

NPA GEOPHYSICAL SURVEYS

Client Report CP619

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GEOPHYSICAL SURVEYS OF LAND OFF MUSTON ROAD, FILEY, NORTH YORKSHIRE

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on behalf of

WARDELL ARMSTRONG LLP

NGR TA 111 800

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Martin Railton BA (Hons), MA AIFA
North Pennines Archaeology Ltd
Nenthead Mines Heritage Centre
Nenthead
Alston
Cumbria CA9 3PD
Tel: (01434) 382045
Fax: (01434) 382294
Mobile: 07979617882
Email: m.railton@nparchaeology.co.uk



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VAT Registration No. 817 2284 31

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SUMMARY

In February 2008, North Pennines Archaeology Ltd, commissioned by Wardell Armstrong LLP, undertook geophysical surveys of 8ha of land to the south of Filey, North Yorkshire (NGR TA 111 800). This was following an application for a proposed new residential development by Persimmon Homes, on land to the east of Muston Road. The objective of the geophysical surveys was to determine the presence/absence, nature and extent of any archaeological anomalies within the proposed development area.

There were no known archaeological sites within the proposed development area. However, the earthworks of medieval ridge and furrow cultivation had previously been identified on the west side of the site. The objective of the geophysical surveys was to determine the presence/absence, nature and extent of any archaeological anomalies within the proposed development area, and the presence/absence of any known modern anomalies within the study area, which may affect the results.

Geomagnetic survey was undertaken over four separate areas (Areas 1-4) within the study area, covering the area of the proposed new residential development (Areas 1-3), and a sample area to the south (Area 4). The surveys detected agricultural features over the majority of the study area, including former ridge and furrow earthworks of possible medieval or post-medieval date, and a possible series of later land drains.

A number of potential archaeological features of unknown date have been detected including an L-shaped ditch, a possible drain or field boundary, and possible parallel soil-filled ditches. A number of possible soil-filled features have also been detected, some of which could be pits. A significant area of magnetic disturbance was detected on the west side of the study area, which is difficult to interpret, but could potentially be archaeological in nature.

1 INTRODUCTION (*Figures 1 & 2*)

- 1.1 In February 2008, North Pennines Archaeology Ltd, commissioned by Wardell Armstrong LLP, undertook geophysical surveys of 8ha of land to the south of Filey, North Yorkshire. This was following an application for a proposed new residential development by Persimmon Homes, on land to the east of Muston Road. The objective of the geophysical surveys was to determine the presence/absence, nature and extent of any archaeological anomalies within the proposed development area. The work was conducted in accordance with a Written Scheme of Investigation (WSI), produced by Wardell Armstrong LLP (Wardell Armstrong 2008), and the relevant English Heritage and IFA guidelines.
- 1.2 The proposed development area is situated on the southern outskirts of Filey, to the east of Muston Road. Mill Farm, and Muston Grange are situated to the south of the proposed development area. The site is centred on Ordnance Survey grid reference TA 111 800 (Figure 1).
- 1.3 There are no known archaeological sites within the proposed development area. However, the earthworks of medieval ridge and furrow cultivation have previously been identified on the west side of the site.
- 1.4 The solid geology of the area comprises Ampthill Clay and Kimmeridge Clay. These are overlain by glacial deposits of boulder clay. The topography of the study area was of undulating character. A ridge crosses the site, aligned approximately east to west, with elevations ranging between 50m OD to the west and 40m OD to the east.
- 1.5 The proposed development area measured 16ha in total. At the time of the survey this area comprised 3 fields of pasture subdivided by wide hedgerows and modern fences. The geophysical survey areas measured 8ha in total, divided into four separate areas (Areas 1-4). These survey areas were determined by Wardell Armstrong LLP, and were selected to sample the areas most likely to be impacted on by the proposed development, plus a sample area of land to the south (Figure 2).
- 1.6 The objective of the geophysical surveys was to determine the presence/absence, nature and extent of any archaeological anomalies within the proposed development area, and the presence/absence of any known modern anomalies within the study area, which may affect the results. The results of the geophysical survey were to be used to inform the need for any further evaluation work within the proposed development area.
- 1.7 The geophysical surveys were conducted by Kevin Mounsey and Angus Clarke between 25th February and 28th February 2008, and managed by Martin Railton, NPA Senior Project Officer. This report was prepared and illustrated by Martin Railton, and was edited by Matthew Town, NPA Senior Project Officer.

2 METHODOLOGY

2.1 Standards

- 2.1.1 The geophysical survey and reporting were conducted in accordance with English Heritage guidelines (English Heritage 1995), and the recommendations of the Institute of Field Archaeologists (IFA 2002).

2.2 Technique Selection

- 2.2.1 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.
- 2.2.2 This technique involved 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 was recorded by the instruments and downloaded into a laptop computer for initial data processing in the field using specialist software.

2.3 Field Methods

- 2.3.1 The study area was located in three separate fields of pasture. Four separate areas were surveyed (Areas 1-4). 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.
- 2.3.2 Geomagnetic measurements were determined using a Bartington Grad601-2 dual gradiometer system, with twin probes 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 was downloaded on site into a laptop computer for processing and storage.

2.4 Data Processing

- 2.4.1 Geophysical survey data was 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 for each area.
- 2.4.2 Raw data was 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 gradiometer data

Destagger: to reduce the effect of staggered gradiometer data, sometimes caused by difficult working conditions, topography, or operator error

2.5 *Interpretation*

2.5.1 Three types of geophysical anomaly were detected in the gradiometer data:

positive magnetic: regions of anomalously high or positive magnetic gradient, 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 gradient, 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-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.

2.5.2 Discrete dipolar magnetic anomalies were detected across the whole of the study area. 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 drawings, but not referred to again in the subsequent interpretations.

2.6 *Presentation*

2.6.1 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, dipolar, and diffuse magnetic anomalies.

2.6.2 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.

2.6.3 Trace plots of the unprocessed geophysical data are available if required.

2.7 *Project Archive*

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

2.7.2 One copy of the survey 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)**. The OASIS reference for this project is **northpen3-39192**.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Historical Background

- 3.1.1 A desk-based assessment of the proposed development area was undertaken by Wardell Armstrong, as part of the Environmental Statement accompanying the planning application, a summary of which is included below.
- 3.1.2 No known prehistoric or Roman sites are recorded in the immediate vicinity of the proposed development area. However, the wider area was exploited during these periods. A Roman signal station has been documented north of Filey, at Carr Naze (TA 1271 8162). A Roman road is also believed to have existed between Filey and Gristhorpe.
- 3.1.3 The name Filey is believed to originate from the Anglo-Saxon words 'Fif' and 'Leah', meaning 'five clearings'. Settlements were certainly in existence at Filey and Muston by the medieval period, as these were included in the Domesday Book of 1086. At this time farming would have taken place in open fields outside of the settlements. Ridge and furrow earthworks of this period have been identified in fields to the east of Muston Road.
- 3.1.4 The 1838 Tithe Map of the Parish of Muston indicates that the proposed development area was within five fields, which were used as both pasture and arable cultivation at that time. The fields were unchanged by the time of the 1st edition Ordnance Survey map of 1854. Muston Corn Mill was located immediately to the southwest of the proposed development area, with Mill Farm and Muston Grange to the south. The area of the proposed development was named 'Mill Closes' at that time. The area to the north was known as Filey Moor. Marl pits were recorded to the east of the proposed development area. A railway was constructed to the east of the proposed development area with a station at Filey.
- 3.1.5 During the Victorian period Filey was transformed from a farming and fishing village into a popular seaside resort. Development of Filey continued into the 20th century. Modern developments include housing developments and a cemetery to the north of the proposed development area, a school to the west, and caravan parks to the east and south.
- 3.1.6 The proposed development area appears to have remained as agricultural land into the modern period, with the only obvious change being the amalgamation of the three most eastern fields (as shown on the 1838 tithe map) into a single field.

3.2 Previous Archaeological Works

- 3.2.1 No known previous archaeological investigations have taken place within the proposed development area.

4 SURVEY RESULTS (Figures 3-14)

4.1 Area 1 (Figures 3-5)

- 4.1.1 Area 1 measured 0.83ha and was located on the west side of the study area in a field of pasture, to the east of Muston Road, bounded by a hedgerow and modern post and wire fence on the east side. This fence produced strong dipolar magnetic anomalies along the west side of the survey area.
- 4.1.2 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 drawings, but not referred to again in the subsequent interpretations.
- 4.1.3 A series of weak linear positive magnetic anomalies, with values between *c.*0.5nT and *c.*2.1nT, were detected over the majority of Area 1, aligned approximately north to south. These anomalies were spaced *c.*6m apart, and are typical of former ridge and furrow cultivation.
- 4.1.4 A series of weak positive anomalies, with values between *c.*2.0nT and *c.*4.5nT, were detected at the northern end of Area 1, forming a L-shaped feature in plan. These anomalies were interpreted as two sections of a soil-filled ditch, which may have been truncated by the furrows of former ridge and furrow cultivation.
- 4.1.5 A number of irregular positive magnetic anomalies were detected in Area 1, with values between *c.*4.6nT and *c.*7.8nT, which were interpreted as possible soil-filled features of unknown date.

4.2 Area 2 (Figures 6-8)

- 4.2.1 Area 2 measured 4.32ha, and was situated immediately to the east of Area 1, in a field of pasture bounded by wide hedgerows and modern post and wire fences. Small discrete dipolar magnetic anomalies were also detected across the whole of Area 2, caused by fired/ferrous litter in the topsoil.
- 4.2.2 A series of weak linear positive magnetic anomalies, with values between *c.*0.5nT and *c.*2.1nT, were detected over the majority of Area 2, aligned approximately north to south. These anomalies were also interpreted as the remains of former ridge and furrow cultivation.
- 4.2.3 A chain of irregular positive magnetic anomalies with values between *c.*0.6nT and *c.*5.7nT (and corresponding negative values), was detected on the north side of Area 2, aligned east to west, turning northwards at the west end. The disturbed nature of the feature suggested that this could be a modern drain, former field boundary or possibly a disturbed/truncated soil-filled ditch.
- 4.2.4 On the west side of Area 2, a group of irregular and linear positive magnetic anomalies were detected, with values between *c.*6.5nT and *c.*14.5nT, and irregular negative anomalies with values between *c.*-4.0nT and *c.*-8.9nT, forming an area of significant magnetic disturbance. These anomalies are interpreted as possible soil-filled features.
- 4.2.5 A series of weak linear positive magnetic anomalies were detected across the majority of Area 2, aligned northeast to southwest, and interpreted as possible land drains.

4.3 *Area 3 (Figures 9-11)*

- 4.3.1 Area 3 was situated in an arable field on the east side of the proposed development area. This area measured 1.98ha in total, and was reduced in size by 1ha from that specified in the WSI, at the request of the client. Small discrete dipolar magnetic anomalies, and a group of strong dipolar magnetic anomalies were detected in Area 3, and were almost certainly caused by fired/ferrous litter in the topsoil.
- 4.3.2 A series of weak linear positive magnetic anomalies, were detected over the majority of Area 3, aligned approximately north to south similar to those in Area 1 and Area 2. These anomalies were also interpreted as the remains of former ridge and furrow cultivation.
- 4.3.3 At the northwest corner of Area 3, a group of parallel irregular linear positive magnetic anomalies were detected, with values between *c.*0.65nT and *c.*5.70nT, aligned north to south. An alignment of discrete positive magnetic anomalies was also detected at the southwest corner of the survey area. These were interpreted as possible soil-filled features.
- 4.3.4 A series of weak linear positive magnetic anomalies, aligned northeast to southwest, were detected in Area 3, and were interpreted as possible land drains. A series of partial linear positive magnetic anomalies were also detected in this area, with values between *c.*6.5nT and *c.*14.5nT. These were also interpreted as possible land drains.

4.4 *Area 4 (Figures 12-14)*

- 4.4.1 Area 4 measured 1.08ha, and was located in a field of pasture to the south of Area 2. Strong magnetic dipolar anomalies were detected along the field boundary on the south side of this area. Small discrete dipolar magnetic anomalies were also detected in this area, and were almost certainly caused by fired/ferrous litter in the topsoil.
- 4.4.2 A number of irregular linear positive magnetic anomalies were detected, interpreted as possible soil-filled features.
- 4.4.3 A number of weak linear positive magnetic anomalies were also detected, aligned north to south, and were interpreted as possible land drains.

5 CONCLUSIONS

- 5.1 Geomagnetic surveys, covering 8ha of land, have been conducted over four separate areas within the study area, covering the area of the proposed new residential development (Areas 1-3), and a sample area to the south (Area 4).
- 5.2 The surveys have detected agricultural features over the majority of the study area, including former ridge and furrow earthworks of possible medieval or post-medieval date (Areas 1-3), and a possible series of later land drains (Areas 2-4).
- 5.3 A number of potential archaeological features of unknown date have been detected including an L-shaped ditch in Area 1, a possible drain or field boundary in Area 2, and possible parallel soil-filled ditches in Area 3. A number of possible soil-filled features have also been detected, some of which could be pits.
- 5.4 A significant area of magnetic disturbance was detected in Area 2, which is difficult to interpret on existing information, but could potentially be archaeological in nature.

6 ACKNOWLEDGEMENTS

North Pennines Archaeology is grateful to Charlotte Dawson of Wardell Armstrong for commissioning the geophysical surveys. The digital mapping used during the survey was provided courtesy of Wardell Armstrong LLP.

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APPENDIX I – ILLUSTRATIONS