AB HERITAGE
ARCHAEOLOGICAL CONSULTANCY

Plot 8 Salters Lane, Longbenton, Newcastle Upon Tyne

Geophysics Survey Report

Client: NKA PUBLIC AFFAIRS

AB Heritage Project No: 10447

Date: 30/04/2015

Amersford Farm, Tyne and Wear
Geophysical Survey

Client	**NKA Public Affairs**
Project Number	**10494**
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Approved By	**Andy Buckley**

Rev Number	Description	Undertaken	Approved	Date
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1. INTRODUCTION

1.1 Project Background

1.1.1 AB Heritage has been asked to undertake a geophysical survey on behalf of NKA Public affairs, at Plot 8 Salters Lane, Longbenton, Newcastle Upon Tyne, (See Figure 1).

1.1.2 The purpose of this work is to identify any potential surviving archaeological remains.

1.2 Site Location & Description

1.2.1 The surveyed area was over an area of approximately 1.3 hectares, centred at NZ 26155 69957. The proposed development site is located approximately 5km to the northeast of the City of Newcastle upon Tyne and approximately 850m to the northwest of the suburb town of Longbenton. The proposed development site is adjacent to the modern industrial development of Gosforth Business Park to the south and east, and is bounded by Salter's Lane on the west.

1.3 Geology & Topography

1.3.1 The underlying solid geology comprises mudstone, siltstone and sandstone of the Pennine Middle Coal Measures Formation, laid down in an environment previously dominated by swamps, estuaries and deltas, between 309 and 312 million years ago. The underlying superficial deposits consist of till, deposited around 2 million years ago in an ice age environment (BGS 2015). This form of geology is not likely to cause an adverse effect to the geophysical survey.

1.3.2 The site is relatively flat with an average of c.45m AOD, with a raised bank that runs along the eastern edge of the site next to Gosford Park Way.

2. AIMS & METHODOLOGY

2.1 Aims of Survey Works

2.1.1 Geophysical survey is a programme of non-intrusive archaeological work. The aims of this geophysical survey were to:

- Identify any geophysical anomalies of possible archaeological origin within the specified survey area;
- Accurately locate these anomalies and present the findings in map form; and
- Provide recommendations for any further archaeological work(s) necessary to contribute to the mitigation of the impacts of proposed development on these potential features.

2.2 Methodology of Survey Works Summary

Site Specific Information

2.2.1 A magnetometry survey was undertaken covering an area of c.1.3ha

2.2.2 The AB Heritage staff members who undertook the works were Glenn Rose (Senior Project Archaeologist), and Sam Burn (Archaeological Technicians).

2.2.3 The weather conditions for the work were mainly dry and sunny throughout the survey; these conditions had no material impact on the survey.

Equipment

2.2.4 The magnetic survey equipment used was one Bartington Grad-601 (fluxgate magnetometers). Please see Appendix A, which contains a detailed methodology for the works undertaken; however, briefly, Table 1, below, shows site specific information on how the magnetometer was set up:

Table 1: Setting Parameters of Magnetometer

Grid Size	30x30 metres
Data Capture Distances	1m x 0.25m
Sensors	2
Sensitivity	0.1nT

2.2.5 A GPS was used to setup the geophysical survey was a Trimble GeoXR has a sub-centimetre accuracy suitable for this survey.

2.3 Known Constraints

2.3.1 Within the site there are metallic man hole covers, which are likely to cause magnetic disturbance with c.2m - 3m.

2.3.2 Metallic debris across the ground is likely to cause small anomalies within c.0.5m.

2.3.3 Metallic pylon situated within the northern part of the site is likely to create a disturbance of c.4-5m.

2.3.4 The eastern side of the site contains a recent made ground bank which is likely to create disturbance within this area.

2.3.5 The ground conditions of the site are undulating, which has the possibility to cause slight stagger within the data.

3. RESULTS & INTERPRETATIONS

3.1 Geophysical Survey Results

3.1.1 Two sets of positive linears [**GP 1**] run in a north west to south east direction, the northern most linear has a variation of readings of between 10nt (nanoteslas) and 17nt stretching to a length of c.100m from the eastern to western boundary. The southern linear has a length of c.75m with a reading of between 0nt and 2nt with an adjoining linear running in a north east to south west direction at a length of c. 25m.

3.1.2 The site has mainly magnetic disturbance [**GP 3**] associated with a Bi-polar linear [**GP 4**], which runs in an south east to north west direction with a length of c.125m.

3.1.3 Large areas of magnetic disturbance [**GP 3**] also exist within the northern, eastern and western side of the site.

3.1.4 Di-Polar [**GP 2**] anomalies mainly exist within the southern area of the site in an amorphous pattern.

3.2 Geophysical Survey Interpretation

3.2.1 Interpretation of the results of geophysical survey is based on professional judgement as to the likely/probable cause of an anomaly or reading. For example, strong dipolar discrete anomalies of small size are often associated with ferrous debris or similarly magnetic debris. In addition, where a positive linear anomaly is recorded, which has a negative anomaly associated alongside either side of it, this is often likely to relate to the line of a modern service.

Table 2: Interpretation of Geophysical Anomalies

AB No	Appearance	Potential Cause
GP 1	Positive linear features	Possible Archaeology / Field boundaries
GP 2	Di-polar anomalies	Amorphous magnetic debris
GP 3	Magnetic disturbance	Modern activity
GP 4	Negative and positive linear (Bi-polar)	Modern utilities

3.2.2 Positive linears [**GP 1**] identified are likely to relate to previous field boundaries/divisions which are likely to have run across the site.

3.2.3 Modern services [**GP 4**] run throughout the site and create the majority of the magnetic disturbances [**GP 3**]; with a modern drainage pipe running through the centre of the site, and other areas of magnetic disturbance likely caused by highly magnetic modern services.

3.2.4 Di-Polar anomalies [**GP 2**] are likely due to magnetic debris with the majority located within the southern half of the site.

4. CONCLUSION

4.1.1 A geophysical survey was undertaken by AB Heritage Limited at Plot 8, Salters Lane, Longbenton, Newcastle upon Tyne. The purpose of this work was to understand the potential for any archaeological remains to survive undisturbed and, where possible, identify the form, function and extent of any potential remains.

4.1.2 The geophysical survey identified two sets of positive linears [**GP** 1], which are likely to be previous field boundaries. .

4.1.3 The majority of the features identified relate to modern disturbances [**GP 2-4**], which is spread mainly through the southern side of the site.

4.1.4 The potential for significant / complex archaeological features to survive within the limits of proposed development is concluded to be low, based on the results of the geophysical survey.

5. ARCHIVE

5.1.1 The Site Archive will contain the following, as a minimum:

Table 3: Site Archive Data

Archive	Format
Raw Geophysical Data files	XYZ and Text
Processed geophysical data files	JPEG, BMAP
Archaeological Interpretation	Shape Files ARC GIS
Final Report	PDF
Final Images	PDF

5.1.2 A physical and digital archive will be stored in a suitable format at AB Heritage Limited offices in Taunton, Somerset.

6. REFERENCES

BGS (British Geological Society) 2015.*Geology of Britain viewer.* http://mapapps.bgs.ac.uk/geologyofbritain/home.html.

IFA, 2011.Standard and Guidance for archaeological geophysical survey.

Jones, D.M. (ED) 2008. Geophysical Survey in Archaeological Field Evaluation. English Heritage.

Schmidt, A. 2002. Geophysical Data in Archaeology*: a Guide to Good* Practice. Oxford. Oxbow.

Appendix 1 Technical Information on Geophysical Survey

FLUXAGTE MAGNETOMETRY SURVEY

The magnetic survey is carried out using a fluxgate gradiometer, which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field, whilst the lower sensor measures the same field but is also more affected by any localised buried field. The difference between the two sensors will relate to the strength of a magnetic field created by a buried feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity, disturbance from modern services etc.

Survey equipment

The Bartington Grad 601-2 dual magnetic gradiometer is capable of surveying to an accuracy of 0.1 nanotesla (nT).

Sample interval and depth of scan

The magnetometer data is collected in 30mx30m grids at a resolution of 1m x 0.25m. This sample density is recommended for site evaluation (English Heritage, 2008). This equates to 3600 points per 30mx30m grid. The magnetometer has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects are buried within the site.

Data capture and processing

The readings are logged continually by the data logger during the survey, which is then downloaded on site to a site laptop. At the end of each job, data is transferred to the office PC's for processing and presentation.

This 'regular xy' data is then downloaded into specialist data processing software, at user defined sample intervals (in this case 1 m by 0.25 m). This is processed as standard magnetometer data.

GPS METHODOLOGY

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to sub-cm accuracy, a far greater accuracy than a standard GPS unit. An RTK system uses a base station receiver and a number of mobile units (rovers). The base station takes measurements from satellites in view and then broadcasts them along with its known position to the rover receivers. The rover receiver also collects measurements from the satellites in view and processes them with the base station data. The rover then computes its location relative to the base.

During such a survey a Trimble GeoXR Differential Global Positioning System (dGPS), capable of Real Time Kinematic (RTK) is used to set out a nominal grid prior to the survey. This increases the accuracy and efficiency of the survey. The data is then downloaded from the unit on the day, using a USB stick.

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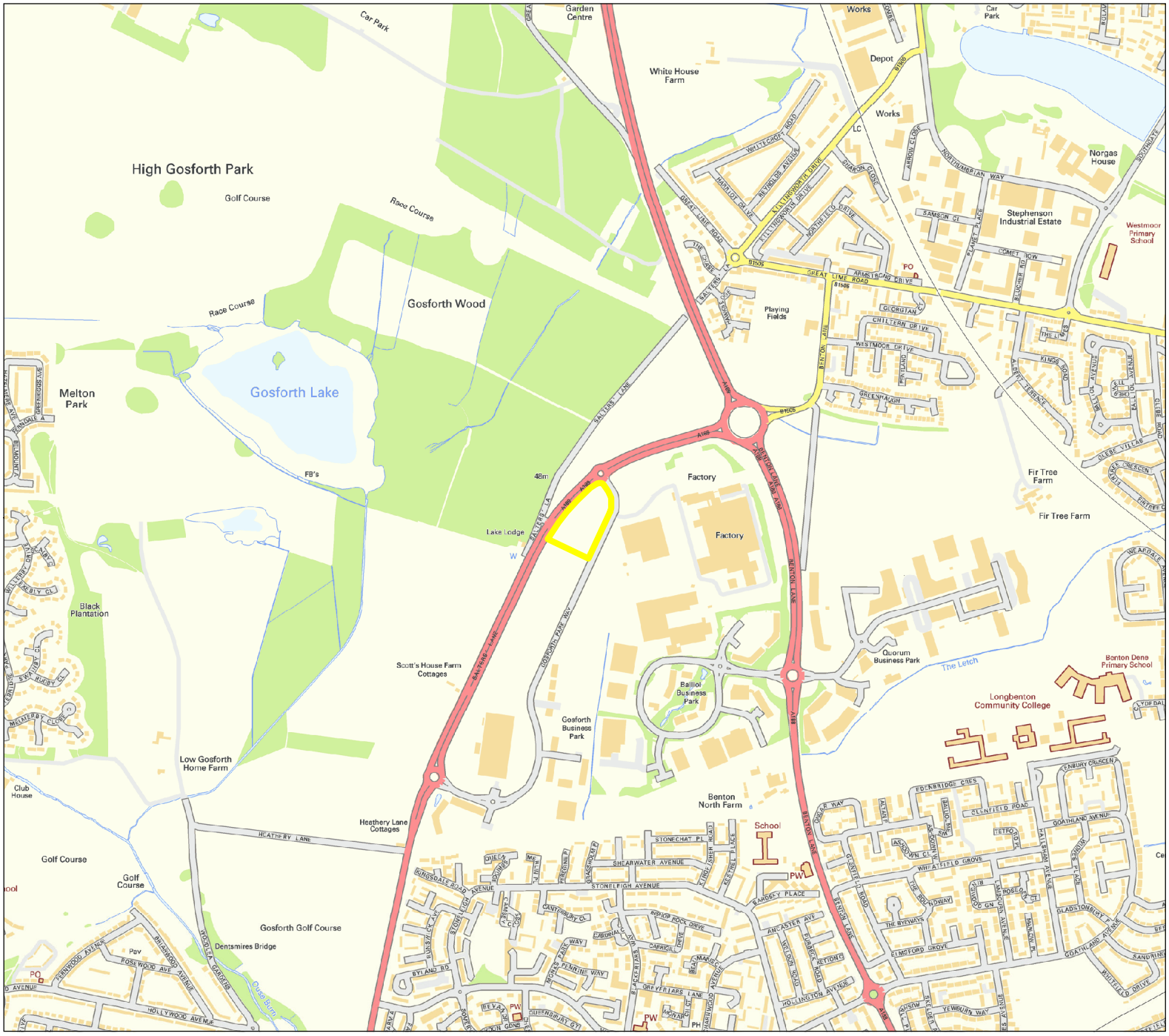
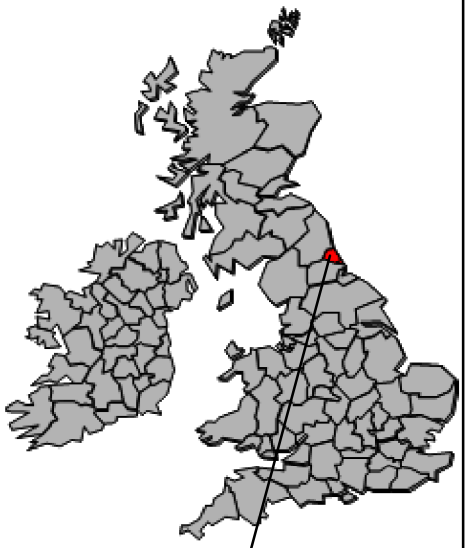


N

Legend

Site Boundary



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0 300 600 1,200 m

Figure 1: Site Location

Project: Salters Lane, Newcastle Upon Tyne

Date: 21/04/15	Job Number: 10494
Drawn by: ZE	Approved by: GR

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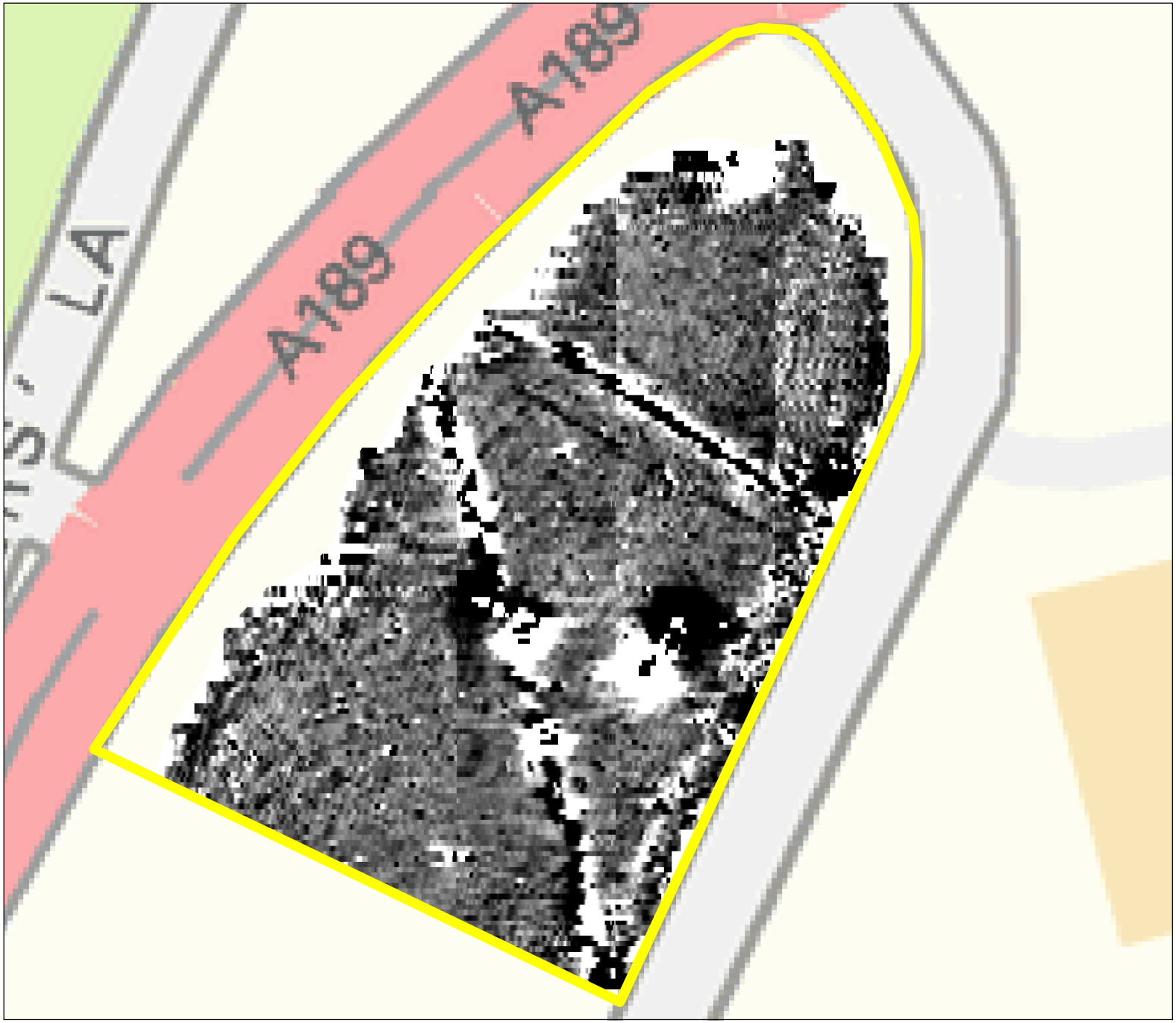

N

Legend

Site Boundary

+2.5

Plotting Perameters

-2.5

Figure 2: Raw Geophysical Data

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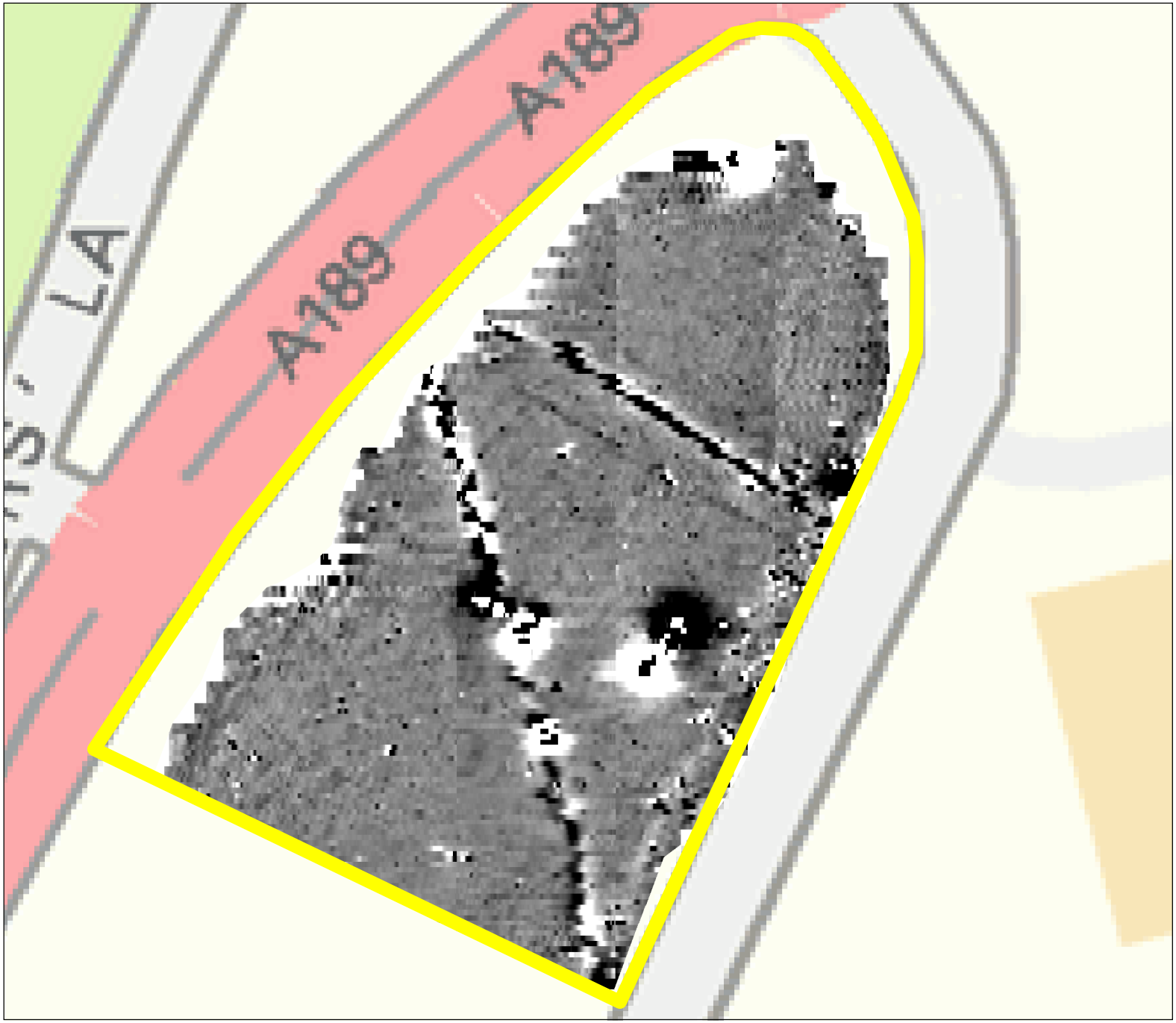
0 20 40 80 m



N

Legend

Site Boundary

+6

Plotting Perameters

-6

0 25 50 100 m

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Figure 3: Processed Geophysical Data

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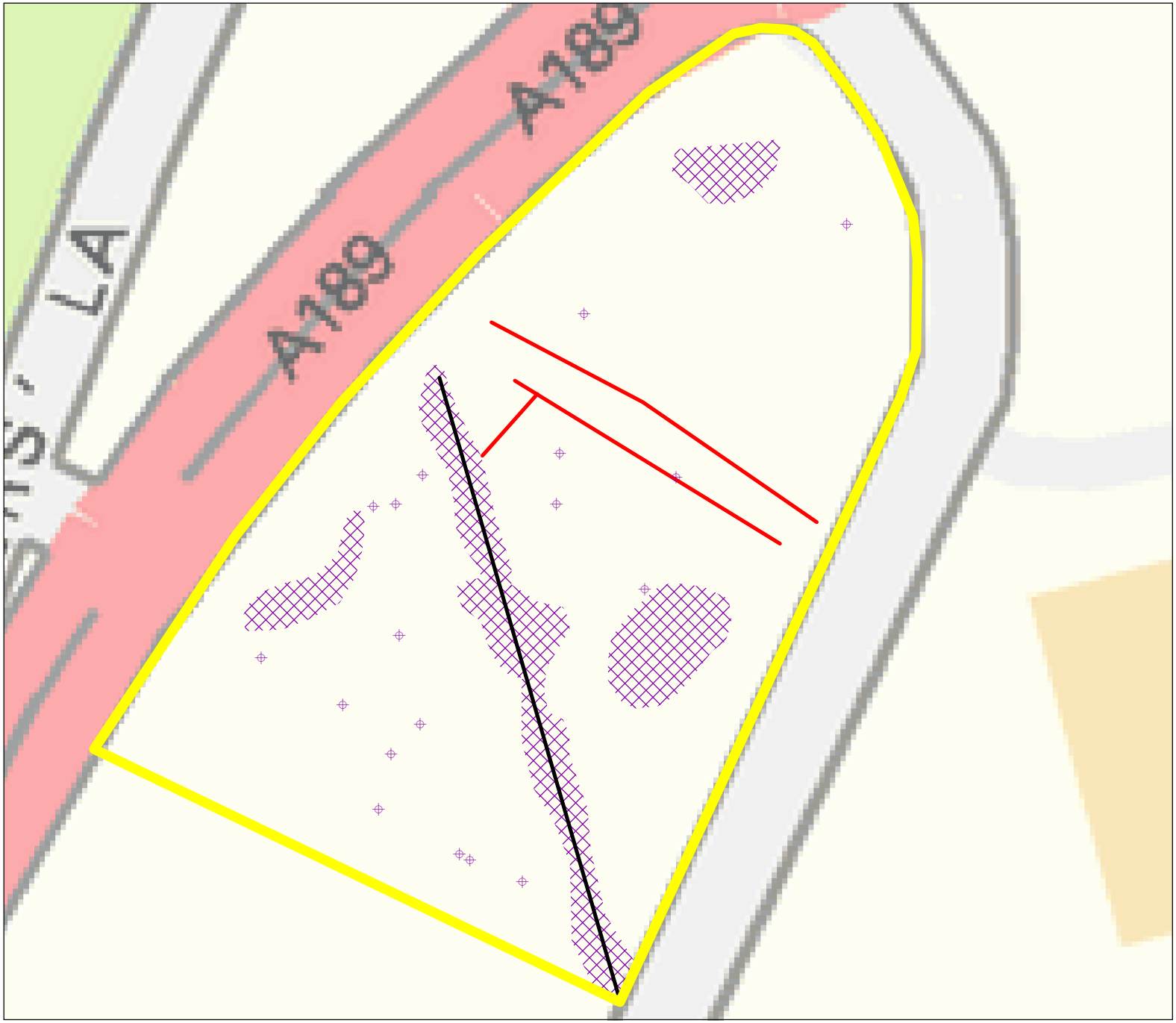

N

Legend

- Former Field Boundaries [GP1]
- Di-Polar Anomalies [GP2]
- Magnetic Disturbance [GP3]
- Utility [GP4]
- Site Boundary

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0 25 50 100 m

Figure 4: Interpretation of Geophysical Data

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N

Legend

Former Field Boundaries [GP1]

Site Boundary

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0 25 50 100 m

Figure 5: Interpretation of Archaeological Features

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