ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
Taylor Wimpey North East

The former Cragside County First School
Cramlington
Northumberland

geophysical survey

report 2807
December 2011

Durham
University

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South Road · Durham · DH1 3LE · tel 0191 334 1121 · fax 0191 334 1126
archaeological.services@durham.ac.uk · www.dur.ac.uk/archaeological.services

1. Summary

The project

1.1 This report presents the results of a geophysical survey conducted in advance of proposed development at the former Cragside County First School, Cramlington, Northumberland. The works comprised the geomagnetic survey of approximately 0.5ha of land.

1.2 The works were commissioned by Taylor Wimpey North East and conducted by Archaeological Services Durham University.

Results

1.3 Probable traces of former ridge and furrow cultivation were identified across the survey area.

1.4 A possible soil-filled ditch was identified in the south-east of the survey area.

1.5 A modern service was identified along the south-western edge of the area.

2. Project background

Location (Figure 1)

2.1 The survey area was located on land at the former Cragside County First School in Cramlington, Northumberland (NGR centre: NZ 2692 7569). One survey covering approximately 0.5ha was conducted on the former school playing field. The site is surrounded on all sides by housing.

Development proposal

2.2 The proposal is for a residential development.

Objective

2.3 The principal aim of the survey was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the development.

Methods statement

2.4 The surveys have been undertaken in accordance with a Written Scheme of Investigation provided by Archaeological Services Durham University and approved by Northumberland County Council Conservation Team.

Dates

2.5 Fieldwork was undertaken on the 25th November 2011. This report was prepared for 16th December 2011.

Personnel

2.6 Fieldwork was conducted by Catrin Jenkins (Supervisor) and Stephanie Piper. The geophysical data were processed by Natalie Swann. This report was prepared by Natalie Swann, with illustrations by Tony Liddell, and edited by Duncan Hale, the Project Manager.

Archive/OASIS

2.7 The site code is **CCS11**, for **C**ramlington **C**ragside **S**chool 20**11**. The survey archive will be supplied on CD to the client for deposition with the project archive in due course. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (**OASIS**). The OASIS ID number for this project is **archaeol3-115852**.

3. Historical and archaeological background

3.1 There are no recorded prehistoric or Roman sites within the proposed development area and little is known of the prehistoric or Roman periods in Cramlington as a whole.

3.2 The earliest recorded settlements are the medieval villages at Horton and West Hartford. The development of Cramlington itself was dominated by the coal industry during the post-medieval period. The proposed development area lies to the east of the former West Cramlington Colliery (now the site of Alexandra Park) and the former West Cramlington Waggonway lies adjacent to the south-western boundary of the site.

3.3 Historic maps show that the proposed development area remained as open farmland until the 'New Town' development of Cramlington in the 1960s.

4. Landuse, topography and geology

4.1 At the time of survey the proposed development area comprised a playing field to the west of the former Cragside County First School.

4.2 The site was predominantly level with a mean a mean elevation of approximately 55m OD.

4.3 The underlying solid geology of the area comprises sandstone of the Pennine Middle Coal Measures overlain by drift geology of Devensian till.

5. Geophysical survey

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage guidelines, *Geophysical survey in archaeological field evaluation* (David, Linford & Linford 2008); the Institute for Archaeologists (IfA) *Standard and Guidance for archaeological geophysical survey* (2011); the IfA Technical Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney, Gater & Ovenden 2002); and the Archaeology Data Service *Guide to Good Practice: Geophysical Data in Archaeology* (Schmidt & Ernenwein 2011).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance it was considered possible that cut features such as ditches and pits might be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.

5.4 Given the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 A 30m grid was established across the survey area and tied-in to known, mapped Ordnance Survey points using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic corrections (RTK) typically providing 10mm accuracy.

5.6 Measurements of vertical geomagnetic field gradient were determined using Bartington Grad601-2 dual fluxgate gradiometers. A zig-zag traverse scheme was employed and data were logged in 30m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval was 0.25m and the traverse interval was 1m, thus providing 3,600 sample measurements per 30m grid unit.

5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Geoplot v.3 software was used to process the geophysical data and to produce both a continuous tone greyscale image and a trace plot of the raw (minimally processed) data. The greyscale image and interpretations are presented in Figure 2; the trace plot is provided in Figure 3. In the greyscale image, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. A palette bar relates the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to the data:

clip	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
zero mean traverse	sets the background mean of each traverse within a grid to zero; for removing striping effects in the traverse direction and removing grid edge discontinuities
destagger	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
despike	locates and suppresses iron spikes in gradiometer data
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.25m x 0.25m intervals

Interpretation: anomaly types

5.10 A colour-coded geophysical interpretation is provided. Three types of geomagnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches

negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and service pipes) and/or fired structures such as kilns or hearths

Interpretation: features

5.11 A colour-coded archaeological interpretation is provided.

5.12 A series of alternate, parallel, positive and negative magnetic anomalies was detected aligned approximately north-south; these anomalies almost certainly reflect former ridge and furrow cultivation of the area. A linear positive magnetic anomaly aligned east-west at the north end of the ridge and furrow may reflect the remains of an associated headland.

5.13 A linear positive magnetic anomaly was detected aligned north-west/south-east in the south-east of the survey area, which may reflect a soil-filled feature such as a ditch. This feature is apparent on recent aerial photography (Google Earth).

5.14 A chain of dipolar magnetic anomalies was detected along the south-western edge of the survey area, which almost certainly reflects a modern service.

5.15 The only other anomalies detected here are small, discrete dipolar magnetic anomalies. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes, brick fragments or colliery waste.

6. Conclusions

6.1 Approximately 0.5ha of geomagnetic survey was undertaken at the former Cragside County First School prior to proposed development.

6.2 Probable traces of former ridge and furrow cultivation were identified across the survey area.

6.4 A possible soil-filled ditch was identified in the south-east of the survey area.

6.3 A modern service was identified along the south-western edge of the area.

7. Sources

David, A, Linford, N, & Linford, P, 2008 *Geophysical Survey in Archaeological Field Evaluation*. English Heritage

Gaffney, C, Gater, J, & Ovenden, S, 2002 *The use of geophysical techniques in archaeological evaluations*. Technical Paper **6**, Institute of Field Archaeologists

IfA 2011 *Standard and Guidance for archaeological geophysical survey*. Institute for Archaeologists

Schmidt, A, & Ernenwein, E, 2011 *Guide to Good Practice: Geophysical Data in Archaeology*. Archaeology Data Service

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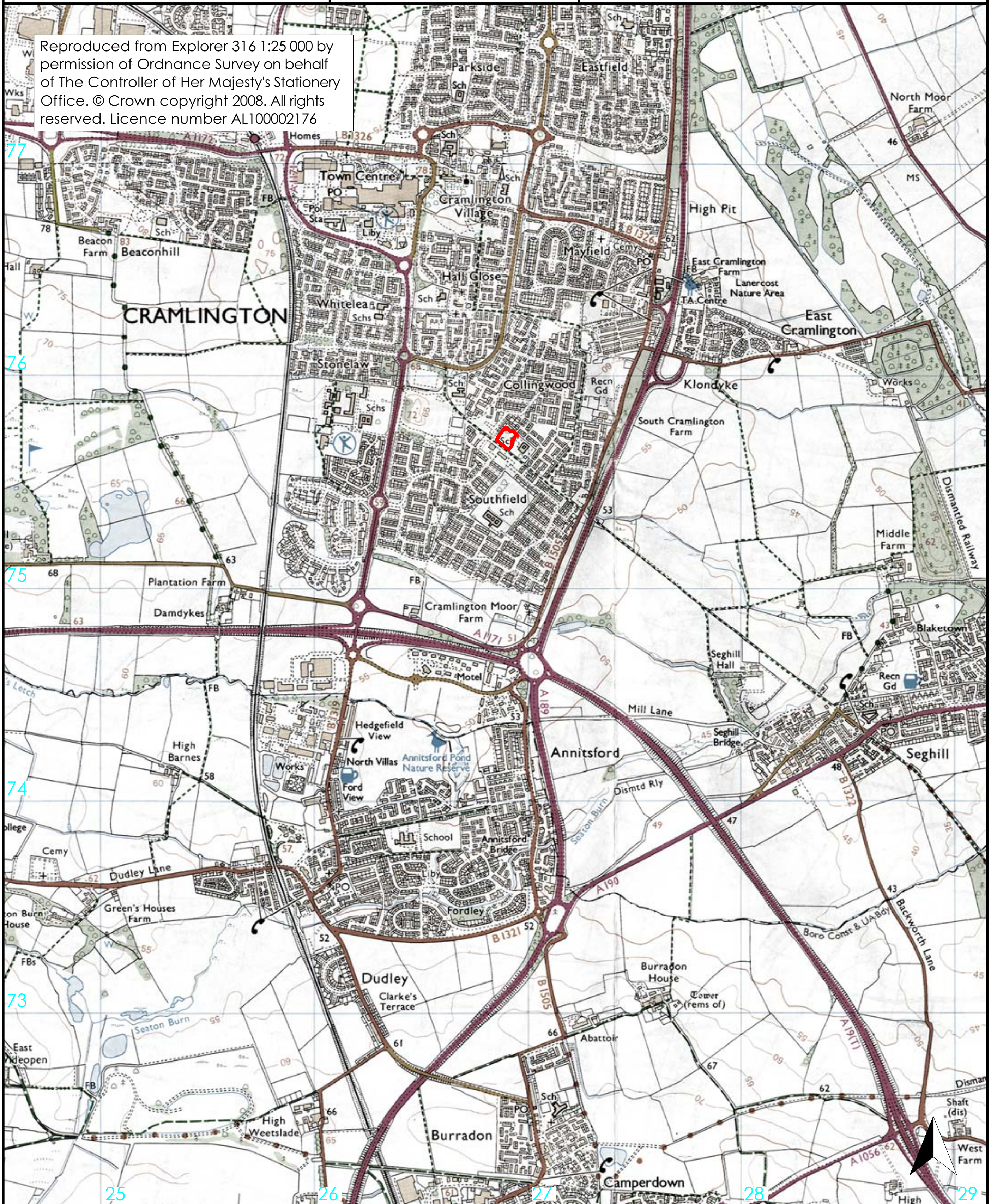
Figure 1: Site location



survey location

0 1km
scale 1:25 000 for A4 plot

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0 50m
scale 1:1000 for A3 plot

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Figure 2: Geophysical survey and interpretations

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Figure 3:
Trace plot of geomagnetic data