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Geophysical Survey of Proposed Site of Educate  
Together National School,  
Jervis St, Ardee, Co. Louth

ARCHAEOLOGICAL  
CONSULTANCY  
SERVICES UNIT

Client  
Louth County Council  
County Hall  
Millennium Centre  
Dundalk  
A91 KFW6

ITM: 695610, 790682

Planning Ref: Louth County Council (Part 8)

Licence No: 17R0230

Jon Stirland

10<sup>th</sup> January 2018

Ref: 1768

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## PROJECT DETAILS

Project	Geophysical Survey of Proposed site of Educate Together National School, Jervis St, Ardee, Co. Louth
Report Type	Geophysical Survey
Archaeologist	Jon Stirland
Client	Louth County Council County Hall Millennium Centre Dundalk A91 KFW6
Site	Jervis St, Ardee, Co. Louth
Townland	Townparks
ITM Ref.	695610, 790682
Planning Ref. No.	Louth County Council (Part 8)
RMP No.	N/A
Detection Device Licence No.	17R0230
Report Date	10 <sup>th</sup> January 2018
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## NON TECHNICAL SUMMARY

This report details the results of a Geophysical Survey carried out on behalf of Louth County Council on the site of an Educate Together National School, located on Jervis St, Ardee, Co. Louth. The geophysical survey was carried out at the request of Louth County Council, who specified that an archaeological assessment include a geophysical survey and test trenching of the site. These requirements were based on recommendations made as a result of an Archaeological and Architectural Heritage Desk Based Assessment which was **carried out for this site in March 2015 by Archer Heritage Planning Ltd (Aidan O' Connell).**

The site is currently under pasture and was originally parkland associated with Adree House, a large country house and its associated estate grounds built in 1760-1800. The proposed works occur approximately 300m west of the historic town of Ardee (LH017-101) which is marked by fortifications along its western boundary and an entrance through the Town Wall at Ash Walk Gate.

The geophysical survey was conducted by Jon Stirland of Archaeological Consultancy Services (ACSU) between the 3<sup>rd</sup> and 4<sup>th</sup> January 2018 under license 17R0230. A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual sensor fluxgate gradiometer system. A detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas within the site with variations in the magnetic field between (-100nT to +107.834nT). The survey indicates that the site contains numerous magnetic anomalies that may be indicative of agricultural activity, such as iron objects located within the plough soil. Three areas of large isolated anomalies were noted. These may represent possible archaeological features, but may also represent areas of burning or large ferrous anomalies. A linear response aligned north-west to south-east traversing the centre of the site was also identified. This represents the line / route of a track / laneway, which is clearly depicted on the Ordnance Survey Cassini 6-inch MAP.

It is recommended that during the archaeological test trenching of the site that the three areas of potential archaeological / ferrous anomalies be tested to assess their significance.





## Contents

1. INTRODUCTION .....	1
2. METHODOLOGY .....	1
3. PLANNING BACKGROUND.....	1
4. SURVEY OBJECTIVES .....	2
5. SOILS, GEOLOGY & TOPOGRAPHY.....	2
6. RECORDED MONUMENTS.....	2
7. METHOD OF DATA INTERPRETATION.....	3
8. SURVEY RESULTS .....	3
9. CONCLUSIONS .....	3
10. REFERENCES .....	4
Appendix 1 - Summary Technical Information & Glossary of Terms .....	5

### List of Figures

Figure 1: Location of site showing areas of geophysical survey and nearby Recorded Monuments.

Figure 2: Extract from OS 6 inch Cassini map (1938-39) showing location of site and areas of geophysical survey.

Figure 3: Extract from first edition OS 6 inch map 1835 showing location of site and areas of geophysical survey.

Figure 4: Extract from OS 25 inch map 1907-09 showing location of site and areas of geophysical survey.

Figure 5: Detail of proposed development showing area of geophysical survey Area A.

Figure 6: Detail of geophysical survey.





## 1. INTRODUCTION

This report details the results of a Geophysical Survey carried out on behalf of Louth County Council on the site of an Educate Together National School, located on Jervis St, Ardee, Co. Louth, (ITM 695610, 790682), (Figures 1-2). The geophysical survey was carried out at the request of Louth County Council, who specified that the archaeological assessment must include a geophysical survey and test trenching of the site.

The geophysical survey was conducted by Jon Stirland of Archaeological Consultancy Services (ACSU) between the 3rd and 4th January 2018 under license 17R0230. A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual sensor fluxgate gradiometer system. Detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas within the site of the proposed development with variations in the magnetic field between (-100nT to +107.834nT). The site is currently under pastures and was originally parkland associated with Adree House as large country house and its associated estate grounds built in 1760-1800.

## 2. METHODOLOGY

The site is currently overgrown but was recently cut in order to facilitate the survey. It is enclosed by hedgerows to the east and west, by the Canal Road along the north and by a metal fence between it and the football field to the south. A low ridge runs north-south across the centre of the site. The north-east corner of the site was unsuitable for survey due to the presence of a hard-standing area consisting of tarmac and compacted gravel. The geophysical survey was carried out using a Bartington Grad 601-2 dual sensor fluxgate gradiometer which was designed specifically for archaeological prospection. A detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for the survey areas within the site of the proposed development. The survey was carried out in grids of 40m by 40m using a zig-zag pattern (Figures 5-6).

A gradiometer survey can detect subtle variations in the local magnetic field with measurements recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through detailed survey. Data was collected with a sample interval of 0.25m and a traverse interval of 1m, providing 1600 readings per 40m x 40m grid. The instrument was calibrated as recommended by **the manufacturers' guidelines**.

## 3. PLANNING BACKGROUND.

The proposed National Primary School at Jervis St, Ardee, Co. Louth, is being carried out by Louth County Council as a (Part 8) Planning application.

**An Archaeological and Architectural Heritage Desk Based Assessment was carried out for this site in March 2015 by Aidan O' Connell** of Archer Heritage Planning Ltd. This Geophysical survey is being carried out at the request of from Louth County Council. The site will also be tested by means of trenching following the geophysical survey. It is proposed that a full detailed gradiometer survey shall be undertaken throughout the application area.

The proposed works occur approximately 300m west of the historic town of Ardee (LH017-101) which is marked by fortifications along its western boundary and an entrance through the Town Wall at Ash Walk Gate. Previous archaeological excavations have occurred along the Town Wall in the area of the Supervalu supermarket to the east of the site.



## 4. SURVEY OBJECTIVES

The purpose of this Geophysical Survey is to assess if archaeological features are present within the current proposed development. A pre-survey examination of aerial photographs and cartographic evidence shows no change in field boundaries since at least the middle of the nineteenth century (Figures 3-4).

## 5. SOILS, GEOLOGY & TOPOGRAPHY

Most of Louth is underlain by rocks deposited in the Silurian period (shown in greenish-grey on the geological map below). These are part of the low-lying, long-eroded Longford-Down massif and explain some of the similarities in soil type and landscape between Louth and adjoining counties to the north (the brighter green rocks are of similar age and character). Some favoured parts of the county are underlain by the Carboniferous limestone (light blue below) that floors much of the midlands of Ireland. These two rock types, greywackes and limestone, are the main building rocks seen in the county, though there is some use of granite, granophyre and gabbro in the Cooley area.

Louth has a remarkably diverse and satisfying landscape for such a small county. This variety is a result of geological diversity. Most of Louth forms part of the low-lying Longford-Down massif and is underlain by sandy and shaley rocks deposited in the Silurian period (and some, older Ordovician rocks). These 420 million year old shales and greywackes were formed from deep water sediments, laid down on the continental slopes and ocean floors of an ancient, now-vanished ocean (named the Iapetus, after the father of Atlas, for whom the current, Atlantic Ocean is named). This ocean lay between a proto-Europe and a proto-North America, which advanced upon each other, swallowing up the intervening ocean floor and slamming (ever so slowly) into each other along a line which runs across Ireland from the Shannon Estuary to Clogherhead. The continental collision was accompanied by volcanism and the formation of towering, Himalaya-sized mountains, now eroded back to sand, silt and mud and Louth's fertile plains.

Towards the south of the county, and along the continental suture, the land rises into low hills, such as Mount Oriel, from which wonderful views can be had, both south, into the Boyne Valley, and north over the rest of the county. The Boyne Valley, as with much of the rest of the midlands, is dominated by limestone and other rocks of Lower Carboniferous age, which also occur in a few other places, including near Dundalk and on the Cooley peninsula.

The northern end of the county is, however, dominated in a very different, physical sense, by hard, resistant, igneous rocks. The Cooley peninsula has more in common with related igneous areas in South Armagh (Slieve Gullion, to the north-west) and to Down's Mourne (to the north-east) than with the rest of Louth. Approaching from the south these three mountain ranges appear like a huge barricade, controlling access into Ulster from the rest of Ireland, or is it the other way around? These mountains owe their origin to the opening, not the closing of an ocean. As Eurasia and North America went their separate ways, huge ruptures and cracks in the earth's crust allowed hot, molten rock reach close to or even onto the earth's surface. This magma forced its way up and into the existing 'country rocks', where it cooled and solidified, some 56 to 58 million years ago. This was the same time period as the formation of the world famous Giant's Causeway. Tens of millions of years of erosion, including several Ice Ages, have worn away the originally-overlying sedimentary rocks, exposing these bones of the landscape at the surface.

## 6. RECORDED MONUMENTS

The site of the proposed development contains no recorded monuments listed within the Record of Monuments and Places (RMP). The closest recorded sites to the subject site are a tower house (LH017-009; 80m east), a mound (LH017-002; 155m south) and a ford



(LH017-103; 205m southwest), located at the east, south and southwest (Figure 1). The historic town of Ardee (LH017-101) is also located c. 350m to the east. The site is therefore located in an area of archaeological potential, with buried archaeological remains known to be present within the later medieval town. The following monument descriptions are derived from both the published 'Archaeological Inventory of County Louth' (Dublin: Stationery Office, 1986) and the 'Archaeological Survey of County Louth' (Dublin: Stationery Office, 1991).

## 7. METHOD OF DATA INTERPRETATION

Interpretation of the results was made by examination of the raw data as greyscale images, XY trace, relief and data plots. Archived raw data is presented in Figure 6 and an interpretation is also in Figure 6.

## 8. SURVEY RESULTS

The geophysical survey was conducted by Jon Stirland of Archaeological Consultancy Services (ACSU) between the 3rd and 4th January 2018 under license 17R0230. A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual sensor fluxgate gradiometer system. Detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas within the site of the proposed development with variations in the magnetic field between (-100nT to +107.834nT). The site is currently under pastures and was originally parkland associated with Adree House as large country house and its associated estate grounds built in 1760-1800

The survey indicates that the site contains numerous magnetic anomalies that may be indicative of agricultural activity, such as iron objects located within the plough soil. Three areas of large isolated anomalies were noted and these may represent possible archaeological features, but may also represent areas of burning or large ferrous anomalies (Figures 5 and 6).

A linear response aligned north-west to south-east traversing the centre of the site was also identified. This represents the line / route of a track / laneway, which is clearly depicted on the Ordnance Survey Cassini 6-inch, (Figures 5 and 6).

## 9. CONCLUSIONS

The survey indicates that the site contains numerous magnetic anomalies that may be indicative of agricultural activity, such as iron objects located within the plough soil. Three areas of large isolated anomalies were noted and these may represent possible archaeological features, but may also represent areas of burning or large ferrous anomalies.

A linear response aligned north-west to south-east traversing the centre of the site was also identified. This represents the line / route of a track / laneway, which is clearly depicted on the Ordnance Survey Cassini 6-inch. It is recommended that during the archaeological test trenching of the site the three areas of potential archaeological / ferrous anomalies be tested to assess their significance.




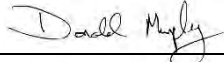
## 10. REFERENCES

Gaffney, C & Gater, J (2003). *Revealing the buried past: Geophysics for Archaeologists*. Tempus Publishing Limited.

Gaffney, C. Gater, J. & Ovenden, S. (2006) 'The use of Geophysical Techniques in Archaeological Evaluations.' IFA Paper No. 6.

English Heritage (2008) *Geophysical guidelines: Geophysical Survey in Archaeological Field Evaluation*. Second Edition.

National Soil Survey of Ireland (1980) *General soil map* Second edition (1:575,000). An Foras Taluntais.

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Prepared by:	Jon Stirland
Signed:	
Approved by:	Donald Murphy
Signed	



## Appendix 1 - Summary Technical Information & Glossary of Terms

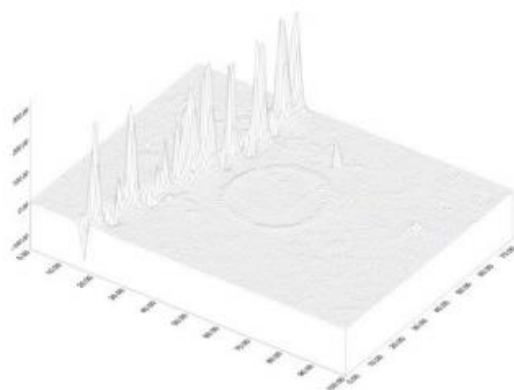
Fluxgate Gradiometer Survey: Surveys are undertaken using the Bartington Grad 601-2 survey instrument which was specifically designed for archaeological prospection. It includes sensors that are highly stable, minimizing requirements for excess data processing. The instrument has a vertical 1 m sensor separation permitting finite resolution of buried archaeological features. Surveys can be undertaken in scan or detailed (zig-zag traverse) modes for reconnaissance or high-density mapping. The fluxgate enables reliable flexibility during fieldwork. Frequent realignment of the instruments and zero drift correction ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions. The instrument can be employed in both commercial and research based investigations allowing for completion of projects within short timescales. Regular grid sample densities from standard 1600 readings to 12800 readings per 20m by 20m grid are permitted. A constant high quality of data is assured by experienced field staff operating in accordance with English Heritage Research & Professional Guidelines *Geophysical Survey In Archaeological Evaluation* (David, A, 1995).



Bartington Grad 601-single axis dual sensor gradiometer.

### Data Display Formats

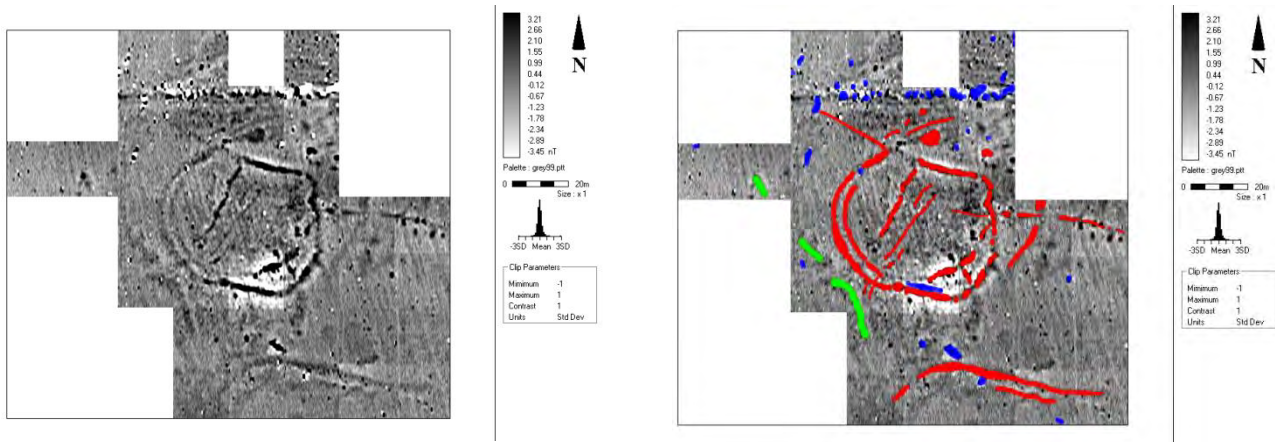
**XY Trace:** The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.



XY Trace of enclosure site

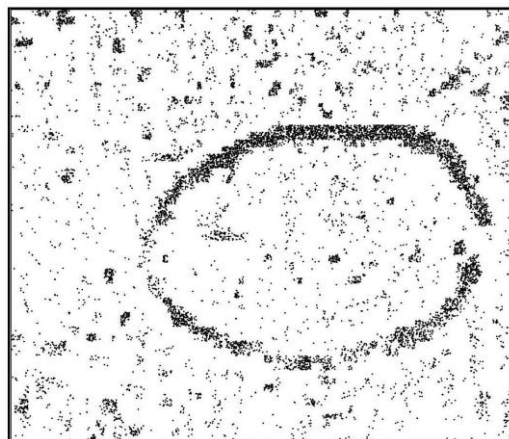


**Greyscale:** As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection.



Early medieval enclosure greyscale

**Dot Density Plot :** Each datum is assigned a cell in which the intensity or number of dots displayed is proportional to the magnitude of the individual response. The visibility or presentation of responses within a given survey area is governed by numeric parameters specific to both soil morphological and archaeological conditions observed on site. Typically, the range of weak to strong responses is manifested by a low to high level of dot density. The format is useful for displaying gradiometer and resistance data particularly for identifying low-level responses.



Dot Density plot of oval shaped enclosure

## Glossary of Interpretation Terms

**Archaeology:** This category refers to responses usually supported by comparative archaeological evidence (i.e., photographic transcriptions, excavation, etc). The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, storage pits and associated features.

**Archaeology ?:** This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

**Industrial:** Such anomalies generally possess a strong magnetic response and may equate with archaeological features such as kilns, furnaces, concentrations of fired debris and associated industrial debris.



**Area of Increased Magnetic Response:** These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

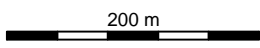
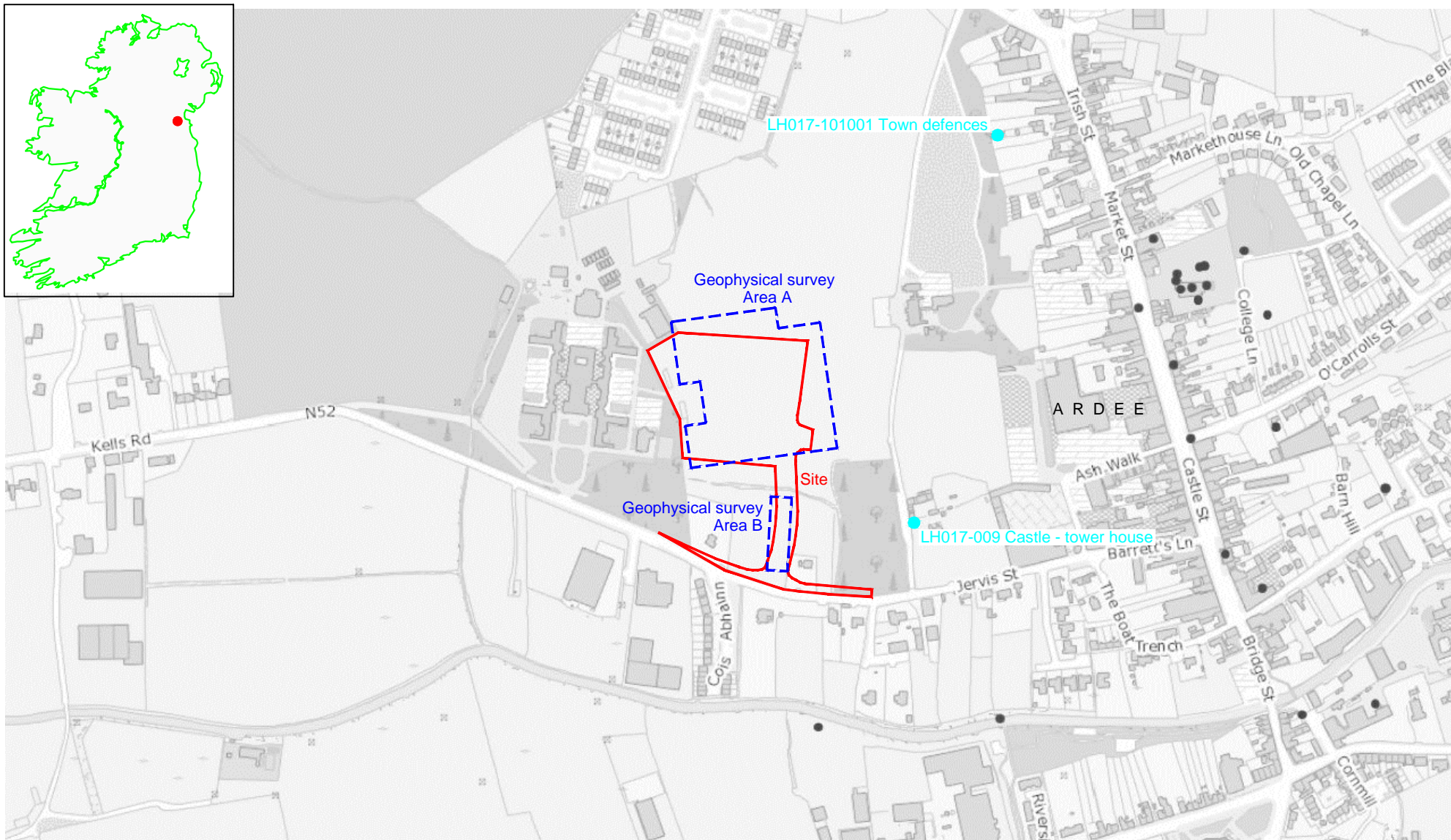
**Trend :** This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

**Ploughing/Ridge & Furrow :** Visible as a series of linear responses, these anomalies equate with recent cultivation trends.

**Natural?:** Resulting from localised natural variations in the magnetic background of the subsoil, these responses are often recorded in areas of low-lying land prone to flooding.

**Ferrous :** These anomalies exhibit a typically strong magnetic response, often referred to as 'iron spikes,' and are the result of modern metal debris located within the topsoil.

**Area of Strong Magnetic Disturbance:** This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.



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Client: Louth County Council		
Issued for: Geophysical Survey Report		
Date: Jan '18	Scale: 1:6,000 @a4	Drawing No.: 1768_C1021

Figure 1: Location of site showing areas of geophysical survey and nearby Recorded Monuments

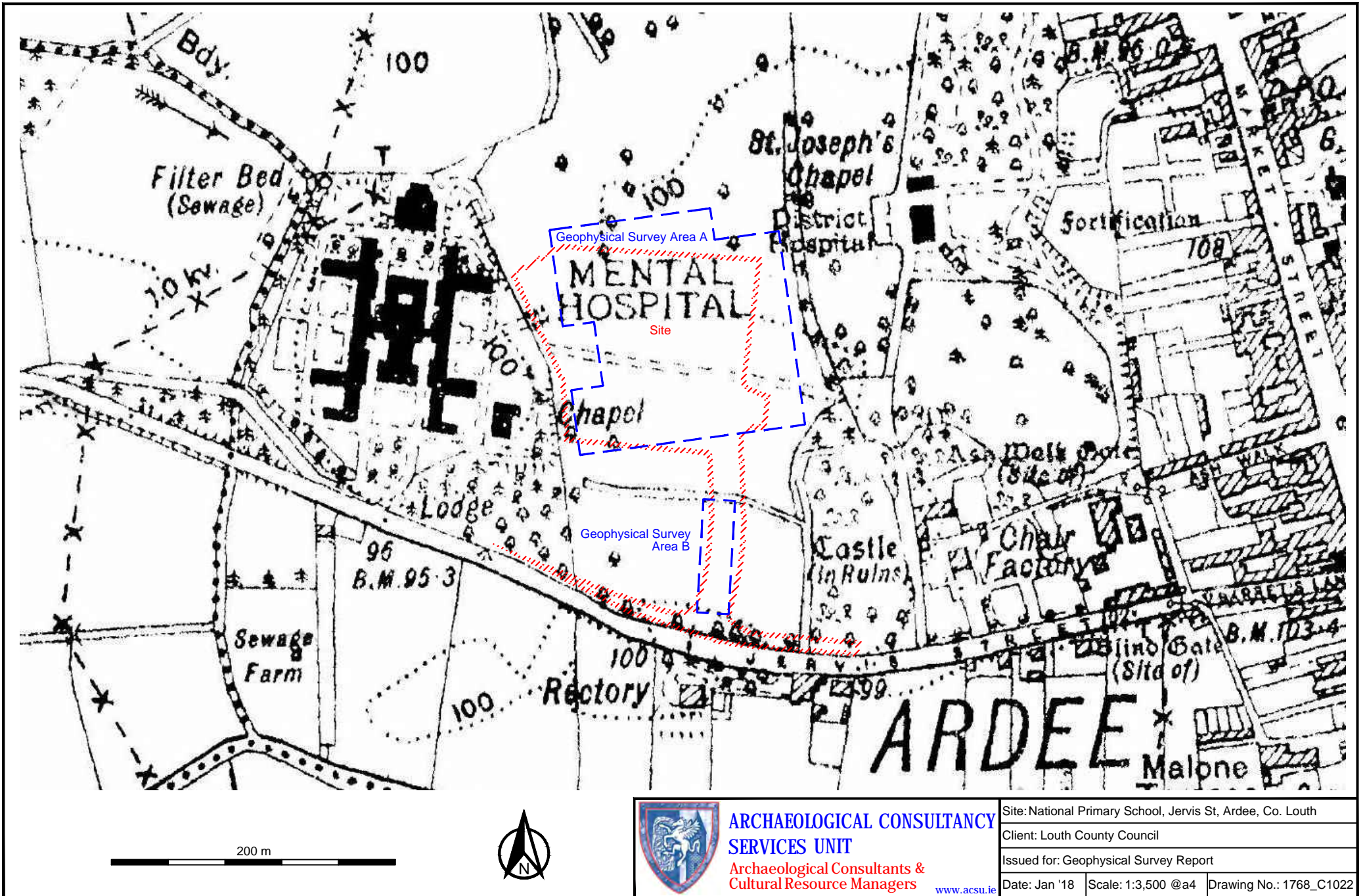
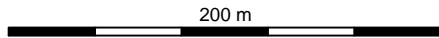
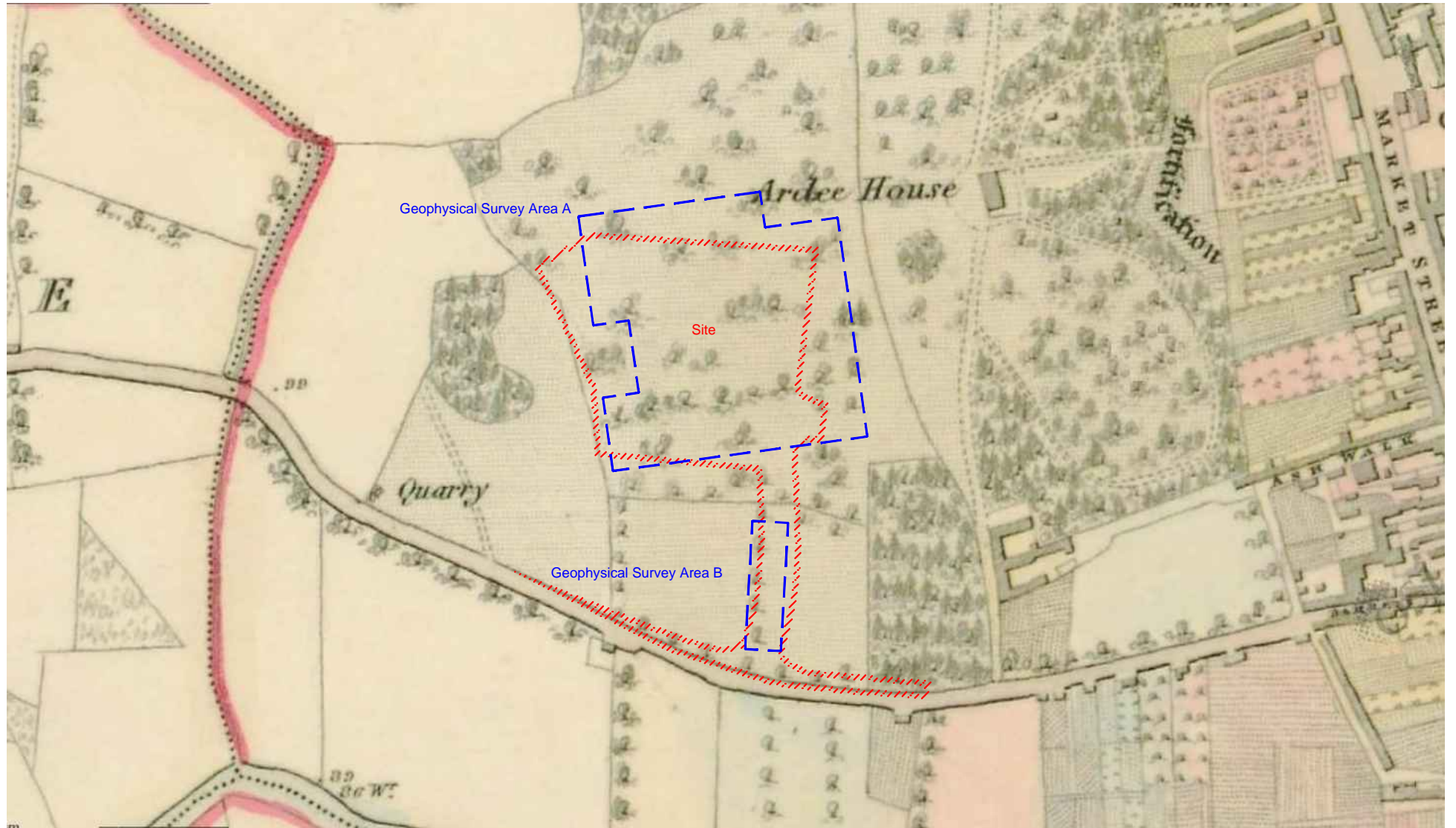


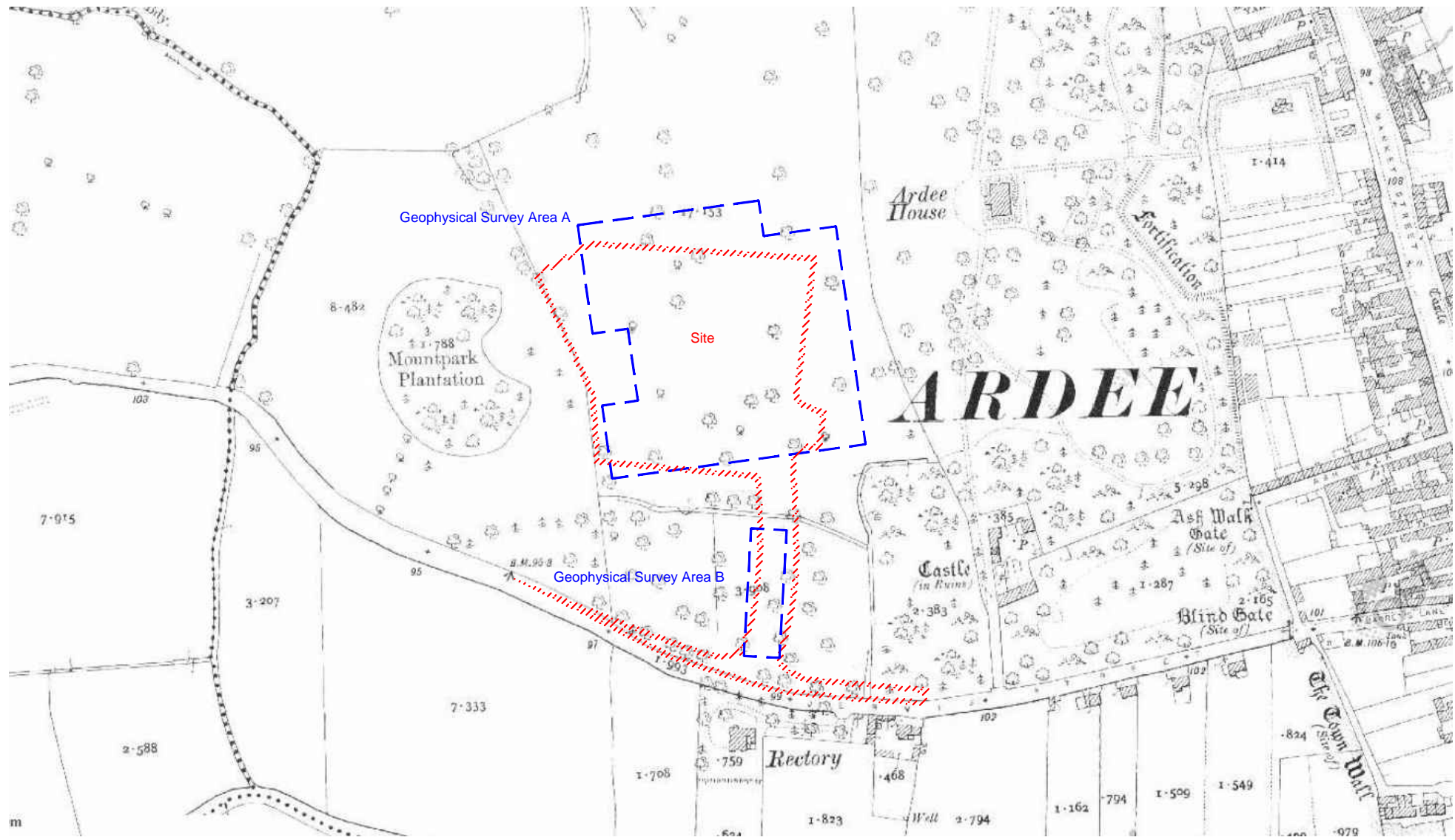
Figure 2: Extract from OS 6 inch Cassini map (1938-39) showing location of site and areas of geophysical survey



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Figure 3: Extract from first edition OS 6 inch map (1835) showing location of site and areas of geophysical survey




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	Date: Jan '18	Scale: 1:3,500 @a4	Drawing No.: 1768_C1023

Figure 4: Extract from 25 inch OS map (1907-9) showing location of site and areas of geophysical survey

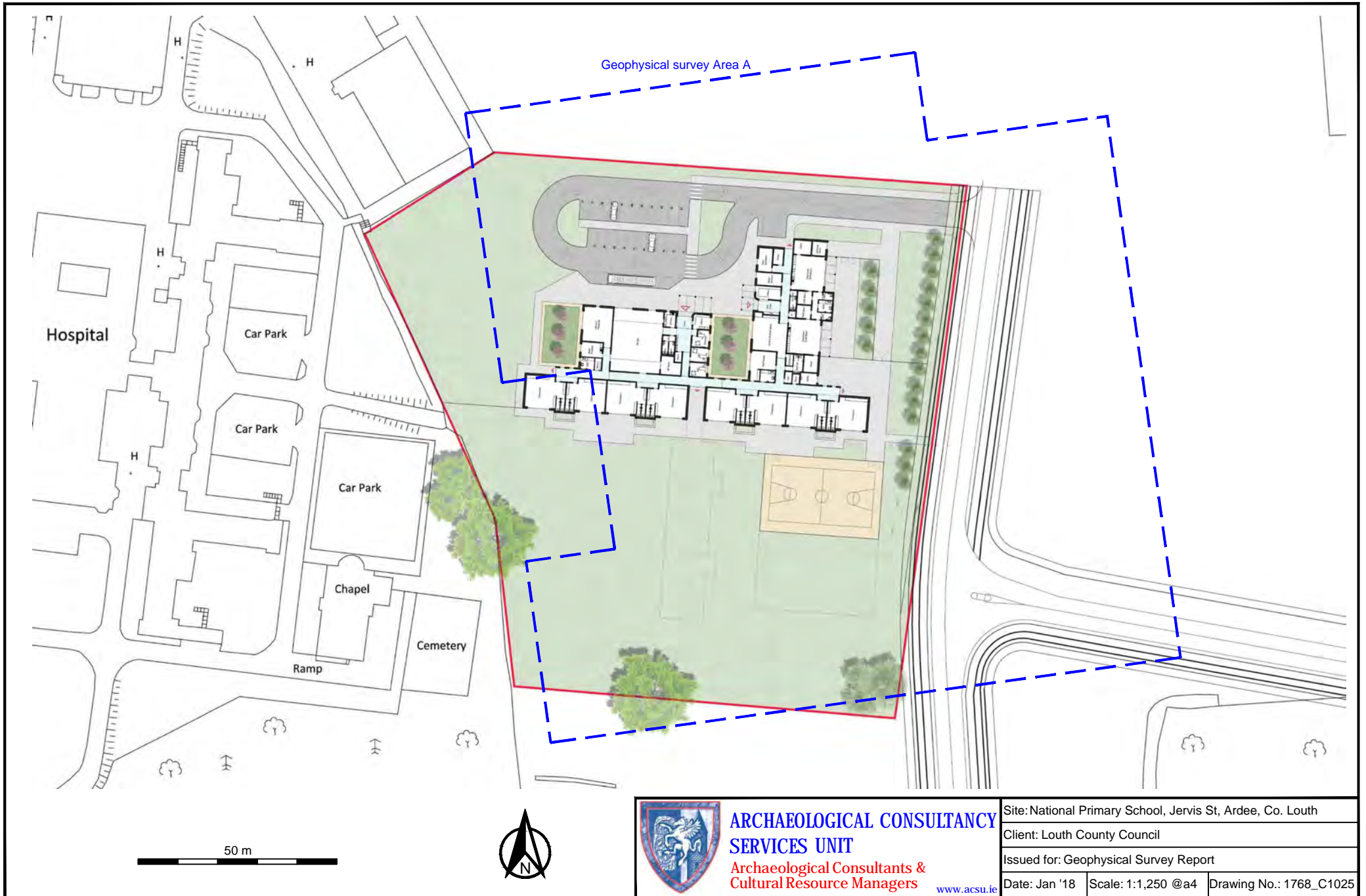


Figure 5: Detail of proposed development showing geophysical survey Area A

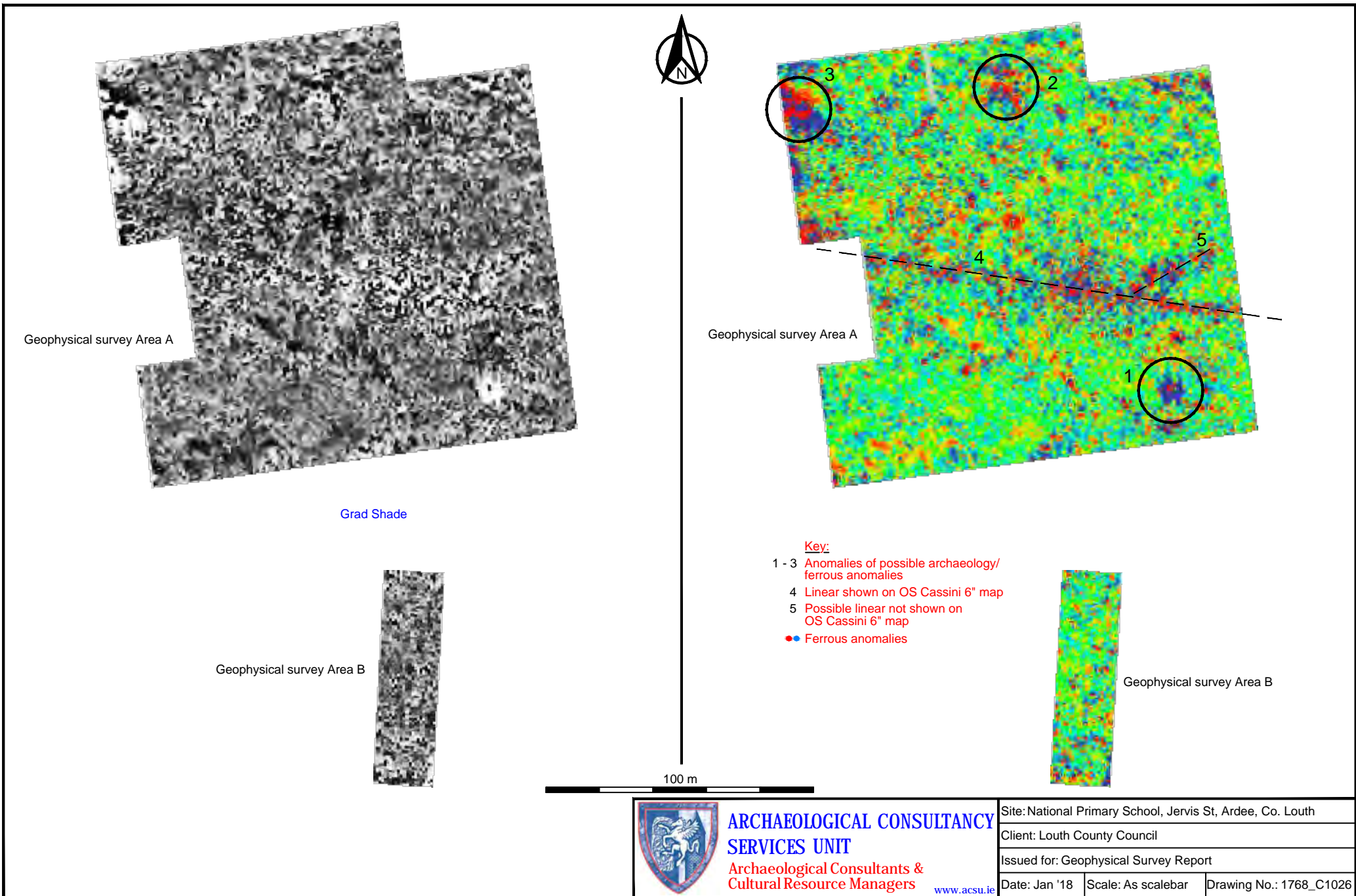


Figure 6: Detail of geophysical survey