

**Archaeological geophysical survey of  
the proposed Bengrove Solar Farm, Sandhurst  
Gloucestershire  
December 2021**

Report no. 22/002

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Project Manager: John Walford

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<b>Project: Bengrove Solar Farm, Sandhurst</b>		<b>OASIS No: molanht1- 503813</b>	
<b>ACTIVITY TYPE</b>			
Project/Activity type	Geophysical survey		
Reason for investigation	Planning: Pre-application		
Development type	Solar farm		
Planning reference ID	-		
<b>PROJECT LOCATION</b>			
National grid ref	SO 838 226		
Site name	Bengrove Solar Farm, Sandhurst, Gloucestershire		
<b>REVIEWERS/ ADMIN</b>			
HER for project	Gloucestershire		
National organisation	Historic England		
<b>WORK UNDERTAKEN</b>			
Methodological summary	Magnetometer survey with a cart-mounted array of Bartington Grad-01-100L fluxgate gradiometers.		
Previous work?	None	Future works?	Not known
Dates - Start date:	13-12-21	End date:	17-12-21
<b>GEOPHYSICS</b>			
Geology	Jurassic interbedded mudstone and limestone of the Rugby Limestone formation, with no drift geology recorded.		
Land use (i.e., arable)	Arable		
Survey type	Magnetometer survey		
Size of survey area	c25ha		
Instrumentation	Bartington Grad-01-1000L	Fluxgate – Multiple sensor	
Configuration	Hand-pushed cart survey (6-probe array)		
Spatial resolution	Traverse spacing	0.8m	Reading interval 0.225m
Resolution (data values)	0.1nT		
<b>BIBLIOGRAPHY</b>			
Title	Archaeological geophysical survey of the proposed Bengrove Solar Farm, Sandhurst, Gloucestershire, December 2021		
Author(s)	Chris Manktelow		
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Report number	22/002		
Report release delay?	Six months		
<b>PEOPLE</b>			
Organisation	MOLA		
Project manager	John Walford		
Project supervisor	Chris Manktelow		
Funding body	Sonnedit Bengrove Ltd		
<b>KEYWORDS</b>			
Monuments found/ date	Undated ditches		
<b>RESULTS</b>			
Description of outcomes	A small circular feature, measuring c5m in diameter, was detected in the west of the survey area but its archaeological significance is unclear. Several linear features, which may be ditches, were also detected, along with medieval to post-medieval ridge and furrow, historic field boundaries and former ponds.		
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Accession ID	TBC		
Finds Archive repository	None	Expected date of submission:	-
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# CONTENTS

1	INTRODUCTION .....	1
2	BACKGROUND .....	1
	2.1 Location, geology and topography.....	1
	2.2 Historical and archaeological background .....	2
3	METHODOLOGY .....	3
	3.1 Fieldwork.....	3
	3.2 Data processing and presentation.....	3
4	SURVEY RESULTS .....	4
5	CONCLUSION.....	5
6	BIBLIOGRAPHY .....	6

## Figures

Front cover: Partial view of processed survey data

Fig 1: Site location	1:10,000
Fig 2: Magnetometer survey results (north)	1:2000
Fig 3: Magnetometer survey results (south)	1:2000
Fig 4: Magnetometer survey interpretation (north)	1:2000
Fig 5: Magnetometer survey interpretation (south)	1:2000
Fig 6: Unprocessed magnetometer data (south)	1:2000
Fig 7: Unprocessed magnetometer data (north)	1:2000

# Archaeological geophysical survey of the proposed Bengrove Solar Farm, Sandhurst, Gloucestershire December 2021

## ABSTRACT

*MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey across c25ha of land for the proposed Bengrove Solar Farm, Sandhurst, Gloucestershire. A small circular feature, measuring c5m in diameter, was detected in the west of the survey area but its archaeological significance is unclear. Several linear features, which may be ditches, were also detected, along with medieval to post-medieval ridge and furrow, historic field boundaries and former ponds.*

## 1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by Joe Abrams of Abrams Archaeology, on behalf of his client Sonnedix Bengrove Ltd, to undertake an archaeological geophysical survey of c25ha of land to the south-east of Sandhurst, Gloucestershire (NGR SO 838 226) (Fig 1). The purpose of the survey was to identify and map any archaeological remains which may be affected by the proposed development of a solar farm.

The survey comprised a magnetometer survey and was conducted over one week commencing on 13 December 2021. It followed a Written Scheme of Investigation (MOLA 2021) and was also conducted in accordance with Chartered Institute for Archaeologists and European Archaeological Council guidelines (CIfA 2014 and Schmidt *et al* 2015).

## 2 BACKGROUND

### 2.1 Location, geology and topography

The survey took place across two adjacent fields located c700m southeast of Sandhurst. The fields are bounded to the north-west by a farm track and to the south-east by Cox's Brook. Hedges separate the survey area from farm buildings and pasture fields to the north and arable fields to the south (Fig 1).

The survey area lies on broadly level ground between c10m and 12m above Ordnance Datum, with a slight slope in the south-east towards Cox's Brook.

The solid geology of the survey area comprises interbedded Jurassic mudstone and limestone of the Rugby Limestone formation. No drift geology is recorded within the survey area although Quaternary alluvium has been recorded immediately adjacent to the west, south and east (BGS 2022).

## 2.2 Historical and archaeological background

The client has provided MOLA with data from the Gloucestershire Historic Environment Record (HER) covering the survey area and its immediate environs (search date 18/10/21). This shows that there are no Listed Buildings or Scheduled Monuments, no known find spots and no known monuments other than ridge and furrow within the survey area itself.

The survey area is located in an area where Roman activity is known, and the route of the Gloucester-Birmingham Roman road (HER 6704) passes c600m to the east of the survey area.

Evaluation trenching completed in 2013 discovered previously unknown Roman activity in Twigworth, c1.5km south-east of the survey area (HER 45420). A series of east to west aligned ditches were discovered and these contained Roman pottery dating to the 1st-3rd centuries AD (Barber 2013). Another archaeological evaluation completed near Twigworth uncovered Roman enclosures and settlement activity dating to between the 2nd and 4th centuries AD (HER 46145). A later small, mixed-rite cemetery was discovered by the same excavation, with the burials and cremations cutting through the settlement remains (HER 48744) (Fairhead 2016). Further evaluation work was completed 100m to the north in 2019, uncovering Roman remains including a trackway which was aligned perpendicular to the A38 (HER 46145).

The centre of Sandhurst is located c850m west of the survey area. The village is recorded in the Domesday Book of AD 1086 as "*Sanher*" giving the village an early medieval to medieval origin (HER 8821).

The remains of a medieval moat lie c500m from the survey area in the grounds of Bengrove Farm. Only the north-western arm of the moat is visible today as the others have been backfilled. A medieval building is thought to have stood at the centre of the moat (HER 4464). Another alleged medieval moat is located at Moat Farm, c750m from the survey area, but evidence for this is far less substantiated when compared to the moat located at Bengrove Farm (HER 5583).

A possible rectangular enclosure and building platform with a series of parallel ditches have been documented in a field c850m to the south-east of the survey area, with the remains of ridge and furrow cultivation in the immediately surrounding area. It is unclear whether the presumed building would have been domestic or agricultural in nature (HER 5584).

A collection of decoy pools, pre-dating AD 1840 and used in the hunting of wildfowl, are situated just to the east of the survey area (HER 13988).

The survey area is presently composed of two fields and historic Ordnance Survey mapping shows that the northern of these has been relatively unchanged since the late 1800's. The southern field was previously split into three separate fields with the north-western part being mapped as a wooded area until the mid-1920's. The three fields were amalgamated into one by the time of the 1970 Ordnance Survey mapping. A small pond towards the north-eastern edge of the field seems to have been removed at the same time, whilst another pond in the west of the field was removed before 1990.

### **3 METHODOLOGY**

#### **3.1 Fieldwork**

The magnetometer survey was undertaken with a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform designed to be pushed by hand. It incorporates a bank of six vertically-mounted Bartington Grad-01-1000L magnetic sensors (fluxgate gradiometers), spaced at 0.8m intervals along a bar aligned crossways to the direction of travel. These sensors were calibrated ('zeroed') at the start of each day's survey to minimise heading errors and offsets in their zero values.

The cart also incorporates a Leica Geosystems Viva GNSS antenna mounted on the central axis, 1.02m astern of the sensors. The magnetic sensors each output data at a rate of eight readings per second and the GNSS antenna outputs NMEA format data (GGA messages) at a rate of one position per second. These data streams are compiled into a single raw data file by MultiGrad601 logging software specifically developed for that purpose.

The cart was propelled along straight and parallel traverses across the survey area, with data logging being 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 typical speed of coverage was under 1.8m/s, with the effective data resolution thus approximating to better than 0.225m x 0.80m.

#### **3.2 Data processing and presentation**

The raw survey data was initially processed with MLGrad601 software, which calculated a UTM co-ordinate for each data point by interpolating the GNSS 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 minor striping caused by slight mismatches in the calibration of the individual magnetic sensors. This was removed in TerraSurveyor by applying the median de-stripe function to runs of data from each sensor.

The processed survey data is presented in this report as greyscale raster images at a range of +/-4nT. These have been rotated and scaled to fit against topographic base-mapping at a scale of 1:2000 (Figs 2 and 3). An interpretive overlay highlights notable anomalies for discussion is presented in Figures 4 and 5 and minimally processed data plots are presented at a range of +/- 10nT in Figures 6 and 7.

## 4 SURVEY RESULTS

The geophysical survey has revealed various anomalies which have been interpreted as possible archaeological features, historic field boundaries and medieval to early post-medieval ridge and furrow cultivation.

A number of weak linear anomalies of varying length were detected by the survey, mainly located within the northern field. It is generally unclear whether they represent ditches, field drains or unrecorded historic field boundaries, though one example, located in the centre of the northern field appears to run along the heads of ridge and furrow which suggests that it may represent a ditch associated with a plough headland (Fig 4, A).

Towards the western side of the southern field the survey has discovered a possible small circular feature c5m in diameter (Fig 3, inset and Fig 5, B). This could feasibly be composed of several pits rather than a continuous ditch as the magnetic response is not constant around its circuit. It cannot be said with certainty that the feature has an archaeological origin, due to its isolation and its insubstantial size. A single positive response at the centre of the ring conceivably represents a pit or post-hole.

The sets of parallel linear anomalies in the survey data indicate the remains of medieval or early post-medieval ridge and furrow. Several blocks of furrows with different alignments have been discovered, the majority being aligned north-east to south-west and others aligned east to west or north-west to south-east. The furrows within each block vary in both spacing and straightness. This is, for instance, evident in the eastern part of the survey area where thin, straight, parallel furrows are abutted by slightly wider, curved ridges.

No evidence of ridge and furrow has been detected in the north-western half of the southern field. It is possible that ridge and furrow was never present there, as Ordnance Survey mapping from the late 19th century indicates the area to have been wooded, maybe used as an orchard. Alternatively, if there had been ridge and furrow in that area, it may have been fully erased by more recent ploughing.

The survey has detected two linear anomalies in the southern field which match the position of mapped historic field boundaries. Three other linear anomalies in the northern field may also represent boundaries, though there is no map evidence to confirm this. Two of these northern boundaries, which are roughly aligned with present-day boundaries to the north, respect the edges of a block of narrow ridge and furrow. The third, which connects the other two perpendicularly, intersects the set of furrows, although it is unclear which feature precedes the other.

Two large, intense positive anomalies were identified in the southern field, with the smaller lying against its western edge and the larger lying c200m further east. These represent two ponds shown on Ordnance Survey mapping from the late 19th century. The ponds have since been backfilled and are no longer visible on the surface other than a very slight depression where the eastern of the two is located (*pers obs*). The anomalies almost certainly arise from pieces of scrap metal or other such material that were pushed into the ponds during the backfilling process.

Three parallel north-west to south-east linear anomalies in the northern field represent sections of field drains. The characteristics of these anomalies, which are weak and composed of alternate positive and negative magnetic segments, are particularly diagnostic of such features. As noted above, some of the anomalies tentatively interpreted as possible archaeology might also prove to be sections of field drains.

The small dipolar anomalies scattered throughout the data are an indication of small metal fragments in the ploughsoil, possibly originating from modern agricultural equipment or general litter. The positive halos seen at the side of fields arise from

adjacent, upstanding fences and gates; as such they are insignificant features and have therefore not been marked on the interpretation plot.

## **5 CONCLUSION**

The survey has detected relatively little of archaeological interest. There is weak evidence for an isolated circular feature, which measures c5m in diameter and is perhaps formed of a number of pits with one pit or post-hole in the centre, but the lack of more convincing features nearby casts some doubt on its archaeological significance. The various linear features dispersed across the two fields are nondescript and, although they may represent ditches, they do not point to any major archaeological activity.

Medieval to post-medieval ridge and furrow cultivation has been detected across a large portion of the survey area, with a greater extent than previously recognised by the Gloucestershire HER. One set of furrows in the northern field are noticeably straighter and closer-spaced than the others and it may be that these, along with their encompassing boundaries, are more recent than the more typical broad, curving furrows elsewhere in the survey area (*cf* Hall 1993, 17).

Other features detected by the survey include the remains of two former field boundaries and two ponds recorded on historic Ordnance Survey maps, as well as a few field drains of relatively recent date.

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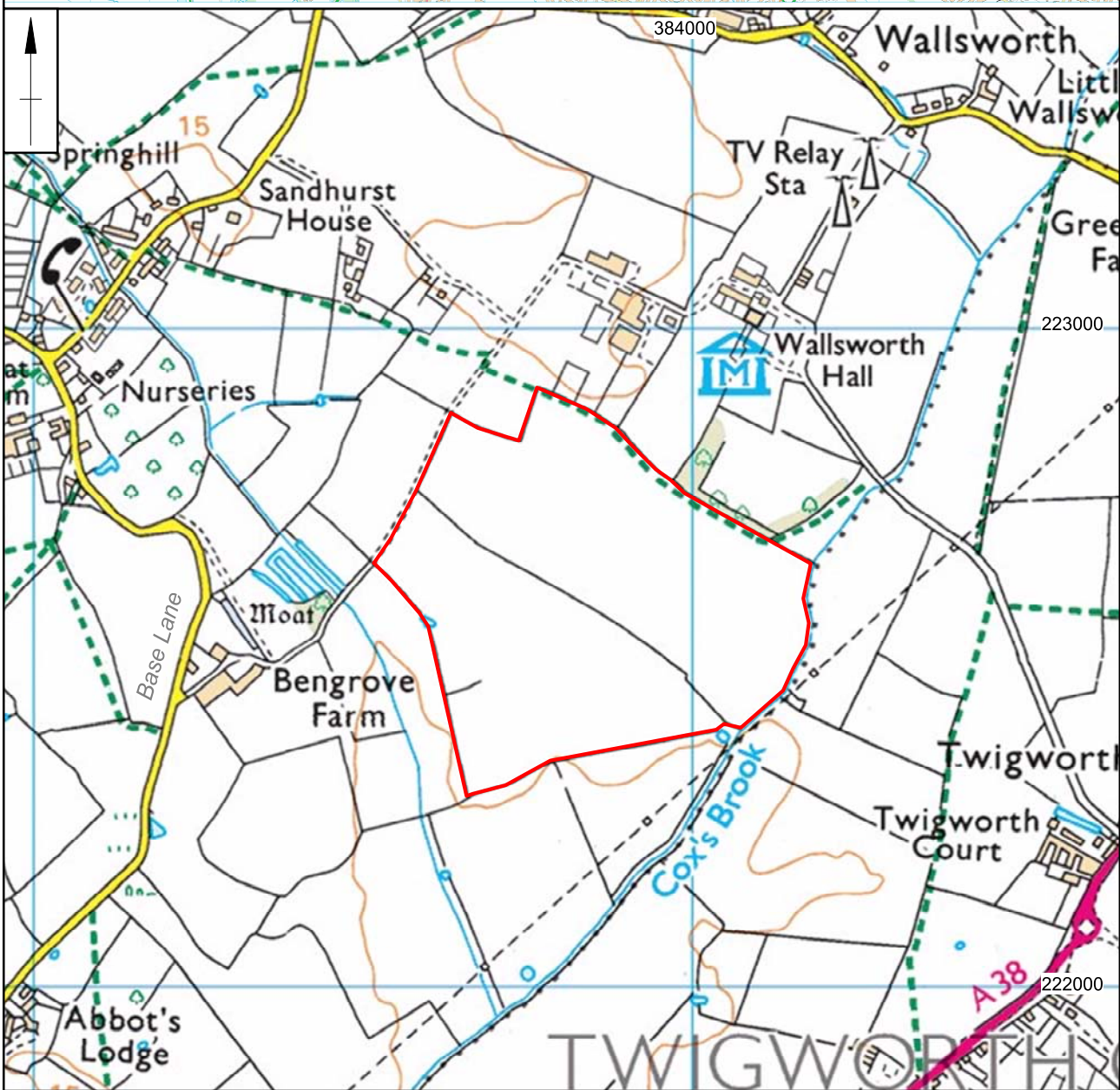
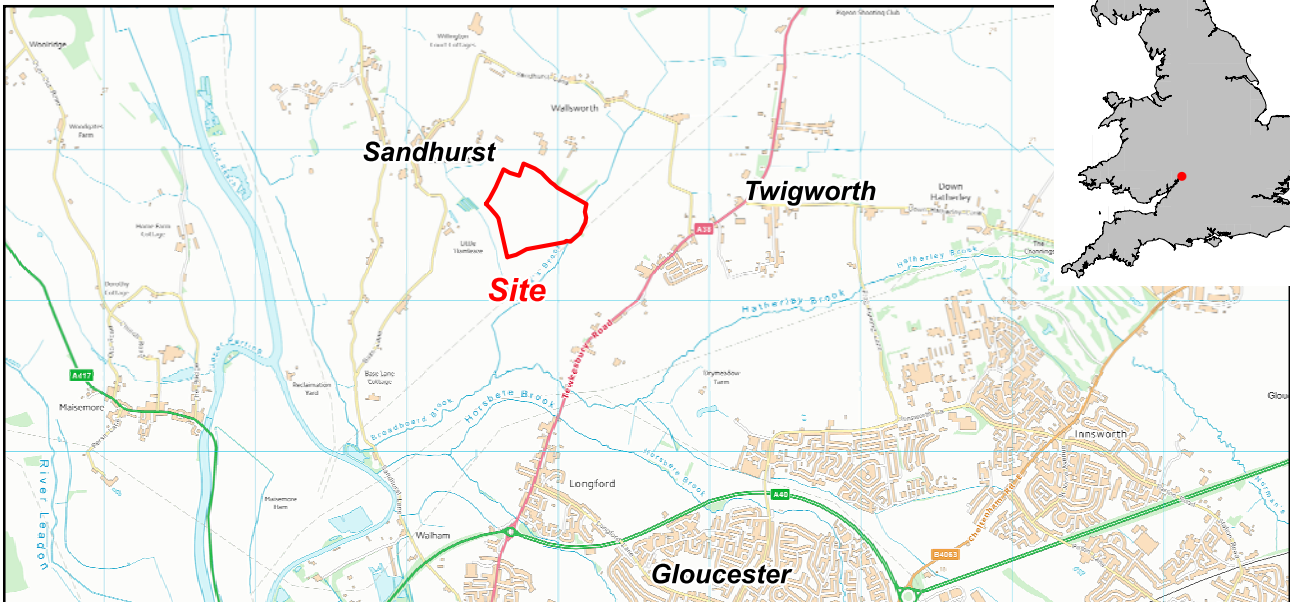
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MOLA

25th January 2022



0 1:10,000 500m  
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Scale 1:10,000 (A4)

Site location Fig 1

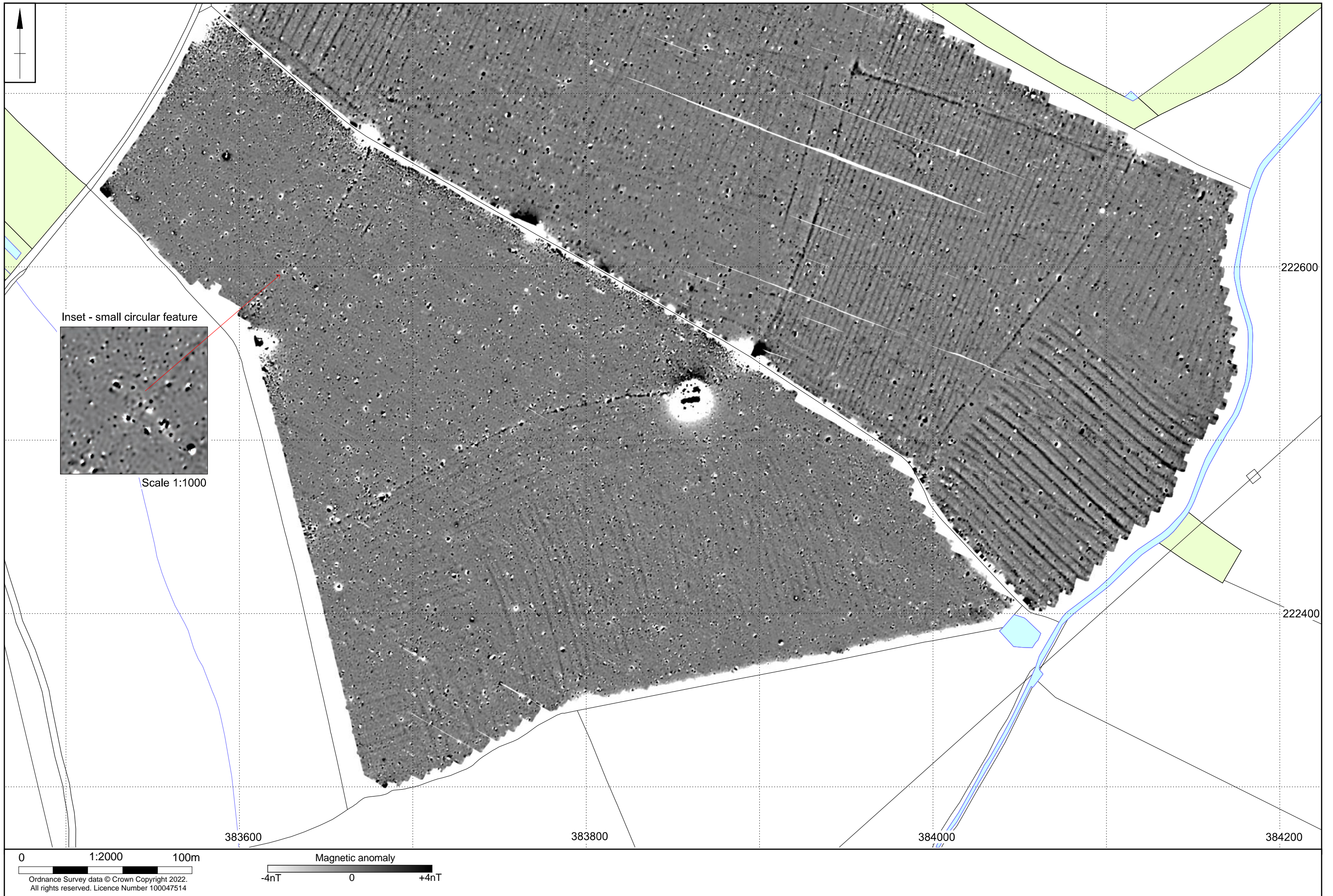




Scale 1:2000 (A3)

Magnetometer survey results (north) Fig 2

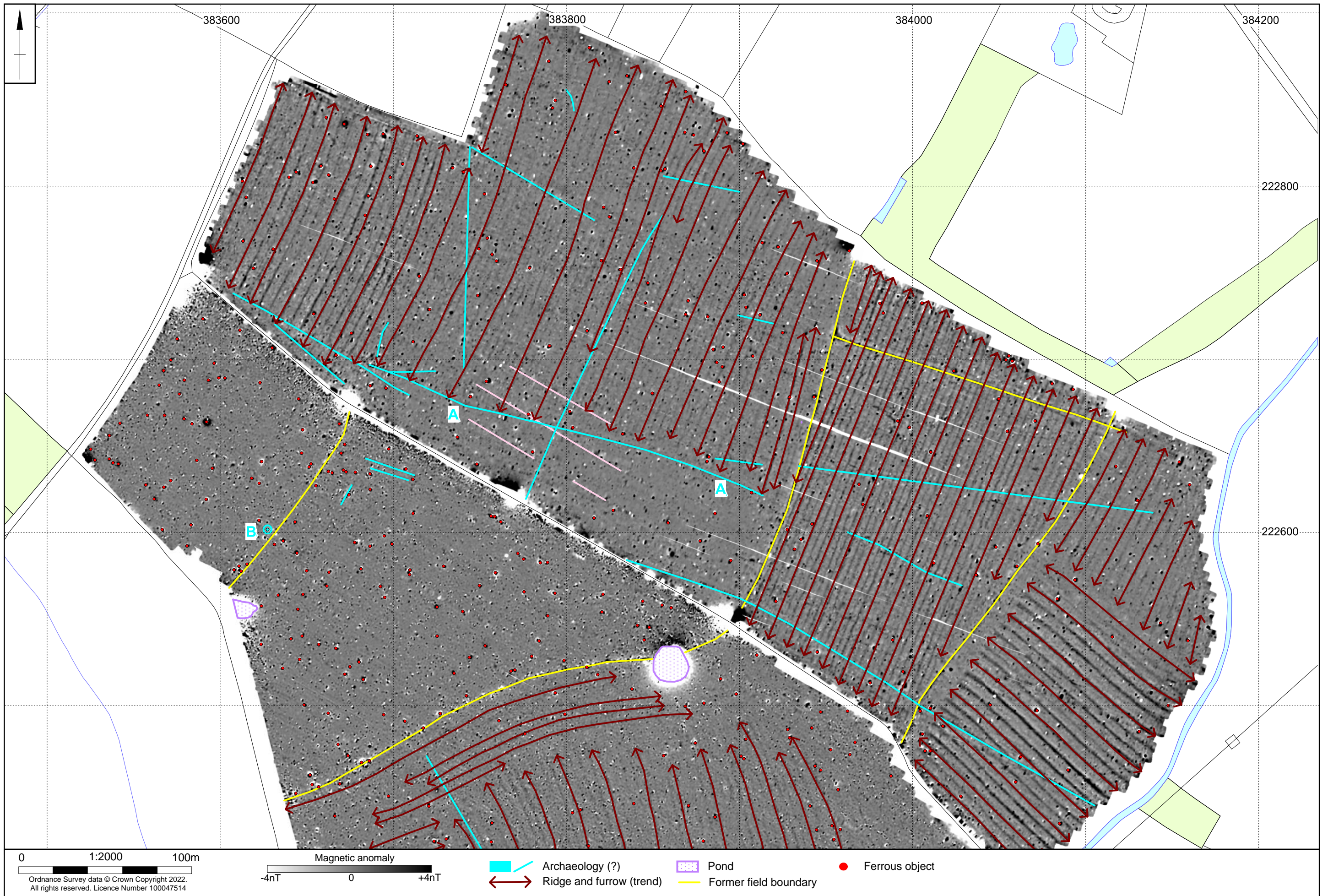




Scale 1:2000(A3)

Magnetometer survey results (south) Fig 3





Scale 1:2000 (A3)

Magnetometer survey interpretation (north) Fig 4

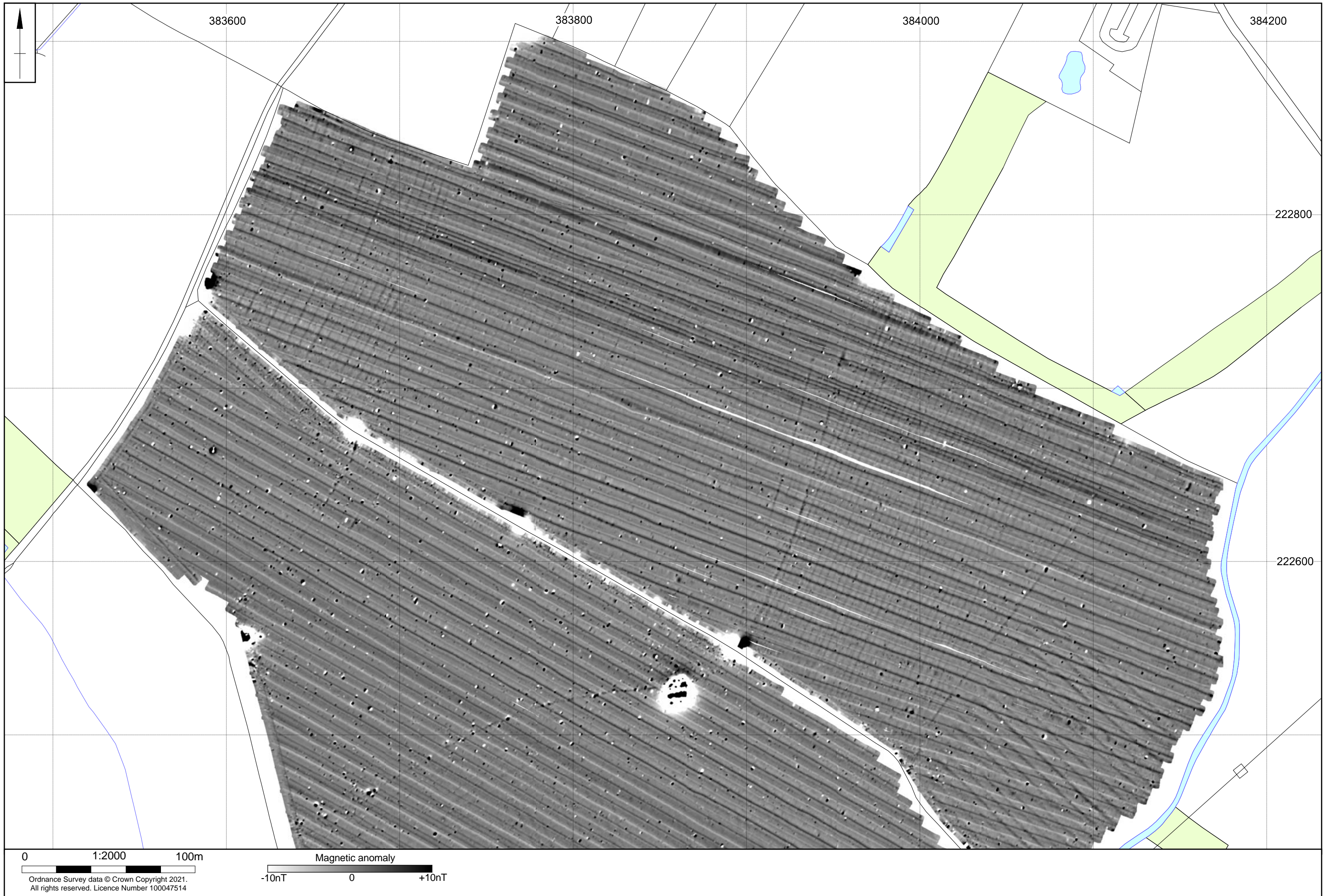




Scale 1:2000 (A3)

Magnetometer survey interpretation (south) Fig 5

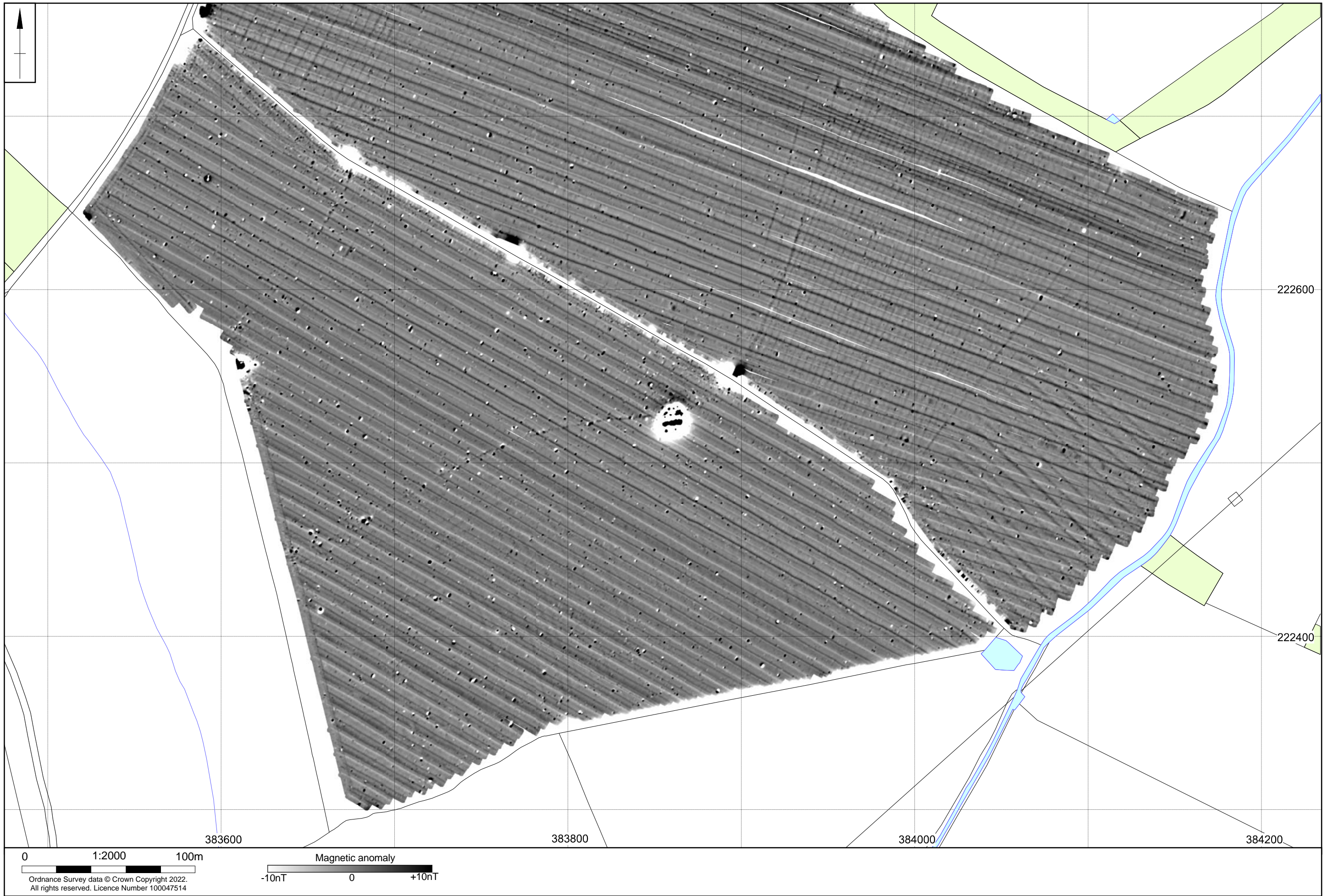




Scale 1:2000 (A3)

Unprocessed magnetometer data (north) Fig 6





Scale 1:2000 (A3)

Unprocessed magnetometer data (south) Fig 7



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