

ARCHAEOLOGICAL
SERVICES
DURHAM UNIVERSITY

on behalf of
Cemetery Development Services Ltd
for
Durham County Council

Pelton Cemetery Extension
Pelton
County Durham

geophysical survey

report 3048
December 2012

Contents

1.	Summary	1
2.	Project background	2
3.	Historical and archaeological background	2
4.	Landuse, topography and geology	3
5.	Geophysical survey	3
6.	Conclusions	5
7.	Sources	6

Figures

Figure 1:	Site location
Figure 2:	Geophysical survey
Figure 3:	Geophysical interpretation
Figure 4:	Archaeological interpretation
Figure 5:	Trace plot of geomagnetic data

1. Summary

The project

- 1.1 This report presents the results of a geophysical survey conducted in advance of a proposed extension to Pelton Cemetery, Pelton, County Durham. The works comprised detailed geomagnetic survey of approximately 2ha of arable land to the north-west of the existing cemetery.
- 1.2 The works were commissioned by Cemetery Developments Ltd for Durham County Council and conducted by Archaeological Services Durham University.

Results

- 1.3 No features of archaeological significance have been identified in the geophysical survey.
- 1.4 Anomalies likely to relate to recent agricultural activity and ferrous/fired debris have been detected.

2. Project background

Location (Figure 1)

- 2.1 The proposed development area was located to the north-west of the existing cemetery at Pelton, County Durham (NGR centre: NZ 2442 5319). One survey of approximately 2ha was conducted. The site was bounded to the north-west by an embankment up to the A693 road; to the north-east by the Consett & Sunderland Railway Path; to the south by Pelton Cemetery, surrounded by yews and metal railings; and to the south-west by open farmland, bordered by scrub.

Development proposal

- 2.2 The proposal is to develop the land as an extension of the current cemetery.

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 proposed development 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 instructions from the client and national standards and guidance (see para. 5.1 below).

Dates

- 2.5 Fieldwork was undertaken on 20th November 2012. This report was prepared for 3rd December 2012.

Personnel

- 2.6 Fieldwork was conducted by Ashley Hayes and Richie Villis (supervisor). The geophysical data were processed by Ashley Hayes. This report was prepared by Richie Villis, with illustrations by David Graham, and edited by Duncan Hale, the Project Manager.

Archive/OASIS

- 2.7 The site code is **PCE12**, for **Pelton Cemetery Extension 2012**. 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 **Online AccesS** to the **Index of archaeological investigationS** project (**OASIS**). The OASIS ID number for this project is **archaeol3-138069**.

3. Historical and archaeological background

- 3.1 The website *A vision of Britain through time* (<http://www.visionofbritain.org.uk/>) provides access to John Marius Wilson's *Imperial Gazetteer of England and Wales* (1870-1872). Pelton is described by Wilson as "a village, a township, and a chapelry, in Chester-le-Street parish, Durham. The village stands 1¼ mile S of the river Team, 2 N W of Chester-le-Street, and 4½ W by S of Peshaw r. station; has recently undergone much enlargement; and is associated with a popular air, called "Pelton Lonnin" The township comprises 1, 109 acres. Real property, £3, 652. Pop. in 1851, 1, 207; in 1861, 2, 787. Houses, 544. The increase of pop. arose from the extension

of collieries. The chapelry is more extensive than the township, and was constituted in 1842.”

- 3.2 The name Pelton is likely to derive from the Old English meaning 'Paelli's farmstead' and the village is first recorded in 1312. Most of the village buildings date to the mining industry period of the 19th century. A stained glass window to commemorate the deaths of those who perished when a plague swept through the area was erected in Holy Trinity Church in 1850.
- 3.3 The cemetery around Holy Trinity Church appears on the Ordnance Survey (OS) 1896 1st revised County Series map of Durham. By 1939 it has been extended to its current size. Apart from the construction and subsequent abandonment of the railway line to the north-east very little development has taken place on the site through the OS editions.

4. Landuse, topography and geology

- 4.1 At the time of survey the proposed development area comprised a single field of ploughed and rolled arable land. High quantities of pottery, brick and metal waste were noted in the ploughsoil.
- 4.2 The area undulated gently with a mean elevation of approximately 95m OD dropping steeply to around 90m OD in the east corner.
- 4.3 The underlying solid geology of the area comprises Westphalian strata of the High Main Post Member, which are overlain by 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 likely 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 anticipated shallowness of targets and 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 related to known, mapped Ordnance Survey points and the National Grid using a Leica GS15 global navigation satellite system (GNSS) with real-time kinematic (RTK) corrections 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 Figures 2-4; the trace plot is provided in Figure 5. 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 geomagnetic data:

<i>clip</i>	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
<i>zero mean traverse</i>	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
<i>destagger</i>	corrects for displacement of geomagnetic anomalies caused by alternate zig-zag traverses
<i>interpolate</i>	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 plan 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 plan is provided.
- 5.12 A series of north-east/south-west aligned positive and negative magnetic anomalies has been detected across the area. These anomalies reflect the current plough regime.
- 5.13 An earlier OS edition shows a former field boundary in the north-west of the survey area. This has not been identified in the data as it runs parallel with the plough anomalies.
- 5.14 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 and brick fragments. Large quantities of pottery, brick fragments and general debris were noted in the ploughsoil during survey. Particularly high quantities were detected near the northern and western edges of the area.
- 5.15 Strong dipolar magnetic anomalies along the edges of the area, especially the southern edge, reflect the adjacent metal field boundaries.

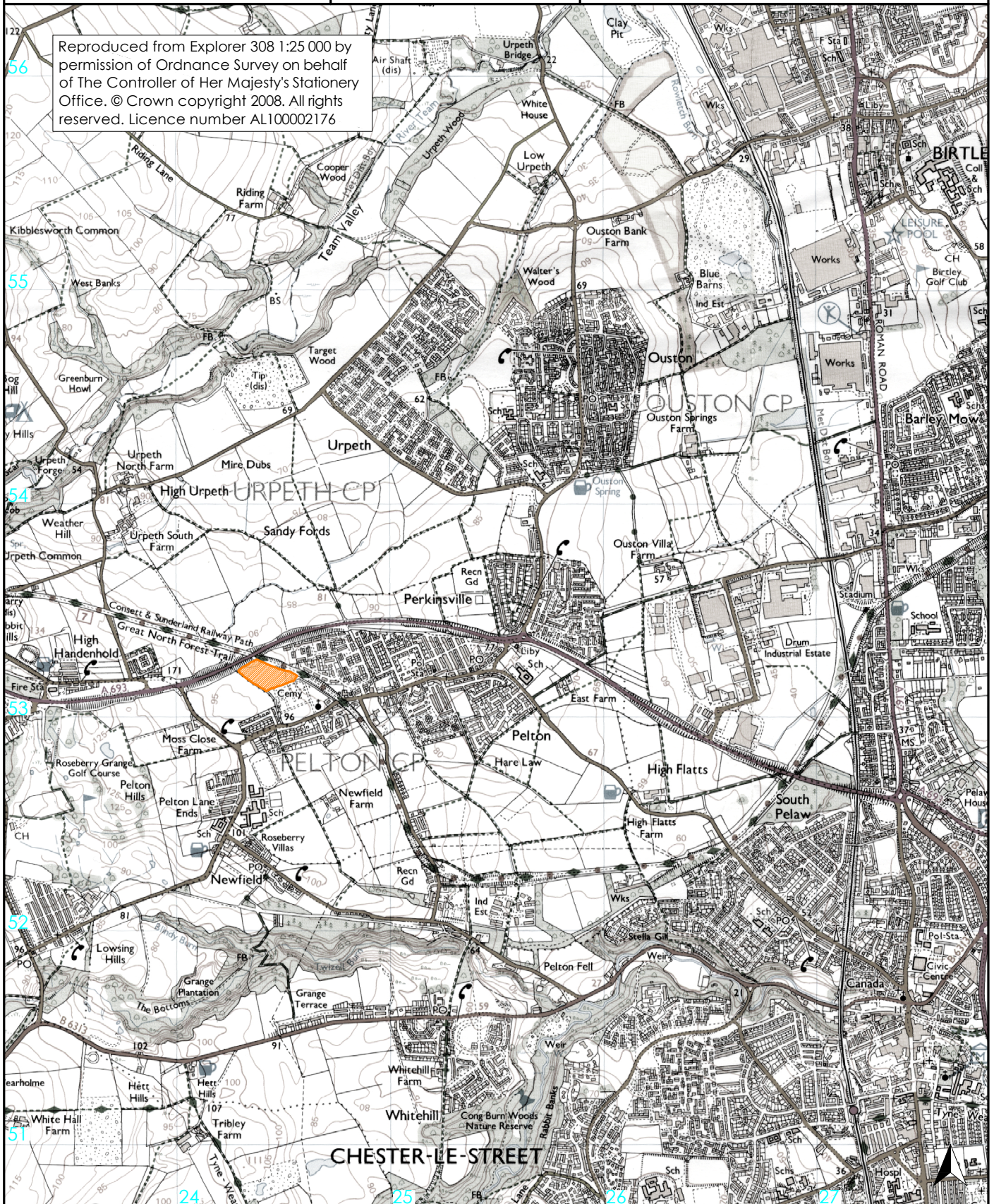
6. Conclusions

- 6.1 Approximately 2ha of geomagnetic survey was undertaken on land to the north-west of Pelton Cemetery, Pelton, County Durham, prior to a proposed extension to the cemetery.
- 6.2 No features of archaeological significance have been identified in the geophysical survey.
- 6.3. Anomalies likely to relate to recent agricultural activity and ferrous/fired debris have been detected.


7. Sources

- A vision of Britain through time* <http://www.visionofbritain.org.uk/> Accessed 23rd November 2012
- 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

Reproduced from Explorer 308 1:25 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright 2008. All rights reserved. Licence number AL100002176



 site location

0  1km
scale 1:25 000 for A4 plot

Reproduction in whole or in part is prohibited without the prior permission of Durham County Council

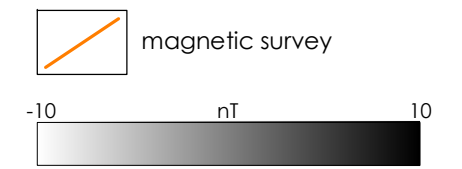
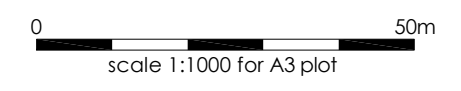
ARCHAEOLOGICAL SERVICES

DURHAM UNIVERSITY

for
Cemetery Development Services Ltd
on behalf of
Durham County Council

Pelton Cemetery Extension
Pelton
County Durham
geophysical survey
report 3048

Figure 2: Geophysical survey



Reproduction in whole or in part is prohibited without the prior permission of Durham County Council

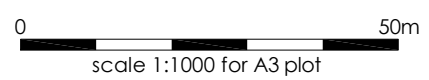
ARCHAEOLOGICAL SERVICES





DURHAM UNIVERSITY

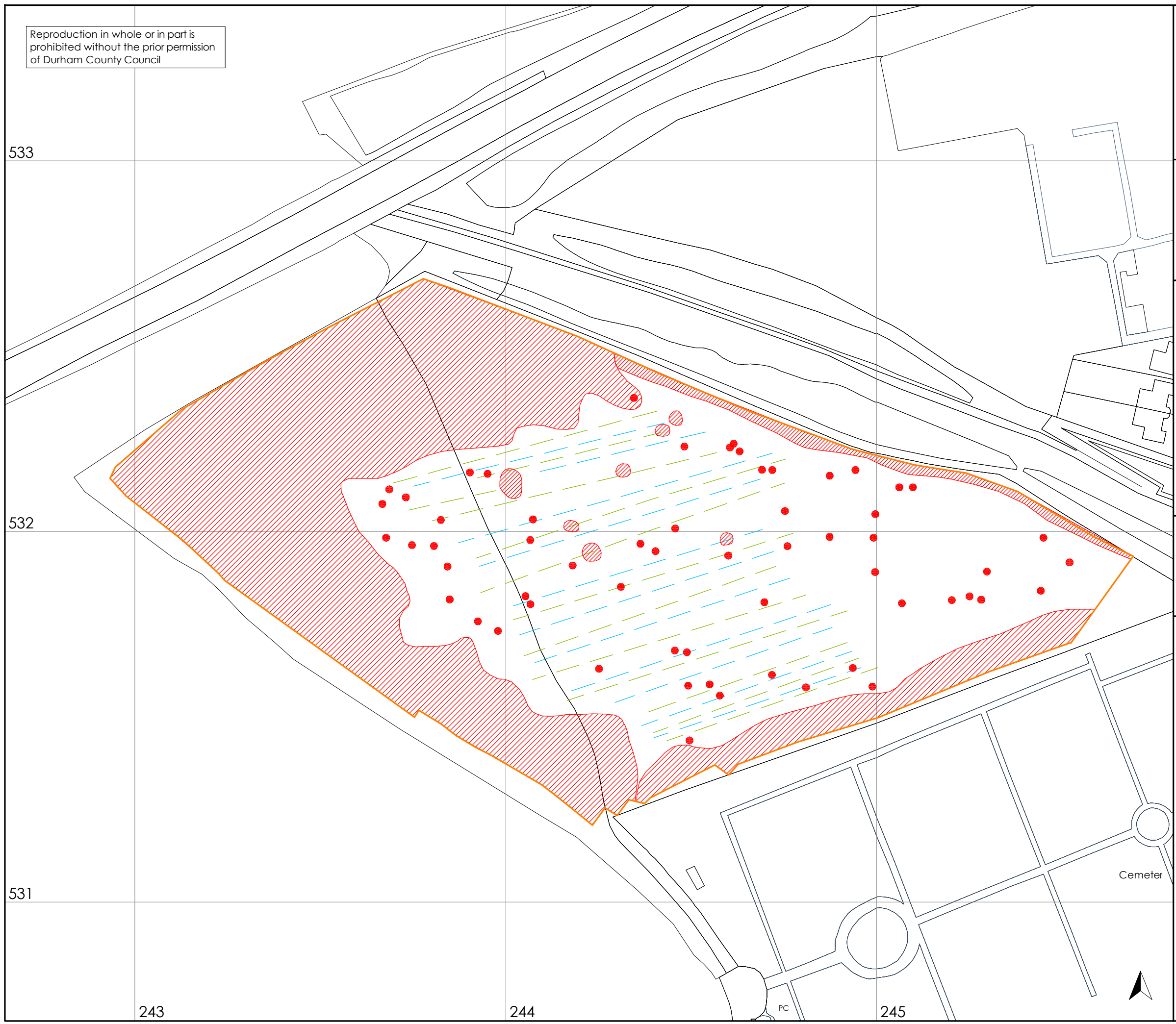
for
Cemetery Development Services Ltd
on behalf of
Durham County Council

Pelton Cemetery Extension
Pelton
County Durham
geophysical survey
report 3048

Figure 3: Geophysical interpretation



-  magnetic survey
-  dipolar magnetic anomaly
-  positive magnetic anomaly
-  negative magnetic anomaly



Reproduction in whole or in part is prohibited without the prior permission of Durham County Council

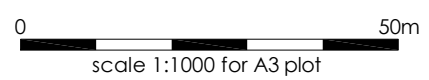
ARCHAEOLOGICAL SERVICES




DURHAM UNIVERSITY

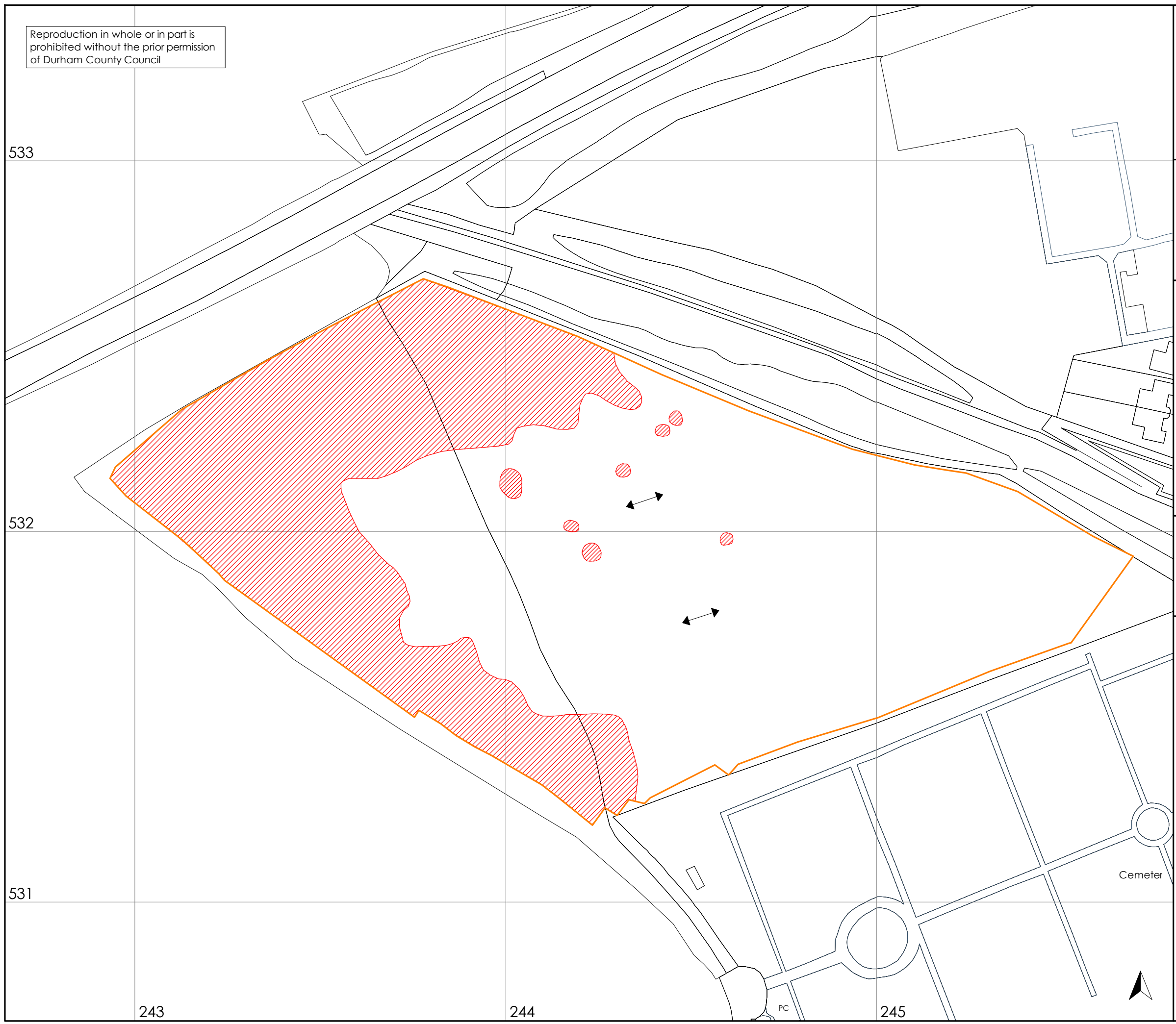
for
Cemetery Development Services Ltd
on behalf of
Durham County Council

Pelton Cemetery Extension
Pelton
County Durham
geophysical survey
report 3048

Figure 4: Archaeological interpretation



-  magnetic survey
-  ferrous/fired materials
-  former ploughing



533

532

531

243

244

245

PC

Cemeter

for
Cemetery Development
Services Ltd
on behalf of
Durham County Council

Pelton Cemetery Extension
Pelton
County Durham

geophysical survey
report 3048

Figure 5: Trace plot of geomagnetic
data

0 50m
scale 1:1000 for A3 plot

20.00nT/cm

