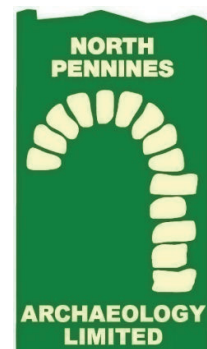


**GEOPHYSICAL SURVEYS
OF LAND AT FITZ PARK
COCKERMOUTH
CUMBRIA**



**GEOPHYSICAL SURVEY REPORT
CP. No: 1031/09
27/10/2009**

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Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

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SUMMARY

In October 2009, North Pennines Archaeology Ltd, commissioned by Philip Cracknell, undertook geophysical surveys of land adjacent at Fitz Park, Cockermouth, Cumbria (centred on Ordnance Survey grid reference NY 1063 3073), prior to the proposed development of the site by Lakeland Leisure Limited. This area borders the site of a Scheduled Ancient Monument (SAM 27706), which is believed to be the site of a Romano-British farmstead.

The objective of the geophysical surveys was to determine the presence/absence, nature and extent of potential archaeological features within the study area, and the presence/absence of any known modern features within the survey area, which may affect the results. The results of the geophysical survey were to be used to inform the locations of trenches in the subsequent trial trench evaluation of the site.

Geomagnetic surveys covering c.5ha of land in total were conducted over two separate locations within the study area (Area 1 and Area 2). The central part of the study area was not surveyed, due to the presence of a substantial depth of made-ground resulting from the construction of the A66 carriageway. It is considered unlikely that this area would be responsive to a geophysical survey.

The northern part of the study area (Area 1) was situated in an area of alluvial geology close to the River Derwent. The most notable features detected by the geophysical survey were a series of linear and curvilinear magnetic anomalies, which are interpreted as possible palaeochannels. Modern service pipes and a series of possible land drains were also detected.

The southern part of the study area (Area 2) was considered to have high archaeological potential due to the close proximity of a Romano-British settlement in Fitz Woods. However, the results of the geophysical survey in this area were dominated by the presence of fired/ferrous magnetic material resulting from modern activity, making the value of the geophysical survey extremely limited.

It is recommended that the results of the geophysical surveys are tested through the excavation of a series of trial trenches across the site. These should be positioned both to sample the possible soil-filled palaeochannels detected in the northern area, and to test for archaeological features in the southern area, since the geophysical survey in this area was dominated by modern magnetic disturbance which could have masked potential archaeological features.

ACKNOWLEDGEMENTS

North Pennines Archaeology Ltd would like to thank Philip Cracknell, for commissioning the project, and for all assistance throughout the survey.

North Pennines Archaeology Ltd would also like to extend their thanks to Mr & Mrs Robert Slack of The Fitz, for their assistance during the fieldwork.

The geophysical surveys were undertaken by Angus Clark and Kevin Mounsey. The report was written and illustrated by Martin Railton. The project was also managed by Martin Railton, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT (FIGURE 1)

- 1.1.1 Between 19th and 21st October 2009, North Pennines Archaeology Ltd, undertook geophysical surveys of land at Fitz Park, Cockermouth, Cumbria, at the request of Philip Cracknell. This followed a proposal by Lakeland Leisure Limited for a residential development at the site. The archaeological work was undertaken in accordance with a Cumbria County Council Historic Environment Service (CCCHES) brief, which specified that an archaeological evaluation was required at the site. This was in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16) and the Allerdale Local Plan.
- 1.1.2 The study area comprised two fields of pasture land, and an area of very rough ground, situated to the north of the A66 carriageway, to the west of Cockermouth. It was bounded by the River Derwent to the north, and Fitz Woods to the east (Figure 1). The site is centred on Ordnance Survey grid reference NY 1063 3073.
- 1.1.3 This area borders the site of a Scheduled Ancient Monument (SAM 27706), the site of a Romano-British farmstead. It was believed that archaeological remains could survive at the site, which may be associated with this settlement.
- 1.1.4 The objective of the geophysical surveys was to determine the presence/absence, nature and extent of potential archaeological features within the survey area, and the presence/absence of any known modern features within the survey area, which may affect the results. The results of the geophysical survey were to be used to inform the locations of trenches in the subsequent trial trench evaluation of the site.
- 1.1.5 This report outlines the results of the geophysical surveys undertaken, and includes an interpretation of the geophysical survey results, in light of the archaeological and historical background of the site, with recommendations for further work where necessary.

2 METHODOLOGY

2.1 STANDARDS

2.1.1 The survey work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA 2002), and English Heritage Guidelines (English Heritage 2008).

2.2 GEOPHYSICAL SURVEYS

2.2.1 **Technique Selection:** geomagnetic survey was selected as the most appropriate technique, given the non-igneous environment, and the expected presence of cut archaeological features at depths of no more than 1.5m. This technique involves the use of hand-held gradiometers, which measure variations in the vertical component of the earth's magnetic field. These variations can be due to the presence of sub-surface archaeological features. Data were recorded by the instruments and downloaded into a laptop computer for initial data processing in the field using specialist software.

2.2.2 **Field Methods:** the geophysical study area measured c.5ha divided into two separate areas (Areas 1-2). A 30m grid was established in each area, and tied-in to known Ordnance Survey points using a Trimble 3605DR Geodimeter total station with datalogger.

2.2.3 Geomagnetic measurements were determined using a Bartington Grad601-2 dual gradiometer system, with twin sensors set 1m apart. It was expected that significant archaeological features at a depth of up to 1.5m would be detected using this arrangement. The survey was undertaken using a zig-zag traverse scheme, with data being logged in 30m grid units. A sample interval of 0.25m was used, with a traverse interval of 1m, providing 3600 sample measurements per grid unit. The data were downloaded on site into a laptop computer for processing and storage.

2.2.4 **Data Processing:** geophysical survey data were processed using ArchaeoSurveyor II software, which was used to produce 'grey-scale' images of the raw data. Positive magnetic anomalies are displayed as dark grey, and negative magnetic anomalies are displayed as light grey. A palette bar shows the relationship between the grey shades and geomagnetic values in nT.

2.2.5 Raw data were processed in order to further define and highlight the archaeological features detected. The following basic data processing functions were used:

Despike: to locate and suppress random iron spikes in the gradiometer data.

Clip: to clip data to specified maximum and minimum values, in order to limit large noise spikes in the geophysical data.

Interpolate: to match the traverse and sample intervals in the gradiometer data.

2.2.6 **Interpretation**: three types of geophysical anomaly were detected in the gradiometer data:

positive magnetic: regions of anomalously high or positive magnetic data, which may be associated with the presence of high magnetic susceptibility soil-filled features, such as pits or ditches.

negative magnetic: regions of anomalously low or negative magnetic data, which may be associated with features of low magnetic susceptibility, such as stone-built features, geological features, land-drains or sub-surface voids.

dipolar magnetic: regions of paired positive and negative magnetic anomalies, which typically reflect ferrous or fired materials, including fired/ferrous debris in the topsoil, modern services, metallic structures, or fired structures, such as kilns or hearths.

2.2.7 **Presentation**: the grey-scale images were combined with site survey data and Ordnance Survey data to produce the geophysical survey plans. Colour-coded geophysical interpretation diagrams are provided, showing the locations and extent of positive, negative and dipolar geomagnetic anomalies.

2.2.8 Archaeological interpretation diagrams are provided, which are based on the interpretation of the geophysical survey results, in light of the archaeological and historical background of the site.

2.2.9 Trace plots of the raw data are included in Appendix I.

2.3 ARCHIVE

2.3.1 The data archive for the geophysical survey has been created in accordance with the recommendations of the Archaeology Data Service (ADS 2001). This archive is currently held at the company offices at Nenthead, Cumbria.

2.3.2 One copy of the final report will be deposited with the County Historic Environment Record, where viewing will be available on request. The project is also registered with the **Online Access to the Index of archaeological investigations (OASIS)**, where a digital copy of the report will be made available.

2.3.3 The OASIS reference for this project is **northpen3-66311**.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

3.1.1 Cockermouth lies on the eastern edge of the West Cumbria Coastal Plain, in a pastoral landscape with gently undulating topography (Countryside Commission 1998). Fitz Park lies on the western edge of Cockermouth, immediately to the north of the A66. The parkland is situated within the valley of the River Derwent, which flows from east to west to the north of the park. The Fitz mansion house lies on the east side of the park. Land rises to the southwest behind the mansion house to a height of 60m AOD. This higher ground is occupied by the Romano-British farmstead within Fitz Woods. The land to the west of the proposed development area is occupied by a modern sewerage works. The proposed development encompasses the parkland behind The Fitz and two agricultural fields to the northwest.

3.1.2 The underlying geology is primarily Carboniferous limestone, which is part of a narrow band, with coal measures and millstone grit to the west, and Skiddaw slate to the east, with overlying Moranic Drift (British Geological Survey North Sheet, First Edition Quaternary, 1977). The overlying soils of the area are known as Brickfield 2 soils, which are fine loamy soils, with deposits of alluvium close to the River Derwent.

3.2 HISTORICAL CONTEXT

3.2.1 *Introduction:* this historical background is compiled mostly from secondary sources, and is intended only as a brief summary of historical developments specific to the study area. A desk-based assessment of the site has already been undertaken, a summary of which is included here (Cracknell 2009).

3.2.2 *Prehistoric and Roman:* during the Roman period, there was a heavy military presence in Cumbria, and there is considerable evidence for Roman military activity to the north of the study area during this period. The earliest known settlement is at Papcastle c.1km to the north of the proposed development area. This dates to the Romano-British period, and may be subdivided into the fort of *Devensio*, and the extramural settlement (*vicus*).

3.2.3 The fort and extramural settlement at Papcastle is well served by Roman roads. There were at least five major roads radiating from Carlisle, which served the whole of Cumbria. The road from Carlisle to Papcastle is well documented (Road 75, Margary 1973), from where it runs through the forts at Old Carlisle (Maglona) and Blennerhasset. The modern A595 road follows the original Roman road. From earlier observations it seems fairly clear that the main road 75, continued beyond Papcastle to the south-west. The fort

occupies a strategic position on a hill overlooking a major crossing of the River Derwent. A number of Roman finds have been recovered from fields immediately to the north of the present study area by metal detectorists.

- 3.2.4 The earliest evidence of past activity within the study area is the Romano-British settlement in Fitz Woods (SAM 27706). This is a sub-rectangular earthwork enclosure, with rounded corners, inner bank, ditch and outer bank, measuring 44m by 38m internally. The site is interpreted as a native settlement of the Roman period; however this has not been confirmed by excavation. The site is covered by mixed deciduous woodland, probably associated the landscaping of Fitz Park (Plate 1). It is possible that further features associated with this earthwork survive in the vicinity of the study area.
- 3.2.5 There are a number of other possible prehistoric earthworks in the Derwent Valley including 'Papcastle Dykes', which have been identified on air photographs of the area. None are known within the immediate vicinity of the study area.
- 3.2.6 *Medieval*: the remains of ridge and furrow earthworks of probably medieval date which have been identified on air photographs of the Derwent Valley, although none have been recorded within the study area.
- 3.2.7 *Post-medieval and Modern*: the Fitz estate is recorded from as early as 1620, when Edward Savile, the son of Sir John Savile of Howley, Yorkshire sold the estate to Cuthbert Orfeur of Arkleby. The house was sold again in 1627 to Henry Dalton, who's son married Elizabeth Bromfield. After her husband's death, Elizabeth married Patricious Senhouse. A branch of the Senhouse family occupied The Fitz until 1991, when it was sold to Mr Robert Slack. The present mansion house is a Grade II Listed Building (English Heritage Listed Building No. 72603) and is a late Georgian mansion, built between 1834 and 1839 (Cracknell 2009). Fitz Park has been managed as parkland since at least the early 19th century.
- 3.2.8 The line of the London and North-Western Railway, the Cockermouth, Keswick and Penrith Line, was opened in 1864 and ran adjacent to the northern boundary of the study area, to the north of the present road into Cockermouth (B5292). This was closed around 1972.
- 3.2.9 The most significant modern development close to the study area was the construction of the A66 Trunk Road along the southwest side of the estate. The spoil, excavated from the cut of this road, was deposited across the southeast half of the proposed development area to a depth of up to c.5.2m. It is unlikely that a geophysical survey would produce meaningful results in this area as the made-ground will mask potential sub-surface archaeological features.

3.3 PREVIOUS ARCHAEOLOGICAL WORK

- 3.3.1 An archaeological evaluation was undertaken by Carlisle Archaeology Unit in 1999 on the western part of the Fitz Park estate, prior to the construction of a modern housing estate (centred on NGR NY 11114 3034). No report exists for this work; however it is believed that no significant archaeological features were revealed.
- 3.3.2 The desk-based assessment undertaken for the present development included a visual site inspection of the study area (Cracknell 2009). This identified that the area of made-ground adjacent to the A66 would be unresponsive to a geophysical survey. The area of the Romano-British settlement in Fitz Woods was also visited and found to be tree-covered. Parts of the proposed development area to the east of the monument were also covered in vegetation at the time of the visit.
- 3.3.3 In June 2008, North Pennines Archaeology Ltd, undertook geophysical surveys of c.1.45ha of land to the north of Papcastle, Cockermouth, Cumbria (NGR NY 1115 3160), in advance of a proposed private development at the site. The results of the geophysical survey, on the north side of the survey area, were dominated by the igneous geological anomalies detected in this area. However, the survey successfully detected archaeological features over the remainder of the site. The majority of the features detected were associated with the medieval and post-medieval agricultural use of the site, including the remains of ridge and furrow cultivation, former field boundaries, and possible land drains (Railton 2008).



Plate 1: Ditch and banks of the settlement in Fitz Woods (SAM 27706)

4 THE GEOPHYSICAL SURVEYS

4.1 INTRODUCTION (FIGURE 2)

4.1.1 The geophysical surveys were undertaken between 19th and 21st October 2009 covering the parts of the proposed development area that were available for geophysical survey, but excluding the area of made-ground adjacent to the A66. Geomagnetic survey was undertaken over two separate areas (Area 1 and Area 2) within the study area (Figure 2).

4.1.2 Area 1 measured c.3.2ha and was situated in a single field of pasture at the northern side of the proposed development area. This field was predominantly level, and bounded by the A66 to the southwest, a sewage works to the northwest, a minor road and the River Derwent to the north, and an open stream to the southeast. Some of the field boundaries comprised post and wire fences, which produced strong dipolar magnetic anomalies around the periphery of the survey area.



Plate 2: Area 1, looking northwest towards the sewage works

4.1.3 Area 2 measured c.1.5ha and comprised a piece of rough ground at the southern side of the proposed development area, bounded by areas of woodland, post and wire fences, and a stream. The land had recently been utilised for a variety of purposes including a pony paddock, pig housing, rubbish heaps and bonfires. Parts of Area 2 were also thick with vegetation and could not be surveyed, meaning significant parts of this area had to be excluded from the geophysical survey.



Plate 2: Area 2, looking northeast towards The Fitz

4.2 AREA 1 (FIGURES 3-5)

- 4.2.1 Small discrete dipolar magnetic anomalies were detected across the whole of Area 1. These are almost certainly caused by fired/ferrous litter in the topsoil, which is typical for modern agricultural land. These anomalies are indicated on the geophysical interpretation drawing, but not referred to again in the subsequent interpretations.
- 4.2.2 Two strong dipolar linear magnetic anomalies were detected on the northwest side of Area 1, aligned east to west. These were due to the presence of modern service pipes, believed to be a sewer and water pipe. Another strong dipolar linear magnetic anomaly was detected on the eastern edge of the survey area, aligned north to south, which is probably another service pipe.
- 4.2.3 A parallel series of weak positive and negative linear magnetic anomalies were detected in Area 1, aligned southwest to northeast, and northwest to southeast, which are interpreted as possible land drains.
- 4.2.4 A number of broad linear and curvilinear positive and diffuse magnetic anomalies were detected in Area 1, which were detected over the majority of the survey area. These linear anomalies were mostly aligned north to south and southwest to northeast, and are interpreted as possible palaeochannels. Their location close to the River Derwent, and the orientation of the anomalies suggests that these relate to former stream beds that have since been in-filled with soil.

4.3 AREA 2 (FIGURES 6-8)

- 4.3.1 The presence of modern structures, rubbish heaps and vegetation meant that the geophysical survey could not be completed over the whole of this area. Strong dipolar magnetic anomalies were detected in this area due to the presence of concrete surfaces, wire fences, and metal structures.
- 4.3.2 Small discrete dipolar magnetic anomalies were detected across the whole of Area 2, due to the presence of fired/ferrous litter in the topsoil and on the ground surface. In particular, the geophysical survey in the northern part of Area 2 was dominated by a dense spread of discrete dipolar magnetic anomalies, due to the presence of former bonfires.
- 4.3.3 A number of very weak positive and negative linear magnetic anomalies were detected in Area 2, east to west, which are interpreted as possible land drains or former boundary features.
- 4.3.4 Two weak positive curvilinear magnetic anomalies were detected towards the centre of Area 2, aligned approximately north to south, which may be soil-filled features. However, these were unconvincing as archaeological features and they may relate to modern activities at the site.

4.4 DISCUSSION

- 4.4.1 The most notable features detected by the geophysical survey were a series of linear and curvilinear magnetic anomalies in Area 1, which are interpreted as possible palaeochannels. The author has witnessed similar anomalies on other sites, which upon excavation proved to be former stream beds, which had been backfilled with soil in the post-medieval period for land-improvement purposes. Nevertheless, given the close proximity of the Romano-British settlement in Fitz Woods, the possibility exists that one or more of these features may be archaeological in nature.
- 4.4.2 The results of the geophysical survey in Area 2 were dominated by the presence of fired/ferrous magnetic material resulting from modern activity. This magnetic material will have masked any potential archaeological features that may be present, making the value of the geophysical survey in this area extremely limited.

5 CONCLUSIONS

5.1 CONCLUSIONS

- 5.1.1 Geomagnetic surveys covering *c.*5ha of land have been undertaken within Fitz Park, Cockermouth, covering two separate locations within the study area, prior to a proposed residential development.
- 5.1.2 The northern part of the study area (Area 1) was situated in an area of alluvial geology close to the River Derwent. The most notable features detected by the geophysical survey were a series of linear and curvilinear magnetic anomalies, which are interpreted as possible palaeochannels. Modern service pipes and a series of possible land drains were also detected.
- 5.1.3 The southern part of the study area (Area 2) was considered to have high archaeological potential due to the close proximity of a Romano-British settlement in Fitz Woods. However, the results of the geophysical survey in this area were dominated by the presence of fired/ferrous magnetic material resulting from modern activity, making the value of the geophysical survey extremely limited.
- 5.1.4 The central part of the study area was not surveyed, due to the presence of a substantial depth of made-ground resulting from the construction of the A66 carriageway. It is considered unlikely that this area would be responsive to a geophysical survey. The archaeological potential of this area therefore remains unknown.

5.2 RECOMMENDATIONS

- 5.2.1 It is recommended that the results of the geophysical surveys are tested through the excavation of a series of trial trenches across the site. These should be positioned both to sample the possible soil-filled palaeochannels detected in the northern area, and to test for archaeological features in the southern area, since the geophysical survey in this area was dominated by modern magnetic disturbance which could have masked potential archaeological features.

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APPENDIX 1: TRACE PLOTS

APPENDIX 2: FIGURES
