



THE YORKSHIRE DALES MAPPING PROJECT

A report for the

National Mapping Programme

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A REPORT FOR THE
NATIONAL MAPPING PROGRAMME

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YORKSHIRE DALES MAPPING PROJECT

CONTENTS

1	SUMMARY	6
2	INTRODUCTION.....	7
2.1	BACKGROUND TO THE PROJECT	7
2.2	OBJECTIVES	7
2.3	SOURCES (GENERAL).....	8
2.4	METHODOLOGY.....	10
2.4.1	Mapping Methods	10
2.4.2	Conventions	10
2.4.3	Databases	10
2.5	ARCHIVE AND PUBLICATION DETAILS.....	11
2.6	PROJECT DETAILS	11
2.6.1	Project Team structure.....	11
2.6.2	Timetable/man-days.....	11
2.6.3	Funding	12
2.7	SCOPE OF THE REPORT	12
3	BACKGROUND: THE PROJECT AREA AND ITS ARCHAEOLOGY	13
3.1	PREVIOUS WORK	13
3.1.1	National Archaeological Record	13
3.1.2	SMR record	13
3.1.3	Aerial Photographs	14
3.1.3.1	Archaeological Air Survey.....	14
3.1.3.2	Non-Archaeological Air Survey	15
3.1.4	Other archaeological work.....	15
3.2	LANDSCAPE	16
3.2.1	Geology.....	16
3.2.2	Geomorphology	18
3.2.3	Soils.....	18
3.2.4	Land Use	19
3.3	THE DISTRIBUTION OF ARCHAEOLOGICAL EARTHWORKS AND CROP MARKS	20
3.4	LIMITATIONS OF RECORD	20
4	RESULTS	22
4.1	THEMATIC REPORT	23
4.1.1	Agriculture and Subsistence	23
4.1.1.1	Ridge and Furrow	25
4.1.1.2	Strip lynchets/cultivation ridges.....	27
4.1.1.3	Discussion of ridge and furrow and lynchet systems.....	29
4.1.1.4	Stack Stands	29
4.1.1.5	Rabbit Warrens	30
4.1.1.6	Coaxial field systems	33
4.1.2	Defence	42
4.1.2.1	Dykes - frontier works	43
4.1.2.2	Hillforts	43

4.1.2.3	Roman forts.....	44
4.1.2.4	Medieval Fortifications	44
4.1.2.5	Civil war and Napoleonic sites	44
4.1.2.6	First and Second World War sites	45
4.1.3	Domestic	45
4.1.3.1	Hut circles	47
4.1.3.2	`Askriggs'	49
4.1.3.3	Construction camps.....	52
4.1.4	Gardens and Parks	53
4.1.5	Industrial	56
4.1.5.1	Lead industry.....	57
4.1.5.2	Coal	59
4.1.5.3	Zinc, copper, barytes and other minerals	60
4.1.5.4	Peat cutting.....	60
4.1.5.5	Charcoal/elling kilns	60
4.1.5.6	Quarrying	61
4.1.5.7	Limekilns	61
4.1.5.8	Brick/Tile works	62
4.1.5.9	Manufacturing.....	62
4.1.6	Maritime	62
4.1.7	Recreation	63
4.1.8	Religious, Ritual and Funerary	63
4.1.9	Transport	65
4.1.10	Water and drainage	68
4.1.11	Unassigned, civil, commemorative and commercial	70
4.1.11.1	Boundaries	72
4.2	MORPHOLOGICAL REPORT	73
4.2.1	Enclosure table	74
4.2.2	Linear system table	94
4.2.3	Linear feature table	100
4.2.4	Macula table	105
4.2.5	Industrial complex table	109
4.2.6	New classes	110
4.3	PERIOD SUMMARIES	110
4.3.1	Unknown	111
4.3.2	Pre-Neolithic	112
4.3.3	Neolithic	112
4.3.4	Bronze Age	113
4.3.5	Iron Age	113
4.3.6	Roman	115
4.3.7	Unknown Prehistoric (Roman or earlier)	115
4.3.8	Early Medieval (to AD 1086)	117
4.3.9	Medieval (1086-1540)	118
4.3.10	Post-Medieval (1540-1900)	120
4.3.11	Modern (20th Century to 1945)	122
4.3.12	Unknown Medieval (Early Medieval to 1945)	123
4.3.13	Multi-Period landscapes	125
5	CONCLUSIONS AND RECOMMENDATIONS	127
6	BIBLIOGRAPHY	132

7 APPENDICES 135

7.1 SOURCES CONSULTED - AIR PHOTOGRAPHS..... 135

7.2 SOURCES CONSULTED - OTHER 137

7.3 MORPH2 DATABASE AND ARCHIVE DETAILS 138

7.4 STATUTORY BODIES 139

7.5 MAP NOTE SHEETS 140

7.6 MAPPING CONVENTIONS..... 149

A SUPPLEMENTARY VOLUME CONTAINS FIGURES

SUMMARY

The RCHME's Yorkshire Dales mapping project was one of four pilot projects for the National Mapping Programme. The project area covered 3000 km² of the Pennines in North Yorkshire and Cumbria, including the whole of the Yorkshire Dales National Park (Figure 1).

Previous archaeological work in the area had been restricted to limited areas or specific sites, and the existing NAR and SMR records were known to be inadequate. Interpretation of oblique and vertical aerial photography resulted in the creation of 143 map overlays at a scale of 1:10,560 and a MORPH2 database containing 18,249 records. The project has clearly demonstrated the wealth of archaeological survival of a wide variety of sites and extensive landscapes in the area. These range from fields and settlements of the Prehistoric period through to the Medieval and Post-Medieval periods, and more recent industrial landscapes. Additionally, the project has demonstrated the effectiveness of rapid air photo interpretation survey as a method of documenting archaeological sites and thereby assisting the management of large areas of upland archaeology.

The project ran from 1989 to 1992, and since then the data have been used regularly as an aid to cultural resource management.

This report represents the results of preliminary analysis of these data.

ACKNOWLEDGMENTS

On behalf of the project team, the help and advice of the following bodies and individuals is gratefully acknowledged: various members past and present, of the archaeology section of the North Yorkshire County Council Planning Department (NYCC); The Yorkshire Dales National Park (YDNP) and particularly the parks archaeological officers, Robert White and Olwyn Beazley; the staff of the RCHME National Library of Air Photographs (now the National Monuments Record Air Photographs); other RCHME colleagues, especially those in the Air Photography Unit and in the northern recording section of the National Archaeological Record; Davina Turner for the general tidying of the draft report; Philip Sinton for his work on the illustrations; Chris Musson for his exhaustive and extremely useful comments on the first draft; finally the authors wish to extend their thanks to the other members of the project team, Ann Carter, Simon Crutchley, Damian Grady, Dilwyn Jones and to Alison Deegan and Pamela Grace for their work on the Howgills.

2 INTRODUCTION

2.1 BACKGROUND TO THE PROJECT

Meetings were held between the RCHME and English Heritage (EH) in 1988 to discuss ways in which mapping and recording from the interpretation of aerial photographs could be used in the rapid production of a primary archaeological record for an upland area. At this time the RCHME and EH had already collaborated on mapping projects for Dartmoor and Kent, and two other joint funded projects (Hertfordshire and Thames Valley; Fenner 1992, Fenner and Dyer 1994) were already underway. The Dartmoor project had demonstrated the effectiveness of rapid mapping from aerial photographs in an upland area rich in archaeology. The Kent project had demonstrated the potential of a rapid method of recording based on the morphological aspects of monuments, in this case working largely with archaeological sites visible as crop marks (Edis 1989). The Dales project was seen as a pilot to develop these methods of working in an upland area known to be rich in archaeological sites surviving as earthworks and stoneworks and including extensive industrial remains; it was also an area in which the records of the local SMR and of the NAR were perceived as being weak.

2.2 OBJECTIVES

The original objectives of the project were to develop a methodology for recording archaeological data in an upland area and, in doing so, to produce a primary archaeological dataset for the western part of North Yorkshire using aerial photographs as the primary source. (A concurrent RCHME project enhanced the National Archaeological Record (NAR) from published sources, see below 3.1.1).

As might be expected in a pilot project of this size, the methodology and objectives were developed over the course of the project and these changes are highlighted below and in 2.4.1.

The specific objectives of the project were:

- To develop and test an improved version of the MORPH database system used for the Kent Cropmark project (Edis et al 1989). The new version needed to address the problems of earthwork archaeology in an upland area and to cater for extensive remains of industrial activity. The revised database system was named MORPH2.
- To help, in conjunction with the other pilot projects, to define a methodology for rapid air photo interpretation, mapping and recording in other areas of England.
- To investigate the practicalities of recording industrial remains from aerial photographs used in conjunction with information recorded on the Ordnance Survey (OS) First Edition 6" maps.

- To produce a primary archaeological dataset for the western part of North Yorkshire (see below) for all periods using aerial photographs as the primary source. The resultant data would be used to enhance the NAR and provide the North Yorkshire County Council (NYCC) and Yorkshire Dales National Park (YDNP) with information to assist their activities as SMR and Planning consultants.
- To provide archaeological data to English Heritage in such a manner that Monument Protection Programme staff could assess the information in the light of existing MPP classes and potential new classes. During the course of the project the possibility of an Historic Landscapes Register was also raised and it was noted that the data might be suitable for assisting assessment of potential areas.
- To suggest possible approaches and specific targets for future survey within the project area.
- To produce a synthetic report to act as an introduction to the material recorded.
- After completion of the mapping phase, to map the remaining parts of the YDNP (the Howgills area) to a similar specification.

The area covered by the project is shown in Figures 1 & 2.2. The original proposal targeted those parts of the YDNP which lie in North Yorkshire, but the area was subsequently doubled (in terms of km²) to include all of the county west of OS easting ⁴20000. The revised proposal called for the survey of circa 2730 km² lying on 134 OS 6" quarter sheets. In general mapping stopped on the county boundary, so that 41 map sheets which the boundary crossed were not completely surveyed. However, subsequently six of these edge maps were completed and a further 9 maps added to the total. These maps related to the Cumbrian part of the YDNP, Garsdale, Dentdale and the Howgill Fells, an area already identified by the RCHME as having a poor representation in the national record and timetabled for a rapid field survey project. The total area surveyed and discussed in this report was therefore just over 3000 km².

2.3 SOURCES (GENERAL)

The main source of aerial photographs was the National Library of Air Photographs (NLAP - now NMR Air Photographs). All photographs available through NMR Air Photographs at the date of mapping were consulted, including both obliques (several thousand) and verticals at scales larger than 1:15,000 (more than 11,000). The most useful source of archaeological information were the various vertical sorties at a scale of c1:10,000, and particularly those flown by Meridian Airmaps Limited from 1967 to 1972 which covered the whole of the project area within North Yorkshire; the RAF vertical photography from earlier years often provided valuable extra information. In general the OS photography, which is mostly at a larger scale than the other mentioned sources, was not available through NMR Air Photographs at the time of the project but would no doubt be valuable for any future work.

The holdings of NYCC and YDNP, which included their own photography and photographs from other sources (including the NMR) were borrowed to assist the project, and proved invaluable. The important CUCAP collection was not directly consulted since the results of a previous study of CUCAP photography were available in the form of simple sketch transcriptions and written references on the NYCC record maps. Copies of many of the most informative CUCAP photographs were in any case also available through either NLAP or NYCC. There will certainly be CUCAP photography which would provide further information, especially given the wider Sphere of Interest now employed by the RCHME; anyone doing further work would be strongly advised to consult this source.

Additional photographs were provided by Anthony Crawshaw from his personal collection.

In the Howgills area not all of the photography was accessed for the area beyond the National Park boundary and therefore the survey of these areas should be considered incomplete.

The NAR was consulted, but as it was being updated concurrently (see below 3.1) the records used were essentially those of the OS record cards and the annotated OS First Edition maps.

The NYCC SMR was not generally consulted as it was not thought (by NYCC) to contain significant additional information other than that on the sketch overlays and their accompanying record sheets, which were consulted.

Where readily available, published sources referred to in other records were examined.

General and local publications relevant to the project are listed in the bibliography. Particularly useful works were the Countryside Commission Guide to the Yorkshire Dales National Park (Waltham 1987) as a general introduction to the area, Clough 1962 for the lead industry, and the interim reports on the Swaledale Ancient Land Boundaries Project (Fleming and Laurie 1985, 1986, 1990 & 1992).

Detailed surveys of Ingleborough and Ribblesdale, including field work, and the field sketches by A Raistrick held in the NAR archive were used to assist interpretation and mapping. Other maps and plans in the NAR archive were not generally consulted, except where the record cards themselves contained illustrations.

Other sources of information that were identified but not used were: the Raistrick archive at Bradford University, the records of the Northern Mine Research Society and of the consulting engineers Ove Arup, and the results of the separately commissioned English Heritage lead mining project that ran concurrently.

2.4 METHODOLOGY

2.4.1 Mapping Methods

The information gained from photo interpretation was mapped by means of manual transcription using pencil on stable (polyester) translucent overlays. Final inked overlays were then produced by tracing onto a clean overlay using technical pens and a limited range of line types and symbols (see conventions, Appendix 7.6). Mapping was done in blocks of 5 km x 5 km at a scale of 1:10,560, directly relating to the available OS quarter sheets and the NYCC overlays (see 3.1.2). Position and accuracy was largely dependent on the quality of the mapping on the OS base maps, combined with the skills of the air photo interpreter. In intake areas the positional accuracy is estimated to be in the order of 5-15 m but on open moorland the limited background information may result in errors of 50-100 m. The limestone scars so dominant in the landscape are often very poorly recorded on the OS base maps, either being omitted or wrongly positioned, and therefore the relationship between sites and these scars may be difficult to establish from the overlays alone (though the LOCATION field in the MORPH2 database may help). In all cases the mapping tried to place the sites in their true location on the overlay. Where more detailed surveys were available these were used as the basis for the transcription, eg Ingleborough and Stanwick.

Additional information that could not be shown on the mapping and was not recorded in the MORPH2 database was recorded on a Map Note Sheet for each quarter sheet.

During the project a number of field visits were made by members of the mapping team, to gain an understanding of the landscape and various types of archaeological feature and to address specific problems of air photo interpretation.

2.4.2 Conventions

Pens of varying sizes (0.13, 0.18 and 0.25), were used. Letraset, for symbols and a degree of labelling, was used on some of the earlier overlays. During the project new conventions were suggested and a change in symbols and method of depiction was implemented, most notably the adoption of a new symbol for ridge and furrow and the decision to use ink instead of transfer symbols and lettering (see Figures 4.3.13e & h). Labelling of the archaeology on the ink transcriptions was also eventually stopped in favour of a solely graphical approach to depicting the archaeology, all other information being available in the MORPH2 database. (Appendix 6 shows the conventions used.)

2.4.3 Databases

All mapped archaeological sites were described using the MORPH2 database system. This was specially developed for the project and subsequently underwent a number of mainly minor changes during the project. The only substantial change, near the end of the project, was the addition of a GROUP table allowing information to

be attached to groups of related sites. At the end of the project all maps were checked and updated where necessary to ensure compatibility throughout the database. The method of input and subsequent checks paid great attention to the correctness of the recorded grid references and therefore it is suggested that of the 30,015 NGRs in the database less than 1 per cent are likely to be erroneous (within the parameters listed above in 2.4.1).

2.5 ARCHIVE AND PUBLICATION DETAILS

Copies of the information resulting from the project have been supplied to the North Yorkshire County Council and the Yorkshire Dales National Park; a copy is also held in the York office of the RCHME. All original material will be archived in the NMRC Swindon. Appendix 3 lists the items that are to be archived within the NMR.

Short notes on the project have been published in the journal of the Yorkshire Archaeological Society and the proceedings of the International Symposium for Aerial Archaeology in Amiens 1992 (Horne 1994 and forthcoming).

2.6 PROJECT DETAILS

2.6.1 Project Team structure

The project was set up under the guidance of Roger Featherstone, but Robert Bewley took over as Project Leader in June 1989. Initially the team consisted of Pete Horne (Team Leader), Simon Crutchley and David MacLeod but on relocation to York in September 1989 was reconstituted as Pete Horne, Ann Carter, Dilwyn Jones and David MacLeod with Damian Grady who joined in June 1990.

Survey of the Howgills area was initially undertaken by Alison Deegan (a student on placement from Bradford University), as a training exercise under the supervision of Ann Carter. Subsequently Ann Carter and Pamela Grace completed the mapping and MORPH2 input of this area as a training exercise for Pamela Grace.

A project liaison group met approximately twice yearly to report on progress and discuss changes of methodology etc. The RCHME (NAR, APU and Field), NYCC, YDNP and EH were represented.

2.6.2 Timetable/man-days

The project ran from early in 1989 to mid July 1992 with an interruption in productivity in the last quarter of 1989 due to relocation. 2321 man-days were spent on the mapping phase. This includes all time spent on photo interpretation, transcription, MORPH2 database recording and related tasks.

104.5 man-days were spent on post-transcription tasks such as map copying, data validation and sorting the photographs for return to NMR Air Photographs.

An additional 215 man-days were spent on the transcription and MORPH2 input of the Howgills area. Altogether a total of 2516 man-days were spent on the survey, transcription and MORPH2 database input for the area covered by this report.

2.6.3 Funding

The project was jointly funded by RCHME and EH, with EH making grants available for staff costs from 1989 to 1991.

2.7 SCOPE OF THE REPORT

This report is concerned only with the air photo interpretation element of the Dales project and all analyses are based solely on information recorded in the MORPH2 database, Map Note Sheets and inked overlays, unless explicitly stated otherwise. The report aims to be an introduction and overview to the information available in these sources. It does not aim to be a summary of the archaeology of the project area, but some pointers and suggestions for further archaeological work will be suggested. The report has been written by two people (PH and DMacL) but is based on the interpretation, mapping and recording work of eight individuals.

In the time available for production of this report it was not possible to treat all aspects of the data in the detail they deserve, and the decision has been made to summarise some aspects quite briefly whilst investigating others in more detail to show the possibilities for research using the project information. The primary level of the survey means that users would be well advised to go back to original sources whenever detailed analysis is proposed rather than to rely solely on the description and mapped interpretation provided. It should also be stressed that there is considerably more information retrievable from aerial photographs than the timescale and recording methods of the project allowed. In areas targeted for further fieldwork it would be wise for the first stage to include re-examination of all available photography.

3 BACKGROUND: THE PROJECT AREA AND ITS ARCHAEOLOGY

3.1 PREVIOUS WORK

Each MORPH2 record created by the project includes a 'source score' (see the MORPH2 Users Guide) which gives some indication of the quality of the information available for the interpretation of each site, varying from 'poor quality photography' to 'full-scale excavation'. This information is summarized in the three source-based distribution maps (Figures 3.1a-c) which illustrate the limited nature, and the pattern, of previous survey and investigation which has assisted this project.

3.1.1 National Archaeological Record

In 1989 the NAR record for the area was largely based on the OS card index. Prior to the Yorkshire Dales Project, the area had seen the same level of OS field recording as the rest of the country, but with the additional benefit of a very active special correspondent, Arthur Raistrick, the original source of many NAR records.

As a part of the same joint-funding from English Heritage the NAR was enhanced as a parallel part of the project. The NAR was already the most comprehensive record for the project area, containing c1800 records (largely of medieval or earlier sites), but was known to be deficient in records relating to the industrial landscape. The main source for NAR enhancement was the First Edition OS 6" mapping (1849-57), and the use of a wide 'sphere of interest' resulted in the creation of a further 12,600 records. An additional enhancement programme created records on the basis of settlements appearing on First Edition maps, cross-referenced to the English Place-Name Society volumes; this added another 1050 records. The final integrated version consisted of a database of 15,500 records.

The project to enhance the NAR record ran concurrently with the air photo survey and so although the APU used this enhanced NAR information whenever possible, often the information available was only the original records and the annotated First Edition maps. On occasion the First Edition maps were only seen after the photo interpretation and mapping had been completed. Figure 4b shows the proportion of MORPH2 records that relate to these enhanced NAR records.

3.1.2 SMR record

The limited nature of the local SMR record was one of the prime factors in choosing this area for the project. The main SMR source was a series of quarter sheet overlays on which very basic sketch plotting from air photographs had been recorded. These were supported by short written descriptions, cross referenced to the photographs, the numbers running consecutively within a quarter sheet; these sites are cited in the MORPH2 record as a number prefixed by AP, eg AP7. The overlays had been kept up to date with recent photography by NYCC when resources allowed. The photographs used to compile the SMR overlays were largely those held in the collections of NYCC (including their own photography, labelled ANY, and Meridian), CUCAP and the oblique photographs held by NMR Air Photographs.

Within the area of the National Park these overlays had been further enhanced by Robert White from the YDNP photographic collection with similar annotations (these are referred to in the MORPH2 database as YDNP). Figure 4b shows the proportion of MORPH2 records that relate to these local SMR records.

The scale of 1:10,560 for the current project was chosen to match the SMR maps, because it was thought that the NYCC overlays (also at 1:10,560) could be used to speed up the transcription process. In the event the NYCC overlays were only used as reference because the manner in which they had been compiled and the type of information which they included was not compatible with the requirements of the project. Sometimes information was present on these maps which could not be verified; where this information was copied onto the Project maps the source field in the MORPH2 database records the fact.

3.1.3 Aerial Photographs

3.1.3.1 Archaeological Air Survey

The area as a whole has not been intensively surveyed from the air, but a few locations and sites have been well covered (eg the field system north of Grassington and the Malham area). Although there are a few pre-1945 photographs, aerial reconnaissance in the area really started with CUCAP visits in the 1950s. Since then occasional visits by the CUCAP, the RCHME, Derrick Riley, and various people working for NYCC (producers of the ANY photographs) have photographed many sites and elements of the broader landscape. More recently Robert White, under the auspices of the YDNP (grant-aided by the RCHME), has instigated more intensive survey, including the industrial remains. Further targeted and reconnaissance flying by the RCHME and Robert White (YDNP) since the start of the project has begun to enhance the quantity and quality of photography now available for archaeological purposes.

Specialist photography of industrial remains was particularly scarce prior to the project, and photography of all but the best known archaeological sites was far from adequate. Crop marks and soil marks have been rarely recorded in the main part of the area (see 3.3). This may be due to the limited arable cultivation in the area and the types of soils (see below 3.2), but there has been little recorded effort to fly the area in summer months and occasional crop marks suggest there is some potential (eg Wensley Roman Fort, NY.786.26.1).

Almost all of the available photography taken specifically for archaeological purposes is oblique photography but some extremely useful vertical photography exists in CUCAP for specific areas (eg Malham and Grassington).

Figure 3.1b shows only those sites which were interpreted from good quality (ie specialist archaeological) photography. This shows that in the past there has been a tendency to concentrate effort on a few small areas, notably mid-Wharfedale (Grassington), mid-Wensleydale (Bainbridge), Skipton, Ribblesdale (Settle and Ribbleshead), with a fairly thin general scatter confined mainly to the south and east of the project area. The Howgills in the north-west have been particularly neglected,

probably because the narrow valleys and extensive moorland have seemed to offer few returns for time and effort spent flying there.

3.1.3.2 Non-Archaeological Air Survey

The project had the benefit of complete coverage at 1:10,000 scale by Meridian and extensive RAF National Survey cover, particularly for the north east of the area. The Meridian and RAF photography was variable in quality but some sorties taken early in the day in winter were particularly useful. The exaggerated height in the model created by viewing the Meridian photography stereoscopically was very useful in the search for earthwork sites.

OS photography only became readily available, for some limited areas, towards the end of the project. The OS photography covers the whole of the project area but, although at a larger scale than the other vertical surveys, was found less useful for identifying earthworks, the photographs generally having been taken in flatter lighting conditions. However, it may well prove useful in the areas where the remains are fairly substantial or bare stonework is being examined. Other sources of photographs were identified but not used: recent colour and monochrome photography commissioned by the Countryside Commission as part of a project to monitor land-use change in the National Parks of England (Silsoe); Ministry of Agriculture, Farms and Fisheries vertical collection; the CUCAP (see above); large scale enlargements of the Meridian photography held by NYCC might be useful for further work.

Figure 3.1a shows all sites which were derived from poor quality (ie non-archaeological) photography alone. The distribution pattern is little different from the overall distribution of sites recorded by the project (see Section 4, Figure 4a) and underlines the importance of the vertical photographic resource, particularly to projects covering the highland zones.

3.1.4 Other archaeological work

Predominant in the area is the work of Arthur Raistrick. Although his work was generally consulted only through published works and the OS records it provides the main body of background information. Fieldwork by other local archaeologists, and more recently university departments, has also been important in highlighting the potential of the area: work by Alan King, particularly for the Ingleborough area; survey by T Laurie & A Fleming in Swaledale; fieldwork by Manchester University working in Littondale; and in recent years the work of Steve Moorhouse investigating the medieval landscape by analysis of documentary sources and selective field survey. Work by the Northern Mine Research Society, and in particular Mike Gill, has documented much of the lead industry in the area. Railway enthusiasts have done much to document the history of the railways in the area and also the construction of the major reservoirs (Croft 1987; Bowtell 1988 and 1991). Recent detailed field survey by the RCHME has been very limited and largely restricted to specific, threat-led requests, eg Ingleborough (Bowden et al 1989) and Ribbleshead (SD 77 NE / 12). During the project one map-sheet (SD 98 NW) saw a

rapid RCHME field evaluation and since the end of the project RCHME have undertaken a more complete rapid field survey of the Howgills area. The information from these surveys was not available for this report but in general they appear to have confirmed the overall accuracy of the air photo interpretation and mapping as well as identifying a number of additional sites.

Figure 3.1c shows the distribution of those sites where the air photo interpretation was assisted by information from these and other sources. The additional sources include documentary evidence as well as fieldwork; the illustration shows very clearly the focus of effort on the southern limestone. However, in a rapid survey such as this the search for additional sources cannot be intensive and this should not be taken as a wholly accurate picture. A substantial number of the sites in this distribution were those recorded in the field by Raistrick. Much more field investigation has been carried out in recent years, particularly in Swaledale and upper Wharfedale/Langstrothdale, but the results were not available to the project during the transcription phase.

3.2 LANDSCAPE

It is not intended in this section to give a full description of the geology, geomorphology, soils and land-use of the Yorkshire Dales, but rather to highlight the general trends which may have influenced major land-use patterns in the past and which are reflected in the distribution patterns of the mapped archaeology.

3.2.1 Geology

The solid geology of the Project area is divided into two main areas (Figure 3.2.1a). The northern, and largest, part is defined by a coherent geological structure, the Askrigg Block. The major faults which delimit this block to the south, the Craven faults, mark the change to a different, gritstone dominated, landscape. A third area, to the west of the Dent fault, characterised by the Silurian rocks of the Howgill Fells, was touched upon by the extension to the original project area. An excellent summary of the geological make-up of the National Park area can be found in the Countryside Commission Guide to the Yorkshire Dales National Park (Waltham 1987).

The Askrigg Block is a single geological structure surmounted by rocks of the Carboniferous period, dominated by limestones, first in the Great Scar Limestone (now further subdivided by geologists) and then in the repeating bands of limestone, shales and sandstones of the Yoredale series. The block is topped with Millstone Grits. The regular bedding and gentle dip slope of these rocks has given the landscape its well known 'stepped' form due to the different erosional characteristics of the various rocks (Figures 3.2.1b & c). In the south and west parts of the Askrigg block the visible geology in the dales is dominated by the Great Scar Limestones, but in the more northern dales (northern Wharfedale and Wensleydale) it is the Yoredale series that are most evident. Similarly the Millstone Grits are only visible on the highest parts of the south-west, but are the dominant feature of the moorlands of the more northerly dales (Swaledale, Arkengarthdale) and Nidderdale. The free draining

of the limestone has resulted in good grazing land, whilst the acid soils on the sandstone have produced rough moorland on the higher ground. Despite the relatively high rainfall averages for the Pennines the fact that much of the natural drainage of this landscape is underground has resulted in extensive water-management systems to ensure that water is available where it is required.

Within the Yoredales and the Millstone Grits thin beds of coal appear in some areas, as does chert, and both have been exploited in the past. Small coal deposits were used locally for firing limekilns as well as domestic use, but there are also a few areas that have seen extraction on a larger scale (eg Preston Moor and Tan Hill). However, the most important raw material is the lead ore found in intrusive veins within the base rock. Since at least Roman times there has been extensive working of the two main lead fields in the area, in the north in Swaledale and Wensleydale, and in the south around Grassington and Greenhow Hill. The lead ores are often associated with other minerals, some of which have been exploited at various times (eg copper and barytes). The rocks themselves have also been quarried for various uses - the name of the Millstone Grit is one clear pointer (it was also used as a building stone), but also there are narrow bands of sandstone in the Yoredale series that have been prized as flagstones or roofing slates, depending on how thinly they split. Limestone is still extracted in large quantities from the area and crushed for use as roadstone and in concrete, and to a lesser extent as a building stone, for cement production and for use in the steel and power industries. The removal of decorative garden limestone, so popular in the recent past, has now almost stopped. In the past some limestones were in demand as high quality building stone, particularly those that could take a polish and were classed as 'marbles'. Locally, all the various stone types were used for drystone walling and the vernacular architecture. However, limestone's most obvious use in the past was in a processed state, clearly evidenced by the limekilns found throughout the area, as a 'sweetener' for agricultural purposes and for cement production.

The second major division of the project area, geologically speaking, lies south of the North Craven fault and is the start of the Central Pennines zone. Here the geological structures are more complicated and much faulted, with the Yoredales, Millstone Grits, and a limited area of Coal Measures all being present at the surface in different locations. Again, the rocks have been exploited by stone quarrying and coal mining, but perhaps the most notable feature is that limestone no longer predominates; this not only gives the landscape a darker, more sombre appearance, but also means that the high rainfall of the Pennines drains less freely with a major effect on the soils and land use.

In the north-west corner of the area are the Howgill Fells. These are largely built of Silurian slates and grits and present quite a different appearance, with steep sided, rounded, hills. Similar rocks underlie the limestones of the Askrigg block and are occasionally visible in the valley bottoms (eg around Ingleton), where the true slates and the associated tough greywackes have often been exploited for use respectively as roofing materials and roadstone.

3.2.2 Geomorphology

The topography of the area is one of hills and moorland rising to over 2000 feet OD divided by numerous valleys, some narrow, some wide (Figure 1). Much of the drainage is underground but all the major valleys are served by a river that flows throughout the year; the catchment area for each of these defining natural landscape units divided from each other by passes at 1000-1500 feet OD. The major faulting of the landscape has led to some clear breaks in topography which must always have been important to local populations. South of the Craven fault the courses of the Rivers Ribble and Aire, cutting through the Pennines, provided an important cross country route from early times. The hills and valleys of the project area show clearly the various effects of glacial and periglacial modification: U-shaped valleys, dry valleys, truncated spurs, and bare limestone pavements largely stripped by glacial flows (Figure 3.2.1c). Additionally, glacial deposition has affected large areas, resulting in numerous drumlins and terminal moraine deposits. These can have a major effect on patterns of land use because of the local effect on topography and the different soils which develop on them, or simply because they are a source of sand, gravel or clay. The Roman fort at Bainbridge, in Wensleydale, sits proudly on top of a large glacial deposit, as do a number of early sites in Swaledale. The glacial lakes formed behind these moraines are also evident in the landscape as large areas of flat alluvium, mainly of use as pasture. Major slumping has also occurred in many areas, probably during the warming immediately after the last glaciation, and in some areas these landslips can be difficult to differentiate from large-scale mining or quarrying operations.

3.2.3 Soils

Detailed descriptions can be found on the Soils of Northern England, Sheet 1 and in the accompanying legend (Soil Survey of England and Wales, 1983). Figure 3.2.3 is a simplified extract from this map.

The project area straddles the Yorkshire Fells of the Pennines, where upland soil types (in particular peat) predominate. Drainage is poor on the Millstone Grits, and blanket peat covers most of the high moorland between the dales. The peat has for long been an important source of fuel for domestic use, but in the eighteenth and nineteenth centuries it was also used as a fuel for limekilns and the lead industry. Around the peat margin and on the lower moors the soils are acidic clays and loams under a thin peat layer. The latter soils are often marginal to the enclosed farmland on the lower dale sides and have in parts, since Post Medieval times, been enclosed and improved by draining and repeated liming.

On the limestone plateaux and exposed dale-side benches are very shallow humose loamy soils, which support herb rich grassland, excellent for stock rearing but interspersed with often-extensive areas of limestone pavement. In the dale bottoms deep stoneless river alluviums, sometimes overlying gravels, as in Littondale and Wharfedale, provide good permanent grassland with some arable potential.

The southern edge of the project area, south of the Craven Fault, is characterised by loamy soils, subject to seasonal water-logging, which also support good grazing and

some cereal production. On the higher ground are highly acidic soils and some blanket peat.

On the east, the project area reaches beyond the Pennine uplands to encompass part of the Vale of Mowbray at the mouth of Wensleydale, and the similar gently rolling landscape around the Stanwick earthworks, in the north-east. In these areas the soils tend to be deep, well-drained loams, good for mixed farming. These soils extend into the mouth of Wensleydale, and of all the soils in the project area have the greatest potential for crop mark development, as reflected in the distribution plot of crop marks (Figure 3.3).

3.2.4 Land Use

Current farming practice in the project area is primarily pastoral. The dale floors provide lowland grazing and rich hay meadows which support dairying and stock rearing. Good grazing is also found on the herb-rich grassland which grows on the limestone benches of the upper dale sides, but on the higher moorland grazing is very poor and extensive areas are managed as heather moorland for grouse shooting. The field pattern in the dales is typically a network of drystone walls defining small, often irregular fields, on the lower dale sides, with larger and more regular fields on the dale floor. On the higher dale sides are large fields of improved land, beyond which lies the unimproved moorland. Arable is only common, as part of a mixed farming economy, in the south and notably in the north-eastern corner of the project area, but patches are also found on the floors of the larger valleys. In the north-east corner the mouths of Wensleydale and Teesdale rapidly widen and the Pennines give way to a rolling, lowland landscape of large, hedged fields broken only by the low mass of moorland known as the Bellerby Ranges, a military training ground for the Catterick garrison, which extend west almost as far as Reeth. Further north, Gayles Moor, north west of Richmond, is another area of military ranges.

There are several large quarries still operating, mainly producing road stone and aggregate for concrete; in the past these and other quarries supplied stone for a variety of uses (3.2.1 above; Figure 4.1.5.6b). Quarrying has resulted in the loss of some notable archaeological sites, eg at Ribbleshead and above Preston Scar.

Forestry covers less than 2 per cent of the project area, the bulk of the plantations occurring inside the National Park at the heads of Dentedale, Wensleydale, Raydale and Widdale, and the largest occupying the entire upper half of Langstrothdale.

The only natural bodies of standing water in the area are Malham Tarn and Semer Water, but there are several large reservoirs in the south and east which supply the urban and industrial areas of Leeds and Bradford. The major reservoirs are found on Barden Moor, Appletreewick Moor and in Nidderdale, with a series of four reservoirs filling most of the Washburn valley in the south east (Figure 1).

Recreation and tourism are also important, particularly in the National Park, where a dense network of local and long-distance footpaths crosses the area.

The traditional farming landscape in parts of the Pennine Dales is to some degree protected, not only by their inclusion within the National Park but also by the designation of the intake areas of the upper dales as an Environmentally Sensitive Area. Nidderdale, outside of the National Park, has been designated an Area of Outstanding National Beauty, and the National Trust are maintaining an ever-increasing part of the landscape, most notably in upper Wharfedale.

A detailed survey of current land use in all National Parks was recently commissioned by the Countryside Commission and the results may be consulted via the relevant National Park authority.

3.3 THE DISTRIBUTION OF ARCHAEOLOGICAL EARTHWORKS AND CROP MARKS

The figures used in this section for crop marks, earthworks and stoneworks include in each category sites which were seen as combinations of two or more of these forms unless otherwise stated. Some sites are thus counted twice compared with the overall site-numbers (18,249) recorded in section 4. The only substantial overlap is between earthworks and stoneworks, a total of 4141 sites being seen as earthwork/stonework combinations.

Earthwork sites, including those recorded as earthwork/stonework combinations, totalled 16,848, the high number owing much to the lack of arable farming over most of the area. The distribution of earthworks is universal, apart from the high moorland. Many of these earthworks are actually soil-covered stone structures, which are often extremely well preserved, particularly those on the upper dale sides and in the moorland areas. There is a marked concentration of these earthwork/stonework sites on the southern limestones.

There are only 284 sites which were seen in whole or in part as crop marks (Figure 3.3); these are largely confined to the east and south where the soils are more conducive to crop mark development (see 3.2.3).

The total of 1248 sites visible solely as stonework were accounted for by the many unroofed buildings, limekilns and quarries listed in the database. Proportionately the distribution of these sites spreads higher onto the moorland than that of the earthworks, primarily because it is in those areas that mining and quarrying have had the greatest impact. Within the area of the National Park many of these sites are still extant, either derelict or in many cases now in a renovated state.

3.4 LIMITATIONS OF RECORD

The project was designed to develop a methodology for the National Mapping Programme. The NMP is a rapid survey exercise in which full evaluation of all the available archaeological and photographic sources is not practical. The intention is to present a clear, and as far as possible accurate, overview of the prehistoric and historic landscape, without attempting to depict every detail or pursue every source. The project therefore presents not a complete record of the archaeology of the

Yorkshire Dales but an interpretation of the redundant man-made features of that landscape as seen on aerial photographs.

The project record is biased by all the factors described above (3.1-3.3), such as the earthwork/stonework emphasis in the specialist photography, the variable quality of the vertical photography, and the general lack of breadth or depth in the existing record for the area. Moreover, the project had a developmental function and was breaking new ground in rapid survey methodology; inevitably this has had some effect on the consistency of the record, as explained in 2.2 and 2.4 above.

The results presented here are based solely on the completed Dales project MORPH2 database (18,249 records, dated 23 December 1993, including the Howgills area), and on the related Map Note Sheets and overlays, unless explicitly stated otherwise. The analysis presented is therefore solely based on information obtained by interpreting aerial photographs of varying quality, it should not be considered as a statement on all available archaeological information. Users of this report are recommended to read the MORPH2 manual in order that they fully understand the nature of the record. All terms used in MORPH2 have a specific meaning, for example a SITE is the basic unit of record, describing a morphologically distinct feature or group of features (or an industrial area), and a GROUP is one or more SITES which are interpreted as having an archaeologically significant relationship (not simply spatial); to indicate this special use such terms appear in SMALL CAPITALS in this report.

It is worth noting that all MORPH2 records have a statement of VALIDITY, which expresses the confidence the air photo interpreter had in their interpretation of type and period for the site. VALIDITY was scored on a scale of increasing confidence from 1 to 5, the total number of records for each score being: 1 - 285 (1.5%), 2 - 2339 (12.8%), 3 - 7207 (39.5%), 4 - 8015 (43.9%), 5 - 403 (2.2%). In general the VALIDITY rating has been ignored in the following statistics but is worth bearing in mind if further work is intended on any of the classes described below (an example for hut circles is given in section 4.1.3). It is also important to understand that the MORPH2 database only allows for a single interpretation of Period and type for each SITE (although a single additional interpretation is allowed for each GROUP).

It would not be practical to include lists and distribution maps for all the analyses performed on the database, and only the most informative have been included. If clarification of specific points is required users are advised to consult the authors and the original database.

Because of the large size of the database, the distribution maps are normally presented with information based on the number of SITES per square kilometre. Each individual kilometre square with one or more relevant records has a box drawn within it of a size proportional to the number of records, the largest boxes indicating five or more SITES. (The overall distribution maps are presented with similar proportional boxes, but with the largest size being representative of 20 or more sites per square kilometre). It is important to remember that these are MORPH2 SITES and one record may represent an extensive LINEAR SYSTEM or only a small fragment of LINEAR FEATURE. Therefore when analysing distributions of, for example, field systems an area with several adjoining kilometre squares flagged as having only one record may indicate a wide-spreading and well preserved field system (eg the area west of Redmire on Figure 4.1.1a showing medieval ridge and furrow), whilst large numbers of records may indicate a lesser degree of preservation or a series of smaller individual field systems.

Figure 4a shows the overall distribution of MORPH2 records and can be used as a basis for comparison with other distributions, such as those according to source described above (Figures 3.1a-c).

Figure 4b illustrates the relative proportions of the 18,249 records according to their interpreted Period and whether the sites had previously been recorded, in any form at all, in either the NAR or SMR. It is particularly noticeable that only 7.5 per cent were flagged in both SMR and NAR records prior to the project. The 15 per cent of MORPH2 records solely related to existing NAR records will largely be those resulting from the study of First Edition maps (see 3.1.1), whilst the 12 per cent solely related to SMR records will largely be the result of the NYCC air photo mapping (see 3.1.2).

In the statistical analyses the Roman and prehistoric Periods have all been grouped together, because of the lack of precision possible when assigning Periods solely on the basis of air photo interpretation. The large proportion of records ascribed to the Medieval and Post-Medieval Periods is particularly noticeable, the Medieval records reflecting the extensive field systems and associated settlements thought to be medieval in origin (see 4.1.1), and the bulk of the Post-Medieval records relating to mining activities (see 4.1.5). More accurate dating of these features could change the picture considerably, perhaps by reassigning both types of records to earlier Periods. In all Periods except the 'Roman and earlier' category more than 50 per cent of the records created by the project were 'new', compared with the NAR and SMR records, clearly substantiating the perception prior to the project that the existing records were inadequate. Even for the 'Roman and earlier' category 32 per cent of the records were 'new'. If one assumes that only half of the records given an unassigned Period may also be Prehistoric, then the number of potential 'new' Prehistoric sites is again more than 50 per cent of the total, ie a doubling of the available resource compared with earlier records.

In the following sections references to individual sites are either in the form of MORPH2 numbers (NY.1222.3.2) or NAR numbers (SD 96 NW / 2). Place names used can be found on the location map (Figure 1 and overlay). The measurements used reflect the 1:10,560 base maps used, so whilst all dimensions and distances are given using metric units, altitude is given in feet.

4.1 THEMATIC REPORT

The thematic section of the report deals with the site interpretations sub-divided according to the classes defined in the Thesaurus of Archaeological Site Types (RCHME/EH 1992).

4.1.1 Agriculture and Subsistence

Table 4.1.1a Agriculture and Subsistence - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
BARN								130		45		175
BARN PLATFORM							4	15		37		56
BIELD								8	1	2		11
CAIRN		17	4		43			3		5	28	100

CLEARANCE CAIRN			1		25			2		8	18	54
CROFT							29			4		33
CROFT BOUNDARY *							10			13		23
CULTIVATION MARKS											3	3
DEWPOND								6		5	1	12
FARMHOUSE							1	6		1		8
FARMSTEAD			3	4	6	1	1			8	2	25
FIELD BOUNDARY			4	6	77		106	753	2	951	206	2105
FIELD SYSTEM			13	4	113	5	40	32		132	39	378
GARDEN							2	3		1		6
HUNTING LODGE								1				1
LAZY BEDS						1				2	1	4
LONG HOUSE						10		6		7		23
LYNCHET			1		1	4	149	4	1	188	12	360
LYNCHET FIELD SYSTEM			3	1		8	86			88	2	188
MANOR							2					2
PILLOW MOUND							3	9		21		33
PLANTATION *								24		1		25
PLOUGH HEADLAND *							8	1		10		19
RABBIT WARREN								3				3
RIDGE AND FURROW			1	1	2	1	609	400		992	3	2009
SHEEP HOUSE							4					4
SHEEPFOLD				1			15	193	4	117	79	409
SHOOTING BUTT *									11			11
STACK STAND							19	6		293	1	319
STOCK ENCLOSURE			9	4	26	2	2	4		13	4	64
WASHFOLD								5		1		6
Class Totals	0	17	39	21	293	32	1090	1614	19	2945	399	6469

Table 4.1.1b Agriculture and Subsistence - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
FARMSTEAD			2	3	8	5	7	11		29	3	68
FIELD SYSTEM					42	4	313	155		301	20	835
GRANGE							3					3
LYNCHET FIELD SYSTEM						2						2

MANOR							2			1		3
RABBIT WARREN								1		2		3
SHEEPFOLD											1	1
VILLA				1								1
Class Totals	0	0	2	4	50	11	325	167	0	333	24	916

The high proportion (35%) of individual records that are assigned to this class, irrespective of date, clearly demonstrates how the remains of agricultural activity dominate the archaeological landscape. Of these records nearly 80 per cent relate directly to field boundaries and field systems, including lynchets and ridge and furrow cultivation; only a limited number can be directly related to activities such as warrening and hunting (fishponds are included under Water and Drainage in 4.1.10). Normally only those remains of structures which had fallen into disuse at the date of the photography were recorded; numerous sheepfolds, washfolds, barns and field walls still in a reasonable state of repair were not included in the record. Field walls may of course have considerable antiquity, but where these were clearly visible on the base maps used they were not recorded. Field boundaries which now survive only as earthen banks were normally mapped. The combination of OS base map and transcription overlay should assist preliminary analysis of these features, by together providing an almost complete cover of all field boundaries.

4.1.1.1 Ridge and Furrow

Although arable fields are not a major component of the current landscape now (except as a phase in the creation of present day 'improved' pasture) a large proportion of the land appears to have come under the plough at some time in the past. The main evidence lies in the form of ridge and furrow and strip lynchets, but smoothing and clearing within other recognised field systems suggest that ploughing may have occurred in many of these also. Clearance cairns are an expected feature of upland areas where prehistoric settlements and field systems have been identified, but in the Dales very few were recorded. The small number of identified clearance cairns may reflect the low visibility of these features on the vertical photographs, but there are other possible explanations. In the area north-east of Ingleton many of the limestone benches were certainly cleared of loose stone, which was probably moved to the foot of the steep dump of eroded material that marks the back of each bench. A process such as this does not leave tangible structures to identify and survey (no record has been created for such evidence, but it may be noted on the Map Note Sheets, eg SD 77 SW).

A total of 2009 SITE records relate to the remains of ridge and furrow. The extent of individual GROUPS interpreted as Medieval field systems is based on the individual interpreter's assessment of the archaeological information available; in some cases Parish boundaries have been used as a basis for splitting up continuous areas of ridge and furrow. 40 per cent of the ridge and furrow records are in GROUPS described as field systems; 36 per cent of the total are described as LINEAR SYSTEMS rather than LINEAR FEATURES. This reflects the often large-scale survival of this type of feature but, because the main photography used was 20 years old, this is not a reliable

indicator of the current survival of individual elements. This is particularly the case for ridge and furrow, as oppose to other types of monuments, since the remains lie principally in open lowland areas which may be subject to later ploughing or land-improvement. The records do, however, provide a good measure of the data available for research purposes; more detailed work could go a long way towards recovering the original field patterns related to existing or deserted settlements.

Only four of these records have been tentatively assigned to the Roman period or earlier and are likely to be the equivalent of 'cord-rig' (Topping 1989). This low figure may reflect the fact that the majority of archaeology was recorded on the basis of rapid interpretation of vertical photographs; increased specialist archaeological photography and more detailed analysis of the existing archives may well lead to the discovery of further areas of cord rig.

No real attempt has been made to put accurate dates on any of the visible ridge and furrow. Where ridge and furrow seems to have been laid out within apparently post-medieval enclosure walls, and/or is very straight and narrow, it has generally been ascribed to the Post-Medieval Period (Taylor 1975, 126 and 143). Other ridge and furrow, with a curving or reverse-S shape or a clear relationship with other medieval features, has generally been described as of Medieval or Unknown Medieval Period. The choice between Medieval and Unknown Medieval appears to have varied according to the individual preference of the interpreter, and this information has therefore been grouped together for the distribution maps. This inconsistency of usage should be noted if more detailed analyses are proposed; it should also be noted that the Unknown Medieval Period band includes the Post-Medieval period (see the period summaries 4.3.9 & 12).

The distribution of ridge and furrow according to Period is shown in Figures 4.1.1a & b). (To aid interpretation see the note in the introduction to Section 4, on distribution maps and extensive archaeological features.) As one would expect almost all the ridge and furrow lies on ground below 1200 ft and the frequency decreases further up into the individual dales. The sparse distribution of apparently medieval ridge and furrow (Figure 4.1.1a) in the upper parts of Wharfedale, Wensleydale and Nidderdale, where the land still seems suitable, may in part be due to recent land use (eg the reservoirs in Nidderdale). Alternatively this may actually be a genuine archaeological feature, perhaps reflecting the medieval forests in the area (see 4.1.4).

Post-Medieval ridge and furrow accounts for 20 per cent of the records and, as Figure 4.1.1b shows, is an important element in the landscape. The sharp regularity, straightness and narrowness of much of the remains suggests steam-ploughing in the 19th or 20th centuries, either for land-improvement or cultivation. It is perhaps worth noting that the distribution of Post-Medieval ridge and furrow suggests a close link with recent settlement patterns and may bear some relationship to the railways of the area.

Further analysis, based on splitting the data according to morphological characteristics, suggests a lower inconsistency between individual photo-interpreters but does little to change the overall picture. Most areas show a mixture of straight and curved (including reverse-S) ridge and furrow, as seen on small scale air

photographs. However, there appears to be a slightly lower relative occurrence of curved ridge and furrow the further one goes up the individual dales and the curvilinear ridge and furrow is almost totally absent from that part of Nidderdale that lies in the project area. The most extensive areas of classic ridge and furrow, of probable medieval date and conforming to the common reverse-S pattern, are to be found on the lower lying ground in the north-east of the project area where Wensleydale opens into the Vale of York, (eg Figure 4.1.1.c) and around Ravensworth and Stanwick. A small but significant concentration is to be found in the well-preserved field systems south of Grassington in mid-Wharfedale.

4.1.1.2 Strip lynchets/cultivation ridges

Closely related to ridge and furrow are the remains of strip lynchets, either in small groups or extensive systems (interpreted here either as 'lynchet field systems' or simply 'lynchets'). The distribution, shown in Figure 4.1.1c, is similar to that for ridge and furrow but rather more restricted, extending less extensively into the upper dales.

Strip lynchets have in the past been variously dated as medieval or earlier, but without firm evidence; the likelihood is that they belong firmly alongside ridge and furrow (Taylor 1975, 88-92). The terraced effect would be a normal product of strip ploughing along the contours of steep slopes, but might equally indicate deliberate terracing to take advantage of such slopes. Not all lynchets in the project area run parallel to the contours. Often strip lynchets are overlain with ridge and furrow with perhaps 2 or 3 ridges lying between the main lynchets; whether this reflects later subdivision or was part of the original plan cannot be assessed in this level of survey. Some of the evidence for this can be seen in that 43 GROUPS specifically link lynchet field systems and ridge and furrow records and a further 82 GROUPS link ridge and furrow with lynchet records. There are a much greater number of cases where the relationship between lynchets and ridge and furrow is less clear and so although the remains may adjoin or overlap they have not been GROUPED together in the MORPH2 record. Figures 4.1.1.2b & c illustrate the close relationship between lynchets and ridge and furrow.

An interesting suggestion has been made by S Moorhouse (pers comm) that the lynchets in the Castle Bolton area (Figure 4.1.1.2b) form part of an irrigation system, potentially necessary because of the free draining limestone.

Some analysis can be done on the dimensions of these strip lynchets, using the 148 sites described as LINEAR SYSTEMS. (The analysis does not differentiate between the Period to which the various sites have been assigned: 2 Iron Age, 8 Early Medieval, 73 Medieval, 64 Unknown Medieval, and 1 Unknown).

Widths between individual lynchets of between 9 m and 50 m have been recorded, with the vast majority lying in the 9-20 m bracket (119 of the 136 for which the dimensions have been adequately recorded); 12 lie in the 21-30 m bracket and only 5 have widths greater than this. The graph of widths (Figure 4.1.1d) suggests a possible grouping around 10 m and 20 m which may have some relevance beyond the obvious preference for multiples of 5 m in the recording process. More detailed

mapping and measurement could investigate this; if there is a direct original relationship with ridge and furrow then one would expect the widths to be the same as nearby ridge and furrow widths on level ground, or multiples thereof.

The application of the PATTERN terms to the lynchets field systems does not vary with the width of the strips (92 of 148 are described as ORDERED), nor does there appear to be any preference in terms of SHAPE (the site descriptions are evenly spread between CURVILINEAR, RECTILINEAR and MIXED).

The lengths (recorded as an average for each block) of the individual lynchets in those lynchet field systems described as LINEAR SYSTEMS vary from as little as 40 m (this is also the system given the lowest width - 9 m) to 600 m, with the majority lying in the 100 m to 300 m band (only 14 out of 106 lie outside this band). The graph of average lengths (Figure 4.1.1d) again shows preferences for rounding by the photo interpreters at 50 m intervals but suggests there may be a real peak at around or just above the 200 m mark, perhaps coinciding with the measurement of one furlong, 220 yards (201 m). There may be minor peaks also around the 150 m and 250 m marks.

The application of the PATTERN terms to the lynchet field systems does not show any clear variation when compared with the recorded average length of the strips, beyond a slightly higher proportion described as RANDOM in the 150 m to 200 m band; 83 of 106 are described as ORDERED. The overall numbers assigned to each SHAPE category (RECTILINEAR, CURVILINEAR, and MIXED) is evenly spread (39, 31, 36) but is biased slightly towards CURVILINEAR in the group given average lengths between 200 and 220 m (5, 11, 8).

The MORPH2 database is worth examining for other features described in morphologically similar terms but not given the interpretation of lynchet field system. There are 47 SITES described as LINEAR SYSTEMS which have a unit length of 100 m or more and a unit breadth of between 9 m and 30 m; 38 of these have been described as Medieval or Unknown Medieval and 1 as Early Medieval. Three have been given interpretations of lynchet, 11 ridge and furrow, 19 field system, 3 simply field boundary and 1 as croft boundary. Obviously it would be worthwhile including re-examination of these SITES alongside any further examination of the sites described as lynchet systems and ridge and furrow. Of this morphological group it is notable that the only other significant group (7 SITES) has been interpreted as field systems of pre-medieval or Unknown date.

A further 400 records relate to lynchet sites that do not fit into the category analyzed above (ie, they are either not described as lynchet field systems and/or not described as LINEAR SYSTEMS). 287 of the 395 LINEAR FEATURES described as lynchets are flagged as probably being part of LINEAR SYSTEMS, but the air photo interpreters did not feel that there was enough continuity for them to be so described; the range of recorded lengths is similar to that for the LINEAR SYSTEMS.

4.1.1.3 Discussion of ridge and furrow and lynchets systems

It may well be worth making further comparisons with ridge and furrow, for example the question of standard lengths. Unfortunately, the breadth of blocks or number of strips cannot be easily compared using the current data, as the method of recording did not include the width of the individual cultivation ridges nor the overall breadth in blocks of strip lynchets.

The ASPECT of the ground on which ridge and furrow and strip lynchets lie appears to be little different from the overall pattern for all recorded sites. Not surprisingly there are few lynchets with the ASPECT recorded as ALL, slopes being a pre-requisite for their existence.

The pattern of ridge and furrow and lynchets needs to be investigated in more detail if we are to understand the medieval land-division in the Dales' area. The overlays used in conjunction with the base maps can provide the basic tools but these then need to be compared with better information on land-ownership, derived from historical sources. Such methods might hope to answer some of the questions pertinent to the medieval archaeology of the Dales' landscape. Where exactly were the forest boundaries? Can the field systems be related to specific periods of encroachment on the forest areas? The importance of the Cistercians in setting up large arable and sheep farms in Yorkshire is well known (Taylor 1975, 99, Raistrick 1976) and therefore relating the recorded field remains to the probable sites of Granges may be informative. Some locations show a clearly organised pattern of field systems over a large area, perhaps indicative of monastic influence. The area of lower Bishopdale and its junction with Waldendale is a particularly fine example, with remains of extensive ridge and furrow field systems displaying a very uniform appearance.

4.1.1.4 Stack Stands

There are 319 sites which have been interpreted as stack stands, all but nine of them described as ENCLOSURES. The distribution (Figure 4.1.1e) of these enclosures shows a marked concentration in Wensleydale, with most of the remainder concentrated to the south of Catterick and around the mouth of Swaledale. Within this overall distribution there are also quite localised concentrations. These small enclosures are generally defined by a ditch and low internal bank, with the occasional hint of a small central mound. There are only six sites which may have deliberate entrances, gaps in the bank or ditch usually being attributed to erosion. The enclosures frequently occur in apparent association with field systems of probable late medieval or post-medieval date. Some are built against the boundaries of these field systems (eg on Floshe Hill, north of Hawes on SD 89 SE) but the majority are free standing. The general acceptance that they belong to this rather broad date range caused the majority to be listed as Unknown Medieval. They are usually in valley bottoms, in good pasture, some of them overlying earlier ridge and furrow. Shape does not seem to be significant, except that almost two-thirds (189) of the total are rectilinear, spread evenly throughout the main distribution (not illustrated). Only the isolated group at the head of Wensleydale and the group west

of Askrigg show a preference for curvilinear shapes. The size range is from 7 m² to 490 m², but most (279) lie between 12 m² and 150 m².

This type of enclosure is quite distinctive in terms of form and location and there is little likelihood that they could be misinterpreted as hut circles or pye kilns (see 4.1.1.5). Very little work has been done on the type but the RCHME (Ramm et al, 1970) have described and discussed 122 which were found in their study area and which they date to the 18th and 19th centuries. These and similar structures (eg turf stands on Bodmin Moor) are, however, known from many areas.

The function of a stack stand is to provide a dry platform, protected from livestock, for the storage of winter fodder. In this their function is similar to that of the field barn, a common feature of the Dales but particularly numerous in Swaledale where there are correspondingly few stack stands recorded. The period of use for both these monument types is probably post-medieval, for the most part, and this complementary distribution may therefore to some degree indicate different approaches to livestock management in Swaledale and Wensleydale at this time. The stone-built barn was designed to house stock and fodder over winter, but while the stack stands presumably stored the fodder where it was needed, there is no sign of any nearby accommodation for stock.

The large number of stack stands recorded by the project, their polyfocal distribution and their relationships with other features make this site type a good candidate for further investigation. Particularly well preserved groups can be found near Semer Water (Figures 4.1.1.4b & 4.3.13h), at Flosches Hill near Hawes, and near Garsdale Head.

4.1.1.5 Rabbit Warrens

The evidence for rabbit farming in the project area comes from sites described either as pillow mounds or warrens, and attributed to medieval or later periods (though few are in fact securely dated). Twenty-six GROUPS of such sites have been recorded but there are a number of other warrens known from maps, place names and other historic sources. In the NAR record the following are recorded: 'The Warren' (SE 18 SE / 75), 'Coney Garth' (SD 76 SE / 4, NY.1326.6 & 7), 'Cony Warren' (SE 05 NE / 45) (see also Moorhouse 1991b), 'Rabbit Hill' (SE 06 SE / 89) and specific 'Rabbit Warrens' (SD 98 NE / 63, SE 09 NW / 202); some of these are supported by evidence on air photos. In some cases the mapped placename is the only reason for the transcription and interpretation, eg a broken-down wall around an old quarry on Grinton Moor described on the map as 'Rabbit Warren' (SE 09 NW / 202, NY.775.20). (Less specific place names have not always been included in the record eg 'Warrendale Knotts', SD 836 644).

Rabbit warrens often take the form of large enclosures intended both to contain the rabbits and protect them from predators. For example the well known rabbit warren around Lady Hill in Wensleydale survives largely intact as a standing wall at least 8 ft high (SD 98 NE / 63; Hartley and Ingilby 1982, 106-8), but because this wall is still in use (though not for rabbits) it has not been recorded on the transcription. In other cases features have been transcribed and interpreted as warrens either because

of place-name evidence or similarity in location and form to other, better authenticated, sites. An enclosure on the slope of Nar Hill beside 'Rabbit Crag' with a small structure attached and two pillow mounds within has tentatively been proposed as a warren, although not recorded as such on the OS First Edition map (NY.1461.18). Similarly, a bank some 280 m long, interpreted in the MORPH2 record solely as a boundary of Unknown Medieval date (NY.871.18.1), lies on a small hill known as 'Buck Bank' (on map SE 18 NE) and may be another contender, as may the large polygonal enclosure near Embsay (NY.1432.38).

Pillow mounds provide more solid evidence for rabbit warrens, sometimes from the evidence of aerial photography alone. In the project area there are 33 such records, describing at least 52 pillow mounds. Pillow mounds are identified by their appearance as a low mound, usually oblong, and often surrounded by a ditch. Supporting evidence from historical sources or place names help to confirm the identification. Low oblong mounds can, however, result from other activities and may easily be confused with pillow mounds. Commonly pillow mounds are named 'Giants Graves', or the like, reflecting their similarity to long barrows. One interesting example near Sedbergh of shooting butts, consisting of three parallel oblong mounds overlying ridge and furrow (CU.18.9.1), could easily be mistaken for pillow mounds.

The majority of pillow mounds recorded by the project have been described as OBLONG MACULAE (31) or LINEAR FEATURES (7); 4 have been described as RECTANGULAR MACULAE, and 10 as RECTANGULAR ENCLOSURES, because of the dominance of the surrounding ditch on the aerial photographs (one of these is perhaps better considered as a 'rabbit type', see below).

Because of the different MORPH2 TYPES used to describe the pillow mounds their size has been recorded in a number of ways, all but 7 are equivalent to the MEDIUM and LARGE MACULA sizes, ie with maximum dimensions in the range 4-50 m, most commonly around 10-20 m. The largest recorded (NY.1103.11), on the south side of Littondale, is not certainly a pillow mound, but the group of five VERY LARGE mounds on Ellerlands, west of Castle Bolton (along with several other mounds in the vicinity) are more certainly identified. The large central mound in the latter group appears rather irregular on the transcription, but in fact comprises five regular rectangular mounds in an interlocking pattern (see Figure 4.1.1.5). There are suggestions that others in this group are not of a single construction; the largest is 100 m in length. At the other extreme, adjacent to three pillow mounds known as the Giants' Graves (SE 95 NW / 9, NY.1346.6.1) are three small round mounds which may be a variation on the normal elongated form. The varying size and shape of the pillow mounds is similar to those studied at Bryn Cysegrfan (Austin 1988, who also uses two of these sites for comparison); at Bryn Cysegrfan there is also a parallel for the single possible L shaped pillow mound in the study area (NY.880.36.1, Austin Type V).

A few of the pillow mounds, 9 in all, appear singly (NY.479.71, 737.16, 880.14, 1103.11, 1263.2, 1454.7, 736.12, 736.13, 736.14), although the last three may be better considered as a part of a single extensive warren west of Castle Bolton (see below). But rather more (16) appear to be in pairs, often of different sizes (NY.778.8, 821.7, 880.36, 1326.6, 1346.7, 1398.4, 1441.12, 1461.18 and an

unnumbered pair near Castle Bolton, see below). Possible groups of three also occur in Bishopdale (NY.479.41), near Rylstone (NY.1336.11), and near Gargrave (NY.1346.6). Close to the latter site are three smaller mounds that may also be related and two further pillow mounds (1346.6) which probably places this site in the final group of more extensive warrens. A site near High Bentham has up to seven near-identical pillow mounds in groups of three and four (NY.1262.2), while another site on Threlsay Hill near West Marton has six pillow mounds in a very regular pattern (NY.1345.15).

The most impressive and extensive remains are those west of Castle Bolton (Figure 4.1.1.5) where, as well as the central group of very large pillow mounds mentioned above (NY.736.19), there are several single pillow mounds in the surrounding area (NY.736.12-14 & 16 and a single mound and a pair of mounds marked on the transcription, but not having MORPH2 records, at SE 0295 9200 & SE 0291 9222). Additionally there are three small square enclosures (NY.18.1-3) amongst the central group of mounds and one close to the northernmost mound. The relationship of these enclosures to the pillow mounds, and their possible function, was not recorded at the time of survey, but it is possible that they are 'rabbit types' (see below). If this is the case, then further investigation should also consider the small square enclosure, described as a possible stack stand, to the east (NY.737.10) and possibly also the three or four larger enclosures to the south which are unexplained (NY.737.5-8, Figure 4.1.1.2b).

An important feature of rabbit farming from the 18th century onwards was the 'rabbit type' or pit-trap, which could either be incorporated within the warren wall or in small enclosures within the warren area (Harris and Spratt 1991). No sites in the project area have been described as 'rabbit types' (either as pit traps or enclosures with pit-traps) but they are well documented for the Lady Hill warren mentioned above and it is likely that some, if not all, of the other 'enclosure' warrens will have also been furnished with 'types'. Several sites in the project area do have small enclosures (generally between 8 m and 12 m square) associated with the pillow mounds, and it is possible that these too are 'rabbit types'. The most likely examples occur in the large warren west of Castle Bolton (described above) but others occur alongside single or paired pillow mounds (NY.1326.7, NY.1441.12.2 described as a pillow mound but may alternatively be a 'type'). Not all of these have been GROUPED with the pillow mounds, probably because they were not originally identified as potential 'types' (none is described as such) or because they were thought to indicate a later addition to the site. The Dales landscape, particularly the sands and gravels of the glacial moraines found in the valley floors, would be well suited to natural warrens and the possibility of small enclosures of unspecified function in these areas also being 'rabbit types' should be considered.

The dating of most of these warrens, and the pillow mounds in particular, is uncertain; most have been assigned an Unknown Medieval date. The walled enclosures are perhaps more likely to be post-medieval in date, but it is likely that some pillow mounds may be of medieval origin (Austin 1988). In very generalised terms all the warrens in the project area can be described as lying on marginal ground, but it would be worth investigating their environs more closely to try to understand the context, and possibly the period, in which they were constructed. At Norton Tower the pillow mounds (SD 95 NE / 14, NY.1336.11) are closely

associated with the deer hunting enclosure (SD 95 NE / 7) (Moorhouse 1991c); a deer hunting enclosure is also a part of the landscape west of Castle Bolton. Another type of association, with monastic granges, might be suggested as at least one site, north of Gargrave, (NY.1346.6 & 7) lies adjacent to a grange (SD 95 NW / 9).

4.1.1.6 Coaxial field systems

Several coaxial field systems (English Heritage, 1988) were previously known in the project area, in particular those in Wharfedale, north of Grassington, and those in Swaledale. The latter group has been studied in some detail as part of the Swaledale Ancient Land Boundaries Project (Fleming and Laurie 1991). The Dales project has now mapped and individually described at least 35 coaxial field systems. The specific interpretation of 'coaxial field system' was not used by members of the project team, and this class of monument has therefore been extracted by use of the morphological description in the database (a useful example of the database's capacity to reveal site types not specifically recognized during the transcription process). In some cases groups of two or more of the MORPH2 records have been reassessed and are considered as single systems for the purpose of this report (eg NY.1049.1.1 & 2 and NY.1049.22.1). The sites discussed here have mostly been described as LINEAR SYSTEMS in the MORPH2 database. Other more fragmentary coaxial systems may have been described as LINEAR FEATURES; apart from identifying a list of a further 40 records which conform to a basic set of descriptive criteria, comprehensive analysis of the database and maps for such sites has not been attempted.

This extensive data set, of thirty-five or more separate coaxial field systems, can provide an important body of comparative data from which to start any analysis.

Table 4.1.1.6 Coaxial field systems

NGR	MORPH number	Period	UNIT LENGTH	UNIT BREADTH	ASPECT	Terminal boundary (n = natural)	Transverse walls (n = natural)	Key to Fig 4.1.1.6b
NZ 081 006	NY.658.6.1	UP	-	100	E	*UPPER/LOWER	YES	
SD 834 663	NY.1238.9.1	IA	300	50	NW	nLOWER	YES	
SD 896 636	NY.1146.6.1	UP	400	30	E		NO	
SD 823 644	NY.1237.13.1	UP	-	60	W	nUPPER	YES	
SD 883 752	NY.1049.2.1	U	-	38	NE	UPPER?	YES	
SD 880 759	NY.1049.22.1	U	-	40	NE		YES	
SD 878 758	NY.1049.1.2	UP	-	50	NE		NO	
SD 882 750	NY.1049.1.1	UP	-	75	NE	LOWER	NO	
SD 993 677	NY.1121.16.2	IA	115	30	SW	LOWER?	YES	4
SD 957 679	NY.1116.9.1	UP	320	50	S		NO	
SD 985 697	NY.1123.55.1	UP	-	50	SW	nLOWER/UPPER	YESn	2
SD 992 689	NY.1123.21.1	UP	-	90	SW	UPPER	NO	3

SD 949 681	NY.1118.50.1	UP	-	30	SE		NO	
SD 949 674	NY.1118.26.1	UP	-	60	NE	UPPER	YES	
SD 986 628	NY.1042.1.1	UM	-	30	E	UPPER	YES	
SD 910 643	NY.1142.9.1	UP	350	110	S		NO	
SD 902 639	NY.1142.23.1	UP	130	40	SW	UPPER	YES	
SD 979 716	NY.999.1.1	U	90	60	W	nLOWER	YESn	1
SD 929 726	NY.1096.1.1	U	80	40	SW		YESn	
SD 997 868	NY.480.72.1	UP	-	30	SE		YES	
SD 992 867	NY.480.73.1	UP	180	35	SE		YES	
SE 001 670	NY.955.1.1	UP	-	40	SW		NO	5
SE 004 653	NY.955.2.1	UP	80	40	SW	nLOWER	YES	6
SE 098 729	NY.962.9.1	UM	-	40	NE	UPPER/LOWER?	YES	
SE 002 873	NY.480.81.1	U	150	30	SE		YES	
SE 027 867	NY.935.6.1	UP	400	50	NW	nUPPER	NO	
SE 031 870	NY.935.6.2	UP	-	70	NW	nUPPER	NO	
SE 008 987	NY.674.8.1	U	350	50	S		NO	
SE 044 971	NY.778.68.1	UP	-	110	NE		NO	
SE 038 976	NY.778.68.2	UP	-	120	NE		NO	
SE 007 912	NY.738.6.1	UP	600	50	SE		YES	
SE 004 906	NY.738.18.1	UP	65	50	SE		YES	
SE 123 664	NY.1519.22.1	U	-	35	S	nLOWER	YES	
* Terminal boundaries for NY.658.6.1 were identified only by field survey; also two records below, from the LINEAR FEATURES table, of parts of the Healugh/Reeth system identified by the Swaledale Ancient Land Boundaries Project (Fleming 1990)								
SE 018 998	NY.611.1.2	UP			SE		NO	
SE 019 998	NY.611.7.1	UP			SE		NO	

As an introduction to the potential value of this resource a few general observations will help to establish the local context of coaxial field systems and then several of the systems in Wharfedale will be described and discussed in a little more detail.

Distribution and survival

The distribution of the coaxial systems (Figure 4.1.1.6a) shows an apparent absence in the north-west of the project area, much of which is high peat moorland, and in the lowlands, including the valley floors. None is recorded above the 1300 foot contour. Essentially the surviving distribution coincides with marginal land, most of it unimproved pasture or moorland, but this distribution covers a wide range of soil types (see below). The prevailing winds are westerly, and the resultant lower average rainfall on the east side of the Pennines, may have been a factor in the

distribution of these systems. Slightly better protection from wind and rain at a local level is perhaps the reason why more than half of the systems (19) are sited in locations with aspects recorded as lying between north and south-east.

In many cases, the lower parts of the systems appear to have been destroyed or obscured by later agricultural development, primarily medieval cultivation. Robbing of material for dry-stone wall-building, during phases of late medieval and post-medieval enclosure, must have been responsible for an unquantifiable amount of damage.

In broad terms the project area is dominated by limestone, which in the north is capped by sandstones (see 3.2.1). The distribution of the coaxial systems, with about half the sites in and around Wharfedale, shows a slight bias towards the limestone but the smaller group in Swaledale lies on the wetter moorlands offered by the sandstones. Currently the Wharfedale systems are on rich but shallow loamy soils which offer excellent grazing on moorland and herb-rich grassland, while the Swaledale systems are on peat covered acid loams which, unless improved by liming and manuring, provide very poor grazing. Fleming has identified cleared areas and groups of clearance cairns on acid soils in Swaledale, which he suggests indicate that prehistoric soils in these locations were suitable for cultivation; the acid soils and associated peat cover being a later development. Other systems, in Wensleydale and Nidderdale, are on a variety of different soils which includes those above, but the lower-lying sites are on deep, well drained loams which are good for both cereals and livestock. All that can be concluded, variations in the soil profile over time accepted, is that these systems could have supported a mixed economy but that different local emphases might have been placed on cereal or livestock production.

Transverse walls and terminal boundaries

Only rarely is there evidence for built terminal boundaries in the transcribed examples, though Fleming and Laurie have identified several examples during field survey (see Table 4.1.1.6). At least eight of the coaxial systems may have utilised natural features as terminal boundaries (see Table 4.1.1.6). Seventeen of the systems employ transverse divisions between the axial boundaries, while in three instances the system runs across a series of limestone terraces and scars, the scars perhaps being consciously utilised as transverse dividers (eg NY.999.1.1). The remaining ten systems give no indication of either transverse walling or of terminal boundaries. It is possible that some of these coaxial systems, particularly those nearer the valley bottoms, may have incorporated timber fence lines as transverse divisions, but there is no surviving evidence for this; for those systems on the moorland it seems likely that the divisions never existed in any form.

Size

Full dimensions cannot be established for any of the systems because of the lack of clear terminal boundaries, though Fleming's Marrick Moor system is as much as 3 km in length. It is possible, however, to measure the relative distances between adjacent axial boundaries, and a comparison of system averages shows a range from

30-150 m, with all but a few lying in the 30-60 m band. Internally, the axial widths of a system can be fairly constant or can vary quite widely. Sometimes the larger widths appear to reflect multiples of the narrower ones, as at Halton Gill in Littondale, where the approximate axial widths include spacings of about 15 m, 30 m and 60 m.

Coaxial field systems in Wharfedale : a closer view

On the east side of Wharfedale, between Grassington and Kettlewell is one of the best preserved prehistoric and historic landscapes in the project area (Figure 4.1.1.6b). The archaeological palimpsest is difficult to untangle and requires more detailed assessment than is possible here. In this area there are at least six, possibly more, coaxial field systems, each with its own distinctive blend of features. Each system will be examined separately, in an attempt to highlight differences and to identify significant relationships between the systems themselves and with some of the other monument types in the landscape.

Beginning above Kettlewell and running south along Scar Top for about 1.2 km are the remains of the northernmost system (Figure 4.1.1.6b - 1, NY.999.1.1). The axial boundaries cross several limestone benches and scars, between the 1050 foot and the 1250 foot contours, rising about 200 ft over a distance of about 350 m. The series of scars is largely responsible for the fragmentary appearance of the system. It is possible that the axial boundaries were continued up the face of the less vertical scars but no evidence was seen to support this. There is no evidence for built transverse walls; the almost sheer scars may have fulfilled this function. The spacings of the axial boundaries is about 50 m; the longest axial boundary is 325 m and the maximum visible length of the system is little more than this, falling short of 400 m. The northern end of the system appears to run out at c1100 ft, on the flat top of the promontory above Kettlewell, while the southern part may have continued up the slope to terminate at the face of a slight scar just below the 1300 foot contour. In general most of the axial boundaries become lost where the slope begins to level off, just above the 1200 foot contour. There is no sign on the aerial photographs of continuation onto the gently sloping and extensive limestone grassland above the 1300 ft contour. The system itself covers the steepest and agriculturally least attractive part of the valley side, though this may be a factor of survival rather than original intent. Scattered throughout this system are numerous small enclosures, many of hut circle size, occurring singly and in small groups. One such group is described as a nucleated (actually linear) settlement with fragmentary fields, ascribed by comparison with other local sites to the Iron Age/Romano-British period (SD 97 SE / 5). There is no excavated evidence for the dating of any of these enclosures and many of them could be medieval shepherd's huts and sheepfolds. Only a few have a physical relationship with the field system and it is these which need to be targeted for field work if the system is to be better understood. At the southern limit of the system, where the settlement and many of the small enclosures lie, the evidence for the system itself is very limited and its extension this far is by no means certain. In fact the settlement partly fills a gap some 800 m wide between this system and the next to be described.

To the south, above Swineber Scar, a second coaxial field system (Figure 4.1.1.6b - 2, NY.1123.55.1) also runs across several limestone benches and scars (Figure 4.1.1.6c). In this area the benches are wider and the scars less pronounced, the major part of the system rises about 220 ft between the 1025 ft and the 1300 ft contours, over a distance in excess of 400 m. The system is fragmentary but is more extensive than the Scar Top system discussed above, extending along the valley side for more than 1.5 km and with a potential axial length of at least 0.7 km. There is some evidence of transverse walling, the most striking of which follows the top edge of a low scar and runs south to terminate at a banked driveway. The lower ends of several axial boundaries abut this wall, which suggests it formed the lower terminal boundary for part of, or for one phase of, the system. On a slightly higher scar only 30 m distant are the fragmentary traces of a similar transverse wall, crossed by most of the axial boundaries which it encounters. Most of the axial boundaries on the first bench above Swineber Scar, in the lowest part of this system, are slightly offset from those above, though the separating scar has a gentle slope and would have been easy to build across. This break in continuity coincides with the line of the possible terminal boundary just described, reinforcing the concept of a phased development. The spacing of the axial boundaries is more consistent on the lower bench, at 50-60 m, than above the scar, where the spacing ranges from 30-80 m, though the average is still c50 m width. Once again there is no apparent reason why the system should not extend higher, onto the flatter expanse of New Close Allotments, though a transverse wall with a few fragments of axial walling (SD 987 702) may indicate the presence of another system at this higher level. The south side of the system appears to be marked by a driveway (NY.1123.25.1), assigned in the database to the Early Medieval Period; this climbs up the valley side onto New Close Allotments, where it forms a T-junction (SD 993 692) to run north west and south east. The driveway is formed by earth-and-stone banks which at their lower end disappear amid the densely lynched medieval landscape of the valley sides. The lack of evidence for continuation of this driveway through the medieval lynchet system suggests that it is earlier in date. The mid-section of the driveway parallels the axial boundaries of the field system and it is here that the possible terminal boundary abuts the driveway. At the T-junction, the north-west branch is curtailed after a short distance, but aligns with a single bank (NY.1123.57.1); this runs almost at right-angles to the system's axial alignment and may form the top terminal boundary. If so it gives a system length of about 550 m between these boundaries and a maximum length of about 700 m if measured to the top of Swineber Scar. If the driveway is contemporary with at least one phase of the system, the fact that it is enclosed by banks on both sides suggests that the system continued along the valley side, to the south of the driveway. Only one right-angled bank, however, springs from that side of the driveway, from a point slightly off-set from the line of the possible terminal boundary abutting the driveway on the north side. The continuation of the enclosed driveway well below the apparent lower limit of the system also indicates enclosure of the lower slopes. There is ample evidence for this, above the lynched zone but no way of linking the boundaries here with the higher coaxial system other than by referring back to the driveway, which might alternatively be later than all these features.

A third coaxial field system (Figure 4.1.1.6b - 3, NY.1123.21.1), further south again, has a direct physical relationship with both the previous system and with the driveway described above. It lies mainly on the gently sloping grassland at the

south end of New Close Allotments. The axis runs north-east from a band of limestone pavement above Hill Castles Scar, though this lower end has been all but destroyed by an unusually high (altitude) ridge and furrow system. Consequently there is no evidence for a lower terminal boundary. The driveway apparently associated with the previous system zigzags diagonally across the two northernmost fields but, for 150 m before its T junction, appears to utilise one of this system's axial boundaries. Further, the right-hand branch of the driveway, running south-east, is almost at right-angles to the main axis of the system, probably marking the upper terminal boundary. The driveway is therefore a late feature and, by association (see above), the Swineber Scar system to its north could also post-date the New Close Allotments system, parts of which may still have been in use when the driveway and the Swineber Scar system were laid out. The visible extent of the New Close Allotments system is approximately 650 m by 650 m, but if the axis does run from the T-junction of the driveway to Hill Castle Scar, then its maximum axial length would be closer to 800 m. The axial boundaries are quite straight and the distance between them fairly regular, between 90-100 m. A bank (NY.1123.23.1), running parallel to the main axis and some 160 m to the south-east may mark the limit of the system on this side, but the bank runs beyond the line of the driveway/terminal boundary, which lies at about 1250 ft, up on to New Close Allotments at least as far as the 1400 ft contour. This bank possibly forms a boundary to the area of essentially open pasture on the higher valley sides, access to which would have been gained by way of the driveway. A comparable bank, 1.5 km further south, appears to have a similar function, but this feature, aligned on a Bronze Age barrow, is definitely not associated with the coaxial systems in its vicinity. There are apparently no other features associated with the New Close Allotments system, apart from those already mentioned.

About 1 km further south, above Old Pasture, a fourth coaxial field system (Figure 4.1.1.6b - 4, NY.1121.16.2) stands out from the first three because of its frequent transverse walling and close association with an extensive linear settlement. The system lies mainly on limestone grassland, in parts quite level and in others gently sloping, in no place rising higher than the 1150 ft contour. The settlement, given an unsubstantiated Iron Age date (SD 96 NE / 8), lies perpendicular to the system axis, along the west face of a low scar. Above the settlement is an area of limestone pavement across and beyond which some of the axial boundaries extend. The aerial photographs clearly show that in this case some of the axial boundaries run through the settlement, suggesting that they are not strictly contemporaneous. The frequency of transverse walling, particularly in the southern part of the system, may indicate a long period of currency, during which the system was developed and altered.

Nearby, in the area known as Old Pasture which projects from the valley side above Conistone, there is a profusion of fragmentary banks which suggest the extension of the latter system to cover most of this flat topped hill. In support of this, the longest (750 m) and most complete axial boundary runs in a straight course until about 100 m from its southern end, where it gently curves to the south-west, more in line with the fragments on Old Pasture. None of the other axial boundaries mirrors this change; in fact in the northern part of the system none goes beyond a fragmentary transverse wall which, if projected, would intersect the boundary just after its change of alignment. The transverse wall may be a lower terminal boundary for that part of the system associated with the settlement. In the middle of the southern part of the

system the second most complete axial boundary appears to be aligned on a large barrow, dated by excavation to the Early Bronze Age with Iron Age intrusions (SD 96 NE / 11). The barrow position is at the same altitude as the point of change in the boundary discussed above and a bank does extend from the barrow on the new alignment. However this cannot be positively linked to the field system since it directly continues the line of a solitary bank which is also aligned on the barrow. The system's dimensions are, for the reasons discussed above, difficult to estimate. The overall axial length, including the fragments on Old Pasture, could have been as much as 1.3 km, but if measured from the topmost extent to the possible terminal boundary below the settlement the length would be reduced to around 750 m; the phase associated with the occupation of the settlement may only have extended from the settlement to that terminal boundary, in which case the length would be only 400 m. The width is no less difficult to define, although the northern limit is clearly marked by Conistone Dib, a steep-sided dry valley that runs up the main valley side from Conistone. To the south, this system is contiguous with another (Figure 4.1.1.6b - 5), on the same axial alignment, which differs only in its lack of transverse walling. Measured to the point where the transverse walling stops, the width of the fourth system would be about 1 km. The spacing of the axial boundaries is commonly about 30 m, within a range of 25-40 m, the larger spacings becoming dominant at the southern end where the adjacent system has an average field width of 40 m. In two places, near the centre of the system, are lengths of parallel banks which could be axial droveways of about 5-10 m width, though this interpretation is uncertain.

As already noted above, the fifth coaxial system (Figure 4.1.1.6b - 5, NY.955.1.1) is almost inseparable from the system just described. In this instance the system covers moderately sloping grassland, and is not traceable above 1200 ft, after which the terrain levels out on to the higher Back Pasture, also good grassland. At its lower end, the system is again untraceable below 950 ft, where the slope levels out at the head of a long shallow trough of excellent pasture which runs south to Grassington. At neither end of this system did the survey record a terminal boundary, man-made or natural, or any extensive activity such as medieval cultivation that might have destroyed its limits. There also appears to be an almost total absence of transverse walling. The known limits of the system give a length of between 700 m and 800 m. The width as indicated by the grid references in the MORPH2 database is nearly 1.5 km, but this is pushing the southern extent too far into the next and final coaxial system in the sequence. The true width may be as little as 650 m, but at its southern end the system becomes less coherent, possibly continuing as a narrow band of axial boundaries, only one longer than 150 m, and several with small enclosures attached, which would give a system width of 1 km. The spacing of the axial boundaries varies between 25-50 m, 40 m being a reasonable average.

The sixth and most southerly of the coaxial systems, covering an area of grassland known as Sweet Side, north of Grassington (4.1.1.6b - 6, NY.955.2.1), is also the most complex system. The area covered by the field system has been described in some detail elsewhere (SD 96 NE / 14) and a large-scale analytical survey (Ordnance Survey in collaboration with Dr A Raistrick) is available, so only the most salient points need be made here.

This system is, at first sight, very different in appearance from those described above, with droveways running across the main axis and transverse walling dividing the system into a profusion of small fields. In this it typifies the Romano-British adaptation of a pre-existing coaxial system, according to the English Heritage single monument class description for Coaxial Field Systems (Romano-British). Arguably, the field system as a whole is only coaxial by default, though around its periphery can be seen uncorrupted elements of the earlier, and intentionally coaxial, system. It is also likely that an unquantifiable percentage of the system was further adapted and reused in the early to mid medieval period, some of it related to the early site of Grassington, situated at the south side of the field system. Throughout the system there are several, mainly curvilinear enclosures, some of which may be individual farmsteads. There are two, possibly three, droveways apparently associated with the system, mainly running across the axial alignment, though at its north end the droveway which runs up Lea Green from Grassington turns almost ninety degrees to parallel the axial boundaries. The axial boundaries of the primary system can be traced almost as high as the 1200 ft contour, with no trace of an upper terminal boundary. At their lower end it seems probable that the axial boundaries actually terminate against the small but well defined scar above which sits Lea Green. In support of this, there is no direct continuation of the axial boundaries across Lea Green. Though field banks on the same alignment do run out from either side of the Lea Green droveway, their spacing is vastly greater than that of the primary system's axial boundaries and they are certain to be a later, possibly medieval feature. The surviving length of the primary system, measured from the natural lower terminal boundary, is in excess of 800 m, its width probably exceeding 1 km. The spacing of the axial boundaries covers a range from 30-60 m, a spacing of 35-40 m being the most common.

Discussion

Each of the six coaxial field systems described above has unique features, though they share many features in common. It is possible that they were all contemporary but even at this basic level of research there are indications that this is not necessarily the case. The currency of coaxial systems nationally is considered to be more than 1600 years, with the major construction phase in the late second millennium BC (English Heritage, 1988). However, Fleming has C14 dates associated with one of the banks on Calverside, in Swaledale, which suggest a construction phase in the second half of the first millennium BC (Fleming 1986). There is scant evidence to date the Wharfedale coaxial systems but it is possible that some were abandoned or in decline while others continued to be built, maintained and utilised for several centuries longer. The system above Old Pasture (Figure 4.1.1.6b - 4, NY.1121.16.2) may have been laid out with reference to a barrow, built in the Early Bronze Age and still prominent when reused in the Iron Age. The Sweet Side system (Figure 4.1.1.6b - 6, NY.955.2.1) immediately north of Grassington, is widely accepted as Romano-British, but is largely the product of the continued use and adaptation of an earlier coaxial system, which must therefore attest a probable terminus ante of late Iron Age, in keeping with Fleming's Swaledale dates.

Carefully targeted field work in Wharfedale could probably produce at least a floating chronology for the systems described above and for some of their physically

related features; it might even reveal a few 'anchor' dates for related settlement sites (eg NY.1121.16.1) to narrow down the phases of construction and abandonment for the field systems. Further, more precise, analysis of the structure within each system, where the spacing of the axial boundaries is variable but usually within a fairly narrow range, might also be profitable. Perhaps blocks of like-sized strips could be identified within individual systems; if so they could be indicative of a system's development over several years or perhaps generations.

The question of how these systems were laid out also needs consideration. Was a centre line established, and other boundaries paced out from it at regular intervals, or were boundaries simply added roughly parallel to pre-existing boundaries? The axial boundary aligned on the barrow in the system above Old Pasture may well have been the starting point for the definition of that system. Different field widths might be used each time a system was expanded by a different generation. An apparent rule in their laying out appears to be that the axis should run perpendicular to the contour, as straight as the terrain would allow; but this was not always the case, as the Marrick Moor system (NY.658.6.1) in Swaledale shows. Elsewhere in the country a similar relationship has been noted (Fleming 1988, 63).

Exactly how these coaxial field systems functioned is still not clear. If their use was mainly for arable cultivation, there would presumably be a tendency for lynchets to form at the lower ends of these elongated fields, so often located on sloping ground? Hand cultivation might not cause lynchet formation but many of the fields seem too extensive for this to have been a realistic usage. The lower dale sides would have offered better conditions for cultivation, but because of the intensity of medieval cultivation we have little knowledge of how that zone was utilised in prehistory. The likelihood is that cereals and other crops were grown on the lower dale side, since the soils enclosed by the coaxial systems are not now those best suited to the cultivation of crops; however, the problem of soil profiles changing over time needs also to be considered. Whether or not the coaxial systems originally extended into the lower zones of the dale is not known, but several of the sites discussed above show evidence of lower terminal boundaries, higher even than the upper limits of medieval cultivation, apparently restricting these systems to the lower marginal land, best suited to use as grazing. If they were used primarily for livestock why did they not reach higher still to enclose the often equally good grazing above 1300 ft? The droveways, if contemporary, imply that the higher grass and moorland were utilised as grazing, presumably on a seasonal basis and in common. The enclosed fields, on the lower slopes and presumably adjacent to the settlements, could have provided winter pasture and secure lambing and calving areas. Despite the good quality of much of the grassland enclosed by the Dales systems, their winter carrying capacity may have been relatively low and the generally large field size might be a reflection of this. To compensate, a system of winter rotation could have reduced the pressure on each field, and some fields might even have been cut to provide hay for winter fodder.

The implications of these extensive, apparently well-organised systems for the social structure of the time also needs considering. For this, the related settlements need to be identified, along with other potentially contemporary field systems and boundaries.

4.1.2 Defence

A notable feature of the project database is the very small total number of records relating to defence. This is particularly striking for the Roman and earlier periods, though the small number of defensive sites may in part be due to the use of the broad interpretation 'enclosure' for sites which, though not strictly defensive, were certainly defensible (see 4.1.3 'Askriggs').

Table 4.1.2a Defence - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ANNEX *			1	1								2
ANTI-AIRCRAFT BATTERY									3			3
ARROW(MILITARY EARTHWORK) *									2			2
BAILEY							5					5
BEACON								3				3
CASTLE							4					4
CIVIL WAR BATTERY *								1				1
DYKE						4				7	9	20
FORT				3	1							4
GUARD HOUSE *								1				1
HILLFORT			5		1							6
MARCHING CAMP				1								1
MILITARY EARTHWORK *									11			11
MOTTE							5					5
OPPIDUM			1									1
PELE TOWER							1					1
PRACTICE CAMP									1			1
RIFLE BUTTS									1			1
SEARCHLIGHT BATTERY									9			9
SLIT TRENCH									2			2
WORLD WAR 2 DEFENCES *									5			5
Class Totals	0	0	7	5	2	4	15	5	34	7	9	88

Table 4.1.2b Defence - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ANTI-AIRCRAFT BATTERY									1			1
MILITARY EARTHWORK *									1			1

MILITARY TRAINING AREA *									1			1
MOTTE AND BAILEY							1					1
SEARCHLIGHT BATTERY									3			3
SIGNAL STATION				1								1
Class Totals	0	0	0	1	0	0	1	0	6	0	0	8

4.1.2.1 Dykes - frontier works

Substantial dykes are an important feature in the north-eastern part of the study area. Most notable are the major structures near Reeth, in Swaledale, (Figures 4.3.13b & c) which cut right across the valley (NY.778.3.1-3), along with adjacent features that follow the contours on the high moorland (NY.778.67.1 & 2) and, in part, defend a hilltop (NY.775.31.1 & 2). Further to the east, is Scots Dyke (NY.664.30.1-10), running for more than 10 km from near Richmond on the Swale to a point close to the massive Stanwick earthworks. None of these features is securely dated, though late pre-Roman and Dark Age attributions have been suggested. The relative date of some of the earthworks around Reeth can be assessed from the relationships with well-preserved field systems in the area (see NY.778.3.1 & 2, south of the Swale, Figures 4.3.13b & c), tentatively attributed to the Iron Age or Roman periods (Fleming 1992). Whether any of these structures were strictly defensive is also questionable, though the major dyke on High Harker Hill (NY.775.3.2), along with steep cliffs to the north, could certainly have protected the high plateau from attack from the east.

The only major dyke outside of this north-eastern area is the massive earthwork of Tor Dyke (NY.970.1.1), which would effectively control access into Coverdale from Wharfedale. There are a number of enclosures attached to the rear of this feature, which have previously been interpreted as an Iron Age settlement, but the dating is not secure (NY.970.2).

4.1.2.2 Hillforts

The database lists six sites described as hillforts, five assigned to the Iron Age and one more loosely described as Unknown Prehistoric. The best known is the hillfort on the summit of Ingleborough, 2372 ft above sea level (NY.1065.1, SD 77 SW / 1). The recently published report on air photo survey and field work by RCHME (Bowden et al 1989) has highlighted the exceptional nature of the Ingleborough fort noting that it 'is geographically and typologically isolated', and states that 'the nearest neighbouring hillforts are ... 25 km to the west and ... 40 km to the south'. Indeed, of the other six sites in the project area one is probably too small to warrant the term hillfort (NY.68.3.1, SD 98 NW / 3). Two others (Castlesteads NY.833.1, SD 18 NW / 19; Braithwaite NY.837.23, SE 18 NW / 16), along with a site described simply as a fort of unknown prehistoric date (Maiden Castle NY.778.4, SE 09 NW / 4) have substantial ramparts but are situated on hill slopes, where they seem likely to be primarily domestic in function (see 'Askriggs' 4.1.3).

However, the two other possible hillfort sites require further investigation. Howe Hill, near Downholme in Swaledale (NY.730.23 SE 17 NW / 4), is largely obscured by the effects of medieval agriculture, but might well repay geophysical examination. A large enclosure, on Rough Haw north of Skipton and new to the record (Figure 4.1.2.2b, NY.1335.13.1), is in a dominant position in the landscape, overlooking the River Aire and the valley of the Flasby Beck, an easy route into Grassington and upper Wharfedale. The Rough Haw enclosure needs further ground evaluation to investigate whether it is a hillfort that requires evaluation alongside the Ingleborough hillfort (30 km distant) or a structure of an earlier, or later, date.

4.1.2.3 Roman forts

The three Roman forts in the database (Bainbridge NY.104.64.1, Elslack NY.1430.1.1, and Wensley NY.786.26.1) were all well known before the project started, as was the Roman marching camp at Mastiles Lane (NY.1151.1.1). Other Roman forts might be expected in the area, especially in view of the probable Roman exploitation of the lead resources in the Swaledale and Greenhow Hill areas. An enclosure (NY.661.1.1) bisected by the A66, north of Richmond, was previously listed by the NAR (NZ 10 NE / 10) as a Roman fort, but does not appear likely to be of Roman military origin. Additionally the spacing of known forts suggest there might be a further one yet to be discovered in Wharfedale between Kettlewell and Grassington.

The pattern of the Roman roads that served the known forts is well preserved in some areas, eg south and west of Bainbridge, and is of some interest. The mapping from this project has done much to sort out the probable routes of the Roman road over Stake Allotments (NY.498.2.1 and comments on the SD 98 SW Map Note Sheet). However, the Roman roads connecting Bainbridge to surrounding forts remain untraced for large parts of their routes and might prove a fruitful topic for research. Only one site in the database was interpreted as a signal station (NY.716.14.1) but others, not yet recognised, may have existed along the known routes through the main dales, or to provide a link with the Stainmore Pass system.

4.1.2.4 Medieval Fortifications

The motte and baileys, and castles of the area are all well known, although additionally a rather doubtful site (NY.1212.19) south-west of Ingleton needs further examination as a possible motte and bailey.

4.1.2.5 Civil war and Napoleonic sites

Three beacons, two on Great Shunner Fell (NY.363.1.1, SE 89 NW / 74; NY.363.2.1, SE 89 NW / 47) and one on Pen Hill (NY.844.1.1, SE 08 NE / 1) and a Napoleonic Guard House (NY.1447.9.1, SE 05 SE / 2) were recorded in the air photo survey, but place name evidence, recorded in the enhanced NAR database, suggests the existence of others. It is possible that other earthworks, mapped during the

project in remote locations, and of broadly similar form to the known beacons may have served a similar function (eg NY.522.1.3, SD 88 SE / 2).

4.1.2.6 First and Second World War sites

Several of the records in this class describe military remains from the Second World War, types of monument not previously recorded by the NAR. The most numerous are a number of searchlight batteries (eg NY.1421.5, Figure 4.1.2.6) in the south-east corner of the project area, probably part of a decoy system designed to lure enemy aircraft away from the industrial conurbation around Leeds and Bradford. The interpretation of these sites was new to the project team and the correct terminology was not always easy to establish, hence sites such as NY.1533.20.8, interpreted as an anti-aircraft battery, may in practice be another searchlight position rather than a gun emplacement.

Bomb craters are not classed under defence in the Thesaurus (RCHME & EH 1992) (see Unclassified, 4.1.11) but several were recorded in an area of military activity north of the A59 where it crosses Blubberhouses Moor. One tightly grouped cluster of craters (NY.1462.2.1) was seen in a hollow close to a track and probably represents the safe disposal of unexploded munitions.

Army camps and training grounds are still an important part of the landscape (see 3.2.4) and some redundant features, such as slit trenches (e.g NY.805.8, to the top of Figure 4.1.1.1c) and rifle butts, were recorded during the project (see 4.1.7). One abandoned camp, at Breary Banks, is discussed below (see 4.1.3); since this project was completed aerial survey has identified a previously unknown area of slit trenches near the camp.

4.1.3 Domestic

The plentiful settlement evidence for the area is varied in form and extent and covers all periods from the Bronze Age onwards, though few sites are securely dated. It is beyond the scope of this report to provide a full discussion of the domestic archaeology of the Dales, but the project database and maps could act as a starting point for regional or typological analysis. The importance of much of the Dales archaeology is that the domestic settlement evidence is preserved alongside extensive agricultural remains. Whilst the present level of survey does not allow a detailed understanding of the relationships, the morphological structure of the database allows general trends and patterns to be identified for ENCLOSURES and LINEAR SYSTEMS (see below 4.2.1 & 2, and above 4.1.1) in the search for understanding of the developing landscape. Similarly, examples of morphologically similar sites can be extracted and studied as a group (see hut circles, 'Askriggs' and construction camps in the following discussion, and 'Ingletons' in section 4.1.1). Other classes of site, such as medieval settlements and shielings, which deserve further attention, have had to be omitted from the present discussion.

Table 4.1.3a Domestic - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
BAILEY							5					5
CASTLE							4					4
CONSTRUCTION CAMP *									1			1
CRANNOG *					1							1
DESERTED MEDIEVAL SETTLEMENT *										1		1
DESERTED VILLAGE							2					2
FARMHOUSE							1	6		1		8
HILLFORT			5		1							6
HOUSE							1	11		6		18
HUNTING LODGE								1				1
HUT CIRCLE		5	168	24	444						70	711
MOAT							7			3		10
OPPIDUM			1									1
PLATFORM SETTLEMENT					2						2	4
PROMONTORY FORT			1		1							2
SETTLEMENT			12	2	42	1	16			40	22	135
SHIELING							1	3		1		5
TOFT							24			2		26
Class Totals	0	5	187	26	491	1	61	21	1	54	94	941

Table 4.1.3b Domestic - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
CONSTRUCTION CAMP *								1	1			2
DESERTED MEDIEVAL SETTLEMENT *							2			1		3
DESERTED VILLAGE							9			2		11
HOUSE								1				1
PLATFORM SETTLEMENT					1							1
SETTLEMENT			26	11	100	6	16	5		23	15	202
SHIELING							1			11		12
SHRUNKEN VILLAGE							8			4		12
VILLA				1								1
Class Totals	0	0	26	12	101	6	36	7	1	41	15	245

4.1.3.1 Hut circles

A total of 715 structures were mapped and recorded (in 711 records) with the interpretation of 'hut circle'. Although the question of the MORPH2 VALIDITY and source scores is not generally discussed in the interpretative section of the report, it may be useful to consider these items first when looking at hut circles.

The ENCLOSURE table was used to describe 699 of the features interpreted as hut circles. Figure 4.1.3.1c shows the approximate size range, which is discussed further below. Sixty per cent of all the hut circles were recorded solely on the basis of information derived from 'Poor Quality' photographs (SOURCE score 1 on Figure 4.1.3d). In general this means they were seen on vertical photography at a scale of c1:10,000. At this scale the largest are only about 1 mm in diameter, and their walls only 0.1 mm wide. This, along with the natural tendency to see circles on images, means that they lie close to the size limit for accurate identification of archaeological features in the rapid scanning of vertical photography. Additional complications specific to the project area are the presence of other features of similar appearance such as mine-shafts, small limekilns (pyekilns) (see 4.1.5) and natural shakeholes. All are liable to misidentification on the evidence of aerial photographs alone. A nice example is a group of ten hut circles in a newly discovered settlement south of Addleborough (Figure 4.1.3.1e, NY.558.6), added by the OS to recent maps (on aerial photographic evidence) but described as 'Shakeholes'. Only 19 SITES (2.7%) in 4 GROUPS are recorded as being supported by evidence from excavation, all in a limited area of Craven (NY.1145.2 - dated as Unknown Prehistoric, the Middle House site NY.1160.9 - Iron Age, 1205.8 - Iron Age & 1233.1 - Roman).

The database shows that 67 per cent of the database hut circles have been identified with a VALIDITY score of 3 or 4, ie with reasonable confidence. This is a lower figure than that for all sites (83%) (see 4.1 intro), and is balanced by the higher proportion given a VALIDITY score of 2 (29%); it may be that there has been a tendency to reject more dubious candidates because of the factors described above, a possibility perhaps supported by the low number given a VALIDITY score of 1. What is evident from ground visits to selected sites is that the identification of hut circles from vertical photographs sometimes results in misidentifications, perhaps with a tendency to false omissions rather than false inclusions. When looking at the transcriptions and records for individual settlements or landscapes, the source and VALIDITY scores for each site should be assessed in order to have a better understanding as to whether individual hut circles have been accurately identified, or whether it is likely that an absence of hut circles on the record is a result of these distortions.

Given these caveats the recorded evidence for hut circles nevertheless provides the most complete picture yet available of early settlement. Of the 715 hut circles, 223 (31%) were previously unrecorded, 215 (30%) were part of sites that had been recorded either by the NAR or SMR, while 277 (39%) belonged to sites that had previously been recorded in some form by both the NAR and the SMR. Proportionately, the number of previously unrecorded GROUPS including hut circles is even higher, 137 out of 281 (49%). There is clearly an increased recovery of those

sites which individually have only a small number of related hut circles. Because of the reasons explained above, ground visits to these sites could well greatly increase the total number of hut circles known.

The interpretation hut circle is by far the commonest interpretation used for domestic structures of the Unknown Prehistoric Period (and related periods), but that does not necessarily imply a single type of structure or method of construction, such as the stone-walled round house. The small number of sites (54, 8%) which do not conform to the usual circular/sub-circular plan suggest some variations and the very few excavated examples provide little help. The relative use of timber and stone as construction materials is not readily assessable from the aerial evidence. Ground visits showed some huts to have stone walls surviving to more than 1 m above their original floor levels (eg parts of NY.533.13 and NY.533.14, Figure 4.1.3.1a); at others the stone may merely have been a foundation for a timber structure (eg Figure 4.1.3.1b). The FORM recorded in the database reflects the difficulty of interpretation in that 138 are recorded as being 'foundation-defined' and 531 as 'bank-defined'; though in the latter class 241 are recorded as being visible at least partially as stonework, and a further 65 solely as stonework. Six sites are recorded as being of single ditch form, three are recorded as crop marks, but three others were recorded from vertical photographs as earthworks (NY.782.33.1-3, and therefore could be classed as 'ring-groove huts' of the kind found further to the north. Unfortunately the last group and their associated enclosure have been destroyed by quarrying since the date of the photography. Four sites (all in one GROUP, NY.1238.8, recorded from good quality photography) have a double wall construction, but as this would not readily be visible from vertical air photographs alone we cannot judge whether this is an isolated phenomenon. Similarly entrances have only been recorded at 9 sites, though with the usual predominance of an east or south-east entrance.

Figure 4.1.3.1c shows the size range of the ENCLOSURES described as hut circles. The measurements are almost all based on interpretation of small-scale information and cannot be accurate to more than 1-2 m either way. Measurements will have been taken from 1:10,560 sketch mapping, supplemented by the individuals perception of the accuracy of the sketch plot. The sharp peak at an internal diameter of 8 m may therefore be an artefact of the process; the overall picture of most sites falling fairly evenly across the 3 m to 10 m band is perhaps more reliable.

Using the criteria of the commonest shape and size of recorded hut circles, the ENCLOSURE table of the morphological database provides a list of 1292 sites of which the largest group is the hut circles (670 sites, 52%). A further 311 sites (24%) are described simply as 'enclosures', 233 being dated as Unknown, Unknown Prehistoric or more specific Prehistoric or Roman dates; all of these could be viewed as potential hut circles. The only other interpretations with significant numbers of entries in this group are sheepfolds (101, 8%) and Stack Stands (102, 8%) - see section 4.1.1.

The number of hut circles in each GROUP can give an idea of the type of settlement involved, but speculation should not be taken too far without more accurate data from more detailed survey, especially as regards contemporaneity of the individual huts. 139 of the 715 hut circles (19%) are not GROUPED with any other hut circles. Put another way, of all the GROUPS with hut circles 49% have only a single recorded hut circle, 21% have two, 13% have three and a further 6% have four; only 10%

have more than four hut circles. 61% of all hut circles are in GROUPS of four or less, but a significant proportion are found in larger GROUPS perhaps reflecting more nucleated settlements. Figure 4.1.3.1f recording the distance between hut circle GROUPS and their nearest neighbour, shows that most lie within 1 km of a similar site. The larger GROUPS, however, tend to be more widely spaced. More sophisticated spatial modelling using site classification and perhaps restricted to the areas of the best preservation, could well provide pointers to the social structure and methods of land use in the Roman and pre-Roman periods.

Other records may describe buildings of the prehistoric period. 136 sites have been described simply as 'buildings' (85 are assigned to the Iron Age, Roman or Unknown Prehistoric Periods, and 51 Unknown). The majority of these have a rectilinear shape (83, 61%), usually taken to indicate a Roman or later date. The general distribution of hut circles (Figure 4.1.3.1g) shows a bias to marginal land, though this may reflect the difficulty of recovering evidence for such sites in the good pasture land of the valley sides and floor. Small platforms, scooped into the hillside, have been identified in Swaledale within the intake land (including some recorded by this project), and more recently in Wharfedale (Laurie and Fleming 1990, Cardwell et al 1991). These have been suggested as probable hut sites. Only one has so far been excavated, near Healaugh in Swaledale (Laurie and Fleming 1990), revealing a Roman-period oval house built over an Iron Age round house. Such sites are difficult to identify from non-specialist aerial photography; they could have served a number of uses, but it seems likely that some of the smaller were individual house platforms while some of the larger may have accommodated small groups of houses and are described as 'platform settlements' in the database. Barn platforms are also a feature of the area and some barns within sloping fields may well have been built on pre-existing platforms, effectively masking their true origins.

4.1.3.2 'Askriggs'

Several enclosures, which appeared to be defensive in construction, were noted in the course of the project. These enclosures were sited in elevated or slightly elevated locations, commonly on valley sides. One, in a commanding position overlooking Askrigg, was new to the record (Figure 4.1.3.2b, NY.259.1.1) and provided the starting point for analysis.

Table 4.1.3.2 'Askriggs' - select list.

Key to Figures 4.1.3.2a-c	MORPH number	NAR number	Name	Interpretation	Period	SHAPE	Size (m2)
1	NY.716.14.1	NZ11SE/6		Enclosure	U	RECTANGULAR	3000
2	NY.1070.16.1			Enclosure	U	OVAL	7065
3	NY.1070.18.1	SD77SW/3	Jarlsber Camp	Settlement	IA	CURVI/ASYMMETRIC	4710
4	NY.1331.1.1	SD85NE/6		Enclosure	UP	SUB-CIRCULAR	2374
5	NY.1332.22.1	SD85NE/7	Steeling Hill	Enclosure	UP	RECTANGULAR	4800
6	NY.1340.8.1	SD85SE/2		Enclosure	UP	CURVI/ASYMMETRIC	7771

7	NY.1221.11.1			Enclosure	UP	POLYGONAL	15000
8	NY.1418.2.1	SD94NE/1		Enclosure	UP	SUB-CIRCULAR	3846
9	NY.1420.5.1			Enclosure	UP	REGULAR	4945
10	NY.1425.2.1	SD94NE/3		Enclosure	UP	CURVI/ASYMMETRIC	5338
11	NY.259.1.1	SD99SW/72	Askrigg	Enclosure	U	POLYGONAL	5525
12	NY.675.1.1	SE09NW/5	How Hill	Settlement	U	CURVI/ASYMMETRIC	3768
13	NY.778.4.1	SE09NW/4	Maiden Castle	Fort	UP	CURVI/ASYMMETRIC	6594
14	NY.778.94.1	SE09NW/12	Grinton A	Enclosure	UM	POLYGONAL	5600
15	NY.1505.1.1	SE17SE/2		Enclosure	IA	POLYGONAL	4800
16	NY.833.1.1	SE18NW/19	Castle Steads	Hillfort	IA	POLYGONAL	4800
17	NY.837.23.1	SE18NW/16		Hillfort	IA	CURVI/ASYMMETRIC	11225
18	NY.886.1.1			Enclosure	U	RECTANGULAR	12000
19	NY.808.1.1			Enclosure	U	POLYGONAL	9900
20	NY.808.6.1			Enclosure	U	POLYGONAL	4200
21	NY.730.23.1	SE19NW/4	How Hill	Hillfort	IA	CURVI/ASYMMETRIC	17662
22	NY.801.21.1			Enclosure	U	POLYGONAL	6400
23	NY.778.96.1	SE09NW/12	Grinton B	Enclosure	U	RECTANGULAR	2500

To test whether these enclosures formed part of an identifiable class, a search of the database was carried out using size (calculated area) as the primary characteristic but with the filter set to exclude all Post-Medieval sites and a small list of strictly agricultural interpretations. The size band (3000 m² - 9000 m²) was initially set to provide a generous bracket around the size of the Askrigg enclosure (NY.259.1.1), but was later expanded to include all enclosures above the lower limit. The search produced a list of over 130 enclosures, reduced by a subsequent manual check to 23, removing among others, a few large hillforts and promontory forts and a handful of Roman forts and camps (see 4.1.2.2 & 3). Other enclosures were eliminated because their location and slight construction made them unlikely candidates as other than livestock enclosures.

Of the 23 selected enclosures (Figures 4.1.3.2a - c, Table 4.1.3.2), 16 were of bank and ditch construction (7 of these having inner and outer banks), the remainder, with one banked exception, were simply ditched. The ditched examples all lay in areas where agricultural damage (from ploughing) was likely to have been high, and banks therefore less likely to survive. Site NY.1070.16.1, near Ingleton was the only double-ditched enclosure in the list. Recovered as a very indistinct grass mark on an Ordnance Survey vertical, the enclosure was of very low VALIDITY, and in all probability non-archaeological. The sizes of the enclosures ranged from between 3000 m² to 17,500 m² with the majority (18) between 3000 m² and 7500 m². Thirteen of those in the narrower band were of bank and ditch construction, 10 of them with areas of between 3000 m² and 6000 m².

There was no trend to either curvilinear or rectilinear in their shapes, but there was a predominance of asymmetry. In the majority of cases this may have been caused by adaption to the site topography. Of the seven with symmetrical shapes one (NY.716.14.1) stood out as a regular round-cornered rectangle. This lay on a low ridge approximately 2.5 km north-west of the Stanwick earthworks, and could conceivably be of Roman military origin. Another site (NY.886.1.1) was rectangular and round-cornered, though much larger than the enclosure near Stanwick. Two of the sides in this case were slightly bowed and there was no visible entrance, making it a less likely product of the Roman military; it could, however, belong to any late prehistoric or medieval period.

In terms of location most of the enclosures were on the valley sides though four of the bank and ditched examples lay on hill-tops. The altitudes of the 23 enclosures were examined. Twenty lay between the 600 ft and the 1000 foot contour, 10 lying in the narrower band between 750 and 900 ft. The remaining three, only one of which involved a combination of ditch and bank, all lay below the 500 ft contour. A more relevant measure may be their relative heights above the valley floor. Twenty lay between 100 and 500 ft above the valley floor, and 13 between 100 and 300 ft. Only three were sited lower than 100 ft above the valley bottom. One was the site near Stanwick, in a landscape more lowland than Pennine in character, the other two stood close to each other opposite the mouth of Arkengarthdale in Swaledale, on slight glacial ridges rising from the valley floor (NY.778.94.1 and NY.675.1.1). The former is one of two adjacent enclosures on the same gravel ridge; its partner (NY.778.96.1) was too small (at 2500m²) to be in the original selection, but its ditch and external bank construction and its potential relationship to NY.778.94.1 justify its inclusion in the list.

The enclosures in this group do not appear to be primarily defensive; in fact in some the ditch is inside the bank which has led in the past to their being labelled as stock enclosures. The siting, often on sloping and overlooked positions, also suggests considerations other than defence. For instance, the enclosure of Castle Steads, previously described as an Iron Age fort (SE 18 NW / 19), is situated at the bottom of a very steep slope, which would largely offset the benefits of its presumed defensive construction. The massive southern ramparts of another, the Maiden Castle fort, (Figure 4.1.2.2a) are similarly overlooked. Possibly, with the exception of the three in valley bottom situations, the siting reflects a land use boundary. There may also be a close tie to the availability of surface water, with many of the enclosures just below the spring line; for a few, however, there is no potential water source apparent on the map base. In all cases, including the valley bottom sites, the enclosures are sited in locations of high visibility, perhaps indicative of concern with prestige and display.

Eight of the enclosures have entrances, all except one visible as simple gaps in the banks and ditches. Enclosure NY.837.23.1 (SE 18 NW / 16), above Braithwaite Hall in Coverdale, appears to have two entrances though probably only that on the down slope side is original. In general the entrance positions vary, with no discernible preference. The entrance to Maiden Castle in Swaledale is approached by a 'stone walled avenue' over 100 m long (SE 09 NW / 4, Figure 4.1.2.2a), which if the site were a crop mark, might result in its being labelled an Iron Age 'banjo' enclosure. A tumulus near the entrance to the avenue may perhaps be related. There are broad

similarities with a site in Micheldever Wood in Hampshire, which is claimed to be a rare earthwork example of a 'banjo' enclosure and which excavated evidence dates to the Iron Age (Fasham 1987).

Few of the enclosures have structures within or attached to their circuits, but two, Maiden Castle and NY.1425.2.1, contain evidence of settlement in the form of hut circles, while the enclosure above Braithwaite Hall surrounds a small but substantially constructed square enclosure which could conceivably be of a different period. On brief ground inspection, the enclosure near Askrigg (NY.259.1.1) was seen to contain slight earthworks which could be building remains. There are traces of a lightly constructed concentric outer bank to the enclosure at How Hill, west of Maiden Castle, running around the base of the hill on the south, and terminating at both ends at the steep natural terrace edge above the river on the north.

Only NY.1505.1.1 has any substantial evidence for an associated field system, albeit fragmentary and with no clear pattern. The enclosure near Askrigg is respected by a lynchet system and shows no obvious sign of internal cultivation, but no closer association, or dissociation, can be made between these features. The dubious enclosure near Ingleton (NY.1070.16.1) has two parallel linear features running away to the south east which may be field boundaries.

In summary therefore, this group of enclosures have a number of features in common. Most are sited near reliable water sources; in the Dales, with its permeable geology, this means away from the main hilltops and higher ground. They appear to have been of substantial construction, though not so strongly built as to be considered specifically defensive. They are in visually prominent locations and lack any clear association with other features, particularly field systems. At least two contain hut circles, which may imply a prehistoric date, but no other dating evidence is available. The general distribution (Figure 4.1.3.2a) shows a preference for the wider, more open dales and Pennine fringes, perhaps indicating a relationship with the rich soils of the valley floors, which they overlook. From this limited evidence, they may tentatively be interpreted as having a permanent domestic function, and probably an Iron Age date.

4.1.3.3 Construction camps

The project area contains a number of railway and water management works of the Victorian era and the early 20th century. Dams, viaducts and tunnels which are still in use today were not recorded by this project, but their builders also left behind traces of their construction works which were included in the transcription. Evidence for the extraction and transportation of materials such as stone for these large projects is well represented (see Transport, 4.1.9), but traces were also recorded in four cases of the enormous human resource involved in such engineering works.

At Scar House reservoir, built in the 1920s and 1930s near the head of Nidderdale, a large linear village of timber and steel framed buildings was constructed to house the work force (Figure 4.1.3.3a). This project recorded the foundations for the ten hostels (NY.946.4.1), which documentary sources tell us each comfortably housed 64 men, a landlady and her family and serving staff. Additionally the site had

several detached and semi-detached houses, and among the services available were a hospital, a shopping centre, a school, a cinema, a library, and a fish and chip shop (Croft 1987; Bowtell 1991). There had been an earlier construction village at the head of Nidderdale to house the workforce for the Angram reservoir, but there was no trace of this on the available photographs. Also recorded, about 8 km to the east of Scar House, was a similar temporary village (NY.1406.9), built to house the construction workers for the Roundhill reservoir.

A single record in the database (NY.890.1.1, interpreted as military earthworks) constitutes token recording of probably the best preserved of the reservoir villages, at Breary Banks near Masham. Begun in 1904, the original village was to the south of the road, its fifty or so buildings catering for the needs of several hundred men who worked on construction of the Leighton reservoir. In 1914 the War Office built a training camp immediately to the north, and this soon expanded by taking over the existing village. For the later half of the Great War the camp housed German officer prisoners of war, before being refurbished and returned to its original purpose, until its final abandonment in the late 1920s (Bowtell 1991). The full plan of this site is still clearly visible from the air (Figure 4.1.3.3b) and recent reconnaissance has revealed additional detail (see 4.1.2).

The construction of the Settle to Carlisle railway in the late 19th century necessitated many impressive engineering feats, the greatest at the head of Ribblesdale. Construction of the Ribblehead viaduct and of the tunnel under Blea Moor, to bring the railway into Dentdale, involved a vast workforce; temporary villages between the moor and the dale head housed over two thousand people. The moorland vegetation now obscures surviving traces of the villages, but building foundations (NY.1134.13.5) were recorded near the viaduct, which are probably the remains of the settlements called Inkerman and Sebastopol (Mitchell 1988). The track beds of construction railways are also visible looping round the site, and a ground visit identified the probable remains of large brick kilns within the settlement area (at the top of Figure 4.3.13g).

4.1.4 Gardens and Parks

Table 4.1.4a Gardens and Parks - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
AVENUE OF TREES								1				1
GARDEN							2	3		1		6
GROTTO								1				1
HA HA								1				1
TREE ENCLOSURE RING								1				1
TREE RING								6		1		7
Class Totals	0	0	0	0	0	0	2	13	0	2	0	17

Table 4.1.4b Gardens and Parks - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
FOLLY								1				1
Class Totals	0	0	0	0	0	0	0	1	0	0	0	1

The importance of the project area's medieval forests, parks and chases is not reflected in the records in this class. This is in part due to the absence as yet of historical research to identify those linear features which relate to such enclosure, and also because the boundaries must often have been defined by reference to natural features (cf 'The Boundary of Burton-in-Lonsdale Chase'; Higham, 1994). The restricted distribution of ridge and furrow may give some indication of the areas involved (see 4.1.1) and it is likely that many of the miscellaneous linear features that have been recorded will also relate to forest boundaries (see 4.1.11).

Only six garden earthworks were recorded, but only one of these at Jervaulx Abbey (NY.880.7.1), was related to a previously existing NAR or SMR record. All were essentially rectangular earthworks of varying degrees of completeness, with sizes up to a maximum dimension of 100 m. As well as these at Jervaulx, four related to substantial houses (Draycott Hall near Reeth, NY.616.34.1; Danby Hall in Wensleydale, NY.873.3.1; Grinton Shooting Lodge, NY.778.93.1; Stanwick Hall, 705.12.1). At Stanwick Hall the remains of the demolished house were also visible. The sixth site is a more lowly affair - a small house and its surrounding garden east of Skipton (NY.1432.40.1).

The most unusual decorative landscape feature recorded lies in a Forestry Commission plantation west of Masham, and is traditionally known as the 'Druids Temple' (NY.1409.1.1-4; SE 17 NE / 6). This folly, built in the AD 1820s as a job creation incentive, is described in the database as consisting of two stone circles, a grotto and standing stones, all under the GROUP interpretation of folly.

Since completion of the project other possible garden features have been identified or suggested from fieldwork (eg Castle Bolton, Moorhouse 1991d), and no doubt there are more to be discovered. More detailed re-examination of some of the sites already in the database is likely to reveal that they also belong in this class (eg a circular feature on the Bolton Abbey estate, NY.1453.7.1).

Table 4.1.5a Industrial - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ADIT								47		5	2	54
AIR SHAFT								3				3
BELL PIT										1		1
BOUSE TEAM								7				7
CHIMNEY								19				19
CLAY PIT								5				5

CLAY PUDDLING PIT								2				2
COAL MINE								11				11
COAL MINING *								2				2
COAL PIT *								127		27		154
CONDENSER *								1				1
CONSTRUCTION CAMP *									1			1
CRUSHING MILL *								6				6
DRESSING FLOOR								1				1
ELLING KILN *										5		5
EXTRACTION *								14	2	13	3	32
FLAGSTONE QUARRY *										1		1
FLUE								14				14
GRAVEL PIT								62	3	7	1	73
HORSE WHIM								11				11
HUSH								28		4	1	33
KILN								2			1	3
KNOCK STONE							1					1
LEAD WORKINGS								19		4		23
LEAD WORKS								8		1		9
LEAT							4	215		63	5	287
LEVEL *								58	1	2	1	62
LIME WORKS								1				1
LIMEKILN								502	3	21		526
LIMESTONE QUARRY							1	602	16	24	1	644
MILL							2	4				6
MILL POND							4	5		6		15
MILL RACE							4	10		17		31
MINING *								21		7		28
MINING (LEAD) *								93		22		115
OPENWORK *								12		3		15
ORE PROCESSING AREA *								3				3
PEAT CUTTING								98	1	40		139
PEAT STORE								5				5
POST MILL							1					1
PROCESSING AREA *								2				2

PROSPECTING TRENCH								51		15		66
PYE KILN *							1	1		13		15
QUARRY						3	1	1184	20	333	37	1578
SAND PIT							1	13		1		15
SANDSTONE QUARRY								264		4		268
SHAFT								153		11		164
SHORT SHAFT *								200		148	8	356
SLATE QUARRY								3				3
SMELT MILL								20				20
SMITHY								1				1
SPOILHEAP								187	19	11	4	221
TAIL RACE							1	1		1		3
WHEEL PIT								3				3
WINDING GEAR *								3				3
WINDMILL										2		2
Class Totals	0	0	0	0	0	3	21	4104	66	812	64	5070

4.1.5 Industrial

The Project area, and in particular the Yorkshire Dales National Park, is not now perceived by the public as an industrial area, but the importance of industry in the past is clearly demonstrated by the high proportion of individual records allocated to this class (28%). Even this figure underestimates the number and scale of individual monuments, and the area of land affected, because of the shorthand methods used in recording industrial landscapes. Although the INDUSTRIAL COMPLEX table is used in the same manner as the morphological tables (see 4.2), the terms used are interpretative and the results are therefore discussed mainly within this thematic section. As well as the tables presented here (Tables 4.1.5a & b) an additional table (4.2.5) provides summary information of the INDUSTRIAL COMPLEXES recorded. Furthermore the extensive use of the MACULA table, which allows multiple similar elements to be recorded within a single record, also obscures the sheer quantity of the industrial remains. In the Industrial Class there are a total of 15,159 maculae recorded in 4449 records (90% of all MACULA entries, see Table 4.2.4). The largest number in a single record is 500, an estimate for the number of coal pits in an area of activity, about 5 km², on and around Preston Moor (NY.779.1.1). (Further details of the industrial component of the MACULA record are discussed in section 4.2.4)

Table 4.1.5b Industrial - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
COAL MINE								4				4
COAL MINING *								32		4		36

CONSTRUCTION CAMP *								1	1			2
CONSTRUCTION WORKS *									2			2
CRUSHING MILL *								3				3
EXTRACTION *								3				3
LEAD WORKINGS								4				4
LEVEL *								1				1
LIME WORKS								3	2			5
LIMESTONE QUARRY								1		1		2
MILL								1				1
MILL POND								1				1
MILLSTONE WORKING SITE										1		1
MINING *								22		1	1	24
MINING (LEAD) *								49		21	1	71
ORE PROCESSING AREA *								1				1
POTTERY WORKS								2				2
QUARRY								7				7
SANDSTONE QUARRY								1				1
SMELT MILL								4				4
TILE WORKS								1	1			2
Class Totals	0	0	0	0	0	0	0	141	6	28	2	177

4.1.5.1 Lead industry

By far the most important and extensive industrial remains in the project area relate to the lead industry (Figures 4.1.5.1a-d). Only a few basic statistics and observations will be presented here, as the lead industry has also been the subject of two studies commissioned by English Heritage (the results of which have not been seen by the present authors). The first evaluated all known lead working remains in the Pennines, including the Dales Project area, but ran concurrently with this project and did not use the project data either from aerial photographs or from the First Edition maps. The second, 'Designated Mining Landscapes in the Yorkshire Dales', was conducted by Michael Gill at the request of English Heritage, using documentary and field-derived evidence supplemented by the Dales project's aerial photographic transcriptions (Gill 1993c). The usefulness of the aerial transcriptions for this type of work can be assessed from Gill's comments that they "proved to be a highly reliable and invaluable source". Previous work on the industrial remains has tended to concentrate on the smelt mills (Clough 1962) and their immediate surroundings, the often impressive 'hushes' or open workings and the documentary evidence of the 18th and 19th centuries. (The works of Gill listed in the bibliography provide a good starting point for any research.)

The presence of extensive lead working remains was taken into account when designing the database for use in the Project; a specific table, INDUSTRIAL COMPLEX, was provided to simplify recording procedures. As well as providing a check-list of the types of evidence visible in each area, this included an overall approximate dimension for each INDUSTRIAL COMPLEX. Additional information describing specific features was often GROUPED with these INDUSTRIAL COMPLEXES. Looking at the INDUSTRIAL COMPLEXES alone the predominance of the lead industry is apparent (Table 4.2.5). A total of 101 records were created of which 75 related directly to the lead industry. The predominance is even more evident when one considers the approximate area covered (assumed to be an oval defined by the length and breadth given). The 101 records describe an area of c74.5 km², of which those relating to the lead industry cover c68.0 km² (91%). Even this is a minimal estimate as areas of mining marked only by spoil-defined shafts, will normally have been described using the MACULA option of the MORPH2 database. Of the 517 MACULA records (5805 maculae) interpreted as shafts or short-shafts, 96 records (3593 maculae, 62%) are specifically related to the lead industry.

Although the aerial photograph mapping treated the industrial remains in a simplistic manner it has done much to emphasise their context and to map out some part of the related water management systems. The records of minor activity, such as trial trenches and test pits along with minor hushes will also be particularly useful because it is often the unsuccessful prospection or small scale extraction which provides the best evidence for early activity, so often destroyed on the more successful veins. One example is the organised system of minor hushes and associated leats and dams on Grinton Moor (NY.775.5.1). This record, centred at SE 030 965, is presumably evidence of prospecting activities which developed into major extraction further to the east and west.

It is noticeable that the dates given for almost all the lead mining is Post-Medieval or Unknown Medieval, despite the fact that lead mining of the Medieval period and Roman period is reasonably well attested. Unfortunately it is not presently possible to assign dates purely on the appearance of the remains. Whilst the large scale later mining - with its deep shafts and associated tramways and or ropeways - can be readily identified, the simpler forms of mining - using hushes, short shafts or bellpits and openworks - can be of any date. Nor should we assume that Medieval and earlier mining would only have exploited surface or near-surface deposits, evidence for deeper mining is known in Roman and Medieval contexts (Hartley 1993). Similarly the processing areas of the 18th and 19th centuries are usually fairly distinctive, but the smaller scale smeltworks likely to remain from earlier periods are more difficult to identify.

Evidence of medieval mining is particularly likely to be present at Greenhow Hill and other areas known to have been under monastic control. An example of medieval lead mining referred to by Tyson (1989, 13), relates to the construction of Marrick Priory from the 12th century onwards. 'Lead for roofing was got from mines established "from time out of minde" at Copperthwaite, Blakey Howe, Redd Hurst, Greenhowse and Ullandes Barfe'. Tyson also reproduces maps (his Figures 2 & 3) of the Hurst and Copperthwaite areas dated AD 1592 and showing extensive lead workings that can be related to the modern maps and to detail on the transcription overlays. Although the detail is not such that reliable comparisons can

be made, it is clear that in broad terms the extent of the mining activities visible in 1592 was not greatly different to that now visible on the aerial photographs.

Roman and earlier mining is also likely to be present wherever the main veins were exposed in the valley sides (eg north of Reeth). Whilst the remains of these earlier extractive activities have probably been largely destroyed or altered during later works it seems likely that at least some of the ancillary works, such as water supply, may in part survive and await identification. The traditional dating of one potential Roman mine, Jackass Level near Greenhow Hill (SE 16 SW / 1), is based on little evidence. If, as seems likely, the mining fields were developed in the first and second centuries AD under military control (Frere 1974, 322), then the presence of one or more further Roman forts, or at least some form of official settlement, might specifically be expected. The currently known Roman forts in the surrounding area (Brough-under-Stainmore, Bowes, Bainbridge, Catterick, Ilkley and Wensley) are all some distance from the main veins, (those north of Reeth, Gunnerside, Kettlewell or Greenhow Hill) where early extraction is most likely to have taken place. There may, therefore, be military or official sites awaiting discovery, perhaps masked by continuing settlement.

Given the scope of the project and the scale of mapping, much of the less obvious evidence will be lacking from the record. For example the small dams, processing areas and wheel pits, horse gins and other related features have not been recorded in any detail. For this ground-based survey is essential, but targeted aerial photography at a suitable scale and in suitable conditions could prove enormously useful as the sorties by R White have shown. However, it is unlikely that the earliest smelting sites, the 'bail hills', will be accurately identified by aerial survey without at least follow-up survey on the ground.

4.1.5.2 Coal

Coal mining, the next most important source of industrial archaeological remains in the project area (Figure 4.1.5.2), has been less studied, though Raistrick (1975, 98-105) provides a useful summary. In the INDUSTRIAL COMPLEX table 10 records relate to coal mining, covering an approximate area of 4.8 km², the most extensive and large-scale remains being those of the Tan Hill coal mines, which alone cover nearly 4 km² (NY.374.1.1). Although the large-scale remains now visible are mainly of 19th and 20th century date, documentary evidence records mining here in the 14th century (Raistrick 1975, 98). Much coal mining was recorded using the MACULA table for areas of coal pits (150 records describing 1991 maculae), most notably the extensive coalfield of Preston Moor, Grinton Moor, Redmire and Bellerby Moors, where approximately 500 coal pits cover an area of about 5 km² (NY.779.1.1). Here, exploitation is attested at least as early as the 16th century, and continued into the 19th century. Other smaller, but significant, areas are to be found, such as those on Threshfield and Linton Moors (NY.1036.2-6,8,12,15 & 16). However, the nature of the coal - thin seams of little commercial value - means that most mining would have been on a small scale to service local needs only, particularly for the firing of lime kilns. Coal workings seen on aerial photographs can usually be differentiated from those of lead, which usually followed linear veins, but are difficult to differentiate from forms of quarrying (eg, for flagstones) which, like coal, tend to occur along

exposures of the geological bedding planes. Extraction, probably of coal, along a bedding plane can be seen near the Garsdale colliery, described in the record as adits (NY.1110.3.3). Coal was also used in the lead industry and the areas of workings often overlap, as in the Preston Moor area mentioned above.

4.1.5.3 Zinc, copper, barytes and other minerals

No records specifically identify mining of other minerals, but there is known to have been some limited mining of copper, zinc (Calamine) and iron ores in at least the Malham area (Raistrick 1967, 147; 1975, 96-8). This would not be easily separated from lead mining evidence during air photo interpretation. Twentieth century reworking of spoil-heaps to extract useful minerals such as fluorspar and barytes, previously treated as waste, is also a major feature of many of the larger lead working areas in Wensleydale, Swaledale and on Grassington Moor (Edwards and Trotter 1954, 80). Features relating to this recent activity have not generally been recorded, but may be mentioned on the Map Note Sheets.

4.1.5.4 Peat cutting

Locally, peat was one of the most important sources of fuel because of its widespread availability (Figures 4.1.5.4 and 3.2.3). The extent to which it was used in the lead industry is attested by the peat stores found at smelt mills such as Old Gang (NY.536.1.5) and Surrender (NY.541.1.6) and by the large areas from which peat has been extracted on Flincher Bottom Moss (NY.542.1.7). Other areas show extensive peat working on areas with traditional turbary rights (eg Pen Hill, NY.929.1). Peat cutting at the head of Mallerstang (NY.142.14-17, NY.1309.3) and near Scar House reservoir (NY.948.3.3-8, Figure 4.1.3.3a) may relate to the construction of, respectively, the railways and dams. The nature of peat cutting often makes it difficult to identify the area and depth of extraction since only the last cutting face is readily identified on the aerial photographs (eg Pen Hill).

4.1.5.5 Charcoal/elling kilns

Wood must also have been an important fuel, though this is difficult to quantify. Areas of managed woodland and deliberately pollarded trees of some antiquity have been identified in some areas (Waltham 1987; Fleming 1994) but only the presence of elling kilns or chop-wood kilns or charcoal platforms can verify this use. As an example of the importance of wood, documentary sources tell us that in one year at the beginning of the 18th century the Grassington mines used 617 loads of chop-wood and 97 loads of local coal for smelting (Raistrick 1967, 117). Only five elling kilns have been recorded in the MORPH2 database, the interpretation in each case being based on previous field work. The smallness of these structures make them difficult to identify on aerial photographs, especially as they often resemble the simpler forms of limekilns; though the absence of an apparently associated quarry workings might be a pointer in such cases.

4.1.5.6 Quarrying

The ready availability of a wide variety of stone suitable for constructional use is evident from the number of records interpreted as quarries (Figure 4.1.5.6a). 2587 records describe at least 3976 individual quarries, the majority simply termed quarry, others more specifically listed as 'Sandstone', 'Slate', 'Flagstone', 'Gravel' 'Clay' or 'Sand Pit', on the basis of OS map information. Limestone quarries account for 25 per cent of the total, and of these 42 per cent are directly associated (GROUPED) with a limekiln (see below). Quarries of all sizes were recorded (see Figure 4.1.5.6b), though the small quarries visible on the aerial photographs alongside the 19th century enclosure walls were not usually included (but see SD 88 SE Map Note Sheet). Large scale stone quarrying continues to be of importance, threatening archaeological sites such as those at Ribbleshead.

Chert beds occur high in the geological strata of the Dales, primarily in Swaledale (Richmond, Crow, Main and Undersett cherts). Some of the brown chert or flinty-chert is of a quality suitable for prehistoric tool manufacture. There is no nearby supply of flint, so the Dales may have been an important source of raw-material for tool-making both locally and in adjacent areas with no local supply of flint or chert. Dales chert is known to have been utilised in the Mesolithic period and, although never of great importance, is known to have travelled some distance (eg to Deepcar in South Yorkshire; Barnes 1982, 33). Chert was also exploited more recently for use in glazes for ceramic sanitary ware (A King, pers comm), and the OS map marks chert quarries as part of the complex of industrial activity on Fremington Edge in Swaledale (NZ 047 001, NY.616.10.1). No records specifically identify chert extraction, though some of the unclassified quarries may relate to such activity.

Similarly, millstone working sites are barely represented in the record due to the difficulty of identifying such sites on the basis of aerial photography, although one possible location has been suggested (NY.1519.16).

4.1.5.7 Limekilns

Limekilns are a characteristic feature of the industrial heritage of the Yorkshire Dales; their history, use and products are summarised by Raistrick (1967, 73-89). In total 536 limekilns were identified from the evidence of aerial photographs (526 records, 7 being multiple descriptions adding ten more kilns to the total) (Figure 4.1.5.7). A total of 987 kilns were identified from the evidence of the First Edition OS maps, and 303 of these were confirmed on aerial photographs. The total of limekilns identified from these two sources is 1220, but many more no doubt remain unidentified. The small size and simple structure of early kilns makes them particularly difficult to identify on aerial photographs. The majority of the 233 limekilns identified from aerial photographs, but not recorded on the mid 19th-century OS First Edition maps, could belong to the period following that major survey. This may not be the case, however, for some of the smaller, less substantial sites; the remains of tiny pye kilns for instance, would probably have been considered insignificant by the OS map-makers.

The recorded limekilns vary in type from the basic pye kiln, as in the group suggested in an area north of Settle (NY.1239.22.1, 23.1, 43.1, 46.1, 47.1, 48.1, 49.1, 50.1, and 70.1), probably much more common than the record suggests, to the numerous field-kilns and the commercial kilns of the 18th, 19th and 20th centuries. Prominent in the latter group are two Hoffman type kilns, one near Ingleton and the other near Stainforth (NY.1073.10.2, NY.1237.1.2). There were also many other large kilns clearly built on a commercial scale, such as one on the same site as the Stainforth Hoffman kiln (NY.1237.1.1) and several alongside the important Pateley Bridge to Grassington road (eg NY.1522.34.1, an unusual kiln with a horizontal flue and chimney).

The date recorded for limekilns is almost always Post-Medieval, reflecting the predominance of the field-kiln in the record, although a few are described as Modern (ie 20th century). The majority (350, 65%) fall into the SMALL MACULA size range (1-4 m), and 178 (33%) in the MEDIUM MACULA size range (5-15 m). A further five sites fit into the LARGE MACULA size range (16-50 m) (NY.551.8.1, NY.699.1.1, NY.1120.1.1, NY.1237.1.1) and along with the two Hoffman kilns, described as VERY LARGE, represent commercial exploitation. Altogether 381 limekilns were described as essentially ROUND and 100 as RECTANGULAR. In the latter group the number of sites not having an NAR record was higher proportionately than that for all limekilns (62% as oppose to 43%), perhaps reflecting the better construction and preservation of limekilns built after the 1850's. The overall dominance of the ROUND shape in the records, perhaps reflects the normal appearance of the charging hole on vertical photography, and should not be considered as having secure structural implications.

4.1.5.8 Brick/Tile works

Two groups are identified as tileworks (NY.1261.1, NY.1413.1) and there are possible brickworks related to the Blea Moor tunnel and Ribbleshead viaduct construction camp (SD 77 NE Map Note Sheet, NY.1134.13; see also 4.1.3).

4.1.5.9 Manufacturing

Mill sites are under-represented in the aerial photographic record because in general they tend to be still roofed or lie in valleys where they are masked by tree cover. The enhanced NAR record, based on the First Edition OS maps, provides a better guide to the range and types of mill operating in the Dales in the 18th and 19th centuries.

4.1.6 Maritime

The project area has no coastline and therefore no records belong to this Class.

4.1.7 Recreation

Table 4.1.7 Recreation - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
FAIR										1		1
SHOOTING BUTT *									11			11
TENNIS COURT								1				1
Class Totals	0	0	0	0	0	0	0	1	11	1	0	13

There are no records with Group Interpretations in this class.

Rifle and shooting butts are recorded in a number of locations, the main concentration being related to the military training areas on Barden Moor (SE 14 95; see sections 3.2.4 and 4.2.3). Grouse butts, a ubiquitous feature of moorland areas, were not recorded since most of them are probably still in use. Practically all of the butts are beyond the limits of resolution for this level of survey and could not usefully be described, nor their phasing established. They are, however, a major feature of the upland moors, and because of the importance of the grouse shooting industry in landscape management over the last two centuries, an historical and archaeological survey of related features would be of interest (see 4.3.10).

The recording of a single fair is not representative of the number of fairs and markets known to have been held in the area (see Raistrick 1967, 121-36) but rather of the lack of visible archaeological remains of such sites. The drove roads that serviced these and other fairs beyond the survey area are mentioned elsewhere (4.1.9). The recorded site (NY.1423.7.1), at Cross Green 4 km south-west of Skipton, is a large, rectangular enclosure 230 m x 260 m, surrounded by a ditch and divided internally into two areas. It is identified as a fair because of its proximity to Carleton Cross, believed to mark 'the site of a traditional fair which flourished to the end of the 18th century' (SD 94 NE / 4), and its appearance is consistent with a medieval or post-medieval date. In this context the term 'fair' could equally be classed under Agriculture and Subsistence.

4.1.8 Religious, Ritual and Funerary

Table 4.1.8a Religious, Ritual and Funerary - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ABBAY							1					1
BARROW		6			5						2	13
BOWL BARROW		1										1
CAIRN		17	4		43			3		5	28	100
CHAPEL							2			2		4
CHURCH								2				2
HENGE	1	1										2

LONG CAIRN	1											1
RELIGIOUS HOUSE							1					1
RING CAIRN		7			5							12
ROUND BARROW		3									1	4
STANDING STONE								1			1	2
STONE CIRCLE		4						2				6
Class Totals	2	39	4	0	53	0	4	8	0	7	32	149

Table 4.1.8b Religious, Ritual and Funerary - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ABBAY							1					1
ENCLOSED CREMATION CEMETERY					1							1
GRANGE							3					3
PRECEPTORY							1					1
RELIGIOUS HOUSE							2					2
Class Totals	0	0	0	0	1	0	7	0	0	0	0	8

With only 149 sites, this class is extremely under-represented, at 0.8 per cent of the project database. In contrast, for the National Forest Project, 5.6 per cent of all records were in this class, while the Thames Gravels Project, dealing predominantly with crop marks, had nearer 10 per cent. Overall, 52 of the 149 sites had not been previously recorded. It is of interest to note that of the 100 cairns in the class, 51 had been recorded by the county Sites and Monuments Record (44 also by the NAR), the balance of 49 representing previously unrecorded cairns. Eight of these 'new' cairns were described as Medieval or Post-Medieval (boundary markers or agricultural features), the remaining 41 being split between the Unknown, Unknown Prehistoric and (in one case only) Bronze Age Periods.

Historic sites in this class, for instance monasteries, were generally not included in the transcription though related features such as leats, fish ponds and a variety of agricultural remains will be included in the relevant classes. This tends to mask the importance of monastic influence on the medieval life of the Dales (see 4.3.9).

For an area which has a great deal of evidence for prehistoric settlement there are remarkably few prehistoric sites in this class (98 Prehistoric and 32 Unknown) (Figure 4.1.8). Part of the reason for the low representation of prehistoric funerary monuments may be lack of visibility; many cairns and barrows would not have been seen on the vertical photography, since their smooth, low, profiles require strong, oblique, lighting to make them visible. In the areas of limestone pavement, monuments constructed from the same stone are difficult to detect, even on oblique photographs. Certainly the NAR contains many records of cairns and barrows that could not be detected on the available photography. The low representation may

also derive, in part, from variations in local burial practices. There are several known cave burials in the Dales, from the Neolithic and later periods, indicating a non-monumental tradition, but these are largely restricted to the limestone areas (eg Elbolton Cave, SE 06 SW / 8). There is also evidence that burials were sometimes placed in the grykes of the limestone pavement (King 1970), the fissures offering ready made cists; such burials would obviously not be detectable on aerial photographs.

Further evidence for funerary structures may be found by looking at sites recorded simply as 'mound' (4.1.11), of which there were 66. At least 42 of these may be prehistoric (37 Unknown, 2 Unknown Prehistoric and 3 Roman) and hence could have had funerary functions.

Prehistoric ritual monuments are represented by two henges and four stone circles (two other stone circles in the record are part of a Post-Medieval folly, see 4.1.4). Four of the ritual sites are in the southern half of the area, lying in a broad band between Pateley Bridge and Settle (Figure 4.1.8). The other two are the possible Neolithic henge in Wensleydale (see 4.3.3), and a circle of small stones, probably a ring cairn, situated by the river in Langstrothdale (NY.979.15.1, SD 87 NE / 1).

4.1.9 Transport

Table 4.1.9 Transport - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
AERIAL ROPEWAY								1	1			2
BRIDGE								1		1		2
CANAL										1		1
CAUSEWAY										1		1
DROVE ROAD					3	2				12	1	18
INCLINED PLANE *								7	1			8
RAILWAY								7				7
RAILWAY TURNTABLE									4			4
ROAD				15			1	9		8	5	38
STEPPING STONES										1		1
TRACKWAY			3	6	17	3	46	277	6	576	68	1002
TRAMWAY								6	6			12
Class Totals	0	0	3	21	20	5	47	308	18	600	74	1096

There are no records with Group Interpretations in this class.

Most of the features in this class only become comprehensible against the background of the relevant base map. This is particularly true of trackways and roads which are disused sections of otherwise still-functioning routeways, such as

the Roman road from Bainbridge to Ingleton (described below). There are excellent published studies of the area's major roads and trackways, which provide more detailed information and analysis than is possible at this level of survey (see Raistrick 1978 and Wright 1985 for a detailed bibliography).

Half of the interpretative terms used in the Transport class (eg tramway, canal) are derived from post-medieval and modern industrial activities, but account for only 34 records, or 3 per cent of the class total. For example, the recorded tramways mostly relate to the construction of dams and railways (see 4.1.3). Several of the Modern, Post-Medieval and Unknown Medieval trackways are also related to industrial activities, principally lead mining, though many may perhaps perpetuate tracks with monastic or earlier origins. The number of recorded tramways, railways and roads related to industrial activities is actually much higher than this, since many will have been recorded solely as elements of INDUSTRIAL COMPLEXES (see 4.1.5). The trackways and drove roads assigned to the Prehistoric Periods have usually been so dated by association with other features.

Many of the shorter lengths of trackway were little more than an access way leading to the mouth of a limekiln or into a quarry. Others were deeply worn, interwoven, narrow hollows where the terrain restricted the choice of route on to high pasture. (NB The term 'hollow way' was not used in this project). The few records for sections of drove road mostly describe features more than 2 m wide, but many of those interpreted simply as trackways are similarly wide. The long-distance medieval and post-medieval drove roads tended to avoid the cultivated lower slopes and valley floors, while some, running between walls or banks, were local drove ways giving access to high pasture while excluding stock from cultivated areas. Some of these local drove ways may even be Prehistoric in origin (see the discussion of coaxial field systems in 4.1.1.6).

Several Roman roads cross the Dales, linking the area's three forts (see 4.1.2) with military and civilian settlements beyond the project limits. One of the most clearly visible on aerial photographs being that running north-west from Ilkley to Aldborough as it crosses Blubberhouses Moor (RR 720b, NY.1481.1.1). Five of the fifteen records relating to Roman roads have no cross reference to an NAR linear record, and thus would appear to be new identifications.

Several roads converge on the fort at Bainbridge. Most of the road running south-west to Ingleton (RR 73) is identified on OS maps and lies under modern roads and tracks and so only a few short sections were transcribed. The best known stretch, the Cam High Road, runs straight from Bainbridge up to Wether Fell and is overlain by the metalling of an 18th century toll road. A second road (RR 730) runs south from Bainbridge to cross into Wharfedale on its way to Ilkley. Five kilometres south of Bainbridge part of this road survives as a walled lane, following the contour of Shaw Side (SD 98 SW) until the lane begins a gradual ascent, curving east then south on to Stake Moss. The original Roman road holds to the contour for a further 0.75 km before making a steep, sinuous climb to rejoin the lane on Stake Moss. This part of the road is depicted as a track on the OS map and was omitted from the transcription, but a few metres before the road and lane meet, a small rectangular building (NY.498.1.1) was noted adjoining the road. Ground inspection showed this to be a shallow platform and found traces of coursed stone revetment on three sides, the

fourth being open to the road. The Roman road apparently remained in use until AD 1798 when the walled lane was built (Wright 1985), so the platform could belong to any period between Roman and Post-Medieval. About 500 m after cresting Stake Edge the walled lane runs along the parish boundary and in the two fields to the east is paralleled by a very straight section of road with a marked agger and side ditches (NY.498.2.1). This length of road is grassed over but appears to be rutted with use; it certainly predates the enclosure walls and joins the line of the lane at both ends. It was thought to be Roman when transcribed but could alternatively be an earlier course of the 1798 road, the latter perhaps being realigned on the parish boundary when the later enclosure walls were built. It seems likely that this feature was also the basis for the projected and otherwise unsubstantiated alternative route of RR 730, cutting directly across Stake Allotments and down to Bainbridge. No evidence of this route could be found during air photo transcription and the distinct angled bend at the north end of NY.498.2.1 shows the unlikelihood of the conjecture.

As well as these routes to the south-west and south, the fort at Bainbridge, sited in the middle of Wensleydale, must have had communications east to Catterick, possibly by way of the fort at Wensley, and also west then north to Brough. The existence of these roads has been assumed but not proven, the Bainbridge fort usually being shown in isolation on maps of the Roman road network. There is, though, a long section of road on the OS maps, running down the east side of Mallerstang (the north-south running valley of the river Eden) and called first 'Old Road' and then 'The Highway' as it crosses into the head of Wensleydale. The recent history of this road is well known, mainly through the early 17th century diaries of Lady Anne Clifford (Wright 1985), but its origin is obscure. North of Hell Gill Bridge (on the Cumbria/North Yorkshire boundary), this road is very well engineered across the slope of the fell side beyond the project limits. However, an equally well-made section, which branches south off the higher route at Hell Gill Bridge to run down to the valley head, was recorded in the air photo transcription (NY.1310.3.1). The transcribed section may or may not be Roman but even on the vertical photography its relationship to the bridge, rebuilt in 1825 to replace an earlier structure, shows the road to be the earlier of the two. The general route is an obvious one and the best choice, possibly the only one, for a road between the forts at Bainbridge and Brough on the Stainmore cross-Pennine route. At all events, careful ground survey in the hope of verifying or extending the conjecture might well prove fruitful.

In the south, the Roman road from Ilkley to Elslack (RR 72a) is thought to run around the north slopes of Skipton Moor (SE 05 SW). Some paving has been found on this route and it is traceable as existing lanes along most of the route, though beyond this none of it could be identified on the photographs. Further down the slope, and on a parallel course, several sections of road were seen as earthworks running west for a distance of more than 2 km from Draughton (NY.1432.24.1-3). This lower route is partially overlain by the old A65 trunk road, and is respected by several blocks of ridge and furrow cultivation showing that it is at least medieval in origin. Its line passes under the modern road, and is continued into Skipton by a long, straight, and almost certainly metalled, farm track. The lower route is slightly undulating but never steep, while the higher route of the accepted road, though level for most of its length, makes a sudden and surprisingly steep descent into Skipton. Both these roads are equally acceptable in a Roman context.

4.1.10 Water and drainage

Table 4.1.10a Water and Drainage - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ADIT								47		5	2	54
AQUEDUCT									1			1
DAM							2	127	1	13		143
DEWPOND								6		5	1	12
DRAIN				5			10	74	1	61	11	162
DRAINAGE SYSTEM								16		19		35
FISHPOND							19	3		6		28
FLOOD DEFENCES								23	6	9		38
LEAT							4	215		63	5	287
MILL POND							4	5		6		15
MILL RACE							4	10		17		31
POND								8		7		15
RESERVOIR								22		2		24
TAIL RACE							1	1		1		3
WELL										4		4
Class Totals	0	0	0	5	0	0	44	557	9	218	19	852

Table 4.1.10b Water and Drainage - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
DRAINAGE SYSTEM				1								1
FLOOD DEFENCES								2	1			3
MILL POND								1				1
Class Totals	0	0	0	1	0	0	0	3	1	0	0	5

Not surprisingly, a large majority of the sites (68%) in the Water and Drainage class belong to the Post-Medieval Period. A notable exception is the group of five sites (NY.1404.6.1-5) described as drains of the Roman Period. These are features associated with the Roman villa at Gargrave (SD 95 SW), for which dating and functionality have been established through excavation.

Approximately half of the sites are related to mining, the majority of the dams and leats belonging to the lead industry. Leats and water management systems related to mining have been studied in detail at a few locations in the Dales (eg, Grassington

Moor, Raistrick 1955 & Gill 1984), but had not previously been systematically recorded over such a large area. Leats totalling over 185 km in length were recorded, with individual leats often running for several kilometres (eg NY.455.8.1, 5 km long). The distribution of these records is shown in Figure 4.1.10. Additionally there are the numerous leats that were mapped and recorded as part of INDUSTRIAL COMPLEXES and not given individual records. As well as those on Grassington Moor SE 06 NW (NY.952.1 & 2), good examples of leat and dam systems can be seen on Faggersgill Moor, Arkengarthdale NY 90 NE (NY.619.1), around the Merryfield Mines SE 16 NW (NY.1010.2) and on Greenhow Hill SE 16 SW (Figure 4.3.13a). The adits and leats are also listed under the Industrial class section (4.1.5).

Water was significant at almost every stage of the mining process, either as a problem in the mine where flooding often had to be countered by excavating drainage levels, or as a processing medium for washing and grading the crushed ores, and as a power source for crushing mills, furnace bellows and lifting systems. Water was also used as a tool in the prospection and excavation process. The method of open working known as 'hushing' used water to scour the surface of topsoil or other loose material, or to wash away hand broken debris. A large fan of debris often remains on the slopes below the hush (eg NY.775.3.1). The water was held in a dam at the top of the hush, served by a system of leats. An example of a regular pattern of hushes presumably used for prospecting, can be seen on Grinton Moor (centred at SE 030 965, NY.775.5.1). When a hush had been worked to some depth a parallel bypass channel was often cut to take away excess water while the hush was in a 'dry' stage of operation (eg NY.775.3.1 & NY.775.13.1). The dams, which are often relatively small, can be difficult to identify on small scale vertical aerial photographs and undoubtedly many more await discovery. Many dams were destroyed by later mining activity but the deeply trenched hushes survive as dramatic monuments to the scale of the lead working (Figure 4.1.5.1b; further good examples of hushing landscapes can be seen on maps NZ 00 SW and SE 09 NW).

Water management for domestic and agricultural purposes is also important because much of the natural drainage is underground. By comparing the distribution of leats (Figure 4.1.10) with those for lead and coal mining (Figures 4.1.5.1a & 4.1.5.2) the main areas of non-industrial leats can be isolated, although some may relate to mill sites. For example, leats on Thornton Rust Moor (NY.564.1.1) and on the north side of Bishopdale (SD 98 NE) may have provided a constant supply of water to enclosed pastures and/or farms and villages, or may have ensured a constant head of water for local mills. Recent fieldwork investigating this evidence has suggested some of the leats in Bishopdale may be related to iron working sites (Moorhouse pers comm).

Several dew ponds were recorded; these are common features in areas of upland pasture where surface water is not readily available. In a derelict condition, these small (the largest is 12 m diameter), round structures could easily be taken for hut circles or ring cairns and it is possible that some of the many small and isolated round features recorded on the limestone were in fact dew ponds. Most of those included in the transcriptions are likely to be post-medieval in date, but with abundant evidence for the use of the limestone grasslands from the Bronze Age onwards there is every reason to believe that dew ponds of early historic and prehistoric dates await identification, amongst these or elsewhere.

Flood banks are a common feature throughout the Dales, many of them appearing on the OS First Edition maps. In several areas, notably mid Wharfedale and in Swaledale, large sections of redundant flood bank were seen on the vertical photography and included in the transcription (eg Figure 4.1.1.6b). Most of these were described as Post-Medieval in origin (some Unknown Medieval and one Modern) but it is possible that some may have earlier, possibly monastic, origins. On the River Ure, near Jervaulx Abbey, the flood banks have been eroded by the river and not repaired, presumably because the water no longer has a tendency to flood this part of Wensleydale; alternatively a change in land use may have made the effects of occasional flooding no longer significant (SE 18 NE, NY.880.20.1 & 2).

There are 34 features interpreted as water courses under the class Unassigned. Some of these are entirely man-made (eg NY.615.1.20); others were included in the transcription because they had been partially canalised or altered in some way, or because the photographic evidence could cause them to be mistaken for man-made features such as trackways (eg NY.716.25.1).

The number of recorded mill ponds, mill races and related features is unrealistically low because most such features are found close to streams, in steep-sided and often wooded valleys, where they are not readily identifiable from aerial photographs. Many more will be found by consulting the enhanced NAR record based on early maps (see 3.1.1). The major reservoirs, built in the 19th and 20th centuries, are still in use and therefore do not appear in the record; redundant structures relating to their construction are discussed elsewhere (see 4.1.3.3).

4.1.11 Unassigned, civil, commemorative and commercial

Table 4.1.11a Unassigned - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
AIR SHAFT								3				3
BANK					12	2	4	13		33	48	112
BOMB CRATER									5			5
BOUNDARY			3	4	54	1	46	41		291	106	546
BOUNDARY BANK			1		3		14	1		32	14	65
BOUNDARY DITCH							4	4		20	6	34
BOUNDARY MOUND										4		4
BOUNDARY STONE								1		1		2
BUILDING			17	10	58	21	74	300	7	211	51	749
DITCH					1		3				1	5
DYKE						4				7	9	20
EARTHWORK							1	2			1	4
ENCLOSURE			90	50	620	13	90	160	24	488	657	2192

MOUND				3	2		2	2		20	37	66
NATURAL FEATURE											3	3
OXBOW LAKE										1		1
PIT								3		2	2	7
PIT CLUSTER										2		2
PLATFORM			7	12	5	3	11	5	8	34	24	109
SHAFT								153		11		164
SHORT SHAFT *								200		148	8	356
UNKNOWN *			1	1	2		7	8	2	42	51	114
WALL					5		1	13		9	16	44
WATERCOURSE							3	13		6	12	34
Class Totals	0	0	119	80	762	44	260	922	46	1362	1046	4641

Table 4.1.11b Unassigned - Group Interpretation and Period

Group Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ENCLOSURE											1	1
Class Totals	0	0	0	0	0	0	0	0	0	0	1	1

Several of the features in this 'miscellaneous' class have been dealt with in previous thematic sections of the report. Enclosures, which form almost 50 per cent of the class total, will be discussed mainly in section 4.2.1 of the morphological report. Within the MORPH2 database one of the main morphological descriptions available is ENCLOSURE, and so the use of the term 'enclosure' as a functional interpretation is to some degree tautological; it has only been applied to features of that type for which no other cultural or functional interpretation can be determined. Many of these features will be parts of settlements or pens for stock management, and this may be reflected in the GROUP interpretation of the site, but for the majority more detailed work is necessary if their function is to be understood. Some of this work can start from a morphological examination, as shown in sections 4.1.3 and 4.2.1. A total of 1788 of the sites interpreted as 'enclosures' were described morphologically using the ENCLOSURE table; of the remainder, 343 were described using the LINEAR FEATURE table, 54 with the LINEAR SYSTEM table and 7 with the MACULA table.

The sites described simply as buildings are mostly Post-Medieval, and like the enclosures, are included in this class because their specific function could not be determined. Over 240 other buildings with functional interpretations included in the database: 175 of these are barns, mostly of Post-Medieval date, while other interpretations include farmhouses, houses, smelt mills and chapels, all listed under the appropriate classes. The buildings listed as Prehistoric and Unknown Period (85 and 51 respectively) are discussed in section 4.1.3.

Platforms have also been mentioned in section 4.1.3. The period range for this type of feature is wide, though over 50 per cent were thought to be medieval or later.

Some of these features may have been constructed to hold a building, others perhaps accommodated processing areas and yet others may have acted as enclosures. For the interpretation 'barn platform' (56 examples) see section 4.1.1, Agriculture.

4.1.11.1 Boundaries

The various 'boundary ...' interpretations in the record generally relate to civil, parish or other territorial areas, small or large; they were generally not considered defensive, unlike the more substantial or strongly sited linear features interpreted as dykes (section 4.1.2.1). Boundaries total 641 records, 64 per cent being listed as Medieval. The 'Unknown Period' option was taken for a relatively large proportion of the total (16.5%), while 61 records (9.5% of the total) were recorded as Prehistoric.

An examination of the 'boundary' records shows that 411 of the 546 take the form of a single bank. 65 were seen as a single ditch, while 37 other features, most of them Medieval but with some Post-Medieval, were seen to be of ditch and bank construction. In some cases the interpretation 'boundary' was used because the feature was not clearly a field boundary or part of an enclosure. Such features are usually no more than short lengths of bank or wall, often associated with a settlement (NY.1168.17.13). 94 boundaries were thought to form parts of enclosures and/or field systems, 12 of these being of Unknown Prehistoric date and 28 of Unknown Period.

The form and relationships of these boundaries, as a group, can only provide limited information until more work has been done on specific examples in their local context. Only then can other examples be usefully compared, and allocated to broad timeframes. The examples below indicate the potential, but are not necessarily the 'best' examples.

NY.1121.11.8 is a single, narrow, earth-and-stone bank, perhaps originally a dry stone wall, surviving for over 260 m in an area north of Grassington which is dominated by coaxial field systems. While it is on the same general alignment as the nearest coaxial system, it could not definitely be linked with the fields, though it was thought to be of the same broad period, ie Iron Age. It may perhaps mark an enclosure limit, or separate two areas of open pasture not held in common (see 4.1.1.6 for further discussion).

In Nidderdale (SE 16 NW), a substantial ditch and bank boundary over 1200 m long, runs up and around the small side valley of Dauber Gill and may delineate the grazing, or intake land, allocated to the monastic grange (NY.1503.12, see 4.2.2) situated on a spur lower down the valley. A similar linear feature (NY.70.12.1), also 1200 m in length, runs up the ridge of Bainbridge High Pasture (SD 98 NW) and could be related to lands held by Countersett Hall (figure 4.3.13h).

In Langstrothdale a very substantial ditch (and bank for the upper part of its course) runs from the edge of Deepdale and then follows the contour west at about 1500 ft

for over 800 m. At its west end, after some unexplained deviations, the boundary probably turns sharply downhill as a much eroded ditch towards the river Wharfe. This substantial feature certainly predates the post-medieval enclosure of the area and may bound an assart in the medieval forest.

The study of historical documents and maps in conjunction with the transcriptions may be able to help unravel the boundaries of the deer forests that were once a feature of the area (see 4.1.4). For example, parts of the Forest of Knaresborough (Grainge 1871) lie in the south east of the project area and some unusual, and long, linear features (NY.989.2.1) on the high moorland south of Greenhow Hill may be related.

4.2 MORPHOLOGICAL REPORT

Each MORPH2 record includes a description using one of the SITE TYPE tables, ENCLOSURE, LINEAR SYSTEM, LINEAR FEATURE, MACULA or INDUSTRIAL COMPLEX. All but the last of these are based on the morphological aspects of the site description. There is necessarily a degree of overlap between the TYPE categories, most notably when LINEAR FEATURES are 'flagged' as possible parts of ENCLOSURES or LINEAR SYSTEMS. The histogram (Figure 4.2) reflects this overlap. INDUSTRIAL COMPLEX provides a shorthand method of dealing with complex industrial areas in a rapid survey and is basically a list of interpretative terms for commonly encountered features. The use of INDUSTRIAL COMPLEX has been discussed above in the thematic report (see 4.1.5). The total numbers of records in each SITE TYPE in the Dales study are as follows:

ENCLOSURE	4525
LINEAR SYSTEM	1270
LINEAR FEATURE	7413
MACULA	4940
INDUSTRIAL COMPLEX	101
Total	18,249

For a fuller explanation of these terms and other terms used in this section please refer to the detailed glossary in the MORPH2 manual.

The use of a predetermined and limited range of options for morphological description allows the data to be assessed in two ways. Firstly the data can be looked at in its own right for any patterning, which can then be assessed for archaeological meaning (eg 'Is the size range of different shaped enclosures different? If so, where and why?'). Secondly, the data can be used to search for parallels for specific sites (eg 'I have something that I would describe like this using the morphological terms available. Are there any other sites that have been so described? If so, does a visual inspection suggest a close relationship and have any of the sites received more detailed survey that might give a reliable insight as to what they might be?'). The sections below (4.2.1-4.2.4) use both these approaches to show what the possibilities are; they do not provide a summary of all the possible analyses of the data.

It must be borne in mind that dimensions, where given, are measured from a manually drawn plan at 1:10,560 scale and as such must be used with caution (see 'hut circles' in 4.1.5).

4.2.1 Enclosure table

Table 4.2.1a ENCLOSURE table - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ANNEX *				1								1
ANTI-AIRCRAFT BATTERY									2			2
BAILEY												0
BARN								125		39		164
BARN PLATFORM							4	12		26		42
BOUNDARY BANK								1				1
BOUSE TEAM								7				7
BOWL BARROW		1										1
BUILDING			15	10	50	20	63	280	5	189	44	676
CAIRN		4			1							5
CASTLE							4					4
CHAPEL							2					2
CHURCH								2				2
CIVIL WAR BATTERY *								1				1
CROFT							5			2		7
CRUSHING MILL *								6				6
DAM								1				1
DEWPOND								5		3		8
EARTHWORK								1				1
ENCLOSURE			73	44	498	11	73	137	24	387	541	1788
FAIR										1		1
FARMHOUSE							1	5		1		7
FARMSTEAD			2	4	3	1				5	1	16
FIELD BOUNDARY								1				1
FIELD SYSTEM					1						1	2
FISHPOND							6	1		2		9

FORT				3	1							4
GARDEN							1	1		1		3
GROTTO								1				1
GUARD HOUSE *								1				1
HENGES	1	1										2
HILLFORT			5		1							6
HORSE WHIM								3				3
HOUSE								11		6		17
HUT CIRCLE		5	167	24	435						68	699
LEAD WORKS										1		1
LEVEL *								1				1
LIMEKILN								3				3
LONG HOUSE						10		6		7		23
MANOR							1					1
MARCHING CAMP				1								1
MILITARY EARTHWORK *									3			3
MILL							1	1				2
MILL POND							2			4		6
MOAT							3			2		5
MOTTE							1					1
NATURAL FEATURE											1	1
OPPIDUM			1									1
ORE PROCESSING AREA *								1				1
PEAT STORE								5				5
PELE TOWER							1					1
PILLOW MOUND							2	1		7		10
PIT											1	1
PLANTATION *								19				19
PLATFORM			7	12	2	3	6	1		20	13	64
PLATFORM SETTLEMENT					2						1	3
PROMONTORY FORT			1		1							2
PYE KILN *										3		3
RABBIT WARREN								3				3

RAILWAY TURNTABLE									1			1
RELIGIOUS HOUSE							1					1
RESERVOIR								4		1		5
RING CAIRN		7			5							12
SEARCHLIGHT BATTERY									9			9
SETTLEMENT			2	1	9					7	3	22
SHEEP HOUSE							4					4
SHEEPFOLD				1			12	168	4	104	71	360
SHIELING							1	3		1		5
SMELT MILL								18				18
SMITHY								1				1
STACK STAND							18	6		285	1	310
STOCK ENCLOSURE			8	3	19	1	2	2		13	4	52
STONE CIRCLE		3						2				5
TOFT							16					16
TREE ENCLOSURE RING								1				1
TREE RING								6		1		7
UNKNOWN *							4			13	8	25
WALL								2				2
WASHFOLD								5		1		6
WATCH TOWER								1				1
WHEEL PIT								1				1
WINDING GEAR *								2				2
WORLD WAR 2 DEFENCES *									2			2
Period Totals	1	21	281	104	1028	46	239	865	50	1132	758	4525

The ENCLOSURE table contains 4525 records (25% of all records). Table 4.2.1a summarises the interpretation and Period of all ENCLOSURES. The records are divided into two main SHAPE classes, RECTILINEAR and CURVILINEAR, with further subdivisions within these categories and additional information such as size.

The ENCLOSURE table, along with the LINEAR SYSTEM table, provides the most useful information for statistical analysis and can aid the identification of trends and classes of monument. In this section the broad trends will first be discussed, followed by an example of how splitting the data into blocks (in this case based on size and broad shape criteria) can identify trends; finally an example is presented of how sites of

particular similarity, and so potentially of a single monument class ('Ingletons'), can be identified.

Shape

Table 4.2.1b shows the number of sites recorded according to each of the essential shape characteristics allowed in the MORPH2 system. As well as the nine basic SHAPE options there are further subdivisions, resulting in nineteen possible shape descriptions, of which eighteen have been used in the Project database. Further shape possibilities are provided by information on corners, and by the occurrence of straight sides in CURVILINEAR enclosures or curved sides in RECTILINEAR enclosures.

Table 4.2.1b ENCLOSURES - main SHAPE options.

SHAPE	Records	%	SYMMETRIC	ELONGATED
			ASYMMETRIC	
RECTILINEAR SHAPES	2467	55	2009	320
			458	58
TRIANGULAR	20	0	12	0
			8	3
SQUARE	221	5	221	-
			-	-
RECTANGULAR	1703	38	1703	313
			-	-
POLYGONAL	523	12	73	7
			450	55
CURVILINEAR SHAPES	2058	45	1560	27
			498	36
CIRCULAR	113	2	113	-
			-	-
SUB-CIRCULAR	989	22	989	-
			-	-
OVAL	160	4	160	9
			-	-
REGULAR	298	7	298	18
			-	-

CURVILINEAR ASYMMETRIC	498	11	-	-
			498	36

Within the RECTILINEAR options, RECTANGULAR is the most commonly used descriptive option used, a high proportion of the records relating to buildings. 1390 ENCLOSURES are described as RECTANGULAR and NOT ELONGATED, of which 136 (10%) are interpreted as barns, and 426 (31%) are described as buildings. Of the further 313 described as RECTANGULAR and ELONGATED 134 (43%) are described as buildings or barns. Only 221 ENCLOSURES are described as SQUARE, of which 47 (21%) are interpreted as buildings or barns and 61 (27%) as stack stands (see 4.1.1).

SUB-CIRCULAR is the commonest SHAPE description of the CURVILINEAR options and here an even higher proportion of records relate to buildings; an interpretation of 'hut circle' is given to 595 (60%) of the 989 SUB-CIRCULAR ENCLOSURES (see 4.1.3).

In all the other SHAPE descriptions the commonest interpretation is simply 'enclosure', although this will sometimes be supported by a GROUP interpretation such as 'settlement'.

ASYMMETRIC ENCLOSURES

The majority of all ENCLOSURES, irrespective of SHAPE, are described as SYMMETRIC but there are 956 (21% of the total) which are listed as ASYMMETRIC. These in turn are split almost evenly between CURVILINEAR (52%) and RECTILINEAR (48%). The interpretations applied to the ASYMMETRIC ENCLOSURES are varied but 'enclosure' was by far the most frequently used (652 sites); sheep folds (84 sites), buildings (59 sites), stock enclosures (37 sites) and stack stands (30 sites, see 4.1.1) were the only other interpretations showing sizeable representations. The use of 'enclosure' as an interpretation for a site in the ENCLOSURE table may seem tautological, but can hardly be avoided when there are no functional indicators such as a diagnostic shape and size. An interpretation of 'enclosure' was also used when the SITE is one of a number of SITES which are covered by a GROUP interpretation; in this case the function of the individual site is often regarded as less important than that of the GROUP. Of the 652 ASYMMETRIC 'enclosures' 271 are covered by GROUP interpretations, 244 of them interpreted as 'settlement', and all but two of the remaining 27 as 'field systems'. This leaves 381 (202 CURVILINEAR, 179 RECTILINEAR) ASYMMETRIC ENCLOSURES, 328 of which have an 'Unknown...' period.

SIDES

There are 52 RECTILINEAR ENCLOSURES recorded as having no STRAIGHT SIDES, that is their SIDES are either CONCAVE, CONVEX or a combination of the two. Of these, 25 are RECTANGULAR, and a few are SQUARE with four CONVEX SIDES giving them a pin cushion shape. Twelve of the ENCLOSURES have one or more CONCAVE sides but in only one, a POLYGONAL ENCLOSURE, are the CONCAVE sides dominant. This

enclosure (NY.1145.2.1) sits on the limestone above Malham and as in many of the enclosures in similar contexts, its shape appears to have been derived by accident rather than design. It is one of several enclosures with small (c2 m diameter in this case) intermural huts, all of which are likely to have been used on a short term, seasonal, basis to accommodate stock and herdsman.

There are 326 CURVILINEAR ENCLOSURES with one or more STRAIGHT SIDES. Most of them (260) have just one straight section in an otherwise curvilinear plan, while others (60) have two. A further two enclosures have three STRAIGHT SIDES and one has six. The latter is actually a rectangular post-medieval building with a narrower extension at one end and should correctly have been described as RECTILINEAR and POLYGONAL. Of the other two NY.1118.2.3 is one of two similar sized enclosures (c500 m²) which lie to either side, spectacle fashion, of a rectangular building, together forming a small shieling. The one other ENCLOSURE with three STRAIGHT SIDES (NY.598.13.1) is little more than a sheep pen built against a bank and of probable medieval or post-medieval date.

The term 'polygonal' is usually used in its narrower sense 'having five or more sides', however, within MORPH2 it refers to RECTILINEAR ENCLOSURES having four or more sides; this therefore accommodates all four-sided shapes, symmetric and asymmetric, that are not SQUARE or RECTANGULAR. Of the 523 POLYGONAL ENCLOSURES in the database, 222 have less than five sides and a further 158, described as incomplete, may also have only four sides. Five and six sided enclosures are counted at 77 and 46 respectively, though up to one third of the five-sided are incomplete and may have had more than the five sides counted. Among the remaining nineteen are seven, eight, nine, ten, twelve and fifteen-sided enclosures, almost all of these buildings constructed of multiple rectangles (eg, an 'E' shaped building has twelve sides) although one refers to the aptly named Octagon smelt mill in Arkengarthdale, now demolished (NY.542.1.1). Only three of these many-sided ENCLOSURES are interpreted as 'enclosure'. NY.1407.2.1 was seen as an earthwork overlying ridge and furrow and is possibly a garden or landscape feature. NY.1181.34.1 is one of several small enclosures forming part of a farmstead, which like many of the adjacent sites, is most probably early medieval, though there are similarities with nearby sites which are thought to be late prehistoric farmsteads. Similarly the last of the three, NY.839.6.1 is unremarkable in itself, but forms the core of a small farmstead situated half way up the steep slopes on the south side of Coverdale.

FORM

In all 2632 (58%) of the ENCLOSURES were of single bank construction, while a further 33% were interpreted as having single foundation construction, usually seen as the bottom courses of a wall or stone bank. Only 272 (6%) ENCLOSURES were defined by a single ditch, and 98 (2%) by ditch and bank combinations. There were no pit-defined ENCLOSURES. The database also holds 21 ENCLOSURE records for which there is no constructional information; 2 of these belong to the same GROUP (NY.999.1) and describe a scatter of small, similar enclosures interpreted as hut

circles. The lack of information for these sites probably stems from the use of the multiple description facility (see the MORPH2 manual) which would have duplicated the first, erroneously incomplete, record (they should probably be described as single bank or foundation defined).

ENTRANCES

There are 236 records in the ENTRANCE database, linked to 217 ENCLOSURES. Fifteen of the ENCLOSURES have two entrances while two have three entrances. Most commonly (in 183 examples) the entrances appear as simple gaps in the enclosure circuits ('terminal defined'), others are more elaborate, defined by the addition of an antenna/funnel structure (15), inturned terminals (9) or other structurally defined form (28). One titula/clavicula entrance is recorded for the Roman camp at Mastiles Lane.

There is no one ENTRANCE POSITION which is particularly dominant though east has the most at 44, with west the lowest at 16. Just over 52% of the entrances are found in the south/south-east/east quadrant with fewest (24%) in the opposite, north/north-west/west quadrant.

In the ENTRANCE database there are additionally five records which relate to four fragmentary enclosures described in the LINEAR FEATURE database. Four of these entrances are terminal defined and one of inturned form. Their positions are; three north, one west and one south-east.

Size

All recorded dimensions relate to the internal measurements of the ENCLOSURES. The diameter was recorded for 1209 (27%) of the enclosures and length and breadth for 3156 (70%). A further 106 (2%) and 53 (1%) were recorded with solely a length or a breadth measurement. (One record was given length, breadth and diameter measurements and a further one given no dimensions).

The tendency to round figures to the nearest 5 or 10 m for measurements over about 15 m is evident throughout the data, and also produce artificial peaks in the area calculations, which are all approximations - see Figures 4.2.1a and 4.2.1b.

Length - Recorded internal lengths vary from 2 m to 2000 m, with 94% of the records lying in the 5 m to 75 m band, and 82% in the 5 m to 30 m band.

Breadth - Recorded internal breadths vary from 1 m to 1800 m, with 94% of the records lying in the 4 m to 54 m band, and 82% in the 4 m to 20 m band.

Diameter - Recorded internal diameters vary from 2 m to 150 m, with 95% of the diameters lying in the 2 m to 20 m band, and 85% in the 2 m to 10 m band; of this latter group 653 (63% of the total) are given the interpretation hut circle (see 4.1.3).

Area - Using a standard formula based on the recorded measurements and SHAPE the approximate internal areas for 4364 (96%) ENCLOSURES can be calculated. The range is from 2 m² to 282,600 m² (the Stanwick earthworks, NY.705.1.1), with 2900 records relating to sites with an internal area of less than 150 m². There is a clear tendency for ENCLOSURES in this smallest category to be given functional interpretations (Table 4.2.1c); for example, in addition to the hut circles (695, 23%), a large proportion of the sites in this size band are interpreted as buildings (582, 19%), barns (155, 5%), stack stands (280, 9% - see 4.1.1) or sheepfolds (274, 9%). Only 27% are described as enclosures without further interpretation. In all the larger size bands (greater than 150 m²) the simple term 'enclosure' is the commonest interpretation recorded, accounting for more than 50% of the records.

Table 4.2.1c ENCLOSURES, size band 0 (<150 m²) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
ANTI-AIRCRAFT BATTERY									2			2
BARN								119		36		155
BARN PLATFORM							2	11		21		34
BOUSE TEAM								4				4
BUILDING			14	10	48	16	53	229	5	164	43	582
CAIRN					1							1
CHAPEL							2					2
CROFT							1					1
CRUSHING MILL *								6				6
DEWPOND								5		3		8
EARTHWORK								1				1
ENCLOSURE			31	10	198	7	26	63	19	175	292	821
FARMHOUSE							1	4		1		6
FIELD BOUNDARY								1				1
GROTTO								1				1
GUARD HOUSE *								1				1
HORSE WHIM								3				3
HOUSE								11		6		17
HUT CIRCLE		4	167	24	432						68	695
LEVEL *								1				1
LIMEKILN								2				2
LONG HOUSE						8		6		5		19

MILITARY EARTHWORK *									3			3
MILL							1	1				2
ORE PROCESSING AREA *								1				1
PILLOW MOUND										7		7
PLANTATION *								1				1
PLATFORM			4	9		2	4	1		10	11	41
PYE KILN *										3		3
RABBIT WARREN								1				1
RESERVOIR								1				1
RING CAIRN		6			4							10
SEARCHLIGHT BATTERY									7			7
SHEEP HOUSE							3					3
SHEEPFOLD				1			11	120	1	78	63	274
SHIELING										1		1
SMELT MILL								6				6
STACK STAND							18	4		258		280
STOCK ENCLOSURE			4	1	4	1	1			3	1	15
STONE CIRCLE		3						1				4
TOFT							13					13
UNKNOWN *							3			10	4	17
WALL								1				1
WASHFOLD								1		1		2
WATCH TOWER								1				1
WHEEL PIT								1				1
WINDING GEAR *								2				2
WORLD WAR 2 DEFENCES *									1			1
Total	0	13	220	55	687	34	139	611	38	782	482	3061

Size and SHAPE

For further analysis the 1464 ENCLOSURES with an internal area of 150 m² or more have been divided into five 'bands', chosen to try and incorporate within the bands any peaks at specific sizes (see above), rather than allowing them to sway the bands unduly by placing them at the top or bottom of a range. Table 4.2.1d summarises the number of records in each band, dividing the records between CURVILINEAR and

RECTILINEAR and highlighting sites with a Prehistoric Period (Unknown Prehistoric, Roman, Iron Age, Bronze Age, Neolithic) or recorded as of Unknown Period. It is notable that the proportion of CURVILINEAR to RECTILINEAR ENCLOSURES increases through the size bands when all periods are considered, but is less evident for those sites given an Unknown or Prehistoric Period. (This may reflect a common tendency to interpret rectilinear earthworks as medieval in the absence of contrary information; however, in the areas where most fieldwork has been done rectilinear enclosures have often been interpreted as of Roman or earlier date). It is also probable that the Period distributions are influenced by the different interpretative judgements of the various authors.

Table 4.2.1d ENCLOSURES - summaries according to size band

	All Periods	Prehistoric & Roman Period	Unknown Period
Size Band	CURVILINEAR		
	RECTILINEAR		
Band 1 150 - 349 m ²	202	88	64
	425	61	48
Band 2 350 - 849 m ²	144	73	37
	244	53	37
Band 3 850 - 1249 m ²	42	20	5
	61	12	16
Band 4 1250 - 2999 m ²	81	54	11
	92	25	18
Band 5 >3000 m ²	81	46	13
	92	28	27

Band 1 (150 - 349 m²) - Table 4.2.1e, Figures 4.2.1c & d

RECTILINEAR ENCLOSURES interpreted as of Unknown Prehistoric date are commonest in an area broadly defined by Grassington, Settle, Ingletton, Ribblesdale and Littondale (hereafter referred to as the Southern Limestone Belt). A particular concentration of similar enclosures, but with the PERIOD given as Unknown, in the area of Ribblesdale and Chapel-le-Dale, helps to emphasise the concentration within the Southern Limestone Belt, but it is also noticeable that RECTILINEAR ENCLOSURES of Unknown date are found more thinly throughout the whole of the project area. CURVILINEAR ENCLOSURES (Unknown and Prehistoric) show a more widespread

distribution, although those with a Prehistoric date are more concentrated in the southern half of the Southern Limestone Belt and a further small concentration in the Reeth area of Swaledale.

Band 2 (350 - 849 m²) - Table 4.2.1f, Figures 4.2.1e & f

The distribution of ENCLOSURES in this band (63% of which are RECTILINEAR) is widespread. When the Prehistoric enclosures are examined, there are very few in the eastern strip of the area, except at the northern and southern extremities. The CURVILINEAR shapes are densest in the south and east of the Southern Limestone Block, with another small concentration in Swaledale. The Prehistoric RECTILINEAR shapes have a much more restricted distribution, concentrating on the southern limestone, with a good scatter up to, but not beyond, the River Ure in Wensleydale and none in the Howgills to the north-west. ENCLOSURES of Unknown Period show a total absence in the Howgills and an absence of RECTILINEAR shapes in Swaledale. There is a scatter of both CURVILINEAR and RECTILINEAR shapes in the eastern strip, filling in an area which was largely blank in the Prehistoric distribution.

Table 4.2.1e ENCLOSURES, size band 1 (150 m² - 349 m²) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
BARN								5		3		8
BARN PLATFORM							2	1		4		7
BOUSE TEAM								2				2
BOWL BARROW		1										1
BUILDING			1		2	4	8	47		23	1	86
CAIRN		1										1
CASTLE							1					1
CHURCH								2				2
CROFT							1					1
ENCLOSURE			14	12	97	1	17	27	3	82	100	353
FARMHOUSE								1				1
FARMSTEAD			2		1					2		5
FISHPOND							2					2
HUT CIRCLE		1			3							4
LEAD WORKS										1		1
LIMEKILN								1				1
LONG HOUSE						2				2		4
PEAT STORE								3				3

PILLOW MOUND							2	1				3
PIT											1	1
PLANTATION *								4				4
PLATFORM			3	3	1	1	1			9	1	19
RELIGIOUS HOUSE							1					1
RING CAIRN		1			1							2
SEARCHLIGHT BATTERY									1			1
SETTLEMENT					1					1		2
SHEEP HOUSE							1					1
SHEEPFOLD								33	2	13	5	53
SHIELING							1	3				4
SMELT MILL								5				5
STACK STAND								2		25	1	28
STOCK ENCLOSURE			1		3					4	1	9
TOFT							1					1
UNKNOWN *							1			2	2	5
WALL								1				1
WASHFOLD								3				3
WORLD WAR 2 DEFENCES *									1			1
Total	0	4	21	15	109	8	39	141	7	171	112	627

Table 4.2.1f ENCLOSURES, size band 2 (350 m2 - 849 m2) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
BAILEY							2					2
BARN								1				1
BARN PLATFORM										1		1
BOUSE TEAM								1				1
BUILDING							2	4		2		8
CAIRN		3										3
CIVIL WAR BATTERY *								1				1
CROFT							3			2		5
DAM								1				1
ENCLOSURE			10	9	93		14	26		65	66	283

FARMSTEAD										1	1	2
FISHPOND							1					1
GARDEN								1		1		2
HENGE		1										1
MILL POND										2		2
MOAT										2		2
PEAT STORE								2				2
PELE TOWER							1					1
PLANTATION *								4				4
PLATFORM							1				1	2
PLATFORM SETTLEMENT					1						1	2
RAILWAY TURNTABLE									1			1
RESERVOIR								2		1		3
SEARCHLIGHT BATTERY									1			1
SETTLEMENT			1		2					2	1	6
SHEEPFOLD								13		13	2	28
SMELT MILL								3				3
SMITHY								1				1
STACK STAND										2		2
STOCK ENCLOSURE			1	2	3		1			2	1	10
STONE CIRCLE								1				1
TOFT							1					1
TREE RING								2				2
UNKNOWN *											1	1
WASHFOLD								1				1
Total	0	4	12	11	99	0	26	64	2	96	74	388

Band 3 (850 - 1249 m²) - Table 4.2.1g, Figure 4.2.1g

In this band the RECTILINEAR shapes are again the most numerous, with 59% of the total. The overall distribution pattern is fairly even and this is also true for the Unknown Period ENCLOSURES. The Prehistoric sites show an identical distribution to the Prehistoric ENCLOSURES in Band 2.

Table 4.2.1g ENCLOSURES, size band 3 (850 m2 - 1249 m2) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
BAILEY							1					1
ENCLOSURE			1	2	21	2	1	4	1	26	20	78
FARMSTEAD				1						2		3
HILLFORT					1							1
MILL POND										1		1
PLANTATION *								2				2
PLATFORM										1		1
PLATFORM SETTLEMENT					1							1
RABBIT WARREN								1				1
SETTLEMENT					3						1	4
SHEEPFOLD								2	1			3
SMELT MILL								2				2
STOCK ENCLOSURE			1		1							2
TOFT							1					1
TREE RING								1				1
UNKNOWN *										1		1
Total	0	0	2	3	27	2	3	12	2	31	21	103

Band 4 (1250 - 2999 m²) - Table 4.2.1h, Figure 4.2.1h

In this band the RECTILINEAR shapes represent 53% of the total and are found throughout the area; these shapes are predominant in the Ribblesdale area. CURVILINEAR shapes are absent in the north-east. The distributions of both the Prehistoric enclosures and those of Unknown period differ little from the overall distribution for this band.

Table 4.2.1h ENCLOSURES, size band 4 (1250 m2 - 2999 m2) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
BAILEY							1					1
ENCLOSURE			11	6	53		8	10	1	26	27	142
FARMSTEAD				2	2							4
FISHPOND							2	1		2		5

GARDEN							1					1
HEDGE	1											1
MILL POND							2			1		3
MOAT							1					1
PLANTATION *								3				3
PLATFORM					1							1
SETTLEMENT					2					2		4
SHEEPFOLD							1					1
STOCK ENCLOSURE					1					1	1	3
TREE RING								1		1		2
UNKNOWN *											1	1
Total	1	0	11	8	59	0	16	15	1	33	29	173

Band 5 (>2999 m²) - Table 4.2.1i, Figure 4.2.1i

The total number of ENCLOSURES in this band, and the division between RECTILINEAR and CURVILINEAR, is identical to that of Band 4. Covering all enclosures of 3000 m² and greater, this band encompasses a wider variety of enclosures than do the smaller bands. The 14 exceptionally large ENCLOSURES in this band (greater than 20,000 m²), include the Roman fort at Elslack (NY.1430.1.), the Roman camp at Mastiles Lane (NY.1151.1.1), the hillforts on Ingleborough and Rough Haw (NY.1065.1.1, NY.1335.13.1), a rather doubtful hilltop enclosure near Simon's Seat (NY.990.1.1), the site of a traditional fair (NY.1423.7.1 - see 4.1.7), and the Stanwick earthworks (NY.705.1). The ENCLOSURES in this size band are spread evenly over the whole area, except for a blank patch in the south-east (essentially Nidderdale). The Prehistoric CURVILINEAR shapes are also evenly spread; they are notably present in the Aire Gap and to the north-east, areas with few CURVILINEAR ENCLOSURES in the smaller bands. Adding the CURVILINEAR shapes of Unknown Period does not significantly alter the even spread noted for the Prehistoric ENCLOSURES.

Table 4.2.1i ENCLOSURES, size band 5 (>2999 m²) - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Total
ANNEX *				1								1
BAILEY							1					1
BOUNDARY BANK								1				1
CASTLE							3					3
ENCLOSURE			6	5	36	1	7	7		13	36	111

FAIR										1		1
FARMSTEAD				1		1						2
FIELD SYSTEM					1						1	2
FISHPOND							1					1
FORT				3	1							4
HILLFORT			5									5
MANOR							1					1
MARCHING CAMP				1								1
MOAT							2					2
MOTTE							1					1
NATURAL FEATURE											1	1
OPPIDUM			1									1
PLANTATION *								5				5
PROMONTORY FORT			1		1							2
RABBIT WARREN								1				1
RESERVOIR								1				1
SETTLEMENT			1	1	1					2	1	6
SHEEPFOLD											1	1
SMELT MILL								2				2
STOCK ENCLOSURE			1		7			2		3		13
TREE ENCLOSURE RING								1				1
TREE RING								2				2
Total	0	0	15	12	47	2	16	22	0	19	40	173

In summary, within the overall distribution of Prehistoric ENCLOSURES, which has a bias to the areas of maximum archaeological visibility on the limestone areas of the southern Dales, there are patterns which vary distinctively between the RECTILINEAR and CURVILINEAR ENCLOSURES in the smaller size bands. The larger, and therefore potentially more visible, enclosures show less variation in their distribution. This introductory analysis of the size, shape and distribution of ENCLOSURES shows the potential for targeting further research on specific sites or groups of sites in the Dales area.

INTERNAL FEATURES

Where an ENCLOSURE contained internal detail or structures, or smaller structurally attached features, this was flagged in the record for the main ENCLOSURE and could be given a separate record; 1141 (25%) of ENCLOSURES were flagged this way, 466 (41%) being supported by an additional record or records. This does allow potential similarity between sites to be noted (see 'Ingletons' below). However, because of the very generalized relationship recorded (and only flagged in one direction), it is not possible to do any detailed analysis on, for example, the numbers of hut circles within enclosures. (However, the number of hut circles in a GROUP can be studied - see 4.1.3).

CORNERS

With RECTILINEAR ENCLOSURES the general appearance of the corners, whether ANGLED or CURVED, was recorded. As one might expect, a high proportion (48%) of the 1633 sites recorded as having ANGLED corners were interpreted simply as buildings or as more specific types of building. In contrast, only 13% of the 834 recorded as having CURVED corners were interpreted as buildings. Of the RECTILINEAR sheepfolds, a high proportion (87%) had ANGLED corners. However, stack stands were more frequently recorded as having CURVED corners (56%) (see 4.1.1).

Enclosures recorded using other tables

The LINEAR FEATURE table includes a further 776 records flagged as possible enclosures and 93 described as forming enclosures which are partially defined by natural features (see 4.2.3). Another 154 records in the LINEAR SYSTEM table describe systems of conjoined enclosures (see 4.2.2). Further morphological analysis could usefully incorporate this information from the MORPH2 database to gain a more complete picture.

'Ingletons' - Table 4.2.1j, Figures 4.2.1j, k & l

The following example, along with the example of the 'Askriggs' above (4.1.3), shows the manner in which the structured MORPH2 database can be used to identify potentially similar sites and so suggest possible avenues for further research.

Lying near Ingleton, ENCLOSURE NY.1216.38.1 (Fig 4.2.1j) appears from the aerial photographs to have a very deliberate, organised, form. The overall plan is a very regular rectangle approximately 65 m x 50 m internally, with internal subdivisions. Consultation amongst the project team and with other archaeologists revealed only one similar site (NY.1300.3.1, Fig 4.2.1k - 3). Using the structured format of the MORPH2 database, a search based on the RECTANGULAR SHAPE and broad dimensional characteristics (LENGTH in the range 55-90 m, BREADTH in the range 40-

65 m) revealed thirty seven potentially similar sites (Table 4.2.1j). The mapped information for these thirty seven sites was examined and of these eight were thought to be not similar and a further ten were thought unlikely to be similar. A further seven did not present enough evidence in the mapping to enable valid comparison. The remaining twelve sites are illustrated in Fig 4.2.1j.

Table 4.2.1j 'Ingleton' enclosures - key to Figure 4.2.1k.

Key to Figure 4.2.1k	MORPH number	NAR number	Period	Length	Breadth	Corners	Internal features	Similar to "Ingleton" enclosure?
	CU.19.7.1		UM	70	50	CURVED	No	not enough evidence
	CU.20.29.1	SD69SE/7	PM	60	50	CURVED	No	unlikely
10	CU.60.5.1	SD68NW/3	UP	70	50	ANGLED	Yes	possible
	NY.49.6.1		UM	70	60	CURVED	No	not enough evidence
7	NY.66.11.1		UM	65	45	CURVED	Yes	possible
8	NY.104.49.2		UM	70	50	CURVED	Yes	possible
	NY.298.6.2	SD99NE/6	UM	80	40	ANGLED	Yes	no
	NY.407.6.1		U	70	60	CURVED	No	no
	NY.465.7.1		UM	60	40	ANGLED	No	no
	NY.658.6.6	NZ00SE/7	UP	60	50	CURVED	Yes	unlikely
	NY.658.8.1	NZ00SE/7	U	80	50	ANGLED	No	unlikely
	NY.658.9.1	NZ00SE/7	UP	60	50	ANGLED	No	unlikely
	NY.661.50.1	NZ10NE/2	RO	70	60	CURVED	Yes	no
9	NY.687.5.3		UM	70	50	ANGLED	Yes	possible
	NY.701.3.1		UM	55	50	CURVED	No	unlikely
	NY.705.7.1	NZ11SE/2	UM	85	50	CURVED	No	no
	NY.716.14.1	NZ11SE/6	U	60	50	CURVED	No	unlikely
	NY.775.36.1		U	90	60	CURVED	No	not enough evidence
	NY.832.28.1		PM	60	40	ANGLED	Yes	unlikely
	NY.841.27.2	SE08NW/3	LM	60	45	ANGLED	Yes	unlikely
11	NY.846.32.1		U	90	50	ANGLED	Yes	possible
	NY.1072.36.1		PM	90	45	CURVED	Yes	unlikely
	NY.1103.6.1	SD97SW/2	LM	55	40	ANGLED	Yes	not enough evidence
6	NY.1116.14.1		UM	60	45	CURVED	Yes	possible
5	NY.1123.45.1		U	70	50	CURVED	Yes	possible
	NY.1211.3.2	SD67SW/10	LM	60	55	CURVED	Yes	no

	NY.1216.9.1		U	80	40	CURVED	Yes	not enough evidence
1	NY.1216.38.1		U	65	50	CURVED	Yes	"Ingleton" enclosure
12	NY.1239.57.1	SD86NW/1	UM	84	45	CURVED	Yes	possible
	NY.1250.1.1	SD77NW/11	UP	60	40	CURVED	Yes	no
2	NY.1251.2.1	SD77NW/6	UM	65	40	ANGLED	Yes	possible
	NY.1252.1.1		U	60	40	ANGLED	No	not enough evidence
3	NY.1300.3.1		EM	75	50	CURVED	Yes	possible
	NY.1322.1.1		UP	80	60	CURVED	Yes	not enough evidence
	NY.1332.22.1	SD85NE/7	UP	80	60	CURVED	No	unlikely
4	NY.1405.1.1	SD95SW/2	LM	65	60	ANGLED	Yes	possible
	NY.1461.18.2		PM	60	40	ANGLED	No	no

The interpretations of these twelve, given at the time of recording, are in most cases simply 'enclosure', though with one being described as part of a 'field system', two as part of a 'farmstead' and one as part of a 'settlement'. The dating is either to the Unknown or Unknown Medieval, but with one each assigned to the Medieval and the Early Medieval Periods.

As can be seen from Table 4.2.1j, only four of these sites were previously recorded in the NAR and had been described from ground investigation. These descriptions suggest that three of the sites are medieval in date, two being farmsteads and one (from additional documentary evidence) being identified as the site of a manor (NY.1405.1.1, Fig 4.2.1j). The fourth is suggested as being a possible Romano-British settlement (CU.60.5.1). In practice, however, none of the twelve sites has yet produced reliable dating evidence. A certain degree of relative dating may be possible through careful examination of these sites on the ground. Many of the sites are surrounded by ridge and furrow and the mapped relationship suggests either broad contemporaneity or that the enclosures are earlier. However, the relationship between two of the enclosures and the field systems surrounding them look particularly interesting and would clearly repay field investigation. NY.1216.38.1 may be partially overlain by, or overlie, ridge and furrow, while NY.1123.45.1 appears to partially respect and partially straddle elements of a field system.

The evidence of the individual plans as recorded on the 1:10,560 overlays and in the MORPH2 database, also needs considering. From the transcriptions, the six sites listed as NY.1216.38.1, NY.1251.2.1, NY.1300.3.1, NY.1123.45.1, NY.1116.14.1 and NY.1239.57.1, show a great similarity in the organisation of their internal divisions; additionally they are all described as 'bank defined', and all but number NY.1251.2.1 are described as having CURVED CORNERS. The twelve sites are distributed evenly around the project area (Figure 4.2.1l) but these six all lie in the southern half of the project area, one lying near Ingleton, one at the upper end of Chapel-le-Dale, two to the north and east of Austwick, and two in the Kilnsey area of Wharfedale. In this area in particular, the potentially similar sites rejected from the

initial list of 37 as not providing enough evidence on the basis of the transcription alone, probably warrant further evaluation.

Although sites NY.1216.38.1 and NY.1300.3.1 both lie on south, south-west facing slopes with a good view over the surrounding landscape, there appears to be no consistent pattern across all the sites with regards to their location and elevation in the local topography. Their relationship with other classes of monuments is not immediately evident, but given their regular appearance and group characteristics, along with the possible medieval date, an investigation through other sources of possible monastic connections (in relation to granges/sheephouses?) might be appropriate. Investigation of a possible Roman context might also be worth considering. The six most similar-looking sites could be equally well described as lying close to the routes of possible medieval or Roman roads.

The regularity in appearance of these so-called 'Ingletons' has been taken as the key element in looking for parallels, but it may also be worthwhile pursuing the less regular but possible related sites; if the database is queried solely on the dimensional characteristics described above a further 76 sites are suggested for evaluation. This list has not been fully evaluated, but contains at least two examples that may be comparable to the 'Ingletons', NY.1049.5.1 and NY.1233.1.1, described respectively as a settlement of prehistoric date and a farmstead of Roman date. There may also be further comparable sites, less completely visible or preserved, to be found in the database by analysis using less restrictive dimensional criteria.

Additionally the sub-divided internal structure of the monuments is a repeating characteristic, and so analysis of the LINEAR SYSTEM table might conceivably produce further examples. A search using the criteria 'RECTILINEAR and ORDERED, with overall size range between 1500 m² and 6000 m²' produces a list of 21 sites. The majority of these are elements of medieval villages or field systems, clearly not similar in detail, and at four other sites the mapped evidence does not provide sufficient information for comparison. However, there is a marked similarity in plan with the 'Ingletons' at one of the sites, Sigsworth Grange (NY.1503.12.1, SE 16 NW / 6). If further investigation confirms the strong similarity between all these sites then this could have an important influence on the interpretation of the class.

Analysis of the database and maps has not answered the question 'What is this site near Ingleton described in record NY.1216.38.1?', but we now have some idea on the frequency and distribution of possible parallels in a local context. Furthermore we now have enough evidence to suggest that this site may belong to a class of monument worthy of further research through closer examination of the database and transcriptions, more detailed photo interpretation and further aerial photography, detailed ground survey or documentary research. The isolation of a distinctive 'type-site', not previously recognized as such, and its pursuit to this preliminary stage of hypothesis is a good example of the way in which air photo transcription, allied to a carefully structured database, can not only record but also begin the process of interpretation of archaeological data.

4.2.2 Linear system table

Table 4.2.2a LINEAR SYSTEM table - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
BOUNDARY							1					1
BOUNDARY BANK							1					1
BUILDING			1		1		1	1		4	1	9
CONSTRUCTION CAMP *									1			1
CROFT							18					18
CROFT BOUNDARY *							2			1		3
DAM								1				1
DESERTED VILLAGE							1					1
DRAIN								1		2		3
DRAINAGE SYSTEM								1				1
ENCLOSURE			1	2	18		3	3		14	13	54
FARMSTEAD					3		1			1		5
FIELD BOUNDARY					3		5	3		16		27
FIELD SYSTEM			9	2	53	3	26	8		72	26	199
FISHPOND							1					1
LYNCHET							2			2		4
LYNCHET FIELD SYSTEM			2			8	73			64	1	148
RIDGE AND FURROW							322	141		259		722
SETTLEMENT			8		20	1	7			7	6	49
SHEEPFOLD							1	4			1	6
STOCK ENCLOSURE				1	2	1		1				5
TOFT							6			2		8
UNKNOWN *								1			1	2
WORLD WAR 2 DEFENCES *									1			1
Class Totals	0	0	21	5	100	13	471	165	2	444	49	1270

LINEAR SYSTEMS account for 1270 records, 7% of the MORPH2 database - see Figure 4.2. The LINEAR SYSTEM table is used to describe networks of linear features, usually areas of land division, and contiguous groups of similar enclosures, known as ENCLOSURE COMPLEXES. In general the recording practice was that where it was possible to give an approximate average measurement for individual units within the system then the LINEAR SYSTEM table was used. Otherwise, the options within the

LINEAR FEATURE table were used and the site was flagged as part of a possible linear system; a further 3369 sites were recorded this way (18% of the total). Additionally 275 LINEAR FEATURES were flagged as possibly part of a linear system and/or an enclosure, these sites are the ones most likely to be parts of ENCLOSURE COMPLEXES.

154 of the records describe ENCLOSURE COMPLEXES, of between 2 and 20 conjoined enclosures, of which 57 (37%) are described as Roman or earlier in date, and a further 21 (14%) are of Unknown date. 127 records (82%) describe complexes with 6 or fewer individual enclosures.

PATTERN

The most frequently used PATTERN description for LINEAR SYSTEMS is ORDERED, at 54% of the 1270 record total. A further 38% is accounted for under RANDOM, with only 8% described as ACCRETED. Removing sites interpreted as lynchets, lynchet systems and ridge and furrow from the total leaves only 400 records, of which 67% are ORDERED, 20% RANDOM and 13% ACCRETED. Still excepting lynchets and rig, of those sites described as ACCRETED 53% have interpretations which reflect a settlement-related function, while for both ORDERED and RANDOM the bias is towards agricultural interpretations (67% and 61%).

SHAPE

There are three possible SHAPE options for LINEAR SYSTEMS; RECTILINEAR is the most frequently used at 50% of the total, with MIXED at 33% and CURVILINEAR at 17%. As might be expected, a high percentage (78%) of CURVILINEAR sites describe the SHAPE of ridge and furrow and lynchet systems, slightly more than MIXED (at 74%) and RECTILINEAR, of which 62% are rig and lynchets. In overall terms there are no particularly notable trends in the way that the SHAPE option was used.

Distributions based on SHAPE were examined for sites of a Prehistoric or Unknown Period (Figure 4.2.2). MIXED SHAPE systems of those Periods (43% of which are field systems) are found in the central part of the area with notable concentrations in central Wharfedale and upper Ribblesdale/Chapel-le-Dale. The distribution of CURVILINEAR systems (30% of them field systems) is similar but more tightly focused on the limestone areas around Wharfedale and with a greater tendency to be found near, or even above, the 1200 foot contour. The RECTILINEAR systems tend to be more widely distributed than either of the other two SHAPES and a far greater number (70%) are interpreted as field systems. When those systems described as ENCLOSURE COMPLEXES are highlighted, the result shows, with few exceptions, a contracted distribution largely restricted to the slopes and limestone plateaux south of Wensleydale. The absence of CURVILINEAR systems from Wensleydale northwards is particularly apparent. The virtual absence of sites in the Aire gap, south of the Craven fault, may be largely due to their destruction by later agricultural practices. The MIXED SHAPE sites contain both RECTILINEAR and CURVILINEAR elements and, depending on which is dominant, could be variant forms of either

RECTILINEAR or CURVILINEAR systems. If the MIXED systems are all assumed to be RECTILINEAR variants, there is little difference in the over all distribution pattern for that SHAPE. If, on the other hand, the MIXED SHAPES are all assumed to be CURVILINEAR variants, the overall distribution widens and a shift occurs in the main concentration, emphasising much more the limestone benches of Ribblesdale and Chapel le Dale. Adding the MIXED SHAPES to the CURVILINEAR also increases the numbers of those systems which occur near or above the 1200 foot contour.

This discussion is based on SHAPE distribution for sites thought to be Prehistoric, but with the RECTILINEAR systems in particular, there are likely to be several others listed as Unknown Medieval (123 excluding ridge and furrow) which are just as likely to be Prehistoric but were not readily distinguishable and were therefore dated with caution. This is most likely to have occurred are along the upper limits of medieval cultivation in areas like central Wharfedale where there is considerable overlap between the surviving elements of the prehistoric and historic landscapes. Adding the Unknown Medieval ENCLOSURE COMPLEXES to the distribution of those listed as Prehistoric produces a pattern which differs only by the addition of several sites in Swaledale and a few in Wensleydale. The only way to quantify which, if any, systems are more likely to be prehistoric than medieval is by a full reassessment of all the evidence.

SHAPE and PATTERN

Table 4.2.2b provides summary information on the types of record in the LINEAR SYSTEM table according to the nine possible combinations of SHAPE and PATTERN, cross-referenced to the site interpretation and period (banded to simplify the table). The table can be used as a guide to the frequency of site types, either in simple morphological terms (the columns) or including interpretative terms (the rows). For a full picture of the interpretative terms it will also be necessary to check against the similar tables in each of the other morphological sections, or against the tables at the beginning of each Class category in the Thematic section. SHAPE and PATTERN, when combined with the other options in the database (FORM, SIZE, TRACKWAYS), allow for more detailed searches to help define and identify classes of monument (eg coaxial field systems, lynchet field systems see 4.1.1) or to see variations and trends within a specific class (eg ridge and furrow see 4.1.1).

One category that can be identified on the table as being of possible significance, is a group of sites listed as Medieval or Post-Medieval, described as RECTILINEAR and ORDERED, and with interpretations of croft, toft, settlement or simply enclosure. Table 4.2.2c summarises the data for a slightly narrower group (excluding the Post-Medieval sites) along with four sites described as MIXED rather than RECTILINEAR. In total this list comprises 46 SITES in 36 GROUPS. By looking at the GROUP interpretations, it is clear that with those sites simply described as enclosures we are largely dealing with elements of medieval villages or other small settlements. The sizes, recorded as averages for each SITE, are likely to represent the approximate standard size of individual holdings or elements of individual holdings. The recorded average length varies from 8-160 m, with 80% falling in the 10-50 m range

(however, sites with unit lengths in the larger category are also likely to be described as field systems and so fall outside this present group, see 4.1.1). The recorded average breadth varies from

Table 4.2.2b LINEAR SYSTEM table - SHAPE and PATTERN summaries.

		SHAPE and PATTERN Combinations C=CURVILINEAR,R=RECTILINEAR,C=MIXED r = RANDOM, o = ORDERED, a = ACCRETED									
Site Interpretation	Period	Cr	Co	Ca	Rr	Ro	Ra	Mr	Mo	Ma	Total
BOUNDARY	UM							1			1
BOUNDARY BANK	UM					1					1
BUILDING	UP					1		1			2
BUILDING	UM					5	1				6
BUILDING	U					1					1
CONSTRUCTION CAMP	UM					1					1
CROFT	UM				1	14			3		18
CROFT BOUNDARY	UM					2			1		3
DAM	UM			1							1
DESERTED VILLAGE	UM					1					1
DRAIN	UM	1		1		1					3
DRAINAGE SYSTEM	UM	1									1
ENCLOSURE	UP	1		2	1	6		6	3	2	21
ENCLOSURE	UM					14	3	3			20
ENCLOSURE	U		1	2	1	5	2	2			13
FARMSTEAD	UP	1		2							3
FARMSTEAD	UM					1	1				2
FIELD BOUNDARY	UP				1	1			1		3
FIELD BOUNDARY	UM					16		4	4		24
FIELD SYSTEM	UP	5	2	2	5	34		9	6	1	64
FIELD SYSTEM	UM		5		8	67	1	11	16	1	109
FIELD SYSTEM	U		1			16		3	6		26
FISHPOND	UM					1					1
LYNCHET	UM					3			1		4
LYNCHET FIELD SYSTEM	UP	1	1								2
LYNCHET FIELD SYSTEM	UM	14	25	2	6	41	2	19	32	4	145
LYNCHET FIELD SYSTEM	U								1		1
RIDGE AND FURROW	UM	42	75	6	178	156	8	144	88	25	722
SETTLEMENT	UP	3		12		2	1	6	1	3	28
SETTLEMENT	UM			1	2	8	3	1			15

SETTLEMENT	U			1		1			2	2	6
SHEEPFOLD	UM			1				2	2		5
SHEEPFOLD	U									1	1
STOCK ENCLOSURE	UP			2						1	3
STOCK ENCLOSURE	UM					1			1		2
TOFT	UM					7	1				8
UNKNOWN	UM					1					1
UNKNOWN	U								1		1
WORLD WAR 2 DEFENCES	UM							1			1
TOTAL		69	110	35	203	408	23	213	169	40	1270

Table 4.2.2c LINEAR SYSTEM table - medieval settlement remains

Site Interpretation	Period	Group Interpretation	MORPH2 number	Map Sheet / NAR number	Unit Length	Unit Breadth
CROFT	LM		NY.563.26.1	SD98NE		9
SETTLEMENT	UM		NY.736.5.1	SE09SW / 20		8
CROFT	LM	DESERTED VILLAGE	NY.767.2.3	SE19SW / 2		40
SETTLEMENT	LM	SETTLEMENT	NY.1367.1.1	SD95NW		
ENCLOSURE	UM	SHIELING	CU.9.1.5	SD69NE / 3	8	8
ENCLOSURE	UM		NY.1251.36.1	SD77NW	8	7
TOFT	LM	DESERTED VILLAGE	NY.726.1.1	SE19NW	10	8
TOFT	LM	DESERTED VILLAGE	NY.726.1.11	SE19NW	10	8
SETTLEMENT	LM		NY.832.2.1	SE18NW	10	8
ENCLOSURE	UM	SETTLEMENT	NY.1378.7.2	SE17NW	10	8
TOFT	UM		NY.611.61.3	SE09NW	12	10
ENCLOSURE	UM	SHRUNKEN VILLAGE	NY.687.8.4	NZ10SW	12	10
SETTLEMENT	LM		NY.737.15.1	SE09SW	12	12
ENCLOSURE	UM	SETTLEMENT	NY.1379.1.5	SE17NW	12	8
ENCLOSURE	LM	GRANGE	NY.1503.12.2	SE16NW / 6	15	10
ENCLOSURE	UM	SETTLEMENT	NY.215.1.1	SD89NE	20	12
ENCLOSURE	UM	SETTLEMENT	NY.215.1.2	SD89NE	20	18
CROFT	LM	DESERTED SETTLEMENT	NY.597.1.3	NZ10NW	20	15
TOFT	LM	DESERTED VILLAGE	NY.726.1.10	SE19NW	20	8
TOFT	LM	DESERTED VILLAGE	NY.726.1.14	SE19NW	20	18
SETTLEMENT	UM		NY.1216.2.1	SD67SE	20	15
SETTLEMENT	UM	SHRUNKEN VILLAGE	NY.480.46.1	SD98NE	22	20
TOFT	LM		NY.729.1.1	SE19NW	22	20
CROFT	LM		NY.764.21.1	SE19SW	30	20

CROFT	LM		NY.764.21.2	SE19SW	30	20
CROFT	LM		NY.764.21.5	SE19SW	30	20
SETTLEMENT	UM	SHRUNKEN VILLAGE	NY.826.21.1	SE09NE	30	20
ENCLOSURE	LM	GRANGE	NY.1503.12.1	SE16NW / 6	30	10
CROFT BOUNDARY	LM	DESERTED VILLAGE	NY.1525.1.1	SE16SE	30	30
TOFT	LM	SHRUNKEN VILLAGE	NY.778.62.2	SE09NW	35	10
CROFT	LM	SHRUNKEN VILLAGE	NY.803.22.2	SE19SE	35	18
CROFT	LM		NY.764.21.3	SE19SW	40	12
CROFT	LM	SHRUNKEN VILLAGE	NY.792.4.2	SE19SE	40	15
CROFT	LM	DESERTED VILLAGE	NY.794.1.1	SE19SE / 2	40	18
ENCLOSURE	UM		NY.1345.26.1	SD85SE	40	20
SETTLEMENT	LM	DESERTED VILLAGE	NY.739.14.1	SE08NW / 7	45	30
CROFT BOUNDARY	LM	FIELD SYSTEM	NY.1333.11.1	SD95NE	45	12
CROFT	LM	DESERTED VILLAGE	NY.767.2.4	SE19SW / 2	50	40
CROFT	LM	SHRUNKEN VILLAGE	NY.803.22.3	SE19SE	50	18
ENCLOSURE	UM		NY.406.2.1	SD99SE	60	20
CROFT	LM	DESERTED VILLAGE	NY.726.1.2	SE19NW	80	25
CROFT	LM	SHRUNKEN VILLAGE	NY.805.41.1	SE19SE	90	10
CROFT	LM	SHRUNKEN VILLAGE	NY.763.13.1	SE19SW	100	
CROFT BOUNDARY	UM		NY.1340.1.1	SD85SE	100	30
CROFT	LM	DESERTED VILLAGE	NY.726.1.12	SE19NW	110	40
CROFT	LM	DESERTED VILLAGE	NY.726.1.15	SE19NW	160	

7-40 m, with 85% in the 7-20 m range. (The sites recorded in the ENCLOSURE table with an interpretation of croft or toft also fit within the size range of these central bands, with the exception that the tofts also include some smaller sizes). However, apart from this general picture, no size trends were discerned within this category. This may indicate that the data sample is not large enough, or that there was originally no simple standardisation in the plans of these medieval settlements (remembering that the lack of precision in the data will only show broad patterns and is unlikely to show specifics of the measurement units used). Alternatively, it may be that the overall pattern is masking a number of different small groupings within it. Further analysis using spatial information might be productive, for example of the seven GROUPS including systems where the average lengths lie in the range 30-50 m and the average breadths in the range 12-20 m, four are neighbouring villages lying within a few kilometres of each other north-east of Leyburn (NY.764.21, NY.792.4, NY.794.1, NY.803.22; NY.794.1, Garriston, appears on Figure 4.1.1c), and one lies less than 10 km away in Swaledale (NY.826.21). Any further analysis is likely to be more effective if the information from successful settlement sites can also be incorporated, as the sample recorded by the project only included abandoned sites or parts of sites.

FORM

FORM describes the original physical make-up of the LINEAR SYSTEMS, whether predominantly defined by ditches, banks, pits or consisting of a system of ridge and furrow. No pit-defined LINEAR SYSTEMS were identified, and 722 sites were defined by ridge and furrow. Of the 548 remaining sites, almost 87% are primarily bank-defined. There are very few ditch-defined systems, perhaps a reflection of the general lack of crop-mark sites in which ditched elements are the usual survivors; all twenty two were seen as earthworks, with only two being partly visible as crop marks.

UNIT-DEFINED TRACKWAYS

Only 39 of the LINEAR SYSTEMS were described as having UNIT-DEFINED TRACKWAYS, of which 26 (67%) were described as being of Medieval or Unknown Medieval date. Nine of the sites with UNIT-DEFINED TRACKWAYS were also described as ENCLOSURE COMPLEXES.

4.2.3 Linear feature table

Table 4.2.3 LINEAR FEATURE table - Site Interpretation and Period

Site Interpretation	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	TOTAL
ABBEY							1					1
ADIT								2				2
AERIAL ROPEWAY								1	1			2
ANNEX *			1									1
AQUEDUCT									1			1
ARROW (MILITARY EARTHWORK) *									2			2
AVENUE OF TREES								1				1
BANK					12	2	4	12		33	48	111
BARN								1		2		3
BARN PLATFORM										1		1
BIELD								8	1	2		11
BOUNDARY			3	4	54	1	45	41		291	106	545
BOUNDARY BANK			1		3		13			32	14	63
BOUNDARY DITCH							4	4		20	6	34
BRIDGE								1		1		2

BUILDING			1		5		8	14		11	4	43
CAIRN			2									2
CANAL										1		1
CAUSEWAY										1		1
CHAPEL										1		1
CROFT							6			2		8
CROFT BOUNDARY *							8			12		20
CULTIVATION MARKS											3	3
DAM							2	122	1	13		138
DESERTED MEDIEVAL SETTLEMENT *										1		1
DESERTED VILLAGE							1					1
DITCH					1		3				1	5
DRAIN				5			10	73	1	59	11	159
DRAINAGE SYSTEM								15		19		34
DROVE ROAD					3	2				12	1	18
DYKE						4				7	9	20
EARTHWORK							1	1			1	3
ENCLOSURE			16	4	103	2	14	19		84	101	343
EXTRACTION *								1				1
FARMSTEAD			1							2	1	4
FIELD BOUNDARY			4	6	74		101	749	2	935	206	2077
FIELD SYSTEM			4	2	59	2	14	24		60	12	177
FISHPOND							3			2		5
FLOOD DEFENCES								23	1	9		33
FLUE								14				14
GARDEN							1	1				2
HA HA								1				1
HUNTING LODGE								1				1
HUSH								26		4	1	31
HUT CIRCLE			1		7						1	9
INCLINED PLANE *								7	1			8
LAZY BEDS						1				2	1	4

LEAD WORKINGS								2				2
LEAT							4	215		63	5	287
LEVEL *								1				1
LONG CAIRN	1											1
LYNCHET			1		1	4	147	4	1	185	12	355
LYNCHET FIELD SYSTEM			1	1			13			24	1	40
MANOR							1					1
MILITARY EARTHWORK *									2			2
MILL							1					1
MILL RACE							4	10		17		31
MINING *								2		1		3
MINING (LEAD) *								1		2		3
MOAT							2			1		3
NATURAL FEATURE											1	1
OPENWORK *								7		2		9
ORE PROCESSING AREA *								1				1
OXBOW LAKE										1		1
PEAT CUTTING								1		4		5
PILLOW MOUND								3		4		7
PLANTATION *								4				4
PLATFORM							2			5		7
PLOUGH HEADLAND *							8	1		10		19
POND								1				1
PRACTICE CAMP									1			1
PROSPECTING TRENCH								46		11		57
QUARRY								3		1		4
RAILWAY								7				7
RESERVOIR								3				3
RIDGE AND FURROW			1	1	2	1	287	259		733	3	1287
ROAD				15			1	9		8	5	38
SETTLEMENT			1	1	10		8			22	4	46
SHEEPFOLD							2	21		13	7	43
SHOOTING BUTT *									9			9

SHORT SHAFT *										2	1	3
SLIT TRENCH									2			2
STACK STAND							1			5		6
STEPPING STONES										1		1
STOCK ENCLOSURE			1		5			1				7
TAIL RACE							1	1		1		3
TOFT							2					2
TRACKWAY			3	6	17	3	46	277	6	576	68	1002
TRAMWAY								6	6			12
UNKNOWN *			1	1	2		1	5	2	23	32	67
WALL					5		1	11		9	16	42
WATERCOURSE							3	13		6	12	34
WELL										1		1
WINDING GEAR *								1				1
WORLD WAR 2 DEFENCES *									2			2
Class Totals	1	0	43	46	363	22	774	2078	42	3350	694	7413

The LINEAR FEATURE table contains 7413 records, 40% of the MORPH2 database. It allows for over 200 descriptive variations, including additional information on form and the topographical route followed by the feature. There are forty-eight possible combinations of PATTERN and SHAPE of which forty-two are used in the Dales database. Excluding records describing ridge and furrow, the most common PATTERN and SHAPE combination is 'SINGLE and STRAIGHT' (1173 records).

A substantial part of the LINEAR FEATURE table (1287, 17%) consists of records describing ridge and furrow. A further 395 records relate to lynchets; both these and the ridge and furrow are discussed in 4.1.1.

The largest single interpretation is field boundary (2077, 28%). The interpretation boundary was used for 545 records, a little over 7% (see 4.1.11). The comparison of these two interpretations is not entirely valid since boundary can refer to a variety of quite different features (51 are flagged as probable enclosures) while field boundary is very specific, but functionally they are both designed to exclude and/or contain and could be expected to show similarities in form. There are no marked differences between these two interpretations in terms of their structures. The majority of field boundaries, 1438 (69%) were seen as a single bank, with the boundaries proportionately higher at 411 (75%). The percentages for those features of single ditch form are closer with 13% for field boundaries and 12% for boundaries. In both cases there were very few features of multiple construction, ie with a combination of two or more banks and/or ditches. Only 3% of the field boundaries and 6% of the boundaries were of combined bank and ditch form. In total there are 376 linear

features (including field boundaries and boundaries) which are of multiple construction. Most are two element features but 67 have triple elements, while two others have five and two have six elements. Of the latter four, three records describe military rifle ranges and the remaining record has the interpretation 'unknown', of Unknown period.

After ridge and furrow and field boundaries, trackways (1002) are the most common feature recorded under the LINEAR FEATURE table. The greatest number (861) are described as single ditch in form, usually an indication that they are eroded hollow ways and are not the product of any deliberate construction.

There are only seven LINEAR FEATURE records which are pit-defined, all of them are lines of shafts or trenches related to mining activity (see 4.1.5).

501 LINEAR FEATURES were flagged as the incomplete remains of enclosures (see 4.2.2). The majority of these (93%) were listed as either Unknown, Unknown Medieval or Unknown Prehistoric, perhaps reflecting the uncertainty inherent in the interpretation of such fragmentary remains. A further 3369 records were flagged as being parts of linear systems (see 4.2.3), most of them (88%) listed as either Unknown Medieval, Post-Medieval or Late Medieval as their period. 2703 of these are interpreted as either field boundaries, ridge and furrow or lynchets. For the 275 records flagged as 'both' (ie potentially fragments of an enclosure and a field system, or a series of conjoined enclosures), 71% were thought to be medieval or later.

The LENGTH measurements for the LINEAR FEATURES, like the ENCLOSURE dimensions, show the effect of rounding to the nearest ten metres for all but the shortest LINEAR FEATURES and rounding to the nearest fifty for the longest. LENGTH is in fact of little analytical value since it is frequently impossible to determine the original ends of LINEAR FEATURES. Note that those LINEAR FEATURES which are described as COMPLETE can only be assumed to be complete in so far as they are visible; in other words the visible element may in fact only be a section of an originally much longer feature.

All LINEAR FEATURES described as DISCONTINUOUS or INTERRUPTED may incorporate one or more entrances. Nineteen records in the entrance database are linked to seventeen LINEAR FEATURES, seven of these flagged as enclosures (see 4.2.1), two as linear systems, one as both and seven with no suggested relationship to either enclosures or linear systems. The entrances in the latter are all simple gaps (TERMINAL DEFINED) in the linear elements.

4.2.4 Macula table

Table 4.2.4 MACULA table - Site Interpretation and Period

Site Interpretation	MORPH records											TOTAL	
	NE	BA	IA	RO	UP	EM	LM	PM	MO	UM	U	Records	Maculae
ADIT								45		5	2	52	328
AIR SHAFT								3				3	6
ANTI-AIRCRAFT BATTERY									1			1	3
BANK								1				1	2
BARN								4		4		8	8
BARN PLATFORM								3		10		13	15
BARROW		6			5						2	13	13
BEACON								3				3	3
BELL PIT										1		1	11
BOMB CRATER									5			5	31
BOUNDARY MOUND										4		4	7
BOUNDARY STONE								1		1		2	2
BUILDING					2	1	2	5	2	7	2	21	35
CAIRN		13	2		42			3		5	28	93	141
CHAPEL										1		1	1
CHIMNEY								19				19	19
CLAY PIT								5				5	5
CLAY PUDDLING PIT								2				2	4
CLEARANCE CAIRN			1		25			2		8	18	54	165
COAL MINE								7				7	7
COAL PIT *								123		27		150	1991
CONDENSER *								1				1	1
CRANNOG *					1							1	1
DAM								3				3	3
DEWPOND								1		2	1	4	7
DRESSING FLOOR								1				1	1
ELLING KILN *										5		5	5
ENCLOSURE					1			1		3	2	7	7

EXTRACTION *								13	2	13	3	31	174
FARMHOUSE								1				1	1
FISHPOND							9	2		2		13	21
FLAGSTONE QUARRY *										1		1	1
FLOOD DEFENCES									5			5	205
GARDEN								1				1	1
GRAVEL PIT								62	3	7	1	73	89
HORSE WHIM								8				8	9
HOUSE							1					1	1
HUSH								2				2	2
HUT CIRCLE					2						1	3	7
KILN								2			1	3	3
KNOCK STONE							1					1	1
LEAD WORKINGS								4				4	146
LEAD WORKS								3				3	21
LEVEL *								56	1	2	1	60	91
LIME WORKS								1				1	1
LIMEKILN								498	3	21		522	532
LIMESTONE QUARRY							1	599	15	24	1	640	839
LYNCHET										1		1	3
MILITARY EARTHWORK *									6			6	11
MILL								3				3	3
MILL POND							2	5		2		9	11
MINING *								17		5		22	178
MINING (LEAD) *								47		12		59	1263
MOAT							2					2	3
MOTTE							4					4	4
MOUND				3	2		2	2		20	37	66	90
NATURAL FEATURE											1	1	1
OPENWORK *								5		1		6	6
ORE PROCESSING AREA *								1				1	2
PEAT CUTTING								95	1	36		132	192
PILLOW MOUND							1	5		10		16	35

PIT								3		2	1	6	34
PIT CLUSTER										2		2	52
PLANTATION *								1		1		2	2
PLATFORM					3		3	4	8	9	11	38	88
PLATFORM SETTLEMENT											1	1	1
POND								7		7		14	18
POST MILL							1					1	1
PROCESSING AREA *								2				2	2
PROSPECTING TRENCH								5		4		9	51
PYE KILN *							1	1		10		12	15
QUARRY						3	1	1178	20	332	37	1571	2527
RAILWAY TURNTABLE									3			3	3
RESERVOIR								15		1		16	16
RIFLE BUTTS									1			1	3
ROUND BARROW		3									1	4	4
SAND PIT							1	13		1		15	16
SANDSTONE QUARRY								262		4		266	482
SETTLEMENT			1		3		1			4	9	18	22
SHAFT								153		11		164	692
SHOOTING BUTT *									2			2	5
SHORT SHAFT *								200		146	7	353	5113
SLATE QUARRY								2				2	3
SMELT MILL								2				2	2
SPOILHEAP								187	19	11	4	221	309
STACK STAND										3		3	3
STANDING STONE								1			1	2	9
STONE CIRCLE		1										1	4
TENNIS COURT								1				1	1
UNKNOWN *							2	2		6	10	20	25
WELL										3		3	3
WHEEL PIT								2				2	2
WINDMILL										2		2	2
Class Totals	0	23	4	3	86	4	35	3706	97	799	183	4940	16279

The MACULA table contains 4940 records, 27% of the MORPH2 database. However, as the MACULA table allows the recording of multiple, similar elements using a single record, these records describe 16,279 individual maculae. The number of elements in each record varies from 1 to 500, with more than half the maculae (8936) being recorded in only 206 records, describing groups of ten or more features.

The MACULA table is the simplest of the morphological tables, but even so there are 450 possible different descriptions, without taking into account the 'Number of maculae' in each description. 192 of these possibilities have been used in the Dales project database.

A large proportion (90%) of the MACULA records relate to industrial activity and more specifically describe the evidence of extraction, whether it be quarries or small mining shafts (see section 4.1.5). The INDUSTRIAL COMPLEX table also has fields that can record information on features such as short-shafts (bell-pits), shafts, adits, open-workings and peat cutting (see 4.2.5 & 4.1.5). All of the records describing groups of ten or more maculae relate to extraction, except for one describing bomb craters (see 4.1.2).

The most commonly recorded SHAPE in the MACULA table is AMORPHOUS with 2358 records (48%, describing 5441 maculae); of these half relate to quarries (1182 records, 1920 quarries). Short shafts account for a high number of the AMORPHOUS maculae (1713) but are described using only 14 records. Most short shafts are described as ROUND, 3395 (338 records), which along with coal pits (1918 pits, 135 records) account for 31% of all the ROUND MACULA records (1510) and 61% of all ROUND maculae (8735).

The PATTERN of the maculae within each record is recorded. 3555 of the records relate to single features (72% of the total number of MACULA records but only 22% of the total number of maculae recorded). The commonest PATTERN recorded is a LINEAR arrangement (465 records, 6801 maculae) dominated by the short shafts (128 records, 3728 maculae) and the more general lead mining records (26 records, 1094 maculae), in both cases reflecting the linearity of the ore veins being followed. Coal pits are the commonest interpretations for maculae in a RANDOM arrangement (79 records, 1584 maculae) with randomly patterned short-shafts also accounting for many features (85 records, 959 maculae). Higher than the combined total for coal pits and short shafts is the number of records for quarries with a RANDOM PATTERN (199), but this equates to a much lower number of individual features (604).

The importance of extractive industries is reflected in the high proportion of records described as NEGATIVE in form (3578 records, 10,817 maculae), although a large number are described as having a POSITIVE form (113 records, 2777 maculae) reflecting the pile-up of waste material around the head of shafts.

The majority of MACULA records describe features in the SMALL (1-4 m across) and MEDIUM (4-15 m across) size bands (2245 records, 12,034 maculae); almost all of the short-shafts and coal-pits fall into these bands. The records of LARGE (15-50 m

across) and VERY LARGE (over 50 m across) maculae (2678 records, 3830 maculae) are biased to the quarries (1184 records, 1681 maculae) and, more particularly, the limestone quarries (a further 568 records, 741 maculae).

4.2.5 Industrial complex table

Table 4.2.5 INDUSTRIAL COMPLEX table - Site Interpretation, Period and approximate area

Site Interpretation	PM	MO	UM	TOTAL	AREA km ²
COAL MINE	4			4	4.17
COAL MINING *	2			2	0.32
COAL PIT *	4			4	0.26
LEAD WORKINGS	13		4	17	3.42
LEAD WORKS	5			5	3.40
LIMEKILN	1			1	0.02
LIMESTONE QUARRY	3	1		4	0.44
MINING *	2		1	3	0.04
MINING (LEAD) *	45		8	53	61.17
PEAT CUTTING	2			2	0.61
QUARRY	3			3	0.15
SANDSTONE QUARRY	2			2	0.45
SLATE QUARRY	1			1	0.02
Class Totals	87	1	13	101	74.47

An INDUSTRIAL COMPLEX record, unlike the other four SITE TYPE options discussed above, does not give a morphological description of a single feature, but rather an interpretative summary of the remains of a specific activity or related activities (see 4.1.5 and the introduction to this section, 4.2). The database holds 101 such records, a little more than 0.5% of the total number of records (see Table 4.2.5). Most relate to lead mining and are discussed in the Industrial class Section 4.1.5. Eighty-five of the records list the presence of shafts of some kind, reflecting this predominance of mining. Other features commonly listed are openworks (55 records), leats (56) and buildings (54). Only twelve records are not directly attributable to mining activity, ten of these relating to stone quarrying and two to peat cutting, the latter perhaps supplying fuel for smelting lead ores (see 4.1.5).

4.2.6 New classes

The subdivided rectangular enclosures discussed in 4.2.2 as 'Ingletons' appear to belong to a previously unrecognised class of monument. It is worth stressing that this identification is based solely on their morphology, as recorded in the MORPH2 database and seen on the 1:10,560 transcriptions. Further study is necessary in order to confirm or contradict this identification. If confirmed, the maps and databases should again be consulted in order to see if those sites discounted in the initial search are related or if the search needs to be widened.

The 'Askrigg' enclosures, discussed in 4.1.3, are not so obviously a class, but have sufficient factors in common to warrant closer examination.

Other new classes of monument probably await identification within the database and transcriptions, see Section 5.

It is equally important to emphasise the need to study some of the already known classes of monument in a similar analytical manner. By identifying the variety of their characteristics and their key diagnostic features, the accuracy of their past classification could be assessed and their future recognition improved.

The stack stands, discussed under Agriculture and Subsistence (see 4.1.1), clearly belong to a single class but an under-appreciated one rather than new.

4.3 PERIOD SUMMARIES

All records in the database are ascribed to a specific Period band (Neolithic, Bronze Age, Iron Age, Roman, Early Medieval, Medieval, Post-Medieval or Modern), or to a more general Period band (Unknown Prehistoric, Unknown Medieval, or are simply Unknown). The database does not allow individual records to be ascribed to more than one period, therefore a MORPH2 site that was thought to be either Roman or Iron Age in date would be ascribed to the Unknown Prehistoric period. (Because the MORPH2 database describes each individual site element separately, multi-period sites are adequately catered for, it is only the uncertainty of dating or continuous use of a site element that cannot be recorded in detail).

The Period summaries that follow use the data from these Period bands as their starting point but the degree of overlap, along with the imprecise dating of most sites, requires their use only as a general guide. For each Period summary a table supported by a distribution map documents the actual numbers of records in each Period band. Additional distribution maps for the Medieval and Unknown Medieval Periods depict the pattern with the evidence for ridge and furrow removed.

Additionally, a bar chart (Figure 4b) shows the relative numbers of sites according to the various Period categories, as well as the amount of information recorded in some form previously in either the SMR or NAR. It shows clearly that the majority of

sites are described as of Unknown Medieval Period or Post-Medieval Period, and are largely new to the record.

It is important to remember that the data do not give a full archaeological summary of the development of the landscape, only a general picture of the information available from the specific sources used in the project.

4.3.1 Unknown

Group Interpretations

ENCLOSURE	1
FARMSTEAD	3
FIELD SYSTEM	20
MINING *	1
MINING (LEAD) *	1
SETTLEMENT	15
SHEEPFOLD	1

Total 42

Site Interpretations

ADIT	2	LEAT	5
BANK	48	LEVEL *	1
BARROW	2	LIMESTONE QUARRY	1
BOUNDARY	106	LYNCHET	12
BOUNDARY BANK	14	LYNCHET FIELD SYSTEM	2
BOUNDARY DITCH	6	MOUND	37
BUILDING	51	NATURAL FEATURE	3
CAIRN	28	PIT	2
CLEARANCE CAIRN	18	PLATFORM	24
CULTIVATION MARKS	3	PLATFORM SETTLEMENT	2
DEWPOUND	1	QUARRY	37
DITCH	1	RIDGE AND FURROW	3
DRAIN	11	ROAD	5
DROVE ROAD	1	ROUND BARROW	1
DYKE	9	SETTLEMENT	22
EARTHWORK	1	SHEEPFOLD	79
ENCLOSURE	657	SHORT SHAFT *	8
EXTRACTION *	3	SPOILHEAP	4
FARMSTEAD	2	STACK STAND	1
FIELD BOUNDARY	206	STANDING STONE	1
FIELD SYSTEM	39	STOCK ENCLOSURE	4
GRAVEL PIT	1	TRACKWAY	68
HUSH	1	UNKNOWN *	51
HUT CIRCLE	70	WALL	16
KILN	1	WATERCOURSE	12
LAZY BEDS	1		
		Total 1684	

A total of 1684 records (9% of the total) are ascribed to the Unknown Period band. They are evenly distributed within the overall pattern of records for the area (Figure 4.3.1 & Figure 4a).

A majority of sites tend to have rather vague or chronologically long-lasting interpretations like 'enclosure', 'boundary', 'field boundary' and 'sheepfold'. There is also a higher proportion of records with low VALIDITY scores than for any other period (38.5% with a score of 2 or less). Many may have been given low VALIDITY scores to reflect their author's uncertainty whether features were archaeological, but there is no way to quantify this assumption. The only other period with a high percentage of low VALIDITY scores is the Iron Age, with 34%, and in this case the doubt is probably related to accepting previously recorded sites as Iron Age (see the introduction to section 4 for VALIDITY scores for the whole database).

4.3.2 Pre-Neolithic

No sites were recorded as belonging to a Pre-Neolithic era; Mesolithic flint scatters and implements from earlier periods are known from the area (King 1970), but will clearly not be detectable from aerial evidence alone.

4.3.3 Neolithic

Group Interpretations

None

Site Interpretations

HENGE	1
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LONG CAIRN	1
------------	---

Total	2
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Only 2 records are ascribed to the Neolithic Period, both for sites previously recorded in both the NAR and SMR (Figure 4.3.3). The Castle Dykes henge (NY.553.1.1) is described in the NMR as class 1, Neolithic, but Harding and Lee (1987) were less accepting of its authenticity. The absence of long barrows or their equivalent is particularly noticeable (see 4.1.8). It is possible, in an area of generally high archaeological survival, that this low representation of sites from a period noted elsewhere for large scale ritual and funerary monuments stems from a problem of recognition and not a genuine absence. However, a prerequisite for the construction of large funerary and ritual sites is the ability for large groups of people to act in concert towards a single non-economic goal. Perhaps the absence of henges and large tombs of this period simply indicates a very low and dispersed Neolithic population in this area. Finds and simple inhumations from this period are known, mostly from caves, but no settlement sites have been identified.

4.3.4 Bronze Age

Group Interpretations

None

Site Interpretations

BARROW	6
BOWL BARROW	1
CAIRN	17
HENGE	1
HUT CIRCLE	5
RING CAIRN	7
ROUND BARROW	3
STONE CIRCLE	4

Total 44

There are 44 records (0.002% of the total) ascribed to the Bronze Age, the majority occurring in the southern half of the project area (Figure 4.3.4). Only six (14%) were not previously recorded in either the NAR or SMR. Three are possible 'ring groove' huts, now destroyed (NY.782.33.1-3, see Section 4.1.3.1); the others are a cairn site (NY.907.8.1), a ring cairn (NY.1102.8.1) and a barrow (NY.1336.3.1).

Almost all the records describe sites of ritual or funerary use except for a handful of hut circles. The absence of further records is almost certainly due to the absence of accurate dating; many of the Unknown Prehistoric sites, particularly the settlements with hut circles, may have originated in the Bronze Age.

As yet there is no evidence for major man-made land divisions in the Bronze Age, either in the form of dykes or lines of barrows, like those identified in other parts of northern England (Spratt 1989). The few major dykes in the area are generally thought to be of a later date (see 4.1.2.1).

In the past, the coaxial field systems in the Dales have been compared to the systems on Dartmoor and assumed to belong to the Bronze Age. Recent field investigation of the Swaledale systems suggests that these are more probably of Iron Age date (Fleming 1986, interim report). The coaxial systems in Wharfedale are extensive and have complex associations with a multiplicity of other features, in a landscape which includes a number of Bronze Age cairns. These systems may well conceal elements of Bronze Age land division (see 4.1.1.6).

4.3.5 Iron Age

Group Interpretations

FARMSTEAD	2
SETTLEMENT	26

Total 28

Site Interpretations

ANNEX *	1	HUT CIRCLE	168
BOUNDARY	3	LYNCHET	1
		LYNCHET FIELD	
BOUNDARY BANK	1	SYSTEM	3
BUILDING	17	OPPIDUM	1
CAIRN	4	PLATFORM	7
CLEARANCE CAIRN	1	PROMONTORY FORT	1
ENCLOSURE	90	RIDGE AND FURROW	1
FARMSTEAD	3	SETTLEMENT	12
FIELD BOUNDARY	4	STOCK ENCLOSURE	9
FIELD SYSTEM	13	TRACKWAY	3
HILLFORT	5	UNKNOWN *	1
			Total
			349

A total of 349 records (1.9% of the total) are ascribed to the Iron Age (Figure 4.3.5). Of these records, 31 (9%) were not previously recorded in either the NAR or SMR; they have generally been dated by local association with other sites previously recorded as Iron Age. The records show a clear concentration in the area between Grassington and Ingleton (described above as the southern Limestone Belt, see 4.2.1) and is a clear indication of the importance of the effect of a field archaeologist (Arthur Raistrick) working the area intensively (see 3.1.1). This picture is echoed and complemented by the distribution of Unknown Prehistoric sites (see fig 4.3.7).

Almost all the Iron Age records are related to settlement and agriculture (hut circles, enclosures and field systems), apart from four cairns in the class of Ritual, Religious or Funerary monuments. Two of the cairns produced Iron Age inhumations (NY.955.93.1, SD 96 NE / 19; NY.1205.32.1, SD 86 SE / 4). The two other sites described in the NAR as possible Iron Age cairns are the monuments known as the 'Celtic Wall' (NY.1239.51.1 & 2, SD 86 NW / 2); although clearly of great antiquity these enigmatic structures are essentially undated. The coaxial field systems that occur in many parts of the area may belong to the Iron Age (see 4.1.1.6).

A number of major dykes in Swaledale, previously ascribed to native resistance to the Roman conquest, are now thought more likely to be of early medieval date (see 4.1.2.1; Fleming 1994).

The Iron Age is also represented by a small number of defensive sites in the form of hillforts and promontory forts, Ingleborough being the best known example (see 4.1.2.2). Some of the sites interpreted as hill forts were labelled in accordance with existing NAR/SMR records, though their location and construction suggest that defence may not have been the primary concern of their builders (see 4.1.3.2). New to the record is one possible hillfort, identified in a prominent position north-west of Skipton (see 4.1.2; Figure 4.1.2.2b).

The Stanwick oppidum (NY.705.1) is also assigned to this period and has the distinction of being the largest ENCLOSURE in the database.

4.3.6 Roman

Group Interpretations	
DRAINAGE SYSTEM	1
FARMSTEAD	3
SETTLEMENT	11
SIGNAL STATION	1
VILLA	1
Total	17

Site Interpretations		MARCHING CAMP	1
ANNEX *	1	MOUND	3
BOUNDARY	4	PLATFORM	12
BUILDING	10	RIDGE AND FURROW	1
DRAIN	5	ROAD	15
ENCLOSURE	50	SETTLEMENT	2
FARMSTEAD	4	SHEEPFOLD	1
FIELD BOUNDARY	6	STOCK ENCLOSURE	4
FIELD SYSTEM	4	TRACKWAY	6
FORT	3	UNKNOWN *	1
HUT CIRCLE	24		
LYNCHET FIELD		Total	158
SYSTEM	1		

158 records (0.9% of the total) are ascribed to the Roman Period (Figure 4.3.6). Of these, 25 records (16%) were not previously recorded in either the NAR or SMR. Again, the distribution shows the effect of field work in the Southern Limestone Belt but the evidence for Roman forts, a marching camp and roads shows a wider distribution (see 4.1.2.3 & 4.1.9).

Most of the records relate to 'native' type settlements, with only one record of a 'villa', at Gargrave (NY.1404.5, SD 95 SW / 4; see also 4.1.10). The potential existence of other forts and routes for roads has been discussed in Section 4.1.9, as has the lack of clear evidence for the undoubtedly important Roman lead industry of the area (see 4.1.5). Many of the more regular settlements and field systems, throughout the area, have generally been placed in the Medieval or Unknown Medieval Period bands, but it is possible that in some areas (eg Littondale and Swaledale) these may have already existed in the Roman period.

4.3.7 Unknown Prehistoric (Roman or earlier)

Group Interpretations	
ENCLOSED CREMATION	
CEMETERY	1
FARMSTEAD	8
FIELD SYSTEM	42
PLATFORM SETTLEMENT	1

SETTLEMENT	100		
	Total 152		
Site Interpretations		HILLFORT	1
BANK	12	HUT CIRCLE	444
BARROW	5	LYNCHET	1
BOUNDARY	54	MOUND	2
BOUNDARY BANK	3	PLATFORM	5
BUILDING	58	PLATFORM SETTLEMENT	2
CAIRN	43	PROMONTORY FORT	1
CLEARANCE CAIRN	25	RIDGE AND FURROW	2
CRANNOG *	1	RING CAIRN	5
DITCH	1	SETTLEMENT	42
DROVE ROAD	3	STOCK ENCLOSURE	26
ENCLOSURE	620	TRACKWAY	17
FARMSTEAD	6	UNKNOWN *	2
FIELD BOUNDARY	77	WALL	5
FIELD SYSTEM	113		
FORT	1		
		Total 1577	

In all, 1577 records (8.6% of the total) are ascribed to the Unknown Prehistoric Period (Figure 4.3.7); 609 (38.6%) were not previously recorded in either the NAR or SMR; a further 305 (19.3%) in the county SMR had only been recorded from aerial photographs.

The most unusual record is for a crannog, visible as a differential growth of reeds in the shallow waters of Semer Water. The site is not widely known, despite being the only recorded crannog still surviving in open water in England (Campbell and Lane 1989). The existing NAR record for the site describes it as Iron Age, but there are also significant quantities of Neolithic and Bronze Age finds along the adjacent shoreline.

Records for this Period have done much to show that the previously known distribution of sites of Iron Age and Roman date, concentrated on the limestone areas in the south, represents only a part of the story. Although the highest density of records is still in this area, it is clear that settlement occurred in most of the rest of the project area, though often less easy to identify outside the thin soils of the Great Scar Limestone. For example, the platform settlements, with huts built on individual terraces on the steeper valley slopes, of the kind identified in Swaledale (Fleming 1986) and more recently in Wharfedale (Cardwell 1991), are not easy to identify on small-scale vertical photography. Field systems (see 4.1.1) may give a better idea of the area that might have been in agricultural use in the late Prehistoric and Roman periods. The distribution of field systems of this period may be even more extensive, as it is possible that some of those on the lower slopes of Wharfedale, Littondale and Swaledale, and possibly some other areas, have an earlier origin than the usually attributed medieval one. That the perceived distributions of sites of this period (ie a bias towards the limestone areas) may be more complicated, can be seen in the analysis of enclosure size and shape in section 4.2.1.

4.3.8 Early Medieval (to AD 1086)

Group Interpretations			
FARMSTEAD	5		
FIELD SYSTEM	4		
LYNCHE		FIELD	
SYSTEM	2		
SETTLEMENT	6		
	Total		
	17		
Site Interpretations			
		LONG HOUSE	10
BANK	2	LYNCHE	4
		LYNCHE	FIELD
BOUNDARY	1	SYSTEM	8
BUILDING	21	PLATFORM	3
DROVE ROAD	2	QUARRY	3
DYKE	4	RIDGE AND FURROW	1
ENCLOSURE	13	SETTLEMENT	1
FARMSTEAD	1	STOCK ENCLOSURE	2
FIELD SYSTEM	5	TRACKWAY	3
		Total	
LAZY BEDS	1		85

85 records (0.5% of the total) are ascribed to the Early Medieval Period (Figure 4.3.8); 15 (17.6%) were not previously recorded in either the NAR or SMR.

The distribution of the sites is much the same as for the Roman period, which may say more about the difficulty of attributing accurately to either of these periods on morphology alone than it does about continuity of settlement patterns. For example, the term 'long house', with the period attribution of Early Medieval, has been used to describe 10 SITES. At Ribblehead excavations indicated a ninth century AD date for a long house in a group of buildings and enclosures (SD 77 NE / 12, NY.1181.16; two additional long houses nearby are also recorded, NY.1181.5.1 & 2), and other sites have been put forward as having a similar date on morphological grounds (Kingsdale, NY.1245.7; Greenber Edge NY.556.5 & 7, Figure 4.3.8b). The five database GROUPS in which these occur account for 25 of the Early Medieval records (29%), and reflects the way this morphological type is used by some as a possible diagnostic sign of the period. But the number of sites described specifically as Early Medieval long houses is not a reliable indicator of the possible number of such sites in the project area. Another 13 long houses have been ascribed to the Unknown Medieval or Post-Medieval periods and further analysis based on dimensions, along with interpretations such as 'building', would provide a fuller picture of sites worthy of further examination (eg a site near Malham Moor Lane, NY.1034.1). Additionally it is possible that not only long houses but round houses may belong to this period, though either may of course relate alternatively to earlier periods. For instance the enclosed settlement at Lea Green contains several rectangular houses and is described as 'A village site dating from the late Iron Age to the third century AD...' (NMR record, SD 96 NE /20). This interpretation is based on the finds from

an excavation conducted in AD 1893 and since the site is in the middle of a complex multi-period landscape the contextual integrity of the finds must be treated with caution.

The striking strip lynchets that are a feature of many parts of the Dales, especially Wensleydale, have been described as of Anglian origin (Raistrick 1968, 85-6). In the database a few of the records have been assigned to the Early Medieval Period, but most have been more cautiously described as of Unknown Medieval Period (see also 4.1.1).

4.3.9 Medieval (1086-1540)

GRANGE	3
MANOR	2
MOTTE AND BAILEY	1
PRECEPTORY	1
RELIGIOUS HOUSE	2
SETTLEMENT	16
SHIELING	1
SHRUNKEN VILLAGE	8
Total	366

Site Interpretations		MANOR	2
ABBEY	1	MILL	2
BAILEY	5	MILL POND	4
BANK	4	MILL RACE	4
BARN PLATFORM	4	MOAT	7
BOUNDARY	46	MOTTE	5
BOUNDARY BANK	14	MOUND	2
BOUNDARY DITCH	4	PELE TOWER	1
BUILDING	74	PILLOW MOUND	3
CASTLE	4	PLATFORM	11
CHAPEL	2	PLOUGH HEADLAND *	8
CROFT	29	POST MILL	1
CROFT BOUNDARY *	10	PYE KILN *	1
DAM	2	QUARRY	1
DESERTED VILLAGE	2	RELIGIOUS HOUSE	1
DITCH	3	RIDGE AND FURROW	609
DRAIN	10	ROAD	1
EARTHWORK	1	SAND PIT	1
ENCLOSURE	90	SETTLEMENT	16
FARMHOUSE	1	SHEEP HOUSE	4
FARMSTEAD	1	SHEEPFOLD	15
FIELD BOUNDARY	106	SHIELING	1
FIELD SYSTEM	40	STACK STAND	19
FISHPOND	19	STOCK ENCLOSURE	2
GARDEN	2	TAIL RACE	1
HOUSE	1	TOFT	24
KNOCK STONE	1	TRACKWAY	46

LEAT	4	UNKNOWN *	7
LIMESTONE QUARRY	1	WALL	1
LYNCHET	149	WATERCOURSE	3
LYNCHET FIELD SYSTEM	86	Total	1519

1519 records (8.3% of the total) are ascribed to the Medieval Period (Figures 4.3.9a & b); 982 (64.6%) were not previously recorded in either the NAR or SMR (506 being of ridge and furrow). The distribution is noticeably more biased to the lower-lying ground and away from the heads of the individual dales, perhaps in part reflecting the limits of the medieval deer forests (see 4.1.4). Also the distribution is largely complementary to that for the Prehistoric and Roman Periods reflecting the nature of earthwork remains, with those from the earlier periods being masked or destroyed by later features.

The bulk of the records fall into the Agricultural and Subsistence class (1,090 records, 72%), with 995 (66%) relating specifically to ridge and furrow or other types of field system. Some areas preserve remarkable, continuous landscapes, like that west of Castle Bolton (see 4.1.1; Figures 4.1.1.2b & c, & 4.3.9c).

The number of deserted or shrunken villages recorded is not high given the size of the area surveyed. Many comparable sites, however, may have been given the more general interpretation of 'settlement' or the more specific terms 'croft' or 'toft', or may be described as of Unknown Medieval Period. The transcriptions may well contain evidence of regular planned villages (as has been suggested in 4.2.2); analysis is needed of all such sites, including those with original boundaries fossilised in the present-day layout of the village and its hinterland (the project records only describe those elements surviving solely as earthworks). One deserted village, Walburn, requires special mention because despite being very well preserved in the midst of a large area of almost intact ridge and furrow, and lying alongside a well-known fortified farm house the site remained unrecorded until identified by examination of vertical photography in the course of the project (Horne 1994). Subsequent targeted photography has revealed the site more clearly (Plate 4.3.9d).

The influence of monasticism is certainly under represented in the database, for as well as the abbeys and priories that have long been well known there are many grange sites and sheep houses to be identified. It is likely that many will have been mapped in the project, but air photo evidence alone rarely allows such detailed interpretations. Further work, perhaps linking documentary evidence to the maps and map overlays, may help to identify distinctive morphological characteristics of such sites and therefore help the recognition of such sites in the present record and in the future. For example a number of systems of conjoined enclosures which do not appear to be primarily settlements may be related to activities such as the sorting of sheep. Other sites where a planned layout suggests a centralised organisational structure may also require further investigation in this context (eg the sites in the 'Ingleton' class described in 4.2.1).

There is good documentary evidence for the exploitation of lead in the Medieval period, often under monastic control (Raistrick 1975, 17-24), but this is not reflected

in the database because of the lack of any ready way of identifying early mining on the basis of the surface appearance of the remains (see 4.1.5).

4.3.10 Post-Medieval (1540-1900)

Group Interpretations		LIMESTONE QUARRY	1
COAL MINE	4	MILL	1
COAL MINING *	32	MILL POND	1
CONSTRUCTION CAMP			
*	1	MINING *	22
CRUSHING MILL *	3	MINING (LEAD) *	49
		ORE PROCESSING AREA	
EXTRACTION *	3	*	1
FARMSTEAD	11	POTTERY WORKS	2
FIELD SYSTEM	155	QUARRY	7
FLOOD DEFENCES	2	RABBIT WARREN	1
FOLLY	1	SANDSTONE QUARRY	1
HOUSE	1	SETTLEMENT	5
LEAD WORKINGS	4	SMELT MILL	4
LEVEL *	1	TILE WORKS	1
LIME WORKS	3		Total 317
Site Interpretations		LIME WORKS	1
ADIT	47	LIMEKILN	502
AERIAL ROPEWAY	1	LIMESTONE QUARRY	602
AIR SHAFT	3	LONG HOUSE	6
AVENUE OF TREES	1	LYNCHET	4
BANK	13	MILL	4
BARN	130	MILL POND	5
BARN PLATFORM	15	MILL RACE	10
BEACON	3	MINING *	21
BIELD	8	MINING (LEAD) *	93
BOUNDARY	41	MOUND	2
BOUNDARY BANK	1	OPENWORK *	12
		ORE PROCESSING AREA	
BOUNDARY DITCH	4	*	3
BOUNDARY STONE	1	PEAT CUTTING	98
BOUSE TEAM	7	PEAT STORE	5
BRIDGE	1	PILLOW MOUND	9
BUILDING	300	PIT	3
CAIRN	3	PLANTATION *	24
CHIMNEY	19	PLATFORM	5
CHURCH	2	PLOUGH HEADLAND *	1
CIVIL WAR BATTERY *	1	POND	8
CLAY PIT	5	PROCESSING AREA *	2
CLAY PUDDLING PIT	2	PROSPECTING TRENCH	51
CLEARANCE CAIRN	2	PYE KILN *	1
COAL MINE	11	QUARRY	1184

COAL MINING *	2	RABBIT WARREN	3
COAL PIT *	127	RAILWAY	7
CONDENSER *	1	RESERVOIR	22
CRUSHING MILL *	6	RIDGE AND FURROW	400
DAM	127	ROAD	9
DEWPOND	6	SAND PIT	13
DRAIN	74	SANDSTONE QUARRY	264
DRAINAGE SYSTEM	16	SHAFT	153
DRESSING FLOOR	1	SHEEPFOLD	193
EARTHWORK	2	SHIELING	3
ENCLOSURE	160	SHORT SHAFT *	200
EXTRACTION *	14	SLATE QUARRY	3
FARMHOUSE	6	SMELT MILL	20
FIELD BOUNDARY	753	SMITHY	1
FIELD SYSTEM	32	SPOILHEAP	187
FISHPOND	3	STACK STAND	6
FLOOD DEFENCES	23	STANDING STONE	1
FLUE	14	STOCK ENCLOSURE	4
GARDEN	3	STONE CIRCLE	2
GRAVEL PIT	62	TAIL RACE	1
GROTTO	1	TENNIS COURT	1
GUARD HOUSE *	1	TRACKWAY	277
HA HA	1	TRAMWAY	6
HORSE WHIM	11	TREE ENCLOSURE RING	1
HOUSE	11	TREE RING	6
HUNTING LODGE	1	UNKNOWN *	8
HUSH	28	WALL	13
INCLINED PLANE *	7	WASHFOLD	5
KILN	2	WATCH TOWER	1
LEAD WORKINGS	19	WATERCOURSE	13
LEAD WORKS	8	WHEEL PIT	3
LEAT	215	WINDING GEAR *	3
LEVEL *	58	Total	6901

6901 records (37.8% of the total) are ascribed to the Post-Medieval Period (Figure 4.3.10); 4612 (66.8%) were not previously recorded in either the NAR or SMR; a further 1902 records (27.6%) had previously been solely recorded in the NAR, almost entirely as a result of the work done on First Edition OS maps (see 3.1). The wide range of interpretations used in the project record for this period partly reflects the availability of map and documentary evidence for structures of more recent times; it also indicates a confidence, derived in part from familiarity, allowing air photo interpreters to use functionally explicit interpretations more frequently for this than any of the earlier Periods.

Many of the records (4104, 59.5%) were interpreted as industrial remains, relating mainly to extractive rather than manufacturing industries. The difficulty in accurately dating the surface remains of low-technology mining means that much evidence for earlier mining activity may have been incorrectly recorded as Post-

Medieval. Of the industrial records, 89 use the INDUSTRIAL COMPLEX table, a shorthand method of recording large areas of industrial activity (see 4.1.5).

Over 21% of the records in this period relate to agriculture and the rural economy. The majority of the limekilns and their associated quarries, though classed as industrial, were really for agricultural use (see 4.1.7). Many of the quarries provided stone for building the enclosure walls, barns and farms of the period (see 4.1.7; barns alone form 25% of the 494 buildings). The rabbit warrens and pillow mounds reflect a once-important form of animal husbandry (see 4.1.1). One Post-Medieval innovation which has had a major and lasting impact on the upland landscapes is the management of moorland for grouse shooting. The only common structures associated with this activity are the lines of shooting butts, sometimes mapped by the OS, but not recorded as a part of this project. A single record describing a hunting lodge is the only link to grouse shooting in the database (see 4.1.7).

The 753 field boundary records relate to well over 135 km of walls and banks, built, used and abandoned within a relatively short period. These figures illustrate the dynamic nature of land enclosure prior to, during and since the main period of enclosure in the late 18th and early 19th centuries. A further 400 records describe ridge and furrow, much of it presumed to be the result of steam ploughing and the related enclosure and land improvement of the 19th and early 20th centuries.

4.3.11 Modern (20th Century to 1945)

Group Interpretations

ANTI-AIRCRAFT BATTERY	1
CONSTRUCTION CAMP *	1
CONSTRUCTION WORKS *	2
FLOOD DEFENCES	1
LIME WORKS	2
MILITARY EARTHWORK *	1
MILITARY TRAINING AREA *	1
SEARCHLIGHT BATTERY	3
TILE WORKS	1

Total 13

Site Interpretations

AERIAL ROPEWAY	1	LIMESTONE QUARRY	16
ANTI-AIRCRAFT BATTERY	3	LYNCHET	1
AQUEDUCT	1	MILITARY EARTHWORK *	11
ARROW (MILITARY EARTHWORK)	2	PEAT CUTTING	1
* BIELD	1	PLATFORM	8
BOMB CRATER	5	PRACTICE CAMP	1
BUILDING	7	QUARRY	20
CONSTRUCTION CAMP *	1	RAILWAY TURNTABLE	4
DAM	1	RIFLE BUTTS	1
DRAIN	1	SEARCHLIGHT BATTERY	9
		SHEEPFOLD	4

ENCLOSURE	24	SHOOTING BUTT *	11
EXTRACTION *	2	SLIT TRENCH	2
FIELD BOUNDARY	2	SPOILHEAP	19
FLOOD DEFENCES	6	TRACKWAY	6
GRAVEL PIT	3	TRAMWAY	6
INCLINED PLANE *	1	UNKNOWN *	2
LEVEL *	1	WORLD WAR 2 DEFENCES *	5
LIMEKILN	3		Total
			192

192 records (1.1% of the total) are ascribed to the Modern Period (Figure 4.3.11); 169 (88%) were not previously recorded in either the NAR or SMR. This high percentage of 'new' sites reflects the extension of the RCHME cut-off date to AD 1945, adopted at the outset of the project.

Forty-one percent of the records have industrial interpretations, relating mainly to mining (see 4.1.7) and the construction of reservoirs and railways (see 4.1.3). Particularly well-preserved in the area around Scar House and Angram reservoirs are the associated quarries, tracks, railways, inclines, settlement sites and evidence for peat cutting that were part and parcel of major engineering works in the early part of the 20th century (Figure 4.1.3.3b). A further 25% of the Modern records are military features related to the army camps, training grounds and 1939-1945 War activities (see 4.1.2 and 3.2.4).

4.3.12 Unknown Medieval (Early Medieval to 1945)

Group Interpretations

COAL MINING *	4
DESERTED SETTLEMENT *	1
DESERTED VILLAGE	2
FARMSTEAD	29
FIELD SYSTEM	301
LIMESTONE QUARRY	1
MANOR	1
MILLSTONE WORKING SITE	1
MINING *	1
MINING (LEAD) *	21
RABBIT WARREN	2
SETTLEMENT	23
SHIELING	11
SHRUNKEN VILLAGE	4
Total	402

Site Interpretations

ADIT	5	LIMEKILN	21
BANK	33	LIMESTONE QUARRY	24
BARN	45	LONG HOUSE	7
		LYNCHET	188

BARN PLATFORM	37	LYNCHET FIELD SYSTEM	88
BELL PIT	1	MILL POND	6
BIELD	2	MILL RACE	17
BOUNDARY	291	MINING *	7
BOUNDARY BANK	32	MINING (LEAD) *	22
BOUNDARY DITCH	20	MOAT	3
BOUNDARY MOUND	4	MOUND	20
BOUNDARY STONE	1	OPENWORK *	3
BRIDGE	1	OXBOW LAKE	1
BUILDING	211	PEAT CUTTING	40
CAIRN	5	PILLOW MOUND	21
CANAL	1	PIT	2
CAUSEWAY	1	PIT CLUSTER	2
CHAPEL	2	PLANTATION *	1
CLEARANCE CAIRN	8	PLATFORM	34
COAL PIT *	27	PLOUGH HEADLAND *	10
CROFT	4	POND	7
CROFT BOUNDARY *	13	PROSPECTING TRENCH	15
DAM	13	PYE KILN *	13
DESERTED	MEDIEVAL	QUARRY	333
SETTLEMENT *		RESERVOIR	2
DEWPOND		RIDGE AND FURROW	992
DRAIN		ROAD	8
DRAINAGE SYSTEM		SAND PIT	1
DROVE ROAD		SANDSTONE QUARRY	4
DYKE		SETTLEMENT	40
ELLING KILN *		SHAFT	11
ENCLOSURE		SHEEPFOLD	117
EXTRACTION *		SHIELING	1
FAIR	1	SHORT SHAFT *	148
FARMHOUSE	1	SPOILHEAP	11
FARMSTEAD	8	STACK STAND	293
FIELD BOUNDARY	951	STEPPING STONES	1
FIELD SYSTEM	132	STOCK ENCLOSURE	13
FISHPOND	6	TAIL RACE	1
FLAGSTONE QUARRY *	1	TOFT	2
FLOOD DEFENCES	9	TRACKWAY	576
GARDEN	1	TREE RING	1
GRAVEL PIT	7	UNKNOWN *	42
HOUSE	6	WALL	9
HUSH	4	WASHFOLD	1
LAZY BEDS	2	WATERCOURSE	6
LEAD WORKINGS	4	WELL	4
LEAD WORKS	1	WINDMILL	2
LEAT	63		
LEVEL *	2		Total
			5738

5738 records (31% of the total) are ascribed to the Unknown Medieval Period (Figures 4.3.12a and b); 4325 (75.4%) were not previously recorded in either the

NAR or SMR. The distribution is generally unremarkable, but is thinnest on the higher moorland areas, coincident with the main mining areas. This may reflect greater confidence in the interpreter when dating industrial remains, which are more likely to be ascribed to the Post-Medieval period.

Many of the records relate to agricultural remains that are difficult to date from this type of survey, including 992 records of ridge and furrow (see 4.1.1) and 951 field boundaries. In many cases relative chronologies could be sorted out, and local studies would do much to improve our understanding of the development of the landscape.

4.3.13 Multi-Period landscapes

It is apparent throughout this report that the area is exceptional in terms of archaeological survival. Apart from the highest peat moorland and some of the more intensively cultivated lowlands, almost any location can be regarded as a good multi-period landscape making it difficult to highlight particular areas as being better than others. Inevitably, density and variety of remains, along with personal preference, are the primary criteria used for selecting the landscape blocks listed below. Those landscapes predominantly of a single period have not been included here, though they clearly have a special importance in their own right (eg see 4.3.9 and Figure 4.1.1.1c). The list is also biased strictly to the Pennine upland, where the most dramatic remains are found, and none of the areas selected reaches to the limits of the project area. Information from this project has been used in a separate study of Industrial landscapes, commissioned by English Heritage (see 4.1.5), they have not therefore been included in the following list, though an example of the transcription of such areas is shown in Figure 4.3.13a.

The landscapes are identified by an appropriate name or names and are in no particular order. The edges of these nominated areas are by necessity 'soft' and no precise limits have been suggested at this stage, the map extracts and photographs (Figures 4.3.13b-h) providing a sample only.

Reeth, Swaledale (Figures 4.3.13b & c)

This area of approximately 45 km² centres around the junction of Swaledale and Arkengarthdale, incorporating the villages of Reeth, Grinton, Healaugh and Marrick Moor, Harkerside Moor and Reeth Low Moor. The landscape contains medieval and prehistoric field systems, prehistoric enclosed and unenclosed settlements, large scale fortifications of uncertain date, and mining remains exemplifying several different techniques of extraction.

Wharfedale - Littondale - Malham (Figures 4.3.13d-f)

This is the largest area, at over 140 km², and incorporates all of Littondale, most of upper Wharfedale (see also Figure 4.1.1.6b), and the limestone plateaux above these valleys, mainly Malham and Kilnsey Moors across to the Malham Tarn and Malham Lings area. The larger villages and hamlets in the area include Grassington, Threshfield, Kettlewell, Malham, and Litton. The archaeology represents all periods from the Bronze Age to Post-Medieval and includes many different forms of settlement and extensive field systems, a Roman camp, several funerary cairns and some of the most promising candidates for early lead mining remains.

Ribblehead (Figure 4.3.13g)

This area covers approximately 55 km² and encompasses the valleys and limestone benches of Chapel-le-Dale and upper Ribblesdale. Apart from the hamlet of Chapel-le-Dale, the modern settlement of the area is sparse and dispersed. This pattern is reflected in the archaeology, which is characterised by small farmsteads and their associated field systems, all overlooked by the Ingleborough hillfort. Around Ribblehead and the famous viaduct there are many remains relating to the building of the Settle-to-Carlisle Railway.

Semer Water - Bainbridge (Figure 4.3.13h)

This is the smallest area, at approximately 36 km², and is centred on Semer Water and the small valley of Raydale, with Bainbridge to the north the main modern settlement. The archaeology testifies to many different phases and methods of agricultural land use, while on Greenber Edge south of Addleborough there is a well preserved linear (and chronological?) sequence of settlements and enclosures (Figure 4.3.8b). The area also contains a crannog, several other settlements and the Roman fort at Bainbridge, with outcrop quarries on the slopes above, probably providing the stone for the fort's construction.

CONCLUSIONS AND RECOMMENDATIONS

This final section discusses the extent to which the original objectives (as defined in 2.2) were met, and makes recommendations arising from these objectives.

- Develop and test MORPH2

The new version of the MORPH recording system and database, MORPH2, was developed at the beginning of the project. The design was based on conclusions gathered from the study of the MORPH database used for the Kent Project, and from the experience of rapid recording of upland archaeology in the RCHME Dartmoor Project, along with a handful of pilot maps for the Dales area. Changes to the MORPH2 system during the project were mainly minor except for the addition of a GROUP INTERPRETATION and NOTES facility added fairly late in the project.

In use, the MORPH2 system proved to be an effective and rapid tool for recording basic information for the majority of site types. Used in conjunction with the AERIAL software in a multi-tasking environment (Desqview) and a large digitizer, it provided a relatively rapid way of recording grid references and ensuring their accuracy. The system did, however, require the manual typing of all grid references. A direct input of grid references from digitizer to database would greatly simplify the recording procedure and minimise time spent at the keyboard; 30,000 8-figure grid references take an appreciable time to type!

The addition of the NOTES facility provided the flexibility to add information that could not otherwise be recorded within the structure of the database, but it came too late to have a significant effect on the Dales data. The GROUP INTERPRETATION provided the facility to interpret a group of separate morphological elements as, for example, a settlement, whilst retaining their individual SITE descriptions. At the end of the project some GROUP INTERPRETATIONS were retrospectively applied to the data that had been input before this facility was available. This inevitably means the GROUP data do not have the consistency that was being strived for in the rest of the data, and the 'bolt-on' nature of the GROUP INTERPRETATION does not result in easy analysis and straightforward statistics.

The use of the MORPH2 system for earthwork sites, as distinct from crop-mark sites as in the original MORPH design, presented few difficulties for the recorders. The benefit in using this approach for earthworks is that the data can readily be enhanced and further analyzed by targeted aerial photography or field work and thereby the system itself can be more fully assessed.

The resultant database proved to be a suitable framework for analysis using basic software tools (R & R Report Writer, AERIAL software for looking at distribution patterns, and VPG Graphics to produce graphs and scatter diagrams). However, improvements to the internal consistency of the information in different tables and the removal of the potential for duplicating information in the GROUP and INDUSTRIAL COMPLEX tables, would do much to simplify the quantification of results.

More sophisticated software would greatly aid the analysis process, in particular the combining of the mapped and digital data within a proper GIS would enable easier and more rapid assessment. The use of specific pattern recognition software to try and recognise trends in the data might also be productive.

The MORPH2 system has proved effective for recording and analysing data on a project basis. However, the continued use of the data created requires that the principles (morphological description and clearly defined units of records) should be incorporated in a database such as MONARCH, which can also record other information about the sites; this will ensure that the results of future work can help to put all the data in a fuller context.

- Help define a methodology for rapid air photo survey

Along with the other pilot projects, the Dales project has clearly shown the effectiveness of skilled air photo interpreters in rapidly mapping and documenting archaeological remains, whether visible as crop marks or as earthworks, to produce a record that is usable in a variety of ways. The practical experience gained during these projects has led to the definition of basic requirements for the methodology of the National Mapping Programme, in particular the fundamental need both to map and to produce a structured written record of the archaeology.

- Investigate the practicalities of recording industrial archaeology

The extensive industrial remains of the Dales area posed a considerable challenge, especially as the staff involved had little or no experience of recording landscapes. The database and map conventions were designed to enable large areas to be recorded with minimal detail (see 4.1.5). As experience was gained, the key features of the industrial areas could be highlighted and characterised, although the lack of large-scale photography often meant that much of the finer detail will have been missed. The use of First Edition OS maps, as an aid to identification and understanding of features seen on aerial photographs, was of great benefit. Closer integration of the recording of this map information and that done from the air photo interpretation would be preferable in future projects, as the understanding of the archaeology from each source is enhanced by the differing perspectives. Many of the features seen on aerial photographs were still in use when surveyed for the First Edition, whilst others were built later and can be identified and dated as such on the aerial photographs. Also, the study of the aerial photographs can show the selectivity of the early map surveys.

- Produce a primary archaeological dataset

The project has produced archaeological mapping for 3000 km² of often extremely dense archaeological remains, along with a computerized database of 18,249 records. The high proportion (65%) of the data that is new to the record (see 4.1) shows

clearly that the identification of the Dales area as being poorly represented in national and local records was entirely correct. For comparison other projects working to a similar specification have produced varying levels of 'new' records: Thames Valley 45%, Hertfordshire 46%, National Forest 59% and Howardian Hills 51% (Fenner and Dyer 1994; Fenner 1992; MacLeod 1995; Carter 1995). The results of the Dales project have been made available to the local planning authorities via the offices of the Yorkshire Dales National Park, and are being used on a 'more than daily' basis (R White pers comm) to assist with resource management.

- Provide English Heritage with data in a form suitable for MPP

The maps and data produced allow for systematic analysis of the data, as is demonstrated in Section 4 of the report. The data can be used to assess potential classes of monument and place them in their context. However, the data requires ground assessment to ascertain the current condition of sites; for many sites the most recent photography available was twenty or more years old. The morphological structure of the database provides a powerful aid to the identification of classes of monument that were not specifically identified at the time of recording (see 4.1.1 Coaxial systems, 4.1.3 'Askriggs', 4.2.1 'Ingletons').

The results have already been used to assist at least one project relating to landscape assessment and has proved its worth. The assessment of mining related landscapes used the air photo transcriptions as the main source for evaluation by a local specialist, who found them 'to be a highly reliable and invaluable source' (Gill 1993c).

- Suggest possible approaches and specific targets for further work

The archaeology of the Yorkshire Dales encompasses a great variety of sites and types of feature, in themselves often interesting though rarely unique. Over the area as a whole, however, it can fairly be said that the preservation and extent of the fossilised landscapes is remarkable in national terms. A future stage in understanding and managing this outstanding cultural resource will be the peeling apart and classifying of these complex multi-period landscapes - a task requiring more detailed assessment than the limitations of this report allows.

Various avenues of further research have been identified in Section 4, including some areas of landscape worthy of particular attention (4.3.13). Similarly, individual sites of interest have been targeted on the Map Note Sheets, and preliminary analysis of a few specific classes has been presented above (section 4). These merely scratch the surface of the possibilities for archaeological research.

The proliferation of enclosure groups in the uplands typify the scale of the problem. Whilst often superficially similar, the morphological and physical forms of these sites must be assessed with an understanding of their functional requirements, the constraints of the physical landscape, the availability of construction materials, and

the timeframe within which they may have been in use. Compare the sample of sites illustrated in Figures 5a-c. Some of these upland sites appear to be settlements (eg Pen Hill; NY.935.17.1, Figure 5a), while others may have served principally for animal husbandry (eg NY.109.2.1, on Stake Moss; NY.1142.1 & 2, Malham Lings, Figure 5b & c). Even those enclosure groups which seem certain to have been settlements are problematic, since there is no easy way to distinguish the permanent from the seasonal occupation - crucial for any real understanding of the role of these settlements in their contemporary landscapes.

Further research in the area could take a wide variety of forms. The role of air photography and photo interpretation is far from over. It would be misleading to assume that a rapid survey such as this has extracted all available information from the existing photographic collections. Quantifying the amount of archaeological information recovered is difficult, but it is worth stressing that this type of survey probably only extracts perhaps 75% of the archaeological information that is available on the photos used. The missed information will be in terms of quality, including accuracy of plans, internal detail and understanding of recorded sites, and quantity, with some sites entirely unrecorded.

The quality of the existing data can be assessed from the examples illustrated in Figures 5d. In the first case (a & b) the comparison is between air photo interpretation and ground survey undertaken entirely independently of each other, whilst in the second (c & d) the site was surveyed in the field following identification and mapping during the Dales project. In each case the primary air photo interpretation has identified and generally characterised the archaeological features, but the field survey has provided more detail and produced a more accurate overall plan.

The quantity of sites and information not visible on existing air photos is even harder to assess. Further aerial reconnaissance, both speculative and closely targeted, continues to provide new information and requires to be maintained for many years, especially to take advantage of weather conditions such as drought or light snow which may reveal hitherto hidden sites. Field assessment of areas initially recorded from the air can be targeted to specific sites and landscapes, but must also examine at least samples of the 'blank' areas on the transcriptions. Vegetation cover is a crucial factor in all survey for reconnaissance purposes; the grouse moorland must almost all be considered a 'blank' area for all but the most substantial structures.

- Produce a synthetic report

The sheer mass of data produced by the project has created its own problems, and a full assessment would require a longer timescale than was allowed for this report. The aim has been to provide an insight into ways in which the data can and might be used, and to present summary information to indicate the scope of the full dataset. The effectiveness of this approach is for the reader to assess.

Conclusion

The key objectives of the project were largely fulfilled shortly after the completion of mapping and transfer of data to the Yorkshire Dales National Park early in 1993. A methodology had been devised and used, with minor modifications, to produce a primary dataset of maps and computer records for 3000 km² of complex upland archaeological landscapes. The experience gained has had a major effect on the design of the RCHME's National Mapping Programme. The Dales project has demonstrated that, if the archaeological resource in our upland areas is to be identified and recorded in a realistic timescale, air photo interpretation and mapping should take a central role in any survey project.

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7 APPENDICES

7.1 SOURCES CONSULTED - AIR PHOTOGRAPHS

NMR Air Photographs (formerly National Library of Air Photographs)

National Monuments Record Centre
Kemble Drive
SWINDON
SN2 2GZ

Tel. 01793 414600
Fax 01793 414606

All oblique photographs and verticals (at a scale larger than 1:15,000) available at the date of mapping were consulted.

North Yorkshire County Council - Archaeology Section

County Hall
NORTHALLERTON
DL7 8AQ

Tel. 01609 780780
Fax 01609 777719

All oblique photographs held in the sorted collection of prints and available at the date of mapping were consulted. Copies of the NYCC air photo overlays and accompanying notes were supplied to the Dales project.

Yorkshire Dales National Park

Yorebridge House
Bainbridge
LEYBURN
DL8 3BP

Tel. 01969 650456

Selected prints from the colour slide collection and other photographs held by the YDNP were supplied by Robert White for use in the project. The YDNP enhanced copies of the NYCC air photo overlays and accompanying notes were borrowed for those OS quarter sheets that lay within the National Park.

Anthony Crawshaw

15, King's Staith
YORK
YO1 1SN

We are grateful to Anthony Crawshaw for providing a selection of photographs from his personal collection. As well as his archaeological photographs a series of photographs documenting footpath erosion and limestone pavements commissioned by YDNP may be of use to future researchers.

University of Cambridge Committee for Aerial Photography

Mond Building
Free School Lane
CAMBRIDGE
CB2 3RF

The CUCAP collection was not consulted directly, only those copies of CUCAP photographs held by NMR Air Photographs, NYCC and YDNP were used in the project (see Section 2.3).

Cumbria County Council

Planning Department
County Offices
KENDAL
LA9 4RQ

Only information available through the YDNP was consulted for those areas that lie outside of North Yorkshire.

7.2 SOURCES CONSULTED - OTHER

The main source of information was the enhanced NAR record including copies of all OS First Edition 6" maps for that part of the project area that lay within the North and West Ridings of Yorkshire. The NAR (now NMR Archaeology) can be consulted via the National Monuments Record Centre in Swindon (address above). Other sources of information can be found via the offices of the North Yorkshire County Council, the Yorkshire Dales National Park, and from the sources cited in the bibliography.

7.3

MORPH2 DATABASE AND ARCHIVE DETAILS

MORPH2 Databases - The hardware and software specifications used for the Yorkshire Dales Project are those set out in Appendix D of the MORPH2 User's Guide. A detailed description of the structure of the MORPH2 databases can be found in Appendix C of the same document. The details of the final Yorkshire Dales Project MORPH2 databases are :-

Database		Size (bytes)	Date	Time	Size (records)
ENC	DBF	557,377	16/11/93	14:47	4525
ENT	DBF	11,733	16/11/93	14:47	255
GRI	DBF	494,398	16/11/93	14:48	11766
GROUP	DBF	58,523	23/12/93	10:04	1355
GROUP	FPT	822	23/12/93	9:59	-
IND	DBF	8,515	19/05/92	12:36	101
LFD	DBF	830,866	16/11/93	14:48	7413
LSD	DBF	107,130	16/11/93	14:48	1270
MCD	DBF	336,274	16/11/93	14:48	4940
PRI	DBF	2,866,215	23/12/93	10:02	18249

Archive - All paper and digital records will be curated by NMR archive as part of the RCHME: Yorkshire Dales Project and RCHME: Howgill Fells Project. the following items will be archived:-

- a - Digital copy of MORPH2 database.
- b - Original inked air photo transcription overlays.
- c - Original pencil working transcription overlays.
- d - Map Note Sheets as described in Appendix 7.5.
- e - NMR Air Photographs loan listings for oblique and vertical air photography used during the project.
- f - List of field visits made during the project.
- g - RCHME quarterly reports and documents relating to project liaison meetings.
- h - Correspondence relating to the project.

For each of items b - d there will be one final version for each of the 143 OS quarter sheets depicted on Figure 2.2. However, for maps coinciding with the edge of the extension of the project into the Howgill Fells there will be earlier versions as well (see Section 2.2).

Additionally copies of the transcriptions and Map Note Sheets are held at RCHME York, NYCC and YDNP.

7.4 STATUTORY BODIES

North Yorkshire County Council (address in Appendix 7.1)

Yorkshire Dales National Park (address in Appendix 7.1)

Cumbria County Council (address in Appendix 7.1)

English Heritage

Fortress House
Savile Row
LONDON
W1X 1AB

Tel. 0171 973 3000
Fax 0171 973 3001

National Trust

Fountains Abbey & Studley Royal
Estate Office
Church Cottage
Studley Park
RIPON
HG4 3DY

Tel. 01765 608888
Fax 01765 608889

7.5

MAP NOTE SHEETS

The Map Note Sheet was designed at the beginning of the Dales project as a means of documenting progress and of highlighting information relevant to each OS quarter sheet. The design of the Map Note Sheet saw minor changes during the course of the project. For the National Mapping Programme the Map Note Sheet was further developed as a double-sided form. This appendix contains the following :-

- 1 Map Note Sheet Guidelines as used during the Dales project.
- 2 Sample of first version of Dales project Map Note Sheet, SE 09 NW.
- 3 Sample of second version of Dales project Map Note Sheet, SE 18 NE.
- 4 National Mapping Programme Map Note Sheet guidelines.
- 5 Sample of National Mapping Programme Map Note Sheet.

MAP NOTE SHEET GUIDELINES

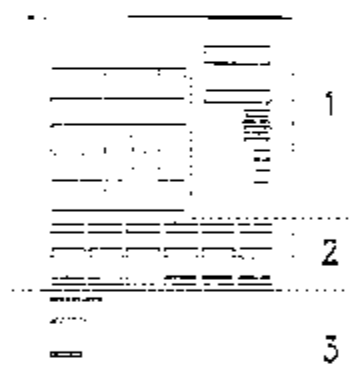
The map note sheet (MNS) is intended to accompany each OS 6" quarter sheet overlay and supporting classification database, as produced by the APU.

The MNS provides an opportunity for the AP interpreter to draw attention to those areas where the archaeological interpretation or mapping is not of as high a reliability as he/she would like. Reasons for highlighting may be for example:-

- a) only limited or poor quality photography available
- b) areas in shadow, or dense vegetation on available photos
- c) woodland masking probable activity sites
- d) extensive peat cover masking probable activity sites
- e) possible settlement sites where interpretation from high level vertical photography is unreliable (e.g. unenclosed hut circles)
- f) possible settlement areas with confused surface appearance
- g) possible industrial processing areas
- h) areas of recent afforestation / flooding / drainage
- i) areas of complex artificial drainage/ leat systems
- j) features of doubtful man made origin (e.g. vegetation marks)
- k) archaeological sites of particular importance which may not be fully apparent on the overlay/database

N.B. This is not a comprehensive list of possible features, it is simply a chance for each AP interpreter to give his/her subjective view in a shorthand form of the problems and/or key points of each quarter sheet.

The MNS is divided into three areas:-



1) Area 1 provides a quick reference, detailing the map sheet number, the Air Photo Interpreter, the transcription completion date, previous AP transcriptions referred to, and a diagrammatic relationship of the map to the OS 1" edition 6" sheets (NAR maps).

2) Area 2 provides a blank grid representing the OS quarter sheet marked off in 1km squares. Within this area individual sites, small areas or large areas can be marked and labelled with a single reference letter. These letters can then be written in the relevant boxes in three rows underneath. The first row indicates the current land-use type of the area marked, the second row the type of archaeological/ or other feature that is thought to be present, and the third row the types of available photography that have been consulted for the marked sites/areas. Blank boxes are left which may be labelled appropriately for areas specific to the current map e.g. afforestation. There is no need to place a reference letter in a box for each row, and similarly a reference letter may appear in more than one box on any row. A number of similar sites may be given the same letter.

3) Area 3 allows a written listing of:-

- i) **Illustrative photos** - those photos that were particularly useful for interpretation or would be suitable for use in public lectures or publications. It is not intended as a comprehensive list of useful photography.
- ii) **References** - a chance to flag any useful additional sources that have been used in the compilation of the map overlay or are known to be available e.g. field surveys, published articles.
- iii) **Comments** - a chance to expand on items flagged in area 2 and to make any further general comments on the map sheet e.g. geology, land use, potential threats.

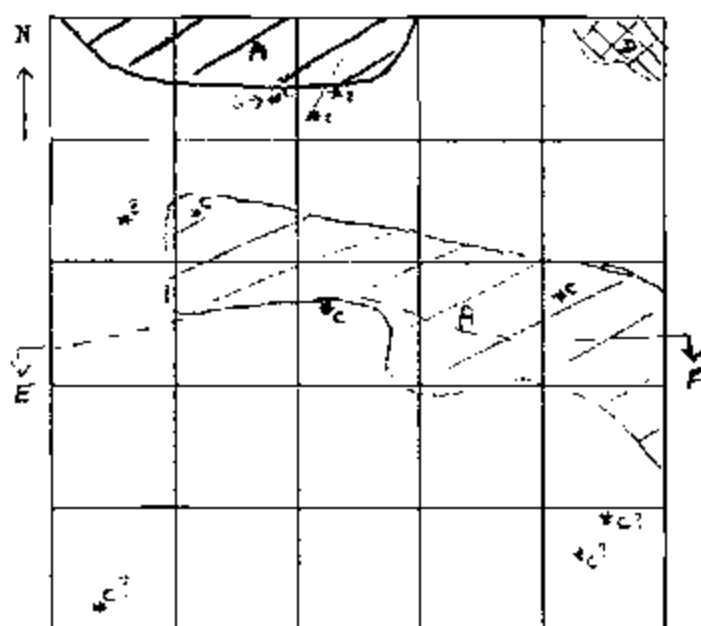
N.B. The Map Note Sheet is intended only for use as a working document to be used in conjunction with the map overlay (and associated database) and the other available map/database sources available. It is not intended as a comprehensive analysis of the validity of the data presented or the archaeological potential of the area.

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

Air Photography Unit

Map sheet number

SE 09 NW



Author

Date _____

PDH

7/89

NAR maps

30

5

NY map

✓

NY (RW) may

Year	Percentage of Population Aged 65 and Over
1950	7
1960	8
1970	9
1980	10
1990	11
2000	12
2010	13
2020	14
2030	15
2040	15
2050	15

STANDARD (CONTINUED)
NUTR (LBS. VIB.) }
NYC C
NYC F

moorland

upland

lowland

Deat

patent:

available

wooded

A C F F

35

$\mathbb{E} - F$

complex

Field

settlement

D 5.4

A

3.6

စာမျက်နှာ ၁၀

vertical

POOR

2.05.2

A 3

ABD, E-

⌂

Illustrative photos :- Lymnchals etc Reeth + Griston MAL 71/167/22-27 (+hushes);
 Any 242/18 (Settlement + platform under snow) - 18023945; Any 229/09 (Settlement - individual seen);
 Any 74/6 (Settlement - "furbifications" + ref under snow);

References :- LAHART + FLEMMING - field work in progress

Comments:- AREA south of E-F more complicated than shown almost certainly more leats and bell pits.

R + F seems likely over most of enclosed pasture area in valley of R. Swale.

6. Federalist Papers, Vol. 1, No. 10, 1787, pp. 10-11.

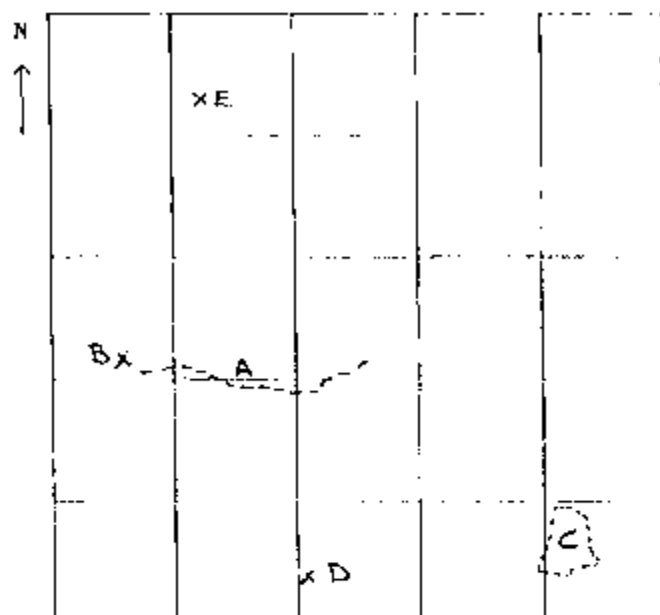
Reasonable photographic coverage of whole area, good quality, verticals for earthworks in KEETA-Granton area. Interpretation more difficult on woodland areas to south.

15/3/61 New York, New York

* (1st edition was not checked for transcription)

Air Photography Unit

SE 18 NE



Author D M AC Date APRIL 91

OS 1st Edition

63 49
84 85

Date

SMR overlay JAN 91NAR JAN 91MAP (obliques) JAN 91MAP (verticals) JAN 91CUCAP JAN 91YDWP JAN 91NYCC JAN 91

moorland	upland pasture	inland pasture	peat	built-up	arable	woodland
		A B C D E				
complex industrial	field system	settlement	dam	warren		
	A B	C	D	E		
oblique	vertical	poor vertical	pond			
A B C	A B C D E					

Illustrative photos :- MERIDIAN COVER O.K.,

NYCC - CUC AQQ 49 (FO- A) AQQ 54, 52 (C)
DNR 1272/20

References :-

Comments :-

- A - GOOD LOTS NEW(?) ROAD BETWEEN TWO DAMS - ONE FROM DAMS HALL TO ST. JULIAN'S CHURCH TO THROTTED TOWARD. [NY 873, 26, 1-2]
- B - IMMEDIATELY WEST OF DAMS HALL INTERESTING ST. JULIAN'S CHURCH [NY 873, 1, 1]
- C - AREA AROUND KILGAM CRANIE HAS FIELD, TALKING, ELLIOTT'S, BUT NOT EXACTLY UNYARDED FROM A.P.S. 0
- D - NICE DAM IN JERUSALEM PARK, POSSIBLY ORIGINALLY SERVING THE HONEY AND/OR ABBEY MILL. [NY 880, 7, 3]
- E - SEVERAL LINEAR FEATURES NOT OBVIOUSLY ASSOCIATED WITH A.P. BOUNDARY IN IMMEDIATE VICINITY. LOCATION IS CALLED "BUCK BARK" SO PROBABLY A MANAGED NATURAL WARREN. [NY 871, 18, 1]

6 MAP NOTE SHEET GUIDELINES

The Map Note Sheet (NMS) MUST accompany every 1:10,000 overlay produced as a part of the National Mapping Programme. It gives the air photo interpreter an opportunity to highlight or supply additional information not appropriate to the overlay or database. It is also intended to assist further surveys (air or ground) for any area. This aspect is important for future reconnaissance projects and Rapid Identification Surveys which aim to identify:

- 6.1 surviving earthworks and to provide up-to-date management information on them,
- 6.2 earthwork sites which appear problematical on the air photographs,
- 6.3 those areas where there was no or poor air photo coverage.

Notes to aid the use of MNS:

- 6.4 At the right-hand side of the sheet are boxes for the essential information: Map Sheet Number, Author/Air Photo-Interpreter's name, and Date Of Completion: all of them must be completed.
- 6.5 Beneath them are two diagrammatic boxes, one to show the relationship of the map to the O.S. 1st. edition map (if being used on the project), the other to note where detail continues onto adjacent maps; this can be simply noted by arrows in the appropriate direction; authors of adjacent maps should check these before making edge comparisons.
- 6.6 Each Map Note Sheet provides a blank grid representing the O.S. quarter sheet divided up into 1 km. squares. Areas and individual sites can be marked up here, labelled with a letter which will refer to the comments made in the "comments" space.
- 6.7 Reference letters marked on the grid should be placed in the boxes beneath the grid which are labelled to indicate different land-use types, different types of feature, and different types of available photography. It is not necessary to place the letter in a box on every row, a box should contain more than one letter and a number of similar sites may be given the same letter. Some boxes are unlabelled, to be used as required.
- 6.8 In the lower half of the sheet there are three sections which allow written comment.

NMP:Draft 2 February 1994

6.8.1 Illustrative photographs:

This gives an opportunity to note the reference number of any photograph which is particularly helpful for illustration, exhibitions, teaching and interpretation (accompanied by the reference letter for the site or area shown on the grid, to which it refers).

6.8.2 References:

This gives an opportunity to note the existence of any additional sources of information used e.g. publications or field surveys.

6.8.3 Comments:

This gives an opportunity to write any remarks about any of the features already marked within the grid or to make any general comments relating to the sheet.

Examples of the kind of items that should be noted are:

- i) extant earthworks
- ii) areas where photography is very limited, of poor quality or none existent
- iii) areas where features may be masked by cloud cover or dense shadow on the photographs or by dense vegetation or woodland
- iv) particular features or areas of interest or importance which may not be immediately obvious from the overlay or database
- v) features or areas which gave particular problems of interpretation
- vi) if an NAR record cannot be identified on aerial photographs (and give reason why).

6.8.4 Sources:

The Map Note Sheet provides a check list of all the sources both photographic and archival which are relevant to the project. These boxes should be filled in with the date that they were consulted, and the appropriate reference numbers given for the photographic loans.

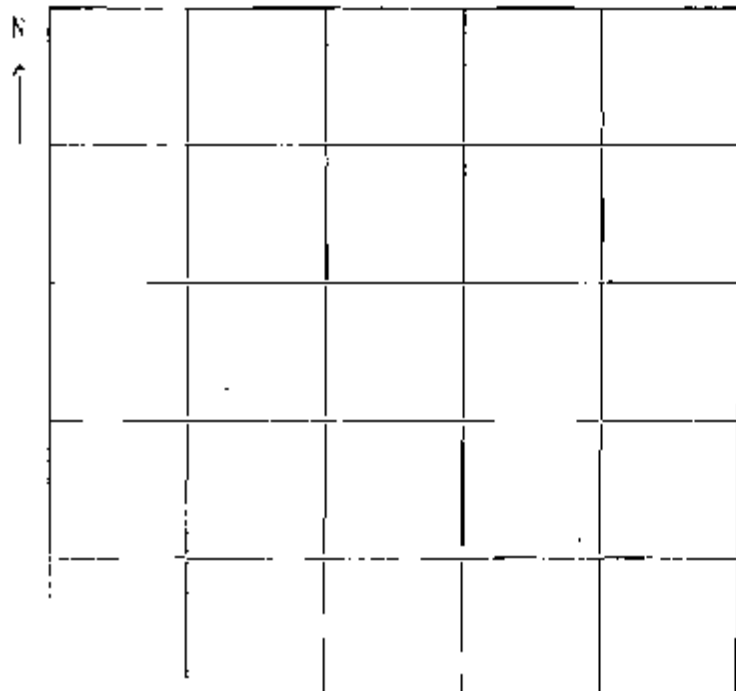
ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

Air Photography Unit

Map sheet number

Author

Date



OS
1st Edition

moorland	upland pasture	lowland pasture	peat	subsoil	scree	woodland
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
marshland	farmland	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
complex industrial	field system	settlement	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
oblique	vertical	near vertical	note	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Illustrative photos :-

References :-

Comments :-

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND
Air Photography Unit

National Mapping Programme map sheet progress record

Project title <i>Lincolnshire</i>	Map sheet number	Author
-----------------------------------	------------------	--------

Sources check list - enter dates completed

Archival sources

/ /	N19 on-line
/ /	N19 primary record update
/ /	N19 record map
/ /	county SWR
/ /	FI card index
/ /	FI record map
/ /	Change and Continuity
/ /	EL aerials
/ /	EL paper record
/ /	Excavation index

Photographic sources

/ /	N19 sketches	leaf number	
/ /	N19 verticals	leaf number	
/ /	CCCAP		
/ /	county		
/ /			
/ /			
/ /			
/ /			
/ /			

Mapping progress





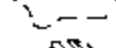













	date	days
transcription started	/ /	
transcription completed	/ /	
inputting started	/ /	
inputting completed	/ /	
total number of days		

7.6 MAPPING CONVENTIONS

The mapping conventions used were developed over the course of the project and influenced the design of the conventions to be used for the National Mapping Programme. This appendix contains :-

- 1 Sketch mapping conventions used at the beginning of the Dales project.
- 2 Revised sketch mapping conventions, used by the Dales project from 20/2/91.
- 3 National Mapping Programme Mapping Conventions guidelines (not used in the Dales Project).

Key to 1:10,000 and 1:10,560 Sketch mapping overlays

	Solid feature (banks, walls, dykes etc.)	
	Cut feature (ditches, drains, leats etc.)	
	Ridge and furrow	
	Trackway, Holloway	
	Industrial Areas	And draw as appropriate.
	Areas of suspected settlement/activity	
	Well pits	
	Quarry	
	Limekiln (and quarry)	
	Building	
	Sheepfold	
	Industrial processing area	And draw as seen using above conventions
	Settlement	
	Stock stand	
	Ring cairn	
	Platform	
	Peat cutting (out-line as quarry if possible)	
	Spoil-hump	

If a cut feature is too small for broken lines to be used then a solid line should be used, however in the database it must be recorded as a cut feature.

Where Tracks, usually drawn as parallel broken lines, have complicated interweaving etc they can be drawn using a single broken line for each track and then labelled as - tks. Hollow ways should be drawn as tracks but labelled - hw.

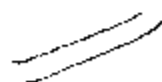
CONVENTIONS FOR DATES 1956 MAPPING

SOLID FEATURES (WALLS, BANKS ETC)



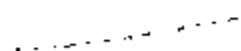
(.13 PEN)

LYNCHETS



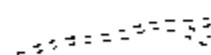
(.15 PEN)

CUT FEATURE (DITCHES, LEAPS ETC)



(.13 PEN, SHORT DASHES, SPACES $\frac{1}{2}$ LENGTH OF DASHES DIRECTIONAL ARROW ON LEAPS IF POSSIBLE)

TRACKWAY, HOLLOWAY



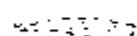
(.13 PEN, SHORT DASHES, SPACES $\frac{1}{2}$ LENGTH OF DASHES DASHES OPPOSED AS FAR AS POSSIBLE)

QUARRY



(.13 PEN)

SPOIL HEAP



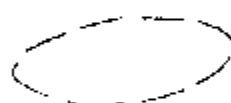
(.15 PEN)

SHAFTS, MINES, BELL PITS



(.13 PEN, MUST ALWAYS BE DRAWN IN 2 STAGES FIRST X, X)

INDUSTRIAL AREA



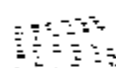
(.13 PEN, LONG DASHES, SPACES $\frac{1}{3}$ LENGTH OF DASHES HANDWRITTEN LABEL OR SELECTED FEATURES SHOWN)

RIDGE AND FURROW



IF NOT ALREADY BOUNDED BY LYNCHETS, BANK ETC, OUTLINE AREA WITH REGULARLY SPACED DOTS, .25 PEN. DIRECTIONAL ARROW, HAND-DRAWN, .13 PEN, NOT QUITE TO BOUNDARIES.

OR



INDIVIDUALS MAY AT OWN DISCRETION. USE THIS SYMBOL IF THEY FEEL IT WOULD CLARIFY A SITUATION.

LIMEKILNS



HANDWRITTEN LABEL OR SYMBOL IF SMALL

VI Methodology

Mapping Conventions

The NMP will use information derived from aerial photographs to produce sketched transcriptions on translucent plastic overlays at a scale of 1:10,000 accompanied by a digital, descriptive record.

The overlays are not intended for publication.

Inked Conventions.

- 0.1 Within the limitations of scale, the archaeology will be depicted "as seen" with emphasis placed on the accurate representation of feature shape (including variable line thickness) and whether a feature is "cut" (see 5.1) or "built" (see 5.3).
- 0.2 Most large area features (maculae) need only be shown in outline. Flat area features which are not Compacted or made stone surfaces/spreads (5.7), may be depicted using the Extent of feature line (5.10). For negative features Extent of feature line is replaced with simple hachures (5.8). For positive features interpreted as spoil/waste dumps the Extent of feature line encloses an open stipple (5.9). Area features such as cairns or windmill mounds should be drawn as for Stone and/or earth banks/mounds (5.3)

N.B. do not confuse Extent of feature with Extent of area (see 2.4 and 5.14).
- 0.3 Very small area features can be depicted in solid black (see 5.7).
- 0.4 Extent of area marks the limit of an area of activity not the outline of a specific feature (see 2.2). Features associated with the activity may be drawn using the appropriate conventions (e.g. key structures in a mining complex or the runways of an airfield).
- 0.5 In order to preserve their shape, very small enclosures are better depicted with a solid line, regardless of whether they are "cut" (see 5.1) or "built" (see 5.3).

N.B. The MORPH record will describe the feature more fully.

1 Hachures.

- 1.1 Hachuring is not usually practical for three dimensional linear features at this scale (including enclosure banks and ditches) but "T" hachuring may be used for very substantial banks.

NMP:Draft 2 February 1994

- 1.2 "I" hachuring is primarily used to outline larger negative maculae (e.g. quarries and pits. see 5.9) but must not be taken as indicative of depth or degree of slope.

- 1.3 The line of hachures may be left open to represent a cut face or slope (5.9).

2 Brand-name transfer materials.

- 2.1 The use of self-adhesive and dry transfer materials is not practical at 1:10,000. Experience has shown that such materials are too fragile to withstand the considerable amount of handling that the overlays are subject to during and after a project, subsequently all final drawing should be done by hand including areas of stippling.
- 2.2 The archive quality of these materials is not assured and would in part depend on the method of storage used for the overlays (e.g. vertical file or plan chest).

3 Labels.

- 3.1 There is no use of labelling within the mapped area since all additional information on interpretation and form is contained in the accompanying MORPH record.
- 3.2 A RCHME standard information box will be printed on each overlay. The box will carry information such as author and project title.
- 3.3 The policy of "archaeology only" within the mapped area is also dictated by the future requirement (GIS) that the transcriptions are capable of being digitally copied.

4 Pens and materials.

- 4.1 Overlays for inking will normally be of 125 micron (.005") polyester, pre-printed to RCHME standard. Non-standard overlays must be of dimensionally stable polyester film of at least 75 microns (.003") thick. Non-standard overlays must be accurately drawn to 1:10,000 scale, not traced from unstable paper base maps.
- 4.2 Inking should be done directly onto a clean overlay not on the pencil version.
- 4.3 The ISO .18 pen should be used for all conventions except the extent of area line which should be drawn using a .25 pen.
- 4.4 Use an ink designed for drawing on plastic film (e.g. Rotring F type ink).

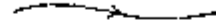
NMP:Draft 2 February 1994

5 1:10,000 MAPPING CONVENTIONS: National Mapping Programme.

- 5.1 Ditches; extant or plough-levelled. Variable Line thickness.



- 5.2 Leat, mill race. Arrow indicating direction of flow if known. Variable Line thickness. (Larger artificial water courses as ditches).



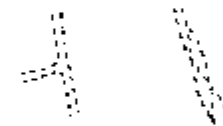
- 5.3 Stone and/or earth banks/mounds; extant or plough-levelled. Heavy stipple. Applies also to lynchets, other artificial slopes & wall foundations (not buildings. See 5.4)



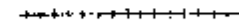
- 5.4 Buildings. Unroofed.



- 5.5 Holloways and unsurfaced trackways not defined by other depicted features. (1mm dashes. Single line per track when braided).



- 5.6 Railway/tramway. (2mm spacing for cross-lines). This convention should be used even if the only visible remains are embankments/cuttings.



- 5.7 Compacted or made stone surfaces/spreads. Medium stipple. (c.g. Paved area, surfaced road, dressing floor).



NMP:Draft 2 February 1994

- 5.8 Area features (small). (e.g. storage pits, grubenhauser, clearance cairns, standing stones) Drawn solid as seen (pit alignments can be stylised). Extant negative features should be drawn with "T" hachures if possible (see 5.9).



- 5.9 Negative features (large) extant or back-filled (0.5mm "T"). (e.g. quarries, fish ponds) Depict as solid if too small to hachure (see 5.8).



- 5.10 Spoil/waste dumps. (1mm dashes at 0.5mm spacing enclosing light stipple). (e.g. mining spoil heaps, saltern mounds) Applies to extant and levelled features. (On large features a 3mm band of light stipple within the dashes will suffice).



- 5.11 Extent of feature. (1mm dashes at 0.5mm spacing). A "hard" boundary marking the outline of a feature (e.g. used to outline runways of a disused airfield). Only use this when other conventions are inappropriate.



- 5.12 Pits or shafts. Including bell pits defined by a "doughnut" of spoil.



- 5.13 Ridge and furrow. Units are defined by dots (1mm spacing) if not bounded by headlands, banks or ditches or any other feature which has a specific convention. Double arrow to show shape and direction of rig.



- 5.14 Extent of area. (3mm dashes at 1mm spacing. Use .25 pen). A "soft" boundary marking the perceived limit of an activity (e.g. lead mining area. See 2.4).

