

SNY	927
ENY	702-722
CNY	2101
Parish	1015
Rec'd	13/02/2001

Archaeological Investigations at Marne Barrack Catterick Garrison, North Yorkshire:

Phase 2: Geophysical evaluation

by

Archaeological Services
University of Durham

on behalf of

**GVA Grimley and
Ministry of Defence**

**ASUD Report 801
May 2001**

*Archaeological Services
University of Durham*

South Road

Durham DH1 3LE

Tel 0191 374 3641

Fax 0191 374 1100

archaeological services@durham.ac.uk
www.durham.ac.uk/archaeologicalservices

REC. 13/6/01

Archaeological Investigations at Marne Barracks – Phase 2 Geophysical evaluation ASUD Report 801

SNY 92 +
C-01/7/1/13
C-01/7/2/1
C-01/7/2/2
Not printed
LCS

**Archaeological Investigations at Marne Barracks,
Catterick Garrison, North Yorkshire**

Phase 2 - Geophysical evaluation

May 2001

by
Archaeological Services University of Durham, South Road Durham DH1 3LE
for
Geoff Prince, GVA Grimley, 3 Brindleyplace Birmingham B1 2JB
on behalf of
Ministry of Defence

Contents

Summary	1
1 Introduction	2
1 1 Project background	2
1 2 The study area	2
1 3 The survey areas	3
1 4 Archaeological background	3
2 Research objectives and aims	4
2 1 Research objectives	4
2 2 Overarching aims	4
3 Scheme of works	4
4 Methods statement	5
4 1 Geophysical surveys	5
5 Survey results - geomagnetic	6
5 1 Anomaly types	6
5 2 Interpretation	7
6 Survey results – electrical resistivity	9
6 1 Anomaly types	9
6 2 Interpretation	9
7 Survey results – ground probing radar	9
7 1 General comments	9
7 2 Interpretation	10
8 Conclusions and recommendations	12
9 Acknowledgements	13
10 Personnel	13
11 References	13

Summary

Geophysical surveys have been undertaken over twelve areas in the northern part of Marne Barracks in order to identify the nature and extent of likely archaeological features. Geomagnetic, electrical resistivity and ground-probing radar techniques have been used.

The surveys have detected several ditch features of possible archaeological interest as well as former RAF buildings. The majority of the ditch features are probably part of the former, post-medieval field system, while the date and function of other ditches is unknown. Some further investigation, such as trial trenching, may be necessary for these features.

It should be noted that the magnetic effects of buildings and services could be obscuring further features of archaeological interest. Similarly, it is possible that some archaeological features may survive beneath existing buildings, particularly around the possible Roman villa site.

The information potential and significance of the above features can be seen as low. Proposed developments in these areas are unlikely to have an adverse impact on the known archaeological resource.

1 Introduction

1.1 Project background

1.1.1 In 1999 the Ministry of Defence (MoD), through the Defence Estates (DE), commissioned GVA Grimley to prepare an Establishment Development Plan (EDP) for Marne Barracks, Catterick Garrison, to guide the long-term expansion and redevelopment of the Barracks over the period 2000-2015

1.1.2 A key recommendation of the resulting EDP was the need to undertake a programme of non-intrusive and intrusive archaeological investigations at the Barracks (GVA Grimley 2000). The first phase of those investigations, 'Phase 1 Assessment', has been completed and reported on (Hale 2001). The Phase 1 works included a comprehensive desktop assessment of the archaeological resource both at Marne and in the broader Catterick area, a geomagnetic survey of 41ha of airfield, a topographic study of Castle Hills Scheduled Ancient Monument and its surroundings, and an auger survey of the northern part of the base. The information gathered during those investigations was collated and discussed and an appraisal of the archaeological resource at Marne was provided, both by archaeological period and by reference to the proposed development zones identified in the EDP.

1.1.3 Many of the features identified during the assessment stage have the potential to be of national or regional significance and consequently a programme of further investigation was recommended. However, due to outbreaks of Foot and Mouth Disease on nearby farms much of the proposed works have been postponed. The Phase 2 investigations now comprise further geophysical surveys in the northern part of the barracks. This report describes the results of those investigations. A watching brief was to be maintained during geotechnical investigations in this area, however, these works have also been postponed.

1.1.4 Geomagnetic surveys have been undertaken over nine areas and an electrical resistivity survey has been undertaken over one area, as shown on Figure 1. Two car parking areas to the north of the cookhouse have been included in the geomagnetic surveys. A Ground Probing Radar (GPR) technique has also been used over the two car parks, as well as over the tennis courts to the west and north-west of the cookhouse.

1.1.5 Intrusive investigations on the airfield will form Phase 3 of the project, provisionally scheduled for September 2001.

1.2 The study area

1.2.1 Marne Barracks, formerly RAF Catterick, is situated immediately south of Catterick Village in North Yorkshire and is bounded to the west by the A1 and to the east by the River Swale (NGR centre SE 247 970). The Royal Flying Corps first moved onto the site in September 1914 and it remained in use by the RAF until Land Command took over in 1994. The site occupies approximately 158 hectares and contains 122 buildings and 84 Service Family Quarters.

1 2 2 With the exception of Castle Hills, the land is predominantly level with a mean elevation of c 53m AOD. The solid geology of the area comprises Carboniferous Millstone Grit and Permian Magnesian Limestone, which is variously overlain by Boulder Clay, river gravels or alluvium, with a limited area of glacial sands and gravels immediately west of Castle Hills.

1 3 The survey areas (Figure 1)

1 3 1 Each of the geomagnetic surveys (Areas 1-9) and the resistivity survey (Area 10) was undertaken over level grassed land, with the exception of Area 3 where the land sloped down to the north-east around a children's play area. The four GPR surveys were each undertaken over level tarmac surfaces.

Area no	Technique(s)	Location	Landuse
1	Geomagnetic	W of Officers' Mess (31)	Lawn
2	Geomagnetic	SW of Officers' Mess (31)	Lawn
3	Geomagnetic	N of Officers' Mess (31)	Lawn
4	Geomagnetic	E of Officers' Mess (31)	Lawn
5	Geomagnetic	E of RHQ 8 Regt (320)	Lawn
6	Geomagnetic	W of Sergeants' Mess (28)	Lawn
7	Geomagnetic	SW of Sergeants' Mess (28)	Lawn
8	Geomagnetic + GPR	S of Officers' Mess (31)	Lawn + car park
9	Geomagnetic + GPR	S of Officers' Mess (31)	Lawn + car park
10	Resistivity	High Level Water Tank (4)	Lawn
11	GPR	W of Cookhouse (158)	Tennis courts (140)
12	GPR	S of Officers' Mess (31)	Tennis court (283)

1 4 Archaeological background

1 4 1 The investigations mentioned below, and others relevant to the site, are described in more detail in the Phase 1 report (Hale 2001). Archaeological investigations in and around Catterick over recent decades have identified numerous sites of national importance. Much work in recent years has concentrated on the Roman town of *Cataractonium* and its hinterland, however, there have also been significant discoveries of sites from the Neolithic period onwards. The construction and subsequent modification of the A1 Catterick bypass, together with extensive quarrying activities, have been the main stimuli for archaeological investigations in the area, recent works prior to proposed extensions to Scorton Quarry and Pallett Hill Quarry, and prior to quarrying within Catterick Racecourse, have revealed many significant prehistoric, Roman and later features.

1 4 2 With specific regard to Marne Barracks, the site is bounded on the west by the nationally important but unscheduled remains of the Roman roadside settlement at Bannesse Farm (currently of unknown extent) and on the east by the scheduled Norman motte and bailey castle known as Castle Hills. It is believed that Castle

Hills may also include the remains of an Anglian royal vill and cemetery, and possibly earlier native British features. Previous investigations at the Barracks have revealed the presence of Roman buildings, a pottery kiln, Anglian burials, a *Grubenhaus*, numerous pits and part of a Romano-British field system. The extents of the settlements, field systems and cemeteries are all currently unknown.

2 Research objectives and aims

2.1 Research objectives

2.1.1 The Phase 1 works raised many questions about the archaeological resource. The Phase 2 works are now confined to the built-up, northern part of the base within the security fence. Broad questions to be addressed in this area include:

- Are there geophysical anomalies which are likely to reflect archaeological remains?
- What is the extent of the probable archaeological features interpreted from the geophysical evidence?
- What provisional dates could be assigned to those features?
- What is the relationship between those features and the archaeological resource previously identified?
- What further investigation of these features may be required?

2.2 Overarching aims

2.2.1 In addition to answering these specific questions, the overarching aims of the project are to:

- identify the nature and extent of the varied archaeological resource
- provide added value information to existing knowledge
- interpret the resource in the context of the known archaeological and historical framework
- assess its information potential and significance
- assess the impact of the development on the resource
- provide mitigation strategy recommendations as appropriate

3 Scheme of works

3.1 The research objectives outlined above will be achieved through successful completion of the Scheme of Works, carried out in accordance with the detailed Methods statement (below, Section 4). The following tasks have been undertaken during the evaluation:

- Geomagnetic surveys of nine potential greenfield development sites, including two car parking areas to the north of the cookhouse

- Electrical resistivity survey of the High Level Water Tank area
- Ground Probing Radar surveys of the two car parks and the tennis courts to the west and north-west of the cookhouse
- Data processing and interpretation
- Production of Phase 2 Geophysical evaluation report

4 Methods statement

4 1 Geophysical surveys

- 4 1 1 All ASUD geophysical work is carried out in accordance with English Heritage (1995) Research and Professional Services Guideline No 1, *Geophysical survey in archaeological field evaluation* by qualified, experienced members of ASUD staff using state-of-the-art field instruments and software ASUD commissioned Stratascan Ltd to undertake the GPR surveys, which have also been carried out in accordance with the above guidelines
- 4 1 2 Fluxgate gradiometer surveys were initially carried out over the undeveloped, grassed areas in the northern part of the base, including the two small tarmac car parks north of the cookhouse Previous surveys and excavations on the nearby airfield indicated that cut features, such as ditches and pits, could be detected and mapped using a geomagnetic technique It was likely that other types of features (such as trackways and wall foundations) and fired structures (such as kilns and hearths) might also be present within the survey areas and, given the shallowness of the targets and the non-igneous geological environment, a geomagnetic technique would be appropriate for detecting each of these types of feature
- 4 1 3 Electrical resistivity surveying has been undertaken around the High Level Water Tank since the magnetic effects of the pumphouse, water tower, play area and associated fences would have obscured weaker anomalies of possible archaeological interest
- 4 1 4 Ground Probing Radar surveys were undertaken in the areas where neither a geomagnetic nor electrical resistivity survey would be successful These areas comprise two tarmac car parks and tarmac tennis courts surrounded by wire mesh fencing
- 4 1 5 A 20m survey grid was established across each area and tied in to known, mapped Ordnance Survey points using a Wild T1000 total station survey instrument and SDR33 datalogger
- 4 1 6 Measurements of vertical geomagnetic field gradient were determined using a Geoscan FM36 fluxgate gradiometer fitted with an ST1 sample trigger to enable automatic logging of the data Resistance measurements were determined using a Geoscan RM15 meter with twin probe array and automatic data logging A

zig-zag traverse scheme was employed in each case and data logged in 20m grid units. The FM36 instrument sensitivity was set to 0.1nT (1 ohm for the RM15), the sample interval to 0.5m and the traverse interval 1.0m, thus providing 800 sample measurements per 20m grid.

- 4.1.7 Magnetic and resistance data were downloaded on-site into a RM NoteBook computer for processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving. InSite v 3 software has been used to interpolate the data to form one array of regularly-spaced values at 0.25 x 0.25m intervals and to produce continuous tone greyscale images of the raw data. The greyscales are presented by importing the images directly into digital plans of the Barracks. A palette bar relating the greyscale intensities to anomaly values in nanoTesla/ohms has been included with each image.
- 4.1.8 Colour-coded geophysical and archaeological interpretation plans are also provided, together with a full discussion of the results and their implications with regard to the future development of the Barracks. Modern services etc. have been clearly distinguished. CAD drawing files, bitmap image files and data files can be supplied on request.
- 4.1.9 The GPR surveys have been undertaken using a 400MHz antenna along parallel traverses 0.5m apart. Data were collected at 32 scans/sec, which equates to 40 scans/metre. A measuring wheel was used to put markers into the recorded radargrams at 1m centres.
- 4.1.10 The average velocity of the radar pulse is assumed to be 0.1m/nsec, which is typical for the type of subsoil on the site. A range setting of 30nsec was used, equating to an approximate depth of 1.35m. This was selected as it is thought that any archaeological remains are likely to be relatively shallow.
- 4.1.11 No processing has been applied to the GPR data. Radan software has been used to produce plots of the recorded data. Interpretation plans and time slice plots are included in this report.

5 Survey results - geomagnetic

5.1 Anomaly types

5.1.1 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 tracks, wall footings and other concentrations of sedimentary rock, or voids

dipolar magnetic paired positive-negative anomalies, the smaller of which typically reflect ferrous litter whereas the larger ones could reflect fired structures such as kilns or hearths Linear anomalies of this type almost certainly reflect buried service pipes and cables

5 2 Interpretation

Area 1 (Figures 2-4)

5 2 1 Three linear positive magnetic anomalies have been detected within this area, aligned north-west/south-east and south-west/north-east One of the anomalies is interrupted by a north-south water pipe The anomalies reflect relative increases in sub-surface magnetic susceptibility, which are almost certainly due to the humic-rich fills of former ditches The ditches do not correspond to former field boundaries or other known features shown on old maps or aerial photographs of the area, although the south-west/north-east ditch is parallel to known former field boundaries It is likely that these ditches may have been part of the post-medieval field system in the area

5 2 2 A concentration of small dipolar magnetic anomalies, measuring c 30 x 30m, has been detected in the eastern part of this survey area, just to the west of a tarmac path These anomalies almost certainly reflect items of ferrous and/or fired debris The cluster of debris corresponds to the location of a former building shown on Air Ministry Drawings 550/35 and 3222/46, of 1935 and 1946 respectively (Francis 2001, p 14 & 45) The building is recorded as having been brick-built and was in use as the Visiting Single Officers' Quarters [Please note that this building is incorrectly numbered as 112 on the 1946 plan in Francis' report, p 45 The correct number should be 110]

5 2 3 Gas, electric (MV) and potable water services are reflected in the greyscale image as chains of intense dipolar magnetic anomalies (paired black-white), and are indicated in red on subsequent interpretation plans

Area 2 (Figures 2-4)

5 2 4 Two positive magnetic lineations have been detected traversing this area These anomalies are again most likely to reflect high magnetic susceptibility soil-filled ditches The ditches meet in a right-angle, adjacent to a Storm Manhole Soakaway, however, the features do not correspond to associated drains shown on existing service plans Although the ditches do not correspond to known former field boundaries, the south-west/north-east alignment of the longer ditch suggests that this might also be part of the post-medieval field system

5 2 5 Services and cables detected during the survey correspond to known services, including 11kV HV cable, MV cables, foul water sewers, potable water pipes, surface water drains and gas supply

Area 3 (Figures 5-7)

5 2 6 No features of potential archaeological significance have been detected during the survey of this area

5 2 7 Known services in this area include gas, MV electric and water

Area 4 (Figures 5-7)

5 2 8 Four features of possible archaeological interest have been identified in this survey. The anomalies again comprise positive magnetic lineations, almost certainly reflecting linear soil-filled structures such as ditches or gullies

5 2 9 Intense anomalies along the northern side of the survey are due to the presence of the security fence, lamp posts and associated cables. Further intense anomalies in the south-western corner of the survey area reflect heating distribution pipes beneath concrete covers. Two chains of small dipolar magnetic anomalies along the south-western side of the area are interpreted as reflecting obsolete services, as they are not shown on current service plans

Area 5 (Figures 8 & 9)

5 2 10 No features of potential archaeological significance have been detected during the survey of this area. Numerous services are evident, including potable water, a probable disused water pipe, storm drains and a control cable (electric)

Area 6 (Figures 10 & 11)

5 2 11 No features of potential archaeological significance have been detected during the survey of this area. Various services have been detected as well as discrete dipolar magnetic anomalies reflecting near-surface ferrous litter. Services in this area include heating distribution pipes beneath concrete covers, MV electrical cables, potable water and storm drains

Area 7 (Figures 10 & 11)

5 2 12 No features of potential archaeological significance have been detected during the survey of this area. Various services have been detected as well as discrete dipolar magnetic anomalies reflecting near-surface ferrous litter. Services in this area include an 11KV electric cable, MV electrical cables, potable water and foul water sewers

Area 8 (Figures 10 & 11)

5 2 13 A concentration of dipolar magnetic anomalies has been detected in the western part of the car park within this survey area. These anomalies almost certainly reflect items of ferrous and/or fired debris. The area of debris corresponds to the location of three former buildings shown on Air Ministry Drawings 713/26,

550/35 and 3222/46, of 1926, 1935 and 1946 respectively (Francis 2001, p 13, 14 & 45) In the 1946 Building Schedule these buildings (56 & 57) are recorded as being of brick construction and were each Quarters for 7 Single Officers

5 2 14 No features of potential archaeological significance have been detected during the survey of this area Various services have been detected as well as discrete dipolar magnetic anomalies reflecting near-surface ferrous litter Services in this area include an 11KV electric cable, MV electrical cables, potable water, foul water sewers and storm drains

Area 9 (Figures 10 & 11)

5 2 15 No features of potential archaeological significance have been detected during the survey of this area Various services have been detected as well as discrete dipolar magnetic anomalies reflecting near-surface ferrous litter Services in this area include 11KV electric cables, MV electrical cables, potable water and foul water sewers

6 Survey results – electrical resistivity

6 1 Anomaly types

6 1 1 One type of resistance anomaly has been distinguished in the data

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

6 2 Interpretation

Area 10 (Figures 12 & 13)

6 2 1 Three small areas of high electrical resistance have been detected in the survey These almost certainly reflect concentrations of stone or brick rubble These rubble concentrations do not correspond to known former buildings but probably reflect debris associated with former construction works for the adjacent buildings and roads

6 2 2 Although not identified in the survey data, services in this area include MV electric cables, potable water, storm drains and foul water sewers

7 Survey results – ground probing radar

7 1 General comments

7 1 1 This section is based on a report provided by Stratascan Ltd (Barker 2001), a copy of which will be kept with the Project Archive

7 1 2 Little, if indeed any, evidence has been found which might relate to surviving archaeological features beneath the four areas to which this technique was

applied. Many diffractions have been detected, most of which relate to buried services (Barker 2001)

7 1 3 What is of particular interest, and indeed most unusual, are the very shallow diffractions seen in Areas 9 and 12. When seen in plan, these diffractions correspond to line markings for tennis courts. The radar must be responding to a component of the paint used for the markings. In Area 9, which is now a car park, no line markings are evident on the surface and so the radar must be responding to a former, buried surface onto which the lines were marked. Conversely, the markings for the two tennis courts in Area 11 are not seen by the radar.

7 1 4 As well as interpretation plots (Figures 14-17), time-slice plots are also provided (Figures 18 & 19). These plots show horizontal slices through the radar data at assumed depths, which are calculated using the average velocity of the radar pulse.

7 2 Interpretation

Area 8 (Figure 14)

7 2 1 This area is the most complex of the four surveyed. A substantial section of the western side is covered by a conductive surfacing material, which probably relates to a former smaller car park. There is a rectangular area contained within this area which is not conductive. This was provisionally interpreted as the site of a possible former building. Indeed there was formerly a building (57) at this location (see para 5 2 14 above).

7 2 2 The areas to the east and north are likely to be extensions to the earlier car park. A well-defined horizon is apparent beneath much of this area at a depth of approximately 0.4-0.5m. This is likely to be the base of the construction for the car park. Several alignments of diffractions have been mapped beneath this surface, which almost certainly represent services.

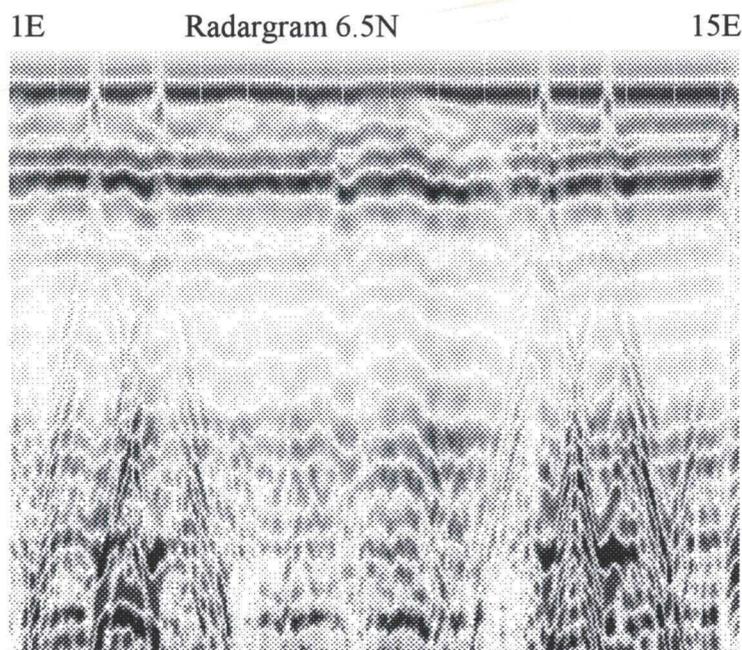
7 2 3 Other curvilinear alignments of complex areas may indicate the locations of former trenches, however, these post-date the conjectural early car park and are therefore not of archaeological potential.

Area 9 (Figure 15)

7 2 4 As mentioned above (para 7 1 2), the survey of this area has mapped line markings for a former tennis court. The illustration below shows a vertical slice through the car park with the tramlines and centre line paint markings at the top of the image.

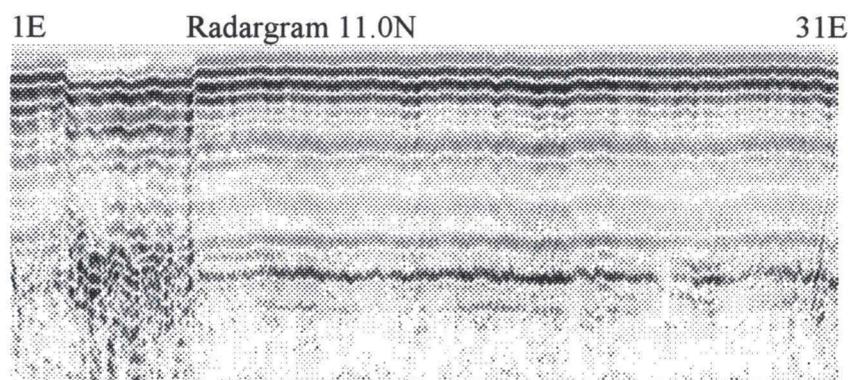
7 2 5 At a later date the tennis court was turned into a car park with an extension added to the north. Some random, non-linear diffractions have been detected at depth in the northern part of the car park. These are thought more likely to

represent geological anomalies rather than archaeological features. The radar survey has also detected buried services in this area.



Area 11 (Figure 16)

- 7.2.6 The most noteworthy features found in this area are two zones of disturbance, which may reflect infilled trenches or pits. One of the zones is particularly rectangular. They appear to be immediately below the surface and extend through most of the radargram, to an assumed depth of c. 1.35m (see below). It is possible that these features are archaeological, although more likely that they have a recent origin.



- 7.2.7 Several random, deep diffractions have also been recorded. These are thought more likely to represent geological anomalies rather than archaeological features. Other anomalies almost certainly represent the post-holes for the tennis nets and small metal objects within the tarmac.

Area 12 (Figure 17)

- 7.2.8 The survey over this tennis court revealed the outline of the court markings as described above (para. 7.1.2). No other features were recorded in this area.

8. Conclusions and recommendations

- 8.1 Fluxgate gradiometer, electrical resistivity and ground-probing radar surveys have been undertaken over twelve areas within the built-up, northern part of Marne Barracks in order to locate any features of possible archaeological interest.

- 8.2 The results can be summarised as follows:

Area 1	possible post-medieval field boundaries former building, Visiting Single Officers' Quarters
Area 2	possible post-medieval field boundaries
Area 3	no likely archaeological features detected
Area 4	possible ditches or gullies of unknown date
Area 5	no likely archaeological features detected
Area 6	no likely archaeological features detected
Area 7	no likely archaeological features detected
Area 8	former buildings, Quarters for 7 Single Officers
Area 9	former tennis court
Area 10	no likely archaeological features detected
Area 11	infilled trench and pit, probably recent
Area 12	no likely archaeological features detected

- 8.3 The surveys have realised the objectives set out in Section 2 by identifying the likely nature and extent of possible archaeological features, their provisional dates and their relationships to the archaeological resource already identified.
- 8.4 Further investigation of the ditch features identified in Areas 1, 2 and 4 may be required in order to confirm their functions and dates. This may be achieved by trial trenching.
- 8.5 The pit features identified in Area 11 lie immediately beneath the tarmac surface of the tennis courts and one at least appears to be very regular in plan. It seems unlikely that these features are archaeological and further investigation is not considered necessary.
- 8.6 The information potential and significance of the above features can be seen as low. Proposed developments in these areas are unlikely to have an adverse impact on the known archaeological resource.

9. Acknowledgements

- 9.1 Archaeological Services would like to thank the Lt Col NC Cheesman (Project Sponsor Team) and Mr G Prince of GVA Grimley for facilitating this work. The cooperation and assistance afforded by Major J Bond (QM 5 Regt) is also greatly appreciated.

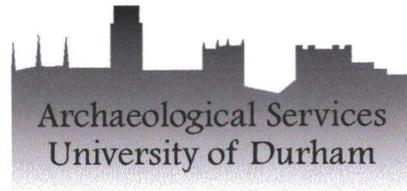
10. Personnel

- 10.1 The magnetic and resistivity surveys were undertaken by Duncan Hale, Andy Platell and Daniel Still of Archaeological Services University of Durham. The ground-probing radar surveys were undertaken by Peter Barker of Statascan Ltd. This report has been prepared by Duncan Hale with illustrations by Linda Bosveld.

11. References

- Barker PP (2001) *Ground Probing Radar surveys at Marne Barracks, Catterick*. Unpublished Statascan Ltd report for Archaeological Services University of Durham. Stratascan Job Ref. No. 1556.
- English Heritage (1995) *Geophysical survey in archaeological field evaluation*. Research and Professional Services Guideline No.1. English Heritage, London.
- Francis P (2001) *RAF Catterick: Historic Aerodrome Survey*. Unpublished report for Archaeological Services University of Durham.
- GVA Grimley (2000) *Establishment Development Plan for Marne Barracks, Catterick Garrison*. Unpublished report for Defence Estates.
- Hale, DN (2001) *Archaeological Investigations at Marne Barracks, Catterick Garrison. Phase 1: Assessment report*. Unpublished ASUD Report 703 for GVA Grimley and Ministry of Defence.

Figure 1: Location of Phase 2 geophysical surveys at Marne Barracks



On behalf of: GVA Grimley and the Ministry of Defence

Scale 1:5000



Geomagnetic survey



Resistivity survey



Ground-penetrating radar survey



Buildings