



**Archaeological geophysical survey at  
Hampton Leys, north of Yaxley  
Peterborough  
April 2016**

Report No: 16/98

Author: John Walford

Illustrator: John Walford



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**OASIS REPORT**

<b>PROJECT DETAILS</b>		<b>Oasis No. molanort1-253666</b>	
Project name	Archaeological geophysical survey at Hampton Leys, north of Yaxley, Peterborough.		
Short description	MOLA was commissioned to carry out a detailed magnetometer survey of the 'Hampton Leys' site to the immediate north of Yaxley, Peterborough. The survey detected six distinct archaeological sites, all apparently linked by a linear ditch which extends for more than 1.75km across the survey area. Three of the sites in the west of the survey area comprise groups of probable settlement enclosures. Further east there are a pair of roundhouses or small ring ditches, a pair of small enclosures with opposed entrances and a weakly resolved set of rectilinear ditches. The last mentioned site appears to be a continuation of an Iron Age and Roman settlement previously identified through excavations north of The Broadway, Yaxley. Medieval ridge and furrow cultivation was also detected by the survey.		
Project type	Geophysical survey		
Site status	None		
Previous work	Not known		
Current land use	Arable		
Future work	Trial trench evaluation		
Monument type/ period	Iron Age and Roman enclosures. Medieval ridge and furrow		
Significant finds	None		
<b>PROJECT LOCATION</b>			
County	Cambridgeshire		
Site address	Hampton Leys, Yaxley, Peterborough		
Study area	c 34ha		
OS Easting & Northing	TL 185 931		
Height OD	c 17m aOD		
<b>PROJECT CREATORS</b>			
Organisation	MOLA Northampton		
Project brief originator	Rebecca Casa-Hatton, Peterborough City Council		
Project design originator	MOLA Northampton		
Director/Supervisor	Adam Meadows		
Project Manager	John Walford		
Sponsor or funding body	O&H Hampton Limited		
<b>PROJECT DATE</b>			
Start date	04 April 2016		
End date	18 April 2016		
<b>ARCHIVES</b>		Location	Content
Physical	N/A		
Paper	MOLA Northampton,		Site survey records
Digital			Geophysical survey & GIS data
<b>BIBLIOGRAPHY</b>		Journal/monograph, published or forthcoming, or unpublished client report	
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# Archaeological geophysical survey at Hampton Leys, north of Yaxley, Peterborough April 2016

## ABSTRACT

*MOLA was commissioned to carry out a detailed magnetometer survey of the 'Hampton Leys' site to the immediate north of Yaxley, Peterborough. The survey detected six distinct archaeological sites, all apparently linked by a linear ditch which extends for more than 1.75km across the survey area. Three of the sites in the west of the survey area comprise groups of probable settlement enclosures. Further east there are a pair of roundhouses or small ring ditches, a pair of small enclosures with opposed entrances and a weakly resolved set of rectilinear ditches. The last mentioned site appears to be a continuation of an Iron Age and Roman settlement previously identified through excavations north of The Broadway, Yaxley. Medieval ridge and furrow cultivation was also detected by the survey.*

## 1 INTRODUCTION

MOLA was commissioned by O&H Hampton Ltd to conduct a magnetometer survey of an area of land immediately north of Yaxley, Peterborough (NGR TL 185 931; Fig 1). This land forms a part of the Hampton Leys development site and has been proposed as the site of a country park that will separate Yaxley from new residential developments to the north. The purpose of the survey was to investigate the presence, layout and extent of any archaeological features occurring within the survey area. The results will contribute towards an assessment of the archaeological impacts of the development and support the devising of an archaeological mitigation strategy.

The fieldwork was conducted between the 4th and 18th April 2016 and covered the majority of the survey area, excluding two relatively small areas of overgrown ground.

## 2 BACKGROUND

### 2.1 Topography and geology

The survey area is an elongated block of land, c 34ha in extent, lying between Yaxley to the south and an area of flooded clay extraction pits to the north (Fig 1). The western limit of the site is defined by the A15 and the eastern limit by the East Coast Mainline railway. At the time of the survey the land was divided into three arable fields, two of which were under developing crops of wheat and the third of which had been drilled but not begun to sprout.

The survey area is low lying with a mostly gentle north to north-westerly facing slope. Much of the ground lies around 13 to 16m aOD, except in the east where a pronounced rise attains a maximum elevation of slightly over 20m aOD.

The solid geology of the area is mapped as Oxford Formation Mudstone. This is largely overlain by a glaciolacustrine drift except in the east where it is overlain instead by Oadby Member diamicton (boulder clay) (BGS 2016).

## **2.2 Historical and archaeological background**

A number of recent archaeological excavations have begun to shed light on the previously little known archaeology of the Yaxley area. The most notable discovery is of a complex of late Iron Age to Roman settlement enclosures and field boundaries to the north of the Broadway, backing on to the eastern end of the present survey area (Brown 2008, Phillips 2011). Other remains of similar date have been identified through excavations in the village at 266 The Broadway (Haskins 2012) and at Park Close (Rees 2013), with the latter site also providing evidence of medieval quarrying.

Historic Ordnance Survey maps show that the present field layout is a largely modern one, shaped by the encroachment of Yaxley from the south and clay pits from the north. As well as the former pattern of field boundaries these maps also show various late nineteenth to early twentieth century features including ponds, a sheepfold and a pump house standing within the survey area. They also show Yaxley Lodge, a farm which formerly stood just to the north of the survey area but has been completely obliterated by clay extraction.

## **3 METHODOLOGY**

### **3.1 General comments**

Two different survey methodologies were applied on this site. The eastern and western fields were covered by traditional gridded survey with hand-held magnetometers but the central field was surveyed by 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.

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 (Figs 2 & 4). The same plots are presented with an interpretive overlay in Figures 3 and 5, and plots of the raw data are presented in Figures 6 to 7.

### **3.2 Gridded survey**

An independent network of 30m grid squares was established across each field 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 MOLA magnetometer 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, 1.90m astern of the sensors. The magnetic sensors each output data at a rate of six 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 the survey area, 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 identified six discrete archaeological sites of probable Iron Age or Roman date. All but one of these lie along the line of a sinuous boundary ditch which, although intermittently detected, appears to be a single feature crossing the entire survey area from west to east (Figs 2 & 4, Sites A to F). Medieval ridge and furrow, post-medieval to modern field boundaries and other modern remains have also been detected.

### **4.1 Site A**

This site lies at the western tip of the survey area and clearly extends beyond its boundaries to the north and south. It is defined by a series of positive linear anomalies which mostly represent enclosure and boundary ditches, with the most prominent of these lying in a cross-shaped configuration. The northern and western arms appear to form parts of a square-cornered enclosure (possibly with an entrance gap in its southern edge) and the southern arm may define part of a smaller curvilinear enclosure. The eastern arm forms a part of the long-distance boundary ditch which runs towards Site B, *c* 60m to the east.

Within the square-cornered enclosure there are two small horseshoe-shaped positive anomalies which may partially demark the locations of roundhouses. There are also a number of discrete positive anomalies, variously located around the site, which may represent pits.

#### **4.2 Site B**

This site is defined by a palimpsest of linear and curvilinear anomalies which represent at least two different phases of enclosure ditches and associated remains. The strongest and most conspicuous anomalies represent a cellular conglomeration of rounded and polygonal enclosures, perhaps of Iron Age date, which are partially appended to the southern edge of the long-distance boundary ditch. The eastern end of this group intersects with a separate set of rectilinear enclosures, perhaps of Roman date, which are represented by weaker anomalies. Other weak anomalies at the western end of the site represent two small rectilinear enclosures and some other ditches arranged in a seemingly incoherent manner.

To the east of Site B, midway between it and Site C, there is a small group of magnetic anomalies representing a rectangular enclosure, a ditch or channel aligned north-south, and other features not distinct enough to be meaningfully described.

#### **4.3 Site C**

The site is defined by a rectilinear arrangement of positive linear anomalies with a very obvious rectangular core measuring c 90m x 70m and outlying elements extending to the south and east. These represent a complex of settlement enclosures and associated remains which, given the overall regularity of the site layout, would seem to be predominantly Roman in date.

The density of the features detected within Site C indicates that it was a site which saw long-term occupation and underwent multiple phases of site development. This means that it is difficult to pick out and describe many individual elements, although one that does stand out is a trapezoidal ditched enclosure on the western side of the central core. This surrounds a weak penannular anomaly which clearly represents a central roundhouse.

In the northern part of Site C there is a group of 'fuzzy' and amorphous anomalies. The most likely interpretation of these would be that they indicate an area partially disturbed by small-scale, pre-industrial, quarrying for clay or gravel.

The relationship of Site C to the long-distance boundary ditch is different to that of Sites A and B. Whereas those sites seem to be arranged in a way that more or less respects its course, Site C sits unconformably astride it. This re-enforces the suggestion of a predominantly Roman date for Site C, as it suggests the boundary ditch had ceased to be a significant feature by the time the site had reached its fully developed form.

#### **4.4 Site D**

This site is principally defined by two small curving magnetic anomalies which could represent a pair of unenclosed roundhouses (or, less probably, small ring ditches). The western one is the larger but less complete of the two, with a projected diameter of c 15m, whereas that to the east is an almost complete ring, c 10m in diameter. There are slight suggestions of an east-facing entrance gap in each anomaly, which would be consistent with the usual orientation of roundhouse entrances, and the eastern anomaly has a very small positive anomaly almost at dead centre, which could conceivably represent the remains of a hearth.

The two probable roundhouses both lie just to the north of the projected line of the long distance boundary ditch, but in an area where it has not been clearly detected by the survey. It is not clear whether this is a real gap, or whether a local change in geology has rendered the ditch undetectable.

A linear anomaly running north-westwards, tangential to the eastern roundhouse, may represent a length of ditch. However, it appears to terminate where it meets an anomaly relating to a historic field boundary (see below) and this means that an interpretation as a field drain should also be considered.

#### **4.5 Site E**

This site is indicated by a set of weak linear anomalies representing ditches which appear to define parts of a rectilinear pattern of enclosures or small fields. Three ditches are aligned south-west to north-east, parallel with the long-distance boundary ditch, and there are traces of other ditches lying perpendicular to these. However the latter are nearly aligned with the medieval ridge and furrow (see below) and this makes their anomalies difficult to distinguish.

The above features all lie close by the northern edge of the Iron Age and Roman remains excavated at the Broadway in 2005 (Brown 2008), and are almost certainly constitute further elements of the same site.

#### **4.6 Site F**

This site comprises two small rectangular enclosures of similar form, both appended to the southern edge of the linear ditch. Each measures c 25m across but the eastern one, at c 30m long, appears to be slightly larger overall than its western counterpart. Their entrance-ways are opposed, facing towards each other across a gap of c 200m, and, apart from the size difference the two enclosures appear to be almost mirror images of each other. It does not seem plausible to interpret them as settlement enclosures, but a strategic function such as defence or livestock management could be possible.

Approximately 25m from the eastern enclosure there is a small but moderately strong positive anomaly (peak intensity c 15nT) which seems to disrupt the line of the linear ditch. It is possible that this represents a large pit or, less probably, a kiln.

#### **4.7 Other possible archaeology**

The data contains a few very widely dispersed anomalies which could represent sections of ditch but are too scattered and disjointed to interpret in a more detailed way. These are indicated on the interpretation plot but do not merit individual description.

#### **4.8 Ridge and furrow**

Parallel sets of linear anomalies, mostly aligned north-west to south-east, cover the greater part of the survey area. These indicate the pattern of ridge and furrow cultivation in the medieval open fields. Particular features of note are the presence of two overlapping furrow directions near the eastern end of the survey area and an area in the central field which is apparently devoid of furrows. The former indicates a place where the pattern of cultivation must have been changed at some time during the life of the open fields, and the latter may indicate an area of former meadow or pasture that was rarely or never ploughed.

#### **4.9 Other historic features**

Three linear anomalies, two in the eastern field and one in the central field, correspond to the lines of former field boundaries recorded on early editions of the Ordnance Survey map. Similarly, a group of positive anomalies encompassed by a negative halo can be correlated with a former pond which these maps depict close to the south-western corner of the eastern field.

Close to the eastern end of the survey area there is a large and intense positive anomaly associated with a dense scatter of small magnetic dipoles. This occurs near to where a small building (possibly a pump house?) appears on the 1901 edition of the Ordnance Survey map. The positive anomaly would be consistent with a large buried metal object, and the noise with a scatter of building rubble. Furthermore, there is a weak negative linear anomaly which runs north from this area and could represent a service trench containing a non-magnetic (concrete?) pipe or duct.

#### **4.10 Pipes and field drains**

An intense linear anomaly of alternating magnetic polarity represents a pipe which crosses the centre of the survey area on a north-north west to south-south-east alignment. The much weaker anomalies of similarly alternating polarity that run through the central and eastern fields are diagnostic of modern field drains.

In the eastern part of central field there are two parallel rows of small, regularly spaced dipolar anomalies. These are best interpreted as representing non-magnetic pipes or drains with metal clips or other fittings spaced regularly along their length.

#### **4.11 Ferrous debris**

Intense dipolar magnetic anomalies of various sizes and forms are widely scattered across the survey area. Most will relate to relatively small and insignificant pieces of scrap metal in the ploughsoil but a few larger ones may arise from more substantial buried metal objects. Where the smaller dipoles are densely clustered, around the field edges and elsewhere, this probably relates to accumulations of modern rubbish and perhaps also of weakly magnetic hardcore materials such as clinker and brick rubble.

Around the edges of the survey area, and especially along the southern edge of the eastern field, there are slight magnetic halos. These are the result of adjacent fences, buildings and other magnetically detectable modern structures.

## 5 CONCLUSION

The survey results show that this area of land to the north of Yaxley contains archaeological remains of probable Iron Age to Roman date. A sinuous linear ditch, presumably marking an ancient boundary, crosses the area from east to west, continuing for a distance of over 1.75km, and six discrete archaeological sites have been detected along its length. There are three enclosure complexes in the western field of the survey area and a fourth in the eastern field. A pair of unenclosed roundhouses or small ring ditches and a pair of small rectangular enclosures with opposed entrances have also been detected.

Whilst the results from the western half of the survey area are clear and visually striking, those from the east are much less distinct. This variation can probably be attributed to the change in geology across the area, because soils formed over boulder clay do not always prove favourable for magnetometer survey. Moreover, the excavation of the Broadway site immediately adjacent to the eastern part of the survey area (Brown 2008) identified archaeological remains that were more numerous and densely arranged than had been suggested by the preceding magnetometer survey (Butler 2005). This re-enforces the impression that the results from the eastern half of this survey may be presenting a less clear complete overview of the surviving archaeology than those from the western half do.

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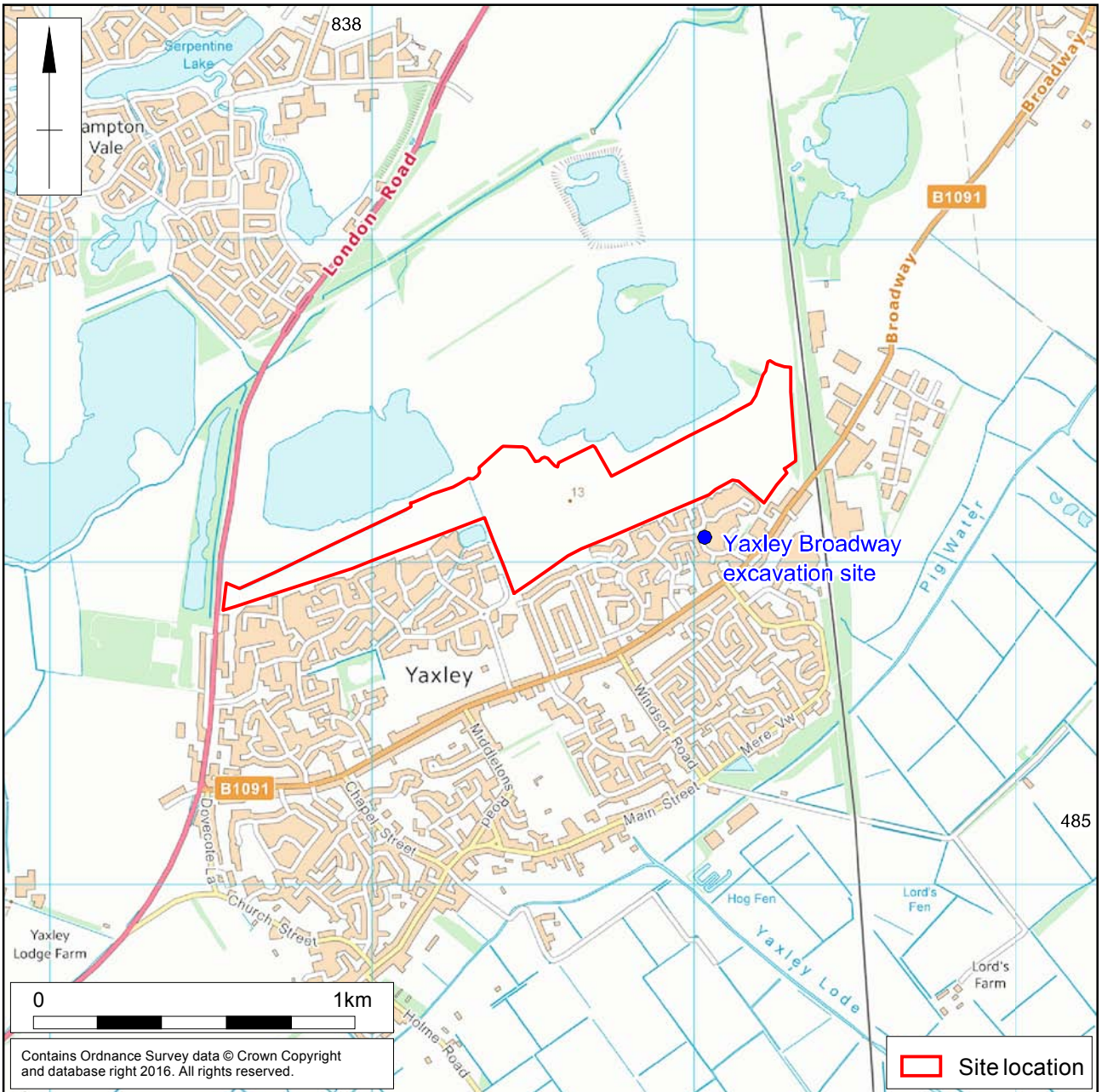
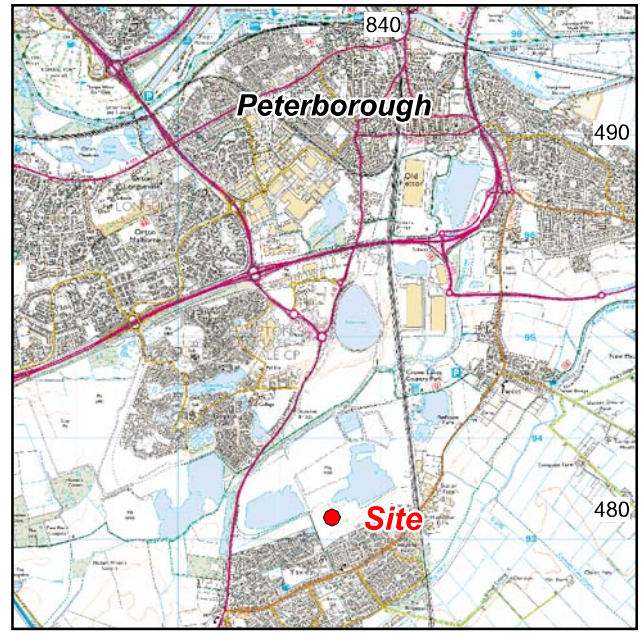
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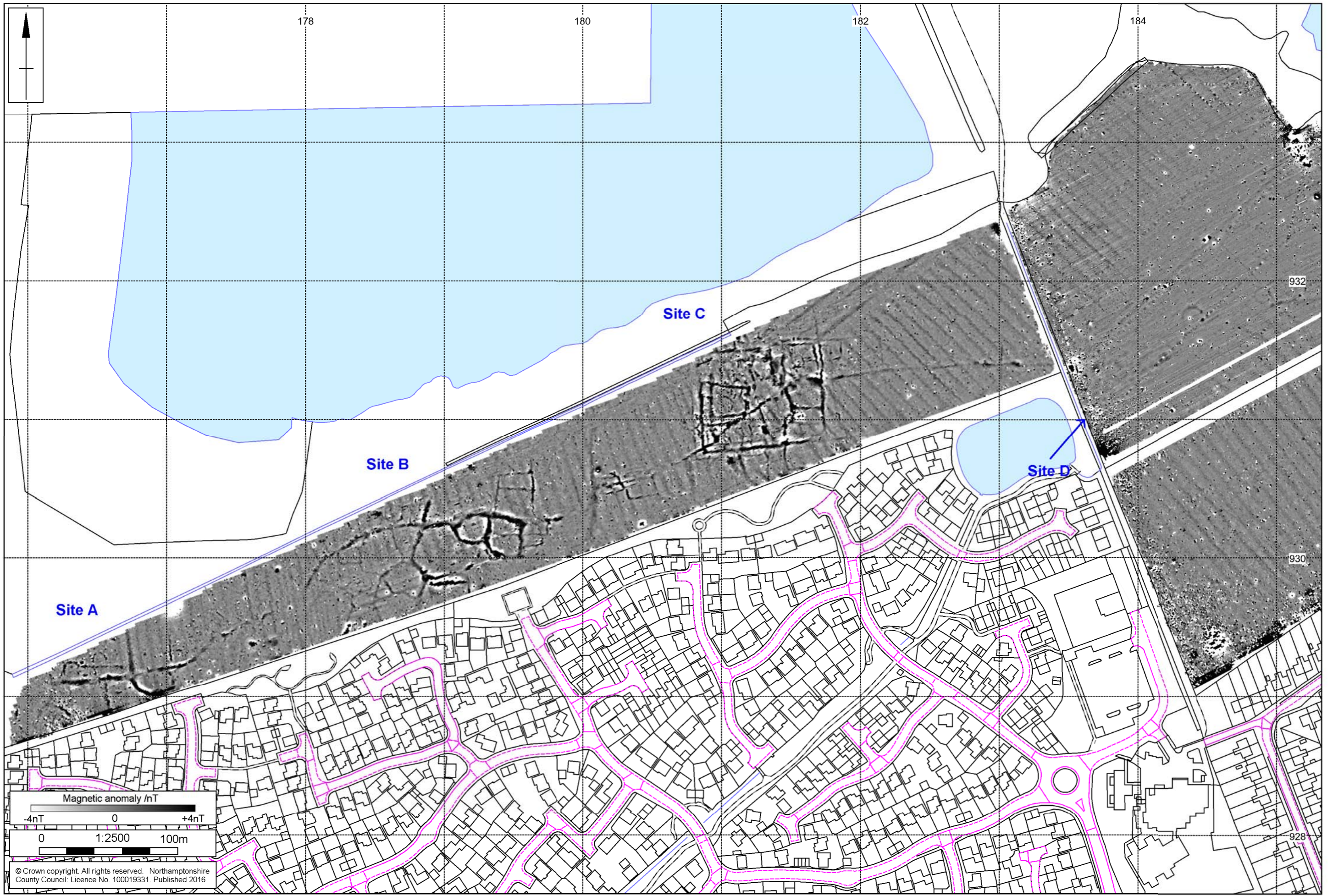
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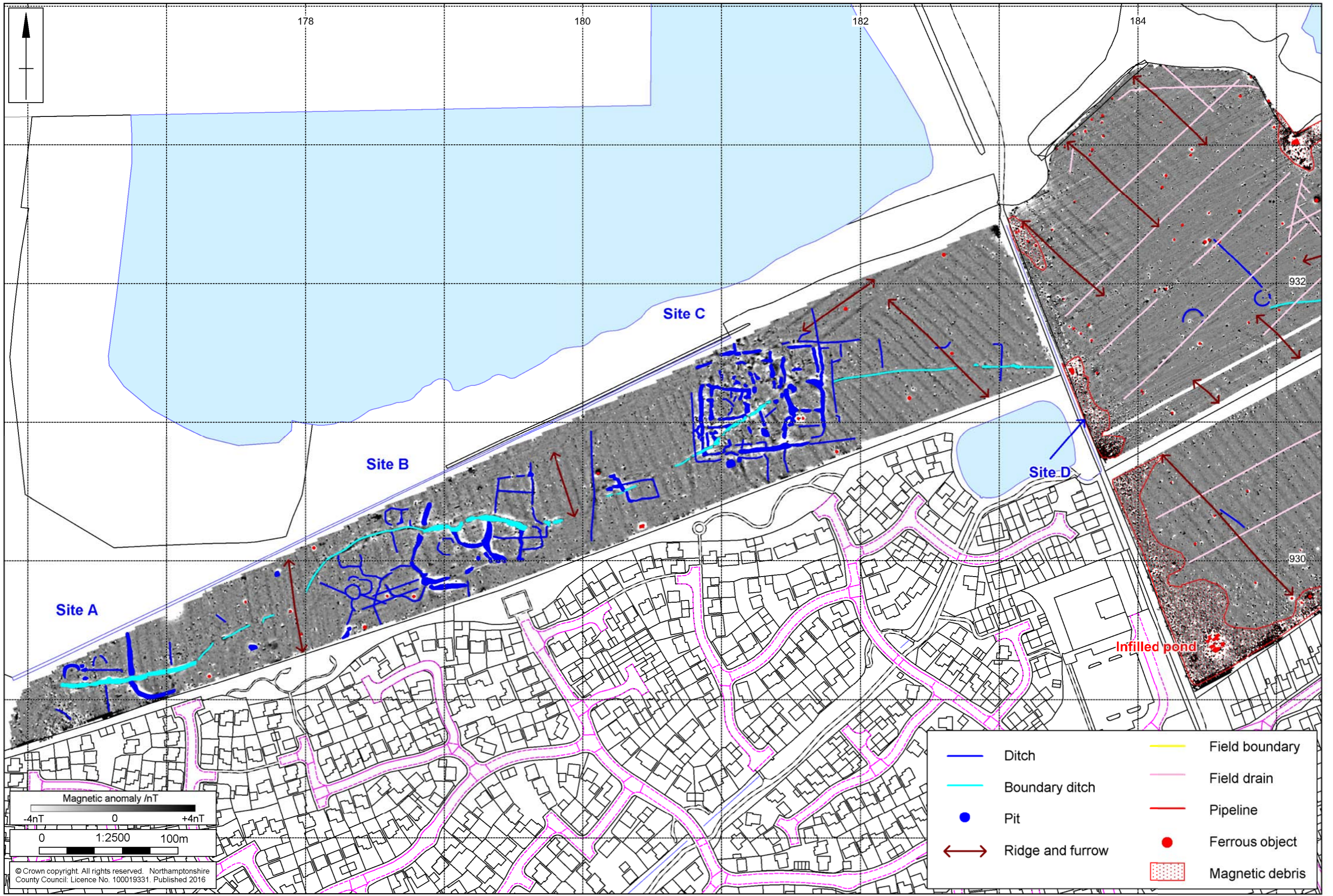
Scale 1:20,000

Site location Fig 1



Scale 1:2500 (A3)

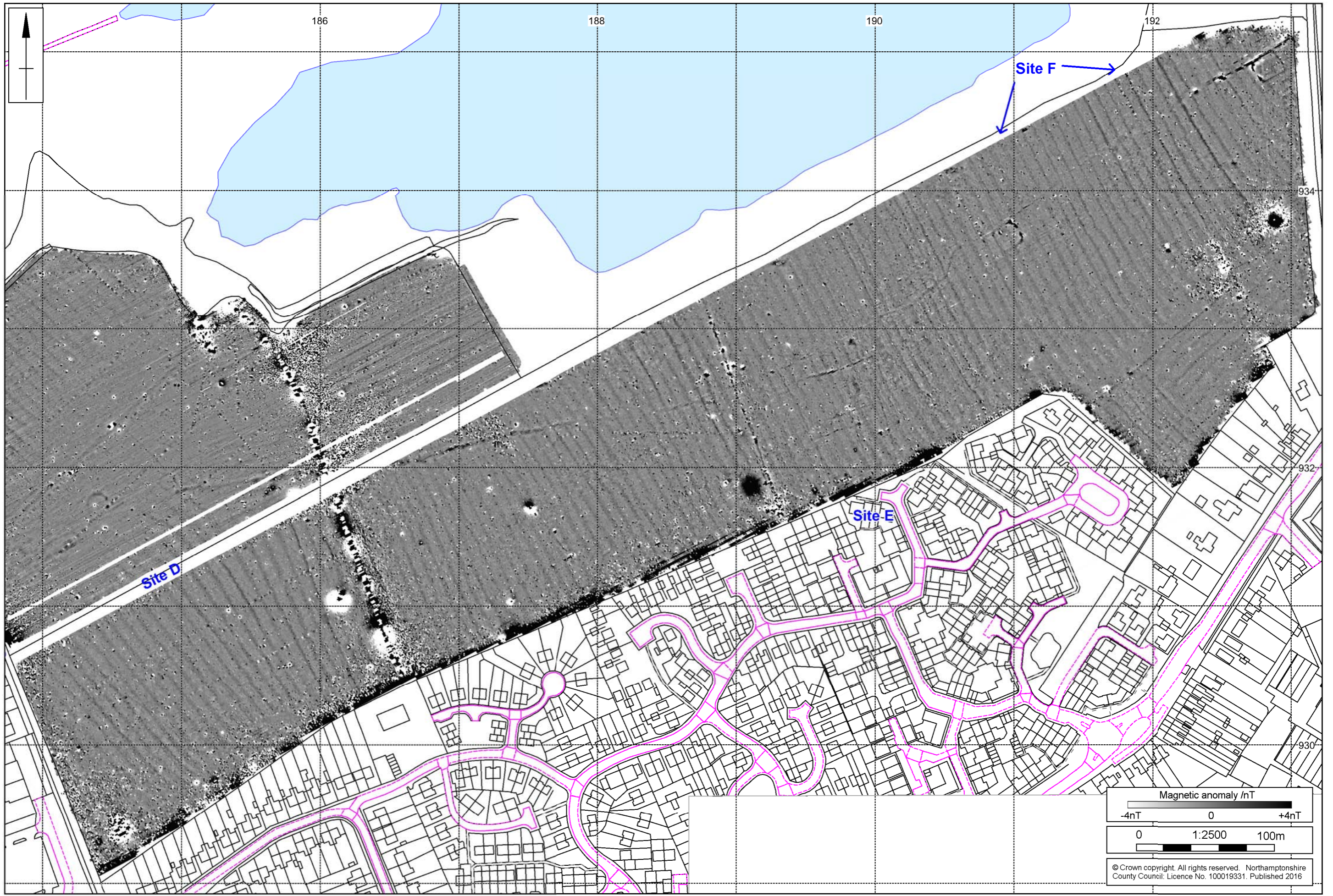
Magnetometer survey results - west Fig 2



Scale 1:2500 (A3)

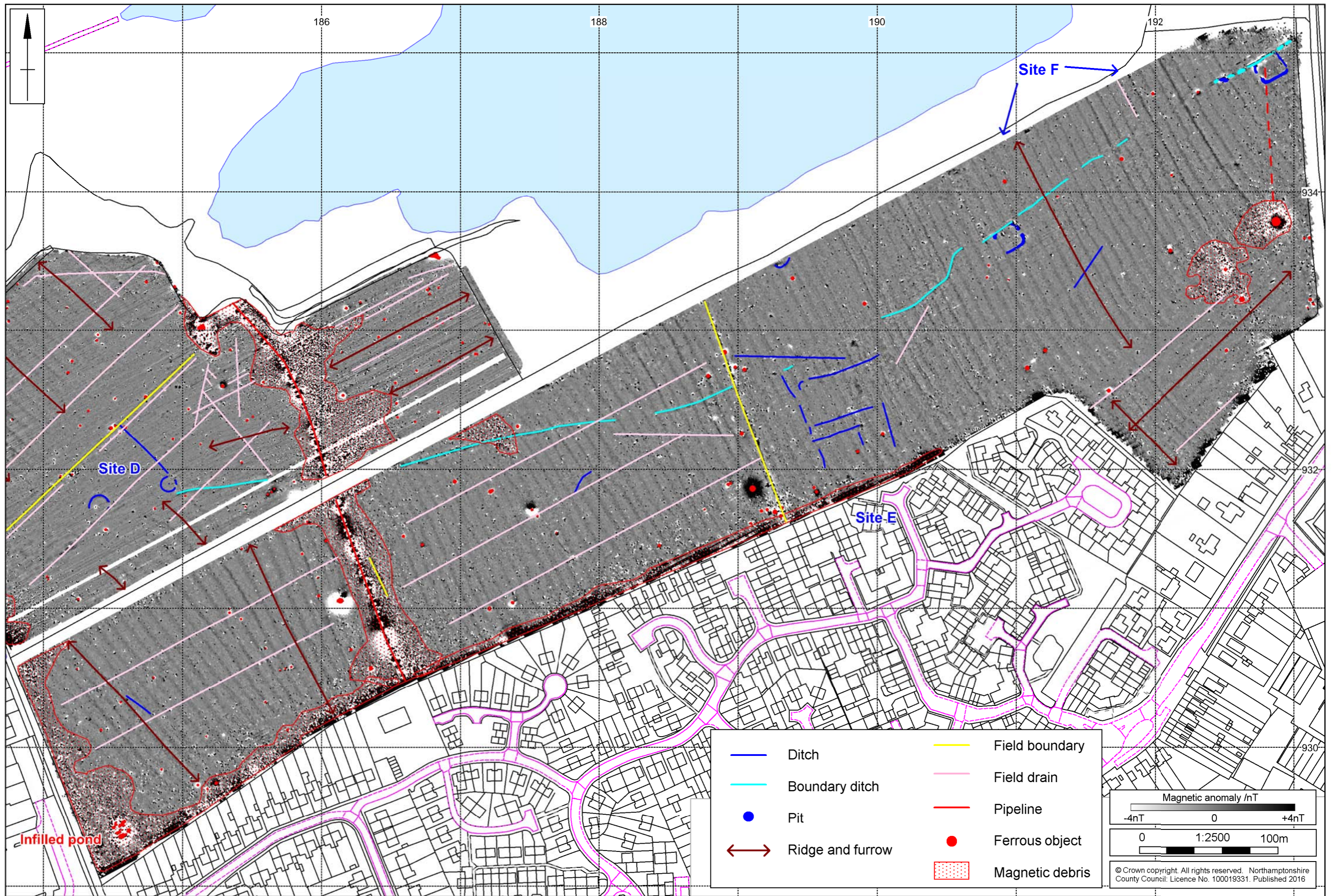
Magnetometer survey interpretation - west Fig 3





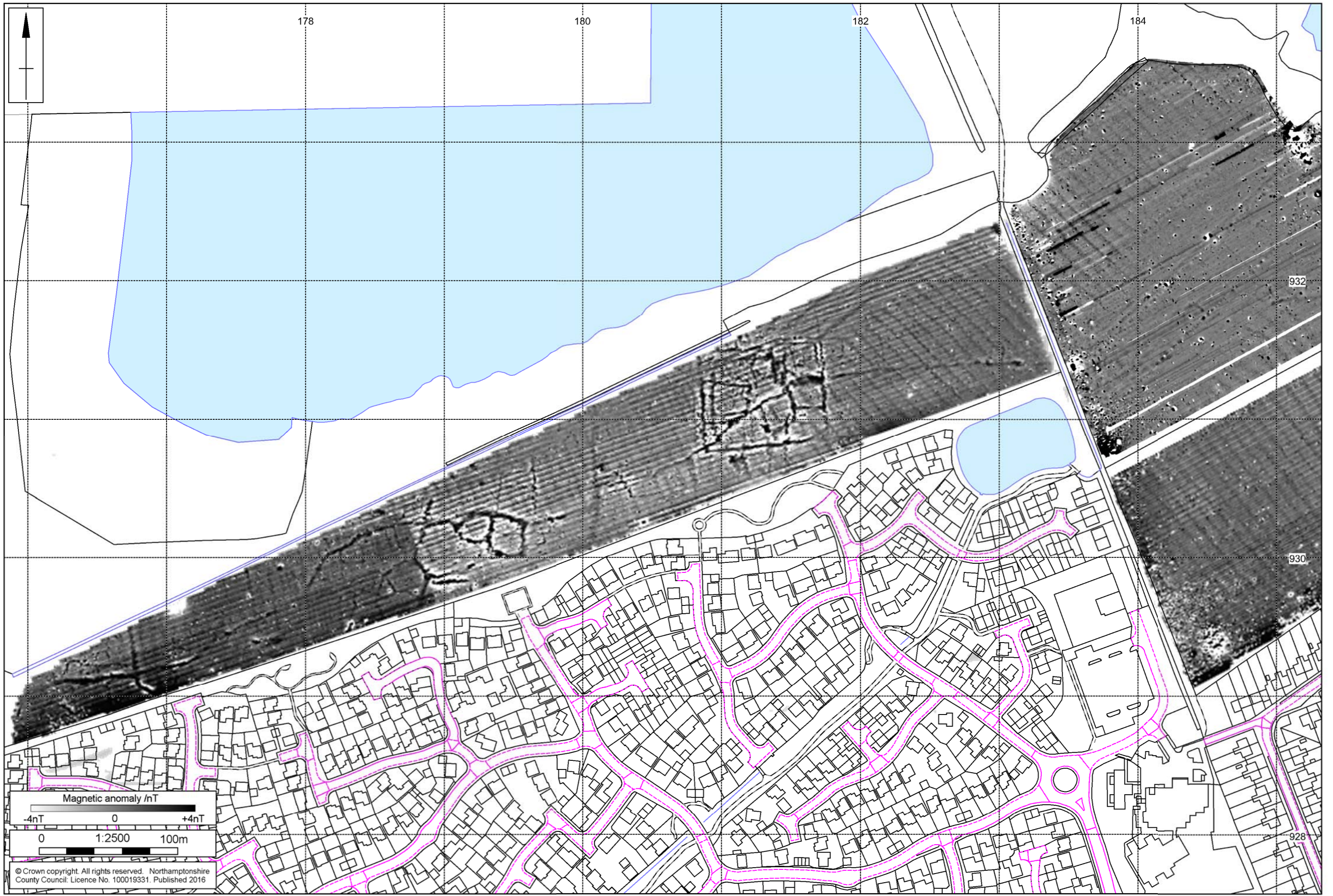
Scale 1:2500 (A3)

Magnetometer survey results - east Fig 4



Scale 1:2500 (A3)

Magnetometer survey interpretation - east Fig 5



Scale 1:2500 (A3)

Unprocessed magnetometer data - west Fig 6



Scale 1:2500 (A3)

Magnetometer survey raw data - east Fig 7



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