

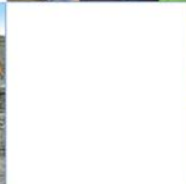
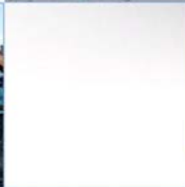
Orchard View, Eskbank:

Evaluation Data Structure Report

AOC Project 21810

Planning Ref: 10/00645/DPP

24th February 2011



Orchard View, Eskbank, Dalkeith: Evaluation, Data Structure Report

On Behalf of: Yeoman McAllister Architects

For

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National Grid Reference (NGR): NT 320 668

AOC Project No: 21810

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This document has been prepared in accordance with AOC standard operating procedures.

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Abstract

This report represents the results of an archaeological geophysical survey and intrusive field evaluation undertaken by AOC Archaeology Group on the site of a proposed residential development Orchard View, Eskbank, Dalkieth

The archaeological evaluation consisted of the machine trenching of 4000 m² equating to a 10% sample of the development area.

The geophysical survey identified anomalies that was thought may be attributed to ditches and pits, some of which corresponded to known cropmarks visible on aerial photographs. The evaluation however failed in identifying significant archaeological material associated with either the cropmarks or geophysical anomalies; it however revealed evidence of north-south aligned relic rig & furrow cultivation.

1 INTRODUCTION

1.1 Background

- 1.1 AOC Archaeology Group was commissioned by Yeoman McAllister Architects on behalf of CALA Homes (East) Ltd to undertake an archaeological evaluation and geophysical survey within a proposed residential development site adjacent to Orchard View, Eskbank, Dalkeith, Midlothian. The archaeological evaluation was undertaken in response to planning condition 10/00645/DPP.
- 1.2 Midlothian Council is advised on archaeological matters by East Lothian Council Archaeology Service (ELCAS). The archaeological works were conducted in accordance with the principles set out in *Scottish Planning Policy* (Scottish Government February 2010) and *PAN 42* (SOEnD 1994) and in accord with Midlothian Council requirements as advised by ELCAS.
- 1.3 The objective of the archaeological works was to determine the existence of any buried archaeological remains within the development area by means of a geophysical survey followed by a programme of trial trenching. A *Written Scheme of Investigation* (AOC 2011) outlining the entire programme of archaeological works was agreed with ELCAS in advance of the works being undertaken.

1.2 Location

- 1.2.1 The proposed development area (NGR: NT 320 668) is located to the immediate west of Orchard view, Eskbank and is bounded to the south by the A768. The River Esk lies to the north (Figure 1). The ground has been in arable cultivation and currently lies to stubble.

1.3 Archaeological background

- 1.3.1 Oblique aerial photography had identified two suites of cropmark features - *NMRS NT36NW108* and *NMRS NT36NW34* occupying the development area (Plates 1 and 2).
- 1.3.2 A pit alignment (*NMRS NT36NW108*), aligned roughly south-east to north-west, transects the northern part of the development area (see upper left on Plate 2). These cropmarks may have represented a continuation of a pit alignment (*NMRS NT36NW 72*; NGR: NT 3205 6685; see central part of Plate 2) located to the south-east and excavated by Barber in 1981. Five pits excavated at the north-western end of the line showed that they varied from 2 m to 3 m in diameter and up to 0.7 m in depth. The pits, which had been dug across a landscape of grassland with scrub woodland, were left open to fill up naturally. A radiocarbon date of 110 +/- 70 BC (GU-1632) was obtained from a lens of charcoal-rich soil at the top of the primary deposits in one of the pits (Barber 1985).
- 1.3.3 A large Roman temporary camp at Eskbank was identified in 1962; the crop-mark of the ditch is clearly visible for most of the northern extent (St Joseph 1965; 1969; See Plate 2). Prior excavations were carried out prior to the construction of a housing estate to the immediate east of the development area. An area 20.0 m by 50.0m was stripped to reveal an intersection of the

ditches of two temporary camps and the entrance complex of one of these camps. A section cut across the point where the ditches met revealed that the later camp was the one without the tutulus. The ditch of the earlier camp was 2.2 m wide by 1.2m deep. No pottery or other material of Roman date was found. An unsuccessful attempt was made to locate on the ground the pit alignment which cuts obliquely across the field in which the camps are sited (Maxfield 1972; 1975).

- 1.3.4 Excavation by CFA in advance of the construction of the A 68 Northern bypass also found the remains of a Roman camp. The camp ditch of the west side was up to 3.5 m wide and 1.7 m deep, V-shaped in profile, with a squared channel at its base; there was no trace of an associated rampart. The eastern ditch could not be located on the expected alignment, despite extensive trenching; it may never have been dug. Two large pits, which yielded burnt cereal grains and charcoal, may have been cooking-pits, or ovens, but it is not certain that they are of Roman origin (Keppie 1996). The wider landscape is also rich in Roman remains most notably the scheduled Elginhaugh Roman temporary camp, native fort and palisaded enclosure (SAM 119) and Elginhaugh Roman fort, annexe and bathhouse (SAM 1236) which lie to the north of the development area.



Plate 1: Development area from south (RCAHMS A65835)

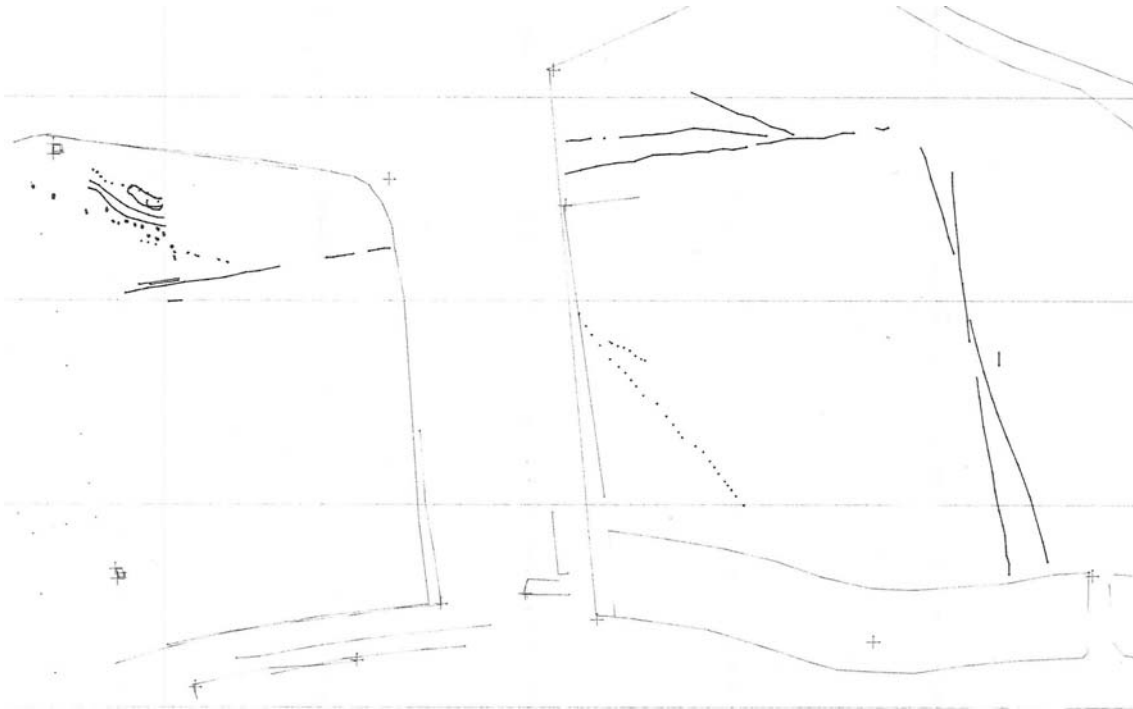


Plate 2: RCAHMS rectification of *NMRS NT36NW108, NMRS NT36NW34 & NMRS NT36NW 72*

2 OBJECTIVES

2.1 The objectives of the archaeological works were:

- i) to determine and assess the character, extent, condition, quality, date and significance of any buried archaeological remains within the proposed development area;
- ii) to advise and implement an appropriate form of mitigation, such as excavation, post-excavation analyses and publication given the infeasibility of preserving the archaeological material *in situ*, should significant archaeological remains be encountered.

3 METHODOLOGY

3.1 Geophysical Survey

4.3.1 The geophysical survey was carried out on behalf of AOC by Archaeological Services, Durham University in February 2011. Given the anticipated nature and depth of targets complementary techniques were used: geomagnetic survey (fluxgate gradiometry) and earth electrical resistance survey. Geomagnetic survey was undertaken over 100% of the development area with resistivity survey carried out over approximately 50% of the development area where the geomagnetic survey indicated the greatest potential for further definition of sub-surface anomalies.

- 3.1.2 Fluxgate gradiometry involves the use of hand-held magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field which are caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect, for example, ferrous, stone, brick and soil-filled features. Electrical resistance survey is ideal for detecting stone features such as walls, paths and culverts, but can also detect soil-filled features, depending on ground conditions at the time of survey. When a small electrical current is injected through the earth it encounters resistance which can be measured. Since resistance is linked to moisture content and porosity, stone and brick features will give relatively high resistance values while soil-filled features, which retain more moisture, will provide relatively low resistance values.
- 3.1.3 A 20 m survey grid was established at each survey location and recorded using a Trimble Pathfinder Pro XRS global positioning system (GPS) or a total station survey instrument. The survey area was related to the Ordnance Survey National Grid and known mapped features.
- 3.1.4 Measurements of vertical geomagnetic field gradient were determined using a Geoscan FM256 or Bartington Grad601-2 fluxgate gradiometer. A zigzag traverse scheme was employed and data logged in 20m grid units. The sample interval was set to 0.25 m and the traverse interval to 1 m, thus providing 1600 measurements per 20 m grid unit.
- 3.1.5 Measurements of earth electrical resistance were determined using a Geoscan RM15D resistance meter with a twin probe array. A zigzag traverse scheme was employed and data logged in 20 m grid units. The instrument sensitivity was set to 0.1 ohms, the sample interval to 1 m and the traverse interval to 1m thus providing 400 sample measurements per 20 m grid unit.
- 3.1.6 Data was downloaded on-site into a laptop computer for verification, initial processing and storage and subsequently transferred to a desktop computer for further processing, interpretation and archiving. Geoplot software was used to process and interpolate the geomagnetic and resistance data to form arrays of regularly-spaced values at 0.25m intervals and to produce continuous-tone greyscale images and trace plots of the raw (unfiltered) data. Plots of filtered data will be provided if appropriate.

3.2 Evaluation

- 3.1 The trenching was designed to establish the extent, condition, character, quality, significance and date of any archaeological features identified by the geophysical survey and/or cropmarks and any others that where as yet be unknown within the development area. The evaluation comprised machine trenching of a 10% sample of the 4 ha development thus trenching consisted of 4000 m² (total basal trench dimensions). A proportion of the trenches (2 m wide) targeted geophysical/cropmark anomalies; others, between 100 m and 40 m in length and set on varying orientations were randomly distribution across the development site (Figure 2).

- 3.2 Stripping of the overburden was by means of a single tracked 360° excavator equipped with a 2 m wide toothless ditching bucket. Excavation was undertaken in shallow units/spits until the first significant archaeological horizon or natural subsoil was reached. All machine excavation was supervised by an experienced field archaeologist.
- 3.3 All trial trenching was undertaken according to AOC Archaeology Group's standard operating procedures. The trenches were carefully backfilled on completion of the evaluation.

4 RESULTS

4.1 Geophysical Survey

- 4.1.1 The full geophysical report can be found in Appendix 4 and a copy will also be deposited with the project archive. The interpretations are based on Figures 3 and 4 therein.
- 4.1.2 Broad bands of positive and negative magnetic anomalies and high and low resistance anomalies were detected aligned north-west - south-east across the survey area. These anomalies are likely to correspond to a change in geology from gravels and sands in the north to boulder clay (Devensian till) in the south.
- 4.1.3 Several linear and rectilinear positive magnetic anomalies were identified north-east of the geological bands which may reflect soil-filled features such as ditches.
- 4.1.4 Several linear negative magnetic anomalies were also identified north-east of the geological bands which may reflect wall footings or concentrations of stone in the geology.
- 4.1.5 North of the main geological bands there is a large concentration of high resistance anomalies which are likely to correspond to the gravel geology in this part of the site. Within this area there are a number of low resistance anomalies that could reflect soil-filled features such as pits and ditches but may also reflect waterlogging within the geology, as this part of the site was waterlogged and flooded when the survey was undertaken.
- 4.1.6 In the north-west corner of the survey area a concentration of discrete positive magnetic anomalies was identified which may reflect soil-filled features such as pits and match a series of pits identified on aerial photographs of the site. A further concentration of possible pits was identified along the north edge of the site.
- 4.1.7 At the centre of the northern part of the survey area a ring of low resistance was detected which may reflect a small ring ditch approximately 11 m across.

- 4.1.8 South of the geological bands two linear positive magnetic anomalies aligned in a T shape were detected which may reflect soil-filled ditches.
- 4.1.9 West and north of these ditches there was a high concentration of discrete positive magnetic anomalies which could reflect soil-filled features such as pits. Some of these anomalies appear to form a pit alignment running northwest - southeast, on the south edge of the geological bands. These pits could possibly be a continuation of the pit alignment excavated to the east of the survey area in 1981. Between the pits two weak linear negative magnetic anomalies aligned north-west - south-east were detected which are likely to reflect gravel bands in the geology.
- 4.1.10 A chain of dipolar magnetic anomalies detected along the north and north-east edges of the survey area reflect a modern service pipe or cable and associated manholes.

4.2 Evaluation

- 4.2.1 The evaluation was undertaken between 14th and 18th January 2011. Overall weather conditions were generally fair, and good archaeological visibility was present throughout the evaluation.
- 4.2.2 Topsoil comprised a dark brown/black silty clay containing frequent small to medium sized rounded stones and varied in depth from 0.3 m to 0.40 m. The natural subsoil consisted of yellow clay in the southern half of the site changing to gravels in the north. Rig & furrow remains, aligned approximately north to south (Figure 2; Plates 3 and 4), were found to cover the whole site. The separation from mid ridge to mid ridge was about 12-13 m. The furrow remains were shallow with a flat base, being on average 0.1 m deep with a maximum depth of only 0.2 m. They contained a single fill of compact mid brown sandy clay with frequent small to medium rounded stones. Field drains were also present in all trenches. The vast majority were aligned north-east to south-west, although north to south drains were also noted. No significant archaeological material was observed.



Plate 3; South facing section through furrow in Trench 18



Plate 4; South facing section through furrow in Trench 18

5 CONCLUSION

- 5.1 Other than the rig & furrow no other features, deposits or finds of any archaeological significance were found. The crop marks identified as Roman marching camps in the adjacent field to the east were not seen to continue in to the site. When these cropmarks were investigated (Maxfield 1972) it was only the eastern ditches that were examined and no excavation was carried out on the northern ditch of the camps. The linear crop mark within the development area which appears to be part a continuation of the northern ditch of the camp is probably due to a land drain. It is at this point that one has to question our understanding of the Roman marching camp at this location, particularly when previously excavated ditches have not been securely dated.
- 5.2 The work undertaken by Maxfield (1972) also attempted to confirm the identification of the cropmarks described as a pit alignment. No trace of these pits was found. However later work did clarify the pit alignment (Barber 1985) in an area of ground that was not under intensive agriculture. It may be that the lack of ploughing led to these particular pits' survival.
- 5.3 The geophysical results identified a large number of discrete anomalies that could have represented pits; but these were found to be geological in character. Likewise it is highly likely that cropmarks identified as pits were also due to the underlying geology. Overall the evaluation trenching revealed

both the cropmarks and geophysical anomalies were derived from either underlying geological anomalies or land drains.

- 5.4 The rig & furrow within the development area was widely spaced (12 - 13 m) and shallow in depth and laid out on the same N-S alignment as the existing field boundary to the east. Such systems are usually associated with a late date and in particular with agricultural improvements in the 19th century (Barber 2001).

6 RECOMMENDATIONS

- 6.1 Other than late agricultural remains (rig & furrow) the significant balance of probability is that the development area is archaeologically sterile. No further archaeological works are considered necessary. This recommendation will require confirmation by ELCAS on behalf of Midlothian council.

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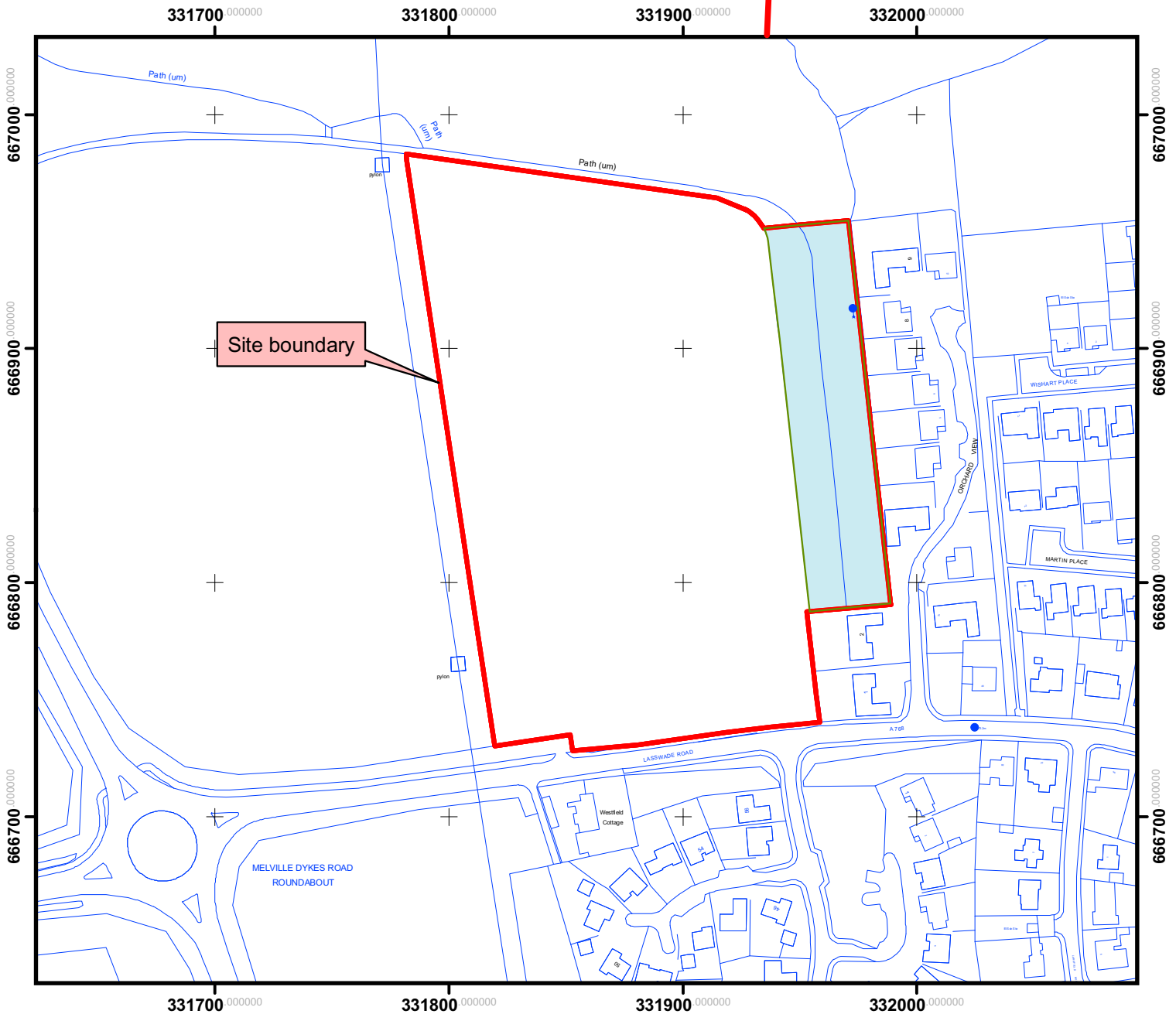
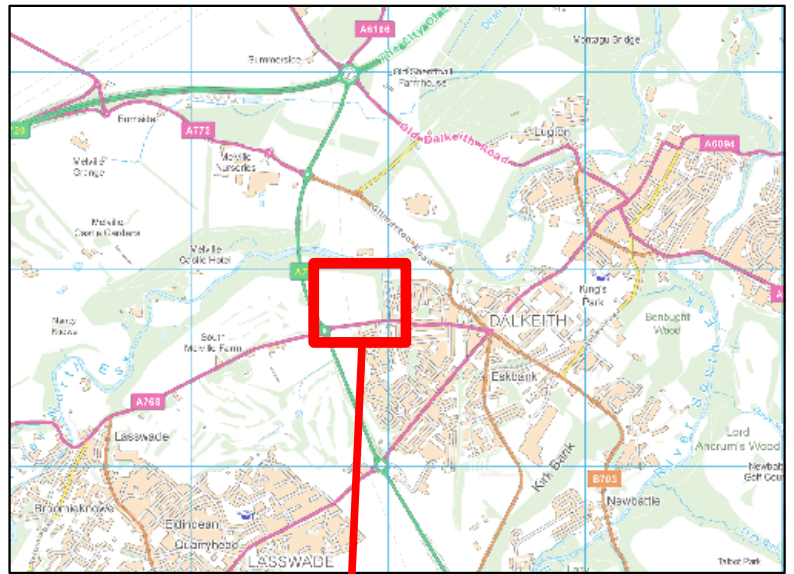
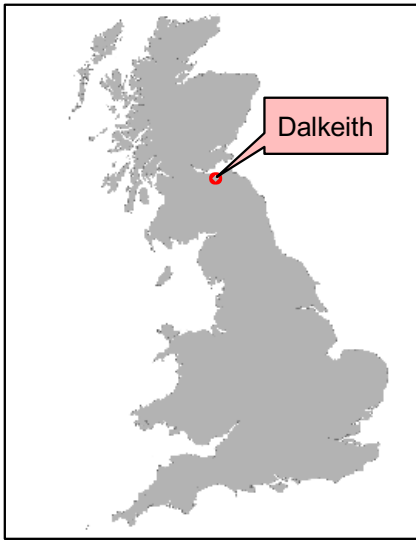
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0 25 50 75 100 Meters

Scale 1:2,500 at A4

Cartographic data derived from OS OpenData, Crown Copyright

Figure 1: Site Location Plan



(c) AOC Archaeology 2010

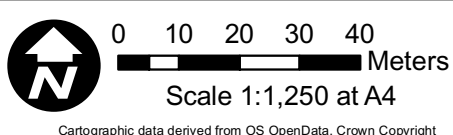


Figure 2: Trench Location Plan

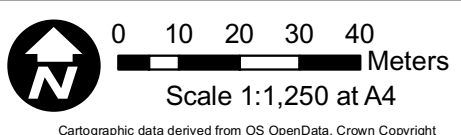
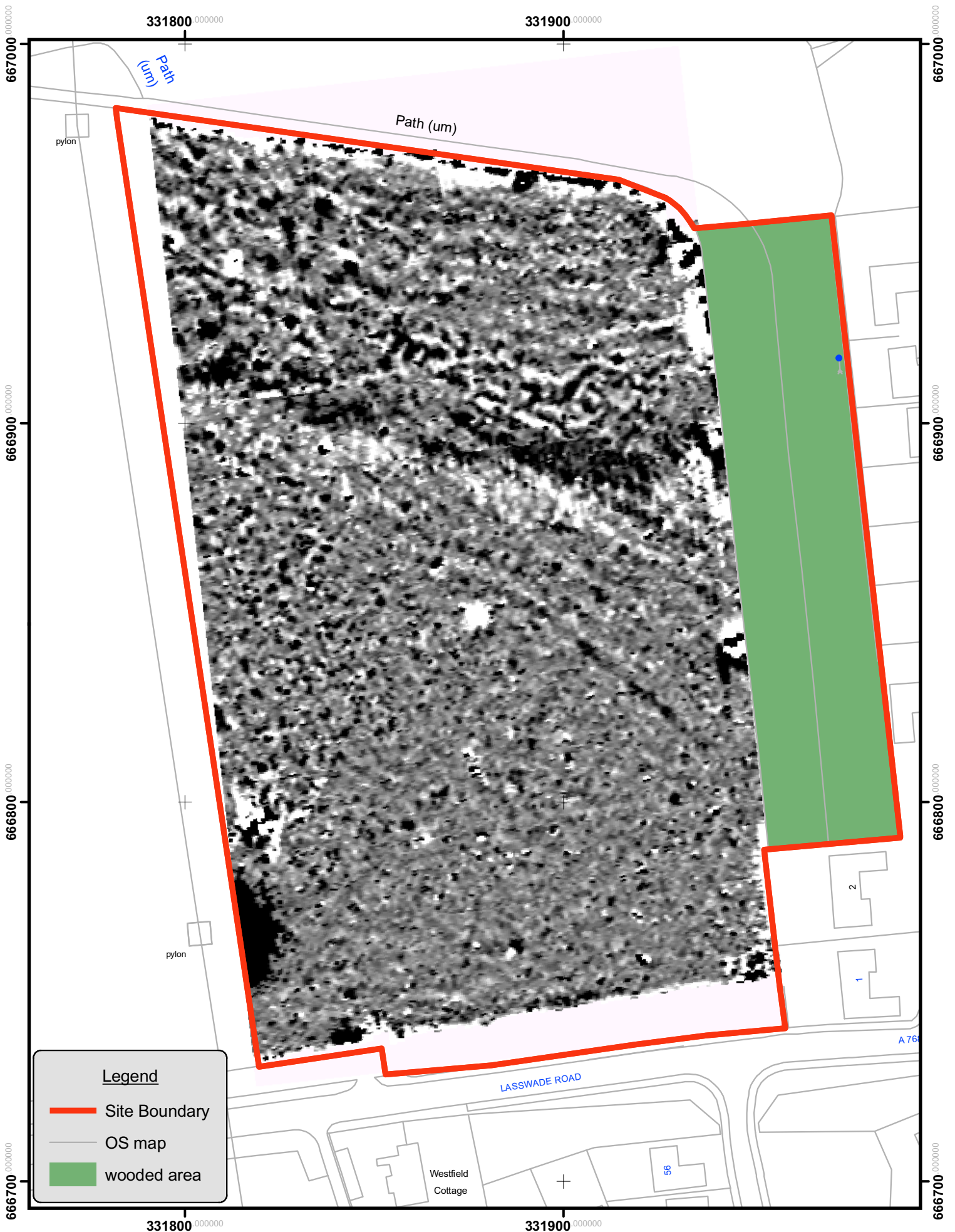


Figure 3: Magnetometer Results



Legend

- Site Boundary
- OS map
- wooded area



0 10 20 30 40 Meters
 Scale 1:1,250 at A4
Cartographic data derived from OS OpenData, Crown Copyright

Figure 4: Resistivity Results

Orchard view, Eskbank, Dalkieth: Evaluation Data Structure Report

Section 2: Appendices

APPENDIX 1: Trench Descriptions

Trench 1

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Ridge and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 2

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 3

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 4

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 5

Dimensions	100m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m

Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 6

Dimensions	100m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 7

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 8

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 9

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay
Finds	19/20 th C pottery in topsoil (not retained)

Trench 10

Dimensions	100 m by 2 m
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Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay and sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 11

Dimensions	100 m by 2 m
Total Area	200 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	Clay and sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 12

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NE-SW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 13

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NE-SW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 14

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NE-SW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 15

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	NE-SW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 16

Dimensions	50 m by 2 m
Total Area	100 m ²
Orientation	N-S
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 17

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	E-W
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 18

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	E-W
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 19

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	E-W
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 20

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	E-W
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 21

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	ESE-WNW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 22

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	ESE-WNW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 23

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	ESE-WNW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 24

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	ESE-WNW
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel

Finds 19/20th C pottery in topsoil (not retained)

Trench 25

Dimensions 40 m by 2 m
 Total Area 80 m²
 Orientation N-S
 Depth of Topsoil 0.3 m
 Depth of Excavation 0.35 m
 Significant Features Rig and furrow
 Other Features None
 Subsoil sand/gravel
 Finds 19/20th C pottery in topsoil (not retained)

Trench 26

Dimensions 40 m by 2 m
 Total Area 80 m²
 Orientation N-S
 Depth of Topsoil 0.3 m
 Depth of Excavation 0.35 m
 Significant Features Rig and furrow
 Other Features None
 Subsoil sand/gravel
 Finds 19/20th C pottery in topsoil (not retained)

Trench 27

Dimensions 40 m by 2 m
 Total Area 80 m²
 Orientation N-S
 Depth of Topsoil 0.3 m
 Depth of Excavation 0.35 m
 Significant Features Rig and furrow
 Other Features None
 Subsoil sand/gravel
 Finds 19/20th C pottery in topsoil (not retained)

Trench 28

Dimensions 40 m by 2 m
 Total Area 80 m²
 Orientation N-S
 Depth of Topsoil 0.3 m
 Depth of Excavation 0.35 m
 Significant Features Rig and furrow
 Other Features None
 Subsoil sand/gravel
 Finds 19/20th C pottery in topsoil (not retained)

Trench 29

Dimensions 40 m by 2 m
 Total Area 80 m²
 Orientation N-S
 Depth of Topsoil 0.3 m
 Depth of Excavation 0.35 m
 Significant Features Rig and furrow
 Other Features None

Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 30

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	N-S
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 31

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	NW-SE
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 32

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	N-S
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 33

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	N-S
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow
Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

Trench 34

Dimensions	40 m by 2 m
Total Area	80 m ²
Orientation	N-S
Depth of Topsoil	0.3 m
Depth of Excavation	0.35 m
Significant Features	Rig and furrow

Other Features	None
Subsoil	sand/gravel
Finds	19/20 th C pottery in topsoil (not retained)

APPENDIX 2: Photographic Register

Digital Film 1

Frame	Trench	Description	From
1	-	Registration shot	-
2	3	General view	SE
3	5	General view	SE
4	7	General view of rig and furrow	S
5	12	General view	NNE
6	19	Drain which may be responsible for cropmark	W
7	20	Drain which may be responsible for cropmark	W
8	21	General view	W
9	23	General view	W
10	25	General view	N
11	31	General view	NW
12	34	General view	S
13	18	3 rd furrow from west south facing section	SW
14	18	3 rd furrow from west south facing section	W
15	18	2 nd furrow from west south facing section	S
16	18	2 nd furrow from west south facing section	W

Black and White Film 1

Frame	Trench	Description	From
1-2	-	Registration shot	-
3	1	General view	SE
4	3	General view	SE
5	20	General view	W
6	5	General view	SE
7	7	General view	S
8	12	General view	NNE
9	19	Drain which may be responsible for cropmark	W
10	20	Drain which may be responsible for cropmark	W
11	21	General view	W
12	23	General view	W
13	25	General view	N
14	31	General view	NW
15	34	General view	S
16-17	18	3 rd furrow from west south-facing section	SW
18-19	18	3 rd furrow from west south-facing section	W
20-21	18	2 nd furrow from west south-facing section	S
22-23	18	2 nd furrow from west south-facing section	W

APPENDIX 3: Drawing Register

Number	Description	Scale
1	Trench 18 South-facing section of 3 rd furrow from W	1:10
2	Trench 18 South-facing Section of 2 nd furrow from W	1:10

Appendix 4: Geophysics Report

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on behalf of
AOC Archaeology Group

Orchard View
Eskbank
Dalkeith
Midlothian

geophysical survey

report 2601
February 2011

Contents

1.	Summary	1
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3.	Historical and archaeological background	2
4.	Landuse, topography and geology	3
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6.	Conclusions	7
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Figures

Figure 1:	Site location
Figure 2:	Geomagnetic survey
Figure 3:	Geophysical interpretation of geomagnetic survey
Figure 4:	Resistance survey
Figure 5:	Geophysical interpretation of resistance survey
Figure 6:	Archaeological interpretation
Figure 7:	Trace plots of geomagnetic and resistance data

1. Summary

The project

- 1.1 This report presents the results of geophysical surveys conducted in advance of proposed development west of Orchard View, Eskbank, Dalkeith, Midlothian. The works comprised 3.5ha of geomagnetic survey and 2ha of earth electrical resistance survey.
- 1.2 The works were commissioned by AOC Archaeology Group and conducted by Archaeological Services Durham University.

Results

- 1.3 Anomalies reflecting a change in geology were detected in the northern half of the survey area.
- 1.4 Possible pits, ditches and accumulations of stone were identified in the north of the site matching features identified from aerial photographs. Additional possible features including ditches, a ring ditch and a pit alignment not shown on the aerial photographs were identified. These features may be geological in origin.
- 1.5 A land drain was identified aligned northeast-southwest across the site which corresponds to the position of a feature identified as a Roman ditch from aerial photographs. Further land drains were also identified across the site.
- 1.6 Modern services and a possible mine shaft were also identified.

2. Project background

Location (Figure 1)

- 2.1 The survey area was located west of Orchard View, Eskbank, Dalkeith, Midlothian (NGR centre: NT 3187 6685). Approximately 3.5ha of geomagnetic survey and 2ha of earth electrical resistance survey was conducted in one land parcel. The site is bounded to the east and north by woodland, to the south by the A768 Lasswade Road and to the west by farmland.

Development proposal

- 2.2 The development proposal is for a new residential development.

Objective

- 2.3 The principal aim of the surveys 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 instructions from the client and with current national standards and guidance (see para. 5.1 below).

Dates

- 2.5 Fieldwork was undertaken between 7th and 10th February 2011. This report was prepared for 24th February 2011.

Personnel

- 2.6 Fieldwork was conducted by Edward Davies, Tudor Skinner and Natalie Swann (Supervisor). The geophysical data were processed by Natalie Swann. This report was prepared by Natalie Swann with illustrations by Edward Davies and edited by Duncan Hale, the project manager.

Archive/OASIS

- 2.7 The site code is **DEB11**, for **Dalkeith, Eskbank 2011**. 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 **archaeol3-49120**.

3. Historical and archaeological background

- 3.1 Oblique aerial photography has identified two suites of cropmark features occupying the survey area.
- 3.2 The first cropmark shows a pit alignment (NMRS NT36NW108), aligned roughly northwest- southeast which transects the northern part of the survey area. These cropmarks may represent a continuation of a pit alignment located to the southeast and excavated by Barber in 1981; a radiocarbon date of 110 +/- 70 BC was obtained from the primary deposits in one of the excavated pits (Barber 1985).

- 3.3 The second cropmark, located to the southeast of the pit alignment, is a linear feature believed to be the continuation of a Roman ditch revealed during excavations of a large Roman temporary camp that were carried out in 1972 prior to the construction of a housing estate to the immediate east of the survey area (Maxfield 1975).
- 3.4 The wider landscape is rich in archaeological remains; similar pit alignments to the one excavated by Barber were excavated northeast of the survey area during the construction of the A68 Dalkeith Northern Bypass; this excavation also revealed remains of a Roman temporary camp (Anderson 2010). The scheduled ancient monuments of Elginhaugh Roman temporary camp, native fort and palisaded enclosure (SAM 119) and Elginhaugh Roman fort, annexe and bathhouse (SAM 1236) lie to the north of the proposed development area.

4. Landuse, topography and geology

- 4.1 At the time of survey the proposed development area comprised a single field of arable land that was boggy and flooded in places.
- 4.2 The area was predominantly level with a mean elevation of approximately 73m OD. The site is bounded on its north edge by a steep scarp which falls to the valley of the River North Esk; the bottom of the valley lies at approximately 50m OD.
- 4.3 The underlying solid geology of the area comprises lower coal measures of the carboniferous period. In the north of the survey area this is overlain by glaciofluvial sheet deposits of sand and gravel. Across the rest of the survey area there is a 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) *Draft Standard and Guidance for archaeological geophysical survey* (2010); 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* (draft 2nd edition, Schmidt & Ernenwein 2010).

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, based on aerial photographic cropmark evidence and previous work, 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.
- 5.5 Given the possibility of the presence of wall-footings and other structural remains an electrical resistance survey was considered appropriate. Earth electrical resistance survey can be particularly useful for mapping stone and brick features. When a small electrical current is injected through the earth it encounters resistance which can be measured. Since resistance is linked to moisture content and porosity, stone and brick features will give relatively high resistance values while soil-filled features, which retain more moisture, will provide relatively low resistance values.

Field methods

- 5.6 A 20m grid was established across the survey area and tied-in to known, mapped Ordnance Survey points using a total survey station instrument.
- 5.7 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 20m grid units. The instrument sensitivity was nominally 0.03nT, the sample interval was 0.25m and the traverse interval was 1.0m, thus providing 1600 sample measurements per 20m grid unit.
- 5.8 Measurements of earth electrical resistance were determined using Geoscan RM15D resistance meters and MPX15 multiplexers with a mobile twin probe separation of 0.5m. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1ohm, the sample interval to 1.0m and the traverse interval to 1.0m, thus providing 400 sample measurements per 20m grid unit.
- 5.9 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

- 5.10 Geoplot v.3 software was used to process the geophysical data and to produce both continuous tone greyscale images and trace plots of the raw (minimally processed) data. The greyscale images and interpretations are presented in Figures 2-6 the trace plots are provided in Figure 7. In the greyscale images, positive magnetic and high resistance anomalies are displayed as dark grey and negative magnetic and low resistance anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla for the geomagnetic data and ohm for the electrical resistance data.
- 5.11 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

5.12 The following basic processing functions have been applied to the resistance 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>add</i>	adds or subtracts a positive or negative constant value to defined blocks of data; used to reduce discontinuity at grid edges
<i>despike</i>	locates and suppresses spikes in data due to poor contact resistance
<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

5.13 Colour-coded geophysical interpretation plans are provided. Three types of geomagnetic anomaly have been distinguished in the data:

<i>positive magnetic</i>	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
<i>negative magnetic</i>	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
<i>dipolar magnetic</i>	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

5.14 Two types of resistance anomaly have been distinguished in the data:

high resistance regions of anomalously high resistance, which may reflect foundations, tracks, paths and other concentrations of stone or brick rubble

low resistance regions of anomalously low resistance, which may be associated with soil-filled features such as pits and ditches

Interpretation: features

- 5.15 A colour-coded archaeological interpretation plan is provided.
- 5.16 Broad bands of positive and negative magnetic anomalies and high and low resistance anomalies were detected aligned northwest-southeast across the survey area. These anomalies are likely to correspond to a change in geology from gravels and sands in the north to boulder clay (devensian till) in the south.
- 5.17 Several linear and rectilinear positive magnetic anomalies were identified northeast of the geological bands which may reflect soil-filled features such as ditches.
- 5.18 Several linear negative magnetic anomalies were also identified northeast of the geological bands which may reflect wall footings or concentrations of stone in the geology.
- 5.19 North of the main geological bands there is a large concentration of high resistance anomalies which are likely to correspond to the gravel geology in this part of the site. Within this area there are a number of low resistance anomalies that could reflect soil-filled features such as pits and ditches but may also reflect waterlogging within the geology, as this part of the site was waterlogged and flooded when the survey was undertaken.
- 5.20 In the northwest corner of the survey area a concentration of discrete positive magnetic anomalies was identified which may reflect soil-filled features such as pits and match a series of pits identified on aerial photographs of the site. A further concentration of possible pits was identified along the north edge of the site.
- 5.21 At the centre of the northern part of the survey area a ring of low resistance was detected which may reflect a small ring ditch approximately 11m across.
- 5.22 South of the geological bands two linear positive magnetic anomalies aligned in a T-shape were detected which may reflect soil-filled ditches.
- 5.23 West and north of these ditches there was a high concentration of discrete positive magnetic anomalies which could reflect soil-filled features such as pits. Some of these anomalies appear to form a pit alignment running northwest-southeast, on the south edge of the geological bands. These pits could possibly be a continuation of the pit alignment excavated to the east of the survey area in 1981. Between the pits two weak linear negative magnetic anomalies aligned northwest-southeast were detected which are likely to reflect gravel bands in the geology.
- 5.24 A chain of dipolar magnetic anomalies detected along the north and northeast edges of the survey area reflect a modern service pipe or cable and associated manholes.

- 5.25 Two intense dipolar magnetic anomalies within the survey reflect metal caps over geotechnical boreholes.
- 5.26 A linear negative magnetic anomaly was detected aligned northeast-southwest across the survey area. This corresponds to a linear low resistance anomaly. These anomalies are likely to reflect the course of a land drain. The negative magnetic anomaly is likely to reflect the drain; the low resistance reflects a relative increase in the moisture content of the backfilled service trench. These anomalies match a linear feature identified as a possible Roman ditch on the aerial photographs.
- 5.27 Further land drains aligned approximately north-south were detected as a series of parallel low resistance anomalies spaced approximately 10m apart.
- 5.28 Small, discrete dipolar magnetic anomalies were detected across the survey area. These almost certainly reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments.
- 5.29 On the west edge of the survey area a strong dipolar magnetic anomaly was detected which may reflect a mine shaft shown on historic Ordnance Survey maps.
- 5.30 The semi-circular dipolar magnetic anomaly on the west edge of the survey area is a result of the proximity of a pylon. The dipolar magnetic anomalies in the southeast corner and on the south edge of the survey area reflect brick and rubble debris.

6. Conclusions

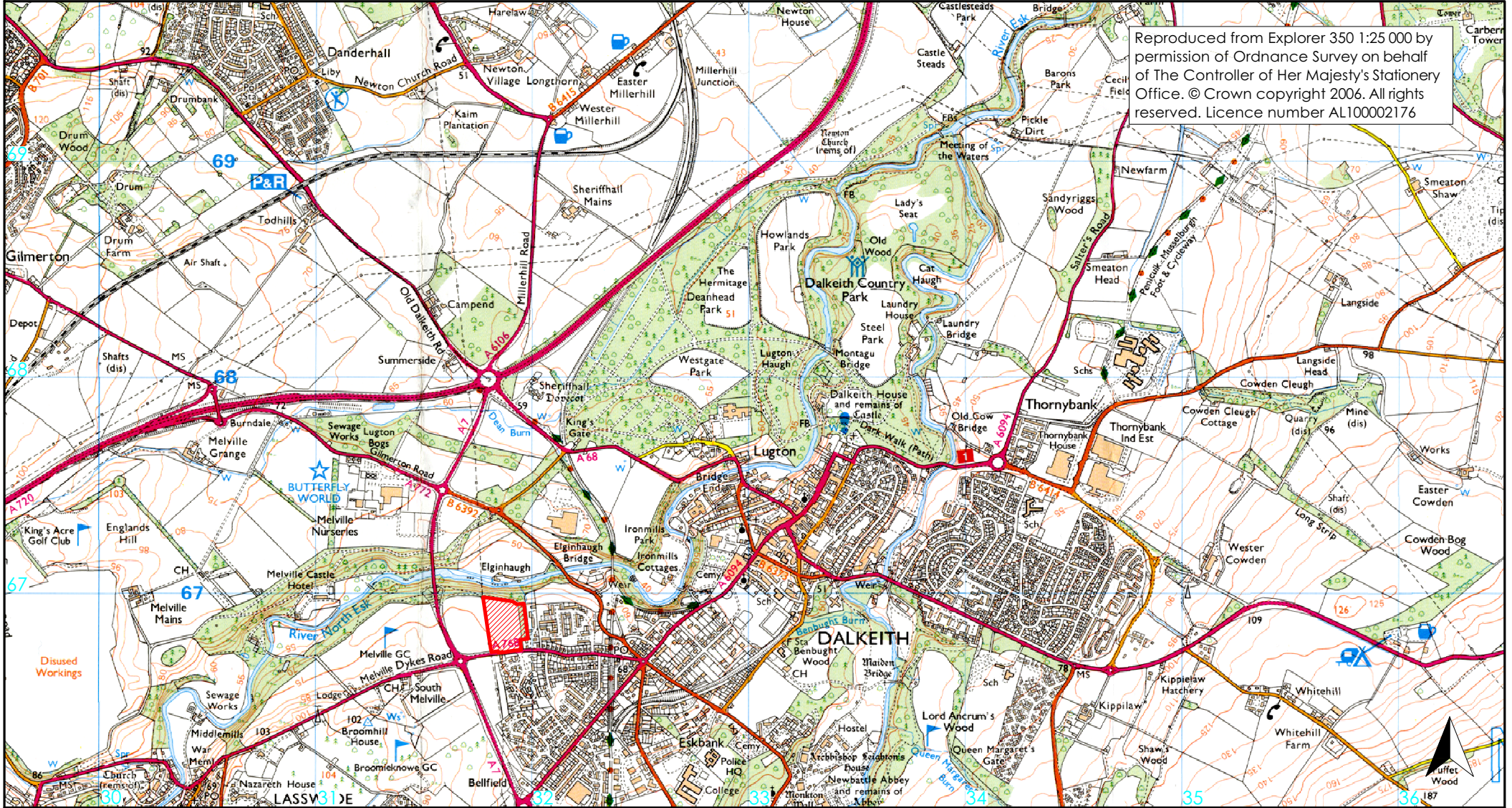
- 6.1 Approximately 3.5ha of geomagnetic survey and 2ha of earth electrical resistance survey was undertaken on land west of Orchard View, Dalkeith, Eskdale, Midlothian prior to proposed development.
- 6.2 Anomalies reflecting a change in geology were detected in the northern half of the survey area.
- 6.3 Possible pits, ditches and accumulations of stone were identified in the north of the site matching features identified from aerial photographs. Additional possible features including ditches, a ring ditch and a pit alignment not shown on the aerial photographs were identified. These features may be geological in origin.
- 6.4 A land drain was identified aligned northeast-southwest across the site which corresponds to the position of a feature identified as a Roman ditch from aerial photographs. Further land drains were also identified across the site.
- 6.5 Modern services and a possible mine shaft were also identified.

7. Sources

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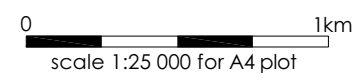
Orchard View
Eskbank
Dalkeith
Midlothian

geophysical surveys
report 2601

Figure 1: Site location



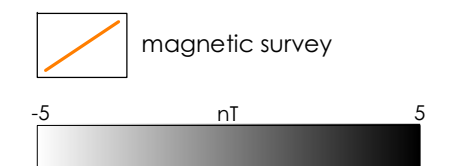
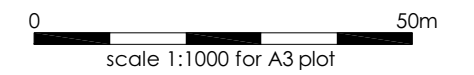
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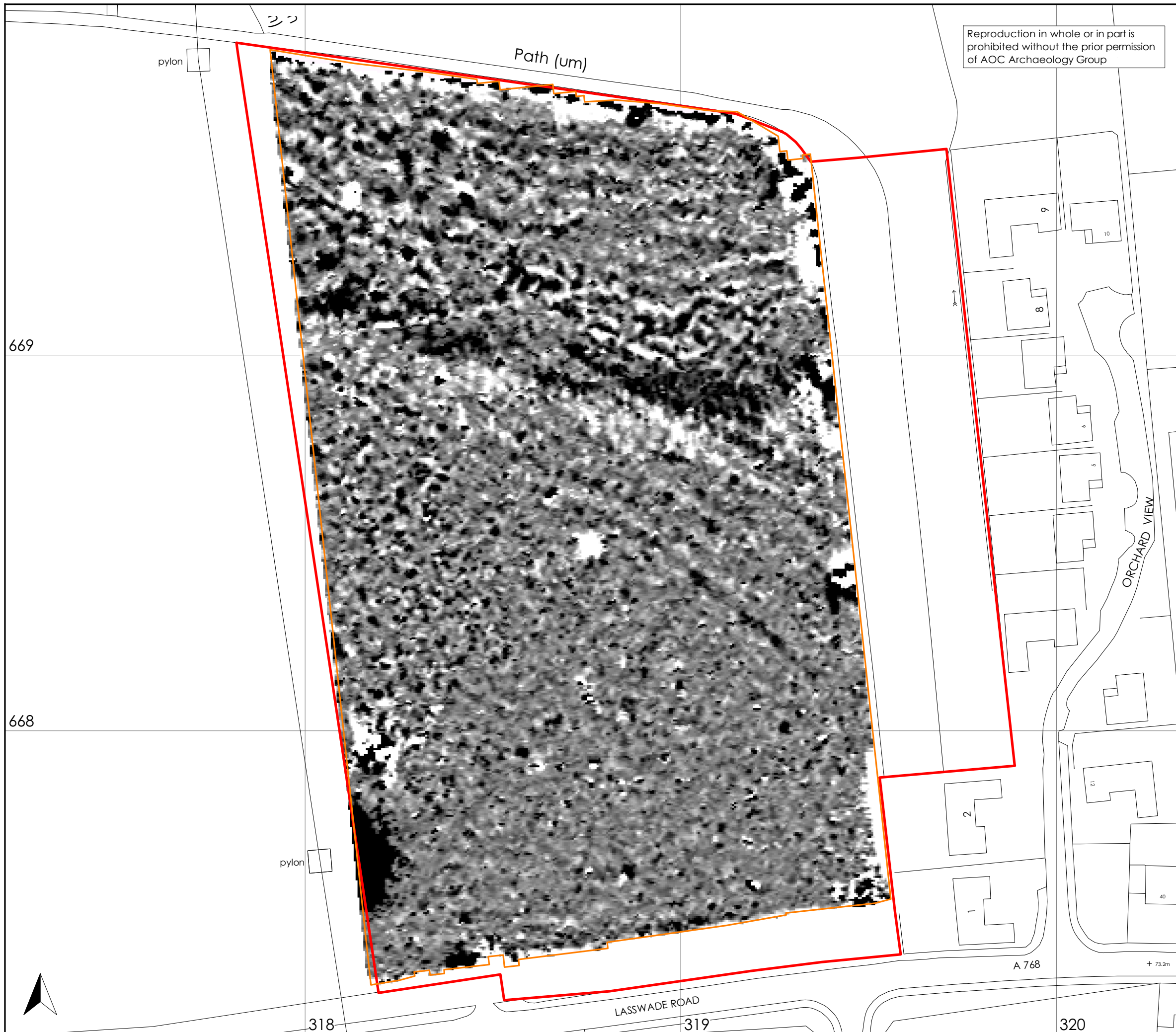
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Figure 2: Geomagnetic survey



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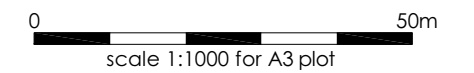






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Figure 3: Geophysical interpretation of geomagnetic survey



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

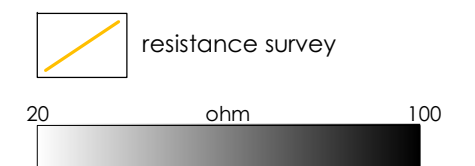
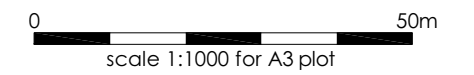
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Figure 4: Resistance survey



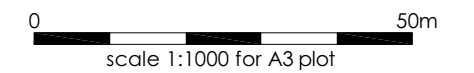
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Figure 5: Geophysical interpretation of
resistance survey



-  resistance survey
-  high resistance anomaly
-  low resistance anomaly

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




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Figure 6: Archaeological interpretation

0 50m
scale 1:1000 for A3 plot

-  soil-filled feature
-  stone / rubble
-  geological feature
-  service pipe
-  land drain
-  inspection cover
-  geotechnical borehole
-  possible former mine shaft

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669

668

318

319

320

pylon

322

Path (um)

9

10

8

6

5

ORCHARD VIEW

2

12

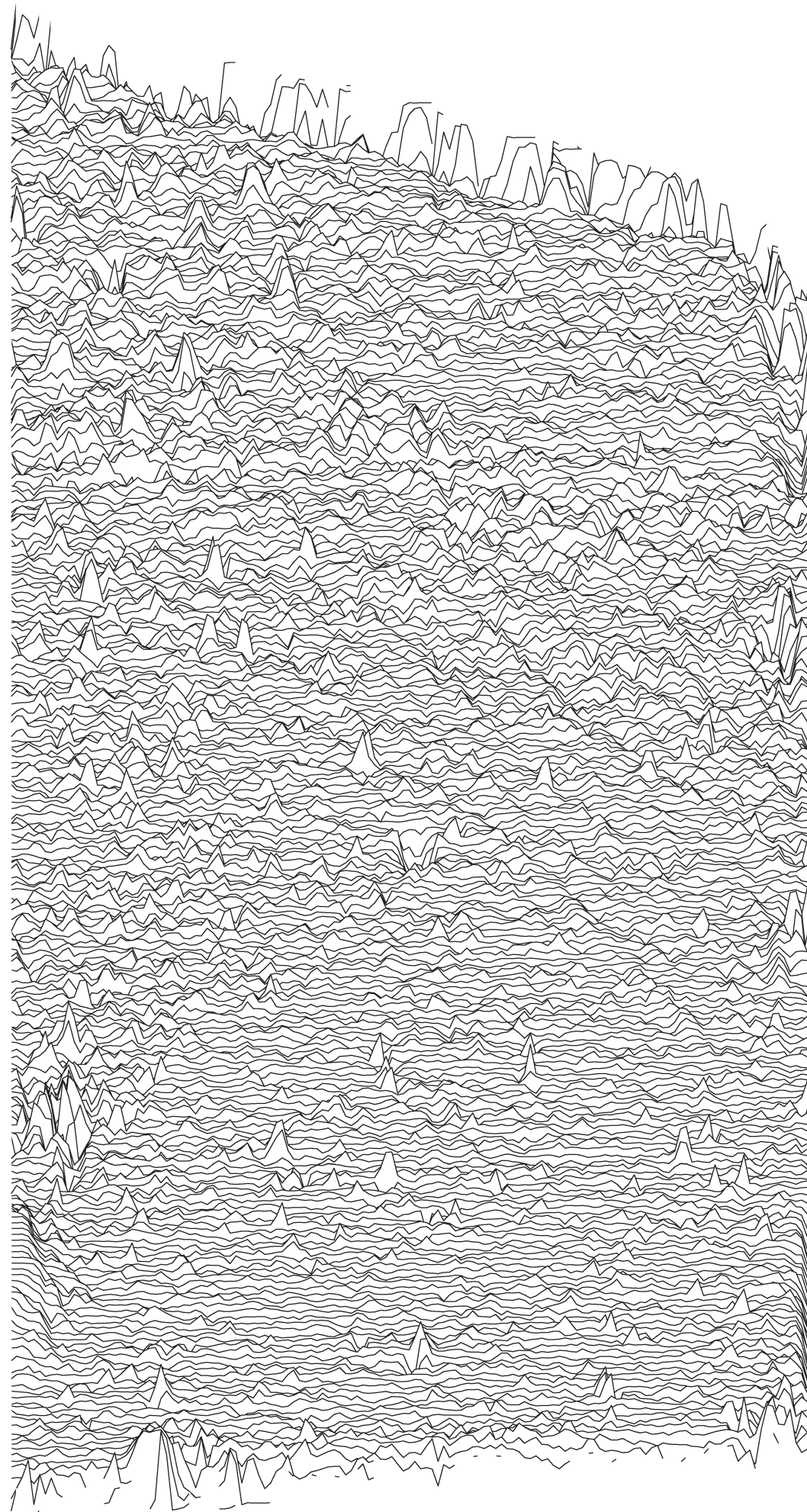
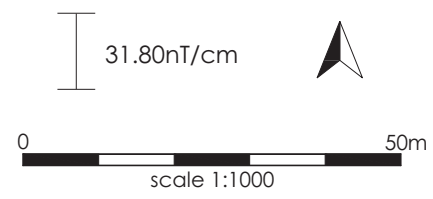
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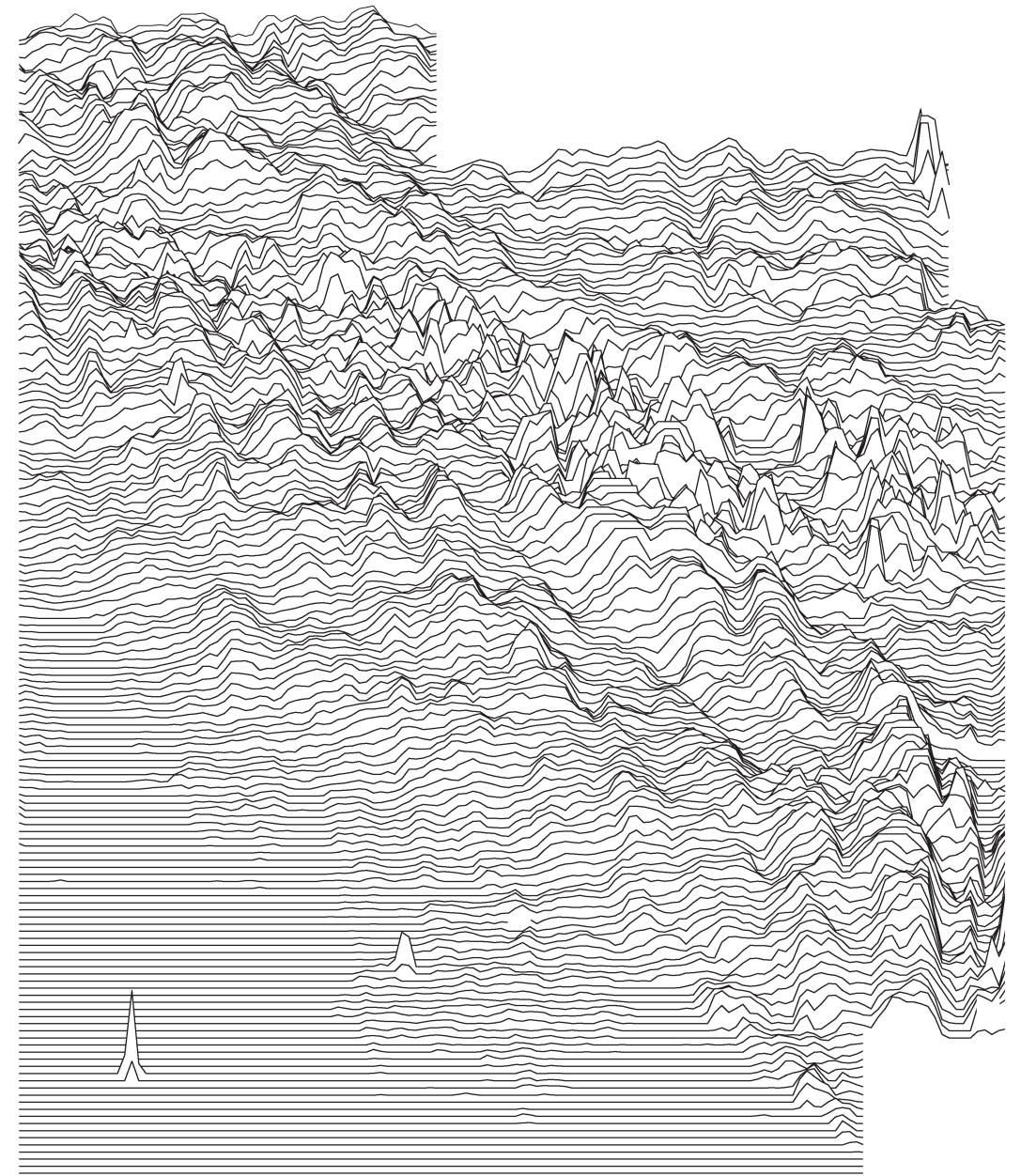
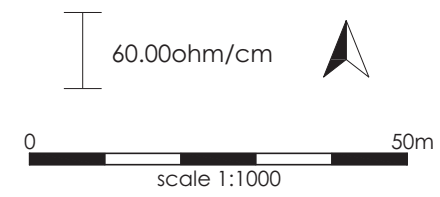
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LASSWADE ROAD

Geomagnetic survey



Resistance survey



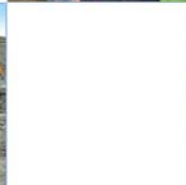
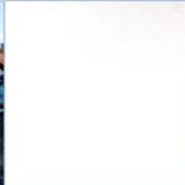
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Figure 7:
Trace plots of geomagnetic
and resistance data

APPENDIX 5: 'Discovery and Excavation in Scotland' Report

LOCAL AUTHORITY:	Mid Lothian Council
PROJECT TITLE/SITE NAME	Orchard View, Eskbank: Evaluation
PROJECT CODE:	AOC 21810
PARISH:	Dalkeith
NAME OF CONTRIBUTOR:	Erlend Hindmarch
NAME OF ORGANISATION:	AOC Archaeology Group
TYPE(S) OF PROJECT:	Archaeological Evaluation and Geophysical survey
NMRS NO(S)	NT36NW108; NT36NW34
SITE/MONUMENT TYPE(S):	N/A
SIGNIFICANT FINDS:	N/A
NGR (2 letters, 6 figures)	NT 320 668
START DATE (this season)	14 th February 2011
END DATE (this season)	21 st February 2011
PREVIOUS WORK (incl. DES ref.)	
MAIN DESCRIPTION: (NARRATIVE) (May include information from other fields)	<p>A geophysical survey - fluxgate gradiometry and electrical resistance - (Archaeological Services Durham University, Report 2601)) and evaluation trenching were undertaken prior to a proposed residential development adjacent to Orchard View, Eskbank, Dalkeith.</p> <p>The archaeological evaluation consisted of the machine trenching of 4000 m² equating to a 10% sample of the 4 ha development area.</p> <p>Neither the geophysical survey nor evaluation trenching identified significant archaeological material. Widely spaced rig & furrow was found to cross the site on a north-south alignment.</p>
PROPOSED FUTURE WORK:	None
CAPTION(S) FOR ILLUSTRS:	---
SPONSOR OR FUNDING BODY:	CALA Homes (East) Ltd
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ARCHIVE LOCATION (intended/deposited)	Archive to be deposited in NMRS



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