Archaeological Services
University of Durham

A1(T) Dishforth to Barton Improvement, North Yorkshire

Phase 3 geophysical surveys at Catterick Race Course

on behalf of

AMEC
Faber Maunsell

for

Highways Agency

Report 1489
June 2006

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Contents

1. Summary

The project

1.1 This report presents the results of a third programme of geophysical survey on land adjacent to the A1(T) between Dishforth and Barton in North Yorkshire, in advance of proposed road improvement. The earlier survey programmes were completed in March 2005 and May 2006 (Archaeological Services 2005a; 2006a).

1.2 The works were commissioned by AMEC/Alfred McAlpine JV and conducted by Archaeological Services Durham University in accordance with instructions from Faber Maunsell acting on behalf of the Highways Agency.

1.3 The current works comprise a geomagnetic survey of *c*.1ha and a smaller electrical resistance survey at Catterick Race Course following the appearance of a hole in the north-western corner of the jump track, only 20m from the existing A1 cutting. The hole, *c*.1m across, exposed the northern side of a circular stone-lined well.

Results

1.4 The surveys have detected a concentration of anomalies in the north, many of which almost certainly reflect remains associated with the Roman town. The well is located just to the south, adjacent to a possible early trackway heading towards the fort and *vicus*. A pipe or drain appears to connect to the well from the east.

1.5 Probable traces of ridge and furrow remains have been detected across much of the race course area. Additional features detected here comprise a probable gully, a relatively recent track and a possible small stone structure.

2. Project background

Location (Figures 1 & 2)

2.1 The study area comprised the extreme north-west corner of Catterick Race Course and part of a hay field to the immediate south, adjacent to the A1(T) between Dishforth and Barton in North Yorkshire. Part of the hay field had previously been surveyed (Area 19a in Archaeological Services 2005a). The results of earlier surveys for this project in the immediate vicinity are shown in Figure 2.

2.2 The current surveys were undertaken following the appearance of a hole in the jump track, 20m from the existing A1 cutting, at NGR SE 22572 98972. The hole, *c.*1m across, exposed the northern side of a circular stone-lined well. These surveys have been indertaken in addition to the 126 surveys (223ha) undertaken during the earlier survey programmes (Archaeological Services 2005a; 2006a).

Development proposal

2.3 The development proposal is to improve the A1(T) road between Dishforth and Barton, North Yorkshire.

Objective

2.4 The principal aim of the survey programmes was to determine the extent and nature of any sub-surface features of likely archaeological interest, including cut, built and fired features, which would assist the client and the planning authority in determining appropriate mitigation strategies should archaeological deposits be found to survive within the study area.

2.5 A specific objective for the current surveys was to establish the extent and nature of features between the well and the existing A1 cutting to the west.

Dates

2.6 The surveys were undertaken on 16th June 2006. This report was prepared between 19th and 30th June 2006.

Personnel

2.7 The fieldwork was conducted by Duncan Hale and Sam Roberts. This report was prepared by Duncan Hale with illustrations by David Graham. The Project Manager was Duncan Hale.

Acknowledgements

2.8 Archaeological Services is grateful to Blaise Vyner, personnel at Faber Maunsell, Catterick Race Course and English Heritage, and the farmer Mr Michael Chapman for their assistance with this project.

Archive/OASIS

2.9 The survey archive is currently held at Archaeological Services, Durham University. Archaeological Services 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 programme of survey is '**archaeol3-16204**'.

3. Previous geophysical surveys

3.1 The results of many previous geophysical surveys along the Dishforth to Barton section of the A1 have been described in our earlier reports (Archaeological Services 2005a; 2006a). Archaeological remains detected during the current A1D2B project include occasional ditches and pits, medieval ridge and furrow, former enclosed field systems and trackways, Roman roads, a possible early Roman camp, parts of two Roman forts and *vici*, a large part of a Roman roadside settlement and parts of a Roman town. Stone-founded buildings, kilns and evidence for other industrial activities were almost certainly detected in and around the settlements. In some locations the surveys confirmed the results of previous investigations, and in many cases they provided added value to existing knowledge with the recording of many new features and more extensive mapping of settlements and field systems, particularly around Bainesse Farm at Catterick.

3.2 Geophysical surveys have previously been undertaken at numerous other locations along this section, prior to proposed road improvement or other development, as outlined below.

A1 North of Leeming to Scotch Corner (North & South Sectors)

3.3 In 1993 twelve gradiometer surveys were undertaken by Geophysical Surveys of Bradford for Lancaster University Archaeological Unit. The report concluded that the results did not appreciably add to the archaeological record, and that while most of the surveys yielded some anomalies of possible archaeological significance the majority of these were weak and ephemeral (GSB 1993). Site 29 in that report corresponds to Area 77 in our earlier report (Archaeological Services 2005a).

A1 North of Leeming to Scotch Corner (Central Sector)

3.4 Also in 1993 the central sector of the above route, west of Catterick Village, was surveyed by Bartlett-Clark Consultancy for English Heritage Central Archaeology Service. Nine gradiometer surveys and two electrical resistance surveys were undertaken (English Heritage 1994). The majority of these survey areas were re-surveyed as part of the earlier phase of survey for the current project (Areas 19-27 in Archaeological Services 2005a).

A1 Dishforth to North of Leeming

3.5 Between 1993 and 1995, 25 gradiometer and electrical resistance surveys were undertaken by Geophysical Surveys of Bradford for Barton Howe Warren Blackledge (BHWB) at various locations on the above section of the A1 (BHWB 1996). Approximately half of these surveys were undertaken to the south of the southernmost survey for the current study. The majority of the remainder of surveys were undertaken at Healam Bridge; these broadly

correspond to surveys undertaken for the present study (Area 46 in Archaeological Services 2005a).

Former airfield at Marne Barracks, Catterick

3.6 In 2000 Archaeological Services conducted a 41ha gradiometer survey of the former airfield at Marne Barracks, immediately east of the A1 opposite Bainesse Farm, prior to proposed development by the MoD (Archaeological Services 2001a). A number of smaller gradiometer, electrical resistance and ground-penetrating radar surveys were also undertaken within the northern, built area of the base (Archaeological Services 2001b). The airfield survey detected features which were subsequently proven to range in date from the late Neolithic through to the 20th century (Archaeological Services 2002, 2005b & 2006b).

Land north of Bainesse Farm, Catterick

3.7 Bradford University undertook trial magnetic and resistivity surveys in the field north of Bainesse Farm in 1980 (Heathcote 1980). The Ancient Monuments Laboratory undertook gradiometer surveys both here and in the field on the opposite side of the A1 in 1981 (CEU Site 46), prior to the construction of the existing 'Catterick South' junction (English Heritage 1981; Bartlett 2002). Remains of a Roman roadside settlement were identified in all of these surveys.

Catterick Bridge, Honey Pot Lane and Catterick Race course

3.8 The Ancient Monuments Laboratory undertook gradiometer surveys at each of the above sites between 1981 and 1984 (Bartlett 2002). Nothing of archaeological interest was detected at Catterick Bridge (Site 240). The survey at Honey Pot Lane (Site 251) detected a ditch and two possible pits. An area of occupation close to Dere Street was detected within the circuit of Catterick Racecourse (Site 273), while at the south end of the racecourse a 'native' farmstead previously identified on aerial photographs was surveyed.

Catterick Triangle

3.9 A resistivity survey was undertaken here, at the south end of Pallett Hill Quarry, by West Yorkshire Archaeology Service in 1987 (Abramson *et al*. 2002). The survey recorded the location of Dere Street and associated drains/ditches.

Cataractonium

3.10 In 1992 the Ancient Monuments Laboratory undertook a gradiometer survey over Brompton-on-Swale Playing Field prior to a proposed development (English Heritage 1994). Part of this area was re-surveyed as part of the current project, by both gradiometer and resistance techniques (Area 75 in Archaeological Services 2005a).

3.11 In 1997 the Ancient Monuments Laboratory undertook a number of gradiometer surveys at *Cataractonium* (Cole 2002). Area 1 at Thornbrough Farm (Area 19bW in Archaeological Services 2005a) detected remains of a

Roman fort, *vicus* and town defences. Area 2 at Thornbrough Farm (Area 19bE, *ibid*.) mapped the clear remains of many buildings along Dere Street and another contemporary road. Area 3 (Area 18, *ibid*.) detected a number of ditch features, obscured by later ridge and furrow remains. Area 4, within Catterick Racecourse, detected the south-eastern corner of the town's defences, together with many internal and external anomalies, though not all likely to be of Roman origin. A broad defensive ditch was detected in Area 5, possibly enclosing an area of *vicus*. Area 6 in Cole (2002) comprises the playing field survey described above in para. 3.10.

4. Landuse, topography and geology

4.1 The current survey area comprised the north-western part of the jump track at Catterick Race Course and the northern part of a hay field. The area contained parts of two tarmac tracks, a water trough and railings for the jump track.

4.2 The land is predominantly level at a mean elevation of 67m OD.

4.3 The site lies on the approximate boundary between Magnesian Limestone and Millstone Grit, here overlain by glacial sands and gravels.

5. The geophysical surveys

Standards

5.1 The surveys and reporting were conducted in accordance with English Heritage Research and Professional Services Guideline No.1, *Geophysical survey in archaeological field evaluation* (David 1995); the Institute of Field Archaeologists Paper No.6, *The use of geophysical techniques in archaeological evaluations* (Gaffney *et al*. 2002); and the Archaeology Data Service *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2001).

Technique selection

5.2 Given the known shallowness of targets (<1m in depth) and the non-igneous geological environment of the study area a geomagnetic technique, fluxgate gradiometry, was considered appropriate for detecting any cut, built and fired archaeological features which might be present. Also, given the presence of a stone-lined well and the likelihood of other stone structures being present, an electrical resistance survey was appropriate for further characterising features between the well and the A1 cutting. The efficacy of both techniques at detecting potential archaeological features in the types of soils and sediments encountered throughout the study area has previously been demonstrated on this project.

Field methods

5.3 A 20m grid was established across the survey area. The locations of the grid and various known, mapped, Ordnance Survey points were recorded using a

Trimble Pathfinder Pro XRS global positioning system (GPS) with real-time correction.

5.4 Measurements of vertical geomagnetic field gradient were determined using a Geoscan FM256 dual fluxgate gradiometer system with automatic datalogging facilities. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1nT, the sample interval to 0.25m and the traverse interval to 1.0m, thus providing 1600 sample measurements per 20m grid unit.

5.5 Measurements of earth electrical resistance were determined using a Geoscan RM15D resistance meter with twin probe array and automatic logging of the data. A zig-zag traverse scheme was employed and data were logged in 20m grid units. The instrument sensitivity was set to 0.1ohms, the sample interval to 0.5m and the traverse interval to 1.0m thus providing 800 sample measurements per 20m grid unit.

5.6 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

5.7 Geoplot v3 software was used to process the geophysical data and to produce continuous tone greyscale images of the raw (unfiltered) data. The greyscale images (Figures 2-4) have been imported directly into digital basemaps supplied by Faber Maunsell. In the greyscale images, positive magnetic anomalies are displayed as dark grey and negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.

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

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.

Despike – locates and suppresses random iron spikes in gradiometer data.

5.9 The following basic processing function has been applied to both the gradiometer and resistance datasets:

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 intervals.

Interpretation: anomaly types

5.10 A colour-coded geophysical interpretation plan is provided (Figure 5). 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

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

high resistance regions of anomalously high resistance, which may be associated with areas of low moisture content such as wall foundations, tracks, paths and other concentrations of stone or brick rubble or voids

low resistance regions of anomalously low resistance, which may be associated with areas of relatively high moisture content such as soil-filled pits and ditches

Interpretation: features

5.12 A colour-coded archaeological interpretation plan is provided (Figure 6). A number of very prominent anomalies were detected by the survey techniques; some of these reflect modern features. Broad bands of negative magnetic anomalies correspond to the railings which define the race circuits. A metalled track heading south from the east end of Fort Bridge is evident in both surveys as a cluster of intense dipolar magnetic anomalies and as a band of particularly high resistance values. In the resistance data it is evident that the metalling continues round to the south-west, on the south side of the railings. A large intense dipolar magnetic anomaly in the southern part of the survey near the A1 cutting corresponds to a water trough.

5.13 The northern part of the magnetic survey is characterised by a high concentration of positive, negative and dipolar magnetic anomalies. Although it is not possible to identify individual structures here, many of the anomalies almost certainly reflect structural features and building debris associated the Roman town of *Cataractonium*.

5.14 The recently exposed stone-lined well is evident in the resistance survey as a feature of high electrical resistance. The geomagnetic survey has detected a chain of dipolar magnetic anomalies heading east from the well, almost certainly reflecting a pipe.

5.15 Additional early features may include a double-ditched track, parallel to and between the course railings, which appears to have been heavily truncated by north-east/south-west aligned medieval ridge and furrow cultivation. The track appears to head north-west from Dere Street towards the *vicus* and fort. Similar weaker anomalies on the west side of the railings could reflect a similar feature of more recent origin, as they correspond to the southern part of the track from Fort Bridge as identified in the resistance survey.

5.16 The remains of a possible soil-filled gulley parallel to the A1 are evident in the southern part of the resistance survey. Three sides of a possible, small, stone feature were also detected at the southern limit of the resistance survey, although the adjacent presence of a water trough may have affected the soil properties here.

6. Conclusions

6.1 A third, much smaller programme of geophysical survey has been carried out on land adjacent to the A1(T) between Dishforth and Barton in North Yorkshire, in advance of proposed road improvement.

6.2 This programme comprised both geomagnetic and electrical resistance surveys within the north-western corner of Catterick Race Course and an adjacent hay field, following the appearance of a hole in the jump circuit near the existing A1 cutting. The hole, *c.*1m across, exposed the northern side of a circular stone-lined well.

6.3 The surveys have detected a concentration of anomalies in the north, many of which almost certainly reflect remains associated with the Roman town. The well is located just to the south, adjacent to a possible early trackway heading towards the fort and *vicus*. A pipe or drain appears to connect to the well from the east.

6.4 Probable traces of ridge and furrow remains have been detected across much of the race course area. Additional features detected here comprise a probable gully, a relatively recent track and a possible small stone structure.

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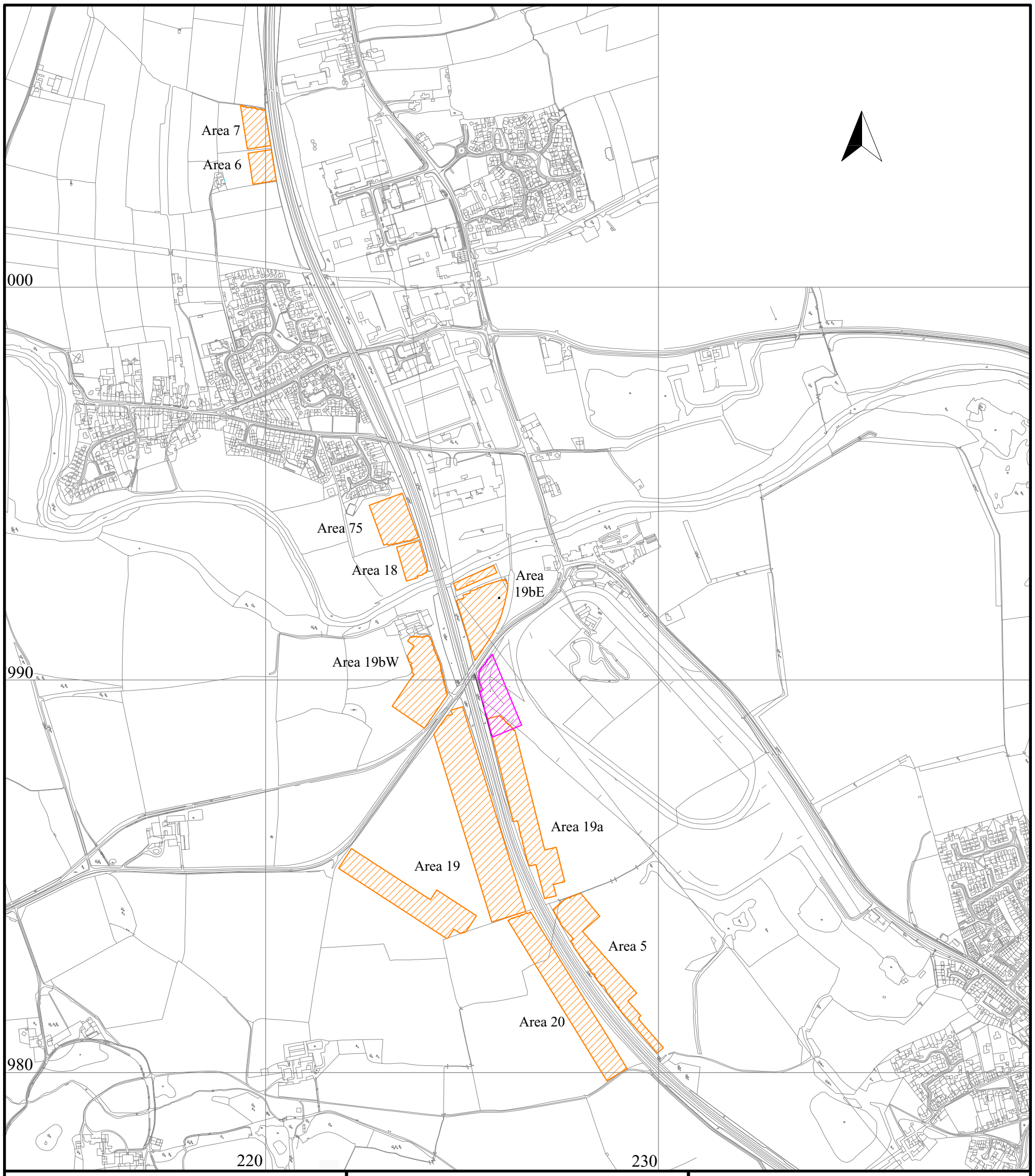

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Figure 1
Locations of current survey and earlier phase 1 areas 5, 6, 7, 18, 19, 19a 19bW, 19bE, 20 & 75
basemap courtesy of Faber Maunsell

A1 d2b

Phase 1 survey area

Phase 3 survey area

0 500m

scale 1:10 000 - for A3 plot

Area 18

Area 19bW

Area 19bE

990

Area 19

Area 19a

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Figure 2
Geomagnetic survey results in area of Fort Bridge

basemap courtesy of Faber Maunsell

A1 d2b

Phase 1 survey area

Phase 3 survey area

0 100m

scale 1:2500 - for A3 plot

991

990

989

A6136

Fort Bridge

A1(T)

Dere Street Roman Road (course of)

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Figure 3
Geomagnetic survey

basemap courtesy of Faber Maunsell

A1 d2b

0 50m

scale 1:1000 - for A3 plot

geomagnetic survey area

5.00
4.17
3.33
2.50
1.67
0.83
0.00
-0.83
-1.67
-2.50
-3.33
-4.17
-5.00 nT

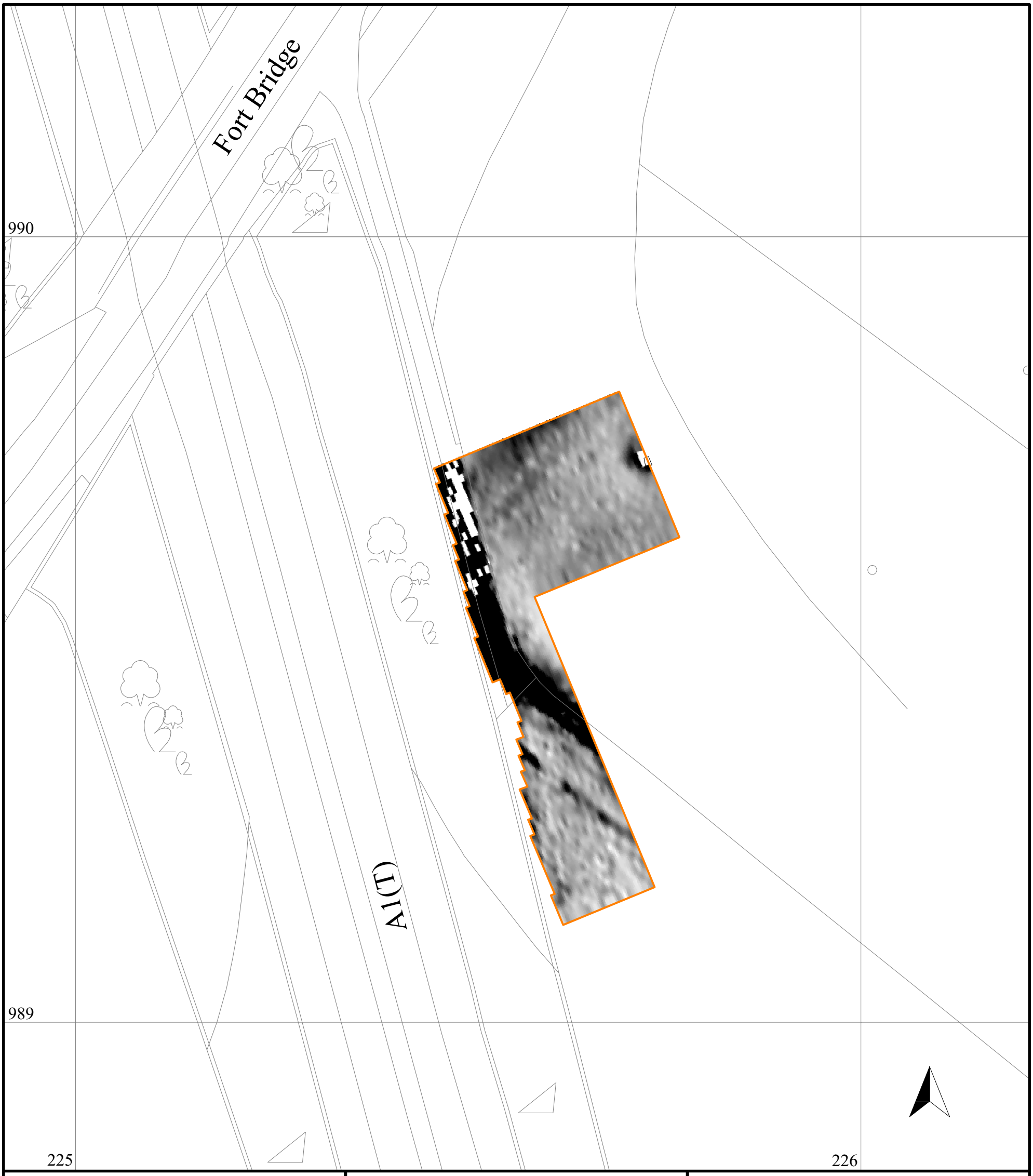

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Figure 4
Electrical resistance survey

basemap courtesy of Faber Maunsell

A1 d2b

0 25m

scale 1:500 - for A3 plot

survey area

40.00
37.92
35.83
33.75
31.67
29.58
27.50
25.42
23.33
21.25
19.17
17.08
15.00 ohm

991

990

989

A6136

A1(T)

Fort Bridge

Dere Street Roman Road (course of)

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Phase 2 geophysical surveys at Catterick Race Course
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Figure 5
Geophysical interpretation

basemap courtesy of Faber Maunsell

A1 d2b

0 50m

scale 1:1000 - for A3 plot

survey area

positive magnetic anomalies

negative magnetic anomalies

dipolar magnetic anomalies

high resistance

low resistance

991

990

989

A6136

Fort Bridge

A1(T)

track

water trough

Dere Street Roman Road (course of)

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Figure 6
Archaeological interpretation

basemap courtesy of Faber Maunsell

A1 d2b

0 50m

scale 1:1000 - for A3 plot

survey area

soil-filled features

service pipes

orientation of ridge and furrow

race course railings

well