NAA

GEOPHYSICAL SURVEY

HILLSIDE ROAD
BROUGHTON
NORTH LINCOLNSHIRE

prepared for

Lanpro Services Ltd

on behalf of Partner

Construction

NAA 18/44
June 2018

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Archaeological
Associates

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Client Lanpro Services Ltd on behalf of Partner Construction
Location Hillside Road, Broughton, North Lincolnshire, DN20 0HH
District North Lincolnshire
Planning Ref PRE/2018/20
Grid Ref SE 96587 09420
OASIS Ref northern1-318997
Date of Fieldwork 29th May 2018

HILLSIDE ROAD, BROUGHTON, NORTH LINCOLNSHIRE
GEOPHYSICAL SURVEY REPORT

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FIGURE LIST

Disclaimer

The results of geophysical survey may not reveal all potential archaeology and do not provide a comprehensive map of the sub-surface, but only responses relative to the environment. Geological, agricultural and modern responses may mask archaeological features. Short-lived features may not give strong responses. Only clear features have been interpreted and discussed in this report.

HILLSIDE ROAD, BROUGHTON, NORTH LINCOLNSHIRE
GEOPHYSICAL SURVEY REPORT

Summary

Northern Archaeological Associates Ltd was commissioned by Lanpro Services Ltd on behalf of Partner Construction to undertake a geophysical survey to the north-east of Broughton, North Lincolnshire (NGR: SE 96587 09420). The survey was required to assess the archaeological potential of the site in support of a planning application (pre application reference: PRE/2018/20) for a proposed residential development. The survey was carried out on 29th May 2018 and covered an area of approximately 0.89 hectares of pasture.

Anomalies identified within the survey area are generally considered to be caused by either modern or agricultural activity.

Several trends were identified, but weak increases in magnetic response and incomplete patterning resulted in only a tentative interpretation being possible.

Three alignments of regularly spaced linear anomalies were identified that are likely to be indicative of agricultural practices.

A broad response was identified, but lacked the necessary increases in magnetic response, or definite patterning for conclusive interpretation.

The north-west of the site contained a high level of magnetic disturbance. It is likely that the disturbance is largely caused by a build up of magnetically susceptible debris or material in the subsoil, which is possibly associated with activity related to the footpath that runs through the north-east of the survey area. However, it is possible that the disturbance may, in part have an alternative origin.

Further magnetic disturbances occur around the perimeter of the survey area. These are considered to be modern in nature and caused by above ground features. Large bipolar disturbances were identified and are also considered to be of a modern nature. In particular, the large bipolar anomaly in the south-west of the survey area is caused by the presence an electricity pylon.

1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA) was commissioned by Lanpro Services Ltd on behalf of Partner Construction to undertake a geophysical survey to the north-east of Broughton in North Lincolnshire (NGR: SE 96587 09420). The survey was required to assess the archaeological potential of the site in support of a planning application (pre application reference: PRE/2018/20) for a proposed residential development. The survey was carried out on 29th May 2018 and covered an area of approximately 0.89 hectares (ha) of pasture.

2.0 LOCATION, TOPOGRAPHY AND GEOLOGY

Location

2.1 The proposed development area (PDA) was located to the east of Hillside Road, in north-east Broughton, which is located approximately 7.5km to the east of Scunthorpe, North Lincolnshire (Fig. 1). The PDA encompasses the north-western part of a pasture field. Consequently, the eastern and southern edges of the area targeted with geophysical survey were not defined by a physical boundary. The PDA is bordered by residential areas to the west, East Wood woodland to the north, and agricultural land to the east and south.

Geology and soils

2.2 The majority of the site's solid geology consists of mudstone and limestone of the Kirton Cementstone Beds formation, with the exception of a band of limestone of the Kirton Cementstone Beds formation occurs within the north-west of the PDA. Superficial deposits comprise sand of the Sutton Sand formation. (BGS 2018). The soils are mapped as the Newport 1 Association (Soil Survey of England and Wales 1983), consisting primarily of freely drained medium and occasionally coarse sandy soils formed in glaciofluvial sands and gravels, river deposits and occasionally stoneless, aeolian medium sand (Jarvis *et al*. 1984, 145).

Topography and land-use

2.3 There was a gentle downward slope to the south of the survey area with the north of the PDA lying at approximately 35m above ordnance datum (aOD), and the south at 26m aOD.

3.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 The archaeological and historical background below is drawn from sources collated for the production of an archaeological desk-based assessment of the site (Lanpro 2018).

Prehistoric period (c.9500BC–c.AD43)

3.2 Although there is no recorded evidence for prehistoric activity within the PDA, a number of flint implements, including scrapers, a point, and part of a ground stone axe, were recorded on the eastern edge of the field in which the survey area is situated. Approximately 230m to the west of the site, an Early Bronze Age scraper has been found in the area of Beachwood Crescent. Further west, Late Bronze Age or Iron Age pottery was found at 3 Dalmatian Way during the construction of houses in 1966.

3.3 The site of a possible Bronze Age round barrow has also been identified from LiDAR data produced in 2001, around 150m to the north-east of the survey area, with a site visit in 2007 confirming the presence of an earthwork feature in this location.

Roman period (c.AD 43–c.AD 410)

3.4 Evidence for Roman period activity in the vicinity of the PDA is represented by chance finds of pottery. The closest recorded find to the survey area was a sherd of Roman pottery, recorded together with the prehistoric flints immediately to the east. A 4th-century coin was found in the same area as prehistoric material recovered from Beechwood Crescent. Greyware sherds have been discovered in fields close to Millfield Plantation, c.380m to the south of the survey area, and a single piece of greyware was found along Catherine Grove, c.450m to the south. To the east, a further sherd of greyware was recovered from a field to the south of Wressle.

3.5 A bronze statuette of Mercury is thought to have been found on Broughton Common in 1889, together with two brooches, which are likely to be of Roman date. These are recorded as being found c.650m to the north-east of the survey area, although the exact location is unknown.

3.6 To the east of Wressle, cropmark features, which appear to represent field boundaries and enclosures of possible Iron Age or Roman date, have been identified, the closest of which are situated c.750m to the east of the survey area. Further undated features

identified to the north of the cropmark features could also potentially date to the Iron Age and Roman periods.

3.7 Broughton is situated adjacent to the line of Ermine Street Roman road to its west, which is now followed along this section by the B1207. Ermine Street Roman road led north from Lincoln to the crossing point of the Humber estuary, where a ferry crossing would have led to the fort at Brough (*Petuaria*) on the north shore (Margary 1967, 236–238, road no. 2d).

Medieval period (c.AD410–c.AD1540)

3.8 The earliest documentary reference to Broughton is in the Domesday Book (1086), which records it as Bertone (Williams and Martin 1992, 939), deriving from the Anglo-Saxon meaning 'farmstead by a hill or mound' (Mills 2011, 82). The Domesday Book records that there was a church at Broughton, and the lower section of the tower of the Parish Church of St Mary dates to the 11th century.

3.9 The historic core of Broughton would have been focused around the church, approximately 900m to the south-west of the survey area, and it is likely that the PDA lies beyond any area of medieval settlement. Certainly, by the post-medieval period, the area was situated within the western end of Broughton Common, and there is no recorded evidence for any medieval activity at the site or in its immediate vicinity.

Post-medieval and modern period (c.1540–present)

3.10 The 25-inch scale Ordnance Survey map of the area, published in 1887, shows that the survey area formed the western end of Broughton Common, with East Wood to the north and enclosed fields to the west. By the early 19th century, a school house had been built to the west of the site, and Broughton extended eastwards close to the Common's western boundary.

3.11 The larger scale and more detailed Broughton tithe map of 1842 shows a similar field pattern as that on the earlier Ordnance Survey map, with no features or boundaries depicted within the extent of the survey area, or across the wider area of Broughton Common as a whole.

3.12 By the 1880s, the present boundary along the eastern side of the survey area had been laid out on a straight, broadly north-west to south-east alignment, while further to the east quarrying on Broughton Common is depicted close to Wressle (Fig. 5, right).

There was no major change in the depiction of the site through the first half of the 20th century (Ordnance Survey 1907; 1950). However, during the late 1960s and 1970s, the present housing estates were constructed to the immediate west of the survey area (Ordnance Survey 1970).

4.0 AIMS AND OBJECTIVES

4.1 The aim of the survey was:

- to attempt to characterise the nature of any sub-surface remains within the survey boundary and identify possible concentrations of past activity in order to inform the requirement for any archaeological mitigation work at the site; and
- to produce a report, including XY-trace plots, raw and processed greyscale images of the survey areas, and interpretations of these results.

5.0 METHODOLOGY

5.1 The geophysical survey was undertaken as a gradiometer survey using the Bartington Grad601-2 dual magnetic gradiometer system with data logger. The readings were recorded at a resolution of 0.01nT and data was collected with a traverse interval of 1m and a sample interval of 0.25m. All recorded survey data was collected with reference to a site survey grid comprised of individual 30m x 30m squares. The grid was established using Real Time Kinematic (RTK) differential GPS equipment and marked out using non-metallic survey markers. All grid nodes were set out with a positional accuracy of at least 0.1m as per existing guidelines (English Heritage 2008; CIfA 2014) and could be relocated on the ground by a third party. The base lines used to create the survey grids are shown on Figure 2 and further details are available in Appendix A.

5.2 The processing was undertaken using Geoplot 3.0 software and consisted of standard processing procedures. Details of processing steps applied to collected data are given in Appendix B.

5.3 On the greyscale plot (Fig. 3, left; Fig. 4, left), positive readings are shown as increasingly darker areas and negative readings are shown as increasingly lighter areas. The XY-trace plot demonstrates the readings as offsets from a central line (Fig. 3, right).

5.4 Interpretation of identified anomalies is generally achieved through analysis of anomaly patterning and increases in magnetic response, and is often aided through examining supporting information. The interpreted data uses colour coding to highlight specific readings in the survey area (Fig. 4, right). Appendix C details the terminology and characterisation of anomalies used for interpreting data.

Surface conditions and other mitigating factors

5.5 At the time of the survey there was high vegetation in the western extent of the survey area and the passage of survey was impeded by substantially dense vegetation along the western edge of the PDA.

5.6 The residential area located to the west of the survey area contained numerous above ground features that are likely to be a source of modern magnetic disturbance or 'noise'. It was necessary to avoid all objects likely to have a high magnetic susceptibility to ensure that their magnetic responses did not impinge on the survey results and mask potential buried features.

5.7 A public footpath ran on an informal north-west to south-east orientation through the north-east of the survey area.

6.0 RESULTS

(Figs 4 and 5)

6.1 There are several weak and diffuse linear trends across the survey area. Generally, these failed to produce the necessary patterning or increases in magnetic response required to be interpreted fully. As a result, their origin is unknown. Some of the identified trends are suggested to be of an agricultural nature, given their similarity to anomalies that have also been identified as associated with agricultural activities. Numerous trends were identified within the area of disturbance in the north-east of the site. It is uncertain if these trends denote modern activity or are suggestive of infilled features that have been disturbed by subsequent modern activity.

6.2 There are three possible alignments of regularly spaced linear anomalies. The weak increases in magnetic response of these anomalies resulted in a tentative interpretation and may suggest that the soils within the site have a relatively weak magnetic susceptibility. Regularly spaced linear anomalies largely appear to conform to the positioning of linear features present in LiDAR survey data; the clearest of these are

the linear anomalies running on a north-south orientation (Fig. 5, left). Although speculative, it is possible that anomalies on a north-south, and a north-west to south-east orientation relate to land cultivation, such as post-medieval ridge and furrow, modern plough activity, or alternative modern cultivation activity. Regularly spaced linear anomalies on an east-west orientation are composed of very weak increases in magnetic response and have a fairly informal distribution. Consequently, it is not possible to suggest a precise origin for them.

6.3 There is a broad irregular response of an unknown origin within the centre of the survey area that runs on an informal east-west orientation (**A**). Given the broad irregular form of **A** and the lack of supporting information (such as features identified on historic maps, LiDAR survey results, or from geophysical survey) it is possible that it denotes geological or pedological changes in the substrata. This interpretation is very tentative, and it is equally possible that it relates to an infilled feature.

6.4 Across the survey area, there are numerous weak isolated anomalies with an amorphous form that are of an unknown origin, as well as dipolar anomalies likely to relate to ferrous or magnetically susceptible objects buried in the topsoil. As there is limited supporting information to aid in the interpretation of these anomalies, a very tentative interpretation applies. Isolated anomalies have not been shown on the interpretation of the survey results.

6.5 Dipolar anomalies are often likely to relate to ferrous or modern objects buried in the topsoil. There appears to be a high level of magnetic 'noise' across the north-east of the site where a public footpath crosses the survey area. Therefore, the magnetic disturbance is plausibly caused by modern magnetic debris in the topsoil, or near the surface, that is possibly associated with use of the footpath. However, it should be noted that this interpretation is fairly tentative, and it is possible that the disturbance is, in part, caused by an isolated infilled features.

6.6 Several isolated bipolar responses have been identified. These are considered to be modern and caused by highly magnetic material, such as ferrous objects. The large bipolar anomaly in the south-west of the survey area (**B**) is caused by an electricity pylon.

6.7 Strong responses caused by above ground features associated with the residential area to the west of the survey area have been characterised as external interference.

7.0 CONCLUSIONS

7.1 Anomalies detected through the geophysical survey are generally considered to be of an agricultural or modern nature.

7.2 Several trends have been identified but lack the necessary increases in magnetic response or patterning to be conclusively interpreted.

7.3 The survey has detected three different orientations of potential agricultural activity in the form of regularly spaced linear anomalies. By comparing the geophysics survey results with LiDAR survey data, it is possible to speculate that anomalies on a north-south and a north-west to south-east alignment relate to land cultivation. The third orientation is composed of very weakly enhanced magnetic anomalies with an informal distribution. As a result, it was not possible to suggest a specific origin for these.

7.4 A broad linear anomaly has been identified (**A**); however, given its inconclusive patterning and the lack of supporting information, its origin is uncertain.

7.5 Modern disturbance is evident within the site and defined as either isolated instances or concentrations of dipolar or bipolar anomalies. These are likely to be caused by ferrous material within the topsoil of the site or above ground features.

8.0 STORAGE AND CURATION

8.1 The records of the geophysical survey are currently held by NAA. All material will be appropriately packaged for long-term storage in accordance with national guidelines (English Heritage 2008; CIfA 2014). An online OASIS form will be completed on the results of the works within three months of the completion of the project under the reference number northern1-318997. This will include submission of a pdf version of the final report to the Archaeology Data Service via the OASIS form

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 for Lanpro Services Ltd
on behalf of Partner Construction

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APPENDIX A

TECHNICAL INFORMATION

GRADIOMETER SURVEY

Magnetic surveys measure distortions in the earth's magnetic field caused by small magnetic fields associated with buried features (Gaffney and Gater, 2003, 36) that have either remnant or induced magnetic properties (Aspinal *et al*. 2008, 21–26). Human activity and inhabitation often alters the magnetic properties of materials (Aspinal *et al*. 2008, 21) resulting in the ability for numerous archaeological features to be detected through magnetic surveys. Intensive burning or heating can result in materials attaining a thermoremanent magnetisation; examples of which include kilns, ovens, heaths and brick structures (Aspinal *et al*. 2008, 27; Gaffney and Gater, 2003, 37). When topsoil rich with iron oxides, fills a man-made depression in the subsoil, it creates an infilled feature, such as a pit or ditch, with a higher magnetic susceptibility compared to the surrounding soil (Aspinal *et al*. 2008, 37–41; Gaffney and Gater, 2003, 22–26). Magnetic surveys can also detect features with a lower magnetically susceptibility than the surrounding soil, an example of which is a stone wall.

LIMITATIONS

Poor results can be due to several factors including short lived archaeological occupation/use or sites with minimal cut or built features. Results can also be limited in areas with soils naturally deficient in iron compounds or in areas with soils overlying naturally magnetic geology, which will produce strong responses masking archaeological features.

Overlying layers, such as demolition rubble or layers of made ground, can hide any earlier archaeological features. The presence of above ground structures and underground services containing ferrous material can distort or mask nearby features.

Particularly uneven or steep ground can increase the processing required, or distort results beyond the capabilities of processing. It is also possible in areas containing dramatic topographical changes that natural weathering, such as hillwash, often in combination with intensive modern ploughing, will reduced the topsoil on slopes and towards the peaks of hills and possibly destroy or truncate potential archaeological features. Conversely features at the bottom of slopes may be covered by a greater layer of topsoil and so if buried features are present they appear faint within the results, if at all.

Over processing of data can also obscure or remove features, especially if there are on the same orientation as the direction of data collection. Consequently, where possible, attempts are made to ensure data is not collected on the same orientation as known potential features and that data quality is sufficient to minimise the required data processing.

INSTRUMENTATION

The data was collected using handheld Bartington Grad 601-2 fluxgate gradiometers. The Bartington 601-2 is a single axis, vertical component fluxgate gradiometer comprising a data logger battery cassette and two sensors. The sensors are Grad-01-1000L cylindrical gradiometer sensors mounted on a rigid carrying frame; each sensor contains two fluxgate magnetometers with 1m vertical separation.

The difference in the magnetic field between the two fluxgates in each sensor is measured in nanoTesla (nT). NAA gradiometer data is recorded with a range of ±100nT, which equates to a resolution of 0.01nT. It should be noted that the actual resolution is limited to 0.03nT as a consequence of internal instrumental noise (Bartington Instruments Ltd n.d., 23).

The gradiometer records two lines of data on each traverse, the grids are walked in a zig-zag pattern amounting to 15 traverses. The gradiometers are calibrated at the start of every day and recalibrated whenever necessary.

SURVEY DETAILS

Table A1: Survey summary

	Survey
Grid size	30mx30m
Traverse interval	1m
Reading interval	0.25m
Direction of 1st traverse	N
Number of Grids	15
Area covered	0.89ha

Table A2: Baseline co-ordinates (baseline is shown on Fig. 2)

Grid point (gp) A	**Grid point (gp) B**
NGR: 496589.0499 409345.8568	NGR: 496619.0499 409345.8568

Table A3: Site information and conditions

Item	**Detail**
Geology	Mudstone and limestone of the Kirton Cementstone Beds formation (south-east of site) Limestone of Kirton Cementstone Beds formation with superficial deposits of sand of the Sutton Sand formation (north-west of site)
Soils	Newport 1 Association
Topography	North: approximately 35m aOD South: approximately 26m aOD.
Land use	Pasture
Weather / conditions prior to and during survey	Overcast - sunny

APPENDIX B

DATA PROCESSING INFORMATION

Gradiometer survey data is downloaded using the Bartington Grad 601 software and the processing was undertaken using Geoplot 3.0 software.

Table B1: Commonly applied techniques

Process	**Effect**
Zero mean traverse	Removes stripping which can occur as a consequence of using multi sensor arrays or a 'zigzag' data collection method by setting the mean reading for each traverse to zero.
Destagger	Removes stagger in the data introduced through inconsistence data collection pace and often exacerbated through the 'zig-zag' methodology.
Clip	Clips data above or below a set value to potentially enhance potential weaker anomalies.
Despike	Removes random spikes or high readings to reduce the appearance of dominant readings, often created by modern ferrous objects that can distort the results.
Low pass filter	Removes low frequency waves or broad anomalies such as those caused by strong or large gradual variations in the soil's magnetic susceptibility often caused by geological or natural changes in the substrata.
Interpolation	Used to smooth or reduce the blocky appearance of data by improving the spatial density and balance the quantity of data points in the X and Y directions.

Table B2: Processing steps

Minimal Processing	**Increased Processing**
• Zero mean traverse +5/-5 • Destagger: - All: 1 - Grids 3, 4, 5, 6, 7, 8 and 12: 1 - Grids 9 and 15: 2	• Low Pass Filter • Interpolate Y, Expand - Linear, x2

APPENDIX C

DATA VISUALISATION INFORMATION

FIGURES

The data was used to produce a series of images to demonstrate the results of surveys these are detailed below:

- Greyscale/Colourscale Plot: this visualised the results as a shaded drawing with highest readings showing as black, running through different shades to lowest showing as white.
- XY-trace Plot: this creates a line drawing showing the peaks and troughs of the readings as vertical offset from a centreline.
- Interpreted Plot: through detailed analysis anomalies have been interpreted and possible features identified. Interpretation drawings are used to show potential features and in particular to reinforce and clarify the written interpretation of the data. Anomalies have been characterised using the terminology detailed in the following section, and have been assigned colour coding outlined in keys found on the relevant figures associated with this report.

TERMINOLOGY

Table C1: Lexicon of terminology

Terminology	Detail
Anomaly	Any outstanding high or low readings forming a particular shape or covering a specific area with the survey results.
Feature	A man-made or naturally created object or material that has been detected through investigation works and has sufficient characteristics or supporting evidence for positive identification.
Magnetic susceptibility	The ability of a buried feature to be magnetically induced when a magnetic field is applied
Magnetic response	The strength of the changes in magnetic values caused by a buried feature with either a greater or lesser ability to be magnetised compared with the soil around it. Anomalies are considered to either have strong / weak or positive / negative responses. The strength of magnetic response (along with patterning) can be essential in determining the nature of an anomaly, but it should be noted that the size or strength of the magnetic response does not correlate with the size of the buried feature.
Patterning of an anomaly	The shape or form of an individual anomaly
Thermoremanence	The affect caused when a material has been magnetically altered through a process of heating. Thermoremanent magnetisation occurs when an object or material is heated passed the Curie Point and acquires a permanent magnetisation that is associated with the magnetic field that they cooled within (Gaffney and Gater 2003, 37)

Supporting information	Supporting information is used to aid the interpretation of a data set and can include as available, but is not limited to: • historic maps • LiDAR survey data • the results of previous archaeological investigations • other anomalies detected through geophysical survey • above ground features identified during the survey works

Different anomalies can represent different features created by human, agricultural or modern activity, or natural pedological or geological changes in the substrata.

Anomalies interpreted with a 'greater' categorisation are considered more likely to be of the interpreted characterisation; whereas a more tentative interpretation is applied to those with a 'lesser' categorisation as a consequence of weaker increases in magnetic response or the anomalies incomplete patterning or irregular form.

The strength and size of anomalies can vary depending on the magnetic properties of the feature, the magnetic susceptibility of the soil, the depth to which the feature is buried, and the state of preservation.

Table C2: Characterisation of anomalies

Characterisation	**Detail**
Archaeology	
Trends	Weak and diffuse anomalies with an uncertain origin are denoted by trends. It is possible that these belong to archaeological features, but given their weak signatures or incomplete patterning it is equally plausible that they relate to agricultural features or natural soil formations.
Agriculture	
Agriculture (cultivation?)	Regularly spaced linear anomalies, often with a narrower spacing, that conforms with ploughing regime at the time of survey, or are recorded on aerial photos of the site, or on LiDAR survey data.
Agriculture?	Regularly spaced linear anomalies that are likely to be of an agricultural nature. However, the lack of supporting information, weak responses, or non-uniform distribution means that it is unclear as to the nature or origin of the agricultural process they are caused by.
Unknown	
Increased response (unknown)	Areas of variable magnetic responses that lack the required increases in magnetic response or patterning to be conclusively interpreted. Consequently, unless associated with conclusively identified features, absolute identification of positive responses can be problematic as it is often not possible to decipher if they are of an archaeological, modern or agricultural origin.
Modern	
Bipolar response (modern)	Positive anomalies with associated negative 'halo' (bipolar) denote features with a strong magnetic response are likely to be of a modern origin. Isolated bipolar responses of a modern nature are likely to relate to buried ferrous material or objects, such as metallic agricultural debris. If a trend is

Characterisation	**Detail**
	noted in the alignment or spacing of isolated bipolar responses, it is possible that they are indicative of ferrous fittings or connectors used on buried non-magnetic buried utilities. Linear bipolar anomalies are likely to be indicative of modern services.
Dipolar response	Dipolar anomalies relate to individual spike within the data and tend to be caused by ferrous objects. These responses have only been shown when located near to archaeological features. When the site is located in a mining landscape it is possible that identified dipolar anomalies relate to mining activity and are indicative of further pits or mine shafts.
Area of increased magnetic response	Areas of increased magnetic response denote areas of disturbance containing a high concentration of dipolar and / or bipolar responses. These are generally considered to be caused by modern debris in the top soil, although it is possible that the disturbance is in part also caused by isolated archaeological material or geological or pedological changes in the substrata.
External interference	Areas of magnetic disturbance, often along the edges of survey areas are caused by standing metal structures such as fencing and buildings.

Hillside Road, Broughton, North Lincolnshire: site location *Figure 1*

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KEY

geophysics survey baseline

geophysics survey grid

geophysics survey area

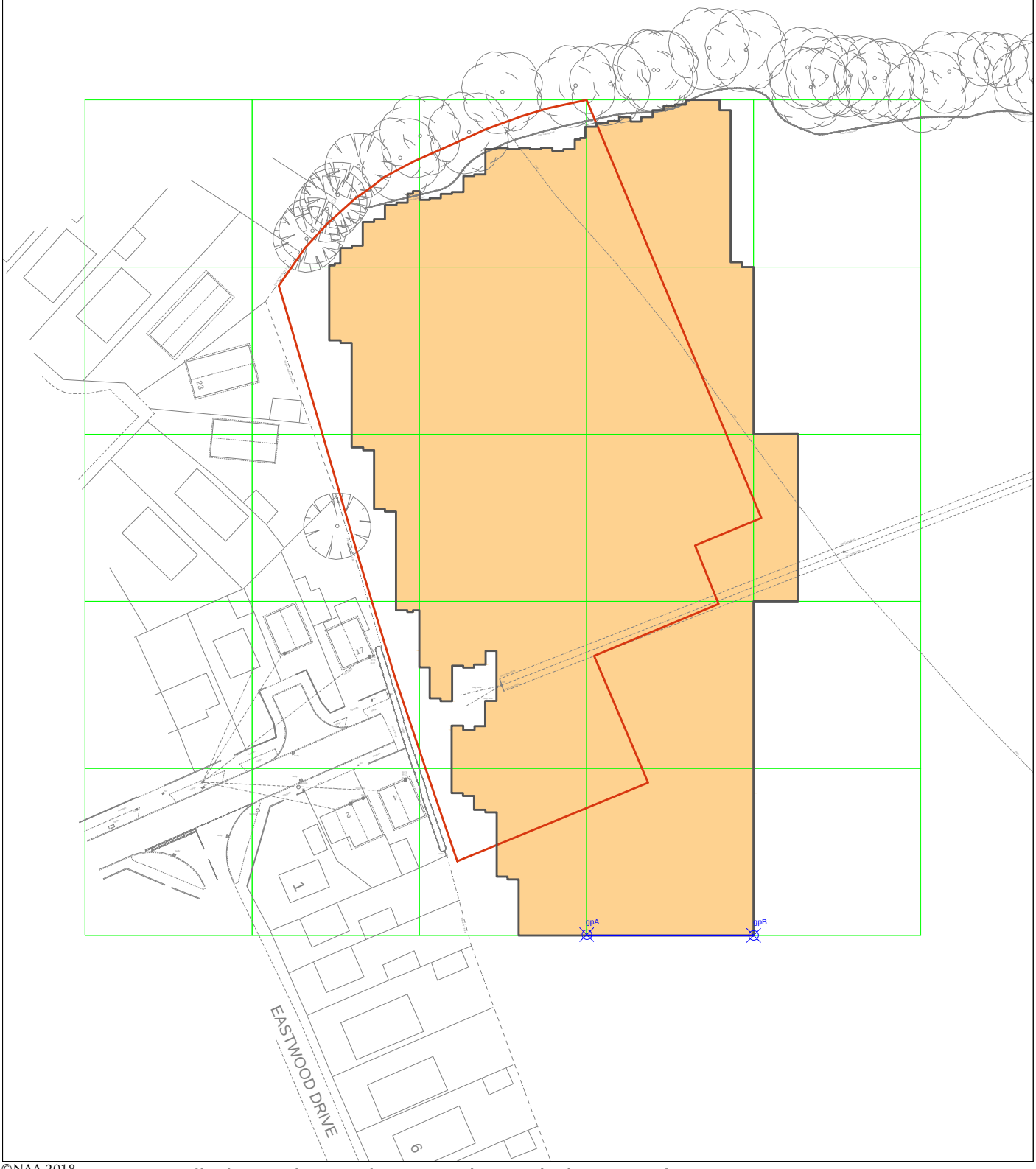
proposed development area

N

0 50 m

scale 1:1000 @ A4

Based on survey data supplied by: Holden Surveys Ltd
ref: Partner_09_Broughton survey date: 14.05.18



Hillside Road, Broughton, North Lincolnshire: geophysics survey area *Figure 2*

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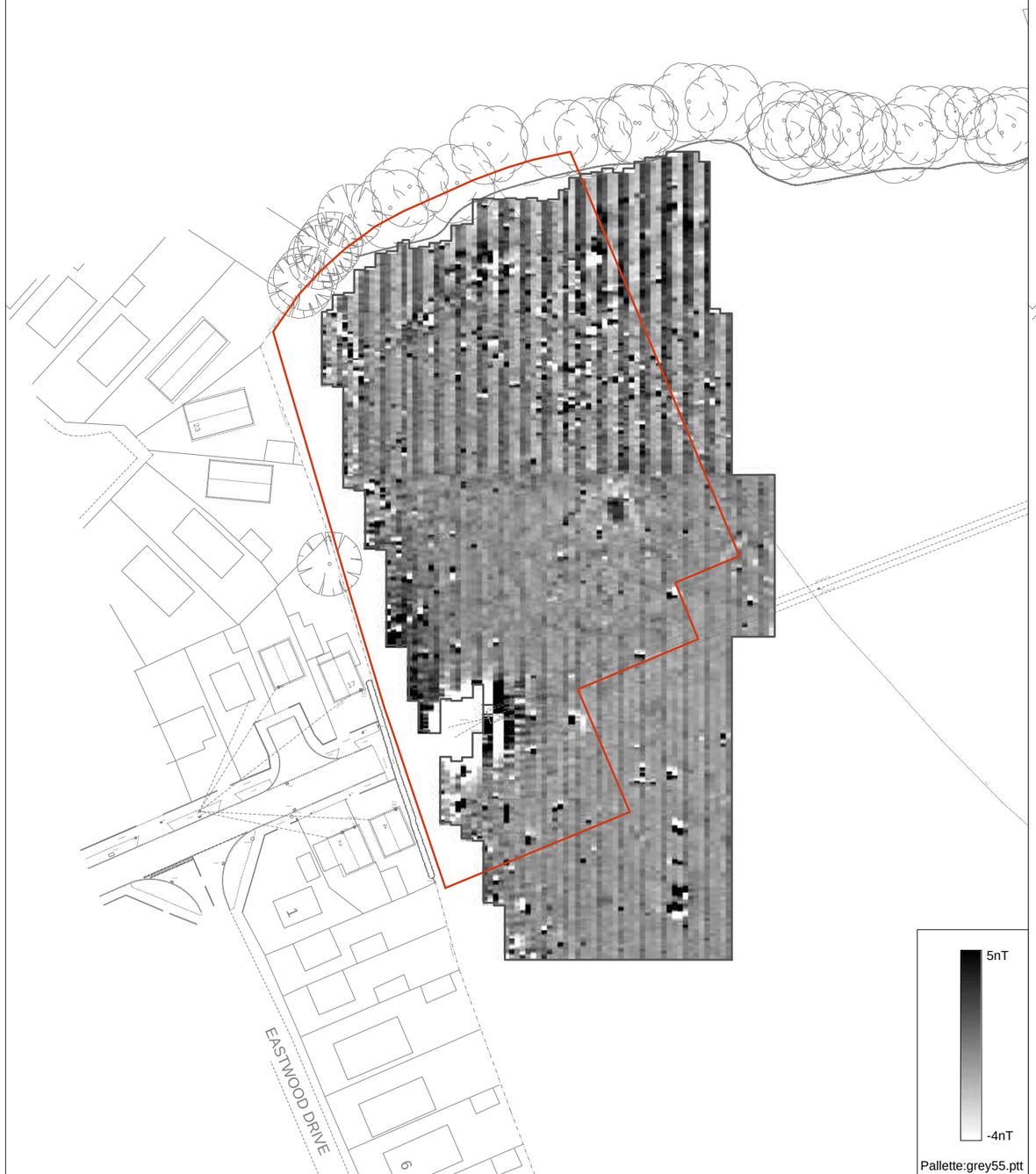
KEY
geophysics survey area
proposed development area
N
0 50 m
scale 1:1000 @ A4

Based on survey data supplied by: Holden Surveys Ltd
ref: Partner_09_Broughton survey date: 14.05.18



Hillside Road, Broughton, North Lincolnshire: unprocessed greyscale and XY-trace plots of gradiometer survey results

Figure 3

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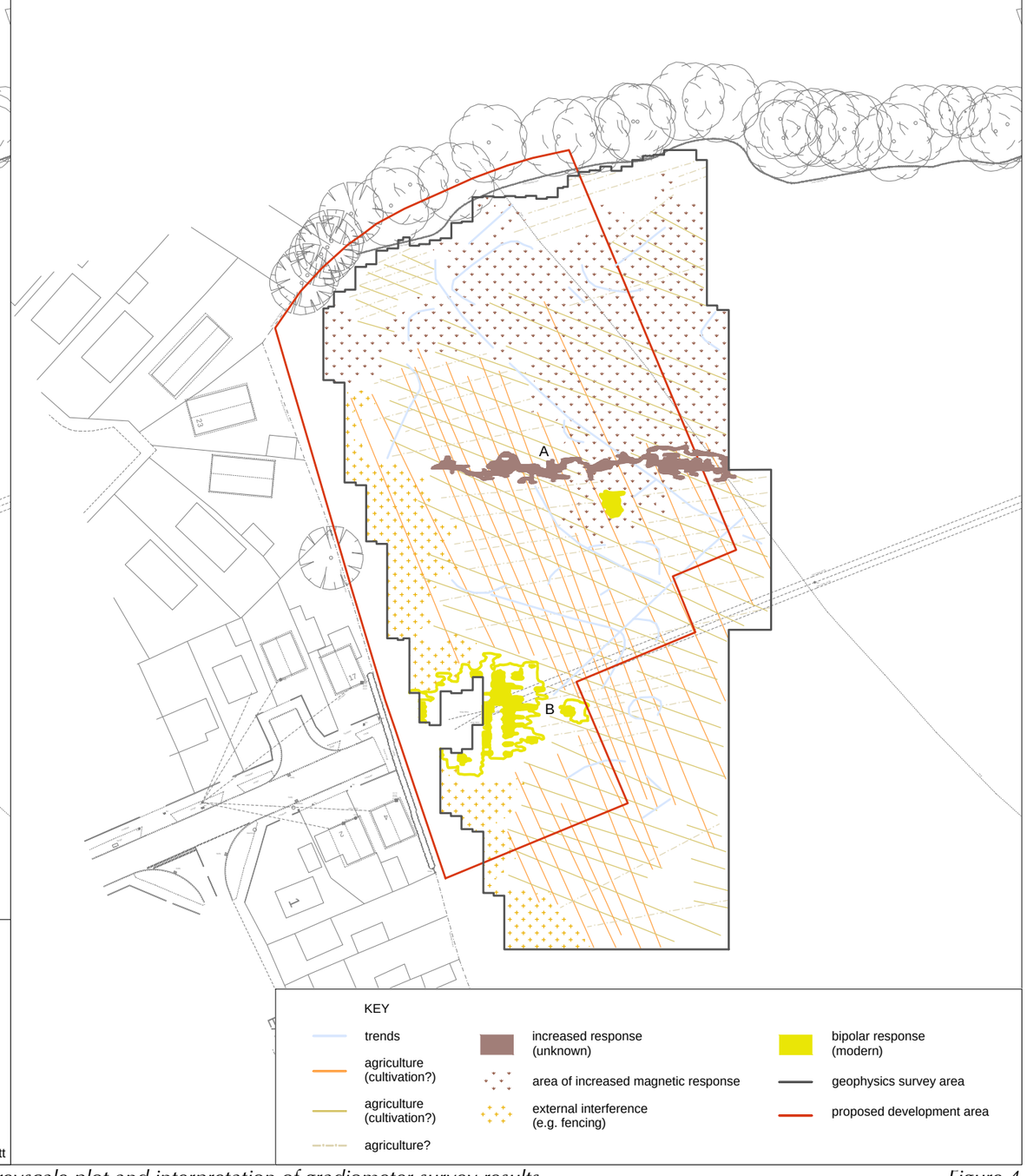
0 50 m
scale 1:1000 @ A4

N

Based on survey data supplied by: Holden Surveys Ltd
ref: Partner_09_Broughton survey date: 14.05.18



Hillside Road, Broughton, North Lincolnshire: processed greyscale plot and interpretation of gradiometer survey results

Figure 4

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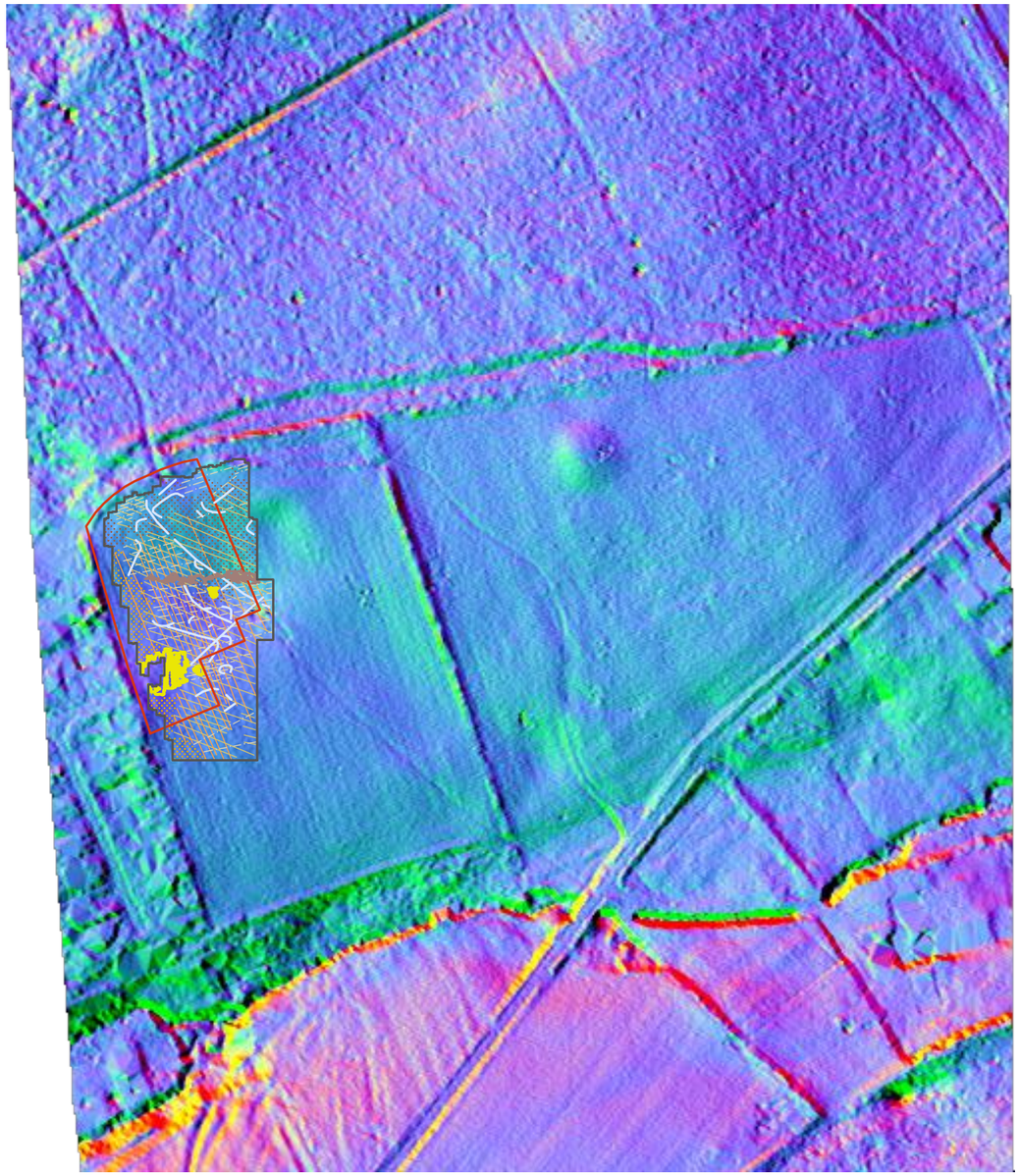

Hillside Road, Broughton, North Lincolnshire: interpretation of gradiometer survey results overlaid on LiDAR survey data (left) and the 1887 25-inch OS Map (right) *Figure 5*