

**Archaeological geophysical survey
of land east of Arlesey
Bedfordshire
January - March 2022**

Report No. 22/028

Authors: Graham Arkley, Chris Manktelow and John Walford

Illustrator: Chris Manktelow



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Project Manager: John Walford

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Kent House
30 Billing Road
Northampton
NN1 5DQ
01604 809 800
www.mola.org.uk
business@mola.org.uk

MOLA Northampton is a company limited by guarantee registered in England and Wales with company registration number 8727508 and charity registration number 1155198. Registered office: Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED.

STAFF

Project Manager: John Walford MSc

Supervisors: Graham Arkley BSc MSc PCIfA
Chris Manktelow BSc PCIfA

Assistants: Stuart Griffiths BA
Daniel Whatton
Ayyub Elmedhem BSc

Text: Graham Arkley
Chris Manktelow
John Walford

Illustrations: Chris Manktelow

Flint Specialist: Yvonne Wolframm-Murray BSc PhD

Project: Arlesey, land east of		OASIS No: molanort1-506120	
ACTIVITY TYPE			
Project/Activity type	Geophysical survey		
Reason for investigation	Planning: Pre-application		
Development type	Residential development		
PROJECT LOCATION			
National grid ref	TL 195 354		
Site name	Arlesey, land east of		
REVIEWERS/ ADMIN			
HER for project	Bedfordshire		
National organisation	Historic England		
WORK UNDERTAKEN			
Methodological summary	Magnetometer survey with a cart-mounted array of Bartington Grad-01-1000L fluxgate gradiometers (combination of hand-pushed and vehicle-towed configurations).		
Previous work?	None	Future works?	Unknown
Dates - Start date:	10/01/2022	End date:	09/03/2022
GEOPHYSICS			
Geology	West Melbury Marly Chalk Formation. Lowestoft Formation chalky glacial till		
Land use (i.e. arable)	Arable and pasture		
Survey type	Magnetometer survey		
Size of survey area	c83ha		
Instrumentation	Bartington Grad-01-1000L	Fluxgate – Multiple sensor	
Configuration	Pushed/towed cart survey (6-probe)		
Spatial resolution	Traverse spacing	0.8m	Reading interval 0.225m
Resolution (data values)	0.1nT		
BIBLIOGRAPHY			
Title	Archaeological geophysical survey of land east of Arlesey, Bedfordshire, January - February 2022		
Author(s)	Arkley, G., Manktelow, C. and Walford, J.		
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Report release delay?	6 months		
PEOPLE			
Organisation	MOLA		
Project manager	John Walford		
Project supervisors	Graham Arkley and Chris Manktelow		
Funding body	Axiom Arlesey Ltd		
KEYWORDS			
Monuments found/ date	Late prehistoric ring ditch Iron Age to Roman settlement Medieval to post-medieval village Medieval to post-medieval ridge and furrow Modern quarry tramway		
RESULTS			
Description of outcomes	The survey identified abundant archaeological remains, mostly located towards the centre of the survey area. Two ring ditches were possibly Neolithic to Bronze Age in date, whilst a flint axe found by a member of the survey team was more conclusively Neolithic. An expansive group of irregularly shaped enclosures, with associated roundhouses, indicated probable Iron Age to Roman settlement; part of a possible trackway and field system might also have been of this date. A third set of remains appeared to represent an abandoned part of the medieval or early post-medieval village. Other detected features included ridge and furrow, historic field boundaries and debris from modern quarry tramways.		
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Archaeological geophysical survey of land east of Arlesey Bedfordshire January – March 2022

ABSTRACT

MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey of c83ha of land east of Arlesey, Bedfordshire. The survey identified abundant archaeological remains, mostly located towards the centre of the survey area. Two ring ditches were possibly Neolithic to Bronze Age in date, and a flint axe found by a member of the survey team was more certainly Neolithic. An expansive group of irregularly shaped enclosures, with associated roundhouses, indicated probable Iron Age to Roman settlement; part of a possible trackway and field system might also have been of that date. A third set of remains appeared to represent an abandoned area of the medieval to early post-medieval village. Other detected features included ridge and furrow, historic field boundaries and debris from modern quarry tramways.

1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by Christopher Arthey of Axiom Arlesey Ltd to undertake an archaeological geophysical survey of c83ha of land to the east of Arlesey, Bedfordshire (NGR TL 195 354) (Fig 1). The purpose of the survey was to identify and map any archaeological remains which may be affected by a proposed development scheme.

The survey comprised a magnetometer survey and was conducted between the 10th of January and the 9th of March 2022. It followed a Written Scheme of Investigation (MOLA 2022) and was also conducted in accordance with Chartered Institute for Archaeologists and European Archaeological Council guidelines (CIfA 2020 and Schmidt *et al* 2015). The Central Bedfordshire Council Archaeologist, Hannah Firth, was informed of the work.

2 BACKGROUND

2.1 Location, land-use, topography and geology

Location and land-use

The survey area covers an elongated block of land, between 300m and 600m wide, located immediately east of Arlesey. Its western boundary follows Hitchin Road and the rear of small residential estates and other properties, including Green End Farm and Arlesey Town Football Club, fronting onto the High Street. The eastern boundary nominally followed the line of an underground high-pressure National Grid gas pipeline, though in practice the alignment was not exact. Several farm tracks and footpaths crossed the survey area, including one leading south-east to the nearby 'Blue Lagoon' fishing and boating lake (Fig 1).

The survey area was divided into fields which were numbered for ease of discussion. The project originally covered 14 fields (c108ha), but three fields in the northern half of

the site (Fields 8, 13 and 14) were scoped out after the survey had begun due to difficulties in organising access (Fig 1).

The surveyed land was in predominantly arable use, in varying stages of cultivation, with some paddocks and pasture. Field 11 was unsurveyable due to being overgrown and much of the centre and west of Field 7 was also unsurveyable, having been recently built up with imported soil and re-seeded with grass (Fig 2).

Topography and geology

The survey area lies on gently undulating land midway up the eastern flank of the River Hiz valley. It stands between c46-52m above Ordnance Datum.

The solid geology of the site comprises Cretaceous chalk of the West Melbury Marly Chalk Formation. Much of the survey area has no drift geology recorded, with only a small deposit of Quaternary chalky glacial till of the Lowestoft Formation in Fields 2 and 5 in the south-east (BGS 2022).

2.2 Historical and archaeological background

Historic England's National Heritage List for England (NHLE) and Central Bedfordshire Historic Environment Record (CBHER) record no Listed Buildings or Scheduled Monuments within the survey area, but CBHER data shows that it contains a number of non-designated archaeological features.

Cropmarks in the south of the survey area, south-east of Arlesey Town Football Club, indicate a series of sub-rectangular enclosures which the HER loosely categorises as prehistoric (CBHER ID: MBD 16812). Further to the north, towards the centre of the survey area, is the findspot of a Roman coin hoard discovered in 1949 (MBD390). There is also some evidence for medieval ridge and furrow field systems in the centre of the survey area, to the north of West Drive (MBD6982).

During the 19th century, two industrial tramways crossed the survey area. One ran between Arlesey Station and the site subsequently occupied by Fairfield Hospital (Three Counties Asylum), following the route now occupied by West Drive and the ensuing footpath (MBD1529). The second lay to the south, connecting two chalk pits (now called Blue Lagoon and Green Lagoon) with an industrial site west of Hitchin Road (MBD1528).

Further archaeological remains occur in various locations outside the survey area. These include a c100m diameter circular enclosure and trackway ditch, of probable Iron Age or Roman date, lying north of the survey area (MBD641 & MBD1767) and various Bronze Age and Iron Age remains on the Fairfield Hospital site to the east (see below).

Within the built-up area of Arlesey there are several Grade II Listed buildings loosely scattered along the 1.5 mile long High Street and its southern continuation, Hitchin Road.

Documentary sources record that during the medieval period much of Arlesey's land belonged to three manors, Etonbury, Arlesey Bury and Llantony, the last named of these being amalgamated with Arlesey Bury in the sixteenth century (Page 1908, 261-5). The village was also divided topographically into a number of 'ends' - Church End, Dean End and Green End - as recorded on Jefferey's Map of Bedfordshire (1795). Green End, presumably named from the village green, lay at the southern end of the village, closest to the present survey area.

The southern part of Arlesey developed industrially during the 19th century, becoming a centre of brick-making and lime burning. A number of brick and clay pits east of the village were linked, via the previously noted tramways, to kilns and other industrial

buildings located to the west, alongside the Great Northern Railway. However, there is no evidence of quarries, kilns, or other industrial features directly within the survey area.

Previous archaeological investigations

Archaeological investigations carried out at the site of the former Fairfield Hospital, c500m east of the survey area, included gradiometer survey by Bedfordshire County Archaeological Service, which revealed a set of substantial curvilinear ditches. This was followed by a series of excavations by Oxford Archaeology (OA 2007) which discovered enclosures, storage pits, roundhouses and four-post structures, and concluded the presence of two settlement sites dating from the late Bronze Age with later Iron Age activity.

A geophysical survey and archaeological evaluation trenching scheme completed in 2016 by Albion Archaeology (AA 2016) at Chase Farm, c600m north-west of the survey area, found evidence of a Late Iron Age/Early Roman settlement consisting of a series of large sub-rectangular enclosures with smaller internal enclosures.

Excavation at Green End Farm by KDK Archaeology, immediately west of the centre of the survey area, uncovered a series of ditches and pits indicating early Medieval agricultural usage (Shlasko 2018).

3 METHODOLOGY

3.1 Fieldwork

The magnetometer survey was undertaken with a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform which may be operated by hand or adapted for towing behind a Utility Task Vehicle (UTV).

As operated by MOLA, the cart incorporates a bank of six vertically-mounted Bartington Grad-01-1000L magnetic sensor tubes (fluxgate gradiometers), spaced at 0.8m intervals along a bar aligned crossways to the direction of travel. It also incorporates a Leica Geosystems Viva GNSS antenna mounted on the central axis. The magnetic sensors are set to output data at a rate of eight readings per second for hand-survey or ten readings per second for UTV survey and the GNSS antenna is set to output NMEA format data (GGA messages) at a rate of one position per second in all cases. The two data streams are compiled into a single raw data file by MultiGrad601 logging software.

The survey across Fields 1, 2, 4 and 5 was conducted with a UTV tow vehicle. All remaining fields were conducted by hand due to a variety of practical considerations. The data collected by each method was broadly equivalent in character and quality.

The magnetic sensors were calibrated ('zeroed') at the start of each day's work to minimise any heading errors or offsets between the zero points of each individual sensor. For ease of handling the cart was only hitched to the tow vehicle after zeroing; as a result, the raw UTV-collected data exhibits a uniform offset of circa 5nT relative to the raw hand-collected data.

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.

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 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 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 and unprocessed survey data is presented in this report as greyscale raster images which have been rotated and scaled to fit against topographic base-mapping at a scale of 1:2000 and a range of +/-4nT (Figs 3 to 6). An interpretive overlay highlights notable anomalies for discussion (Figs 7 to 10). A minimally processed data plot is presented at a scale of +/-10nT (Figs 11 to 14) as a comparison to the final de-striped results.

4 SURVEY RESULTS

4.1 Overview

The survey detected extensive archaeological remains, including enclosures, field systems and trackways. These mainly lie within the central portion of the survey area, where the most substantial group can be broadly dated to the medieval or post medieval periods. There is also evidence of Iron Age and Roman features, as well as possible prehistoric and further undated features. For ease of discussion, the more coherent archaeology are grouped into five sites (Fig 2) with a number of further discrete anomalies spread across the rest of the survey area.

4.2 Prehistoric archaeology

The survey has detected a magnetically positive circular anomaly in the south-west of Field 4 (Site 1), measuring c28m in diameter with a possible opening on its north-eastern side. A similar but less distinct circular anomaly, measuring c21m in diameter with a possible south-west opening has been detected in the west of Field 12. Both of these anomalies are most likely to represent prehistoric (Neolithic or Bronze Age) ring ditches, although in each case a more recent circular feature, such a windmill mound, cannot be ruled out.

A Neolithic flint axe was discovered in the north-west of Field 5, c55m south of the largest ring ditch (Figs 2 and 9) during the survey (Appendix 1), providing slight circumstantial support for the suggested prehistoric dating.

4.3 Iron Age and Roman archaeology

The Iron Age and Roman archaeology found in the survey area can be split into three sites (2-4). The northernmost (Site 2) is marked by a series of strong, positive curvilinear anomalies indicating a series of irregularly-shaped enclosure ditches at the corner of Fields 2, 3 and 4. A weak curvilinear anomaly extends west from this core, probably representing a large enclosure ditch; this peters out to the west and cannot be seen to continue in the field to the south. At its eastern end an elongated D-shaped, almost oval, enclosure is visible. A larger enclosure with some internal divisions has been detected towards the south of Site 2. A circular anomaly can be seen inside the

enclosure along with fragments of other small curving features, possible representing roundhouses. The eastern side of the site is situated within a magnetically noisy area of the data with the gas pipeline cutting through some of the possible enclosure ditches. Despite the noisiness of the data, a number of anomalies can be picked out, representing ditches and some small internal features.

Site 3 lies in the west and centre of Field 2 and comprises two groups of enclosures connected by a single ditch. The western group comprises two rectangular enclosures and perhaps part of a third, less well-defined example. The largest enclosure contains a circular anomaly, probably representing a roundhouse with a possible entranceway on its eastern side. The eastern portion of the site is much more irregular in shape. A number of positive anomalies form a system of enclosures with three possible curving features inside. A c50m long sub-rectangular enclosure, with gaps in the north-western and south-eastern sides, is attached to a larger enclosure with internal divisions forming smaller enclosed areas. An additional, smaller, enclosure has also been detected attached to the south of the larger enclosure, with a shared entrance between the two.

Site 4 is located in the north-east of Field 2, and partially overlaps the south-western edge of Site 2. It is formed of two c100m parallel linear anomalies orientated north to south, with a set of closely-spaced parallel linear anomalies jutting out towards the south-east. These linear anomalies run in a different orientation to ridge and furrow in the area which is predominantly orientated north to south. The two parallel anomalies probably represent the side-ditches of a trackway, whereas the other anomalies could represent Roman planting beds (Wiseman *et al* 2020, Brown *et al* 2001). A similar configuration of trackway and planting beds is known locally at Bedford Business Park, Stewartby (MOLA 2019).

An isolated circular feature in the north-west of Field 2, measuring c13m wide with an eastern opening, is very similar to the possible roundhouse located in the east of Site 3. This, along with linear and curvilinear features (probably ditches) located between Sites 3 and 2, may be evidence of dispersed activity contemporary with the enclosures.

4.4 Medieval – post medieval archaeology

Many of the archaeological features at the centre of the survey area, in Fields 4, 6 and 7, form a coherent site which can be attributed to a medieval or post medieval origin (Fig 2, Site 5).

Considered in overview, the site comprises an intricate arrangement of rectilinear boundaries defining conjoined plots of land. A number of small anomalies within these plots may represent discrete features such as rubbish pits, hearths and perhaps also structural features such as beam slots or post holes. However, many elements of the site are quite weakly resolved, making it hard to offer a confident interpretation of the all the finer details.

The general appearance of the site would be consistent with an area of medieval or later settlement, with the plots perhaps being yards and gardens. This suspected dating receives circumstantial support from the Arlesey tithe map (1808), which shows a number of matching boundaries and other features, including, most distinctively, a short section of trackway and an irregular ditch cutting diagonally across the general 'grain' of the site (Fig 8, inset). Considering the survey results and the map together, it seems that the latter depicts, in vestigial form, an area of former settlement that was deserted prior to the 19th century and survived only as an unusually complex pattern of land division and tenure

Ridge and furrow

Several sets of weakly positive, gently curving parallel linear anomalies have been detected during the survey with the majority roughly orientated east to west with some in the centre of the survey area positioned north to south. These exhibit the classic reverse-S shaped curves of medieval or post-medieval ridge and furrow cultivation.

The data from a number of the fields contain occasional slight, magnetically positive, streaks aligned in the direction of travel for UTV towed data collection. These are residual artifacts from the processing of the data and should not be mistaken for the remains of ridge and furrow, which they somewhat resemble.

4.5 Other archaeology

There are several anomalies of possible archaeological significance situated away from the five main sites discussed above. Field 12 has one c90m long linear anomaly aligned east to west along with a curvilinear anomaly in the south of the field; both of which could denote ditches.

Fields 9 and 10 contain several sections of linear anomalies, possibly representing ditches, as well as a small but moderately intense anomaly of rectangular form that is hard to interpret but perhaps denotes some traces of a burnt structure. Short sections of linear anomalies in the west of Field 1 may represent portions of a possible rectangular enclosure immediately beside Hitchin Road, but the weak nature of the response and lack of characteristic features makes further analysis uncertain. Two further linear anomalies are present in the south of Field 1 and may also represent ditches of archaeological interest.

4.6 Other

Field boundaries

Several positive linear anomalies, which would otherwise be identified as ditches, correlate with field boundaries depicted on Ordnance Survey maps from the mid-20th century. These include linear anomalies in Fields 7 and 12 and a further, right-angled anomaly in Field 3. The boundary detected in Field 1 can be seen in aerial imaging from 2009 (Google Earth) and has only recently been ploughed out.

Ferrous

Small dipolar anomalies scattered throughout the survey area can be attributed to small pieces of ferrous debris from modern farming equipment or general litter. In places these form dense spreads or groups, which can sometimes correlate with made ground (such as in Field 7) or areas where boggy ground has been consolidated around tracks or gateways. The correlation is due to the use of bulky imported material comprising a significant ferrous component, such as building rubble or crushed reinforced concrete.

Well-defined linear anomalies with alternating polarity around and within Fields 7 and 9 arise from post and wire fences and gates between paddocks. The pattern of eight strong negative responses in Field 7 relate to staked equestrian training markers.

Tramways / trackways

Particularly dense linear concentrations of ferrous material have been detected in the north of Fields 5 and 12. In Field 5 the concentration continues eastwards from the modern footpath along the boundary between Fields 2 and 3, correlating with the route of the 19th century tramway between the former "Brick and Lime Works" adjacent to the railway and the former chalk pit (now a large pond) east of Field 5.

The similar band of concentrated ferrous material detected in Field 12, relates to the route of a recently removed trackway. This feature is visible on the previously mentioned 2009 aerial imaging and a significant amount of discarded material remains on the surface of the field (*pers obs*).

Utilities

The survey has detected the course of the gas pipeline along the east of the survey area, shown as a linear anomaly with a very strong, alternating polarity. Several smaller strong linear anomalies indicating further utilities were detected in Field 10.

Natural

A distinctive quadripolar anomaly in Field 1 is probably an example of a 'lightning-induced remanent magnetism' (LIRM) anomaly; a local magnetisation of the topsoil caused by the intense ground currents associated with a lightning strike (Fig 10).

5 CONCLUSION

The survey has detected a wide variety of archaeological remains, largely focussed towards the centre of the survey area. Many of these can be provisionally attributed to one of three broad archaeological periods - Neolithic to Bronze Age, Iron Age to Roman and medieval to post-medieval. Some other features, which are more dispersed and fragmentary are harder to interpret with confidence; it is possible that these represent fragments of outlying field systems and other remains peripheral to the main foci of activity.

One, or perhaps two, ring ditches have been detected, most probably indicating the sites of late Neolithic or early Bronze Age round barrows. A Neolithic flint axe was found by chance during the survey, exposed on the field surface approximately 50m away from the southern ring ditch (Appendix 1).

Three sets of irregularly shaped enclosure ditches with associated roundhouses are thought, based on their overall appearance, to indicate loosely agglomerated rural settlement of Iron Age and/or Roman date. They are associated with some other, poorly-resolved, features including an isolated roundhouse and a possible trackway and system of planting beds. It is likely that a number of the enclosures are identical with those previously identified here on the basis of cropmark evidence (CBHER MBD16812); they are probably also related to some weak cropmarks visible to the immediate east on Google Earth imagery dating from 2009.

A separate set of rectilinear enclosures are thought to mark an abandoned part of the medieval or post-medieval village of Arlesey. Several elements of the enclosures can be matched with a distinct block of small land parcels depicted on the village tithe map (1808), the appearance of which is strongly reminiscent of building plots or yards focussed around a trackway (Fig 8). The map admittedly shows no buildings in the area, but it is quite possible that any buildings had already fallen out of use and been demolished by that date. Furthermore, the survey results suggest that the enclosures were much more complex, with many more sub-divisions and internal features, than the map reveals and that would also support the idea that what survived in 1808 was the merely the vestiges of a previously settled area.

Apart from the remains described above, the survey has detected various features of minor historic interest, including ridge and furrow, historic field boundaries and debris from the track beds of modern quarry tramways. It has also detected the route of the modern pipeline which runs along the eastern boundary of the survey area. Whilst this last feature is not of direct archaeological interest, it should be noted as an obstacle to any excavation works which may subsequently occur on the site.

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MOLA

10th May 2022

APPENDIX 1**Flint Axe** by Yvonne Wolframm-Murray

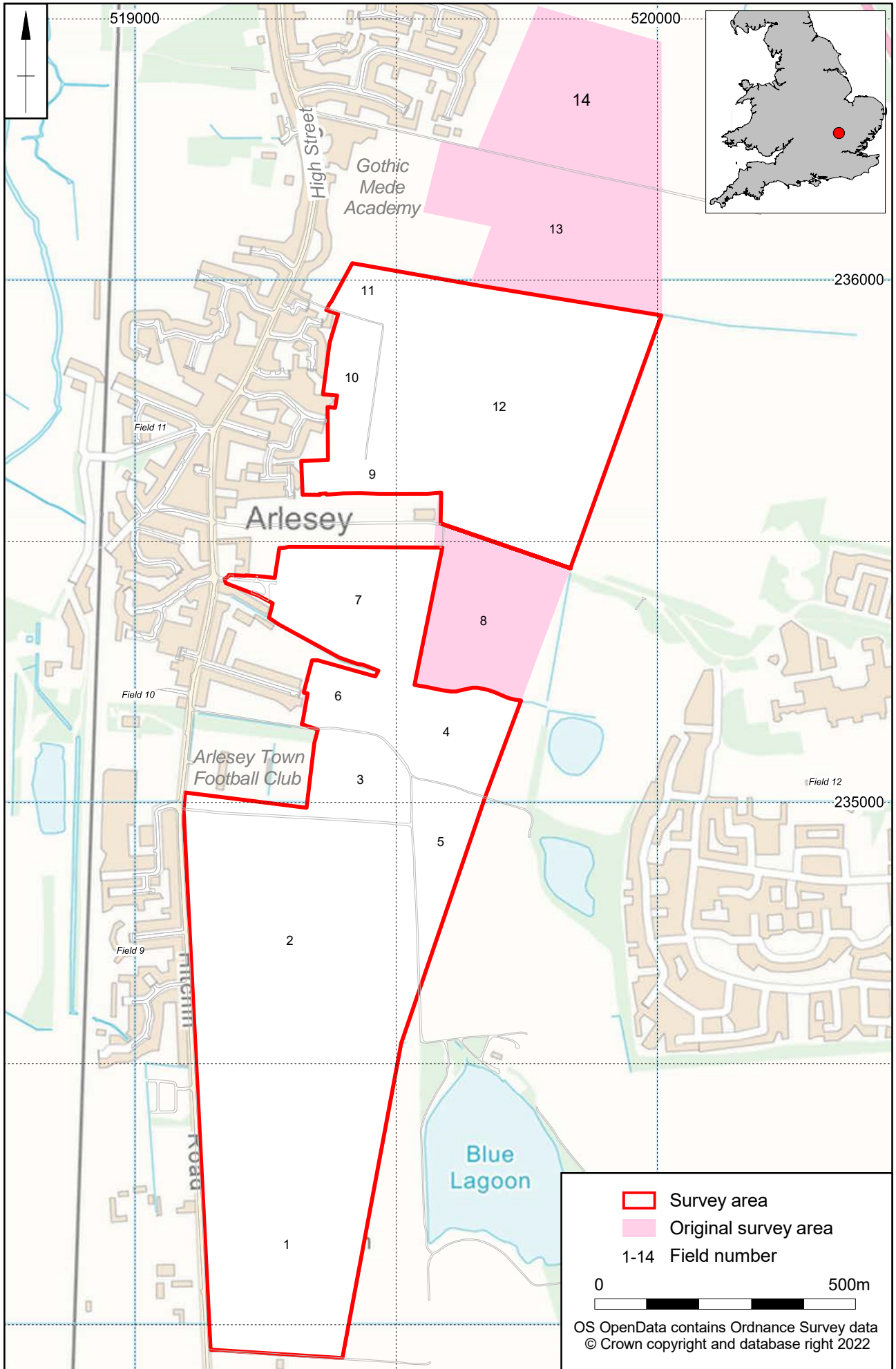
During the geophysical survey a Neolithic flint axe was found near the north-western corner of Field 5 (Fig 9). It measures 105mm long by 65mm wide and weighs 254.61g. The surface of the axe is patinated white, the raw material appears to be variegated grey or grey-brown vitreous and opaque flint. The condition is poor, with damage having occurred in the ploughsoil. The source is possibly clay-with-flints or other local exposures of flint in the chalk bedrock.

The shape of the axe is ovate with a wide butt, the cross section is oval with possible side facets. The edges show some crushing from post-depositional damage. The flake scars on the axe are very prominent and there is limited polishing visible, mostly near the cutting edge. The axe has likely been utilised and the cutting edge possibly resharpened by removing flakes. This may account for the loss of polished surface and the relatively straight cutting edge.



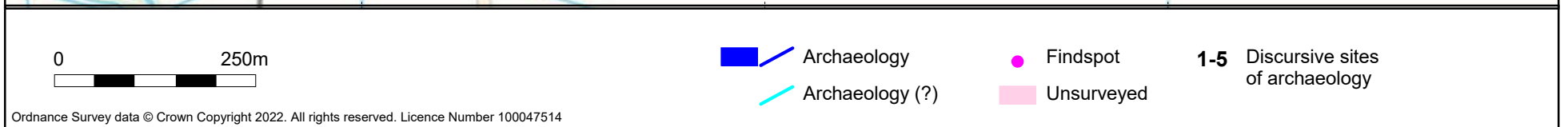
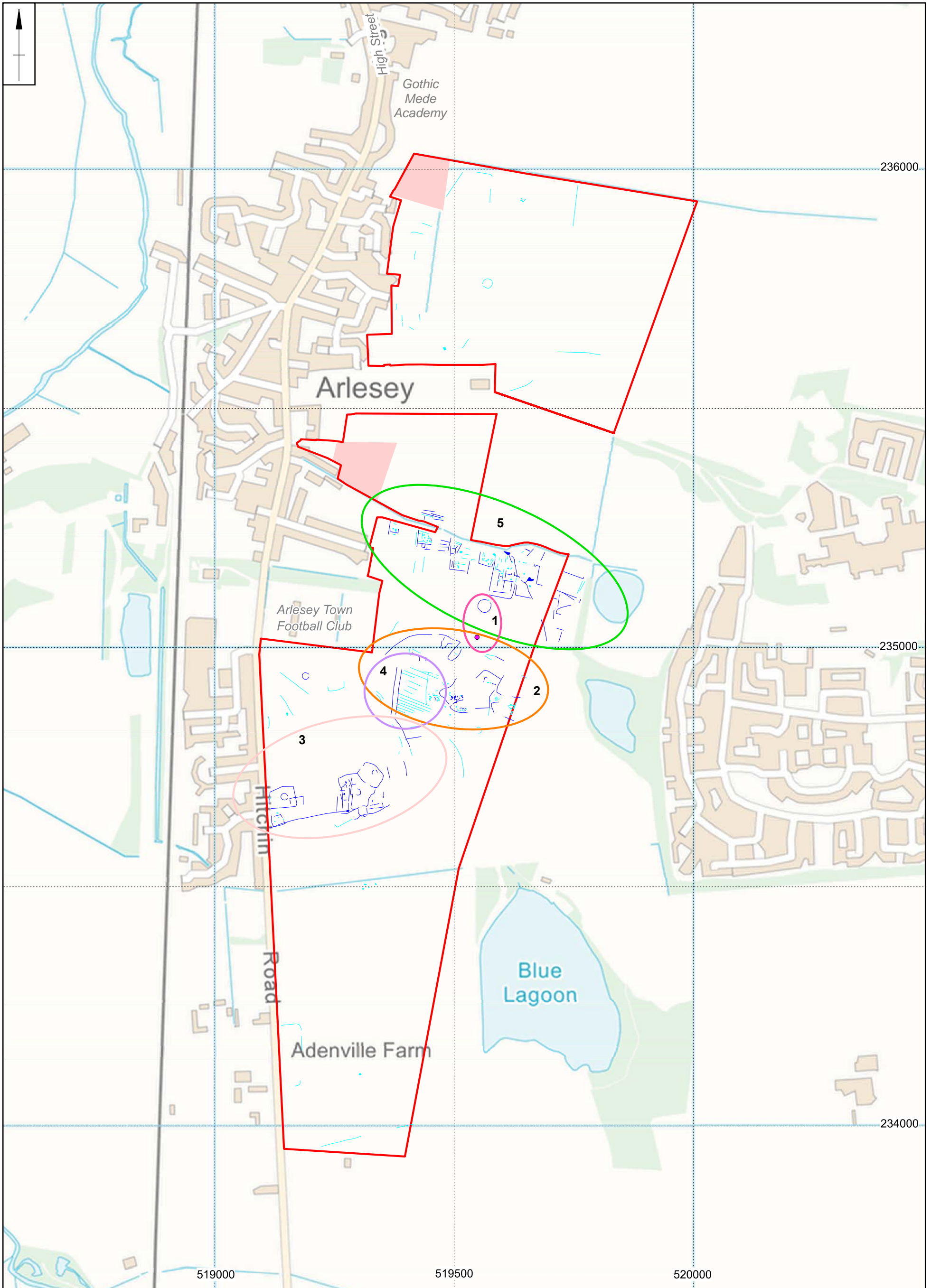
Flint axe

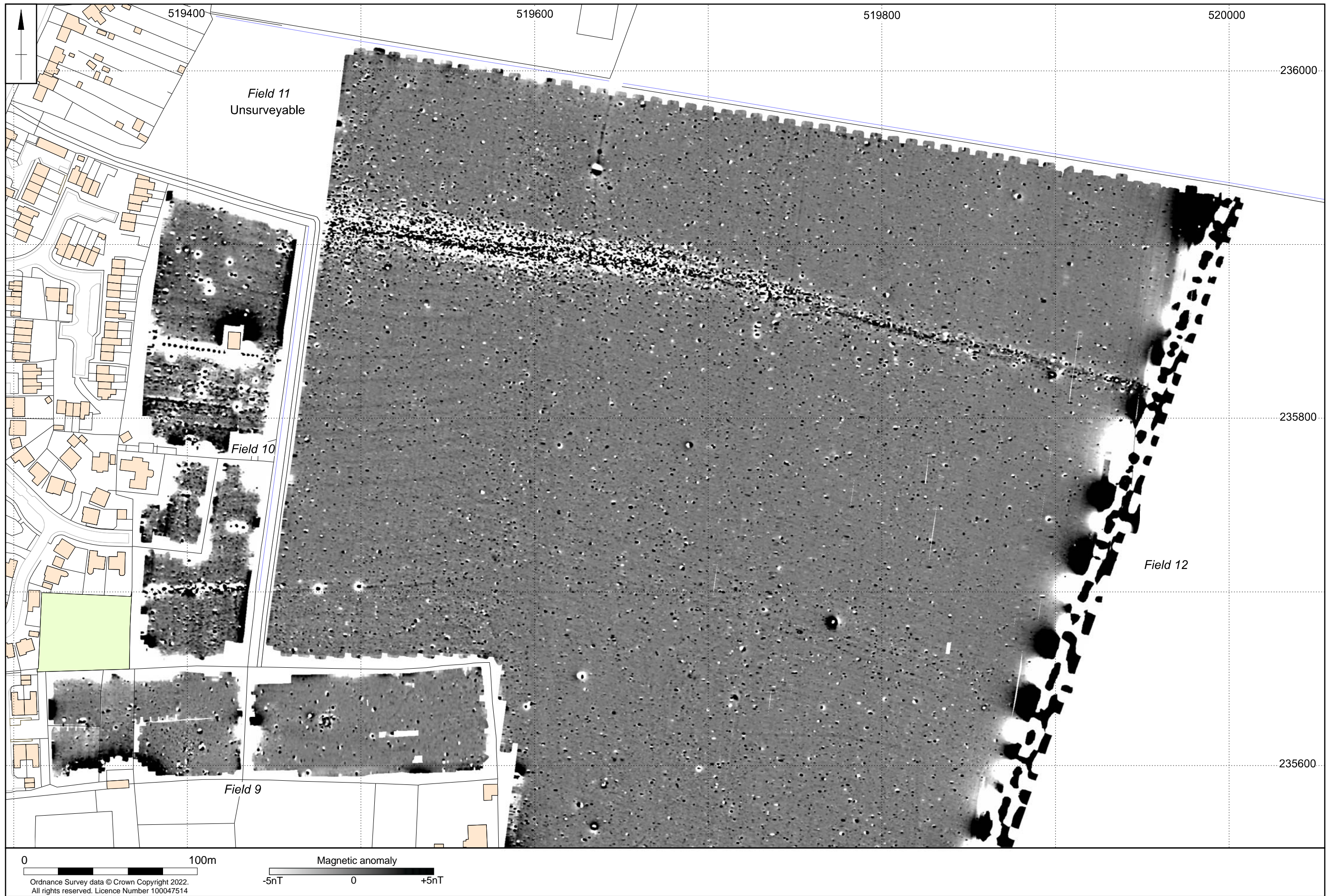
Fig 15



Scale 1:10,000 (A4)

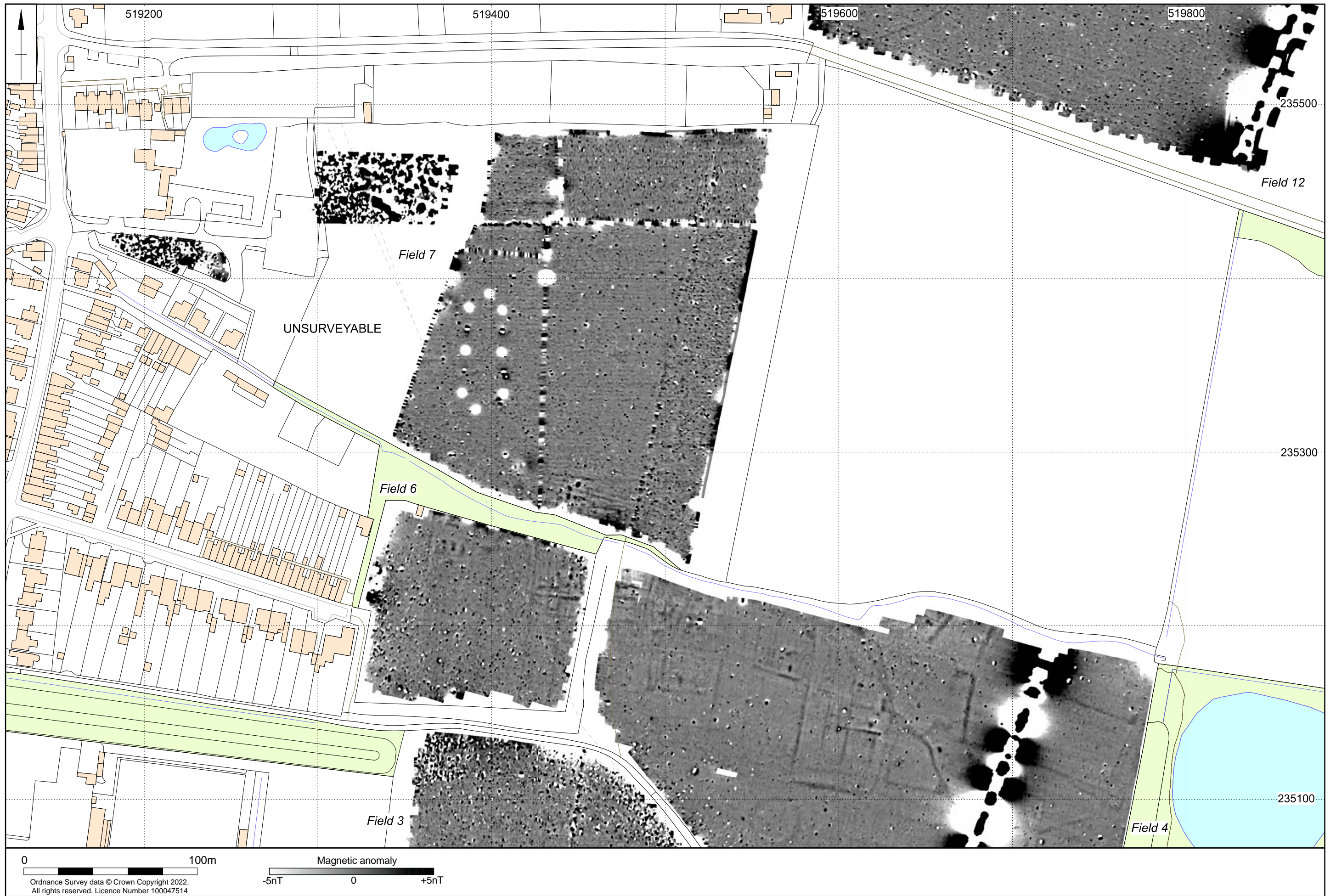
Site location Fig 1





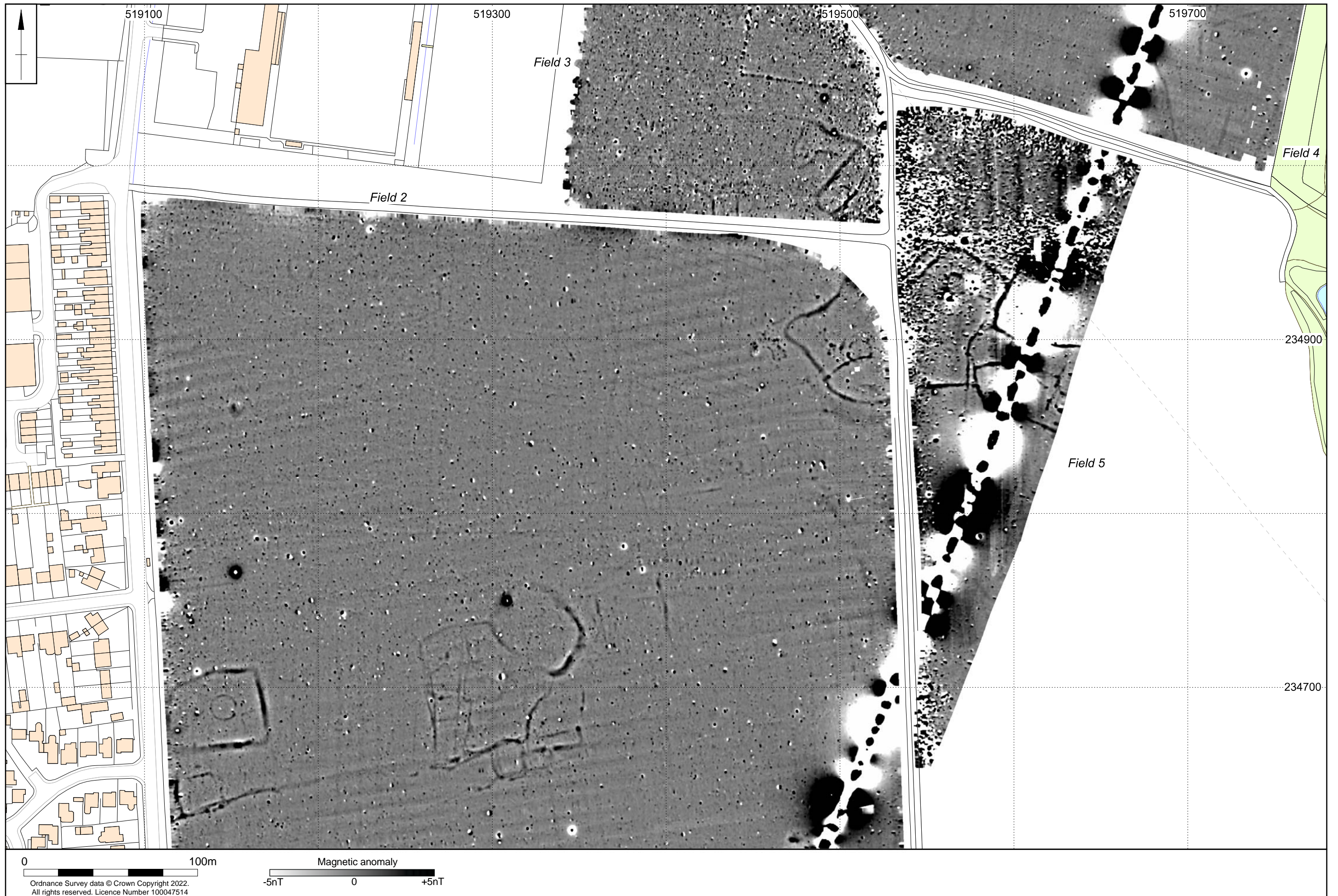
Scale 1:2000 (A3)

Magnetometer survey results (north) Fig 3



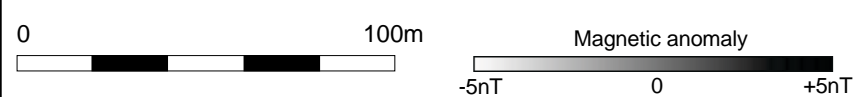
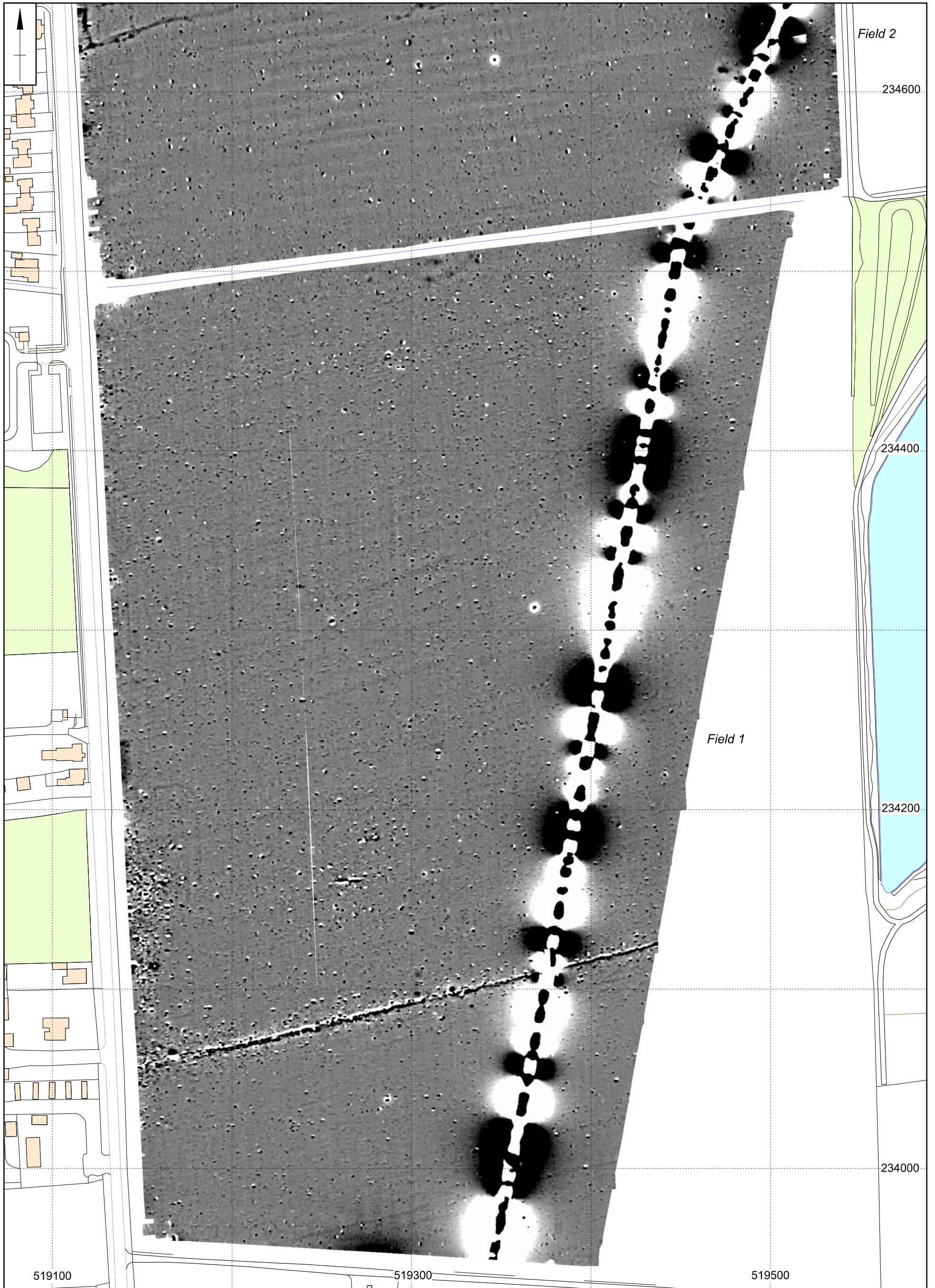
Scale 1:2000 (A3)

Magnetometer survey results (centre-north) Fig 4

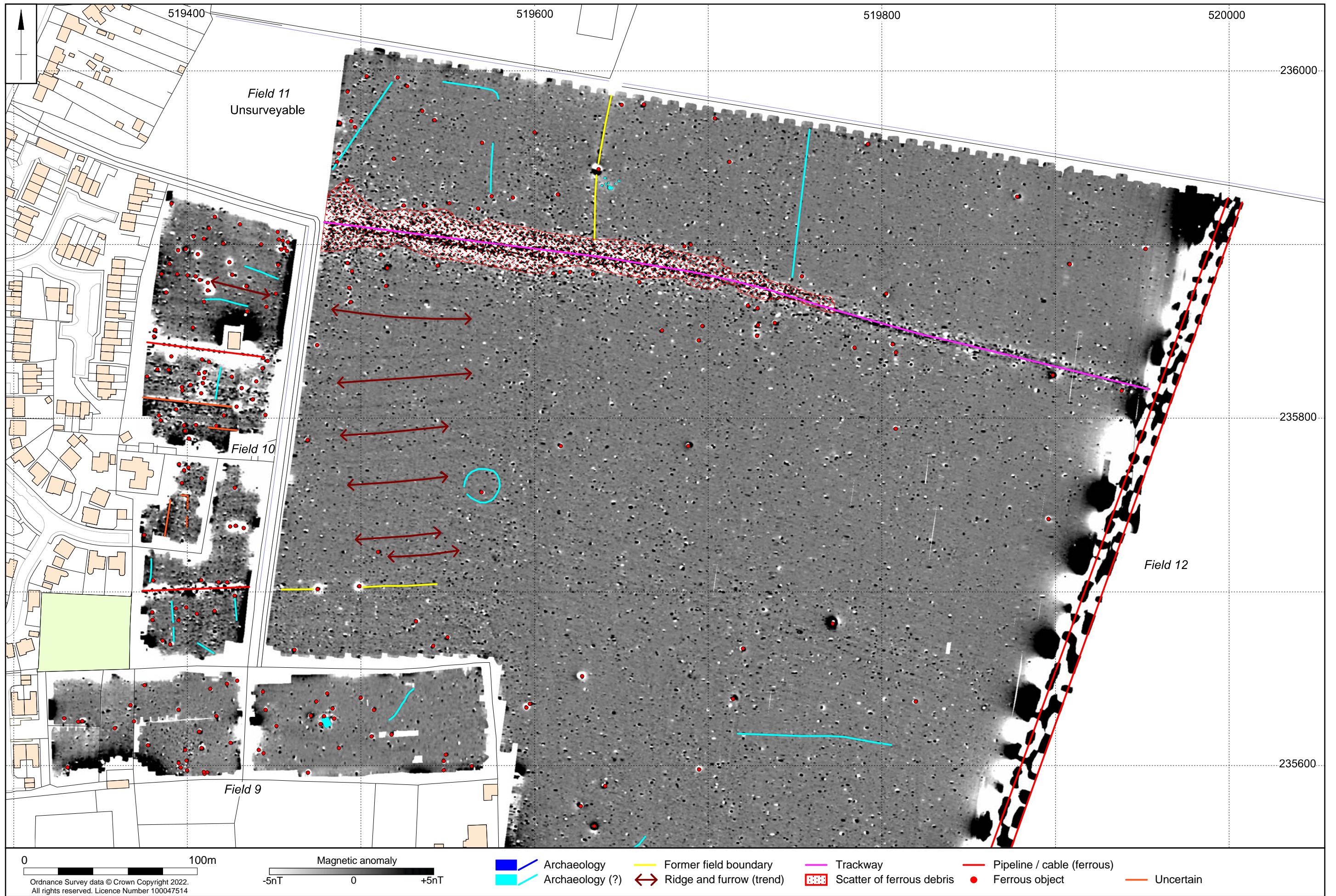


Scale 1:2000 (A3)

Magnetometer survey results (centre-south) Fig 5

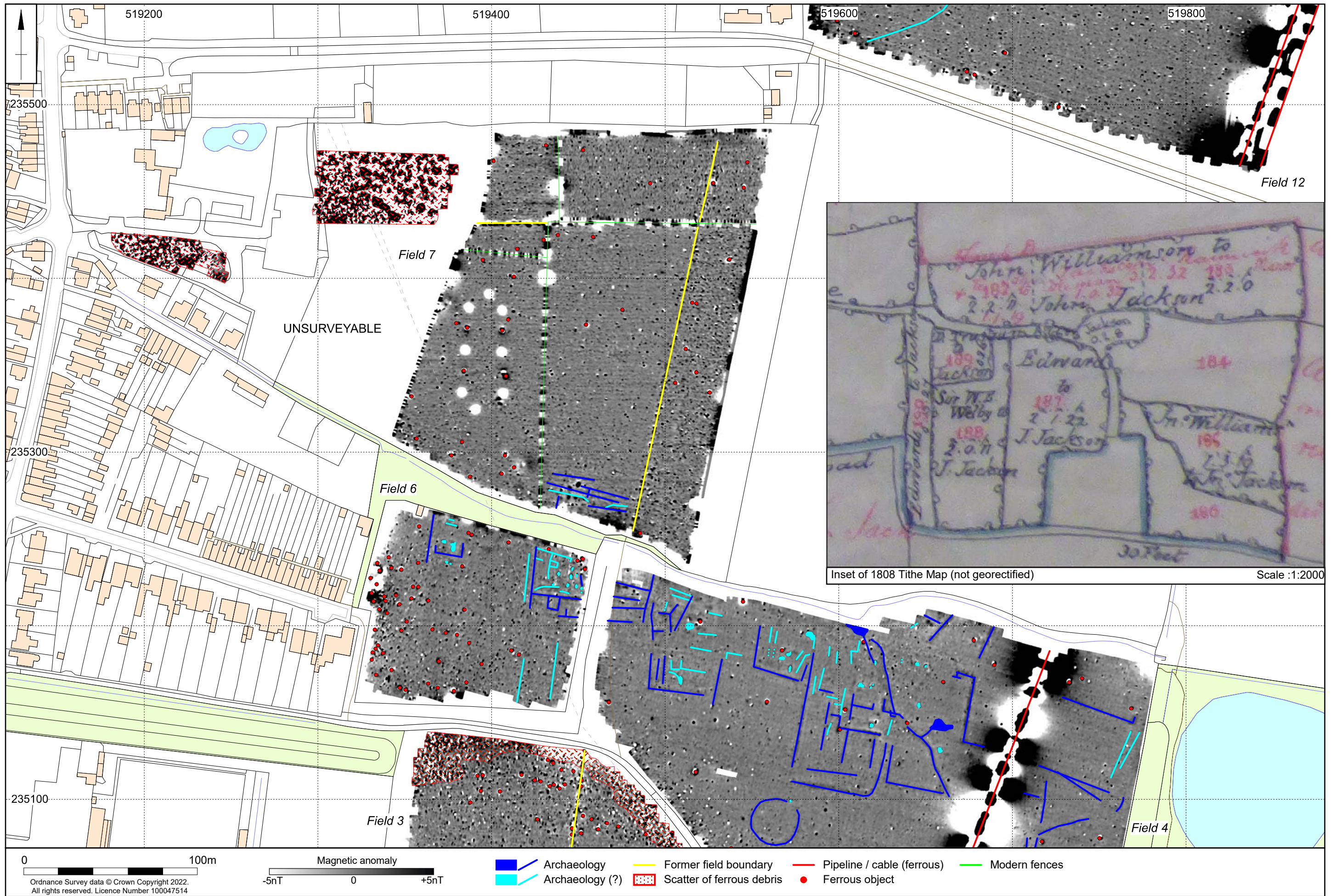


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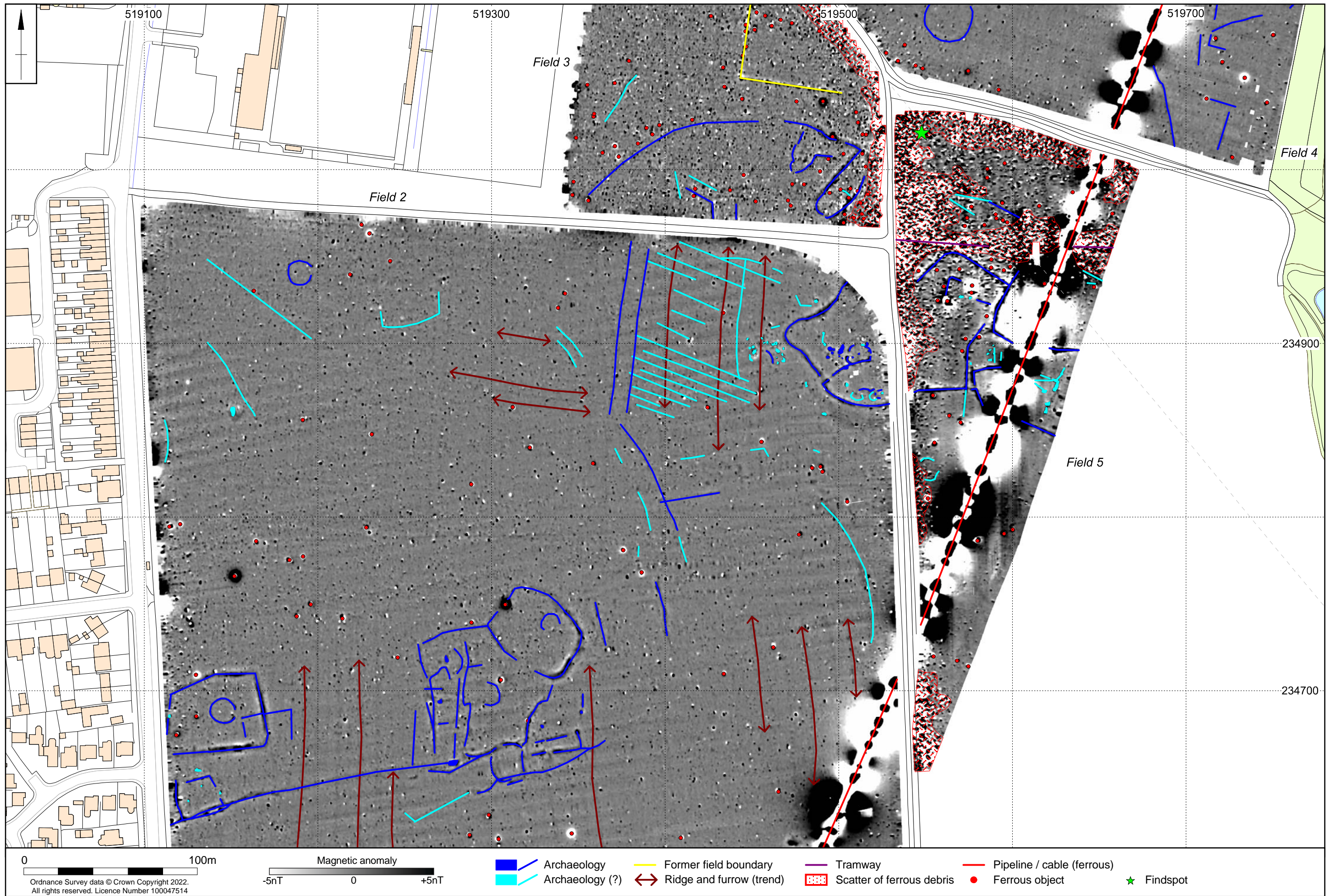
Scale 1:2000 (A3)

Magnetometer survey interpretation (north) Fig 7



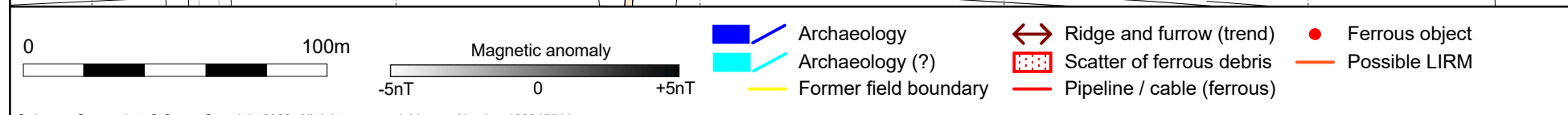
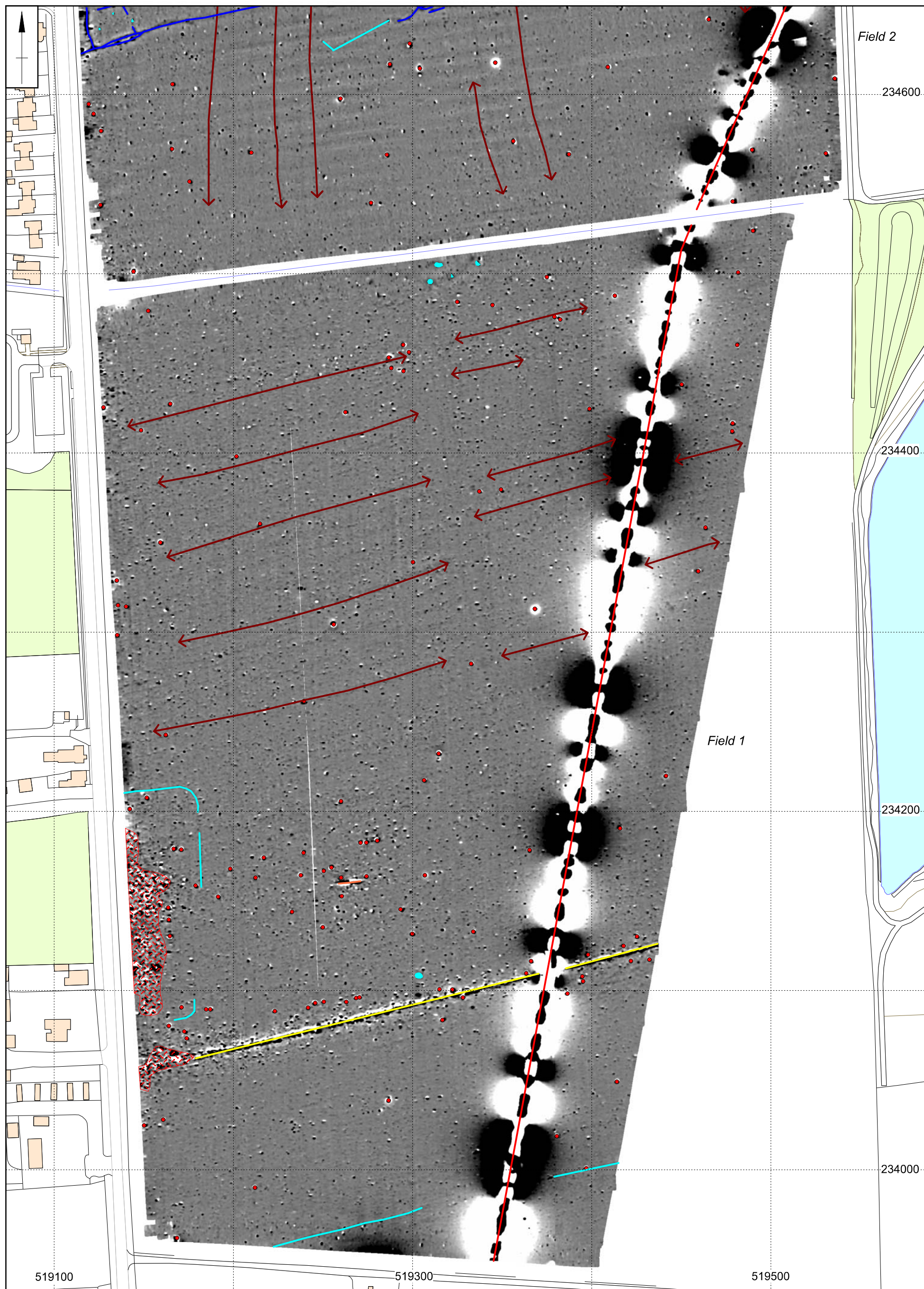
Scale 1:2000 (A3)

Magnetometer survey interpretation (centre-north) Fig 8



Scale 1:2000 (A3)

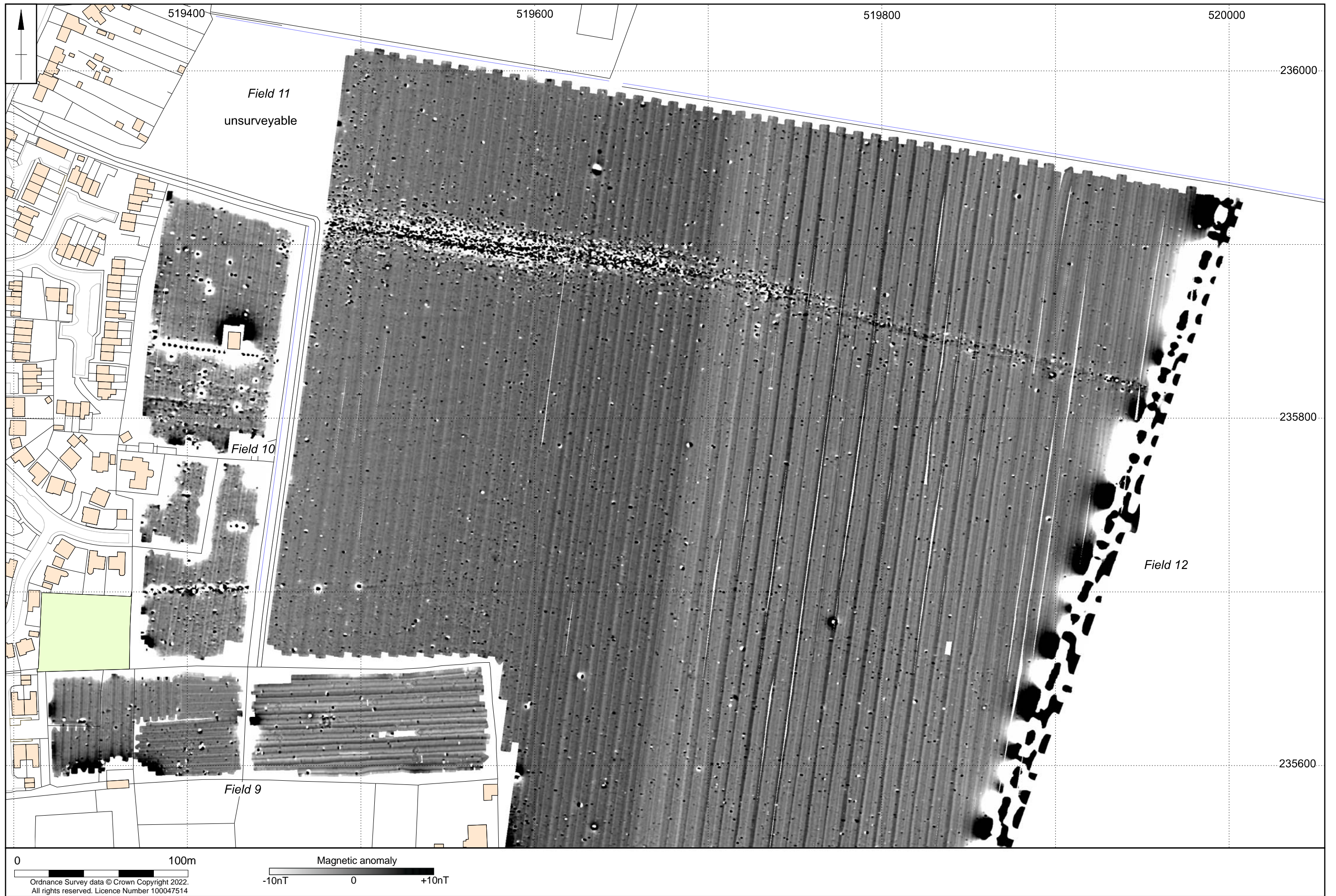
Magnetometer survey interpretation (centre-south) Fig 9

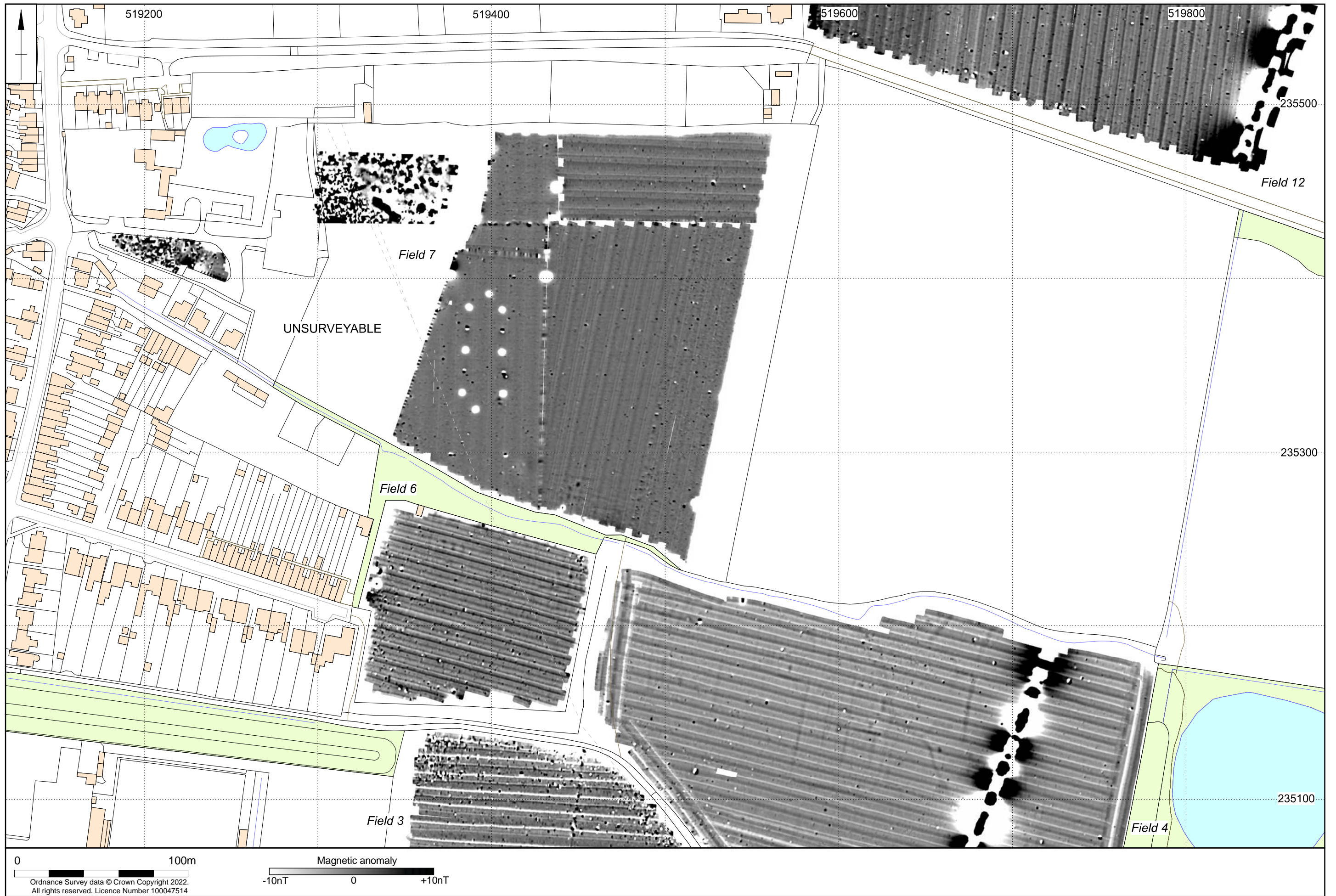


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Scale 1:2000 (A3)

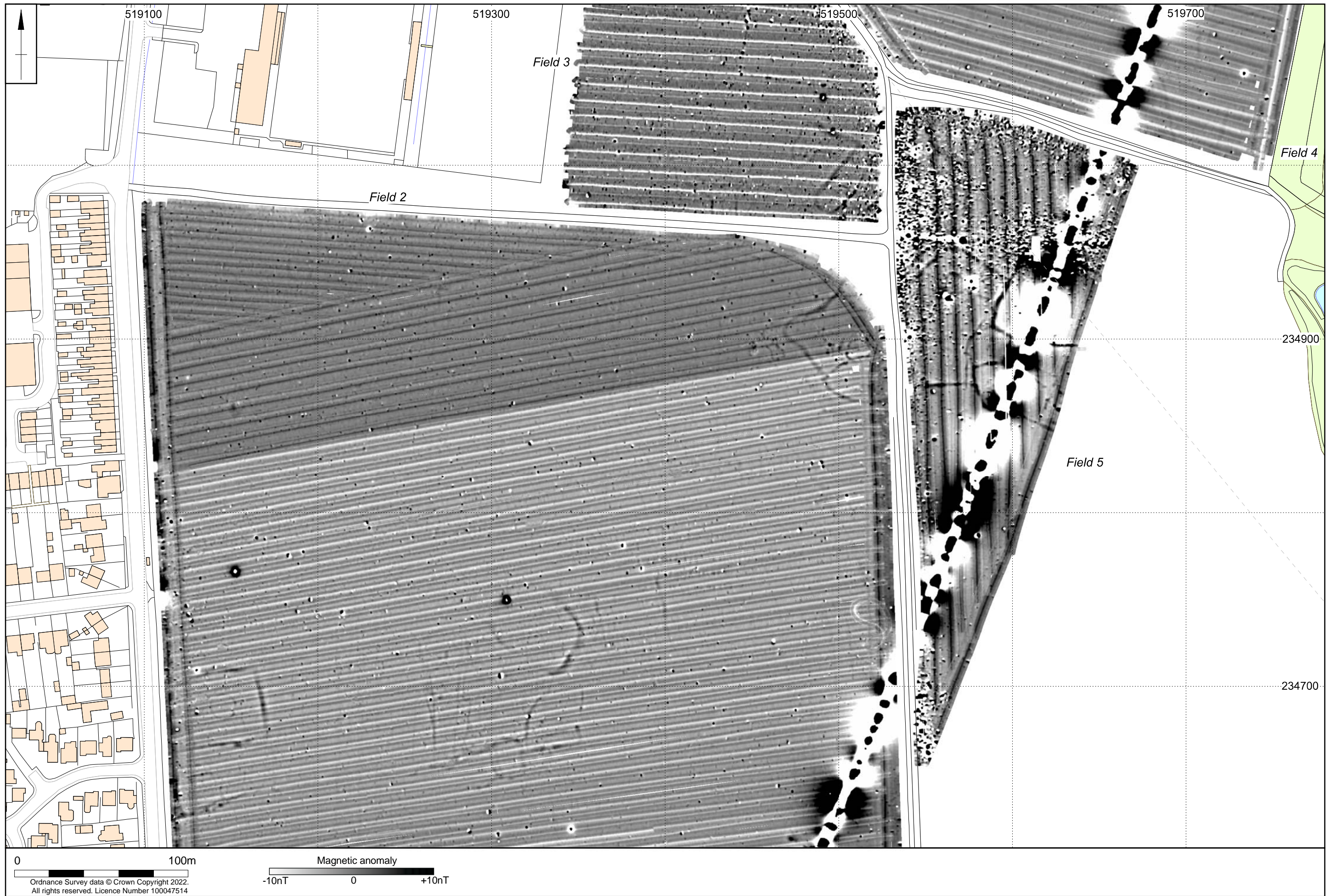
Magnetometer survey interpretation (south) Fig 10

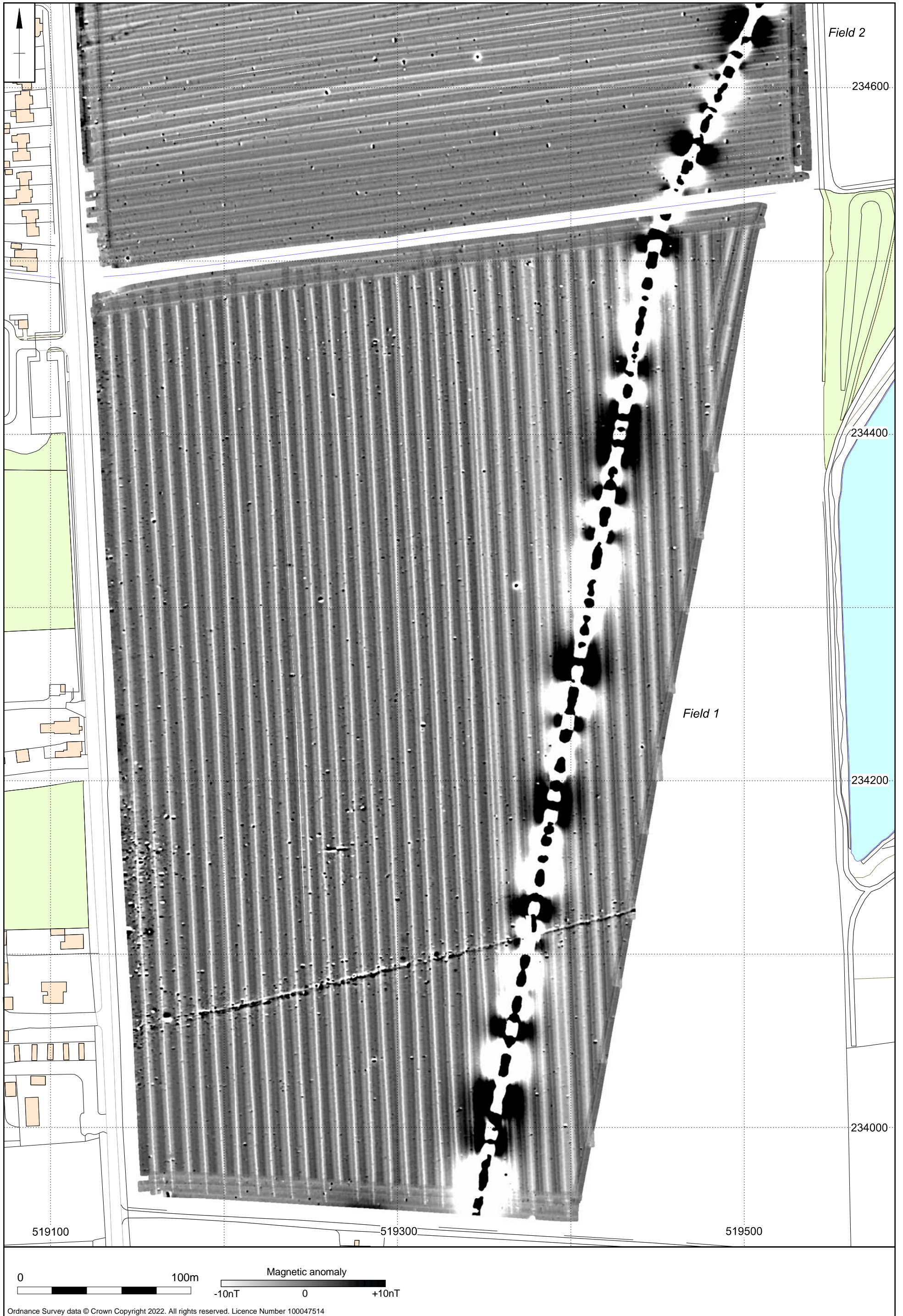




Scale 1:2000 (A3)

Unprocessed magnetometer data (centre-north) Fig 12





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MOLA
Kent House
30 Billing Road
Northampton
NN1 5DQ
01604 809800
www.mola.org.uk
business@mola.org.uk