

# St George's Hospital, Morpeth Report on a Geophysical Survey



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**Compiled By:**  
Rupert Lotherington PI(A)

Archaeological Research Services Ltd  
The Eco Centre  
Windmill Way  
Hebburn  
Tyne & Wear

**Checked By:**  
Chris Scott MI(A)

Tel: 0191 4775111  
Fax: 0191 4777687

[admin@archaeologicalresearchservices.com](mailto:admin@archaeologicalresearchservices.com)  
[www.archaeologicalresearchservices.com](http://www.archaeologicalresearchservices.com)



## Contents

	Page
Executive Summary .....	4
1.0 Introduction .....	5
1.1 Background .....	5
1.2 Location, Topography and Geology .....	5
2.0 Methodology .....	6
2.1 Geophysical Survey .....	6
3.0 Geophysical Survey Results .....	7
3.1 Introduction .....	7
3.2 Anomalies .....	7
4.0 Discussion and Conclusions .....	9
5.0 Publicity, Confidentiality and Copyright .....	10
6.0 Statement of Indemnity .....	10
7.0 Acknowledgements .....	10
8.0 References .....	10
Appendix 1: Figures .....	12

## **List of Figures**

1. General Site Location
2. Site Location
3. Location of Survey Grids
4. Geophysical Survey Grid Locations Fields 1 to 3
5. Geophysical Survey Grid Locations Fields 4 to 5
6. Geophysical Survey Raw Data
7. Geophysical Survey Processed Data
8. Interpretation and Classification of Anomalies
9. 1798 Map with Corresponding Anomalies

## **EXECUTIVE SUMMARY**

*This report presents the results of a geophysical survey undertaken on land surrounding the former site of St George's Hospital, Morpeth, Northumberland.*

*A geophysical survey was carried out between 16<sup>th</sup> and 19<sup>th</sup> December 2013 using a Bartington 601 dual sensor fluxgate gradiometer. A total of 116 30m x 30m square grids were surveyed over the course of 4 days. The survey area was divided between 5 fields .*

*The geophysical survey in Field 2 revealed a number of magnetic anomalies, several positive linear anomalies that have been identified as forming a ditched enclosure containing two identifiable curvi-linear features interpreted to be domestic structures and a cluster of discrete positive anomalies believed to be associated waste pits. The form and pattern of distribution displayed by these anomalies bear similarity to the ditched enclosures excavated at East Brunton, West Brunton, Pegswood Moor and Blagdon Park which had radiocarbon dates displaying occupation from the middle Iron Age until the early second century AD. Further archaeological investigation targeting the anomalies in order to determine their date and significance is recommended. A further curvi-linear anomaly is also visible in Field 3 and may require further investigation due to being similar in form to the curvi-linear features interpreted as possible domestic structures inside the ditched enclosure in Field 2.*

*Anomalies 10 and 14, in Fields 2 and 3, might also require investigation in order to successfully determine their function as potential post-medieval field boundaries as illustrated by White's 1798 Estate Map.*

*Further anomalies revealed in Fields 2 and 3 can be classified as repeating positive linear anomalies and are indicative of ridge and furrow cultivation, possibly from the medieval period. These anomalies were recorded predominately on a north-east to south-west alignment. Fields 4 and 5 revealed considerable modern disturbance and no anomalies of archaeological potential.*

*The results of this geophysical survey should be read in conjunction with the desk-based assessment as part of an overall heritage assessment and this will provide sufficient information to help devise a programme of invasive investigation in the form of strategically - placed evaluation trenches.*

## **1.0 Introduction**

### **1.1 Background**

- 1.1.1 Galliford Try appointed Archaeological Research Services Ltd (ARS Ltd) to undertake a geophysical survey as part of a heritage assessment of the land surrounding the former site of St George's Hospital, Morpeth, Northumberland.
- 1.1.2 The purpose of the survey was to determine the potential for sub-surface archaeological remains to survive at the site, to assist in the development of appropriate mitigation and to provide sufficient information to enable the Local Planning Authority to make an informed decision on the archaeological implications of any proposed development.
- 1.1.3 The objective was to carry out a non-intrusive survey to identify whether any anomalies of a possible archaeological origin could be identified within the survey area, which may be affected by any proposed development and which, consequently, may require further evaluation and/or specific mitigation.
- 1.1.4 This report presents the results of the geophysical survey and concludes this aspect of the heritage assessment.

### **1.2 Location, Topography and Geology**

- 1.2.1 The site is located on the north-eastern outskirts of Morpeth town centre and lies close to the river Wansbeck to the south. The site is bounded to the south by the A197 (Whorrel Bank), to the west by the How Burn, and to the east by a steep bank, but it is unbounded to the north. The site is approximately centred on grid reference NZ 20373 86868.
- 1.2.2 The sites northernmost fields currently comprise open grassland with an undulating topography whilst the southernmost fields are generally pastoral and agricultural. Established woodland encompasses Bluebell Wood to the south and Howburn Wood to the east.
- 1.2.3 The site lies on a geology of Pennine Lower Coal Measure Formation- Mudstone Siltstone and Sandstone. This is overlain by superficial deposits of Quaternary Diamicton Till in the upper northern parts of the site and Glacio-Fluvial deposits of gravel, sand and silt in the lower southern parts of the site (BGS 2013).

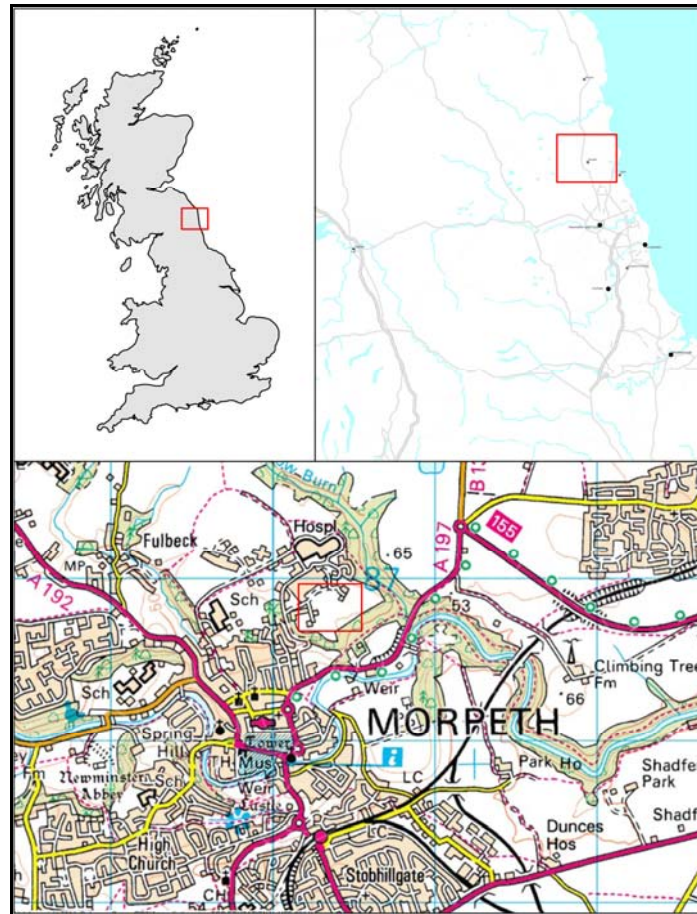


Figure 1. Site Location.

## 2.0 METHODOLOGY

### 2.1 Geophysical Survey

- 2.1.1 Magnetometry is a non-intrusive scientific prospecting technique that is the preferred geophysical technique used to determine the presence or absence of buried archaeological features. It is an efficient and effective method of locating anomalies corresponding with archaeological features.
- 2.1.2 The instrument chosen for this survey was a Bartington Grad 601 dual sensor fluxgate gradiometer which can detect weak changes in the Earth's magnetic field caused by buried features. All fieldwork and reporting was undertaken following English Heritage and Institute for Archaeologists standards and guidance (Gaffney, *et al.* 2008; IfA 2011).
- 2.1.3 The 30m by 30m survey grids were located to cover the entire site (Figures. 4 & 5) In total 116 survey grids were accurately set out on site using a hand-held GPS unit. Each grid was then surveyed at 1m traverse intervals with the sampling at 0.250m (4 readings per metre) intervals. The survey was carried out in 'zigzag' mode with each alternate traverse walked in opposite directions. The range of the instrument was set at 100nT (0.01nT resolution).

- 2.1.4 The survey was carried out between 16<sup>th</sup> and 19<sup>th</sup> December by Richard Durkin of ARS Ltd. The site was sub-divided into five separate fields, displayed in (Figure.3). The weather was fair.
- 2.1.5 The site was not clear of obstructions as Field 2 contained a small dry valley which was extremely steep towards the south-east and consequently unsuitable for survey.
- 2.1.6 At the end of each day, the data was downloaded into a computer, checked and archived on the ARS Ltd server. The data was downloaded using Bartington Instruments' *Grad 601 Communication Application*.

### **3.0 GEOPHYSICAL SURVEY RESULTS**

#### **3.1 Introduction**

- 3.1.1 The data was processed using Geoplot software. To improve graphical presentation various Geoplot processing functions were utilised. The data was clipped (clipping parameters selected on the mean and standard deviation data values), random iron spikes were removed by setting the "despike" function to 1.5 – 2.5 and the striping that can often appear in gradiometer data was removed by utilising the zero mean traverse function. The affect of other processing tools such as "de-stagger" were utilised where appropriate.
- 3.1.2 Occasionally, processing the data to compensate for directional sensitivity or to remove iron spikes caused by miscellaneous ferrous objects can also inadvertently disguise more subtle anomalies that may be of archaeological origin, particularly long linear features in the direction of the traverses. The data has therefore been interrogated in the various stages of processing and in both absolute and standard deviation units.
- 3.1.3 The survey revealed a number of magnetic anomalies: those which have the potential to be of archaeological interest were dominated by the positive linear anomaly classification. Positive discrete anomalies were also recorded. An image of the raw data can be seen in Figure 6 and an image of the processed data in Figure 7. Interpretation and classification of the anomalies can be seen in Figure 8.

#### **3.2 Anomalies**

##### **3.2.1 Field 1 (Figure 8)**

- 3.2.1.1 In Field 1, significant evidence of disturbance from services, tree roots and concrete foundations was both recorded in the geophysical survey results and observed on site.
- 3.2.1.2 Areas of modern disturbance (anomalies 1, 2 and 3) are unlikely to be significant and anomaly 4 represents a concrete foundation still visible on site. Anomalies 5, 6, 7, 8 and 9 represent modern service pipes.
- 3.2.1.3 A small number of discrete dipolar anomalies were recorded and these will correspond to miscellaneous ferrous debris common on most urban sites.

### **3.2.2 Field 2 (Figure 8)**

- 3.2.2.1 Field 2 is the largest field in the geophysical survey area and was mainly free of obstructions although it did contain a small dry valley which was extremely steep towards the south-east and therefore unsuitable for survey.
- 3.2.2.2. The most significant group of anomalies recorded in Field 2 were positive linear anomalies 16 and 17, indicating a ditched enclosure of approximately 115m in length and 40m in width. Within the enclosure, evidence of further features was recorded including at least two curvilinear anomalies (18 and 19) and a number of possible pit features (anomalies 20 to 25).
- 3.2.2.3 Anomalies group 26 can be classified as repeating positive linear anomalies and are indicative of ridge and furrow cultivation, possibly from the medieval period. These anomalies were recorded on a north-east to south-west alignment. Similarly, group 27 also contains repeating positive linear anomalies on the same alignment as those in group 26. These may also indicate potential ridge and furrow agricultural features however the results recorded are similar in form to those displayed by land drains. The orientation of group 27 towards the boundary of Field 2 might also support the field drainage interpretation.
- 3.2.2.5 Anomaly 10 is orientated on an NNW-SSE alignment, measure approximately 180m in length and matches the boundary division between the fields denoted as Bowman's Corner and East Loan Field on White's 1798 Estate Map (Figure 9). Anomaly 10 should therefore be interpreted as a late eighteenth century boundary or drainage ditch.
- 3.2.2.5 The final anomalies of interest in Field 2 are anomalies 15 and 37. Both are classified as discrete positive anomalies and represent the location of potential pits.

### **3.2.3 Field 3 (Figure 8)**

- 3.2.3.1 Field 3 is bisected by a north-south orientated footpath at the western extent of the field and displays two distinct groups of repeating positive linear anomalies (28 and 29) of a similar form to those found in Field 2 (group 26). Group 28 is orientated on a north-east to south-west alignment whilst group 29 is orientated south-east to north-west. Both group 28 and 29 are likely to be furrows relating to agricultural activity and field cultivation.
- 3.2.3.2 Other anomalies of archaeological interest in Field 3 are anomalies 30 and 31, which have been interpreted as isolated discrete features, likely to be pits, and curvi-linear anomaly 13 which is similar in form to the anomalies 18 and 19 in Field 2 (Figure 8).
- 3.2.3.3 Anomaly 32 has been regarded as of no archaeological significance and related to modern disturbance, potentially activity related to a modern bore-hole. Additionally, anomaly 11 and 12 should be regarded as caused by modern activity and are likely to be the result of contemporary services.
- 3.2.3.4 The final feature of interest in Field 3 is anomaly 14 which appears as a north-west to south-east aligned field boundary on White's 1798 Estate map (Figure 9); potentially, a field boundary ditch or hedge-line of post-medieval date.



### **3.2.4 Field 4 (Figure 8)**

3.2.4.1 Field 4 was dominated by a series of high contrast anomalies of little form and likely represents demolition activity relating to the destruction of the 18<sup>th</sup> century farmhouse at East Cottingwood. The farmhouse had already been the subject of building recording and trial trenching and so is of limited archaeological significance (NAA 1999).

### **3.2.5 Field 5 (Figure 8)**

3.2.5.1 Field 5 contains anomalies principally associated with modern disturbance and activity. Two east-west orientated positive linear anomalies (34 and 35), in addition to north-south orientated positive linear anomaly 33, have been interpreted as modern services of no archaeological significance.

3.2.5.2 Area 36 highlighted in Figure 8, located at the western extent of Field 5, was caused by landscaping in relation to the field's former function as a cricket ground and has also been regarded as of no archaeological significance.

## **4.0 Discussion and Conclusions**

4.1 The results of the geophysical survey revealed a single area of potentially concentrated, archaeological significance at the southern extent of Field 2 (Figure 8). Positive linear anomaly 16 has been interpreted as a probable ditched enclosure containing two identifiable curvi-linear features (anomalies 18 and 19). Both anomaly 18 and 19 have been interpreted as potential domestic structures or roundhouses, whilst discrete positive anomalies 20 to 25 are believed to be associated waste pits. Anomaly 17 is also interpreted to be a ditched feature forming the western extent of the enclosure and therefore should be associated with anomaly 16. Anomaly 13 in Field 3 has a similar form to anomaly 18 and 19 (Figure 8) and might also be interpreted as forming part of a potential structure, requiring further investigation.

4.2 The form and pattern of distribution displayed by anomalies 16 to 25 bear similarity to the ditched enclosures of East Brunton, West Brunton, Pegswood Moor and Blagdon Park which had radiocarbon dates displaying occupation from the middle Iron Age until the early second century AD (Proctor J., 2009; Hodgson N., McKelvey J. and W. Muncaster 2012). The Romano-British settlement at Pegswood Moor was located less than a mile to the north-east of Field 2 and consisted of a c.120m wide, sub-rectangular enclosure containing domestic settlement structures, a cattle drove-way and smaller partitioned animal pens. An enclosure of similar form but consisting of less substantial ditches and fewer domestic structures was found 200m south of the main settlement at Blagdon Park and might also be regarded as of contemporary date to the potential enclosure revealed in Field 2.

4.3 The geophysical survey may therefore have revealed a ditched enclosure, related to domestic and agrarian activity, dating from the middle Iron Age until the early Romano-British period. Consequently, anomalies 16 to 25 are regarded as of potential archaeological interest and should be investigated further.

- 4.4 Anomalies 26, 28 and 29, within Fields 2 and 3, also fall into the linear classification and appear to relate to furrowing caused by agricultural activity, potentially farmed by the medieval strip system (Figure 8).
- 4.5 The geophysical survey results in Fields 4 and 5 (Figure 8) have revealed considerable modern disturbance and no anomalies of archaeological potential.
- 4.6 Anomalies 10 and 14 might also require investigation in order to successfully determine their function as potential post-medieval field boundaries as illustrated by White's 1798 Estate Map (Figure 9).
- 4.6 The results of this geophysical survey should be read in conjunction with the desk-based assessment as part of an overall heritage assessment and this will provide sufficient information to help devise a programme of invasive investigation in the form of strategically placed evaluation trenches. ARS Ltd can advise on the location of any evaluation trenches.

## **5.0 PUBLICITY, CONFIDENTIALITY AND COPYRIGHT**

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- 6.1 All statements and opinions contained within this report arising from the works undertaken are offered in good faith and compiled according to professional standards. No responsibility can be accepted by the author/s of the report for any errors of fact or opinion resulting from data supplied by any third party, or for loss or other consequence arising from decisions or actions made upon the basis of facts or opinions expressed in any such report(s), howsoever such facts and opinions may have been derived.

## **7.0 ACKNOWLEDGEMENTS**

- 7.1 Archaeological Research Services Ltd would like to thank those involved in the project for their help and advice. In particular we would like to thank Nathan Smith of Turley Associates.

## **8.0 REFERENCES**

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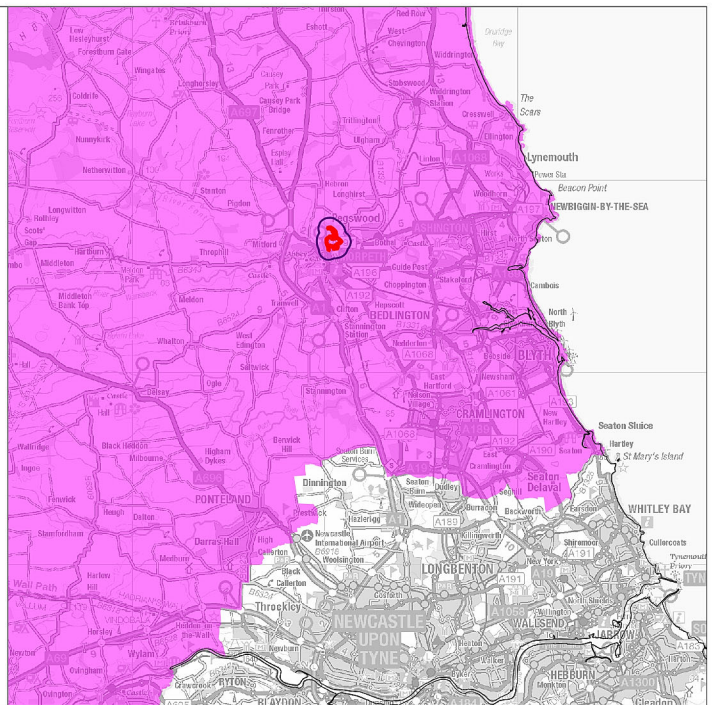
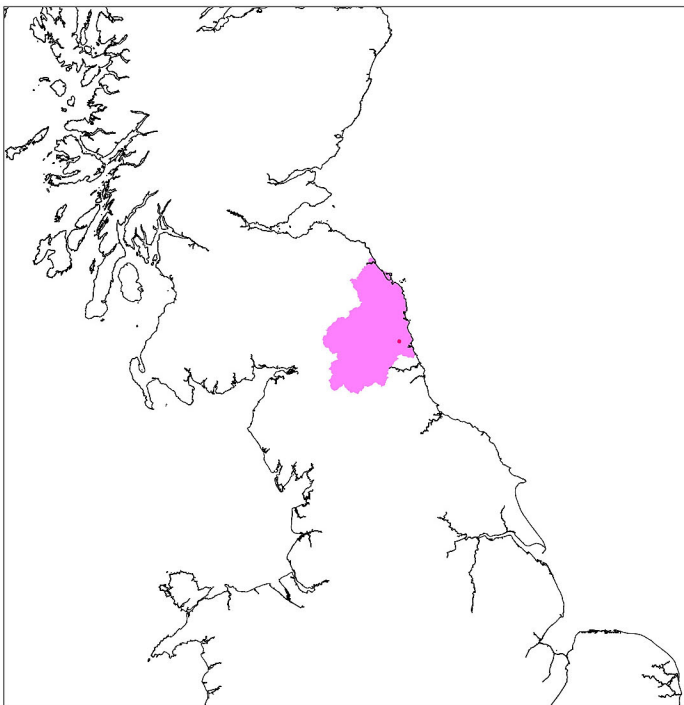
Hodgson, N, McKelvey, J and W. Muncaster, 2012. *The Iron Age on the Northumberland Coastal Plain: excavations in advance of development 2002-2010*, Newcastle-upon-Tyne: Tyne & Wear Archives & Museums and the Arbeia Society.

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## **Appendix 1: Figures**



Site name: St. George's Hospital, Morpeth  
 Date: July 2013  
 Drawn by: AB  
 Scale: Varies

Northumberland



500m study area



Redline boundary



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 Nursery Street  
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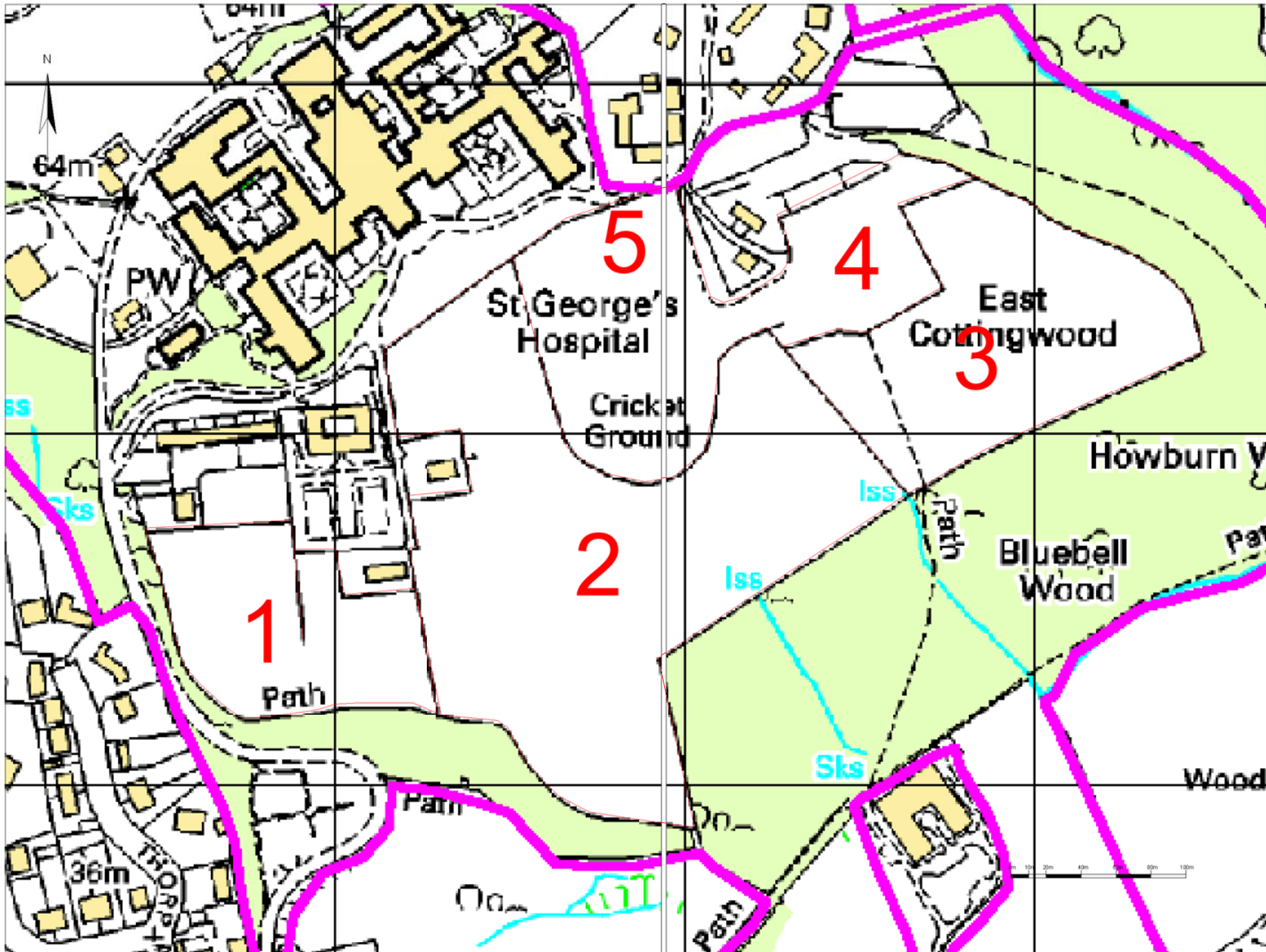


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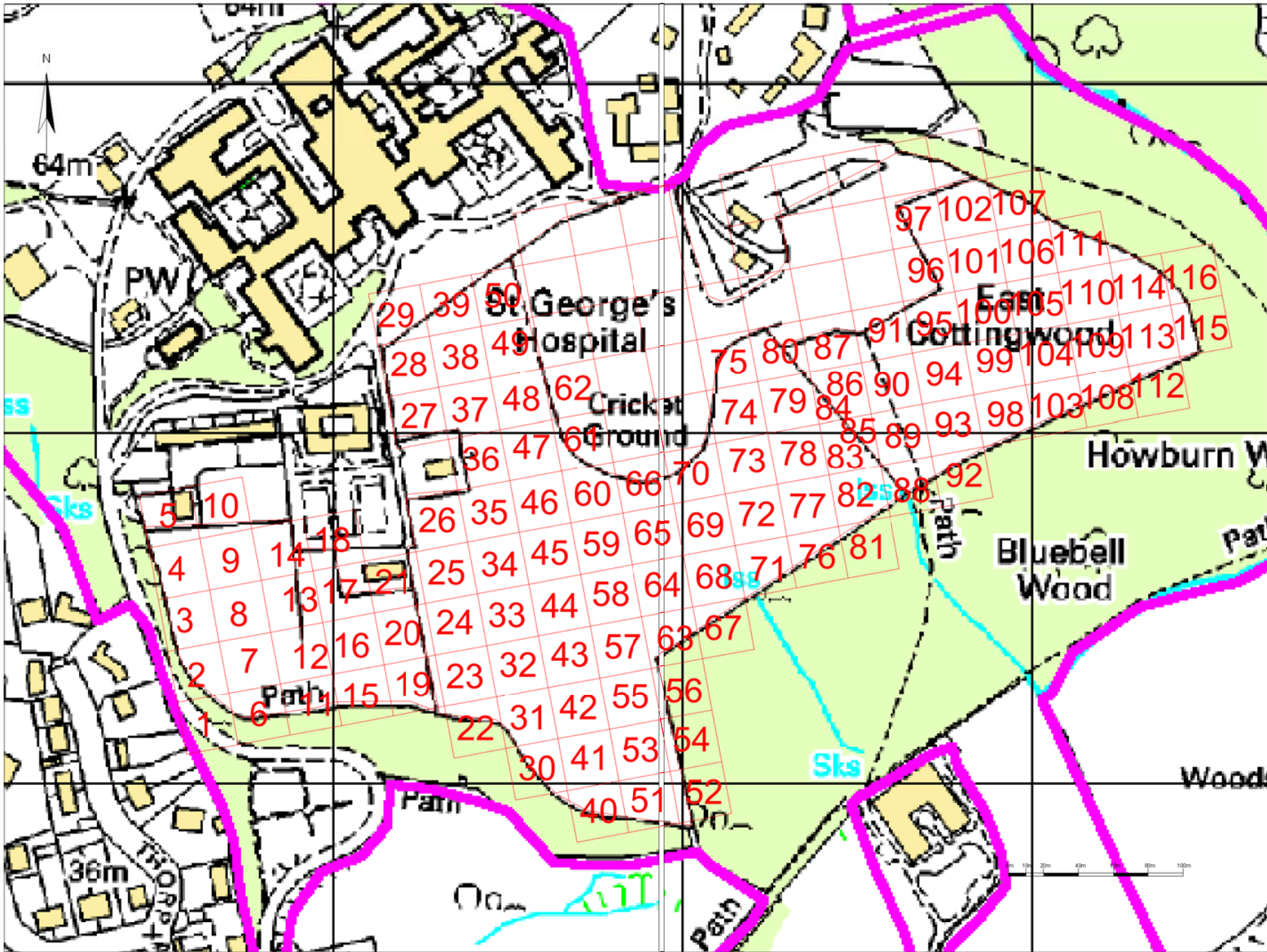


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St. George's Hospital,  
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 Figure 3  
 Field Numbers

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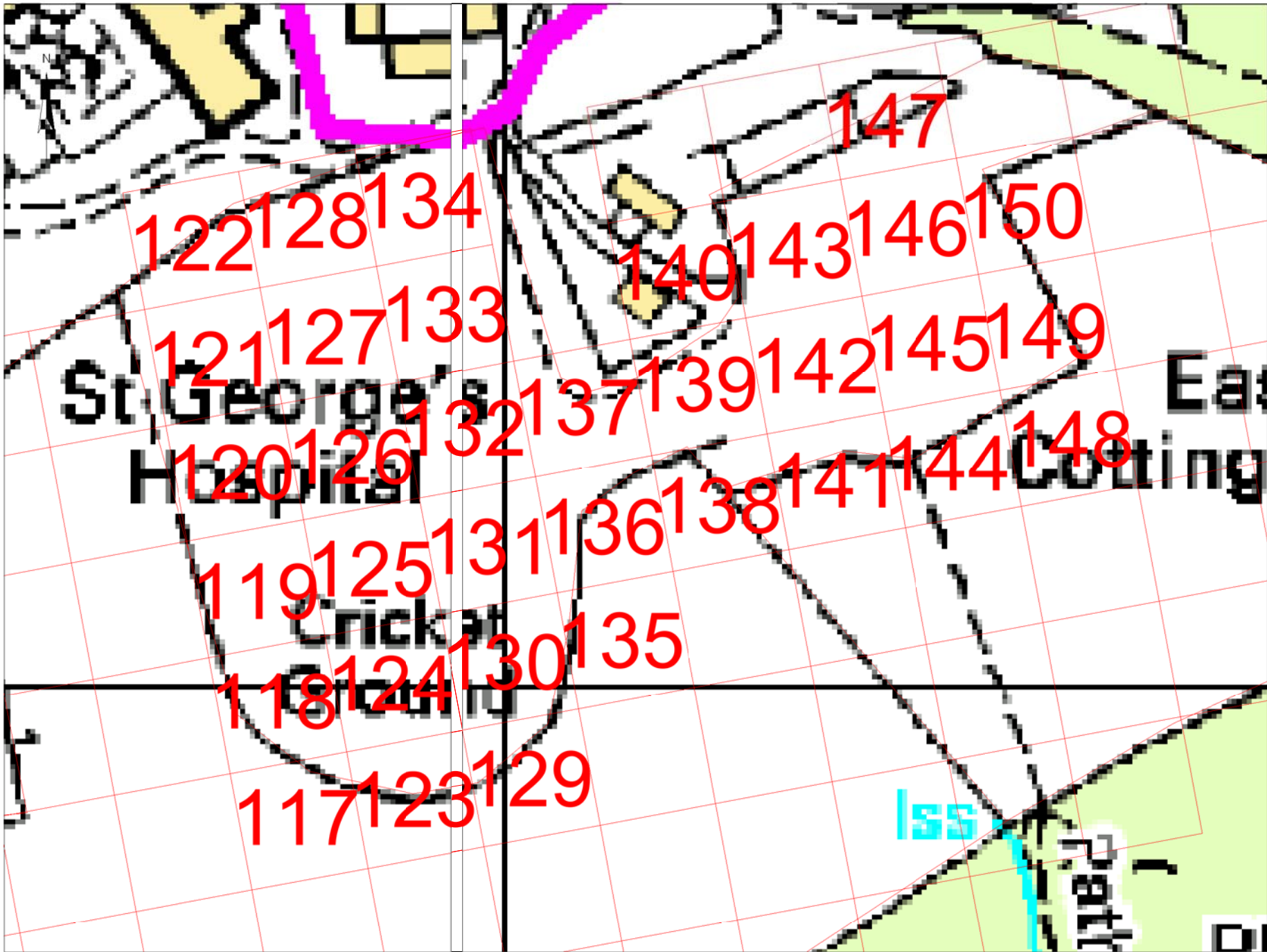
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St. George's Hospital,  
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 Figure 4  
 Location of Survey Grids  
 Field 1 to 3

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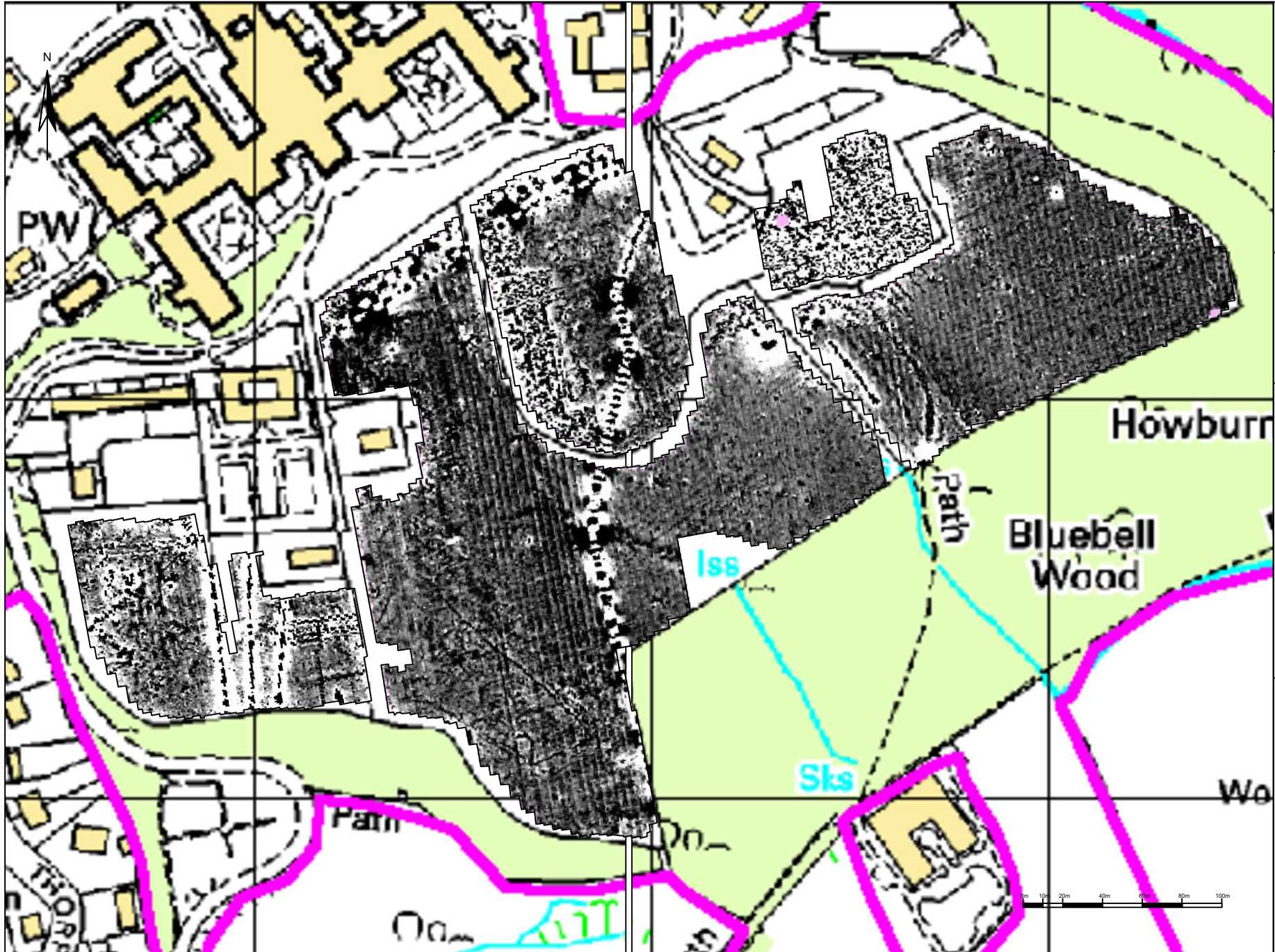
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St. George's Hospital,  
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 Figure 5  
 Location of Survey Grids  
 Field 4 and 5

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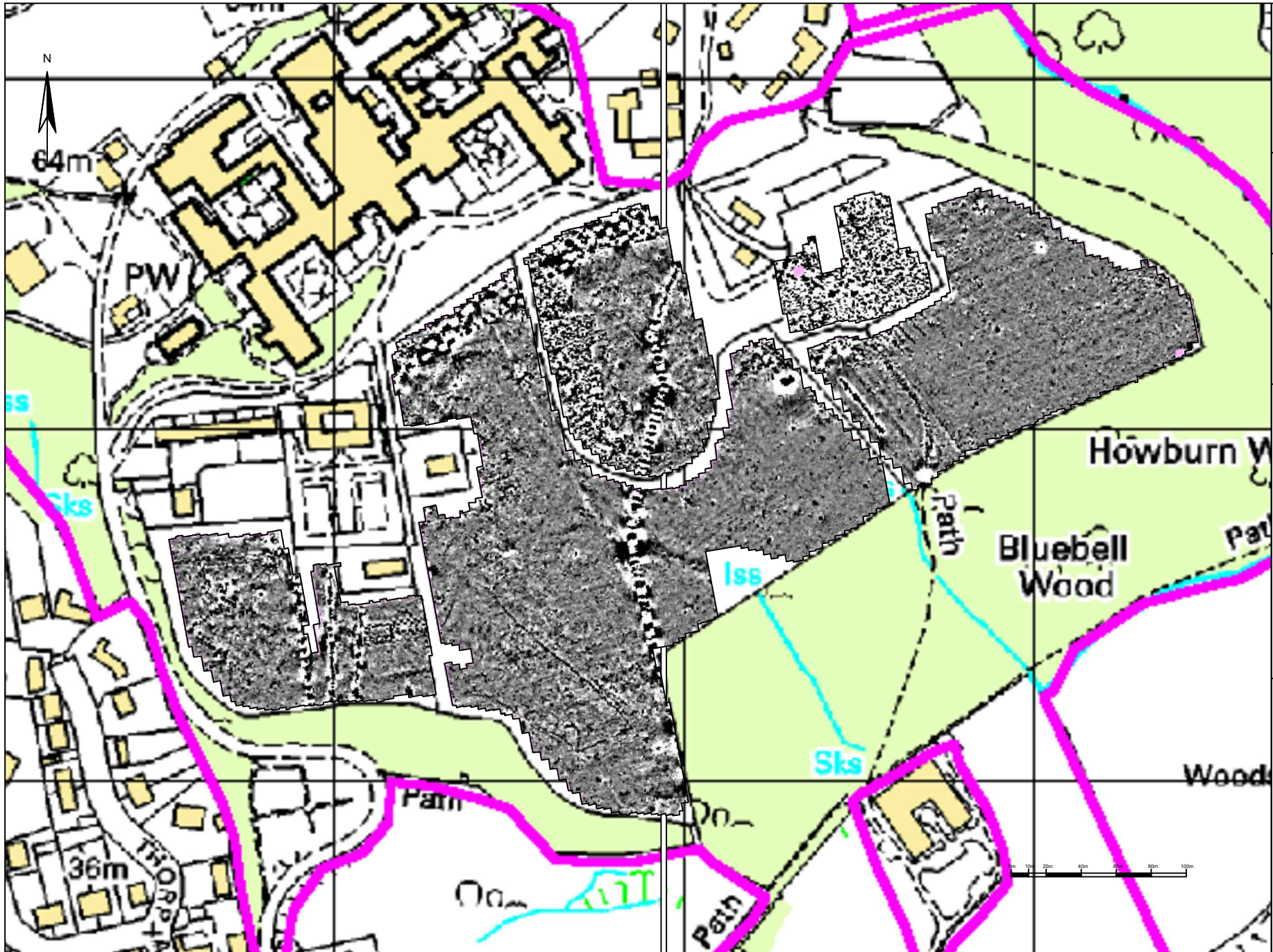
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St. George's Hospital,  
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 Figure 6  
 Geophysics Image of  
 Raw Data

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St. George's Hospital,  
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 Figure 7  
 Geophysics Image of  
 Minimally Processed Data

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St. George's Hospital,  
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 Figure 8

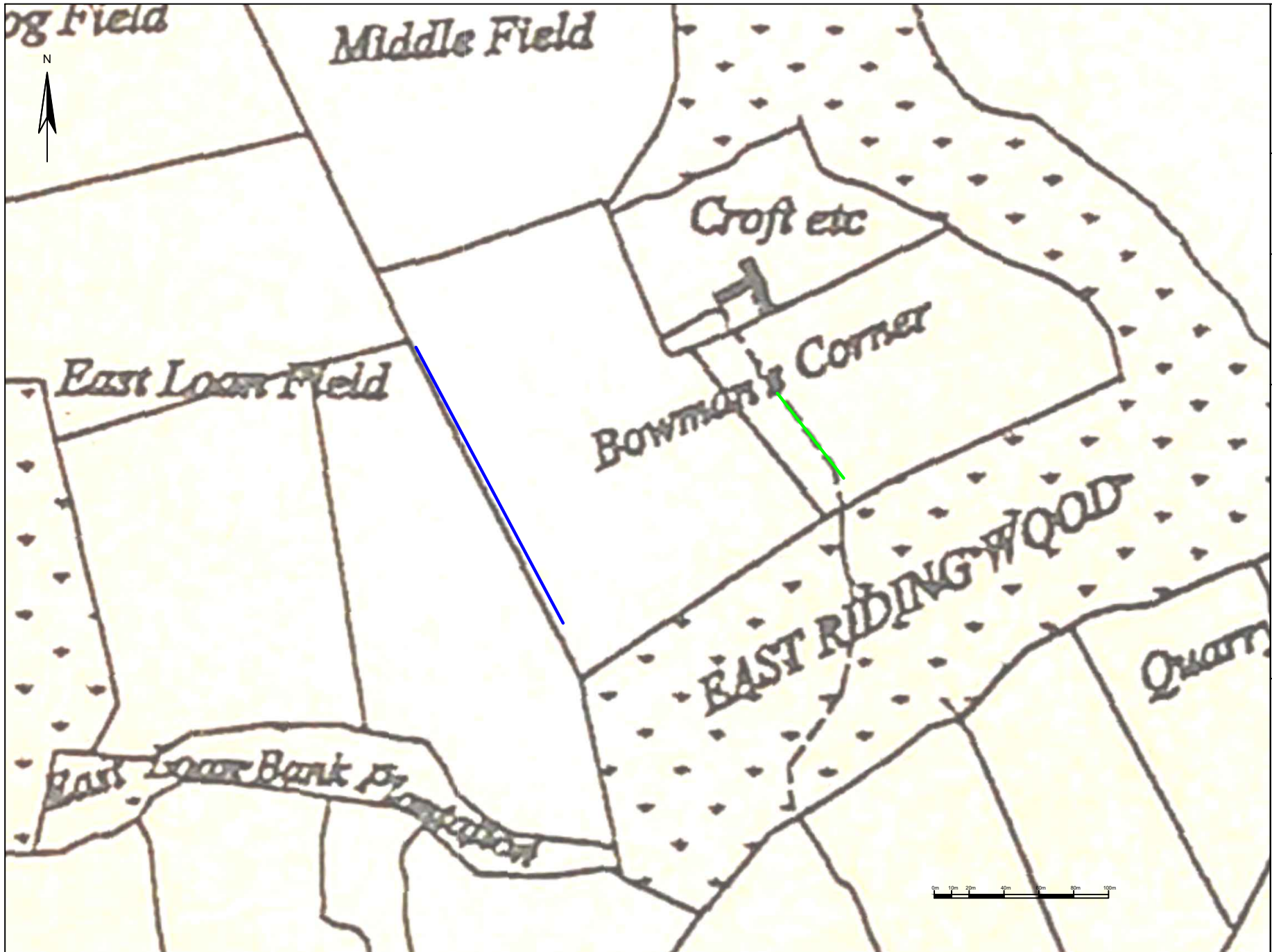
Geophysics Image of  
 Anomaly Classification  
 and Interpretation

- Key
- Positive Linear Anomaly
  - Negative Linear Anomaly
  - Dipolar Linear Anomaly
  - Modern Service
  - Ridge and Furrow
  - Modern Disturbance
  - Unsuitable for Survey
  - Positive Curvi-Linear Anomaly

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St. George's Hospital,  
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 Figure 9  
 1798 Map with  
 Corresponding  
 Anomalies

Key  
 — Positive Linear Anomaly  
 — Negative Linear Anomaly

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