NAA

GEOPHYSICAL SURVEY

THE PITCHES

ROTHERHAM

SOUTH YORKHIRE

prepared for

Newett Homes Ltd

NAA 18/103
November 2018

Northern
Archaeological
Associates

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Client Newett Homes Ltd
Location The Pitches, Rotherham, South Yorkshire, S60 3NG
Planning authority Rotherham
Grid Ref SK 44220 92255
OASIS Ref Northern1-335369
Date of Fieldwork 19th November 2018

THE PITCHES, ROTHERHAM, SOUTH YORKSHIRE
GEOPHYSICAL SURVEY REPORT

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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.

THE PITCHES, ROTHERHAM, SOUTH YORKSHIRE
GEOPHYSICAL SURVEY REPORT

Summary

Northern Archaeological Associates Ltd (NAA) was commissioned by Newett Homes to undertake a geophysical survey on land at The Pitches, Rotherham, South Yorkshire (NGR: SK 44220 92255).

A geophysical survey covering approximately 2.2 hectares was carried out on the 19th November 2018 to assess the potential for previously unrecorded buried remains within the proposed development area (PDA).

Historic maps document the site as agricultural land until the 1930s, when the site was developed into a sports club with associated playing fields. During the 20th century, the PDA is shown on maps and aerial photographs to have housed a bowls lawn, three tennis courts, various football pitches and a cricket pitch.

Generally, the results of the survey contained high levels of magnetic disturbance, and to a large extent it is likely that anomalies relate to recreational activity. Landscaping has probably occurred, with the east of the site forming a raised terrace and a series of regularly spaced linear anomalies clearly denoting buried land drains. Several rectilinear and linear anomalies have been identified, but it is uncertain if these denote buried features, especially given their position and similarities in alignment with known features associated with the sports club. The most coherent of these include bipolar rectilinear anomalies, located central to the cricket pitch, that are on the same alignment as the sports pavilion, and a rectilinear anomaly located to the north of a football pitch that formerly occupied the centre of the PDA.

1.0 INTRODUCTION

1.1 Northern Archaeological Associates Ltd (NAA) was commissioned by Newett Homes to undertake a geophysical survey on land at The Pitches, Rotherham, South Yorkshire (NGR: SK 44220 92255; Fig. 1). The survey was required to assess the potential for buried archaeological remains within the site in support of a planning application for a proposed residential development. The survey was carried out on 19th November 2018 and covered approximately 2.2ha of former recreational land.

1.2 The report details the setting (location, topography, geology) of the proposed development area (hereafter PDA), and sets out the methodology used for the geophysical survey. The interpretation of the geophysical survey is achieved through the analysis of identified anomalies and is often aided by a rapid examination of supporting information. The results of the geophysical survey are discussed below, and the interpretations are supported by appropriate illustrations. Where feasible, a detailed synopsis of anomalies is provided and, if possible, the features that the anomalies are likely to relate to are suggested.

2.0 LOCATION, TOPOGRAPHY AND GEOLOGY

Location

2.1 The PDA comprised a triangular area in Broom, on the south-east side of Rotherham. The PDA formerly functioned as recreational land that belonged to The Pitches Sport Club, and is flanked by houses that line Wickersley Road to the north, Stag Lane to the east and Broom Avenue to the south. At the time of survey, remnants of the former sports club were evident within the PDA, and land formerly containing sports pitches contained heavily overgrown vegetation.

Topography

2.2 The east of the PDA comprises a flat terrace of c.1m and lies at 87m above ordnance datum (aOD). The centre of the PDA is relatively flat at 86m aOD and there is a slight downward slope in the west of the PDA, with the western edge lying at 85m aOD.

Geology and soils

2.3 The solid geology consists of mudstone, siltstone and sandstone of the Pennine Middle Coal Measures Formation. No superficial deposits are recorded within the PDA (British Geological Survey 2018).

2.4 The soils of the Rotherham area are not mapped because of urban land use (Soil Survey of England and Wales 1983).

3.0 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 The South Yorkshire Sites and Monuments Record (SMR) does not document any heritage assets or records of previous archaeological investigations within the PDA.

3.2 The '*Archaeology Scoping Study of Additional Potential Site Allocations*' that was produced on behalf of Rotherham Metropolitan Borough Council documents that evidence for prehistoric activity within 250m of the site boundary is limited to a flint scraper discovered approximately 160m to the south of the site (SMR 0449/01; Wessex Archaeology 2015). There are no sites or activity dated to the Roman or early medieval periods, and evidence for the medieval period is restricted to an area of ridge and furrow that was recorded within a 500m buffer of the site as part of the National Mapping Programme (*ibid*.).

3.3 The Ordnance Survey (OS) First Edition 6-inch map of 1854 shows the site as comprising a single, broadly triangular field that was located within a largely open agricultural landscape. The character of the area remained largely unchanged until the 1930s, when the urban expansion of Rotherham and associated residential development began to encroach on the surrounding area. By 1934, suburban housing had been constructed along Wickersley Road on the north edge of the site, and the PDA had been transformed into a sports ground, including a pavilion in its north-east corner, and a bowling green and tennis courts on its south side. OS maps show the pavilion to have been extended on its north side by the 1980s. At the turn of the 21st century, the tennis courts and bowling green were replaced by cricket and football pitches, and the varying layouts of these pitches are documented on aerial photographs between 1999 and the mid-2010s. Since the disbandment of the sports club, the former playing fields have been left in neglect and presently contain overgrown vegetation. The echoes of the site's former recreational uses presently survive through landscaping elements, such as the terracing dividing the east and west of the site, trees and hedgerow lining the former bowling green, and the pavilion located in the north-east of the PDA.

4.0 AIMS AND OBJECTIVES

4.1 The aim of the geophysical survey was to map and record potential buried features located within the PDA. Through detailed analysis of the results of the geophysical

survey, NAA aimed to provide a detailed interpretation that assessed the archaeological potential of the site and will inform subsequent archaeological mitigation strategies.

4.2 The objectives of the survey were to:

- undertake a geophysical survey across areas deemed suitable for data collection;
- attempt to identify and record any sub-surface remains within the survey boundary;
- characterise the nature of identified anomalies, and where possible suggest the nature of feature they potentially relate to;
- assess the archaeological significance of identified anomalies;
- identify possible concentrations of past activity in order to inform the requirement for any further archaeological investigation at the site; and
- produce a detailed report that includes illustrated results of the geophysical survey.

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 current 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 (Figs 3 and 4), positive readings are shown as increasingly darker areas and negative readings are shown as increasingly lighter areas.

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 (including but not limited to historic maps, LiDAR survey data, and aerial photographs). The interpreted data uses colour coding to highlight specific readings in the survey area (Fig. 5). To support the interpretation of identified features, the interpretation has been overlaid on the 1936 OS map (Fig. 6) and the 1999 Google Earth imagery (Fig. 7).

5.5 Appendix C details the terminology and characterisation of anomalies used for interpreting data.

Surface conditions and other mitigating factors

5.6 At the time of survey, the PDA contained overgrown vegetation. Much of the perimeter of the site contained dense vegetation, and consequently could not be surveyed. There were also several above ground features, including the former sports pavilion, that were considered likely to be a source of magnetic noise. Attempts were made to avoid areas affected by above ground features that were likely to have a high magnetic susceptibility to minimise the potential for their magnetic responses to impinge on the survey results and mask potential buried features.

6.0 RESULTS

(Figs 5–7)

6.1 A large rectilinear anomaly with bipolar responses (**A**) occurs in the east of the PDA, under the location of the former cricket pitch wicket and on the same alignment as of the former sports pavilion building. The area within the rectilinear anomaly contains a variety of bipolar amorphous and linear anomalies (**B**). It is uncertain if **A** and **B** relate to activity belonging to the former cricket pitch, such as different layouts of the wicket, or a buried drainage system. Alternatively, it is possible that they are indicative of buried structural remains. In this interpretation, **A** forms the foundations of a rectilinear building, while **B** denotes internal divisions. In addition, amorphous anomalies are suggestive of the presence of residual activities or materials within the building that have a high magnetic susceptibility.

6.2 A further rectilinear anomaly (**C**) is located to the north of a former football pitch. Unlike **A**, the anomalies that comprise **C** are not composed of bipolar responses and there are no internal linear or amorphous bipolar anomalies. Given the lack of supporting information, it is uncertain if **C** is indicative of buried structural features, infilled

features, or caused by an activity associated with the former recreation function of the site.

6.3 Directly to the south of **C** are a series of fragmented linear anomalies and trends (**D**). The anomalies comprising **D** are on the same alignment as former football pitches, and so are considered likely to be a product of the former recreational function of the site.

6.4 Anomalies comprising **E** are composed of good increases in magnetic response but have an incomplete linear or rectilinear patterning. Generally, there is a high level of magnetic disturbance across the site. Consequently, it is uncertain if **E** denotes buried features or indicates ferrous materials in the topsoil.

6.5 Weak and diffuse anomalies have been identified as trends. Generally, these failed to produce the necessary patterning or increases in magnetic response to be conclusively interpreted. Consequently, their origin is unknown. Given the recreational function of the site throughout the 20th century, it is plausible that the many of these anomalies are of a modern nature.

6.6 Regularly spaced linear anomalies in the east of the survey are characteristic of land drains.

6.7 The results of the survey show a high level of dipolar and bipolar anomalies. Isolated anomalies with a broad or particularly strong bipolar response have been identified on the interpretation plot, as have areas of increased magnetic response that contain dense concentrations of dipolar and bipolar anomalies (Fig. 5). Such anomalies are considered to be modern and caused by highly magnetic material, such as ferrous objects within the topsoil. Although both are considered to be of a modern nature, **F** corresponds to the cricket wicket, and **G** is likely to be a product of the landscaping that created a terrace between the east and west of the PDA.

6.8 Strong responses caused by above ground features external to the survey area, such as buildings, metal fencing and other modern standing features, have been characterised as external interference.

7.0 CONCLUSIONS

7.1 NAA was commissioned to undertake a geophysical (gradiometer) survey on land at The Pitches, Rotherham, South Yorkshire, to support a planning application for a proposed housing development.

7.2 In general terms, identified anomalies were considered to be of a modern nature, and associated with the recreation function of the PDA during the 20th century that saw the site house a bowls lawn, tennis courts, football pitches and a cricket pitch.

7.3 Two coherent rectilinear anomalies were identified, but it is uncertain if they are caused by buried activity associated with the former sports playing fields, or indicative of buried structural features. Bipolar rectilinear anomalies are located in the centre of the cricket pitch and on the same alignment as the sport pavilion to the north-east of the PDA. Although tentative, it is plausible that they either denote varying layouts of the cricket wickets or buried structural remains. It should be noted that that landscaping appears to have occurred in the creation of a terrace in the east of the PDA, and the responses of the rectilinear anomalies supersedes those of the land drains in this area. Although inconclusive, as the magnetic strength of a feature does not correlate to its stratigraphy or origin, this may suggest that the feature post-dates the landscaping and land drains. The second rectilinear anomaly is located to the north of a former football pitch, and likewise is considered to either relate to activity associated with the sports pitch, buried infilled features or structural remains.

7.4 A series of rectilinear anomalies were identified in the west of the survey area, and are considered likely to relate to the former football pitch.

7.5 Other linear and rectilinear anomalies, as well as trends, were identified across the survey area but were composed of weak increases in magnetic response or a poor patterning. Consequently, their origin is unknown, but given the former uses of the PDA, it is plausible that they are of a modern nature and are related to the former sports pitches or associated human activities.

7.6 Terracing has occurred within the east of the PDA, which sits on a level plateau. As part of this landscaping, land drains were installed in the east of the PDA, and are clearly visible within the geophysical survey results.

7.7 Generally, there is a high level of dipolar and bipolar anomalies across the area surveyed. These are generally considered to be of a modern nature and a product of the recreational functions of the site during the 20th and early 21st centuries.

8.0 STORAGE AND CURATION

8.1 The records from 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 has been completed on the results of the survey under the reference number northern1-335369 (Appendix D). This includes submission of a pdf version of the final report to the Archaeology Data Service via the OASIS form.

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ADDITIONAL SOURCES

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National Library of Scotland (2018) *Explore georeferenced maps*. [Online] Available at https://maps.nls.uk/geo/find/#zoom=17&lat=53.5106&lon=-0.5254&layers=102&b=1&point=0,0 (accessed on 27/11/2018).

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 remanent 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	30m x 30m
Traverse interval	1m
Reading interval	0.25m
Direction of 1st traverse	N
Number of Grids	37
Area covered	2.2ha
Date(s) of fieldwork	19th November 2018

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

Grid point (gp) A	**Grid point (gp) B**
NGR: 444862.4052 391442.2782	NGR: 444892.4052 391442.2782

Table A3: Site information and conditions

Item	**Detail**
Geology	Mudstone, siltstone and sandstone of the Pennine Middle Coal Measures Formation
Superficial deposits	None
Soils	Not mapped
Topography	West: 85m aOD East: 87m aOD
Land use / condition	Over grown vegetation (former recreational land)
Weather / conditions prior to and during survey	Sunny with occasional rain

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: - Grid 6: -2 - Grid 7: -1 - Grids 11, 12, 13, 18, 19, 25, 26, 27, 32, 33, 34, 37, 38, 39, 40: 1 - Grids 41, 43, 45, 46, 47, 51, 52: 2 - Grids 53, 54, 57, 58, 59: 3 - Grid 60: 4	• 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.

MAGNETIC ANOMALIES AND 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)

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	
Linear anomaly	Linear anomalies with positive or negative magnetic responses, and composed of a patterning or shape that is suggestive of a buried features.
Unknown	
Positive response	Isolated anomalies or anomalies with an amorphous form. Unless associated with conclusively identified archaeological remains, such as linear anomalies, 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. Consequently, isolated positive responses are not shown within the interpretation unless composed of a broad form or belonging to a series of isolated positive responses.
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 (land drains)	Regularly spaced linear anomalies, often with a narrower spacing, that conform with ploughing regime at the time of survey, or a recent regime recorded on aerial photos of the site.
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 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.
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.

APPENDIX D

OASIS FORM

OASIS DATA COLLECTION FORM: England

OASIS ID: northern1-335369

Project details

Project name	The Pitche, Rotherham, South Yorkshire
Short description of the project	Geophysical Survey
Project dates	Start: 19-11-2018 End: 19-11-2018
Previous/future work	Not known / Not known
Type of project	Field evaluation
Site status	None
Current Land use	Other 14 - Recreational usage
Monument type	NONE None
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Housing estate
Prompt	Planning condition
Position in the planning process	Pre-application
Solid geology (other)	mudstone, siltstone and sandstone of the Pennine Middle Coal Measures Formation
Drift geology (other)	none
Techniques	Magnetometry

Project location

Country	England
Site location	SOUTH YORKSHIRE ROTHERHAM WICKERSLEY The Pitches
Postcode	S60 3NG
Study area	2.2 Hectares
Site coordinates	SK 44220 92255 53.424973764428 -1.33446431404 53 25 29 N 001 20 04 W Point
Height OD / Depth	Min: 85m Max: 87m

Project creators

Name of Organisation	Northern Archaeological Associates
Project brief originator	Lanpro Services
Project design originator	Lanpro Services
Project director/manager	Alice James
Project supervisor	Oskar Sveinbjarnarson
Type of sponsor/funding body	Developer

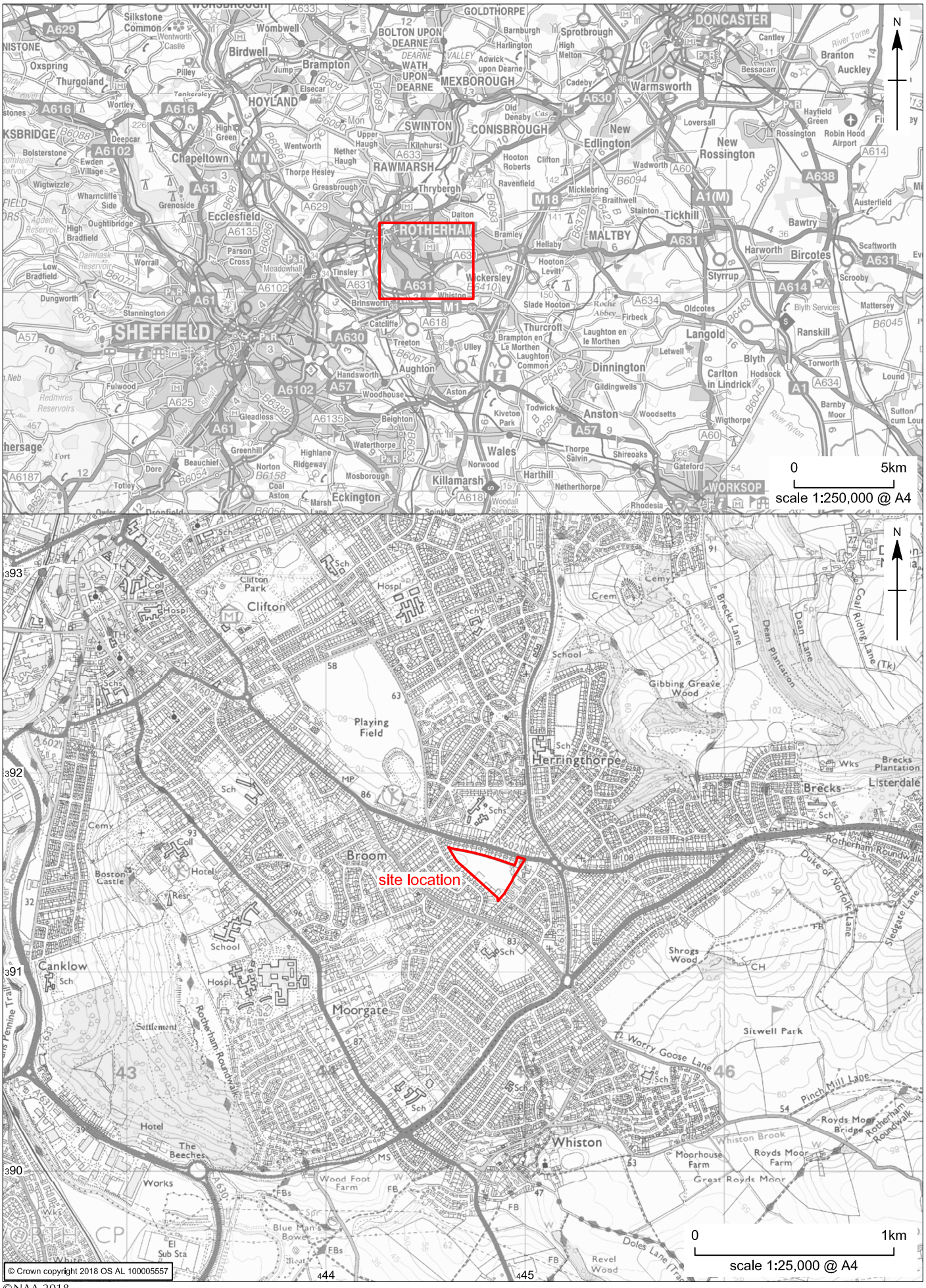
Project archives

Physical Archive Exists?	No
Digital Archive recipient	Northern Archaeological Associates
Digital Contents	"none"
Digital Media available	"Geophysics"
Paper Archive Exists?	No

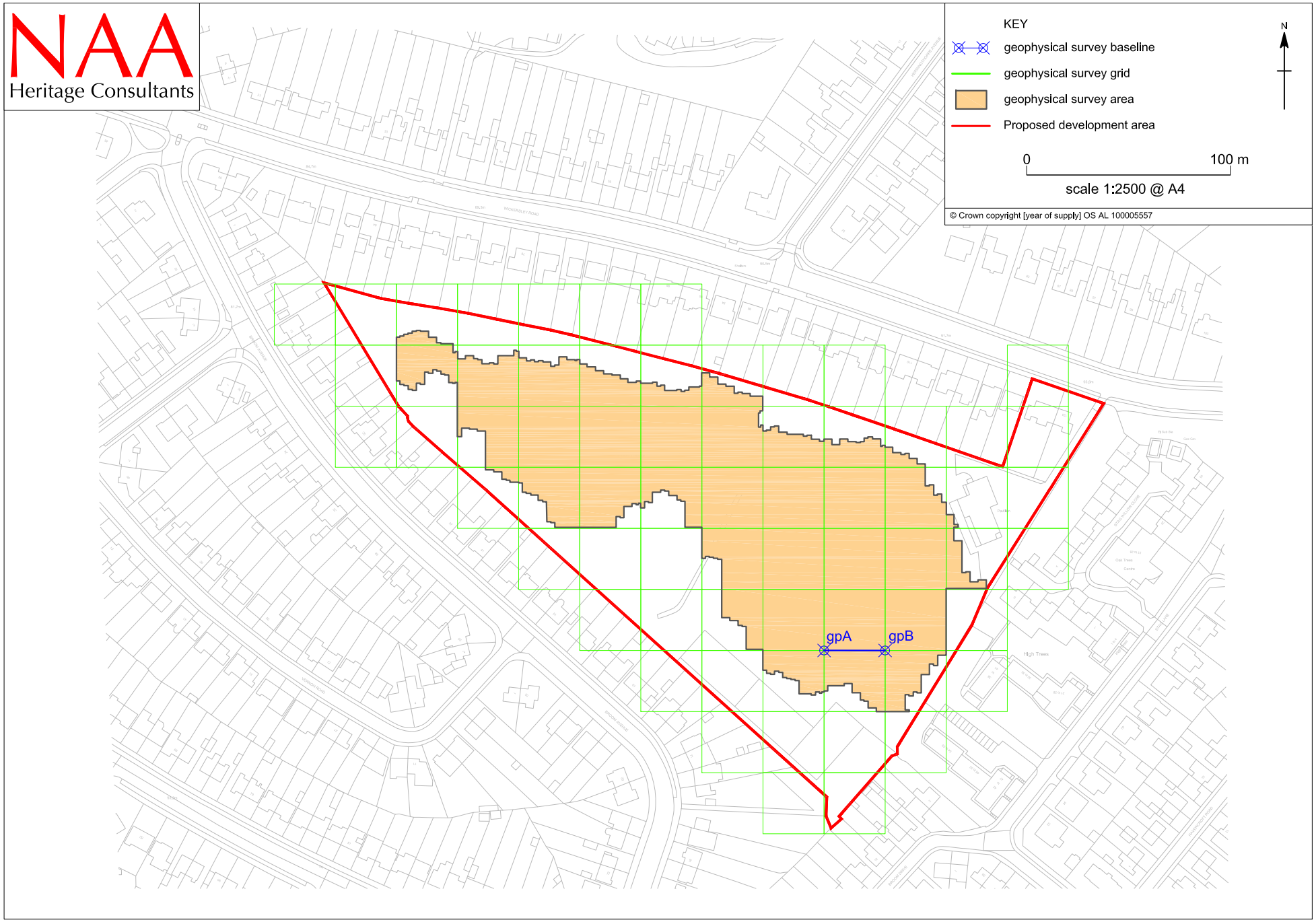
Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	The Pitches, Rotherham, South Yorkshire: Geophysical Survey Report
Author(s)/Editor(s)	James, A
Other bibliographic details	18-103
Date	2018
Issuer or publisher	NAA
Place of issue or publication	Barnard Castle

Entered by	aj (aj@naaheritage.com)
Entered on	29 November 2018



The Pitches, Rotherham, South Yorkshire: site location *Figure 1*



The Pitches, Rotherham, South Yorkshire: geophysical survey location

Figure 2

NAA
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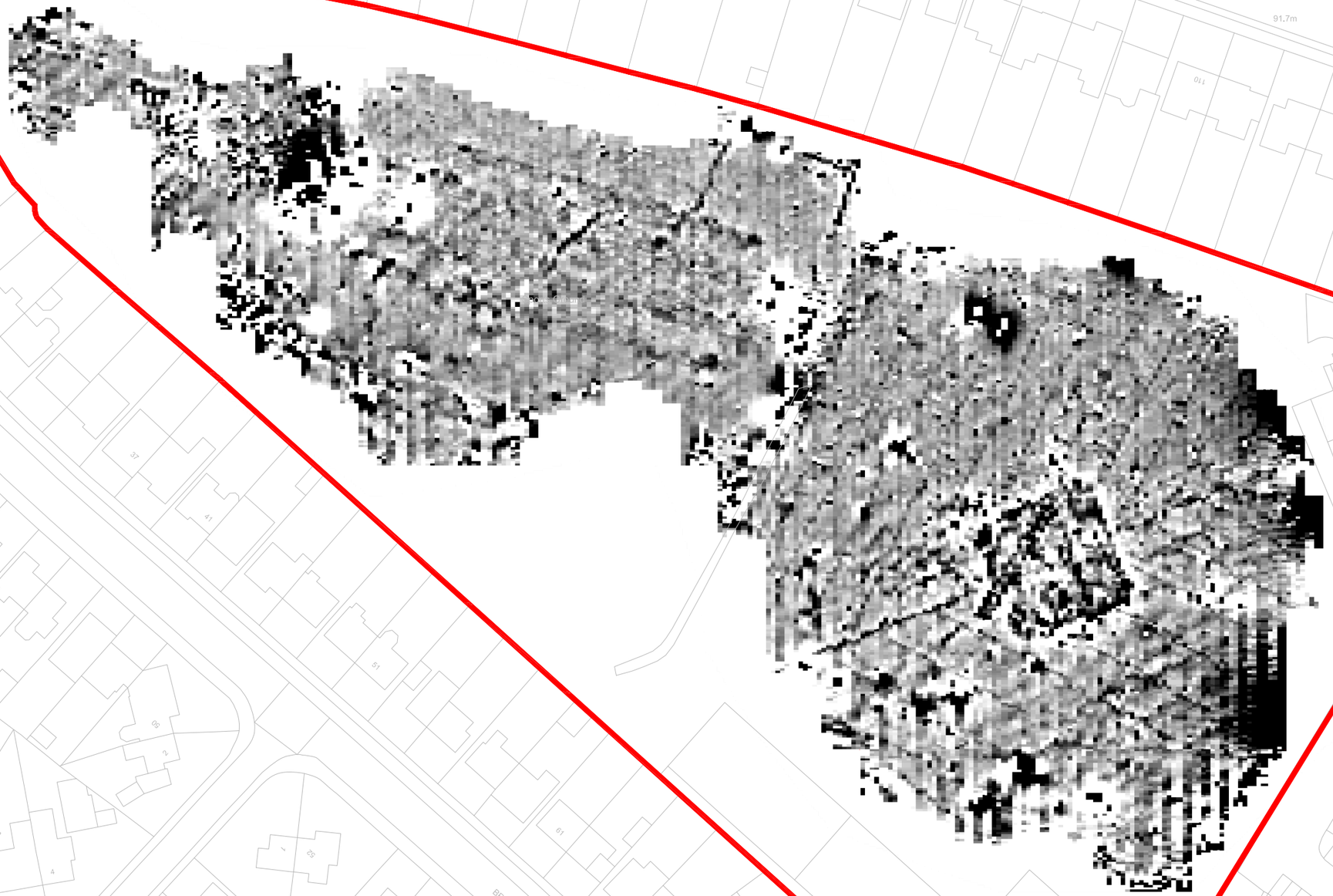
0 50 m
scale 1:1000 @ A3

N

5nT
-4nT
Pallette:grey55.ptt



The Pitches, Rotherham, South Yorkshire: unprocessed greyscale plot of gradiometer survey results

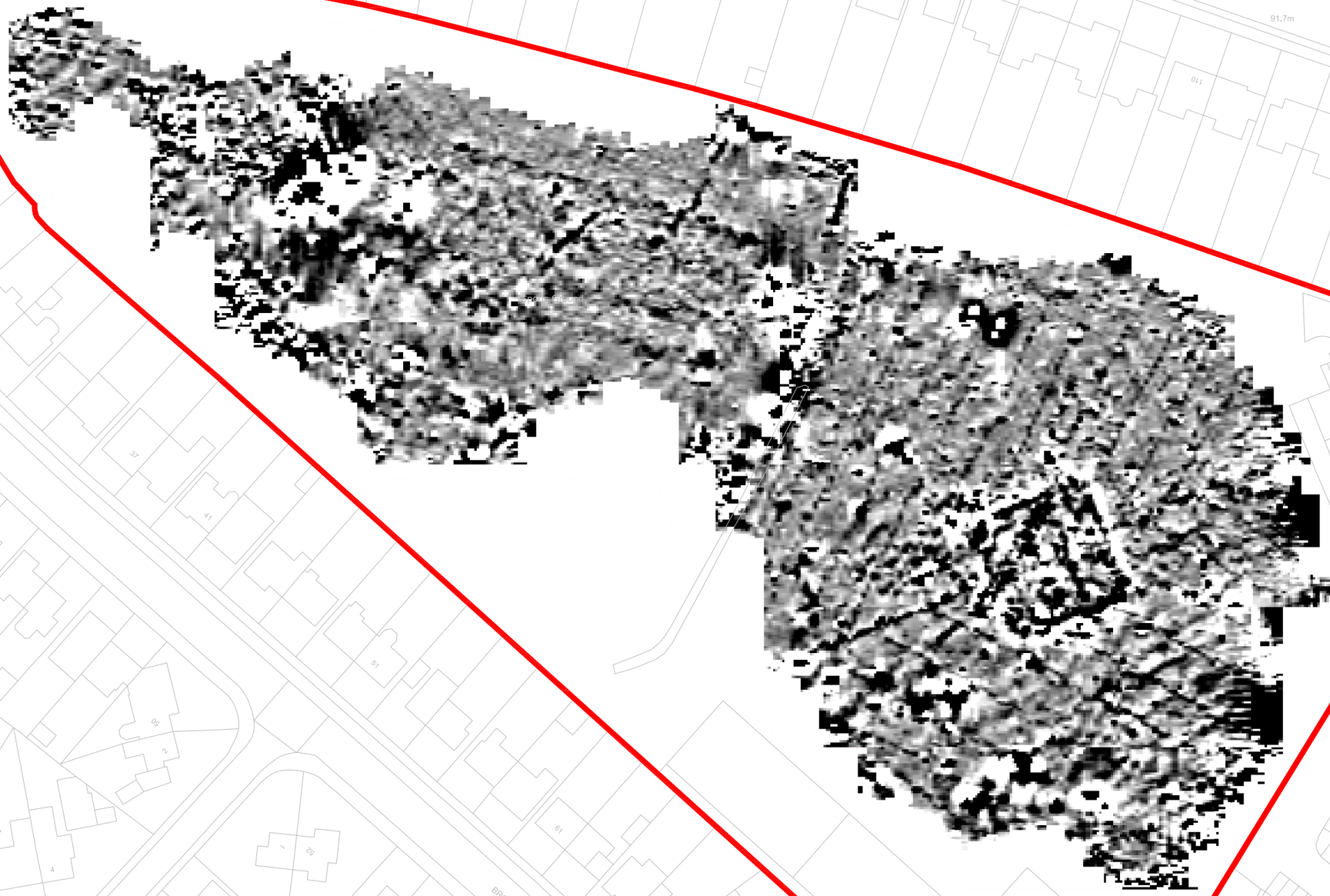
Figure 3

NAA
Heritage Consultants

0 50 m
scale 1:1000 @ A3

N

3nT
-2nT
Pallette:grey55.ptt



The Pitches, Rotherham, South Yorkshire: processed greyscale plot of gradiometer survey results

Figure 4

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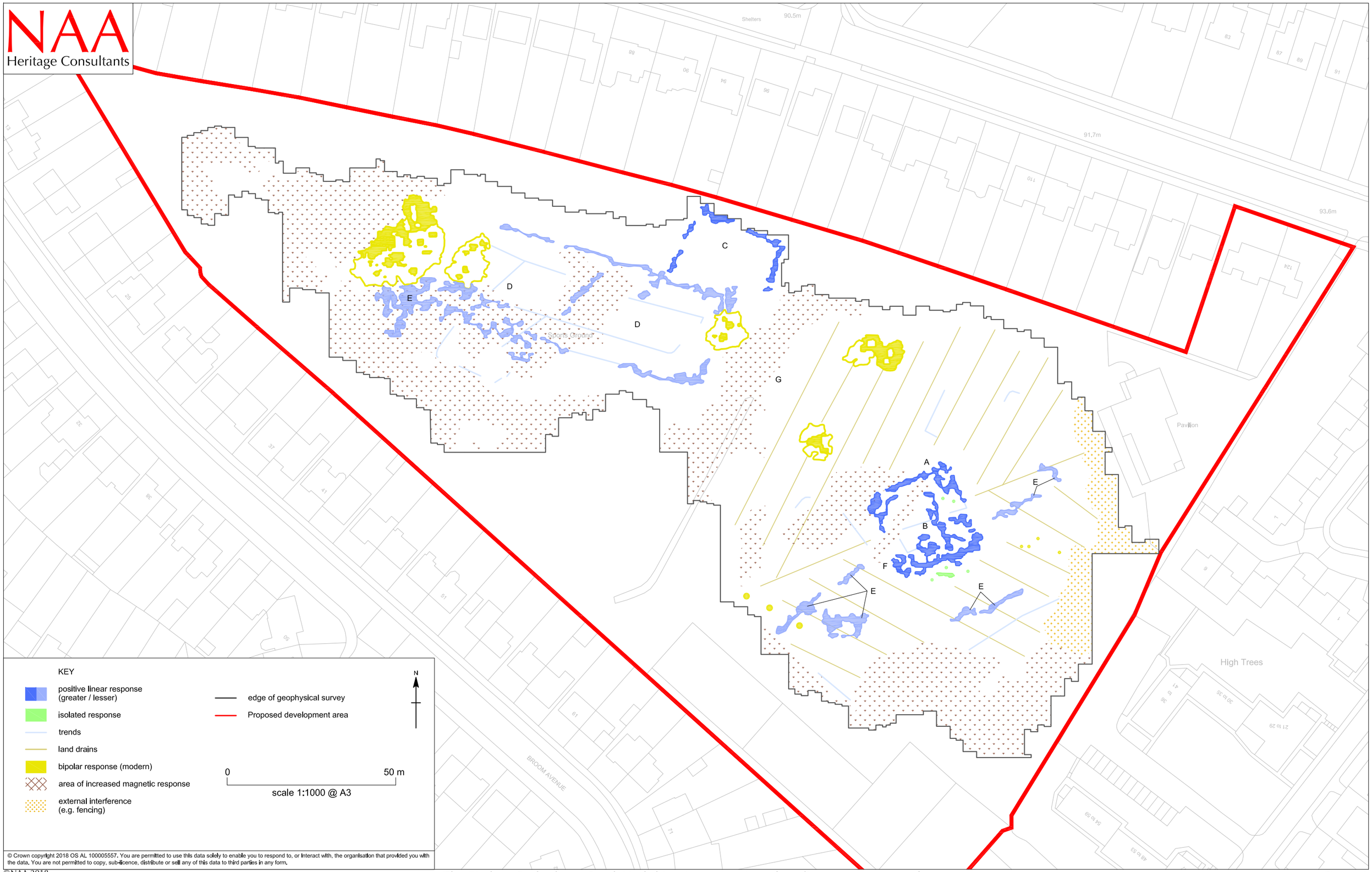


KEY

- positive linear response (greater / lesser)
- isolated response
- trends
- land drains
- bipolar response (modern)
- area of increased magnetic response
- external interference (e.g. fencing)
- edge of geophysical survey
- Proposed development area

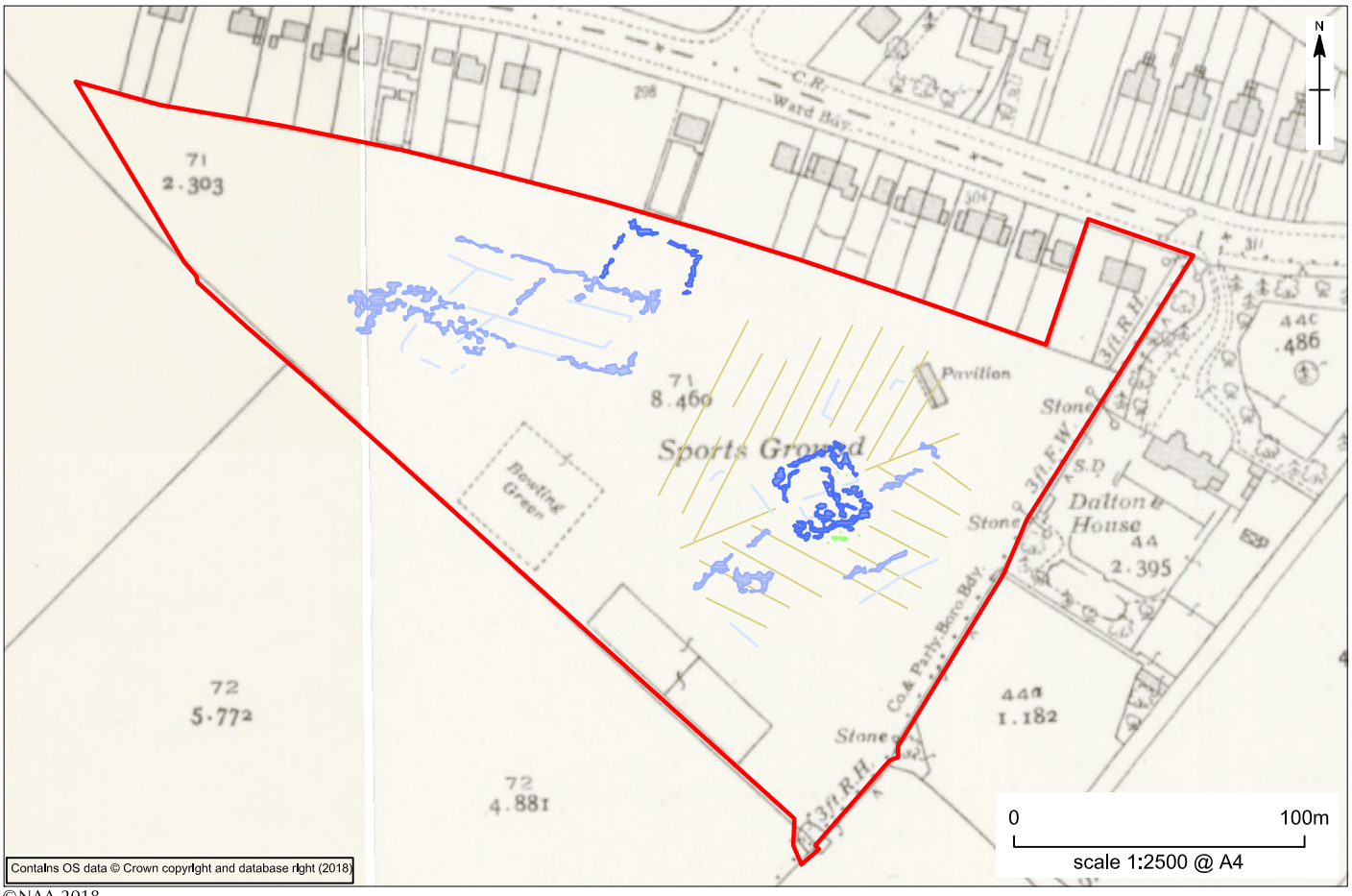
N

0 — 50 m

scale 1:1000 @ A3

The Pitches, Rotherham, South Yorkshire: interpretation of gradiometer survey results

Figure 5



The Pitches, Rotherham, South Yorkshire: interpretation of gradiometer survey results overlaid on 1936 25-inch OS map *Figure 6*

The Pitches, Rotherham, South Yorkshire: interpretation of gradiometer survey results overlaid on 1999 Google Earth imagery *Figure 7*