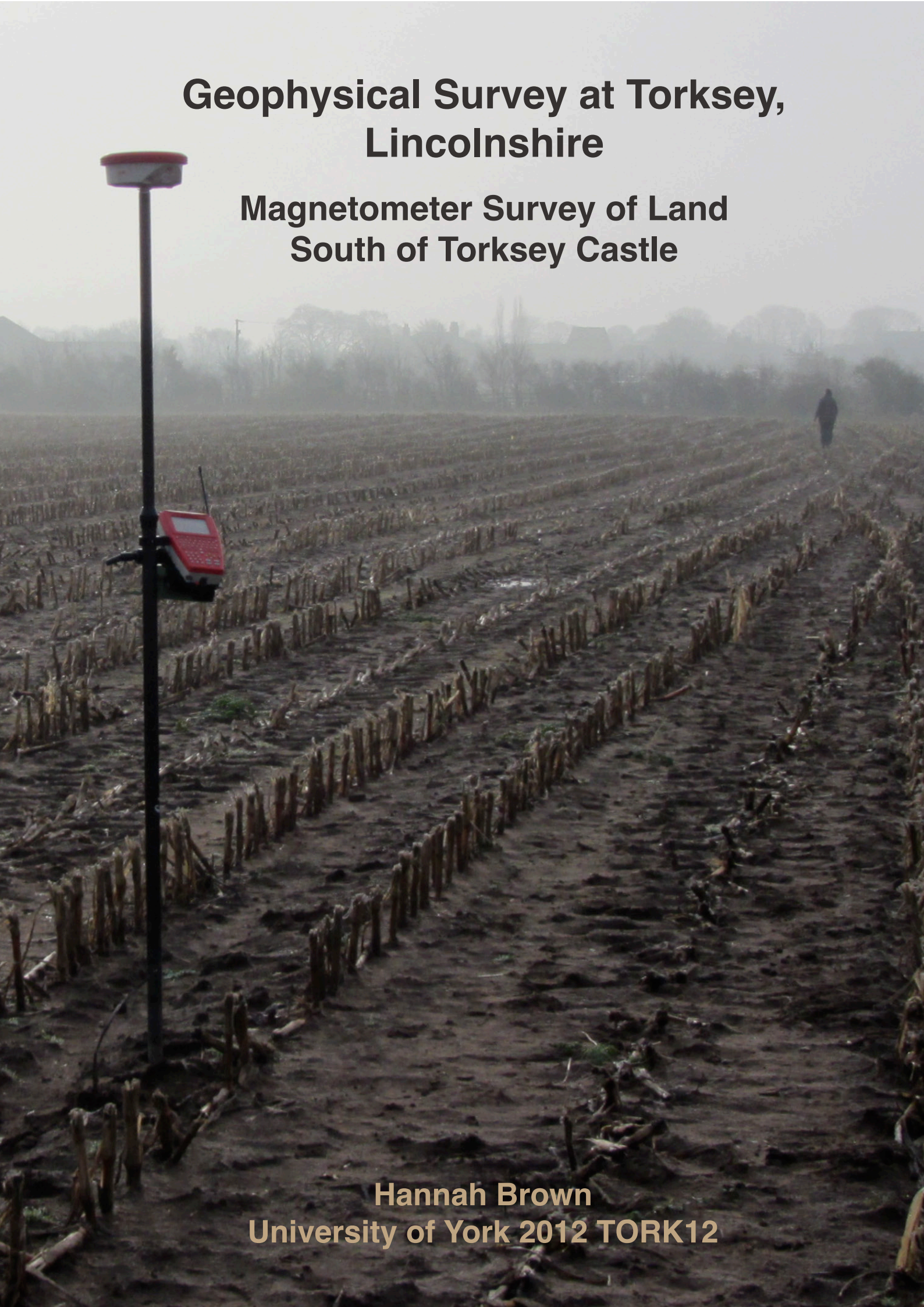
Geophysical Survey at Torksey, Lincolnshire

Magnetometer Survey of Land South of Torksey Castle



Hannah Brown
University of York 2012 TORK12

Contents

Acknowledgements

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The geophysical survey was carried out by Hannah Brown.

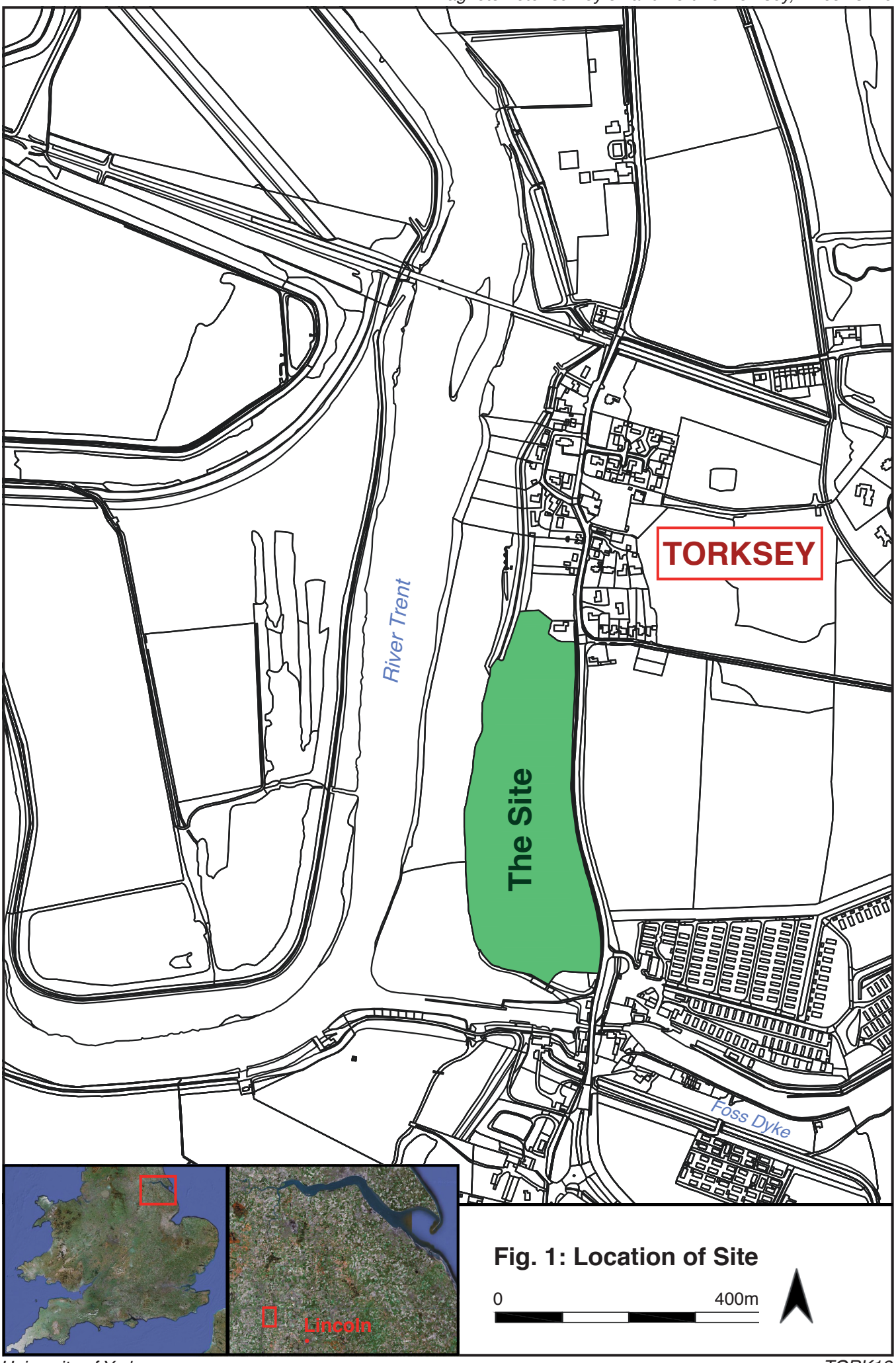

Fig. 1: Location of Site

1 INTRODUCTION

1.1 Project Background

1.1.1 Geophysical survey was undertaken as part of the Viking Torksey Project (www.york.ac.uk/archaeology/research/current-projects/torksey), and funded by the British Academy and the Society of Antiquaries of London. Torksey is known from the *Anglo-Saxon Chronicle* as the site of a Viking Army winter camp in 872/3AD, and there is now an increasing corpus of metal detected evidence from the north of the modern village to support a Scandinavian presence in this period. Torksey is also known for its pre-Conquest pottery industry, and the project is also focusing research on this. The project aims to understand the character and significance of Torksey by investigating its spatial and temporal development. Geophysical survey - alongside field walking, geomorphological survey, test pitting and pottery/finds analysis - forms part of the reconnaissance phase of a larger investigation into Early Medieval Torksey to be conducted over the coming years.

1.1.2 The *ASC* records that, following raiding activity in Northumbria, the Viking 'Great Army' "took winter quarters at Torksey" in 872/3 (Swanton 2000). An accumulation of metal detected finds from the raised land west of the A156 between Torksey and Marton provides strong evidence for this Scandinavian presence in the 870s (Blackburn 2002, 2011). This area has been the focus of further geophysical survey as part of the Torksey Project (Brown 2012).

1.1.3 The land to the south of the modern village was investigated in the 1960s, during which the Department of Continued Education at Nottingham University conducted excavations in fields to the immediate west and east of the A156 with the intention of locating the medieval urban settlement and its defences (Barley 1964 & 1981). These excavations identified several pottery kilns, demonstrating a focus for the established and regionally important pre-Conquest pottery industry; since these excavations, a further 8 kilns have been located throughout the village. Torksey is recorded as having 213 burgesses before 1066 and was ranked in Domesday as the third most important borough in Lincolnshire, after Lincoln and Stamford (D.B. 337a 1986). A mint was also operating at Torksey by this time and three coins minted by Thorketel are known (see PAS database).

1.1.4 In the Post-Conquest period, documentary evidence records that Torksey was granted a market and toll rights, exploiting the advantage of its location, and thrived as a trading/commercial centre: in 1237 the Sheriff of Lincoln noted that "of old time, they say, Torksey was the key

of Lindsey as Dover is the key of England" (Cole 1905: 473). It appears that the medieval framework of Torksey underlies the modern village, and can be partially traced on the ground through surviving documents detailing, for example, land transfers and water disputes (see Cole 1905: 471ff). Decline came in the later medieval period, with the changing emphasis of wool trade routes in Lincolnshire, reflected in the eventual silting up of the Foss Dyke. In recent years, Torksey's role has been primarily one of dormitory settlement and retirement community.

1.2 Survey Objectives

1.2.1 The primary aim of this survey was one of prospection: to establish the presence, distribution, morphology and character of any detectable archaeological remains within the survey area.

1.2.2 Survey on this Site creates a complementary dataset to that previously collected over *c.*27ha to the north of the modern village, allowing comparison of land use (Brown 2012).

1.2.3 It aimed to identify any anomalies consistent with Early Medieval activity, which might warrant further investigation, in order to inform the direction of future research. In particular, this included the identification of features associated with the Torksey pottery industry. Geophysical survey was also intended to add to our knowledge of the settlement of Torksey through time, and facilitate understanding of the spatio-temporal development of the village and its surroundings.

1.2.4 This report presents the survey data and provides an archaeological interpretation of them.

1.2.5 Field-walking was also conducted over the Site, while test-pitting, metal detecting, geomorphological and finds analysis are being carried out across the wider Torksey Area as part of the Project, and the geophysical survey is thus intended to produce a dataset that can be analysed in combination with this complementary information.

1.3 The Site

1.3.1 The Site is approximately centred on NGR SK 83636 78365 and lies on the eastern bank of the River Trent, to the south of the village of Torksey, Lincolnshire (fig. 1). The Study Area comprises land in the angle formed by the confluence of the Fosse Dyke and the Trent at Torksey Lock; it is bounded to the north by residential dwellings of the

village and to the east by the A165.

1.3.2 Approximately rectangular in shape, the Site has gentle contours, with the highest point, in the middle of the western edge, *c.*8m aOD; from here the land drops away steeply to the flood plain to the west, while sloping gradually but persistently down to the road on the east. The land also drops down to the north and south, which were noticeably wetter during survey, despite an artificial levee having been built along the riverbank in the northern portion of the Survey Area (fig. 2). A reasonable panorama is available from the highest point, including views of parts of the Project Study Area to the north of the village.

1.3.3 Torksey Castle, the scheduled remains of a Tudor manor house, apparently ruined during the Civil War, is located to the immediate north-west of the Site (EH Mon. No.: 1005056).

1.3.4 The Site is scheduled as the location of the 'Medieval Town of Torksey' (EH Mon. No.: 1004991).

1.3.5 Torksey is situated on Mercian mudstones, which are overlain by Holme Pierrepont sand and gravels, and deposits of Aeolian sand (BGS 2012). While still sandy, the topsoil contained considerably more silt/clay than areas previously surveyed to the north of the village (Brown 2012). These sediments are generally considered suitable for successful magnetometer survey, and effective surveys of this type have previously been carried out in Torksey and neighbouring parishes (see assorted records in HER).

1.3.6 While numerous archaeological interventions have occurred within the modern village, the first archaeological observations referring directly to the Site were documented by the antiquarian Stukeley, who wrote that Torksey "was a Roman town built at the entrance of the Foss into the Trent to secure the navigation of those parts, and as a store-house for corn, and was walled"; he also places the Cistercian Foss nunnery close to the Fossdyke bridge *i.e.* towards the south-eastern corner of the Site (Cole 1906: 524). It is believed that the Fossdyke canal (EH mon. no.: 1034549) was originally of Roman construction, and the findspots of Roman 'pavement' and 'coins' are noted on the south of the Site on OS maps of the late nineteenth-century.

1.3.7 During the 1960s, research into the Medieval burh of Torksey, led by M. Barley, centred on this field (Barley 1964 & 1981). Geophysical survey was conducted during this work; while the data plots have not been published, the survey results directly informed excavation decisions (Barley 1981). Proton magnetometer survey successfully rediscovered

the location of 'Kiln 1', which had initially been observed on the ground some 20 years earlier, while earth resistance survey revealed a pattern of walls and spread of masonry, which, upon closer inspection, were interpreted as the yard and outbuildings of the nunnery (Barley 1964: 174). On excavation, Kiln 1 (dated to pre-1000) was found to be contemporary with a 'house' *c.*49m to the north; between *c.*65m and at least *c.*85m (the northernmost trench) north of Kiln 1, burials were located which were interpreted as being associated with an unlocated medieval church (Barley 1964: 173).

1.3.8 Most recently, commercial investigations, including geophysical survey and excavation, have been conducted in the 1990s and 2000s, centred on Castle Farm to the immediate north of the Survey Area (Field 1990a&b; Palmer-Brown 1995; Palmer-Brown & Allen 2001). These interventions identified early-Christian burials, at least 2 late-Saxon pottery kilns, with additional probable kilns, a lime kiln and post-medieval structures.

1.4 The Survey Areas

1.4.1 Gradiometer survey was conducted over 4.6ha within the Study Area (fig. 3). The Survey Area was located to complement fieldwalking data, which was collected simultaneously by students of the University of York.

1.4.2 Given the scheduled status of the Site, a Section 42 Licence was obtained from English Heritage prior to survey commencing.

1.4.3 The majority of land in this region is arable, and the Site had been under a crop of maize until shortly before survey. At the time of survey, ground conditions were good, with clear rows of maize stubble approx. 0.25m tall. Numerous pottery sherds were visible on the ground surface across the field; an increasing quantity of building rubble was noted towards the northern end.

2 METHODOLOGY

2.1 Magnetic gradiometer survey was conducted over 4.6 ha, using a fluxgate gradiometer instrument. The survey was conducted in accordance with English Heritage guidelines (2008).

2.2 Magnetometer survey was employed due to the anticipated nature of potential archaeology: this technique has been shown to be very successful over sites of this type due to its ability to detect cut features which are often characteristic of early medieval settlement, as well as features such as kilns with a strong thermoremanent magnetization (Aspinall *et al*. 2008). Magnetometer survey has the added benefit of rapid and efficient data collection, particularly when using a twin-sensor instrument.

2.3 Survey was conducted between 23rd and 26th November 2012. Weather conditions ranged from good to poor, and very heavy rain combined with clayey soil made data collection difficult, particularly in the northern part of the survey area, which was prone to standing surface water. Along the north-western edge, large tractor ruts also made it difficult to walk at constant speed.

2.4 The Survey Areas were divided into 30 x 30m survey grids, and corner points set out using a Leica 900 GPS system, with locational accuracy of 0.02m.

2.5 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer. This instrument has a vertical separation of 1m between sensors and is sensitive to 0.1nT over a 100nT range.

2.6 A sampling interval of 0.25m was employed, along north-south traverses spaced 1m apart. Data were collected in a zig-zag manner. Grids were aligned such that traverses were aligned parallel to the rows of stubble in order to minimize movement of the sensors.

2.7 The data were subjected to minimal correction processes using Geoplot 3.0 and additional software written by Ben Urmston. Zero mean grid, zero mean traverse and deslope functions were used to correct for any variation between sensors and to balance background levels between survey grids. A de-step function was applied to reduce variations in sample position caused by adverse ground conditions and topography.

3 RESULTS AND INTERPRETATION

3.1 Data are presented as greyscale and XY plots, and an archaeological interpretation provided (figs. 4-6). The data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plot. Reference markers with a G- prefix have been used in the following geophysical interpretation, in order to avoid overlap with other strands of ongoing investigation by the Project.

3.2 A moderately strong, well-defined linear feature has been identified running E-W across the centre of the survey area from **G31**, and curving towards the south as it reaches the western edge of the site. This anomaly, approx. 2-3m wide, is likely to be of archaeological origin, and can reasonably be interpreted as an enclosure ditch. While it is possible that it reflects a relatively modern field boundary, no conclusive cartographic evidence is known to support this; however, it is likely that a 19th/20th century field boundary ran ENE-WSW across the Site approx 10-15m south of this feature (see below).

3.3 Towards the southern edge of the survey area, two positive linear anomalies run E-W from **G32** to the western edge of the Site. They are reasonably well defined and approx. 3m wide, separated by a gap of the same distance. While they are slightly weaker than the linear anomaly running across the centre of the grid, they are of a similar nature and share the same alignment.

3.4 A narrow linear anomaly running NE across the Survey Area from **G33** is interpreted as a possible former field boundary, on the grounds that it continues the line of the modern field boundary on the flood plain to the west of the field. While it is similar in character and strength to a number of other anomalies nearby, it does not share their alignment, although this may be coincidental.

3.5 Approximately 15 curvilinear positive anomalies have been identified running almost E-W across the Survey Area, roughly equidistant and most visible in the southern and northern thirds of the dataset. These are interpreted as being generated by ridge and furrow cultivation practices, and their sinewy 'backwards S' shape suggests that they reflect the earliest of the ploughing events represented in the data.

3.6 Another positive linear anomaly, also consistent with an enclosure ditch, is located on the central western side of the survey area. This feature runs approx. 60m ENE from the western bank (15m north of **G33**) towards the centre of the field, continues north at **G34** for approx. 100m,

then returns WSW parallel to the original section, to form a trapezoidal enclosure against the edge of the Survey Area. The feature is clearly defined, although this clarity is somewhat reduced in the northern portion, where it appears to run through an area of multiphase archaeology and is cut by at least one separate anomaly. It is not clear whether the apparent gap in the southern side of this feature represents a real entrance or a coincidental lack of anomaly strength at this point, due, for example, to plough damage.

3.7 A moderately strong linear anomaly interpreted as archaeological in origin runs from the western edge of the Survey Area, curving SE around the contour to **G35**. This anomaly, though stronger than the other linears, is more irregular in direction and dimension, lacking the smooth changes of direction and uniform width demonstrated by anomalies previously noted.

3.8 A further anomaly, similar in character to that noted in paragraph 3.7 though weaker, runs from the western edge of the Survey Area (to the north of **G41,** adjacent to the enclosure noted in paragraph 3.6) SE into the interior. It could be argued that this feature continues east to **G35**, to form a roughly symmetrical enclosure, although further data collection would be required to clarify the relationships of the anomalies at this point.

3.9 From **G35**, at least two linear anomalies run east to the edge of the Survey Area, separated by approx. 5m. The northern-most of these is probably of archaeological origin, although fragmentation of the ?linear form makes its interpretation as such slightly less confident than the southern-most. Either of these two anomalies may be the continuation of that noted in paragraph 3.7, though the data is not conclusive. It is not clear whether the strong anomaly forming the prominent 'node' on the southern-most linear at **G35** represents a discrete feature, an exaggerated part of the linear feature, or the superimposition of multiple features, for example, a feature from which thermoremanent material, or other deposits with particularly high magnetic susceptibility, have migrated through contemporary/later processes to contribute to the backfilling of adjacent cut linear features.

3.10 To the south of the linears at **G35**, there is the suggestion of a third roughly-parallel linear, most strongly visible on the eastern edge of the dataset, although it breaks up almost immediately into small, discrete anomalies similar to those present across the northern half of the Site.

3.11 Several narrow, positive linear anomalies are apparent in the northern *c.*100m of the Survey Area, for example running N-S at **G36**, although

they exist only in sections up to a maximum of around 30m long and do not appear to form identifiable archaeological layouts. Their interpretation is further complicated by the coincidence of a number of these with strong ploughing trends in the area.

3.12 A very strong discrete magnetic anomaly was detected at **G33** which, given the known nature of archaeology on this site, and in conjunction with the observation that relatively high densities of Torksey ware sherds were picked up in this location during field walking, has been interpreted as archaeological in origin; it is believed that this response is probably generated by the burnt clay and magnetized backfill of a pottery kiln. Previous investigation (Barley 1964) has identified a pottery kiln in this area (see below).

3.13 A number of similar discrete anomalies have been identified in this dataset, at **G37, G38, G39** and **G40**, which it is suggested may relate to similar archaeological features. These anomalies are visible in the greyscale data plot as sub-circular or sub-rectangular, positive anomalies of very high magnitude surrounded by a strongly negative 'halo'. The similar character of the responses to **G33** is apparent from the xy data plot, and in the context of the known archaeology it seems likely that at least some of these may be interpreted as pottery or lime kilns, or similar features involving areas of intense localized heating. A concentration of potentially similar anomalies is clustered around **G36**, although their forms in the xy trace data suggest some of these are likely to be generated by ferrous sources.

3.14 To the immediate south of **G37**, as well as at **G32** and **G36**, several discrete positive anomalies are apparent; these are roughly 2-5m across, sub-circular/sub-rectangular and are reasonably well defined. These responses are significantly weaker than those interpreted as reflecting possible kilns, but suggest cut features that have been magnetically enhanced by anthropogenic activity. Such anomalies are typical of, for example, sunken featured buildings or large pits.

3.15 A large number of smaller discrete positive anomalies, approx. 1-2m in diameter, were detected across the Site, with particular frequency in the northern half of the Survey Area. These have been categorized as being of possible or probable archaeological nature. They are interpreted as pits, gullies or small ditches, which may have had a variety of uses but have become backfilled with material which produces an enhanced magnetic signal, either directly, as a result of their primary usage (e.g. kiln waster pits), or due to the later deposition of material from the surrounding area which has become magnetically enhanced as a by-product of anthropogenic processes. A number of anomalies of this type

have been identified that are evenly spaced and aligned in a straight line, *i.e.* those running north (and possibly south) from **G37**, SW-NE at **G41**, approx. NW to **G42**, and E-W at **G43**; it is not clear whether these represent individual features or the effects of plough damage on a single extended ditch-type feature.

3.16 Two areas have been categorized as having an increased magnetic response; these contain anomalies that may be archaeological, however due to magnetic or physical disruption it is not possible to identify specific anomalies/features.

3.17 The dataset contains a background noise of moderately frequent small magnetic anomalies generated by ferrous metal fragments; it is assumed that these are largely of modern origin, resulting, for example, from intensive agricultural activity. Due to the magnitude of the readings they generate, larger ferrous sources are liable to mask any archaeological anomalies in the vicinity; however, ferrous disturbance is very localized on this Site, with large sources confined to pieces of corrugated iron in the hedgerow along the western edge.

3.18 The prevailing direction of ploughing visible in the data (predominantly in the southern half of the field) is NNW-SSE, although the current cultivation rows are aligned with the survey traverses (*i.e.* just off N-S).

3.19 A number of ephemeral trends have been recognized in the data. These may have an archaeological origin, although many will stem from ploughing and other agricultural activities, or represent chance alignments in the data.

4 DISCUSSION

4.1 OS maps from the 1880s-1980s depict an E-W field boundary running across the centre of the Site. It was initially assumed that this was reflected in the strong linear magnetic anomaly that is clearly identifiable in the data in this location (**G31**). Closer georeferencing of the collected data to the appropriate maps, however, suggested that this is unlikely to be the case; although the accuracy of such maps at this level of detail may be questioned, the OS maps place the entirely straight field boundary on an alignment closer to ENE-WSW than that seen in the data, and in a location slightly to the south of the curvilinear archaeological anomaly. The probability of the Survey Area having been previously divided into separate fields is supported by the ploughing trends visible in the data (none of which reflected agriculture current at the time of survey). Land to the south of the postulated location of the field boundary exhibits predominantly NNW-SSE ploughing trends (in addition to earlier E-W agricultural remains) which appear to respect this land division, uniformly ending roughly 20m south of the line **G44**. The double linear anomaly running west from **G32** lines up, at the road, with an extant field boundary to the east of the A156, though the anomaly does not share the alignment of the boundary.

4.2 It is noticeable that the majority of the coherent discrete anomalies detected in the survey are located in the northern half of the survey area, with the exception of a small number along the southern perimeter and the possible kiln at **G33**. The extent to which this reflects a 'real' distribution or differential survival as a result of agricultural practices is not clear, given that this coincides with at least one 19th/20th century field boundary. In the southern third of the dataset, north of **G32**, a number of curvilinear trends are present in the data, which may imply the presence of various circular archaeological features; their faint appearance may suggest plough damage in this area.

4.3 It is worth considering - particularly given that burial remains have been recorded in the western face of the bank dropping down to the river (Thornton 2010) - that archaeology along the western edge of the Site may have been lost to erosion. For example, it is possible that the linear anomalies at **G31** and **G32** were associated, in view of their shared alignments, similar morphology and the southward curve of the feature running from **G31**. Similarly, it is worth noting that what appears to be a trapezoidal enclosure located so as to form its fourth side from the edge of the higher ground dropping to the flood plain, may have once been a fully enclosed piece of land. It is tempting to see this anomaly, given its proximity to human remains noted above and during fieldwork, as

perhaps representing a cemetery boundary.

4.4 The magnetometer data alone is insufficient to determine the relative chronology of the trapezoidal enclosure and the E-W linear, which intersect at right angles in the centre of the Survey Area.

4.5 Approx. 12m to the west of this intersection, the stronger positive interruption to the form of the E-W linear anomaly appears to consist of a separate discrete anomaly, which has become amalgamated with the linear feature; this may reflect real archaeological influences or limits to the resolution of the survey sample density.

4.6 The strong magnetic anomaly at **G33** has been interpreted as being generated by the thermoremanence of a pottery kiln, on the basis of the form, structure and magnitude of the magnetometer data (particularly visible in the xy trace plot, fig. 5) and its comparison with known examples (see Aspinall *et al*. 2008: 155-158). It was also observed during fieldwork that preliminary fieldwalking results suggested a high concentration of Torksey ware sherds in the vicinity. Although Barley's published map is difficult to correlate with accuracy at the required scale, it is suggested that this anomaly corresponds with Barley's Kiln 1 (Barley 1964). Conversely, Barley identified a second kiln, lying a short distance southeast of Kiln 1, which is not identifiable in the magnetometer data; however, it was noted during excavation that this kiln was small and fully excavated (Barley 1964) and as such any magnetic response it generated may be indistinguishable either from the background or from a ferrous 'spike'.

4.7 A further 5 similar anomalies have been interpreted as possible kilns, located around **G37** - **G40**. This is based on the combination of magnetometer data and observations of surface scatters of Torksey ware sherds.

4.8 Phasing or contemporaneity cannot be interpreted from data of this type alone, and is particularly difficult given that few of the recorded anomalies demonstrate morphological qualities obviously characteristic of period-specific archaeological features. In the light of interpretation of a number of magnetic anomalies as possible Torksey ware kilns (in conjunction with existing excavation and field walking evidence), it would be reasonable to suggest that the scatter of magnetic anomalies in the vicinity of these features may represent associated structures – perhaps sunken-featured storage, workshops or accommodation – and negative features relating to the industry, such as waster pits or clay/sand pits. Relatively little is currently known about the organization of such sites.

4.9 The spread of such anomalies, of 3-5m diameter and varying in magnitude, is distributed across the northern portion of the Survey Area, and are consistent with a range of archaeological features from ovens to rubbish pits. Although some may represent ferrous responses or linear ditch features truncated by ploughing, the majority are considered to be of probable archaeological origin, although of unknown provenance. While some may represent the earlier Medieval period, their increased frequency in the northern part of the field may alternatively reflect post-medieval occupation of the manor house.

4.10 The Survey Area is characterized throughout by the presence of 'backwards S' shaped anomalies, which are reasonably regularly spaced and of similar dimensions, interpreted as representing the effects of medieval agriculture. It is interesting to note that these anomalies echo the pattern of medieval land plots which have become fossilized in the modern village to the north of the Site. These anomalies are more even (*c.*12m apart) and sinuous in the southern portion of the Site, although the examination of those to the north is made more difficult by surrounding 'clutter'.

5 CONCLUSIONS

5.1 Magnetometer survey has been successful in detecting a number of anomalies that can be interpreted, with varying degrees of certainty, as being archaeological in origin, which are widely distributed across the Survey Area in terms of both space and, given indications of multiphase use, also time. The good definition of the anomalies suggests reasonable physical preservation.

5.2 The effectiveness of the magnetometer in this survey compares favourably with its use on land to the north of the village (Brown 2012), which, even allowing for a possible lack of archaeology, suggests that the absence of the thicker layer of Aeolian sand present to the north (in addition to the presence of features which are strongly magnetic in character) contributes to the visibility of the archaeology in this survey. It is notable that Barley records the discovery of representative archaeology (limekiln) at a depth of <1m (Barley 1981).

5.3 The survey has not identified any magnetic anomalies that can be categorized as Early Medieval or Viking with absolute certainty, although Barley's Kiln 1 (Barley 1964, 1981) appears to have been located along with several other strong anomalies believed to be responses from thermoremanent magnetization caused by intense localized heating, as occurs in kiln structures; there is a strong probability, given the known archaeological context, that these represent late Saxon Torksey ware kilns. It is believed that a high archaeological potential exists for other features associated with the pottery industry.

5.4 The survey also identified a number of linear anomalies, representing cut features of various forms and characters, many of which intersect, creating a palimpsest of landuse and reuse relating to the fluctuation of the settlement over time. It adds to our knowledge of the landscape of Torksey, and feeds into our developing understanding of Torksey as a context for Viking occupation in the 9th century and subsequent Scandinavian contribution to the evolution of the settlement.

5.5 In addition to drawing directly on the pottery evidence, magnetometer survey has also served to provide a spatial context for a range of finds obtained through fieldwalking. Preliminary comparisons suggest further analysis incorporating both geophysical plots and find distribution data within a GIS would be rewarding. As the area is Scheduled, fieldwork has not incorporated metal detected finds, although the known activity of 'night hawks' on the Site suggests such finds are present.

REFERENCES

Aspinall, A., C. Gaffney & A. Schmidt. 2008. Magnetometry for Archaeologists. Lanham: Alta Mira.

Barley, M.W. 1964. 'The medieval borough of Torksey: excavations 1960-62'. *Antiquaries Journal*, 44: 164-187.

Barley, M.W. 1981. 'The medieval borough of Torksey: excavations 1963-8. *Antiquaries Journal*, 61: 263-291.

Blackburn, M. 2002. 'Finds from the Anglo-Scandinavian site of Torksey, Lincolnshire', *Moneta Mediaevalis: Studia numizmatyczne I historyczne ofiarowane Profesorowi Stanislawowi Suchodolskiemu w* 64: roxcnice erodzin, 89-101, 526-7.

Blackburn, M. 2011. 'The Viking winter camp at Torksey, 872-3', in *Viking Coinage and Currency in the British Isles*, BNS Special Publication 7. London: British Numismatic Society.

British Geological Survey Materials 2011. Copyright NERC 1:50 000.

Brown, H. 2012. *Geophysical survey at Torksey, Lincolnshire. Magnetometer survey of land north of Torksey village. TORK12.* Unpublished survey report by the University of York.

Cole, R.E.G. 1905. 'The royal borough of Torksey, its churches, monasteries and castle', *Associated Architectural Societies Reports and Papers*, 29: 451-530.

English Heritage, 2008. Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No 1, 2nd edition.

Field, N. 1990a. *Castle Farm Torksey, geophysical survey and evaluation*. Unpublished survey report by Lindsey Archaeological Services, Lincoln.

Field, N. 1990b. *Castle Farm Torksey, exploratory excavations.* Unpublished survey report by Lindsey Archaeological Services, Lincoln.

Palmer-Brown, C. 1995. *Castle Farm, Torksey, an archaeological excavation report CFT94*. Unpublished survey report by Pre-Construct Archaeology, Sleaford.

Palmer-Brown, C. & M. Allen. 2001. *Archaeological mitigation strategy proposed residential development: Castle Farm, Main Street, Torksey FCFT01*. Unpublished survey report by Pre-Construct Archaeology (Lincoln), Newton-on-Trent.

Swanton, M. (ed.). 2000. *The Anglo-Saxon Chronicles*. Revised Edition. London: Pheonix Press.

Thornton, A. 2010. *Human remains report, Torksey*. Unpublished site visit report on behalf of Lincoln County Council.

Fig. 2a: Google Earth oblique image showing the Site from the air; the Trent and Foss Dyke are clearly visible, along with the the modern village and castle in the top left corner. The scarp forming the western edge of the Site is marked by the hedgerow and its shadow.

Fig. 2b: View of the Site looking north from Torksey Lock Bridge. The fence in the foreground marks the boundary with the bank of the Fossdyke. The hedgerow on the right marks the line of the road and Torksey castle is visible on the horizon. The topographic profile is visible, with the highest land to the west (the hedgerow on the left marks the edge of the Site).

Fig. 2c: View of the Site looking south from Torksey Railway Bridge: the Survey area is in the cultivated field behind the ruins of Torksey Castle; the difference in elevation between the Site and the floodplain is discernable (marked by the hedgerow on the right). The buildings in the distance mark Torksey Lock and the Fossdyke.

Fig. 2d: Survey conditions. Looking north from the highest point of the Site (centre of the western side), showing how the land slopes down towards the village; the northern end of the Site is prone to standing surface water, even on dry days.


Figure 3: Survey Area
0
200m

Figure 4: Magnetometer data greyscale plot

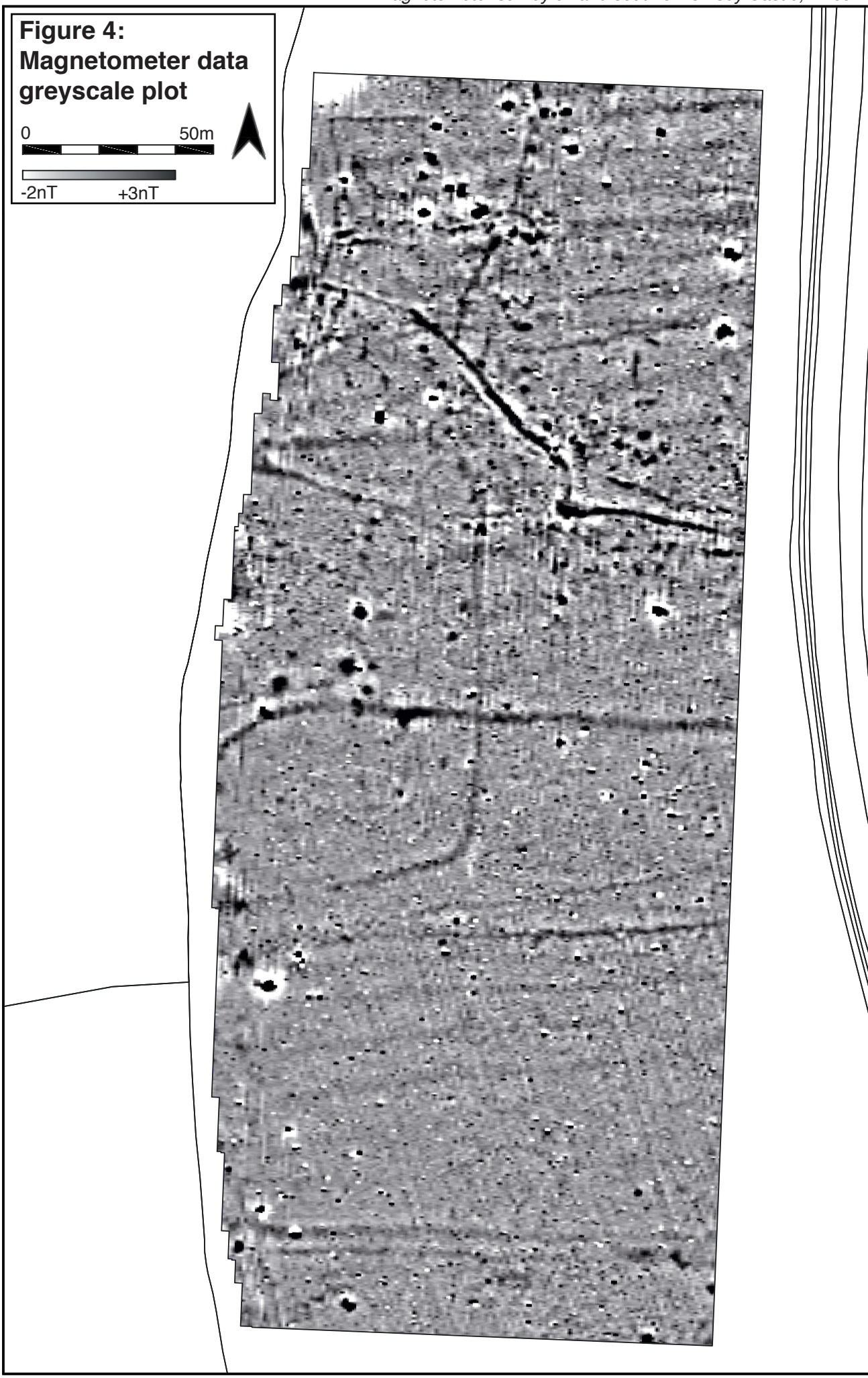

Figure 5: Magnetometer data trace plot

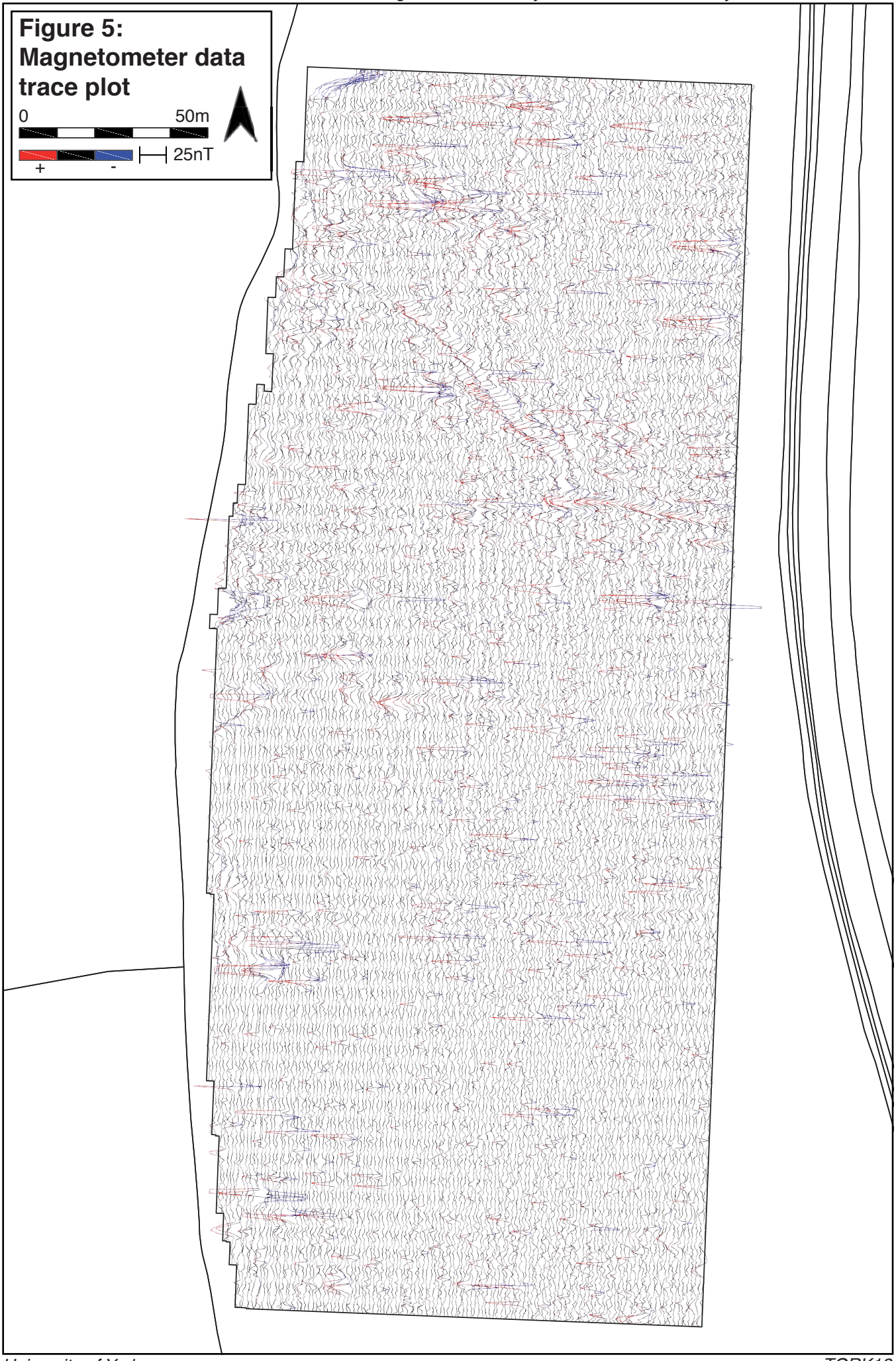

Figure 6: Archaeological Interpretation