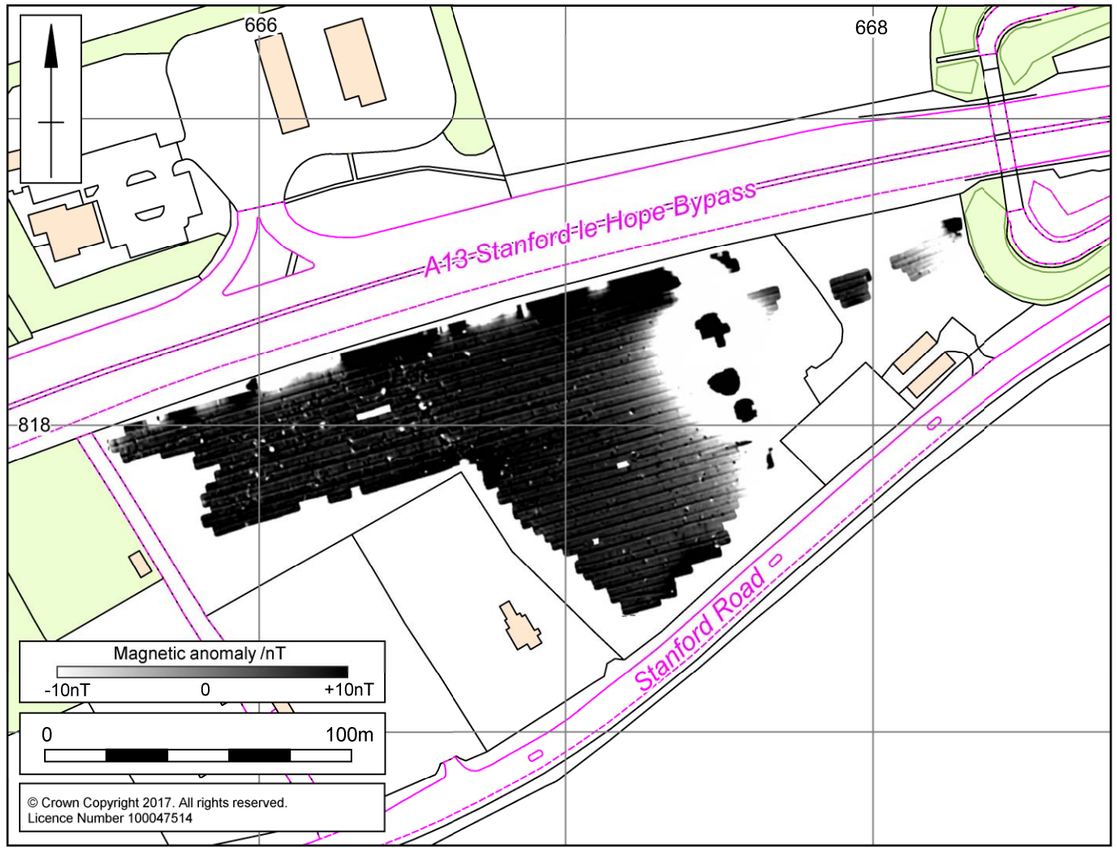
Unprocessed magnetometer data (Areas 5-7) Fig 10



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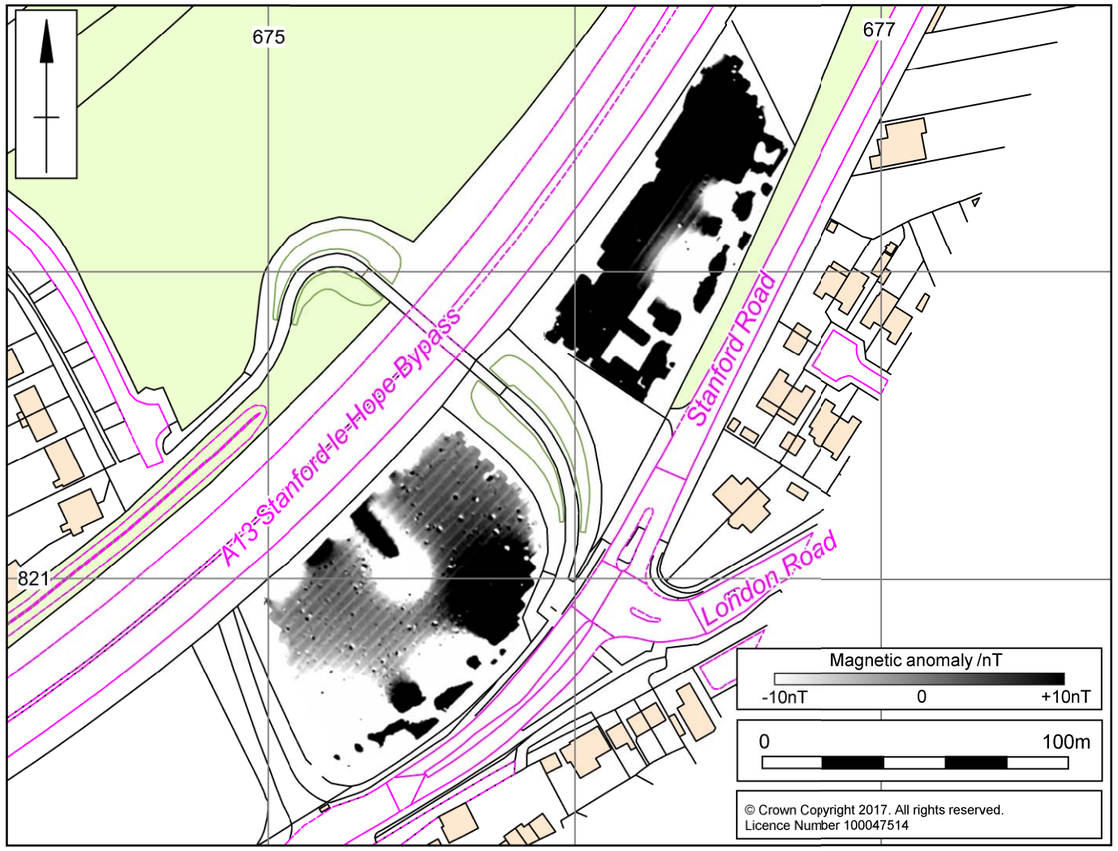
Unprocessed magnetometer data (Areas 8-11) Fig 11



Scale 1:2000

Unprocessed magnetometer data (Areas 17-19) Fig 12

Scale 1:2000

Unprocessed magnetometer data (Areas 15, 16, 20-23) Fig 13

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