

## **GEOPHYSICAL SURVEY OF LAND AT PAPCASTLE, COCKERMOUTH, CUMBRIA**

*on behalf of*

**THOMAS ARMSTRONG  
(CONSTRUCTION) LIMITED**

NGR NY 1115 3160

OASIS ID: northpen3-44783



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## SUMMARY

In June 2008, North Pennines Archaeology Ltd, commissioned by Thomas Armstrong (Construction) Limited, 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 Roman fort of *Derventio* (a Scheduled Ancient Monument) is situated to the west of the site, and two projected Roman roads, exiting the main east gate of the fort, are believed to have extended into the area of the proposed development. A previous desk-based assessment of the site had identified that the potential for sub-surface Romano-British and/or medieval remains in the area was high.

The objective of the geophysical survey 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 work was conducted in accordance the current English Heritage and IFA guidelines.

The results of the geophysical survey, on the north side of the survey area, were dominated by the geological anomalies detected in this area. These anomalies were associated with a prominent ridge, which is probably formed by igneous extrusive basalt or spilite. Although these anomalies were filtered out of the geophysical data, the possibility exists that the geological anomalies detected have masked less substantial features in this area.

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. The westernmost field boundary is illustrated on the Tithe Apportionment map of 1829, but was removed in the early 20<sup>th</sup> century. These features reflect the former presence of medieval strip fields, which would once have surrounded Papcastle.

No features of probable Roman date have been detected by the geophysical survey, despite the close proximity of the proposed development area, to *Derventio* Roman fort. It is possible that medieval and post-medieval cultivation may have truncated earlier features in this area.



## **1 INTRODUCTION (*Figure 1 & 2*)**

- 1.1 In June 2008, North Pennines Archaeology Ltd, commissioned by Thomas Armstrong (Construction) Limited, undertook a geophysical survey of c.1.45ha of land to the northeast side of Papcastle, Cockermouth, Cumbria (Figure 1). This was in advance of a proposed private development at the site.
- 1.2 The Roman fort of *Derwentio* (a Scheduled Ancient Monument) is situated to the west of the site, and two projected Roman roads, exiting the main east gate of the fort, are believed to have extended into the area of the proposed development. A previous desk-based assessment of the site has identified that the potential for sub-surface Romano-British and/or medieval remains in the area is high (Sowerby 2006).
- 1.3 At the time of the survey the site comprised a single field of pasture, centred on Ordnance Survey grid reference NY 1115 3160 (Figure 2). The survey area was bounded by the road to Belle Vue to the north and west, a field of pasture to the east, and modern houses and gardens to the south.
- 1.4 A prominent ridge occupied the northern end of the site. The ground sloped gradually downhill to the south, with elevations ranging between 80m and 90m OD. The River Derwent flows along the southern boundary of the village, with two small tributaries joining it to the west. The solid geology of the area comprises Ordovician Llanvirn and Arenig sedimentary rocks, with igneous extrusive basalt and spilite, overlain by the well-drained loams of the Wick Association.
- 1.5 The objective of the geophysical survey 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 work was conducted in accordance the current English Heritage and IFA guidelines.
- 1.6 The geophysical survey was conducted by Martin Railton and Angus Clark on 24<sup>th</sup> June 2008. This report was prepared and illustrated by Martin Railton, NPA Project Manager.

## **2 METHODOLOGY**

### *2.1 Standards*

- 2.1.1 The geophysical survey and reporting were conducted in accordance with English Heritage guidelines (English Heritage 2008), 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 expected non-igneous environment, and the possible presence of cut archaeological features at depths of no more than 1.5m. A previous magnetometer survey close to the crossing of the River Derwent at Papcastle, was successful in detecting areas of high archaeological potential, including an early field boundary, even though the results were not always clear cut due to the nature of the drift geology in this area (Turnbull 1991).
- 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 a single field of pasture. A 30m grid was established, 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 3,600 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

*High Pass:* to remove high frequency components from the survey data, by subtracting a calculated mean value from data that might otherwise dominate the survey

## 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. A colour-coded geophysical interpretation diagram is provided, showing the locations and extent of positive, negative, dipolar, and diffuse magnetic anomalies.

### 2.6.2 An archaeological interpretation diagram is also provided, which is 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 **northpen3-44783**.

### 3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

#### 3.1 *Historical Background*

- 3.1.1 A desk-based assessment of the proposed development area was previously undertaken by North Pennines Archaeology Ltd (Sowerby 2006). The desk-based assessment involved the examination of all pertinent documents and cartographic sources held in the County Records Office in Carlisle, and the consultation of the Cumbria County Council Historic Environment Record (HER) based in Kendal. The HER includes the locations and settings of Scheduled Ancient Monuments, Listed Buildings, Parks and Gardens and other, non-designated archaeological remains. In addition, a number of published sources were consulted to provide background information, including the journal *Britannia* and several relevant web sites, a summary of which is provided below.
- 3.1.2 No known prehistoric sites are recorded in the immediate vicinity of the study area. However, the wider landscape was undoubtedly exploited during this period. A number of stray finds most notably, stone axes from the Langdales, have been discovered in the Cockermouth area, and a number of monuments of Neolithic or Bronze Age date have been identified in the surrounding area.
- 3.1.3 During the Roman period, there was a heavy military presence in Cumbria, and there is considerable evidence for Roman military activity around the study area during this period. The earliest known settlement at Papcastle dates to the Romano-British period, and may be subdivided into the fort of *Devensio*, and the extramural settlement (*vicus*). The fort and extramural settlement were situated at the junction of two main Roman roads: the road from the fort at Carlisle, heading south-west and the route heading west towards Maryport. The fort occupies a strategic position on a hill overlooking a major crossing of the River Derwent.
- 3.1.4 Limited excavations at various stages throughout the 20<sup>th</sup> century have revealed at least two distinct phases of fort building. The earliest fort was found to date to the mid second century, and was replaced in the late second century by a fort constructed on a slightly different alignment. The extensive alterations were probably associated with the general reorganisation of the frontier district under Lucius Septimius Severus (193-211AD). Occupation of the forts would appear to be continuous, running from the Flavian period through to the end of the 4<sup>th</sup> century (Reeves 2002). The majority of the stone from the fort must have been removed when the fort fell out of use. It is thought that much of the stone went into the construction of Cockermouth Castle, where at least three stone inscriptions relating to the fort have been found (Birley 1963).
- 3.1.5 The earliest detailed record for Papcastle is provided by William Stukely, writing in the 17<sup>th</sup> century, who noted that the fort occupied the top of a hill, and who saw the layout of the fort. The extramural settlement extended to an area of the village called The Burroughs. Stukely mentions that “*the name of Boroughs includes both closes where the old city stood; for they find stones and slates with iron pins in them, coins, and all other matters of antiquity, upon the whole spot below the castrum, towards the waterside*”, which is presumably the River Derwent. Writing in 1860, Whellan, echoes Stukely and comments, “*that the traces of a Roman station or castrum lie on the summit of the hill at Papcastle*” (Whellan 1860).

- 3.1.6 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 A592 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 name Streetgate appears at a farm 1 mile north of Lamplugh, on the north-west side of the present main road leading to Egremont and perhaps eventually to Ravenglass, where there was another fort, but much of the route still needs investigation. There is another possible road from Papcastle south-east into the Lake District (Road 753, Margary 1973). The road east to Maryport (*Aluna*) is equally well documented (Road 751, Margary 1973), the route heads through Dovenby, from where it joins the present A594 road from Cockermouth to Maryport. F.L Ballentine Dykes of Dovenby Hall made a complete survey of the road to Maryport in 1859.
- 3.1.7 The evidence for occupation in the medieval period is extremely limited. Excavations at Papcastle House (Giecco 2005) have demonstrated that the land in that area of Papcastle showed evidence of a large timber building and a probable retting pond for the processing of flax. Both of the features were tentatively dated to the 13<sup>th</sup> and 14<sup>th</sup> centuries (*ibid*).
- 3.1.8 The first available map showing the survey area is the Tithe Apportionment map of 1829 (Cumbria Record Office, Carlisle), which shows the proposed development area as two fields with a single field boundary, aligned northwest to southeast, separating the two. Both fields have been numbered as 138 (west field) and 139 (east field) and are individually owned by Joseph Telford. Field 138 is called '*False Acre*' and 139, '*High Field*'. A small building, which appears to be a field-barn, is located at the northern end of the latter field. The southern boundary is marked by a tree line, which belongs to a large house called The Mount. The 1<sup>st</sup> Edition Ordnance Survey map of 1929, shows the proposed development area as two fields with a single field boundary, as depicted by the Tithe Map of 1829. This field boundary is also shown in the 2<sup>nd</sup> Edition Ordnance Survey map of 1899, but had been removed by the time of the 3<sup>rd</sup> Edition Ordnance Survey map of 1924, to make a single large field.
- 3.1.9 Cartographic sources also illustrate the development of Papcastle throughout the eighteenth and nineteenth centuries, reflecting the limited expansion of the village. This suggests that the settlement stayed fairly static with regards to development and population increases.
- 3.2 *Previous Archaeological Works*
- 3.2.1 There have been at least 11 archaeological investigations within 3km of the development area, mostly in association with the Roman fort of *Devensio* and associated *vicus*.
- 3.2.2 Excavations in 1912 uncovered parts of the north and east ramparts of the later fort. Further trial trenching located the east gate, which consisted of a partially blocked double gateway paved with a concrete of lime and gravel laid on larger stones. Additionally the north-east corner of the early fort was located, and was observed to have been constructed from good ashlar and lime masonry (Collingwood 1912).

- 3.2.3 Later discoveries associated with the second fort included a layer of blackened wheat, located outside the east gate during the excavation of a new gas main in 1923 (Birley 1963). Roman coins, pottery, and large stone slabs, measuring 5.5 ft by 1.5 ft, dug at a depth of 6 ft were discovered just outside the south-east corner of the fort at The Mount (ibid).
- 3.2.4 Excavations carried out by Dorothy Charlesworth in 1961-2 revealed parts of the barrack blocks and commandant's quarters, with evidence for both stone and timber buildings. Although no floor levels remained in the barrack blocks, numerous items of corroded bronze, some identifiable as scale armour were identified (Charlesworth 1965). Other finds included a small bronze statuette, a bronze fibula, and scraps of tent and shoe leather (ibid).
- 3.2.5 There was no further work until 1984, when an excavation in advance of a house - building scheme (NY 110 315) revealed a road running south from the south gate of the fort, which had been repaired on several occasions. To the east of the road was a foundation for a large building, set on a rectangular platform of dumped clay. Below this cap of clay were waterlogged deposits yielding industrial remains and timber drains, and above it traces of several phases of third to fourth century stone structures, which could have been a temple (Oliver 1984). During the excavation a small bronze statuette of Marsyas was uncovered. Marsyas was a satyr who was rash enough to challenge Apollo, the god of music to a music competition, promising that, if he lost, he would submit himself to be bound and flayed alive. He lost, and the statuette shows him bound, awaiting his fate (Shotter 1996). It is believed that the possible temple could have been dedicated to Apollo.
- 3.2.6 Prior to the construction of the Papcastle bypass in 1989, Cumbria County Council undertook an excavation of features identified in an earlier geophysical survey. A small ditch was excavated along its entirety, revealing both modern and Roman ceramics. Several iron nails and regularly spaced pits along the ditch showed that it was revetted with timber. The ditch may be an early field boundary (Turnbull 1991).
- 3.2.7 In 1998, Channel 4's Time Team, carried out trial trenching and geophysical surveys at Papcastle. Two trenches in the garden of a private house (Derwent Lodge) revealed remains of two Roman strip houses and the foundations of a possible monumental structure. Further trenching and survey in the field called Sibby Brows revealed a more extensive area of the vicus than previously recorded. The fort defences were also examined (Time Team 1999).
- 3.2.8 More recently excavations were undertaken by North Pennines Heritage Trust in 2002 (later to become North Pennines Archaeology Ltd) on land adjacent to Derventio House. In total three evaluation trenches were excavated which identified evidence for several Roman features, interpreted as possible terracing (Reeves 2002).
- 3.2.9 As a direct result of the findings from the evaluation at Derventio House, further work was carried out in March 2004 by North Pennines Archaeology Ltd (NPA). The excavation revealed significant Roman deposits relating to the Roman fort, namely the terracing which was noted in the 2002 evaluation. It showed that the terracing had been placed in the 4<sup>th</sup> century when the fort was extensively remodelled, removing most of

the evidence relating to the earlier phases of fort. The main feature of this later fort was a chalet type barrack building from a minor east/west road. This building was partially

demolished and a later Roman part timber building was constructed on the foundations of the earlier building (Giecco 2004).

- 3.2.10 Further works were undertaken by NPA in 2004, when planning permission was sought for a development on land to the rear of Papcastle House. Despite evidence of terracing in the 19<sup>th</sup> century, a series of substantial postholes were identified, which potentially could have formed the corner of a building (Giecco and Crompton 2004). Further excavations in 2005 revealed more timber buildings and a probable medieval retting pond for the processing of flax (Giecco and Crompton 2005).

## **4 SURVEY RESULTS (Figures 3-6)**

### *4.1 Introduction*

- 4.1.1 At the time of the survey the site comprised a single field of unimproved pasture, situated on the periphery of Papcastle village. A steep bank was present on the north side of the site, beyond which was a possible former holloway, and the existing road to Belle Vue. This area was excluded from the survey.
- 4.1.2 Small discrete dipolar magnetic anomalies were detected across the whole of the study area. These were 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 interpretation.
- 4.1.3 The site was bounded by modern post and wire fences, which produced strong dipolar anomalies around the periphery of the survey area. A number of telegraph poles, and modern feeding troughs were also present, which also produced strong dipolar anomalies in the survey data. These are also indicated on the geophysical interpretation drawing, but are excluded from the archaeological interpretation.

### *4.2 Geophysical survey*

- 4.2.1 Two strong geomagnetic anomalies, with corresponding negative geomagnetic anomaly shadows, were detected on the north side of the site, covering a large part of the survey area (Figure 3). These were almost certainly caused by the underlying geology, which dominated the results of the geophysical survey in this area. These anomalies were filtered out of the gradiometer data using a high pass filter, in order to identify less substantial geomagnetic anomalies (Figure 4).
- 4.2.2 A series of parallel weak positive geomagnetic anomalies were detected crossing the survey area, aligned northwest to southeast. These anomalies were typical of former ridge and furrow cultivation. It was noted that one of these anomalies corresponded to the location of a low earthwork ditch, interpreted as a former field boundary.
- 4.2.3 A linear positive geomagnetic anomaly, and corresponding negative geomagnetic anomalies, were detected on the west side of the survey area, aligned northwest to southeast, in the vicinity of a low stone bank. This was interpreted as the location of a former drystone wall, which had recently been removed.
- 4.2.4 Another linear positive geomagnetic anomaly, aligned north to south, on the east side of the survey area, was interpreted as a possible land drain. Two weak positive geomagnetic anomalies were detected in association with this feature, aligned east to west, which were also interpreted as land drains.
- 4.2.5 Three weak linear positive geomagnetic anomalies were detected on the southeast side of the survey area, aligned northeast to southwest, and were interpreted as soil-filled features or land drains.
- 4.2.6 Three very weak linear positive geomagnetic anomalies were also detected on the south side of the survey, aligned approximately northeast to southwest. These were interpreted as possible soil-filled features.



#### 4.3 *Discussion*

- 4.3.1 The results of the geophysical survey, on the north side of the survey area, were dominated by the geological anomalies detected in this area. These anomalies were associated with a prominent ridge, which is probably formed by igneous extrusive basalt or spilite. Although these anomalies were filtered out of the geophysical data, the possibility exists that the geological anomalies detected have masked less substantial features in this area.
- 4.3.2 The subsurface remains of former ridge and furrow cultivation, and two former field boundaries, have been detected crossing the survey area, aligned northwest to southeast. The westernmost field boundary is illustrated on the Tithe Apportionment map of 1829, but was removed in the early 20<sup>th</sup> century. These features reflect the former presence of medieval strip fields, which would once have surrounded Papcastle. Medieval and post-medieval cultivation is likely to have truncated earlier features in this area.
- 4.2.3 The possible soil-filled linear features, aligned northeast to southwest, appear to have been cut by the former ridge & furrow cultivation. The possibility exists that some of these features are early field boundaries.

### 5 **CONCLUSIONS**

- 5.1 Geomagnetic survey covering c.1.45ha, has been conducted over land on the north side of Papcastle, to investigate the possible presence of Roman features associated with *Derventio* Roman fort. 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.
- 5.2 Two projected Roman roads, exiting the main east gate of the fort, are believed to have extended into the survey area. However, no certain features of probable Roman date have been detected by the geophysical survey. It is possible that medieval and post-medieval cultivation have truncated earlier features in this area.
- 5.3 Given the high potential for Romano-British remains in the vicinity of the survey area, it is recommended that the results of the geophysical survey are tested through the excavation of a small number of archaeological trial trenches.

## 6 ACKNOWLEDGEMENTS

North Pennines Archaeology is grateful to Barry Denham of Thomas Armstrong (Construction) Limited for commissioning the geophysical survey, and to Mr Edmond Jackson of Cockermouth for his assistance during the project.

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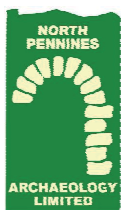
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## **APPENDIX I – ILLUSTRATIONS**





NPA Geophysical Survey  
2008

**PROJECT:** Land at Papcastle, Cockermouth  
**SCALE:** 1:30,000 at A4  
**REPORT No:** CP 712  
**CLIENT** Thomas Armstrong Limited  
**DRAWN BY:** MDR  
**DATE:** June 2008  
**FIGURE No:** 1



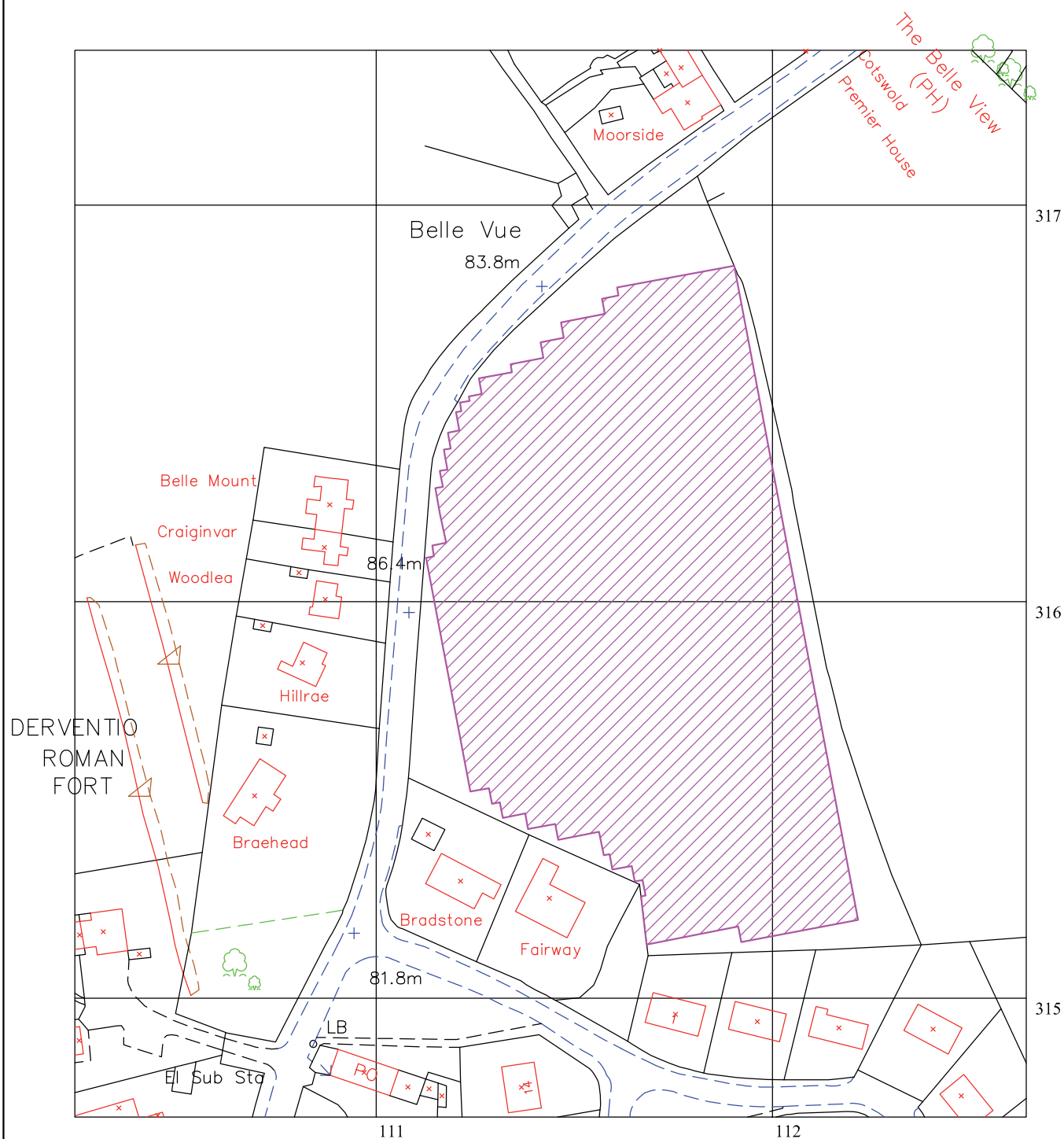
site location



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Figure 1 : Site location





NPA Geophysical Survey  
2008

PROJECT: Land at Papcastle, Cockermouth  
SCALE: 1:1500 at A4  
REPORT No: CP 712  
CLIENT Thomas Armstrong Limited  
DRAWN BY: MDR  
DATE: June 2008  
FIGURE No: 2

 geophysical survey area



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Figure 2 : Location of the geophysical survey

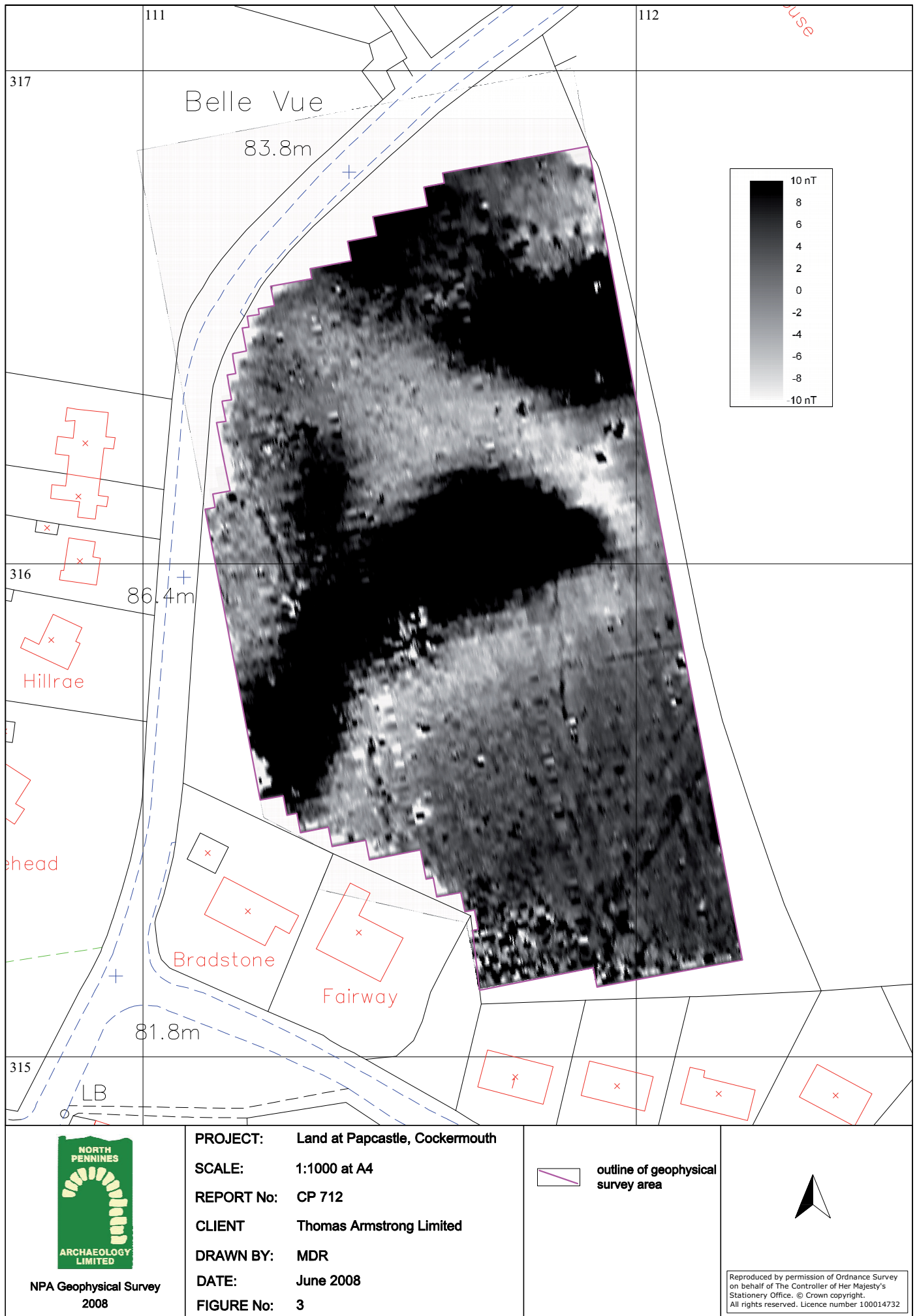


Figure 3 : Geophysical survey

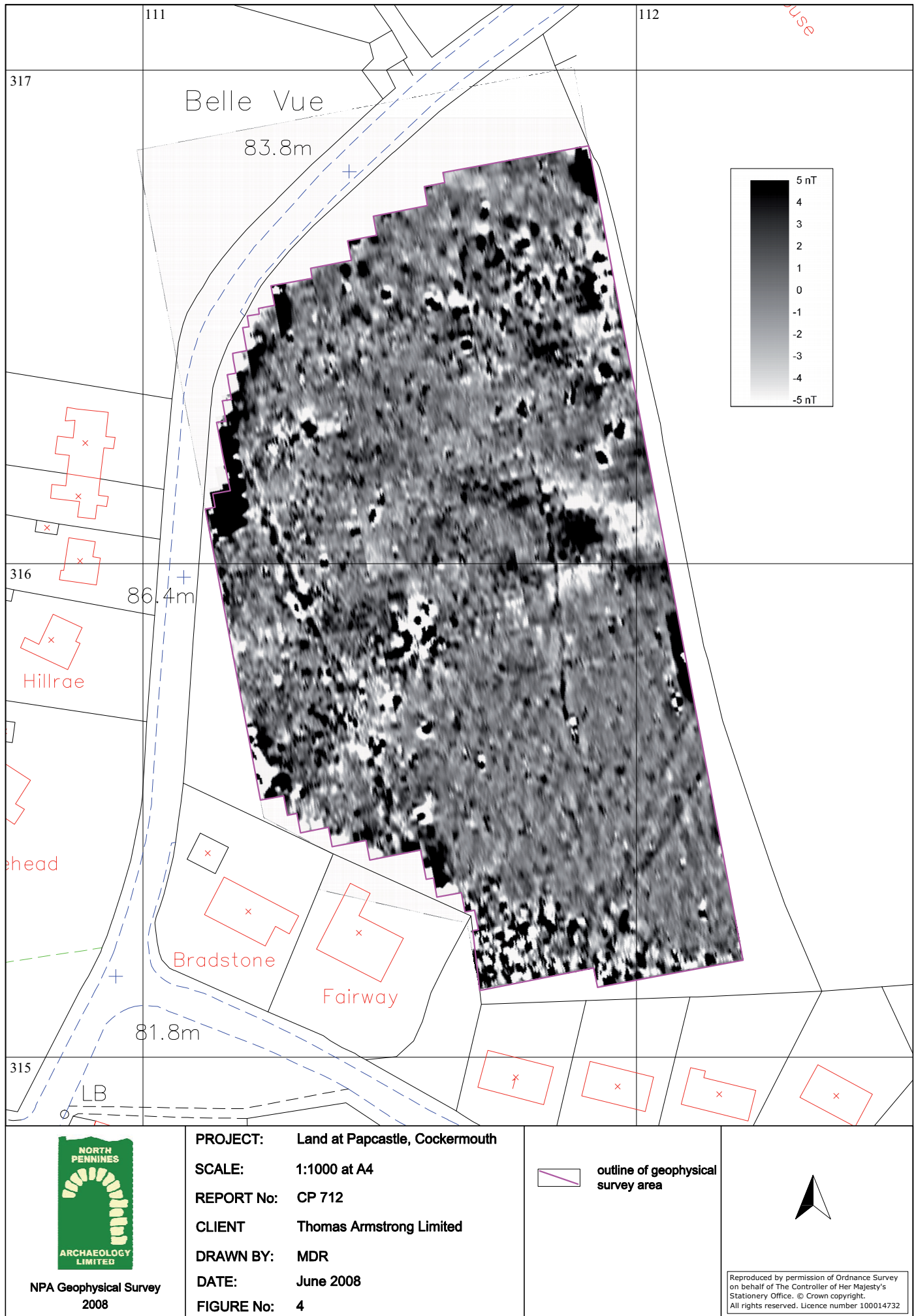


Figure 4 : Geophysical survey with geological anomalies removed

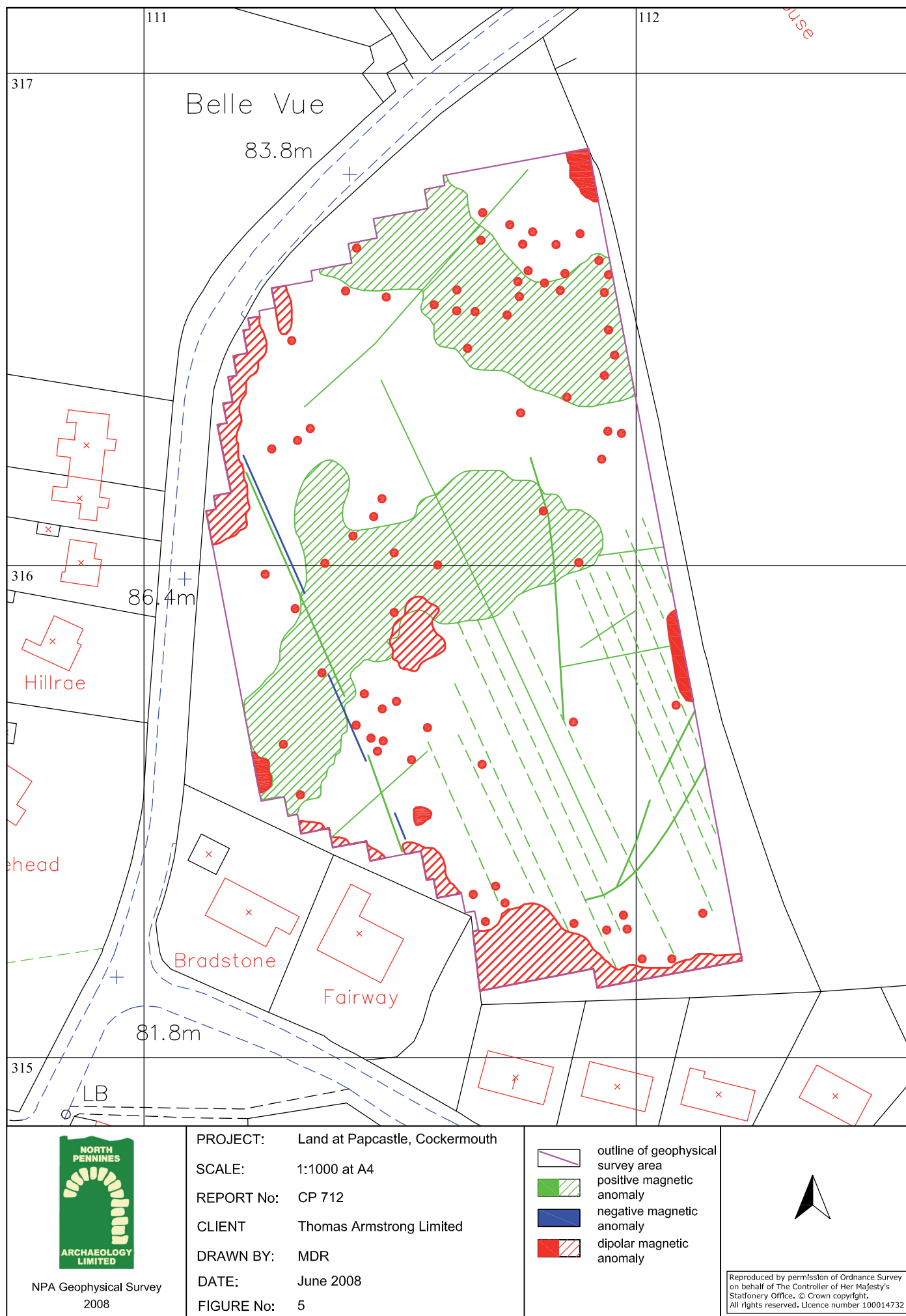


Figure 5 : Geophysical interpretation



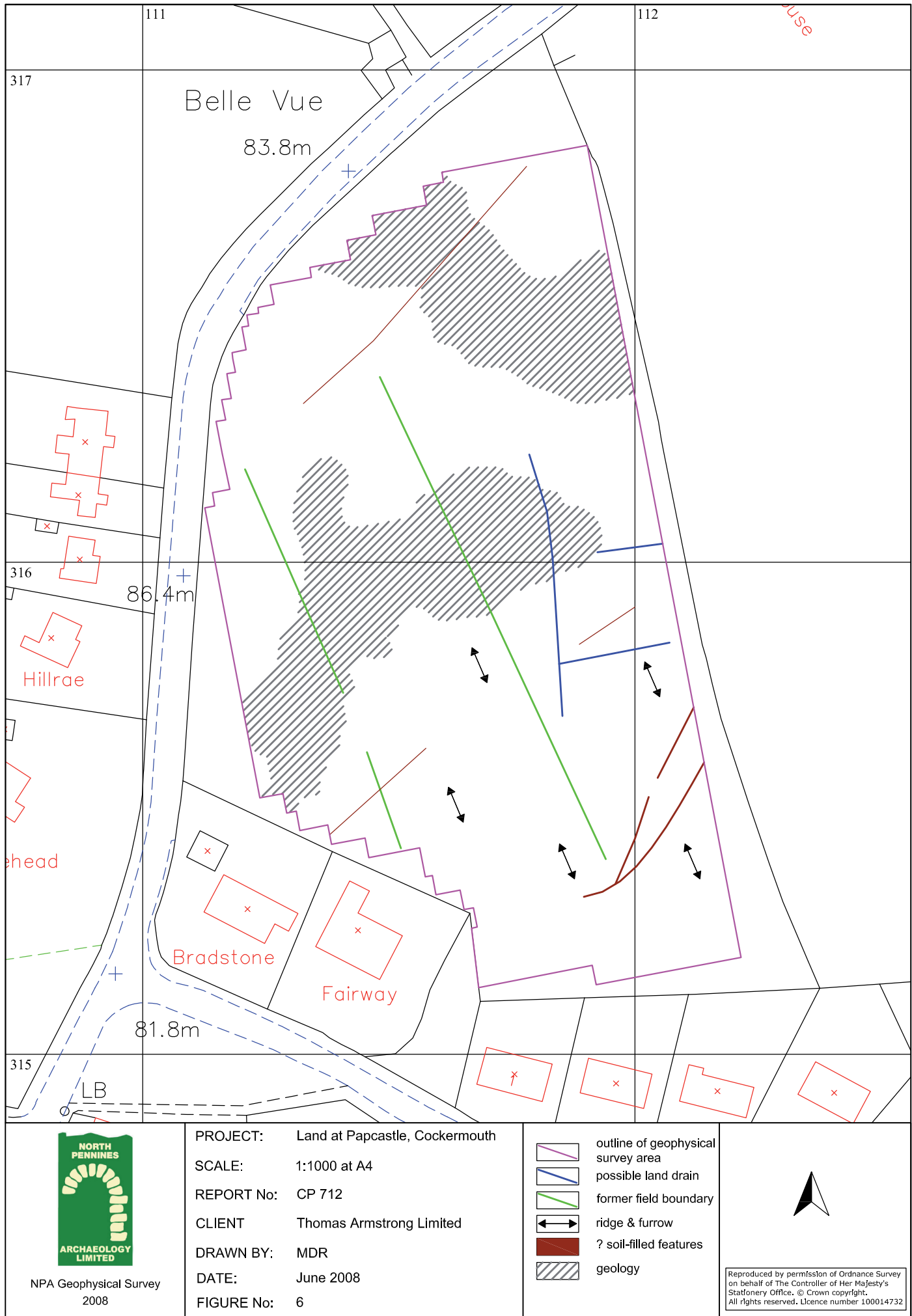


Figure 6 : Archaeological interpretation