



**Archaeological geophysical survey of land  
north-east of the North Quay, Hayle  
Cornwall  
May 2016**

Report No: 16/92

Author: John Walford

Illustrator: John Walford





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**OASIS REPORT**

PROJECT DETAILS		<b>Oasis No. molanort1-253499</b>	
Project name	Archaeological geophysical survey of land north-east of the North Quay, Hayle, Cornwall		
Short description	MOLA were commissioned to undertake a magnetometer survey of c 6ha of land to the north of Hayle, Cornwall. The survey identified a complex pattern of linear features, thought to represent a palimpsest of different field systems. Some of the field boundaries seem likely to date from the nineteenth century but others may be much earlier, possibly even prehistoric. The survey also identified tenuous evidence for prehistoric or later occupation features, including roundhouses and pits.		
Project type	Geophysical survey		
Site status	None		
Previous work	None known		
Current Land use	Arable		
Future work	Trial trench excavation		
Monument type/ period	Undated (prehistoric to modern?) field systems		
Significant finds	None		
PROJECT LOCATION			
County	Cornwall		
Site address	North Quay, Hayle		
Study area	c 6ha		
OS Easting & Northing	SW 559 381		
Height OD	c 15m - 38m aOD		
PROJECT CREATORS			
Organisation	MOLA Northampton		
Project brief originator	Cornwall County Council		
Project design originator	MOLA Northampton		
Director/Supervisor	Adam Meadows		
Project Manager	John Walford		
Sponsor or funding body	Prospect Archaeology		
PROJECT DATE			
Start date	09 May 2016		
End date	12 May 2016		
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	Journal/monograph, published or forthcoming, or unpublished client report		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 of land north-east of the North Quay, Hayle, Cornwall, May 2016		
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# Archaeological geophysical survey of land north-east of the North Quay, Hayle, Cornwall May 2016

## ABSTRACT

*MOLA were commissioned to undertake a magnetometer survey of c 6ha of land to the north of Hayle, Cornwall. The survey identified a complex pattern of linear features, thought to represent a palimpsest of different field systems. Some of the field boundaries seem likely to date from the nineteenth century but others may be much earlier, possibly even prehistoric. The survey also identified tenuous evidence for prehistoric or later occupation features, including roundhouses and pits.*

## 1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by Prospect Archaeology to conduct a magnetometer survey on a proposed development site immediately north-east of the North Quay, Hayle, Cornwall (NGR SW 559 381; Fig 1). The purpose of the survey was to investigate the presence, layout and extent of any archaeological features which may be affected by the proposed development. The survey was undertaken between the 9th and 13th May 2016.

## 2 BACKGROUND

### 2.1 Topography and geology

The survey area comprises three arable fields located to the north of Hayle and south-west of the village of Phillack in the area known as Riviere Towans. They stand between 15m and 38m aOD on the south-facing (leeward) side of the promontory which partially encloses Hayle Harbour, and are bounded to the south by the North Quay and the houses of Clifton Terrace.

The solid geology of the survey area is mapped as sedimentary rocks of the Porthtowan Formation (formerly known as the Gramscatho beds). These are overlain by wind-blown sands of geologically recent date (BGS 2016).

### 2.2 Historical and archaeological background

The Cornwall and Scilly Historic Environment Record (HER) has information about a number of prehistoric and Roman finds from in and around the survey area. A Bronze Age funerary urn (HER No.139294) and a scatter of Mesolithic flints (139239) are recorded as having been found in the south-eastern field and there is a record of a Roman brooch having been found slightly east of the survey area, close to Riviere Farm (39836). Other records relate to a cemetery (31899) and a Bronze Age axe fragment (56496), but these are imprecisely located so their exact association with the survey area is unclear. Likewise, there is a record of an undated human burial having been found somewhere to the west of the survey area (31925), but the location is not precisely known.

The 1879 Ordnance Survey map shows the area to have been fields and undeveloped sand-dunes at that time. The northern and south-eastern fields existed in something close to their modern form, but the western field had not then been fully enclosed. In the northern field, the map depicts a moderately large, elongated mound, apparently with a flat top, but this is not identified with any name or caption.

During the Second World War an anti-aircraft battery was located slightly to the north-west of the survey area, but does not appear to have encroached into it (HER No. 53597).

During this survey, the surveyors were approached by metal detectorists who they had seen searching on the adjacent fields. It was mentioned in conversation that the locality was one where Roman coins were relatively common finds, although it was not made clear exactly where the productive area was or how many coins had been found there.

### **3 METHODOLOGY**

The survey was undertaken with the MOLA magnetometer cart. This is a two-wheeled, lightweight structure designed to be pushed by hand. It incorporates a bank of four vertically-mounted Bartington Grad601 magnetic sensor tubes, spaced at half-meter intervals along a bar aligned crossways to the direction of travel, and also incorporates a Leica Geosystems Viva GPS antenna mounted on the central axis, 0.5m 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 straight and parallel traverses across each field to be surveyed, with logging being manually toggled on and off at the start and end of each traverse to avoid the collection of spurious data whilst turning. Traverse ends were marked with ranging poles to aid even coverage, and the evenness of coverage was further checked by monitoring the positional trace plotted in real time by the MultiGrad601 logging software. The average speed of coverage was *c* 1.5m/s and the effective data resolution thus approximated to 0.25m x 0.50m.

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

The raw XYZ data exhibited striping caused by slight mis-matches in the calibration of the individual magnetic sensors. This was removed in TerraSurveyor by applying the median destripe function to runs of data from each sensor. The data thus de-striped was interpolated to produce a greyscale raster images (range +/-4nT) and these were output with associated world files for geo-rectification against Ordnance Survey base mapping (Fig 2). The same plots are presented with interpretive overlays in Figures 3-4.



## 4 SURVEY RESULTS

The survey has detected a complex set of intercutting linear anomalies which appear to represent a palimpsest of field boundaries relating to multiple periods of land use (Figs 2-4). Some other, less conspicuous, anomalies may relate to dispersed prehistoric or later settlement remains amongst the fields. An attempt has been made to separate these fields and other remains into phased groups so as to aid discussion (Fig 4) but whilst this is likely to have some validity it is very much provisional and should be subject to revision in the light of future fieldwork results.

The linear anomalies are very varied in terms of their strength and magnetic polarity, and this suggests that causative features may be similarly varied in their characteristics. One influential factor may be depth of burial, with some of the weaker and less sharply defined anomalies perhaps arising from features buried beneath layers of wind-blown sand. Another factor may be differences in the nature of feature composition and substrate. Normally a ditch would be expected to show as a positive anomaly, due to the presence of magnetically enhanced soil within its fill, but the reverse could occur if a ditch were cut through a weakly magnetic bedrock or soil horizon then infilled with non-magnetic sand. Similarly, the buried remains of hedge-banks could, in principle, show as either positive or negative depending on the magnetic properties of the particular stone they contain.

The earliest phase of remains may be those picked out in green on Figure 4, which are tentatively proposed to be prehistoric or Roman in date. They comprise a rectilinear pattern of probable field boundaries, reminiscent of so-called 'celtic' fields, at the western end of the survey area, with a linear ditch extending eastwards and then turning a sharp hairpin bend towards the north-west as though defining part of a larger field or enclosure.

Four parallel linear anomalies in the northern and south-eastern fields share a broadly common alignment with the putative Phase 1 remains, but are quite different in character. They are generally prominent features, and notably dipolar, but also broad and ill-defined. It is possible that they represent agricultural terraces cut into the slope, but a geological cause (outcropping dykes or other magnetically enhanced beds) should also be considered.

Near the eastern edge of the south-eastern field there is an annular anomaly, c 10m in diameter, which would be consistent with a prehistoric roundhouse or a small ring ditch. This has a small group of discrete positive anomalies, suggestive of pits, lying close to its north-west, and other anomalies, perhaps also representing pits, forming a larger concentration to the south. Two other possible roundhouses are suggested by arcs of very small positive anomalies, with projected diameters of c 5m-6m, located close to each other in the northern field (Fig 2 inset).

The second phase of remains may be those highlighted in orange on Figure 3. They are defined by anomalies that have a relatively uniform character, being generally narrow and moderately intense linears with slightly sinuous forms. They form an irregular but coherent layout with a central sub-rectangular field aligned north-south and parts of other fields apparently surrounding it.

Whilst there is no certain basis on which to date the Phase 2 remains, their arrangement is largely conformable to groups of weakly defined parallel curvilinear anomalies which can be plausibly interpreted as traces of medieval strip cultivation ('ridge and furrow'). This interpretation, which rests on the curving forms and relatively wide spacing of the

parallel anomalies, might allow the Phase 2 boundaries to be dated as medieval by association.

The Phase 3 remains are largely focussed around a set of three parallel sinuous negative linear anomalies which flank the link of a trackway depicted on the 1879 Ordnance Survey map. A band of densely clustered magnetic dipoles lies in between these ditches, and presumably represents residual debris from the track bed itself. Most of the dipoles are likely to have a ferrous origin, but other hardcore such as granite, iron slag or brick rubble could also contribute to the overall magnetic response.

A rectilinear dog-leg pattern of anomalies with sharply defined corners is aligned on the same general axis as the trackway and presumably defines field boundaries of broadly similar post-medieval date. However the correlation is not perfect, the trackway being more sinuous than the boundaries, and it may be that they represent successive stages of site development rather than forming one set of contemporary features.

At the south-eastern end of the survey area, there is a very weak set of linear anomalies partially defining a rectangular area c 38m wide. This area is very similar in width and orientation to the adjacent curtilages of Clifton Terrace, and it may be speculated whether the anomalies might denote a parcel of land divided off for an expansion of the housing but never actually developed.

In addition to the anomalies described above, there are various others which cannot be attributed to any specific phase. These include three parallel linear anomalies crossing the south-eastern corner of the survey area and a number of other anomalies which are short, disjointed or irregular and cannot be discussed in any meaningful way. Furthermore, there are three discrete positive anomalies in the northern field which could be interpreted as representing large pits, but could also have a geological cause.

An intense linear anomaly of alternating polarity which runs along the southern boundary of the survey area, aligning with Clifton Terrace, clearly represents a modern pipe. Similar anomalies are present alongside many of the modern field boundaries, and these could also relate to pipes although their ubiquity suggests they are more probably the result of fencing or other ferrous material within the hedge-banks. One other modern service may be represented by the straight, narrow positive anomaly which runs west from the building at the junction of the three fields. Such an anomaly would be consistent with a backfilled trench containing a plastic pipe, a copper cable, or some other non-magnetic material.

The survey data also contains scattered magnetic dipoles resulting from items of ferrous debris buried within the plough soil. This debris will probably be fairly insignificant pieces of agricultural scrap, such as horseshoes and plough fittings.

## **5 CONCLUSION**

The survey has detected a complex pattern of linear features, provisionally interpreted as defining at least three phases of field system. It is suggested that prehistoric or Roman, medieval and post-medieval agricultural activity may be represented. The survey has also provided tenuous evidence for prehistoric or Roman occupation remains, including a small number of possible roundhouses and some possible pits.

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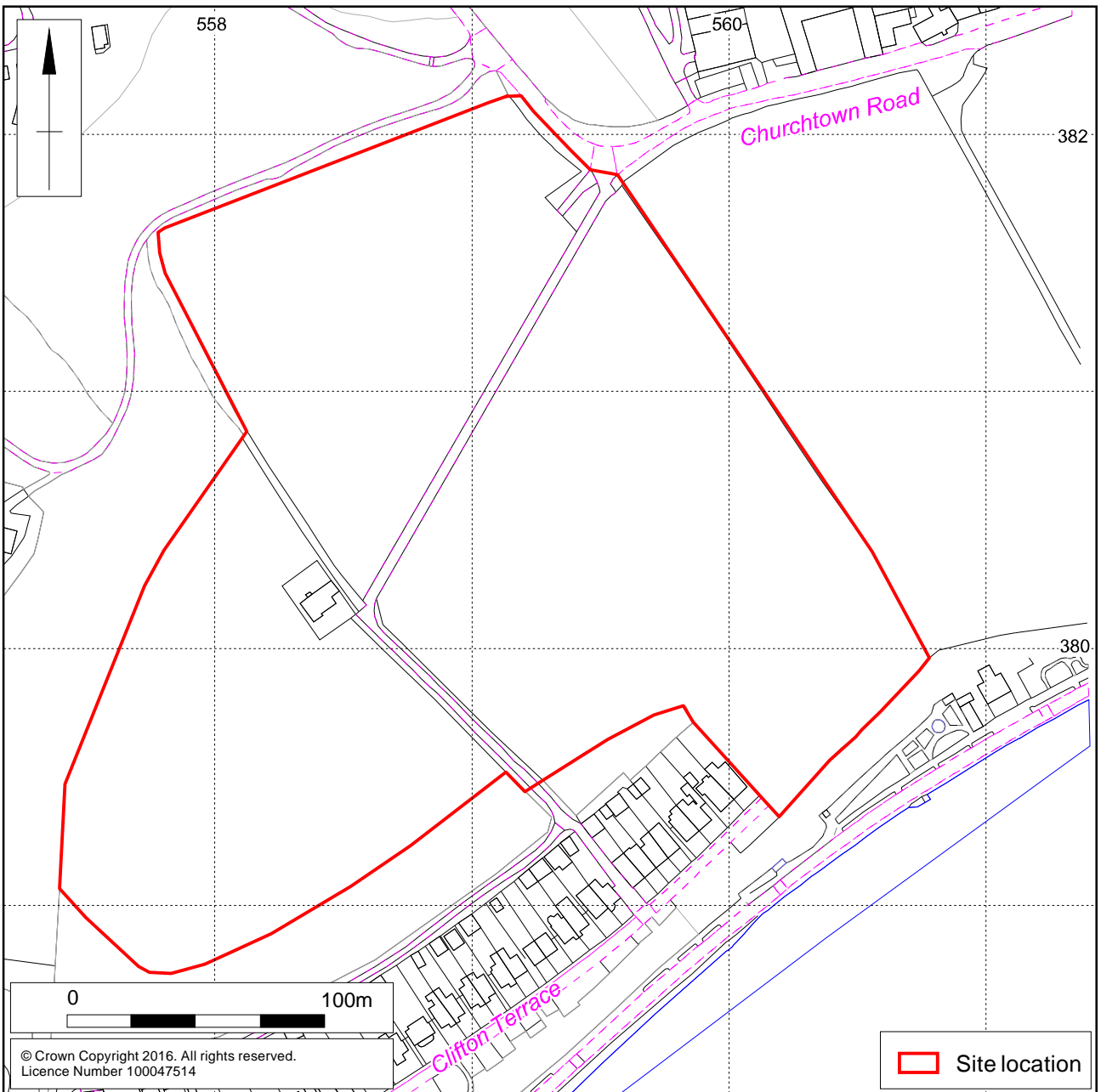
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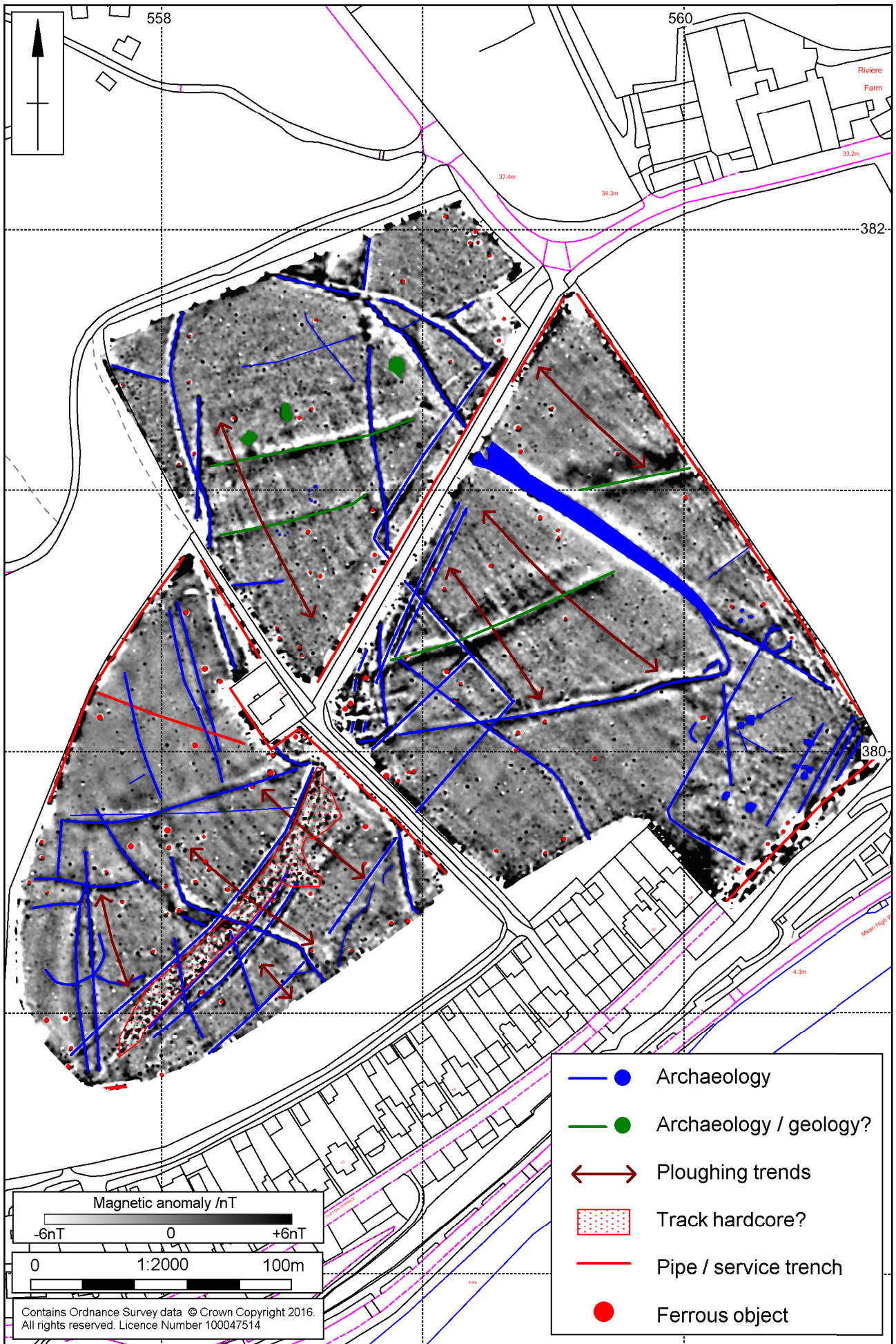
Scale 1:2500

Site location Fig 1



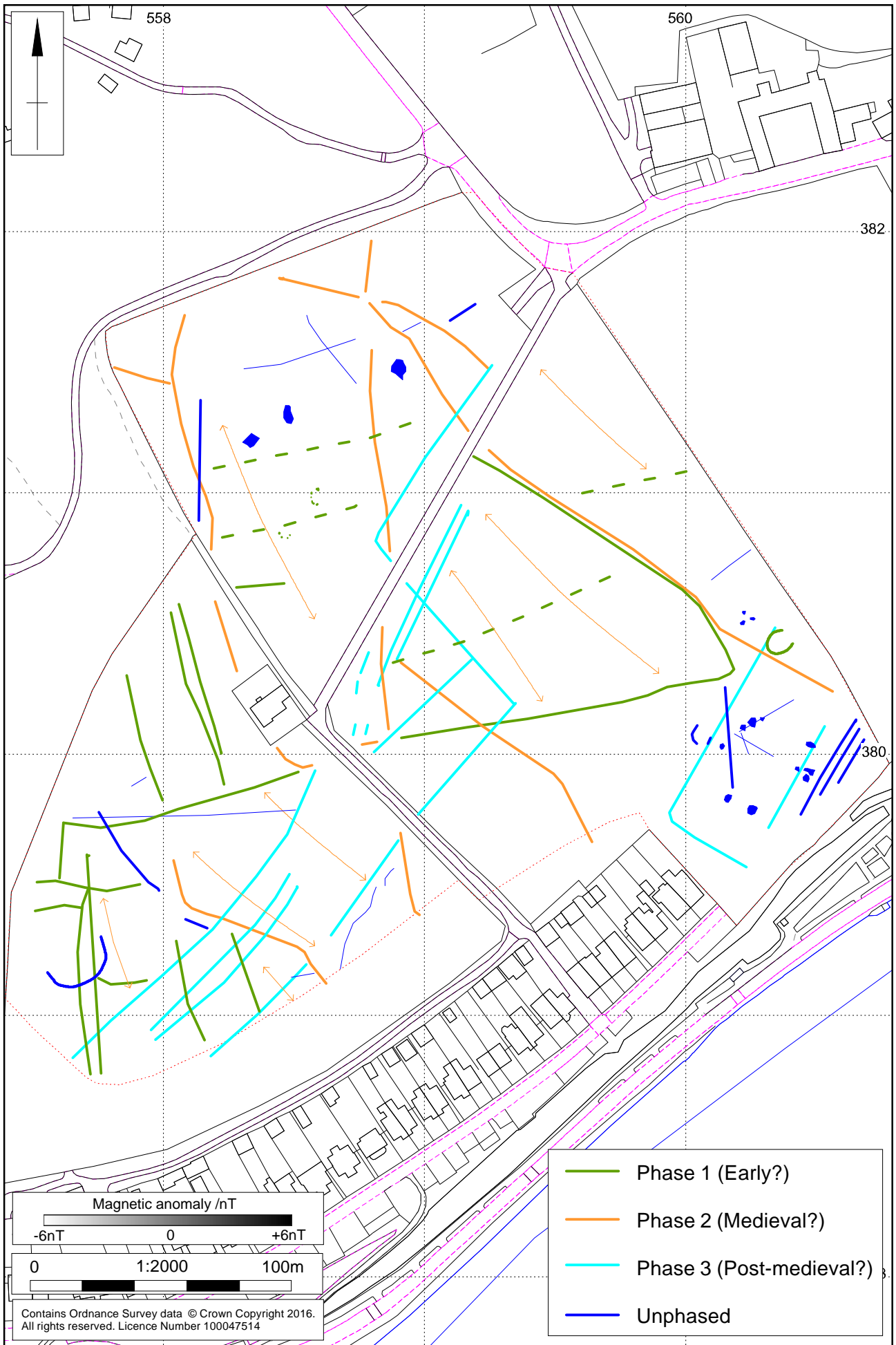
Scale 1:2000

Magnetometer survey results Fig 2



Scale 1:2000

Magnetometer survey interpretation Fig 3



Scale 1:2000

Suggested phasing of remains Fig 4



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