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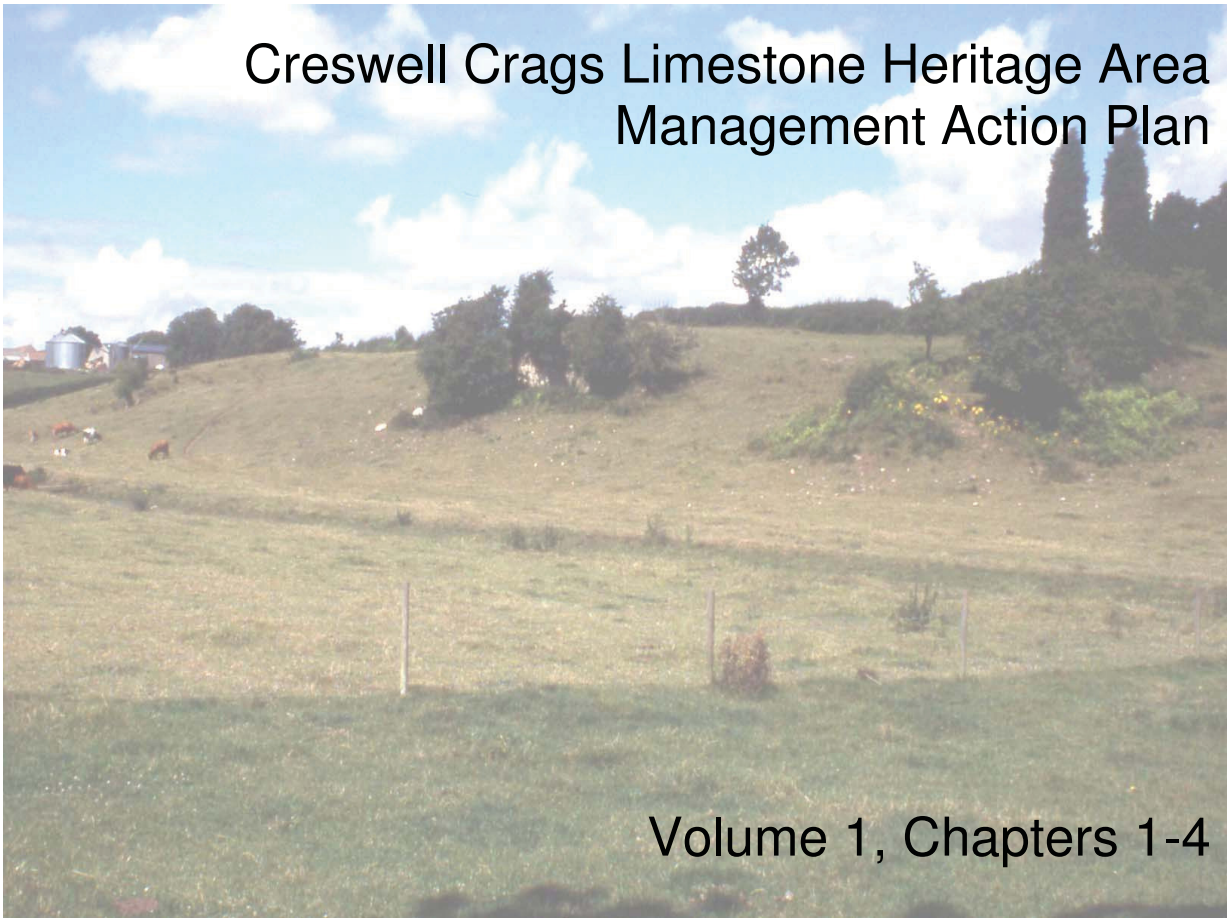

Creswell Crags Limestone Heritage Area Management Action Plan

Volume 1, Chapters 1-4

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1 INTRODUCTION

This document forms phase A of the Creswell Crags Limestone Heritage Area Management Action Plan. This report outlines an innovative, integrated archaeological, palaeontological, ecological and access Management Action Plan for the main limestone vales and gorges within the Creswell Crags Limestone Heritage Area (the southern Magnesian Limestone Natural Area).

The significance of the area's environmental and cultural heritage resource is affected by a number of issues that provide a framework for action within the remit of the Aggregates Levy Scheme. These issues were clearly identified in the Creswell Crags Conservation Plan and in the Creswell Limestone Strategy and provide a rationale for the various elements of the project.

The Management Action Plan for the Heritage Area complements the programme of site specific work in progress to improve heritage management and access at Creswell Crags and work in urban areas at Creswell (Creswell THI) and Bolsover (Bolsover CAP scheme).

The Management Action Plan forms the second stage of a three stage programme that will result in major improvements to cultural and natural heritage conservation and access across the southern Magnesian Limestone.

Stage 1

The first stage of the programme involved the production of the Creswell Crags Conservation Plan (2001) and the Creswell Limestone Strategy (2000). The current proposed Management Action Plan responds to policies and actions set out in these documents.

Stage 2

The second stage will be the production of the Management Action Plan. The Management Action Plan comprises several elements which were combined to produce a series of proposed management actions.

The production of the Management Action Plan is being undertaken in two phases.

Phase A, has been completed and forms the basis of this report. Phase A was concerned with archaeology, GIS, access and management action proposals were drawn up in relation to these issues.

Phase B will deal with the ecological study and revision of the access and the management action proposals to take into account the results of the ecological study.

The most important output of the Management Action Plan are the proposed actions. These include clearly identified, costed, practical and achievable action proposals to improve conservation, management and access with respect to archaeology, palaeontology, ecology and landscape.

Stage 3

The third stage will comprise:

- Implementation of key action plan proposals through a range of mechanisms including local partnerships, community groups, and New Deal programmes.
- Rolling out the action plan to other parts of the Heritage Area including, in particular, a programme of landscape history research to inform the Landscape

Character Assessment process and to provide synergy with parallel initiatives in Sherwood Forest.

1.1 Project Elements

The proposals for the Management Action Plan were divided into six main areas with specific tasks and outputs identified for each element. These are listed below withb the relevant section of this report highlighted.

1 GIS for the Creswell Heritage Area.

- Compile a unified GIS for the Creswell Heritage Area incorporating information from all the local authorities covered by the heritage area. The complex administrative boundaries and the lack of appropriate information currently limit the potential of the Landscape Character approach to provide a framework for strategic planning and management. Establishing a unified GIS is a significant step forward. **Section 2**.

2 Outline archaeological/palaeontological sensitivity study.

- Identify and assess management issues relating to the known and potential sites associated with the Palaeolithic/Pleistocene period. **Section 3**
- Produce a predictive model for the existence and location of other potential Palaeolithic/Pleistocene period sites. **Section 4**.
- Identify and assess the impact of later periods of settlement and land-use on the vales and gorges for management and landscape characterisation purposes. **Section 5**.

3 Consolidation and stabilisation of the national collection and archive of archaeological and palaeontological material of the Palaeolithic/ Pleistocene period from the Heritage Area.

- Accession the national collection from sites within the Heritage Area onto a centralised database for access and monitoring. **Section 6**.
- Identify research priorities and produce an action plan for their implementation. **Section 7**.

4 An ecological potentiality study, to be undertaken in Phase B of the Management Action Plan.

- Identify, map and assess the management of existing areas of high quality habitats characteristic of the Heritage Area.
- Identify, map and assess the potential for linking and extending the areas of high quality habitat.
- Propose future landscape characterisation work that can identify the potential for wildlife corridor links or extensions to major biodiversity nodes.

5 An intellectual, physical and visual access study.

- Identify and assess opportunities for consolidating and improving intellectual, physical and visual access to the Palaeolithic/Pleistocene and ecological resource for local people and for visitors, for both recreational and formal education purposes including the potential for involving local people in management and interpretation. **Section 8**.

6 Production of integrated conservation statements and management action proposals.

- Produce a statement of management action proposals for each of the limestone vales and gorges covering Pleistocene archaeology and palaeontology, landscape history, landscape character, ecology and access. Include provision for appropriate physical, intellectual and visual access and for involving local people in management and interpretation. **Section 9**.

1.2 Project co-ordination

The Management Action Plan project was co-ordinated by Creswell Heritage Trust. As the project was originally conceived, it was proposed that the GIS, archaeology, ecology, and access studies would all be undertaken at the same time and integrated. However, due to a shortfall in funding for the ecology, this part of the project will be undertaken in a later phase. Phase A (reported here) incorporated the GIS, archaeology, access, and draft management action proposals. In Phase B the ecological study will be undertaken and revisions will be made to the access study and the management action proposals.

Phase A was managed by Creswell Heritage Trust and was implemented by ARCUS, Groundwork Creswell and Creswell Heritage Trust.

Phase B will be managed by Creswell Heritage Trust and implemented by appropriately qualified specialists.

On completion of the Management Action Plan the identified actions with their costs will be submitted to the Aggregates Levy and other potential funding bodies.

1.3 Background

1.3.1 Landscape, wildlife and habitats

The Magnesian limestone runs in a narrow belt from Nottingham to the north east of England around Tynemouth. Local conditions in the northern part of the belt support a distinctly different range of plants and animals from that further south. For this reason English Nature recognise the section from Nottingham to North Yorkshire as a distinct 'natural area'. The Creswell Crags Heritage Area and Creswell Limestone Strategy Area cover the southern third of this area.

Magnesian limestone is a relatively soft rock that weathers easily. In the Creswell Limestone Heritage Area weathering has formed a plateau with rounded hills and dry valleys, cut by a number of sharply defined vales and gorges with caves and crags. The steep valley sides with cliffs in association with narrow river corridors create a strong sense of visual confinement. Areas of unimproved pasture and grazing meadows, often with patches of wet grassland, are a recurring feature of the gorges.

The Landscape Character types identified by Derbyshire County Council Landscape Character Assessment of the area are:

- Limestone Farmlands - "A gently rolling, and in places urbanised agricultural landscape, characterised by large-scale open farmland, estate woodlands, and small limestone villages".
- Limestone Gorges - "Incised river corridors, characterised by steep rocky cliffs, woodland and grazed meadow".

Due to intense exploitation of the landscape areas of wildlife interest are largely restricted to oases of high species diversity associated with the limestone gorges and vales. Because of their relative scarcity and high quality, it is particularly important that these sites are protected.

Magnesian limestone grassland is the most distinctive habitat type. It is a nationally scarce habitat and is listed on the EC Habitats and Species Directive (1992) as a habitat type of Community Interest. It is one of only very few habitats in Britain which is so rare that almost all known examples warrant statutory protection through SSSI notification, though some fragments remaining in the strategy area are unlikely to meet the current criteria for designation. The limestone vales and gorges are the main refuges.

The area also contains fine examples of semi-natural broadleaved woodlands recognised as being of national importance for their plants and animals. The only remnants of woodland typical of the Magnesian limestone are those along the grips and crags exhibiting a rich mix of deciduous species and many yews, the latter being vulnerable to farmers who are fearful of poisoning stock. Examples include Langwith and Roseland woods near Scarcliffe and Pleasley Park.

Several of the limestone gorges that characterise the area are Regionally Important Geological Sites (RIGS), coinciding closely with the important Pleistocene sites, areas of rare Magnesian Limestone grassland and fine examples of semi-natural broadleaved woodlands.

The legacy of industry and mineral extraction has resulted in immature restored landscape features (e.g. pit tips) where reclamation schemes have been undertaken and large unreclaimed sites. These are either already valuable biodiversity nodes or have considerable potential for enhancement of their biodiversity value.

1.3.2 Palaeolithic/Pleistocene archaeology and palaeontology

The area contains several sites associated with Palaeolithic (Old Stone Age) material of which four are Scheduled Ancient Monuments. They represent a significant proportion of the Scheduled Ancient Monuments for the Palaeolithic in Britain.

Archaeological exploration of the area began in the mid nineteenth century and has continued through to the present day. Prominent archaeologists who have worked in the area include Boyd Dawkins, Armstrong, Garrod, McBurney, Roe, Campbell, Mellars and White. Key sites include Creswell Crags, Ash Tree Cave, Langwith Shelter, Dead Mans Cave, Lob Wells Wood Rock Shelter and Thorpe Common Rock Shelter.

The finds and archives from these excavations are dispersed amongst a number of regional and national museums. The artefact assemblages from several of the caves have been assigned to the Middle and Upper Palaeolithic and the Mesolithic and the important faunal assemblages extend back to at least the Ipswichian interglacial.

1.3.3 The modern cultural and organisational landscape

The whole of the Heritage Landscape Area lies at the heart of the former coalfield and most communities have been affected by economic decline. Long term high quality conservation of the Ice Age scientific and educational resource is threatened by the continued poor economic, social and environmental conditions that many of the communities continue to face and by the poor understanding and appreciation of the distinctive cultural and natural heritage by local people and by decision makers.

These conditions affect external perceptions of the area, are a break on inward investment, encourage vandalism and neglect and provide conditions for inappropriate development and use. The high quality cultural and natural heritage is undervalued. There is the potential for the natural and cultural heritage to act as a catalyst for a new vision of the future of the area, creating a high quality sustainable natural and cultural environment and encouraging inward investment.

Strategic planning for conservation management, including Landscape Character, nature conservation, and natural and cultural heritage based regeneration is made difficult by the location of the Heritage Area on the boundaries of three County or Unitary Authority areas and the diversity of administrative units that result. Organisations such as the Groundwork and Heritage Trusts that work across these boundaries are of particular value in acting as catalysts for partnership working and strategic planning.

1.3.4 Extent of the Creswell Limestone Heritage Area

The area covered by the Management Action Plan is shown in **Fig 1.1**. The main limestone vales and gorges are:

Roche Abbey Vale

Firbeck Valley

Anston Stones and Lindrick Vale

Red Hill Valley

Thorpe Common and Lob Wells Wood

Ash Tree Gorge

Markland and Hollinhill Grips

Creswell Crags

Elmton and Whaley Valleys

Langwith Vale

Pleasley Vale

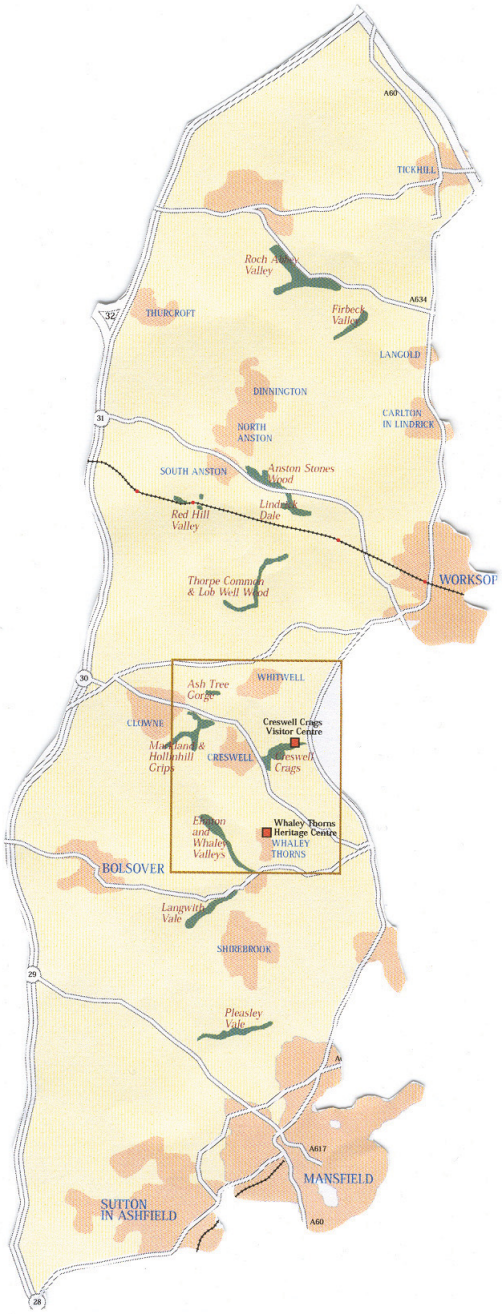


Fig. 1.1 The Limestone Heritage Area

2 CRESWELL CRAGS LIMESTONE HERITAGE AREA MANAGEMENT ACTION PLAN : A UNIFIED GIS FOR THE CRESWELL CRAGS LIMESTONE HERITAGE AREA

2.1 Introduction

The location of the Creswell Heritage Area on the boundaries of three County or Unitary Authority areas and three District Councils has complicated strategic planning for conservation management, including Landscape Character assessment and nature conservation.

To improve the conservation management of the Heritage Area and support natural and cultural heritage based regeneration projects a unified GIS index was developed. Derbyshire and Nottinghamshire County Councils and Rotherham MBC possess GIS for planning and management purposes, and access to the information contained in these systems was integrated for the Creswell Heritage Area to provide a framework for co-ordinated planning and management of the area's cultural and natural landscape assets. This information was supplemented with further information from the county Sites and Monuments Records of Nottinghamshire, Derbyshire and South Yorkshire.

2.2 Methodology

The production of a usable, integrated GIS index for the Creswell Crags Heritage Area comprised four elements:

- construction of a demonstration system.
- agreement of protocols for operating the system.
- setting up the system.
- maintenance of the system (ongoing).

2.3 Demonstration system

A demonstration system of the proposed GIS index was produced by Dave Wood of Nottinghamshire County Council. This was produced in Mapinfo and incorporated ecological data from Derbyshire, Nottinghamshire, Rotherham and Doncaster Councils. The preparation of this demonstration system showed that it was possible to incorporate data from the different local authorities, it also enabled potential problems with the methodology and allowed solutions to be developed.

2.4 System protocols

Prior to developing the full unified GIS index for the Creswell Heritage Area it was necessary to agree a protocol for the development and management of such a system. This required reaching agreement with the partner organisations of the Creswell Crags

Heritage Area and organisations that hold information that will be incorporated within the GIS Index. The following organisations are partners in the GIS:

- Creswell Heritage Trust,
- Nottinghamshire County Council,
- Derbyshire County Council,
- Rotherham Metropolitan Borough Council,
- South Yorkshire Archaeology Service.

On completion of the Creswell Management Action Plan further information will be supplied by:

- ARCUS,
- Groundwork Creswell.

The following are the protocols for the Creswell Heritage Area GIS Index:

- data for the index will include information on natural history, history and archaeology,
- data for the index will be provided by the partner organisations,
- once the index is complete, copies will be provided on CD to all the partner organisations,
- the index will be updated annually,
- during updates the opportunity will be taken to review the system to consider whether additional information or data fields could be profitably added,
- data generated during the production of the Creswell Crags, Limestone Heritage Area Management Action Plan, will be incorporated into the GIS index when appropriate.

2.4.1 Data provision

The information provided to the system from the partner organisations varied. **Appendix 1** includes a list of all the data sets that Nottinghamshire County Council have provided to the system, and similar data was provided by Derbyshire County Council. In South Yorkshire, Rotherham Metropolitan Borough Council provided data on natural history and the South Yorkshire Archaeology Service provided data on archaeology and history. The South Yorkshire Archaeology Service was unable to provide the full data set on archaeology and history, as they were undertaking a general programme of validation of data. This is being done as many of the records on the South Yorkshire SMR are known to be incomplete and to contain incomplete or inaccurate OS grid references. The South Yorkshire Archaeology Service therefore agreed to provide data on Scheduled Ancient Monuments and Sites and Monuments Records for earlier prehistoric sites (Palaeolithic and Mesolithic) at this stage. However, it is hoped that once the validation programme is completed that the additional data will be added to the system.

2.4.2 System access

Access to the system will follow the following principals:

- the system will be distributed to all the partner organisations that contribute to the system.
- the system will not be passed onto any third parties without the written agreement of all the partner organisations the contributed to the system.

2.5 Setting up the system

Dave Wood of Nottinghamshire County Council has offered to host and maintain the GIS index.

Subject to the reliability of the data provided, Nottinghamshire County Council guarantee the integrity of the resultant index and maintain the confidentiality of the system to the participating organisations.

To set up the system, metadata may be required on the sites. However, this will not be retained as part of the system and will be deleted once the index is compiled.

2.5.1 Transfer of data

The data supplied by the participating organisations was, and is being, sent directly to Dave Wood at Nottinghamshire County Council, with data provided in Mapinfo base format or compressed in *.mid* and *.mif* files.

2.5.2 Structure of the system

The GIS index is based on Mapinfo and has the following attributes:

- all sites will ideally be marked with as boundary polygons, but points will be included where boundary polygons are not available ;
- the index will have two layers, one for statutory designated sites and one for other types of sites.

Four fields will be recorded for each site:

Site reference number – designated by originator

Site name – designated by originator

Type of site – e.g. SAM, SMR, SSSI, NNR

Contact – who to contact for further information, i.e. which partner organisations holds the full record.

2.6 Maintenance of the index

It will be necessary to update the index regularly; this will be undertaken by Nottinghamshire County Council. It is proposed that annual updates to the system are organised by Creswell Heritage Trust and Nottinghamshire County Council who will contact the partner organisations for relevant new information.

2.7 Output

The output for this element of the project comprises:

- the GIS layers described above, into which further data from other elements of the Management Action Plan can be added. Layers will be provided in appropriate formats agreed with the participants,
- any documentation required to run and access the GIS, provided as a text file on the CD containing the GIS layers.

3 IDENTIFICATION AND ASSESSMENT OF MANAGEMENT ISSUES RELATING TO THE KNOWN SITES

3.1 Introduction

This report examines the condition and management of known Palaeolithic and Mesolithic sites within the Creswell Limestone Heritage Area. The sites examined are those in the vales and gorges that were identified in the Creswell Crags Conservation Plan and its gazetteer, and those sites identified in the survey undertaken here. The gorge at Creswell Crags was excluded from the study as this had been the subject of a previous study and report (Collcutt and Johnson 1999).

The importance of this area for Palaeolithic and Mesolithic archaeology is demonstrated by Creswell Crags, the best known gorge in the magnesium limestone containing Palaeolithic or Mesolithic material. Creswell Crags is of international significance for the range and quality of archaeological and palaeontological evidence relating to the Middle and Upper Palaeolithic periods. The other gorges/vales have been less intensively studied than Creswell Crags, but even so the area, including Creswell Crags, contains four Scheduled Ancient Monuments. This represents a significant proportion of the Scheduled Ancient Monuments for the Palaeolithic in Britain.

Within the other vales/gorges several caves and rock shelter sites are known and add to the potential for discovering further Pleistocene sites. The research value of these sites and of the area was identified in the Creswell Crags Conservation Plan and in the Assessment Of The Pleistocene Collections (Wall and Jacobi 2000) from the cave and rock shelter sites in the Creswell Heritage Area.

The archaeological, palaeontological, and quaternary geological resource is highly sensitive to a variety of impacts including visitor pressure and vandalism, erosion and neglect through lack of awareness and understanding.

Many of the known sites are located within Sites of Special Scientific Interest, Conservation Areas or Sites of Interest for Nature Conservation and most are on the local Sites and Monuments Registers. Differing degrees of protection are therefore afforded but it is important to ensure that the particular sensitivities of potential Pleistocene archaeological and palaeontological sites are recognised and protected within habitat management plans.

3.1.1 Aims

- *Through desktop research, supported by field visits, identify and record information relating to ownership, condition, management (including habitat management), issues, threats and access.*

- *Identify, agree and cost proposals to improve conservation, management and access.*

3.1.2 Study area

There are eleven vales/gorges within the study area. These contained varying numbers of caves or rock shelters. The eleven vales/gorges surveyed included those listed in the Pleistocene Site Gazetteer in the Creswell Crags Conservation Plan and three further vales/gorges, Roche Abbey Gorge, Red Hill and Firbeck. **Table 1** lists all the vales/gorges along with the number of known caves or rock shelters in each vale/gorge.

Table 1 Gorges in the study area with number of known sites.

Vale or Gorge	No. of known caves or rock shelters
Roche Abbey Vale	1
Firbeck	0
Anston Stones	4
Red Hill	1
Thorpe Common and Lob Wells Wood	4
Steetley Quarry Caves	2
Ash Tree Gorge	3
Markland Grips	11
Elmton and Whaley Valleys	9
Langwith Vale	6
Pleasley Vale	10

3.2 Methodology

The methodology for this study involved two stages:

- identifying the condition of each site and its surroundings,
- making recommendations as to the management of the sites.

The first stage, identifying the condition of each site was undertaken by means of a sensitivity study. This was undertaken following a similar methodology to that used by Collcutt and Johnson (1999) on their sensitivity study of Creswell Crags Gorge. The choice to use this technique was to enable a degree of comparability with the study of Creswell Crags and to use a proven methodology.

The main change in the methodology employed here compared to that used by Collcutt and Johnson was in the degree of detail used in defining the terrain units. These were defined more broadly in this study than in the study of Collcutt and Johnson (1999). This was due to the larger area involved in this survey compared to that of Collcutt and Johnson.

3.2.1 The Concept of Sensitivity

Sensitivity is a subjective assessment of the potential scientific value of a site/deposit and its vulnerability. The scientific potential was assessed by combining information from previous research on the site/deposit with visual inspection of its current condition to assess the likelihood of significant archaeological and/or palaeontological/geological deposits surviving. Vulnerability was an assessment as to the ongoing degradation of the site/deposit, either due to natural processes or to visitor and management activities.

As with the Collcutt and Johnson (1999) study 'potential' (split between the various scientific interests) and 'vulnerability' will be recorded on a scale with seven ranks:

- low
- low to moderate
- moderate
- moderate to high
- high
- high to very high
- very high

The ranks were allocated in the field and were only subject to modification if additional information provided a cogent reason.

Sensitivity was then assessed on the same seven rank scale. Generally sensitivity equaled the same rank as whichever of the rankings for vulnerability or potential was the higher.

A point should be made concerning the meaning of the rankings. A low sensitivity ranking does not mean 'no' sensitivity, and given the potentially disastrous implication of wrong ranking allocations, a minimum care level should be adopted on all future works. Conversely a very high ranking does not preclude all future work but implies a need for great care.

3.2.2 Desk Based Survey

The desk-top research built on the data already in the Creswell Crags Conservation Plan, specifically the Gazetteer of Pleistocene Sites, Creswell Crags Sensitivity Study and the Creswell Crags Pleistocene Collections Assessment. Much of the information required for this study had already been collated in these documents, however, further information was required and all the information required validating. Also the site in Roche Abbey Gorge was not included in the original gazetteer, so a full desk-top search relating to all issues was undertaken on the gorge.

The main areas which the desk-top research collected information on were:

- archaeological background potential
- ownership
- tenants
- management (including habitat management),

3.2.3 Field Survey

It had originally been proposed that two field surveys should be undertaken, one for the *identification and assessment of management issues* and the other for the *predictive modelling for the existence and location of other potential sites* (**Chapter 4**). When fieldwork started it was decided to combine the two surveys. This decision was made as it reduced travelling time, and limited the number of times access had to be arranged. It also enabled the terrain unit survey to be undertaken on the full length of each vale or gorge.

The field survey comprised a terrain analysis of the land in and around the known archaeological sites and new sites identified during the survey. The terrain analysis followed the same basic principals as that undertaken during the Creswell Crags Sensitivity study. However, due to the much more extensive scope of the study (over 20km of gorge compared to just over 1km) the terrain units were more broadly assigned.

The decision on the extent of survey around each site and the definition of terrain units was a balance between detail and extent. For the exercise to have value the terrain analysis had to be of reasonable detail. Within the valleys all rock faces were recorded and terrain units defined for them.

Terrain units were defined on basic geomorphological principles, taking account of sediment origin and sedimentation route. Visible discontinuities in the bedrock were also recorded (joints, faults, fissures and more horizontal discontinuities).

Terrain units were defined in the field. The location and extent of the terrain units defined were mapped onto O.S 1:2000 base maps. This was undertaken using a combination of GPS and topographic mapping.

The surface condition of each terrain unit defined was recorded. This covered both the visible surface sediment of the deposit and its vegetation cover. The terms used followed those used by Collcutt and Johnson in their sensitivity study. The following terms were used for the sediment type:

Table 2 deposit types

loam	clay/silt/fine sand mix
silt	powder-grade particles (often suggestive of wind-blown dust)
(dolomitic) fine sand	fine weathering residue of local limestone
stone	limestone clasts (angular fragments)
stony loam	<50% stone
loamy stone	>50% stone

coarse scree	stone commonly >15 cm, clast-support
blocks	individual stones >50 cm
matrix	fine sediment between stones/blocks
bedrock	*in situ* limestone
made ground	deliberate man-made deposits
tip	debris from past archaeological excavations
cave breccia	consolidated deposit of angular stones and sediment
hard standing	paths or roads with tarmac or hardcore surfaces

Table 3. Vegetation classes, based on dominant plant height used the following terms:

bare	sediment, often with loose organic litter
disturbed	colonisers (usually 30-50 cm) over new or disturbed surfaces
moss/lichen	(cover of rock surfaces, <5 cm)
grass	<10 cm
rough	<50 cm
bushes	<150 cm
wetland	(various, such as rush/reed bed)
saplings	commonly >150 cm
trees	(mature, diameter >20 cm)

A sensitivity survey has already been undertaken of Creswell Crags by Collcutt and Johnson (1999). A walkover survey was undertaken on the east side of the gorge to identify if any changes had occurred to the condition or management practices of the terrain locales identified. This served a two-fold purpose:

it enabled a check to be made as to the stability of terrains identified and any changes in their condition.

it enabled comparison to be made between old Creswell Crags survey and the new surveys.

The walkover of the east side of Creswell Crags identified that there were no significant changes to the terrain units described.

3.3 Results

3.3.1 Desk-based survey

The collection of data for the desk-based survey was undertaken by Rowan May. The desk-top survey built on the data already in the Creswell Crags Conservation Plan, specifically the Gazetteer of Pleistocene Sites, Creswell Crags Sensitivity Study and the Creswell Crags Pleistocene Collections Assessment. For the desk based research the following sources were searched for information.

- South Yorkshire Sites and Monuments Record
- Derbyshire Sites and Monuments Record
- Nottinghamshire Sites and Monuments Record
- Local studies libraries
- Online databases ADS,
- Listings on Cave Archaeology and Palaeontology Research Archive (CAPRA),
- Local Journals
- National Journals
- University of Sheffield Library
- The Creswell Crags Conservation Plan
- Limestone Heritage Area Ecological Assessment of Key Sites (ECUS)

Relevant data from all the above sources was added to the terrain units database.

3.3.2 Field Survey

The field survey was conducted by Glyn Davies, Phil Jefferson and Rowan May, with two people on site at all times. The vegetation cover varied between the vales/gorges, at times this was very dense and this is described in the sections on each gorge. Where the vegetation was very dense it is likely to have interfered with the survey, as it made it difficult to find small rock faces, identify detailed topography and determine the surface sediment. In the case of Markland Grips the vegetation was so dense that the survey of part of the Gorge was undertaken in the autumn when the vegetation was less dense.

Access was arranged with the landowner and tenant before entering any private land. In almost all cases landowners and tenants were happy to give access. Any problems with access are described in the sections on each gorge.

The data from the survey was used to draw up maps of each gorge, these used O.S. data for the base of the maps. This was overlain with data from the field survey showing all rock edges, caves, rock shelters, fissures and terrain unit boundaries.

A database of all the terrain units was produced in Microsoft Access. This incorporated data from the field survey and data from the desk-based survey. All Terrain Units were numbered, The numbering system used was developed from that in the Creswell Crags Conservation Plan Site Gazetteer. In the gazetteer each vale/gorge had a two letter code followed by a number for each cave or rock shelter. The terrain unit numbers had a three letter code for each gorge, this included the two letters from the gazetteer code followed by a T to denote that this is a terrain unit, this was then followed by the terrain unit number. There were separate numbering sequences for each gorge. However, no attempt was made to relate numbers in the gazetteer with those in the sensitivity survey, this was because some gazetteer sites could contain several terrain units making direct correlation impossible. The addition of the extra letter T means that the records from the gazetteer and the sensitivity survey can immediately be told from each other.

3.3.3 Management Recommendations

The management recommendations were drawn up in the office following completion of the fieldwork. These recommendations fall into three groups,

- Immediate Actions – these are actions taken to remediate immediate threats to sites or specific problems that need special attention in the public education or monitoring programmes.

- Public Education – this involves informing the public about the importance of the sites and educating them as to what can damage the archaeological/palaeontological potential of a sites. This information will be aimed at land owners, councils, and visitors. It will also provide contact information where the public can report problems or get advice.

- Monitoring – this involves a long term programme of regular monitoring visits to look for changes to sites that will impact on the archaeological/palaeontological potential of site.

3.4 Roche Abbey Vale

3.4.1 Access and survey conditions

Roche Abbey Vale lies at the northern end of the Creswell Crags Limestone Heritage Area just south east of Maltby. The vale has three arms, north western, south western and an eastern arm. These are all of approximately equal length, of about 1.25km each, giving a total length for the valley of about 3.75km. Most of the land in Roche Abbey Vale is owned by the Estate of the Earl of Scarborough, which provided access to all areas under its control. At the centre of the gorge, where the three arms meet, is the site of Roche Abbey, a Cistercian foundation now under English Heritage guardianship. The eastern arm runs from the abbey through pasture to the village of Stone, around which are patches of woodland. Most of this area had good survey conditions. The south west arm was generally wooded, though at its south west end there were some arable fields and rough grassland and there was a small reservoir at the north east end of the south western arm adjacent to the abbey. In the wooded areas of the south west arm the undergrowth was generally light although there were patches of dense undergrowth that made surveying difficult. The north west arm was wooded for most of its length with a sewage works at its northern end, which was not accessed. Here the undergrowth on the woodland was generally dense, especially on the south western side, which made examining some rock faces very difficult. In general survey conditions were reasonable.

3.4.2 Site condition

3.4.2.1 Caves

There were four possible caves in Roche Abbey Vale, none of which were very large. Cave RAT25 was located on the north east side of the north west arm of the valley. This cave was 3m deep, 1.2m wide and 1.5m high, and had formed on a fissure. Inside the cave contained a stony loam sediment. At the entrance to the cave there was a step up in the sediment, this step was 0.15m high and appeared to be a section left during excavation of the cave entrance. Variation could be seen in the sediment in this section. This was seen as changes in the proportion of stones in the deposits. It appears that some small scale excavations had taken place at the face of the cave, but that this activity has not disturbed the internal deposits. This cave was on a rock face approximately 12m long and fine grained talus cones had formed at either end of the rock face with material washed down from above.

Also in the north west arm, in an area of former quarrying, was a possible buried cave entrance at the base of a rock face (RAT28). As the face has been cut back it is not known if this cave would have originally reached the surface. The current entrance is 1m wide and 0.1m high, extending back for at least 0.7m. As far as is visible the cave is full of scree, but it is not known if any finer grained sediments also exist in the cave. As it was not known if this possible cave had ever reached the surface it was not included in later analyses.

A second cave, RAT15, was located on the south east side of the south west arm of the valley. This had been exposed in a rock face that had been quarried back. As this was exposed in a quarried face it is not known whether this cave originally had an opening to the surface. The mouth of the cave had been quarried out, exposing 2 or 3 side chambers. It was not possible to enter the chambers as their openings were very small, being partially filled with rubble from the quarrying. There was some finer grained sediment in the side chambers which probably did not relate to the quarrying.

In front of this rock face was a rubble dump from the quarrying which spread part way down the slope of the valley.

The third possible cave, RAT4, was located close to the intersection of the three arms. It was on an 8m high north face, at the west end of the east arm of the valley. This appeared to have been a small cave, formed at the intersection of two fissures, that had collapsed. In the area of collapse there were significant deposits of an orange cave breccia spread over a width of 2m. Outside the cave was a moderate slope dropping down to the valley floor. Although the cave has collapsed in the past it appears to be stable now as the slope below is formed of a grassed over stony loam and there is no sign of deposits of the orange cave breccia on the slope below.

3.4.2.2 Rock shelters

Roche Abbey Vale contains numerous rock shelter sites. As there has been little excavation of these features it is not known if these possible rock shelters have been occupied in the past.

There are three rock shelters in the north west arm of the valley. The most westerly of these was RAT27, which had a overhang 15m long and 1.5m deep on a mid level rock face. There was an informal foot path up to and along the rock face, despite this area being a SSSI and signs saying access was not allowed. The informal footpath was bare and some minor erosion was taking place.

South east of RAT 27 was RAT 23. This was part of a high level rock face with a rock shelter formed on two overhangs totalling 20m in length. At either end of the overhang were fissures, and the southern fissure was up to 0.4m wide with some sediment and rubble in it. This rock face also had an informal bare path up to it and along it, despite being in the same SSSI as RAT23, with the same risk of erosion. In this case there was evidence that climbers were using the rock face.

RAT21 was a mid level rock face with an overhang and fissure towards its north west end. The overhang formed a rock shelter 7m long and 2m deep. This contained the remains of a small former building constructed from stone and brick. The south end of the building ended in a brick wall perpendicular to the rock face. This wall had partially collapsed exposing a cave breccia like sediment. It appears that the rock shelter had been partially dug out to construct the building, but that some sediment survived. The building is abandoned and collapsing, and contains some rubbish, including garden waste. An associated fissure to the was north of the overhang was up to 0.4m wide, and at least 2m deep, with some breccia deposits inside.

At the intersection of the north west and east arms of the valley was a small overhang 3m long and 1.5m deep. This rock face extended down to the valley floor and would have provided a rock shelter on the floor of the valley. The site was just off the footpath that runs along the bottom of the valley, but the presence of scrub vegetation between the face and the path restricted access.

There were three areas along the east arm of Roche Abbey Vale where possible rock shelters were located. At the west end were two main rock shelters, RAT5 and RAT6, and one small rock shelter RAT7. RAT5 was a 12m long and 2m deep overhang. Several large stone blocks had fallen from the roof of this feature some of which have been cemented by flow stone. Aside from these large blocks, the floor of the putative rock shelter was covered with a coarse scree-sized rubble fill. The eroded edges of a narrow slot that had been excavated into this rubble fill in the past were still visible. A fire had also been made in the rock shelter in recent times. Just east of RAT5 was

RAT6, a second rock shelter, 7m long and 2.5m deep. This had a stony loam fill. Cows were taking shelter in this overhang, as demonstrated by the presence of cow pats and hoof prints inside There was also extensive graffiti on the rock face within the rock shelter. These two rock shelters which were near the foot path along the base of the gorge were fairly vulnerable due to their location. RAT7, which was approximately 100m east of RAT6, was a 3m long a 1m deep overhang with an orange breccia fill which filled up much of the overhang.

Further west in Seed Hill Wood south west of Stone was a long rock face with an overhang for most of its length (RAT10), known as Stone Mill Shelter. The rock face was approximately 120m long and 8m high and the overhang was in three sections of 27m, 37m, and 40m. The overhangs were each of 4m and 5m in maximum depth. The ground surface within each overhang was made up of a fine grained matrix with occasional stones. The western overhang had a stone built fireplace within it. This had probably been constructed by the workers from the quarry (RAT9) to the west of the rock shelter. The central part of the eastern overhang was full of material, almost to the roof of the overhang. Excavations have been undertaken in the past that have confirmed the presence of Palaeolithic remains in the central overhang (Dolby 2001). Excavation also confirmed that the shelters appeared to have been used in the nineteenth century, during the life of the quarry (RAT9). A footpath runs along the rock face next to the rock shelter and the ground surface is bare in front of the central and western overhang.

There was a further rock shelter in the village of Stone at the west end of the west arm of the gorge. This was in the garden of Stoney Green House and was 15m long and 4m deep. At the west end a building had been built into the shelter, while to the east end a hardstanding surface had been constructed and the shelter was used as a car port. In front of the rock face was a garden which had been landscaped.

There were a few small rock shelters in the south west arm of the valley. Midway down the south west arm, on the south side, was a small gorge (RAT14) created on a large fault/fissure. This was 70m long, up to 6m wide, and approximately 2m deep. The fissure ran roughly north south, and contained a small overhang mid way along, the overhang was 7m long and 1m deep. This feature was in woods, and a forest soil covered any potential deposits in the overhang.

There were three further rock shelters on the north side of the south west arm. These were along the line of an intermittent rock face at mid level on the valley side. All of these faces and overhangs were on a wooded slope with patchy but generally dense undergrowth. RAT19 contained a 6m long and 1.5m deep overhang with a moderate, stony loam, slope below. RAT17 was 6m long and 2m deep. This contained the remains of a pheasant pen constructed from fragments of dry stone wall and wood. The floor of the rock shelter was a jumble of branches and disturbed loamy soil with a moderate, stony loam, slope below to the valley bottom. The disturbance of the rock shelter floor appears to have taken place in the past, there was no evidence of recent activity by animals. The final rock shelter was a 9m long and 2m deep overhang on a 120m long rock face, which was very overgrown and could only be partially investigated. The floor surface inside the cave was made up of scree, however, the dense vegetation on the moderate slope below precluded identification of its surface condition.

3.4.2.3 Fissures

Within Roche Abbey Vale the majority of identified fissures with sediment were located at the intersection of the three arms of the valley close to ruins of the abbey.

These were on the north side of the valley between RAT23 and RAT3. All of these fissure were on low level rock faces near the bottom of the gorge. The fissures varied in size from 0.1m to 0.7m wide, and the fill ranged from loose sand to compacted breccia.

RAT23 contained two fissures one of which was open to 0.4m and contained sediment. In RAT21 there was only one fissure 0.4m wide with a breccia fill. RAT1 had two fissures, one 0.7m wide and one 0.5m wide. Both contained fills of orange sandy matrix with stones, and in both cases they were washing out to form small talus cones. There was only one fissure in RAT2 which was 0.4m wide and contained a breccia fill. RAT3 contained four narrow fissures, all about 0.1m wide, and all containing sediment. There was also one fissure 0.35m wide, in RAT3, with an orange sandy breccia fill that was washing out slightly. All of these fissures were near to the footpath or road that runs along the valley bottom and were easily accessible, although there was no indication of any damage other than from natural weathering.

3.4.2.4 Rock faces and valley sides

Most of the valley sides in Roche Abbey Vale were moderately sloping, with occasional rock faces, which were spread between high, mid and low level. The rock faces varied in height from 2m to 8m with occasional smaller outcrops. The rock faces were usually in short lengths, of less than 50m, with a few longer sections of 100m or more. Within the rock faces were numerous features of archaeological or palaeontological potential which have been described in greater detail in **sections 3.4.2.1 – 3.4.2.3**. On the eastern arm of the valley the valley sides were covered with a mixture of grass and trees, while in the two western arms the sides of the valley were mostly wooded. There were no scree slopes visible in the valley. However, there were a few small patches of bare talus slope, which occurred where erosion from footpaths had taken place.

3.4.2.5 Valley bottom

The valley bottom was generally flat, with a small river running through it. In the western arm the valley bottom was mostly open pasture, while in the other two it was generally wooded.

3.4.3 Management recommendations

3.4.3.1 Immediate Actions

There are several sites that have been considered for immediate remedial action. These have a range of problems or threats against them. There is graffiti on the rock face in RAT6 and fires have been lit in RAT5 and RAT10. Although these are unsightly they were not causing significant damage to the archaeological potential of the sites as they only impinge on the surface of the rock face, or the deposits within, and it is considered that long term control of such activities is best undertaken through public education.

There are three sites, RAT10, RAT23 and RAT27 where footpaths are bare and erosion could take place. In RAT10 the bare footpath runs along the length of the rock shelter, but there is no evidence of significant erosion currently taking place, and this potential damage would be best dealt with through long term monitoring. In the cases of RAT23 and RAT27, both of these were informal paths across areas where access was not allowed. In one case the path went to a rock face used by climbers. In RAT23 and RAT27 erosion was taking place of surface deposits on the valley

slope below the rock faces. However, erosion did this did not appear to be impacting on the deposits in the rock shelters even though their ground surfaces were bare. It is therefore suggested that monitoring can be used to assess the erosion on the path and to asses if it is threatening the potential archaeology. Public education could also be used to deter people from using these informal paths. If this fails and erosion becomes a major problem it may be necessary to fence off the area and stabilise the paths by encouraging plants to recolonise them. However, it is worth remembering that neither of these sites have been investigated, and their archaeological potential is as yet unknown.

3.4.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, local councils, wildlife groups/trusts, local schools and local groups. For more details see **section 3.15.2**.

3.4.3.3 Monitoring

Within Roche Abbey Vale there should be a programme of long term monitoring to regularly visit sites and compare conditions with the current condition of the sites, described in the terrain unit database. Details of how such monitoring should operate are outlined in **section 3.15.3**.

3.5 Firbeck

3.5.1 Access and survey conditions

Firbeck valley run for approximately 1km south west from the village of Firbeck. The land was privately owned. A river runs along the bottom of the valley, and this had been dammed to produce a series of ponds along it. The eastern end of the valley is a pasture field, with occasional trees in it, while the western end of the valley is wooded. The valley appears to have been subject to extensive landscaping, this includes the ponds on the river, and paths through the woods, an ice house, and a hermits cave. All of these features would seem to date from the time when the valley formed the grounds of the demolished Park Hill Hall. Although much of the area is wooded the undergrowth at the time of the survey was generally light to moderate, making survey conditions average to good.

3.5.2 Site condition

3.5.2.1 Caves, rock shelters and fissures

No natural caves were identified in the Firbeck valley. There is one feature on a section of rock face (FBT4) locally known as ‘The Hermits Cave’, however, it was clear that this is a Victorian folly, containing a window and fireplace, that had been constructed onto the rock face.

There was a small overhang on the rock face (FBT2), however, this only extended for a maximum of 0.5m at its greatest, and was not considered a prime location for a rock shelter. Also the base of this rock face was a 2m wide flat area , spread with rubble. This did not appear natural, and may be a further example of landscaping in the woods.

3.5.2.2 Rock faces and valley sides

The rock faces in Firbeck Valley were restricted to an intermittent line on the south east side of the valley towards the south west end. Most of the rock face was about 2m high and vertical, although one small section did rise in a series of steps (FBT3). The rock faces were generally high up the slope on the valley sides, with the valley sides having moderate slopes to the base of the valley.

There were several areas on the south side of the valley, and in the woods, where the ground surface was covered with stony scree like deposits. However, in many places these deposits appeared to have resulted from human activity, either small scale quarrying or landscaping.

3.5.2.3 Valley bottom

The base of the valley was largely obscured by the series of ponds that run along the bottom. These ponds had been created by the construction of dams, weirs and sluices. The ponds had partially silted up, particularly towards the south west end of the valley, and this has resulted in the deposition of an unknown depth of material in the valley bottom changing its profile.

3.5.3 Management recommendations

As there are no known sites with archaeological or palaeontological potential in Firbeck Valley there are no management recommendations for the valley.

3.6 Anston Stones and Lindrick Dale

3.6.1 Access and survey conditions

Anston Stones and Lindrick Dale forms a continuous valley that runs south east from Anston for a total length of c.4.25km. Midway along its length the valley is bisected by the A57. From Anston to the A57, through Anston Stones, the valley is fairly straight, however, the section though Lindrick Dale changes direction, first at the A57 where it turns almost due south for about 1km, then had a T junction one arm runs west for 0.25km and the other runs east for 1km. Anston Stones Wood is mostly owned by Anston Parish Council and is a Country Park, with a railway line running through it. Most of the area is wooded, with occasional patches of open grassland in this area. The level of undergrowth in the wood varied from bare ground with leaf litter, to dense scrub, though generally light to moderate rough predominated. Survey conditions were generally reasonable, although in the dense scrub access was difficult. South and east of the A57 is Lindrick Dale. This is private land in the ownership of several different people. Running south from the A57, the dale contains several large houses and gardens, most of which gave access to their gardens to examine rock faces. Building work was taking place on one house which was empty so access could not be arranged. Extensive landscaping has been undertaken in many of these gardens and has altered the natural topography. The houses and outbuilding have often been built close to or directly up against the rock face. Beyond the T junction most of the land is wooded with a few fields of rough grass. In the wooded areas the undergrowth is usually light, which made for reasonable survey conditions, al though there are a few denser patches of undergrowth.

3.6.2 Site condition

3.6.2.1 Caves

A total of nine caves or caves were identified in Anston Stones Wood, two of which had been previously identified and listed in the Creswell Crags Heritage Area Pleistocene Site Gazetteer. All of the caves in Anston Stones Wood were in the north western half of the valley, in the first 500m of the valley with rock faces. This means that no caves are known for most of the centre and south east end of the valley.

There were three possible caves towards the western end of the valley, on the north side. These are in an area of disconnected rock outcrops and rock faces which extends from high up on the valley side down to the bottom. Two of these (AST9) and (AST12) are possible caves that have been exposed by the presence of badger setts. In both cases badger setts had been excavated at the base of rock faces, demonstrating the presence of buried voids, probably caves. In both cases the potential buried caves appear to be bigger than the area excavated by the badgers, suggesting that there may be further undisturbed deposits *in situ*. AST9 was high up on the valley side, while AST12 was mid-level on the steeply sloping valley side. There was a second badger hole next to AST12, which might indicate the presence of a second buried cave entrance at this location, or a buried overhang. Further down the valley side, just below AST12, was AST14 a small cave in a rock face up to 10m high. This cave had formed on a fissure and had an entrance 1.5m wide and 3m high (including the fissure). The entrance had been blocked with large stones, some of which were concreted together, possibly the work of cavers. Although from different sources, all three of these small caves at the west end of the valley had suffered damage.

On top of a rock face up to 10m tall were two small and adjacent cave entrances (AST18). These were about 4m apart and may well have been part of the same system. The first entrance was a vertical entrance, about 0.4m in diameter, while the second entrance was a horizontal entrance 0.9m wide and 0.3m high. However, inside the second entrance the cave turned sharply. Both caves were choked with rocks and it was not possible to determine the depth of the caves or to confirm that they were part of the same system. Although near a footpath, there was no evidence for any modern human activity in or around these caves.

The best known cave in Anston Stones Wood is Dead Mans Cave (AS4), AST20. This cave has been the subject of excavation and study since the 1960s (White 1970, Mellars 1969 and Wall 1990). The cave is located on a high level rock face on the north east side of the valley. It has a 2.5m wide entrance, which narrows to 1m, before opening up onto a 5m long and 4m wide chamber. The inside of the cave has a stony loam floor. There is a small flat area just outside the cave with a steep slope below. There is extensive graffiti both inside and outside the cave. Bottles and cans are scattered about, and fires have been lit in the cave recently, leaving ash deposits on the floor and black soot on the wall.

AST21 is on the same part of the valley, but below AST20. This cave is located on a mid level rock face 1.5m wide and 2m high. This cave was full of sediment, orange brown, sandy cave breccia, which was eroding from the entrance of the cave. The erosion appeared to be due to natural weathering. Below the cave is a steep slope where the material eroding from the cave might accumulate were it not for the fact that this was also suffering from erosion due to the informal footpath that crosses it.

The second cave that had been previously recorded in Anston Stones Wood is Fissure Cave (AS3) AST26. This cave, which is on a mid level rock face, is only 2m deep and 1.5m wide, and contains breccia sediments towards the rear. Immediately east of the cave is a large 2m wide fissure. This contained stone blocks and breccia, and had a talus cone below, trailing down the side of the valley. AST26 appeared to be little visited, and had no evidence of dumping or human disturbance. However, saplings growing above the site may have loosened material within the fissure.

AST33 is a cave with two entrances on a low level rock face next to the railway line. The cave had formed on two intersecting fissures leaving a small entrance, 1m high and 0.3m wide, facing north west and the main entrance, 1m by 1m, facing south west. It was not possible to determine the natural slope of the valley below the cave as this had been removed by the railway cutting. There was also some graffiti on the cave despite being well away from any paths.

The final cave in Anston Stones Wood is on the south side of the valley facing Fissure Cave AST26. This cave (AST40) is a small cave in the rear of a rock shelter. The cave is only 1.5m wide and 2m deep. However, collapsed stone that had formed a natural wall at the west end of the rock shelter had initially made the cave appear more substantial. This cave is located at the top of a gully on a high level rock face that runs for over 200m. Immediately outside the cave there is a steep slope down through the gully. There is some graffiti on the cave, but otherwise it is in good condition.

3.6.2.2 Rock shelters

Within Anston Stones Woods there are 35 overhangs on rock faces that may have been used as rock shelters. These overhangs vary from a few metres in length to 30m long, and are distributed throughout Anston Stones Wood and Lindrick Dale.

These potential rock shelters vary in character along the length of the valley, and they may be subdivided into three groups. Towards the west end of the rock faces in Anston Stones Wood between AST1 and AST27, in an area of intermittent and generally short sections of rock face, the overhangs tend to be relatively short, with the exception of AST22. In the central and eastern part of Anston Stones Wood between AST36 and AST81, where rock faces tend to be larger, with long sections of continuous rock face, the rock shelters also tend to be larger and longer, although there are still some small overhangs. In Lindrick Dale there are generally fewer rock shelters and these have a mixture of small and medium sized overhangs.

In the western end of Anston Stones Wood there are a total of 8 rock shelters. Two of these, AST8 and AST10, are in a promontory of rock that outcrops on the top of the north side of the valley. This rock promontory also contains cave AST9. Both of the rock shelters have small overhangs, 1.5m and 4m long, and contain sediment. However, it is not clear if the deposits have been disturbed at any time by the badgers which had burrowed into AST9.

AST22 is the largest rock shelter in the western end of Anston Stones Wood. This overhang is 15m long and up to 4m deep forming a large potential shelter near the bottom of the valley below Dead Man's Cave AST20. This overhang, has a stony loam sediment inside it, and has suffered extensive damage. There is extensive graffiti on the rock face, and fires have been lit under the overhang, resulting in patches of soot blackened rock face and charcoal and ashes scattered around the site. People have also placed large stones within the rock shelter to form groups of seats around the fires.

There are three rock shelters in AST24. Here, several large blocks have become detached from the main rock face leaving a small sheltered enclave between the blocks and the face, and within this enclave there are two overhangs on the surviving rock face, both 5m long, and one 6m long overhang on one of the detached blocks. None of these overhangs contains sediment, with bedrock forming the floor surfaces in all of them. However, a fissure was noted at the rear of one that did contain sediment. The sheltered enclave between all of these rock shelters would also have acted as a sediment trap where any material from the rock shelters could have collected. There was a small amount of rubbish around and a fire had been built in one of the shelters, but damage was much lighter than in AST22, probably because AST24 is further away from, and hidden from the footpath. The origins of the shelters and detached blocks was not clear, although the blocks had probably separated from the main face due to the presence of faults/fissures. It is not clear if the rock shelters formed prior to or after the separation of the blocks. It is possible that the rock shelters were originally part of a cave that had fractured with the side collapsing off leaving a group of rock shelters facing each other.

The last potential rock shelter on the north side of the valley in the western end of Anston Stones Wood, is AST27 which has a 5m long overhang and contains a loamy fill. Although close to a footpath, there is no sign of any damage to this site.

On the south side of the valley there is only one potential rock shelter in the western end of Anston Stones Wood. This is in AST37, where large scale faulting has led to the development of a series of mini gorges. These are heavily overgrown and difficult to access, however, one overhang 7m long and 1m deep, was identified, and it was almost completely full of sediment. As this area was very overgrown at the time of the survey there was little sign of human activity and the current threat would appear to be limited to bioturbation from roots.

There are 18 potential rock shelters In the central and eastern parts of Anston Stones Wood. These are spread out over both sides of the gorge, from the top of the valley side to the bottom of the gorge next to the river.

On top of the north side of the valley a large scale fault has developed into a mini gorge running parallel to the main valley for approximately 250m. In this mini gorge two overhangs had formed possible rock shelters AST28, 5m long, and AST29, 15m long. Both of these sites appear to contain a significant depth of sediment, and there was no sign of any erosion or disturbance to either of the sites.

Running parallel to the mini gorge was a mid to high level rock face on the north side of the main valley. This contained 3 rock shelters AST32, AST34 and AST35. AST32 had a large 10m long and 3m deep overhang with stony loam sediment inside. There were extensive animal burrows in the sediment in this shelter and patches of ash, suggesting that fires had been lit in the past. AST34, which was 8m long had a stepped stone floor. Due to the absence of deposits in the shelter the site has limited potential, but a stony talus slope below could contain material, if the site had ever been used by humans. Adjacent to AST 34 was AST35, a 6m long and 4m deep overhang. This contained a breccia like sediment of red brown clay and angular stones and towards the rear of the overhang were large stone blocks, which appeared to have fallen off the roof. There was evidence that the site had been used as a drinking den with cans and bottles scattered around. There were no signs of fires having been lit.

East of AST35 was a further stretch of mid-level rock face which varied in height between 1m and 8m. This face contained two potential rock shelters, AST74 and AST75. The first, AST74 was a large, 20m long, overhang that contains a stony loam fill. This had been disturbed by animal burrows and several fires had also been lit in the shelter. AST75 was shorter at 12m, but is still a significant overhang. Although these was no evidence for fires in AST75 the fill had been heavily disturbed by animal burrowing activities.

At the eastern end of Anston Stones were three rock shelters on low level rock faces. Two were in Anston Stone Wood, and one was in the garden of Lindrick Hall Farm. AST79 appeared to be a small overhang, but this was full of alluvial sediments and it was not possible to determine its size. A badger sett extending under the rock face confirmed that an overhang was present, but also showed that at least some of the sediment must have been disturbed. West of AST79 is AST77, a large low-level rock shelter. This is 15m long and up to 8m deep, with a fill of red brown alluvial silty clay. The remains of a trench could be seen inside the shelter. This was approximately 1m wide and ran back towards the rear of the shelter. There are no recorded excavations on this site, so it is not known why or when this was excavated. There was also evidence of animal burrowing into the fill of the shelter. The final rock shelter on the north side of Anston Stones is a 12m long, low-level, overhang in the garden of Lindrick Hall farm, AST80. Two large slabs had fallen down from the roof of the shelter, covering the floor of the shelter. Below these slabs there appeared to be deposits of sediments, but it was not possible to identify their nature.

There were several rock shelters on high level rock faces on the south side of Anston Stones Wood. At the west end are AST38 and AST39, two overhangs of 12m and 4m length with a step slope below to the valley floor with occasional stone blocks on the slope. A couple of small fires had been lit in AST38, but apart from these there was little evidence of any activities that may have disturbed the deposits in these potential shelters.

AST40 is a, 4m long overhang with a small cave in the rear of the shelter, this was described in more detail in **section 3.6.2.1**. Just east of AST40 is AST41 an overhang split into two by a fissure. The fissure was 0.3m wide and contained a red brown silt which formed a small talus cone at the base of the fissure. The ground surface in the shelters was a stony loam deposit. There was some rubbish in the shelters, mainly beer cans, but no signs of disturbance.

AST42 is a large rock shelter on a high to mid level rock face up to 10m tall. The overhang is 30m long and up to 5m deep. The ground surface in the shelter was mainly bare exposing a brown loam soil, but at the east end a number of large stone blocks had fallen down from the roof of the shelter. These blocks had been reconnected to the roof by flowstone dripping down from the roof above. This site is near a path and some rubbish had been scattered around, and the remains of fires were observed.

Approximately 150m south east of AST42 is another large overhang AST71. This is 22m long and up to 2.5m deep. Talus cones sweep round either end of this rock face, possibly burying further overhang. A gully high up on the centre of the rock face had led to the development of a talus cone partially burying the centre of the overhang. The ground surface in this rock shelter is an orange brown stony loam. The only possible threat to this shelter appears to come from some animal burrows.

AST69 is an intermittent overhang totalling 15m in length. This is on a high level rock face with a moderate slope below. Bioturbation by roots appeared to be the main threat to this as there was little evidence of any other activity on this site.

The final rock shelters in Anston Stones are two small adjacent sections of overhang 8m and 4m long, the larger of which contains sediment while the smaller had a bedrock floor. There was evidence of climbers using this face, and fires had been lit in the rock shelters.

South of the A57 where the valley is known as Lindrick Dale there are 9 overhangs that form rock shelters. Lindrick Dale is quite different in character to Anston Stones. Here the valley contains several large houses and garden which has led to much greater landscaping of the valley sides and bottom. Lindrick Dale is also not as deep as Anston Stones, so many of the rock faces extend for the full height of the valley.

On the east side of Lindrick Dale, towards the north end, is a large rock shelter that runs for 22m in the gardens of Willow Green and Red Croft, with an overhang up to 5m high and 3.5m deep. For most of its length the rock shelter has been paved to make a patio in the garden, though in Red Croft part of the overhang has been incorporated into an old cottage, now used as a garden building. No information is available pertaining to the extent of any groundworks associated with the construction of the cottage and patio, it is therefore unknown if any deposits survive in the rock shelter.

Further south in Lindrick Dale on the west side of the valley are three overhangs next to each other, AST54. These rock shelters are 13m, 12m and 7m long with patches of flowstone on the rock face and sediment inside. On the slope below the rock face are some large stone blocks that had presumably fallen of the rock face maybe suggesting that the shelter line was once more continuous or extensive. As these shelters are in gardens there is the potential for disturbance of the top sediments in the shelters from gardening activities.

Almost opposite AST54 is AST55, in the garden of Lakeside House, which also contains three overhangs next to each other. These are smaller overhangs, only 5m, 6m and 3m long. These were in a more extensively landscaped garden and were therefore presumably subject to greater potential disturbance.

Also in the garden of Lakeside House is a further overhang on a separate rock face AST56. This overhang is 8m long, and had previously contained a small building, the remains of which could be seen on the rock face, more recently the garden had been extensively landscaped and the rock shelter had been paved with gravel and bricks. This final rock shelter would appear to have limited potential due to the extensive construction and gardening activities.

The final potential rock shelter in Lindrick dale is AST57 an overhang in the garden of Lakeside House. This overhang has been bricked up to create a garden shed, completely obscuring the shelter, and any deposits it contains.

3.6.2.3 Fissures

Although there are several fissures in the rock faces in Anston Stones and Lindrick Dale few of these appear to have to have great potential. Most were either narrow or have a stony fill. However, there were 11 fissures that appeared to have moderate to high potential, mainly for palaeontology (AST2, AST10, AST24(x4), AST26, AST51, AST55, AST57, AST70) . These fissures all contain sediment and are generally over 0.5m wide. The fissures are distributed throughout the length of the gorge and are found on both large and small sections of rock face.

There are also 11 fissures that contained some sediment, and that had low to moderate potential, again mainly for palaeontology (AST4 (x2), AST5, AST19, AST41, AST44 (x3), AST51 (x2), AST62). These are generally narrower than the fissures with higher potential, and as with these they are found throughout the valley.

Five small fissures were recorded that had low potential. This is due to the absence of any observable deposits in the fissures. However, they all have small talus cones below suggesting they did once contain sediment, but that this has been eroded out (AST42 (x2) and AST43 (x3)). These are all located near to each other, and it may be that local conditions in this area were encouraging erosion in these fissures.

3.6.2.4 Rock faces and valley sides

The nature of the rock faces and valley sides in Anston Stones and Lindrick Dale varies along its length. At the west end, for the first 0.7km, the valley has sloping sides with no rock faces. In this area the valley sides are generally a mix of moderate to steep slopes with the slopes becoming shallower towards the top of the valley sides. Further east the next part of the valley, which runs for up to 0.4km contains intermittent and scattered sections of rock face on a moderate to steep slope. These sections of rock face are distributed from high to low level and are generally between 1m and 3m high, though in one section, AST22, the rock face is about 10m high.

In the central and eastern parts of Anston Stones Wood the rock faces are generally in long continuous sections. On the north side of the rock faces are high level in the centre which gradually dropped down to become low and mid level faces further east. At the eastern end of Anston Stones Wood there are no faces on the north side, probably because they have been removed by the construction of the railway. On the top of the valley side at the west end of the central section are two further faces. These faced one another in a mini-gorge about 5m wide that has probably been

created on a large fault line. In the mini gorge the rock faces are generally about 2m high, while on the main rock faces of the valley they vary between 2m and 12m high. On the south side of the valley the rock faces vary between mid and high level. These are not as continuous as on the north side, but are still substantial and up to 10m high.

At the east end of Anston Stones beyond Anston Stones Wood there is an intermittent low level rock face, up to 4m high, in the garden of Lindrick Hall Farm.

South of the A57 in Lindrick Dale the valley is not as deep as in Anston Stones. For the first 0.15km at the north end of Lindrick Dale there are no rock faces on the valley sides which are steep. South of this there are long sections of rock face for the next 0.5km. These are not continuous, but are present for most of this section of the valley. These faces are up to 8m high, though usually less, and were high to mid level rock faces, with moderate slopes below to the valley bottom. In some areas the natural shape of the slope below the rock faces can not be determined. This was due to landscaping in the gardens in which these faces lie.

At the bottom end of the north south section of Lindrick Dale, in the garden of Dale House, the rock face, AST61, had been recently cut back during building work on the site. Access could not be gained to this area though from the road it appeared that there may have been archaeologically/palaeontologically sensitive features in this rock face.

On the east west section of Lindrick Dale there are intermittent sections of mid to low level rock face on the eastern arm. These are mainly on the south side of the valley, though there was one section on the north side. These faces are between 3 and 5m high. There are a number of talus cones on the south side of the valley below rock face AST64. These had formed where high level gullies are present on the rock face. Above these faces the valley sides are moderately sloped.

3.6.2.5 Valley bottom

Along the length of Anston Stones and Lindrick Dale the character of the valley bottom varies. The valley bottom is narrow in Anston Stones Wood, often little more than the width of the stream, while in Lindrick Dale there is a much wider flat valley bottom. The Anston Brook, runs along the length of the valley. The presence of the railway line and large embankment in Anston Stones has obscured much of the base of the valley, making accurate observation of the shape of the valley bottom problematic.

3.6.3 Management recommendations

Anston Stones Wood is a park owned by Anston Parish Council. The park is managed by a Management Committee made up of local councillors and representatives of English Nature and The British Geological Survey. However, there are no archaeological representatives on the management committee. The management committee has commissioned a management plan for the woods, this proposal is mainly concerned with the natural environment, but does include an archaeological component. The Management Plan is due to be completed by the end of June 2004. As this is being drawn up at the moment it provides an opportunity to consider an integrated approach to the management of the wood and its natural and archaeological resources.

Brian Davies, the English Nature member of the committee, has indicated that the plan will look at ways to improve management, and public access, while stopping vandalism. Tone of the ways this can be done is through public involvement and education.

Helen MacLean, the archaeologist for Bullens, the consultants drawing up the plan, said that they would be grateful for any information that could be provided to them. It is therefore proposed that a copy of the relevant sections of the management action plan should be forwarded to Anston Stones Wood Management Committee and Bullens as soon as it is finished, so that an integrated approach can be taken on the Anston Stones Wood Management Plan.

Anston Parish Council should also be approached with the aim of obtaining an archaeological presence on the Management Committee. This would be a most effective way of promoting the archaeological importance of the sites in the woods. The archaeological representative should add to the current specialist representatives on the committee from English Nature and the British Geological Survey.

3.6.3.1 Immediate Actions

There are three main concerns regarding the integrity of the archaeological remains in Anston Stones Wood and Lindrick dale.

Recommendations related to Anston Stones Wood should be integrated into the Anston Stones Wood Management Plan that is currently being drawn up. They will be most effective if they become an integral part of the woods management, rather than a external responsibility.

In Anston Stones Wood there is a problem with vandalism which relates to the use of some of the caves and rock shelters as illicit drinking dens. This has resulted in bottles and cans being littered about the sites, graffiti on the rock faces, and fires being lit within in the sites. This is unsightly and potentially dangerous due to the presence of broken glass bottles. However, it is not necessarily particularly damaging to any archaeological or palaeontological deposits, so long as these are not on the surface. However, adding large quantities of ash to the soil could have a potential impact on preservation of some remains through changes to the soil chemistry.

There are two proposals to deal with the problem of vandalism. The first covers public education, and will be aimed at promoting the importance and sensitivity of the sites. This will be undertaken through the public education programme. The second action should be to have a programme to clean litter debris from fires and graffiti off the sites. This will only work if it is carried out on long term basis and should be part of the Management Plan being drawn up for Anston Stones Wood.

There are many paths both formal and informal in Anston Stones Wood. Some of these paths have been constructed, but others are simply bare earth. In the case of the constructed paths their construction may disturb any archaeological deposits that are close to the surface. With the unconstructed paths their surfaces could erode and this may disturb archaeological deposits, particularly where paths cross or run up and down steep slopes. There are a few very steep scramble like paths that have developed, and these show signs of significant erosion.

Problems with paths should be dealt with in two ways. In the case of constructed paths, and associated bridges and steps, further paths should only be approved and

constructed after assessing the archaeological impact of the paths. In most cases the likely archaeological impact will be low and path construction will not be a problem. However, where paths are constructed in the vicinity of sites or rock faces and where construction involves excavations beyond the topsoil there could be archaeological impacts. Informal paths that are leading to erosion should be discouraged through public education. Where erosion is taking place action should be taken to stabilise the slopes through regeneration of the vegetation. This should be part of The Anston Stones Wood Management Plan

The third area of concern relates to bioturbation from animals and plants. There are animal holes in several of the caves and rock shelters, these have been produced by a range of animals from rats to badgers. Some potential cave sites can only be identified through the presence of animal holes, particularly badger setts at the base of rock faces.

Disturbance by animals and plants is the most difficult issues to deal with as the woods are a SSSI and any management actions here will have to strike a balance between preserving the archaeology and not harming the natural environment. There are seven sites with animal holes in them, and two sites with animal holes nearby. However, all of these sites are potential sites, as none have been investigated to confirm if archaeology is present or not. Sites in Anston Stones Wood should be monitored to determine whether animal burrowing is restricted to the currently known sites, or is expanding. Numerous sites have plants, ranging from small shrubs to large trees growing in or near them. The roots from these plants may have disturbed the deposits within them. As the woods are a SSSI removal of plants is not an option, except in the most extreme of cases. The sites should be monitored through the monitoring programme to determine if the current situation is stable or sublect to change. The monitoring of sites should be allied to a programme of small scale investigation to determine if the sites contain archaeologically/palaeontologically significant remains. If significant remains are present then small scale excavation should be considered to preserve the remains by record. This would have to be undertaken in a way that is sensitive to the natural environment and if badgers are involved an English Nature or DEFRA Licence to disturb badger setts would be required. This could be carried out following the procedures described in English Heritage Landscape Advice Note No.16 Badgers and The Historic Environment.

In Lindrick Dale the two main impacts to caves and rock shelters come from the construction of houses up against the rock face, and the incorporation of rock shelters as garden features. In the case of further construction these may be dealt with through the normal planning process, now that the potential of these sites has been identified. In the case of garden features that do not require planning consent the education programme should identify the potential of these site to the owners and suggest approaches that will minimise the potential threat to sites.

3.6.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, local councils, wildlife groups/trusts, local schools and local groups that may be interested. For more details see **section 3.15.2**. In Anston Stones Wood this should be undertaken in conjunction with Anston Parish Council through the Anston Stones Wood Management Committee and integrated with any programmes developed through the Anston Stones Wood Management Plan.

3.6.3.3 Monitoring

Within Anston Stones Wood and Lindrick Dale there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database. Details of how such monitoring should operate are outlined in **section 3.15.3**. In Anston Stones Wood this should be undertaken in conjunction with Anston Parish Council through the Anston Stones Wood Management Committee and integrated with any programmes developed through the Anston Stones Wood Management Plan.

3.7 Red Hill

3.7.1 Access and survey conditions

Red Hill is a small triangular section of land between Kiveton Park and Kiveton Bridge, bounded by the B6059, the Worksop to Sheffield railway, and housing on the east end of Kiveton Bridge. It is 0.75km long and up to 0.25km wide at its widest point. The area contains the north side of an east west running valley. The south side of the valley, which is lower and more gently sloping, is covered by an industrial works and arable farmland and does not contain any known rock outcrops. This southern side of the valley was not surveyed. The east half of Red Hill Valley, adjacent to Kiveton Park is wooded with heavy undergrowth and shows signs of former quarrying activities. The western half is more open, covered in rough grassland with arable land in the valley bottom. The east half proved difficult to survey within the wood, and dense undergrowth, while the west half was easier in the rough grassland.

3.7.2 Site Condition

3.7.2.1 Caves

Red Hill valley contains one known cave, RHT1, Red Hill Cave (AS1). There are no recorded excavations of the cave, which has a small, 1m square, entrance but then opens up inside and is approximately 2m high and 4m square internally. The floor of the cave is made up of a deposit of stony loam, however, it is not known how deep this is but it would appear to have some potential. The cave is been used as a den by local youths, and the inside is scattered with cans, bottles and other rubbish.

3.7.2.2 Rock faces and valley sides

The valley side (RHT2) in which Red Hill Cave is located varies in slope. At the top the slope was moderate, it then becomes steeper through the middle section, and is shallow at the base. There are a few small (less then 1m long) outcrops of bedrock scattered along the slope. A trackway has been cut from the B6059 across the site altering the shape of the valley to the east of RHT2.

3.7.2.3 Valley bottom

A railway runs along the bottom of the valley, and the construction of this has have changed the profile of the base of the valley. However, the bottom of the valley was probably never very wide.

3.7.3 Management recommendations

3.7.3.1 Immediate Actions

No immediate actions are proposed. These is rubbish in the site but although this is unsightly it is not causing significant damage to the archaeological potential of the sites, and it is considered that long term control of such activities is best undertaken through public education.

3.7.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, local councils and local groups that may be interested. For more details see **section 3.15.2**.

3.7.3.3 Monitoring

Within Red Hill Valley there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database. Details of how such monitoring should operate are outlined in **section 3.15.3**.

3.8 Thorpe Common and Lob Wells Wood

3.8.1 Access and survey conditions

Thorpe Common and Lob Wells Wood lie in the long and sinuous Bondhay Valley which runs for approximately 3.25km. From Lob Wells Wood the valley runs south west, for about 0.5km to the village of Top Hall. It then runs south south west for about 1.5km to Whitwell Wood. It then turns west south west to run along the northern side of Whitwell wood for 1.25km, including a short section which turns north west at its very end. All of the land is in private ownership, though there are a number of informal footpaths that run through parts of the valley giving access to some areas. Land owners gave permission to access areas where this was required. The northern end of the valley is wooded in Lob Wells Wood, this generally had light scrub undergrowth, and access and surveying conditions were reasonable. From the village of Top Hall down through Thorpe Common the valley is a patchwork of open fields and woods. Generally, the valley bottom contains fields, either pasture or arable, with woods along the valley edges, although this did vary with occasional patches of woodland in the valley bottom, and fields on the valley sides. The small woods in Thorpe Common generally have dense scrub along their edges, with lighter undergrowth in the middle. Where rock outcrops occur in fields they are usually covered by a small copse of trees. Surveying conditions were reasonable, with occasional difficult patches. Along the north edge of Whitwell Wood the south side of the valley is in the wood, while the north side of the valley was in fields. In Whitwell Wood the undergrowth is light to moderate and survey conditions are reasonable. However, in the fields, which were arable, the outcrops are left as small copses which are heavily overgrown and in one case had formed a dense thicket that could not be accessed.

3.8.2 Site condition

3.8.2.1 Caves

No caves were known from Thorpe Common and Lob Wells Wood and none were identified during the survey.

3.8.2.2 Rock shelters

During the survey five rock shelters were identified. A sixth rock shelter (TL4) had been previously recorded, however, this was not visited as access could not be arranged.

At the north end of the Bondhay Valley in Lob Wells Wood there are two rock shelters (TLT17 and TLT18) on a mid to high level rock face on the south side of the valley. The largest of these TLT17 (TL2) is 7m long and up to 4m deep and is filled with a mixed coarse scree loam deposits. Below the rock shelter is a moderate slope to the valley bottom. Previous excavations by White produced flints one of which was possibly Palaeolithic in date. There have been no known excavations in TLT18, which is 7m long but only 1m deep. This shelter is partly buried by a talus cone which comes around the side of the rock face that contains the shelter. Both of these shelters are in good condition.

Just south of Lob Wells Wood is a rock face that could not be accessed. This probably contained a further rock shelter previously recorded as Lob Wells Rock Shelter 3 (TL4).

Approximately two thirds of the way down the valley, from Top Hall to Whitwell Wood is Thorpe Common Rock Shelter. This is on a high level rock face on the east side of the valley in a copse of trees and scrub, surrounded by an arable field. The rock face is 50m long and is divided into three terrain units, but should be viewed as one site. TLT5 at the south end has the largest overhang, 12m long and 2m deep, and some small trenches have been excavated at this end. Unfortunately the trenches had not all been backfilled and one was left open, plants had only started to re-colonise the trench, the sides of which are eroding and collapsing. It is not certain when the trench was excavated, the last known work on the site was by Jenkinson and Gilbertson in the mid 1980s, however, farm worker Tony Medlum said the excavations had been carried out only a few years ago. It would therefore appear to be possible that more recent unrecorded excavations may have been carried out on the site or that Mr Medlum was mistaken over the dates. TLT6 and TLT7 do not have major overhangs, but small sections of overhang are present. For the full length of the rock face there is a flat area at the base of the cliff with a slope below this. Ploughing in the field is cutting into the base of the slope below the cliff, potentially disturbing archaeological deposits.

Further south, where the valley turns west along the northern edge of Whitwell Wood is a small outcrop of bedrock 4m long, with a small overhang of 0.8m. There is an extensive badger sett below this rock face and at the base of the rock face one of the entrances to the sett appeared to be angling at least partially under the rock face suggesting that the overhang extended further back. If there were any archaeological/palaeontological deposits on this site the badger sett will have extensively disturbed it.

Within Whitwell Wood on the south side of the valley is a rock face that contains a 1m deep and 8m long overhang (TLT12). Although there are no trees up against the rock face, this is in a Forestry Commission Plantation, and the planting and felling of trees may have disturbed any deposits that extend down the slope beneath the rock face.

3.8.2.3 Fissures

Fissures were identified in two areas, on the rock face of Thorpe Common Rock Shelter (TLT5 and TLT7) and on the rock face in Whitwell Wood (TLT13). There are two fissures on the Thorpe Common Rock Shelter rock face, one near the north end in TLT7 and one towards the south end in TLT5. The northern fissure, which is 0.3m wide, is full of sediment, while the southern fissure, 1m wide, contains sediment at its base. The northern fissure is near to an area of collapsing rock face, and a large block has fallen off the face, possibly from a former overhang.

On TLT13 a large rock face in Whitwell Wood there are three fissures and two gullies, these vary in width from 0.6m to 1m wide. None of these features contain substantial deposits, although there is a large talus cone below one of the gullies.

3.8.2.4 Rock faces and valley sides

The Bondhay Valley is generally quite shallow, with only low valley sides along its length. The valley sides are usually moderately sloping, with occasional rock faces.

The nature of the rock faces vary along the length of the valley. At the northern end of the valley in Lob Wells Wood there are substantial lengths of rock face, although most were not very tall (less than 3m in height in general). The majority of these faces are located at mid level on the south side of the valley, with a couple of smaller

faces high up on the north side of the valley. In Lob Wells Wood the slopes below the faces are covered with a forest soil, but in some patches this includes a component of scree material, and it may be that there are further scree deposits buried under the forest soil.

South of Lob Wells Wood there are a number of small rock faces scattered along the east side of the valley. These were generally quite short (2m or less tall), and are located either high or mid slope on the valley side.

Within Whitwell Wood the valley sides are very similar to the section from Lob Wells Wood to Whitwell Wood, with occasional rock faces, generally at high or mid level and on the south side of the valley. There is one rock face on the north side of the valley (TLT14) which could not be accessed as it is so overgrown. For most of the rock faces the main threat was from bioturbation from root activity, as the rock faces are generally in woodland.

3.8.2.5 Valley bottom

The base of the valley is flat with a small river running down it, and is generally fairly narrow, around 50m wide, although the width increases slightly as it runs north and east.

3.8.3 Management recommendations

3.8.3.1 Immediate Actions

One immediate action is proposed. This relates to Thorpe Common Rock Shelter which stretches across terrain units TLT5,6 and 7. Here some old archaeological trenches have been inadequately back-filled leaving sections exposed and open to the environment and eroding. These should be backfilled properly and made stable. It is estimated that this would take two people one day. Material from the partly surviving spoil heaps and the adjoining field should be used in the backfilling. This should be undertaken following agreement with the land owner (see **Appendix 3.3** for costs).

At the base of the slope below Thorpe Common Rock Shelter ploughing in the field is cutting into the slope and leaving a step in it. This is likely to be subject to erosion over time. Management of this problem will be dealt with through the proposed public education programme.

There are some large badger setts in Thorpe Common, but only one appears to be close to a rock face. The sites should be monitored through the monitoring programme to determine if the current situation is stable or liable to deteriorate. The monitoring of sites that are subject to bioturbation should be allied to a programme of small scale investigation to determine if the sites contain archaeologically/ palaeontologically significant remains. If significant remains are present then small scale excavation should be considered to preserve the remains by. This would have to be undertaken in such a way as to be sensitive to the natural environment. If badger setts were involved an English Nature or DEFRA Licence to disturb badger setts would be required. This should be undertaken following the procedures described in English Heritage Landscape Advice Note No.16, Badgers and The Historic Environment.

3.8.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, tenant farmers, local councils, and local groups that may be interested. For more details see **section 3.15.2**.

3.8.3.3 Monitoring

Within Thorpe Common and Lob Wells Wood there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database. Details of how such monitoring should operate are outlined in **section 3.15.3**.

3.9 Steetley Quarry Caves

3.9.1 Access and survey conditions

Steetley Quarry caves lie on the site of a former works. This has closed down and the site is starting to be redeveloped. The site consists of a series of large derelict industrial buildings surrounded by tarmac and hardcore surfaces. Some of the buildings have been constructed in what appears to be old quarries, and there are cut rock faces around the back of some of the buildings. Also next to the site is a large quarry. Access was gained to the site of the works to examine the rock faces. Access could not be gained to the quarry which was described as being in an unsafe condition. Within the area of the works conditions for survey were generally good, except where retaining walls had been built against the rock face. It is not known if there were any natural rock faces prior to the quarrying and construction activity on the site. The faces were examined as two caves with archaeological and palaeontological remains are known from the site, demonstrating that there must have been access to the caves from the surface. One of the caves was in the old works while the other was in the quarry. The fact that the quarry could not be entered was not a problem, as the cave within it is known to have been destroyed by quarrying activity.

3.9.2 Site condition

3.9.2.1 Caves

The one small cave on the site, SCT1 (Steetley Cave ST1), is in a rock face behind a large industrial building. The rock face was clearly cut back when the building was constructed. There are two adjacent entrances, both blocked up with concrete blocks, which may originally have been parts of the same cave. However, it is not possible to confirm this. The cave must have originally had an entrance as extensive faunal remains have been recovered from the cave as has one Mesolithic flint. It is not known how far back the cave extends, although some *in situ* deposits do remain (Jenkinson 1980).

3.9.2.2 Rock faces and valley sides

As well as the rock face (SCT1) in which the cave survives there is a further face (SCT2) on the eastern edge of the site which has been created by quarrying. No caves or fissures are visible in this face, part of which has been obscured by a concrete retaining wall.

3.9.3 Management recommendations

3.9.3.1 Immediate Actions

No immediate actions are recommended.

3.9.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners and local councils. For more details see **section 3.15.2**.

3.9.3.3 Monitoring

As there is only one site, which is blocked up and has no access, no monitoring is recommended. The main threat to the site comes from the current redevelopment of the old industrial site, since the closure of Baker Refractories. The prime protection of the site will be through the planning process see **section 3.15.4**.

3.10 Ash Tree Gorge

3.10.1 Access and survey conditions

Ash Tree Gorge lies to the west of Whitwell, it is a small east west running valley over 0.3km long with rock outcrops for approximately 0.25km of its length. Side valleys enter the gorge from north and south approximately mid way along its length. The land is owned by the Chatsworth Settlement Trustees., and they and the tenant farmer allowed access to the land. The valley lies entirely within a pasture field and is mostly grass. However, trees and scrub have grown up along and on the rock faces. The sides of the gorge are divided into four different areas by the side valleys that enter the gorge and one of these, the north east area, has been fenced off and planted with saplings. As this area is not being grazed it is overgrown with scrub, obscuring parts of the rock face. Survey conditions were generally good except where saplings had been planted.

3.10.2 Site condition

Ash Tree Gorge contains 3 sites recorded on the gazetteer. A total of 40 terrain units were defined in the gorge. There are currently no public footpaths through the gorge and the current usage is as a pasture field. At the time of the survey cattle were using the field, and there was evidence of cattle poaching at the base of some rock faces, and in some gullies.

3.10.2.1 Caves

The gorge contains one cave, Ash Tree Cave (ATT12), located on the south east section of rock face. The cave interior was generally in good condition, and contains deposits for its full length. There are known to have been extensive previous excavations. There are no spoil heaps outside and as the cave is largely full of sediment it must be assumed that extensive back filling has taken place. The internal height of the cave varies from near 4m near the entrance to less than 1m at the rear. Backfilling may have protected any surviving deposits, but the backfill will have to be removed prior to any further excavations. There appear to be *in situ* deposits still remaining on the side walls of the cave below flowstone deposits. These possible *in situ* deposits survive to a height of up to 0.3m above the main floor surface in the centre of the cave. It appears that the previous excavation involved a trench excavated down the centre of the cave leaving material up against the sides of the cave, and that the trench was subsequently backfilled. As the floor surface of the cave is now below the ground surface of the gorge outside a talus slope has developed with material washing into the cave from outside. The cave entrance is at the current floor of the gorge and contains what appears to be the remains of a wooden gate that has collapsed and broken up. Just outside the cave entrance is a pile of wood, including fallen trees and large branches placed their to stop livestock entering or falling into the cave (currently this is working). To the west of the cave entrance the rock face overhangs for up to 0.7m for the first 7m. Ash Tree Cave appears to have further research potential.

3.10.2.2 Rock Shelters

Ash Tree Gorge contains two previously recorded rock shelters. Both of these are close to Ash Tree Cave (ATT12) with one on either side of the valley.

Ash Tree Gorge Rock Shelter 2 (ATT8) is located on the south side of the gorge 20m west of Ash Tree Cave. This rock face was identified as a rock shelter (AT2) in the gazetteer. This section of rock face does not contain any overhangs and is less than 1m high. It is not immediately apparent why this section of rock face has been described as a rock shelter. The gazetteer recorded the presence of an old machine trench in the valley floor and it may be this that has resulted in this being recorded as a rock shelter. However, the former trench was not apparent in this area. A depression could be seen at the entrance of Ash Tree Cave, and old photographs showed a trench in front of the cave entrance. In its current state this site appears as a small outcrop of rock face 4m long, with a short shallow slope below to the valley floor. This rock face appears no more probable as a rock shelter than many other rock faces in the gorge.

The second rock shelter (ATT32) is opposite Ash Tree Cave, on the north side of the gorge, next to where the side valley enters the gorge. This is recorded as Ash Tree Gorge Rock Shelter 3 (AT3) in the gazetteer. This rock shelter has an overhang 4.7m long and 2.1m deep. The floor of the rock shelter is made up of a bare stoney loam that may have buried further overhang. As the deposits inside the rock shelter are bare with no vegetation to stabilize them they may be subject to erosion. Immediately in front of the rock shelter the ground is level, however, beyond that the ground slopes down to the valley bottom.

3.10.2.3 Fissures

One large fissure (ATT3) was identified, this was not previously recorded, and was partially buried by a talus cone. The talus cone is formed of stone blocks covered by a wash of finer sediment from above. The upper part of the cone is bare and subject to continuing erosion and deposition. It is not possible to determine the full depth of the fissure but it is currently 1.2m deep and may extend further. It is possible that the fissure could open up further into a cave.

Several other fissures were also identified in the gorge mostly in the south east area. These are generally formed on faults and were often narrow. One fissure in ATT21 is up to 1m wide, but this does not contain any significant deposits of sediment. There are several narrower fissures up to 0.3m wide that do contain sediments and although these are of limited archaeological potential they may contain palaeontological remains of small animals.

3.10.2.4 Gullies

Several gullies have developed on the rock faces, these appear to originate in two ways, either through erosion on a fault line, or through a block separating off the rock face where two large faults intersect. Those formed through erosion start as high level gullies and gradually increase in size and depth over time. It is less clear if the gullies formed by blocks separating have formed rapidly or slowly, although both are possible. Gullies often provid roots for material to wash down from above the rock faces, which has led to the formation of talus cones at the bases of many gullies. These talus cones are often quite small.

Several of the larger gullies (ATT13, ATT14, ATT22, ATT24 and ATT35) have been used by livestock to move from the bottom of the gorge on to the top of the gorge. Cattle poaching was evident in these gullies, which are often bare of vegetation and subject to erosion.

3.10.2.5 Rock faces and valley sides

As stated previously, the sides of the gorge are divided into four areas by the side valleys, and the rock faces in these varied in character.

The south west area (ATT1 – ATT6) mainly consists of a sloping valley side, with small intermittent outcrops of bedrock. The valley side generally has a moderate slope, although at the east end this is shallower, where the side valley enters the main gorge. Most of the slope is covered with grass or light scrub, that has developed over a stony loam soil. On top of the slope above ATT1, ATT3 and ATT4 is a bund formed from material imported onto the site (Blagg pers. comm.). There are stone blocks and patches of scree in ATT3 and ATT4 and some of the material in these may have originated in the bund. The rock outcrops are generally less than 0.5m high, with the exception of the rock face in ATT3 which is approximately 2m high. It is possible that further bedrock faces are buried under the general slope of the valley side in this area.

The south east area (ATT7 – ATT26) contains the highest and most continuous rock face in the gorge. At the east and west ends of this area the rock face is shallow and intermittent similar to the south west area. However, the central section, between ATT 10 and ATT 23 has a rock face approximately 2m high with a shallow to moderate slope down to the valley bottom from the base of the rock face. The rock face in this area contains several features including Ash Tree Cave (ATT 12) as well as gullies, small fissures and faults. Where these are of archaeological or palaeontological significance they have been discussed in **sections 3.10.2.1 – 3.10.2.4**.

In the north east area (ATT27 – ATT 33) the rock face and valley side are mostly obscured by the growth of saplings and scrub. This area has been fenced off and planted with saplings. Rock face was exposed at the east and west end of this area, beyond the planting and on one large promontory of rock in the centre, the rest of this area contained dense scrub that obscured the rock face. At the east end of this area ATT28 and ATT29 the rock face consists of a series of intermittent outcrops between 0.3 and 1.2m high. At the west end of this area was ATT32 which contains a rock face up to 2m high, and within this is Ash Tree Gorge Rock Shelter 3 (discussed previously). Through most of the north east area it was not possible to determine the nature of the rock face or valley slopes.

The final area surveyed was the north west area (ATT34 – ATT37). The north west area exhibited features seen in all the previous areas. At the east end are small intermittent rock faces up to 0.5m high on a moderate but uneven slope. In the centre of the area in ATT35 are promontories of rock face separated by gullies with a moderate to shallow slope below. At the west end of the rock face, ATT36, is a mostly continuous rock face up to 2m high. A large block has separated off this face leaving a narrow fissure behind. The slope below this face is shallow, with a patch of scree at the west end. Beyond the rock face is ATT37, which contains a moderate slope, becoming shallower near the bottom of the gorge. This slope appears to be slightly terraced in areas, and this may reflect aspects of the underlying bedrock.

The valley extends further west than the main gorge area with moderate to shallow slopes on both sides of the valley, but no bedrock outcrops. This area was not included in the survey.

3.10.2.6 Valley bottom

The valley bottom ATT38 is fairly flat with a general slope down to the east. On either side of the valley there is usually a slope from the rock faces to the valley bottom but this is either shallow, or did not normally extend far in the valley bottom. The bottom of the side valley on the south side ATT40 has a general shallow to moderate slope to the north and does not contain any rock outcrops. The side valley that enters the gorge from the north side ATT39 has a moderate slope, and contains a stone block or bedrock outcrop in the centre of it. However, this is only approximately 0.1m high and does not impede the uses of the two side valleys as a route across the gorge for farm vehicles. Although this route was grassed over slight ruts could be seen on the bottom of the south side valley.

3.10.3 Management recommendations

3.10.3.1 Immediate Actions

Ash Tree Cave has a dangerous entrance due to the steep slope down into it. This is currently controlled by piles of logs and tree stumps that have been placed in the entrance. In the long term it may be necessary to consider securely gating the cave.

Any further proposals to plant saplings on the rock faces, as has taken place on the north east section of the gorge, should be resisted unless it can be demonstrated that they will not damage the rock face or deposits. This should be promoted through the public education programme.

Cattle poaching has exposing bare ground surfaces in some of the gullies it is uncertain if this is an unusual event or an ongoing process. This situation should be monitored through the long term monitoring process to determine if this is resulting in erosion. If erosion is taking place ways to encourage the growth of vegetation in the gullies will have to be considered.

3.10.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, tenant farmers and local councils. For more details see **section 3.15.2**.

3.10.3.3 Monitoring

Within Ash Tree Gorge there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database, details of how such monitoring should operate are outlined in **section 3.15.3**.

3.11 Markland and Hollinhill Grips

3.11.1 Access and survey conditions

Markland and Hollinhill Grips is a large valley with three arms which meet at the north east corner of the complex. The longest arm runs east from the centre of Clowne, where it was known as Clowne Grips, before turning into Hollinhill Grips. This is over 2km long in total. The other two arms are both known as Markland Grips. The first of these runs south west to north east, and joins to the long arm of Hollinhill Grips at its east end near Upper Mill Farm. This arm is almost 2km long. The final arm runs approximately south to north, for about 0.75km, and joins the main Markland Grips arm just south west of its intersection with Hollinhill Grips. The total length of the valleys within Markland and Hollinhill Grips is around 5km.

Access was gained to the majority of Markland Grips, most of the area is owned by the Chatsworth Settlement Trustees and they and their tenants gave access to all areas as did Mrs Prior of Upper Mill Farm. The west end of Hollinhill Grips, known as Clowne Grips, lies in the village of Clowne, where it runs through a linear park. The rock face is in a wooded area within the park with light to moderate undergrowth. This area is owned by Bolsover District Council. Beyond the village of Clowne Hollinhill Grips contains a sewage farm for about 0.25km, which was not accessed. The rest of the valley from the sewage works to Upper Mill Farm is woodland, managed as a nature reserve, with some agricultural land at its east end. The general pattern in this area and for the rest of Markland Grips is for the valley bottom to be pasture with wooded valley sides. However, in many areas the fields in the valley bottom are no longer being grazed, and have become overgrown, with tall dense scrub covering the valley bottom. These small field, in the valley bottom are not being used, partly due to their awkward size and location, but also due to the flies in the valley which irritate cattle kept in the fields. In the main arm of Markland Grips the south west end is open and grazed while the north east half is overgrown, with some land managed as a wildlife sanctuary. The second arm of Marklands Grips is overgrown, with ponds at the north end of the arm.

Aside from the fields that are still used as pasture, and the linear park in Clowne, most of Markland Grips is very overgrown and is difficult to access and survey. For this reason much of the survey of Markland Grips was left until the autumn to allow some of the vegetation to die down. This did improve access conditions but there were still areas that were very overgrown and inaccessible, particularly at the west end on the south side of Hollinhill Grips where a length of potential rock face 150m long could not be accessed.

3.11.2 Site condition

3.11.2.1 Caves

A total of 12 caves were identified in the survey. This included 4 sites listed in the Creswell Crags Conservation Plan Gazetteer and 8 sites that were not recorded on this list. All of these caves occurred in Hollinhill Grips, or towards the north west end of the main arm of Markland Grips.

On the south side of Markland Grips is MGT54, this cave has formed on a fissure on a 10m high rock face, although the cave was 6m high, 6m deep and 1.5m wide this has low potential as the floor inside is bedrock which slopes down steeply to the outside. There is no slope below the rock face, just the flat valley bottom, along which

runs a public footpath a few meters away from the cave. Despite the presence of the footpath there is no evidence of rubbish around the site or damage to it. There are two other large fissures near by this site in MGT52 and MGT53 which will be discussed in section **3.11.2.3**.

Opposite MGT54 on the north side of Markland Grips are 4 further caves. The most westerly of these is MGT74, where there are two small cave entrances that have formed on the same fault line. These entrances are both about 0.5m across with one vertically above the other. The upper entrance does not extend far back, about 0.5m, before it is blocked by sediment. The lower entrance is partly buried by a talus slope, which obscurs the height of the entrance and partially fills the cave which extended back for over 1.5m before it is blocked by washed in material from the talus slope. It could not be determined if these two entrances connect further back although this is possible. Due to the difficulty in determining the size of the lower entrance it is not possible to say if this cave was big enough for human use, although it may have been used as an animal den.

Excavations at Sepulchral cave, MGT77 (MG5), have produced the remains of at least 5 human burials. The cave, which no longer contains any sediment is 1m wide and 2m high and extends back for 3m. This is located on a high level rock face, below which is a moderate to steep talus slope. The talus slope, which starts at the base of the cave entrance, appears to have buried a possible entrance to a lower chamber, a hand-sized hole extending back approximately 0.3m was all that was visible, so it was not possible to determine the size of any lower chamber if it existed. There was evidence of fires being lit in Sepulchral cave, with soot on the walls and ash on the floor. However, as this cave is devoid of sediment these fires will not be damaging any potential archaeology. There is an informal path up the talus slop below the cave and this could encourage erosion which might impact on any deposits in a lower chamber (if it exists).

Further east along the valley is MGT81 (Markland Grips Fissure 6/ Armstrongs A, MG8). This is a tube like cave with two entrances one on the side of the rock face and one on the top of the valley. The larger entrance 2m high and 1.2m wide is on the rock face and from here the cave extends back for 5m before opening out to the top of the valley through a smaller entrance 1m by 0.5m. This cave contains a little sediment, although former records record its as bare bedrock internally, suggesting that this sediment may have washed in recently. A steep talus slope runs down a gully in front of the cave.

The final cave on the north side of Markland Grips is MGT82. This cave is little more than a small recess 2m wide, 2m high and 1m deep containing a stony loam fill. The cave is located on a high level rock face with a steep scree slope below.

As the north side of Markland Grips does not contain any public footpaths the caves on this side are generally not visited as much as the rock faces on the south side, and with the exception of Sepulchral Cave (MGT77), the main threat to the sites on this side of the valley appears to be from bioturbation from roots, as this area is very overgrown with trees, saplings and dense scrub.

The 7 caves in Hollinhill Grips are distributed along the length of the valley, predominantly on the north side. At the east end are two possible caves, one MGT102 (Markland Grips Cave 9, MG 10) is a small recess, 2m wide, 2m high and 2m deep. This is on a high level rock face with a loose scree slope below which extends into the cave, with a road and Upper Mill Farm below it in the valley bottom. 20m east of this is an area of possible former quarrying where a deposit of breccia,

MGT101, was identified, partially set back into the rock face. This breccia deposit was obscured by vegetation and could not be fully defined or described. Next to this breccia deposit is a tube or small cave running parallel to the rock face which has been partially exposed. This also contains some sediment. It may be that these features represent the remains of a cave or cave system that has been cut through by the quarrying activities. The rock face on which this breccia and tube are located extends from low to high level and below it there are some sheds and a caravan, as well as the remains of concrete slabs on which other structures probably once stood. These features are vulnerable to any developments that take place in this area including the removal or construction of further sheds.

On the north side of Hollinhill Grips on top of the valley side is a small cave, MGT106. This has a north facing entrance and is located next to a footpath through a nature reserve. This cave has a 1m diameter entrance but opens out further back to form a 1.5m high 2m wide and 3m deep chamber. The floor of the cave consists of cave breccia, patches of which were also noted on the roof. Outside the cave is a small pile of rubble, possibly suggesting that some excavation has taken place here, although none is recorded. The proximity to the footpath and presence of a rubble pile suggests that this cave may be subject to disturbance.

A large cave MGT108 is located on a high level rock face on the north side of the valley, this has an entrance 3m high and 1.5m wide, opening up to 2.5m wide and 4m deep. Inside there are patches of bedrock and sediment, though the deposits that remain do not appear to be very extensive. This cave is accessed by walking up a moderate to steep slope from an informal path in the valley bottom and the presence of graffiti and the remains of fires demonstrated that this cave has been used in the recent past.

MGT113 is a small cave on a high level rock face in a wide gully. The cave entrance is part way up the face, with an entrance 1m high, 1m wide, and up to 2m deep. There is a small opening at the top with light entering, but the angle of access precludes full visibility of the inside of the cave. Little or no sediment could be seen inside but there is a large talus cove below.

The final cave on the north side of Hollinhill Grips is MGT118. This is a small recess-like cave 1m high, 2m wide and 2m deep on a small rock face. Fragments of flowstone are visible at the back of the cave and there is a mound of sediment in front of the cave. This sediment is possibly washed down from above, but it could be spoil from an unrecorded excavation in the cave. There were the remains of a small fire and some rubbish in the cave at the time of the survey.

MGT125 is the only cave on the south side of Hollinhill Grips. This is located on a small side valley that enters the grips from the south. This cave has two entrances, on open fissures, 0.5 and 0.8m wide, that intersect at the rear to form a chamber 2m high, 2m deep and 1.5m wide. This area is very inaccessible and there is no evidence of any human activity in the area that would impact on the cave.

Caves MGT106, MGT108, MGT113, MGT118 and MGT125 are all within the nature reserve that occupies most of Hollinhill Grips. There are no public footpaths through this area, but there are several informal paths, the main one of which runs along the top of the north side of the valley. Aside from the threats to sites mentioned above the main threat to sites in the nature reserve in Hollinhill Grips would seem to be from bioturbation from roots, as this area is very overgrown with trees, saplings and dense scrub.

3.11.2.2 Rock shelters

There are a total of 41 possible rock shelters in Markland and Hollinhill Grips, ranging in size from 3m long to 30m long. These are distributed throughout the Grips but are most common towards the eastern ends of Markland and Hollinhill Grips.

There is one rock shelter in Clowne Grips, MGT63 (Clowne Crags Rock Shelter, MG11), this was 12m long and up to 3m deep. This is located in a linear park and is used by local youths as a drinking den. This has resulted in graffiti on the rock face, fires being lit, and rubbish being dumped in the shelter, which is therefore in a poor state and vulnerable to further damage.

In the western end of Hollinhill Grips there are 3 small rock shelters, MGT116, MGT117 and MGT126. MGT116 (Hollinhill Grips Rock Shelter 1, MG2) was 3m long and 1m deep, MGT117 was 4m long and 1m deep, and MGT126 was 10m long and 2m deep. All of these sites are difficult to access, MGT116 and MGT117 on the north side of the valley could be reached from informal footpaths but there are no paths to MGT126. Despite the inaccessibility of MGT126 a low stone bank has been constructed in front of it, fires lit inside and rubbish has been strewn around the site, all suggesting that the site has been used as a den or shelter by someone.

In the central and eastern half of Hollinhill Grips rock shelters are more common and often quite large. Along the north side of Hollinhill Grips there are 7 rock shelters, MGT115, MGT114, MGT112, MGT111, MGT109, MGT107, and MGT105, all of these overhangs are between 6m and 8m long except for MGT107 which is 22m long and MGT112 which is 30m long. The overhangs are located at either high or mid level with the mid level overhangs (MGT112 and MGT111) in the centre of this section of valley. Where they could be seen the surface deposits in the rock shelters were primarily stoney loams though there were a few small patches of scree like material. Although all of these sites are in the nature reserve there are no formal footpaths leading to them. However, all sites are accessible via informal paths that run through the nature reserve. Many of these paths are overgrown and little used, suggesting limited public use of these sites. Despite this, fires have been lit in MGT114 and MGT108, which also contains graffiti, and some bricks had been dumped in MGT105. There is little other evidence for damage through human activity, although there were a few patches of bare earth on informal footpaths at the base of rock faces, however, none of these showed significant signs of erosion. Damage to these sites through natural processes was mainly limited to bioturbation from root activity, although a pile of rubble in MGT115 is possibly from a rock fall that could have damages any sensitive deposits near the surface.

On the south side of the central and eastern part of Hollinhill Grips there are 6 rock shelters MGT97, MGT119, MGT120, MGT121, MGT122 and MGT123, the last of which is in two parts on either side of a large gully. These vary in length from 7m (MGT119) to 30m (MGT121) with most nearer the former in size. Four of these sites are at mid level with only two, MGT120 and MGT97, at high level. Surface deposits in the rock shelters are usually stony loams with occasional scree deposits. Access to the sites on the south side of the valley is even more difficult than on the north side, with only a few very overgrown informal paths. One fire has been lit in MGT121 but other than this there is little evidence of recent human activity. This fire was next to a rather unusual structure, which is roughly rectangular in shape, 3.5m long and 1m wide, and runs along the back of the rock shelter. The structure is formed of large stones set on edge at an angle of about 60^{o}. Two of the stones are cemented together with flowstone indicating the structure is of some antiquity. It is unclear if this structure is naturally formed, by stones collapsing off the rock face or if it is of human

origin. Generally, root bioturbation was the greatest threat to the integrity of the deposits in these rock shelters.

In Markland Gripps there are 17 rock shelters in the eastern section between the junction with Hollinhill Grips and the split of Markland Grips into two arms. Eight of these sites are on the north side of the valley and nine are on the south side.

The eight sites on the north side of the east end of Markland Grips, MGT95, MGT94, MGT93, MGT79, MGT78, MGT75, MGT70 and MGT69, vary in length from 3m to 10m long, these are either at mid or high level, with slightly more at high level. Again these sites can only be accessed using overgrown informal paths in the nature reserve. The surface deposits are generally stony loam, often with patches of scree or stone blocks. There is little evidence of current human activity at these sites, but four of them MGT70, MGT75, MGT79 and MGT94 have been disturbed by animal burrows. The last one most extensively. MGT95 has been disturbed by by cattle poaching.

The nine sites on the south side of the east end of Markland Grips, MGT92, MGT50, MGT52, MGT53, MGT55, MGT85, MGT87, MGT89 and MGT127, are generally quite small, with the rock shelters between 5m and 10m long. All of these rock shelters are at the base of a large rock face over 10m tall usually with a short shallow slope below to the valley bottom, locating them at mid level on the valley side. Access to these sites is via a public footpath that runs along the valley below the base of the rock face, between 1m and 10m from it. The surface deposits in this area are generally stony loams with some scree slopes towards the western end of this area. Several of these sites have patches of bare earth at the base of the rock face, although there was only one, MGT89, where the footpath runs along the rock face with erosion visibly taking place. The natural ground surface has been buried or removed by the construction of a farmyard surface and trackway in MGT92. There is some graffiti and dumping of brick and concrete rubble in MGT 85 next to the former railway bridge. Possible dumping is also present in MGT127, where there are large scree like slopes, however, the stones in these are much more rounded than usual, and the material appears to have come from over the top of the rock face suggesting that it may have been dumped. There is little sign of animal activity and bioturbation appeared to be primarily from roots which must have been extensive considering the density of the vegetation.

In the southern arm of Markland grips only two rock shelters were identified, MGT 47 and MGT128, on the west side of the valley. The lack of sites observed in this area is probably mainly due to the dense vegetation and fences that restricted access to the rock faces. Even though MGT128 was observed it could not be entered and properly recorded due to the presence of a fence. The difficult access suggests that it is unlikely to be damaged by human activity, although the dense vegetation means that bioturbation through root activity is likely. MGT47 is an 11m long overhang on a high level rock face with a surface deposit of scree. Root bioturbation is again the main threat to the site.

In the western end of the main arm of Markland Grips there are six rock shelters, two on the north side of the valley, MGT30 and MGT1, and four on the south side, MGT21, MGT12, MGT8 and MGT6. None of these sites are very large with the largest MGT1 being 9m long and the smallest MGT6 only 5m long. The sites are located at high or mid level, with the sites further west generally at mid level with a shallow slope below to the valley bottom. There are no paths through this area, but the valley bottom contains pasture fields making access easy, although the valley sides are usually wooded, often with dense undergrowth. Only limited observation

can be made of the surface deposits in these sites due to the vegetation growth, but where observation could be made the surface deposits were stony loams with some scree in MGT12 and occasional stone blocks in MGT1. There were no obvious signs of any activities or processes in progress that would damage the sites other than bioturbation from roots.

3.11.2.3 Fissures

There are numerous fissures in the valley, however, only those with archaeological or palaeontological potential will be discussed here.

MGT52 and MGT53 are large fissures on the south side of Markland Grips in the nature reserve and a few meters away from a public footpath. MGT52 (Markland Grips Rock Shelter and Fissure 1, MG3) is 2.5m wide and 5m deep while MGT53 is 2m wide and up to 10m deep though it narrows towards the rear. These are near to MGT54 a cave formed on a fissure, however, in these cases the fissures are open at the top so they do not form caves. These fissures may have provided shelter, although only MGT53 contains any deposits internally, a loam soil. Although the ground surface of MGT53 is bare inside there are no signs of disturbance or erosion.

3.11.2.4 Rock faces and valley sides

The rock faces in Markland and Hollinhill Grips vary enormously, from continuous tall,15m high, rock faces to small, 1m high, outcrops. In the central sections of the grips the faces tended to be tall and continuous, while towards the end of the valleys the rock faces tended to be smaller and more intermittent.

In Clowne Crags the rock face survives on one side only, and is up to 4m high, although it is generally around 2m to 3m. The face is quite fractured containing several gullies, a small hole has been excavated into the deposits filling one of the gullies, MGT61.

At the western end of Hollinhill Grips the valley sides are quite low and sloping with intermittent sections of low rock faces, mainly at mid to high level. Further east the valley becomes deeper, with taller and more continuous rock faces, some of which extend lower down the valley sides until some almost reached the valley bottom. At the eastern end of Hollinhill Grips the valley is shallower, as were the rock faces on the south side, while on the north side the rock faces are more broken up and intermittent.

In the eastern end of Markland Grips the valley is quite deep, with tall rock faces on both sides, and shallow low level slopes to the valley bottom below them.

In the south arm of Markland Grips the valley is deeper at the northern end, with taller rock faces. These are more continuous and extend further down the valley side at the north end, particularly on the east side. At the south end the valley has slopes with occasional outcrops of bedrock.

The western end of the main arm of Markland Grips is shallower at the west end where the rock faces are shorter and more intermittent than in the central or eastern end. The rock faces are also taller, and more continuous on the south side compared to the north side.

3.11.2.5 Valley bottom

The valley bottom is generally flat and streams run along all the valley bottoms. These will have deposited an known depth of alluvial sediment in the valley bottom. The presence of a pond at the north end of the south arm of Markland Grips, as well as abandoned and silted up ponds at the south end of Markland Grips and the east ends of Markland and Hollinhill Grips demonstrates that various water management regimes have operated over the years, possibly resulting in the deposition of significant depths of alluvial material.

One upper Palaeolithic blade was found by Roger Jacobi (pers comm.) at the west end of the nature reserve in Markland Grips. The presence of this find demonstrates Palaeolithic activity in the area, although no remains have been recovered from any of the cave or rock shelter sites previously investigated.

3.11.3 Management recommendations

3.11.3.1 Immediate Actions

In Markland and Hollinhill Grips the sites are generally in good condition with the main threat to them from bioturbation from root activity, which should be assessed by monitoring. As large sections of the valley are nature reserves proposals to control bioturbation can only be considered in the last resort. The sites should be monitored to determine if the current situation is stable or subject to change. The monitoring of sites subject to bioturbation should be allied to a programme of small scale investigation to determine if the sites contain archaeologically/palaeontologically significant remains. If significant remains are present small scale excavation should be considered to preserve the remains by record if bioturbation is extreme. This would have to be undertaken in such a way as to be sensitive to the natural environment. If badger setts were involved an English Nature or DEFRA Licence to disturb badger setts would be required. This should be undertaken following the procedures described in English Heritage Landscape Advice Note No.16, Badgers and The Historic Environment.

In Clowne Grips the rock face lies on the edge of a park which is extensively used and there is rubbish dumping, graffiti and the remains of fires that could all damage the sites, as well as unofficial pathways that could cause erosion. There is also evidence of drinking and drug taking in and around the rocks, with attendant rubbish. These issues should be dealt with through the public education programme.

3.11.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, tenant farmers, local councils, wildlife groups/trusts, local schools and local groups that may be interested. For more details see **section 3.15.2**.

3.11.3.3 Monitoring

Within Markland and Hollinhill Grips there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database, details of how such monitoring should operate are outlined in **section 3.15.3**.

3.12 Elmton and Whaley Valleys

3.12.1 Access and survey conditions

The Elmton and Whaley valley runs north west to south east for 4km from Elmton at its northern end through Whaley and down to Langwith. Most of the land in the valley is owned by the Chatsworth Settlement Trustees, and they and their tenants gave access to all the land that they owned. Small areas of land are also owned by other people, and they also allowed access when approached. From Elmton down for about three quarters of the length of the valley most of the land is fields of either pasture or arable. Where outcrops of bedrock occur in these fields they are often covered by small copses of trees or scrub as the land could not be ploughed. Most of this area was reasonable for survey except where the scrub growth on a couple of bedrock outcrops was very dense and difficult to access. Towards the southern end of the fields the valley bottom is very boggy and the west side of the valley is wooded as is the whole of the southern quarter of the valley. The woods in the southern quarter of the valley had variable undergrowth , and although this was generally moderate there were large patches with dense undergrowth that could have hidden any small outcrops. Surveying in this area was difficult in some areas, although most of the small outcrops marked on the O.S. maps were identified.

3.12.2 Site condition

3.12.2.1 Caves

The Elmton and Whaley Valley contains two known caves, one at each end of the valley. At the north west end of the valley is a small cave (EWT21) in the garden of Grange Farm. Although previously recorded as EW1 this cave does not have a name. Its location in a garden provides protection from vandalism and damage by agricultural machinery. This cave is located on the north west facing rock face of a small side valley orientated north east to south west. The cave, which is formed on a fissure, was in the base of a 2.3m high rock face near the valley floor. The cave is narrower at its entrance (0.9m) than it is internally (1.4m), it is also quite small only extending back 3.3m. As the entrance the cave is 2.0m high with the roof formed by blocking of the fissure above, some of the blocking material appears unstable and is being disturbed by plant roots. The interior of the cave is flat with a stony loam soil. It appears that there has been some clearance or excavation of the cave as the fissure in the roof would have resulted in the formation of a talus cone, which is absent, also there are possible stone spoil heaps just outside the cave. There is no record of any excavation, so it is uncertain when this may have taken place or what was removed. *In situ* deposits survive inside the cave, there are tubes on the east side of the cave that still contain deposits and red cave earth was visible in the narrow remains of the fissure on the rear wall of the cave. In front of the cave was a shallow slope dropping down to the valley bottom. A battered barbed wire fence separates the cave from livestock in the pasture field which covered the valley bottom.

The second known cave (EWT37) in the Elmton and Whaley Valley is Aspley Grange Cave (EW8), this is located at the southern end of the valley in a small wood. The cave is on one of a series of small intermittent rock outcrops in the wood. The cave has two entrances, one from above and another from the side. Both entrances are about 1m across. Although they are known to join together a large boulder currently blocks access between the two parts of the cave. The side entrance allows access to a chamber 2.5m long while the upper entrance enters a chamber 3m long. The floors of the chambers are currently covered with washed in forest soil, but it is not known

what, if any, deposits lie beneath this washed in material. As this cave is right next to the road there is a footpath to it and there is some rubbish strewn around and graffiti on rock faces around the cave.

A third small cave (EWT46) is located near the southern end of the valley. This is located in Langwith Country Park near to EWT37. This cave has been exposed during landscaping in the park. The landscaping has resulted in the creation of an L-shaped rock face up to 4m high which contains a small cave. This has an entrance 0.7m in diameter and extends back for 1.5m before it is blocked by a deposit of coarse scree sized rocks in a matrix of red sandy material. As this had been exposed by modern excavation it is not clear if this cave originally opened to the surface.

3.12.2.2 Rock shelters

There are several known and possible rock shelters in the valley, most of these do not have large overhangs. However, rock faces without overhangs have produced material in the valley.

The most northerly of the rock shelters is EWT17 (Oxpasture Lane Rock Shelter EW2). This consist of a series of small outcrops stepping up the valley side, with the largest outcrop 1m high. This has never been investigated, so it is not known if there are any significant deposits present, but there is some erosion taking place in association with cattle poaching.

South of EWT17 is EWT13 (Whaley Rock Shelter 2, EW4), and although this is only a vertical rock face 9m long and up to 1.5m high, excavation has recovered substantial remains from the Palaeolithic, Mesolithic, Neolithic, Bronze Age, Romano-British and Medieval periods. This site is in an arable field so it is possible that ploughing could disturb deposits on the site, but this will depend on how far the archaeologically significant deposits extend from the rock face as ploughing currently finishes 6m from the rock face.

On the edge of the village of Whaley lies the next rock shelter EWT6. This is Whaley Rock Shelter 1 (EW3) which has been subject to some excavation, although there is some confusion as to what was recovered (Jacobi pers. comm.). This shelter, which is 4.2m long and had a 2.2m deep overhang, is again on an isolated rock outcrop on the east side of the valley. Inside the overhang the ground was bare but the rock outcrop is heavily overgrown with trees and scrub. The vegetation limits access to the rock shelter protecting it from wear by people or animals, but root bioturbation is a potential problem

Rock shelter EWT1 (Whaley Rock Shelter 3, EW5) is the only rock shelter on the west side of the valley, has 6m long, 3m high, vertical rock face with a scree slope below. This site is in woods near the base of the slope of the valley side. The overlying scree deposit is likely to protect any buried deposits, however, tree roots may cause bioturbation, as would tree throws, of which there are a number in the woods.

Towards the south end of the valley there are three rock shelters in fields in the valley bottom. There are no records of excavations on these sites, although some may have been investigated in the past. The sites are near the bottom of the slope with the boggy valley bottom below. The most northerly of these sites is EWT34 which has been previously recorded as a possible rock shelter (Mill Farm Rock Shelter EW6). No rock edge is visible on this site which is covered by a pile of rubble.

The dumping of material on this site may well have damaged any rock face or sensitive deposits near the surface.

South of EWT34 are two outcrops of rock known as Scarcliffe Park Rock Shelters (EW7), a third has been previously recorded but this was not visible. However, there are a numbers of small thickets in the valley bottom which could have obscured a small outcrop. Of the two Scarcliffe Park Rock Shelters EWT30 is a small, 0.75m high and 4m long, rock face on a moderate slope, while EWT32 is a 5m long and 0.3m high face stepping up sharply. Both EWT30 and EWT32 have scrub and saplings growing on them which might cause damage through bioturbation.

3.12.2.3 Fissures

There are no significant fissures or gullies in the valley. This is due to the limited nature of the rock faces (see **section 3.12.2.4**).

3.12.2.4 Rock faces and valley sides

There are no substantial rock faces in the valley, only relatively small, 1m to 2m high, intermittent faces, mostly isolated outcrops. All except one of the rock faces are on the north east side of the valley and most are located at mid or high levels on the valley side. The valley sides are generally moderately sloped, this is clear in the centre and north west end, where the valley runs through fields, but is more difficult to see at the south east end which is wooded. Many of the rock faces have been previously described as rock shelters and as such are described in **section 3.12.2.2**.

3.12.2.5 Valley bottom

The valley floor is gently rounded at its north west end while the south east end has a narrower boggy valley bottom.

3.12.3 Management recommendations

3.12.3.1 Immediate Actions

As most of the sites are in farmland without public access the main threats come from agricultural practices. Ploughing is taking place in the field which contains Whaley 2 Rock Shelter (EWT13) This could encroach into the deposits on the slope below the rock face. This should be raised with the farmer through the education programme and monitored through the monitoring programme to minimise the risk to archaeological deposits.

There is some graffiti and rubbish around Aspley Grange Cave (EWT37). This should be dealt with through the public education programme.

3.12.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, tenant farmers, local councils, wildlife groups/trusts, local schools and local groups that may be interested. For more details see **section 3.15.2**.

3.12.3.3 Monitoring

Within the Elmton and Whaley Valley there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database, details of how such monitoring should operate are outlined in **section 3.15.3**.

3.13 Langwith Vale

3.13.1 Access and survey conditions

Langwith Vale is orientated south west to north east and runs for a length of approximately 2.75km. It runs from just south of Scarcliffe at its south west end to Upper Langwith at its north east end. Most of the land in the valley is owned by the Chatsworth Settlement Trustees and they and the Tenants gave access to the land. The north east third of the valley contains pasture fields while the south west two thirds is wooded. In the pasture fields survey conditions were good, The woods have moderate to dense undergrowth in which known rock faces were identified, but small unknown outcrops could well have been missed.

3.13.2 Site condition

3.13.2.1 Caves

At the east end of Langwith valley are three caves on the north side of the valley in a pasture field. One of these caves LBT7 (Langwith Bassett Cave LB1) was excavated during the first quarter of the twentieth century by Mullins (1907, 1913) and Garrod (1927). The other two caves (LBT2 and LBT4) were only known from geophysical survey (Sampson 1977) and have never been excavated. All of these caves are located where small bedrock promontories are exposed on the side of the valley.

Langwith Basssett Cave, LBT7, is a large cave which has a main chamber with a total of six side chambers and passageways off this. The main entrance is a horizontal entrance, 1.7m wide and 2m high, located in a rock face 7m long and 3m high. There are two further vertical entrances, one of these was blocked, with concrete and wood, but could not be identified on the surface while the other had been blocked, with concrete, but the blocking had collapsed and now lay in pieces on the cave floor. The floor of the cave is covered with rubble and pieces of concrete, there are also some cans and bottles and a fire has been lit inside the cave. Cattle appear to use the cave, possibly for shelter, as there were several cow pats in the cave. Although the cave has been extensively excavated there were patches of surviving deposit in some areas, also some of the side passages were small and were not entered, so it was not possible to determine if deposits are present in these. Outside the cave there are large spoil heaps (LBT8) from the previous excavations.

The two unexcavated caves are located west of LBT7 on the same side of the valley. LBT4 (LB2) is exposed on the surface as a 2.5m high rock face with a flat top. There are two faults on the face both of which are slightly open and it may be that one or both of these relates to the cave that has been identified by geophysics. In front of the rock face there are several stone blocks which have become detached from the face. At the base of the face is a 2m wide flat shelf which was covered with cattle tracks. LBT2 (LB3) also consists of a vertical rock face, 1.25m high, with a flat top. This face also contains a slightly open fissure which may relate to the buried cave.

3.13.2.2 Rock shelters

Approximately half way down the Langwith valley is a small side valley entering from the north and at the junction of the two is a rock face (LBT14) known as Gildwells Farm Rock Shelter (LB4). The rock face is 18m long and 2.5m high but does not have an overhang, below the rock face is a talus slope of coarse scree which has

some modern rubbish dumped on it. This site is in a wood with dense undergrowth and appears to be little visited despite the rubbish.

At the south west end of the Langwith Valley in Langwith Wood are two further rock faces, both of which have small overhangs. Neither of these possible sites have been excavated. The first of these rock shelters is LBT21 (Langwith Wood Rock Shelter 2, LB6), this has a 3m long and 1.5m deep overhang on a 20m long and 6m high rock face. The area at the base of the rock face is very overgrown so the site could not be examined in detail. The second site is LBT18 (Langwith Wood Rock Shelter 1, LB5), this has a 4m long and 1.5m deep overhang on a 40m long and 8m high rock face. Again the face and overhang could not be examined in detail due to the dense nature of the undergrowth.

3.13.2.3 Fissures

The only significant fissures are on the two buried cave sites, where the narrow fissures may relate to the buried cave entrances. The low number of fissures is due to the limited nature of the rock faces (see **section 3.13.2.4**).

3.13.2.4 Rock faces and valley sides

There are no substantial rock faces in the valley, only relatively small mostly isolated outcrops. Most are located on the valley sides at mid level. Where they are visible the valley sides are generally moderately sloped, although there are patches that are steeper. In much of the woodland it is difficult to judge the general shape of the valley due to the dense vegetation. Many of the rock faces have been previously described as rock shelters and as such are described in **section 3.13.2.2**.

3.13.2.5 Valley bottom

At the east end the valley has a flat bottom with a small stream flowing through it. At the west end it is more difficult to determine the shape of the valley bottom as a railway line, now dismantled, has run along the base of the valley, obscuring the floor.

3.13.3 Management recommendations

3.13.3.1 Immediate Actions

The only site where immediate action needs considering is Langwith Bassett Cave (LBT7). This has some rubbish in the cave from youths using it as a den, but this should be dealt with through the public education programme.

The cave has two entrances, one of which is vertical (LBT6). This has been blocked with concrete in the past, but the blockage has collapsed. Although the open entrance does not endanger the archaeological remains within, it is a hazard. The cave is in a field with no public right of way, but people obviously do use the cave. The issue should therefore be raised with the landowner and farmer to see if they are aware of the risk. This could be done through the public education programme.

3.13.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, tenant farmers, local

councils, wildlife groups/trusts, local schools and local groups that may be interested. For more details see **section 3.15.2**.

3.13.3.3 Monitoring

Within Langwith Bassett Valley there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database, details of how such monitoring should operate are outlined in **section 3.15.3**.

3.14 Pleasley Vale

3.14.1 Access and survey conditions

Pleasley Vale is an east west running valley about 3km long. Although orientated approximately east west the central section of the valley is sinuous with a few turns. The central section of Pleasley Vale is owned by Bolsover District Council, however, the eastern and western ends are in private ownership as are two houses and gardens in the centre of the valley. Tim Rogers of Bolsover District Council gave permission to access the land in council control. The west end of the valley has shallow sides and contains either fields or woodland.

In the central section of the valley the bottom of the gorge contains several old mills. The rock face has been cut back in the vicinity of many of these mills either to produce building stone or to make room for the mill buildings. The sides of the central section of the valley are wooded with some paths passing through parts of the woods. The woods has variable undergrowth, although this is generally light to moderate. On the south side, on top of the central part of the valley, is an old railway cutting, now used as a footpath, which is surrounded by woodland. This railway cutting cuts into the bedrock, exposing several features. In the central section of the valley most of the rock faces examined had been cut back or created by human activity over the last 200 years. However, these faces were examined and recorded as two caves exposed in these faces have been partially excavated and bones from large fauna have been recovered that demonstrated these caves would originally have had surface openings.

The east end of the valley is more like the west end of the valley with fields, woodland and the occasional house. Towards the east end of the valley, as with the west end the sides become shallower and lower. The valley bottom is generally pasture fields, with wooded sides. The land owners gave access to all areas except one field. This field contains one rock face, according to the O.S. map, however, the land owner said the face was small and overgrown. The owner did not want anyone entering this area as it contained several badger setts which he did not wish to see disturbed. The undergrowth in the woods at the east end of the valley is generally moderate, with occasional light or heavy areas.

In Pleasley Vale survey conditions were generally reasonable, with one or two difficult areas due to either access problems or heavy undergrowth.

3.14.2 Site condition

3.14.2.1 Caves and Fissures

Several caves are known from Pleasley Vale including two which have been investigated. However, during the survey several new caves or possible caves, and large fissures were also identified. The caves were located in the central section of the valley and can be divided into two main groups based on their altitude, with one group at the base of the valley between 100m and 105m AOD, and one group at the top of the valley side between 125m and 130m AOD. Both of these groups of sites have been exposed through human actions cutting back into the bedrock. At the base of the valley a number of fissures and possible cave deposits are exposed when rock faces were cut back during construction of a number of mills and houses in the base of the valley. The group of caves at the top of the valley were exposed

when a cutting was made for the railway that ran along the top of the valley on the south side.

In the railway cutting there are 9 caves or possible cave sites. These are located on either side of the approximately east west orientated disused railway cutting. Some of these sites line up across the railway cutting and were probably parts of the same caves, with the original entrance on the south side of the main valley. It has not been possible to identify any of the original entrances as the area was wooded with a covering of soil with no rock faces visible. However, some of the caves must have originally opened to the surface as the bones of large animals have been found in one of the caves, Yew Tree Cave (PLT30).

At the west end of the railway cutting are three small caves (PLT20, 23 and 24) on the south face of the railway cutting. In this area there is no north face on the railway cutting due to the angle at which the railway had been cut into the rock face. This means that the original entrances for these caves were probably removed by the railway cutting. All three sites are relatively small with the current entrances around 1m in diameter. None of these sites have been archaeologically investigated, however, all of these caves contain deposits of unknown depth and extent. Due to the limited size of these caves they appear to have a greater palaeontological than archaeological potential, possibly having been used as animal dens.

East of these sites is Yew Tree Cave (PLT30) also on the south side of the railway cutting. This site was investigated in the nineteenth century (Ransom 1866, 1867) and produced an important faunal assemblage. This cave which is half way up the side of the cutting could not be entered as it is now gated. The area in front of the cave, including the probable spoil heaps from the original excavations is bare of vegetation, probably due to people walking over the area. As this is on a slope some erosion will be taking place. Directly opposite Yew Tree Cave, on the opposite side of the cutting, is a possible collapsed cave (PLT30), this may well have been a continuation of Yew Tree Cave with the original entrance on the south side of Pleasley vale at the north end of PLT29. This possible cave consists of a deposit of breccia overlain by large stones blocks that had collapsed down from above.

East of PLT29 is PLT31 which contains a small cave entrance. This extends back at least 6m but its full depth could not be determined as it is too small to crawl through, although it appears to open out further back. As with PLT29 its original entrance is probably on the south side of Pleasley Vale at the north end of the current exposed section. There is no obvious continuation of this cave on the south side of the railway cutting.

PLT32 contains a section of fractured and collapsed rock face containing a deposit of breccia. This is difficult to define as it is partially obscured by vegetation. This may be the remains of a collapsed cave, although it could also be a collapsed fissure. No continuation of this could be identified on the south side of the railway cutting.

The most easterly of the sites identified in the railway cutting is PLT33 on the north side of the cutting. This is similar to PLT32, containing an area of fractured and collapsed rock associated with breccia. On the south side of the railway cutting in PLT35, and opposite PLT32, is a small cave entrance 0.5m wide and 0.4m high.

The former railway line is now used as a footpath and as the caves are all accessible from the footpath there is the potential for human impact on the caves. However, there is no evidence of damage to the sites except for bare informal footpaths up to some of the caves that are subject to some erosion. The main damage to these sites

took place when the railway cutting was excavated, although without this activity it is likely that the sites may never have been discovered. There is some natural erosion taking place on these sites where breccia deposits are exposed to the surface.

Pleasley Vale Cave (PLT5) lies on the north side of the valley about half way up the side of the valley, at 110m AOD. This large cave is in a disused car park behind a derelict old house. The cave entrance is 2m high and up to 5m wide, inside the cave extends back 12m and rises to a height of 7m at the rear. The back of the cave ends in a vertical face of sediment. This appears to contain 4 major stratigraphic units, although cleaning the section could well increase this number. At the base of the sediment section there appeared to be an opening extending further into the cave but this is blocked by a deposit of sand that has been dumped in the cave, possibly to restrict access. The front of the cave contains various pieces of dumped machinery, as did the area outside the entrance. Generally this site was in poor condition and not being maintained. Work on the assemblage from this site by Roger Jacobi (pers comm.) has identified two components to the assemblage with very different appearences and it may be that the material was an agglomeration of material from two sites, one of which was Pleasley Vale Cave while the other is unknown. Part of the assemblage is heavily eroded and gnawed and appears to typify material from an animal den, probably Pleasley Vale Cave. The other part of the assemblage consists of an almost complete ungnawed bovid skeleton which may be from a pit fall feature.

In the base of the valley between 100m and 105m AOD are several deposits of breccia and sediment relating to fissures and possible caves. All of these sites are on rock faces that have been cut back exposing the deposits. Although the origin and formation of some of these sites is unknown, as is the presence or absence of any opening to the surface prior to cutting back, these sites represent a separate group of caves to those previously recorded and described in the valley.

On the north side at the base of the valley are a series of fissures spread over 0.2 km. These are located next to the road which runs along the base of the rock face, and are between 0.15 and 1m wide though most are about 0.6m wide. Within PLT1 there are 6 fissures 5 of which contain sediment, usually breccia deposits consisting of a yellow or orange brown sandy silt and angular coarse scree to block sized stones. In two of these fissures the lower part of the fissure is open with the upper part closed possibly forming small caves. As these fissures are generally full of sediment it is impossible to determine how deep the majority of them are. However one of the fissures, the largest and most westerly, may extend a long way back. This fissure lines up with a fissure of similar size that was observed in PLT2 extending over 10m of rock face. This fissure (PLT2), which is located in a garden, was exposed when a slab of rock fell of the cliff face exposing a longitudinal section of this fissure. Flowstone has deposited at the interface of the bedrock and breccia fill of this fissure. The large fissure in PLT1 and the fissure in PLT2 are very similar in size, shape and fill and line up with each other, if they are the same fissure it must be at least 40m long. Although these fissures and possible small caves have been damaged in the past, when the rock face was cut back, they do not appear to be under any threat now as long as no further widening of the gorge takes place. As these fissures mostly contain sediment erosion of the deposits is possible, although there is no significant erosion visible at present.

On the south side of the valley an access road for deliveries runs underneath the central mill, Mill 2, and the bedrock is exposed on the south side of this road. Deposits of breccia were identified adhering to the rock face in 4 places. Three of these deposits are large over 10m long and 2m high and up to 1m deep. There is also a small fissure entering the rock face containing a breccia fill. It is not known if

all these deposits are related, but they could have been the remains of a large fissure or cave system that had been mostly removed during the cutting back of the rock face during the construction of the mill. These deposits are vulnerable as they are exposed on the surface and are covered in pollution from the vehicles that use the road. There is also some evidence of the deposits eroding, with loose material at the base of some of them.

West of PLT17 is a section of rock face ,PLT15, that had flowstone and sediment adhering to it over an area of 2m by 2m. This appears to have been exposed when the rock face was cut back and is presumably originally in a cave or fissure, though it is impossible to tell now. The surviving deposits are no more than a thin skim and have little or no potential.

Behind Mill 3 is a large face formed from a mix of bedrock and retaining wall. Most of the top of the face is retaining wall while the bottom half is mainly bedrock. There are sections of retaining wall in the bottom half (2 main sections) and these appeared to block gaps in the rock face. These would presumably have been fissures or caves, but as they were blocked up it is impossible to tell if there is any surviving sediment in these features.

Just west of Mill 3 the rock face has been cut even further back and a large deposit of breccia (PLT13) has been exposed in the rock face at the corner of a right angled turn in the rock face. The main face of the deposit is on the west facing section of rock face and is 8m wide and 4m high, the height of the rock face. On the north facing section of rock face there are fragments of deposit still adhering to the rock face over a length of about 12m. In the main, west facing, section the deposit is an orange brown breccia containing a number of large stone slabs angled down towards the north. On the north facing rock face there are fragments of flowstone associated with the adhering sediment, including the remains of a possible flowstone floors. The main orientation of this structure would appear to be east west and it is possible that it extends further back behind the main face of the deposit. It is not possible to determine if this site is the remains of a large fissure or a collapsed cave. Some of the deposit in the main face is eroding with patches of unweathered sediment in the face where sediment has collapsed away. The main threat to this site appeared to be from erosion, though there was some dumping of brick and stone rubble at the base of the rock face in this area and this could have brought contaminants onto the site.

None of the low level fissures or possible caves have been investigated in the past so it is not known if the deposits in these features were contemporary or what date they may be. There was also no evidence as to whether these features had openings to the surface prior to the rock faces being cut back. They are therefore something of an enigma in regards to there archaeological and palaeontological potential.

There are further fissures in the valley bottom, although these are further east near Little Matlock, where the valley sides are much lower. One group (PLT40) is on the south side of the valley on a rock face behind some houses near the War memorial. This group contains four fissures, one which has been block up with stone work, one small narrow fissure with sediment and two larger (0.5m wide) fissures with sediment to the rear and small talus cones in front. These two larger fissures may connect together behind the rock face. Further east and on the north side of the valley are two final fissures in PLT43. However, neither of these contained sediment and are therefore of limited interest. The main threat to these fissures appears to be natural erosion removing sediment from them.

3.14.2.2 Rock shelters

There are three rock shelters on rock faces at the east end of the valley and two towards the west end of the valley. Two of the rock shelters at the east end of the valley have overhangs of 2m, one PLT41 was 5m long, while the other PLT44 was 32m long. Both of these are on a long rock face almost 0.2km long and up to 16m high. Under the overhang of PLT41 (Stuffyn Wood Rock Shelter 1) is a depression 5m long and 2m wide, possibly where a trench had been excavated, although no excavations are recorded from this site. There is evidence of climbers using the whole rock face from PLT42 to PLT 45 and in some areas there are patches of chalk and some fixed bolts in the rock face. Below this rock face there is a moderate slope down to the bottom of the valley floor. The third rock shelter at the east end of the valley is Stuffyn Wood Rock Shelter 2 (PLT47). This is 4m long and 1.25m high and has an overhang of 0.3m. This is in a wooded area close to but set back from the path and the rock face itself was too small to attract climbers.

Of the two rock shelters towards the west end of the valley, one (PLT10) is on a mid level rock face and one (PLT8) is on an outcrop of rock on the top of the valley side. PLT10 is a small, 3m long and 1.5m deep, overhang on a 12m high rock face. At the base of the rock face, which was located at mid level on the valley side, is a small terrace which continues on to the west where the derelict house in front of Pleasley Vale Cave has been built on it. The overhang is partially filled with material washed down from above and may extend further to form a small cave. Although there are no obvious threats to the site at present this area may be impacted when the derelict house is either demolished or refurbished.

PLT8 has an 8m long and 1m deep overhang and is located in a wood on the top of the valley side. There is some evidence that the woodland around has been landscaped in the past but there appear to be no activity at the present.

With all the rock shelter sites in Pleasley Vale it is difficult to assess there potential as no work in the valley has produced archaeological remains from the Palaeolithic or Mesolithic Periods from these types of sites. This may be due to the limited nature of the archaeological work undertaken in the valley or it may be an absence of any sites of the appropriate period.

3.14.2.3 Rock faces and valley sides

Pleasley Vale is divided into three sections based on the shape of the valley and the nature of rock faces in it. The west end of the valley does not contain rock faces and has fairly low, moderately sloping sides.

The central section has substantial rock faces distributed between the mid and low levels with moderate high level slopes above. The valley sides are quite deep in this central section. Many of the low level rock faces in this area have been cut back in the past obscuring their original appearance and shape. As the rock faces have been cut back in many places there are often no slopes below them and one section of rock face appeared to contain the remains of a quarry (PLT12). Also in the central section is the cutting of a disused railway, where small rock faces are exposed. The features within this cutting are discussed in **section 3.14.2.1**.

The sides of the valley are shallower towards the east end. There are sections of rock face in the east end of the valley and these tend to be mid to high level and are intermittently distributed on the south and north sides of the valley. There is one terrain unit in the east end of the valley that appears to be a former quarry (PLT46).

However, the rock face here is very weathered, and if this was a quarry this was probably not recently.

All the slopes at the east and west ends of the valley are covered in vegetation, either grass or woodland, and it is therefore not possible to identify whether any scree slopes are present.

3.14.2.4 Valley bottom

The valley bottom is generally undeveloped towards the west end and most of the east end, although there is the small settlement of Little Matlock at the east end of the valley. However, these areas probably retain much of their original shape, having a narrow flat bottom.

In the central section the valley is heavily industrialised, containing three large mills with associated mill ponds. This, in conjunction with the cutting back of rock faces, meant that it is not possible to determine the original shape of the valley bottom in this section, or to determine whether any *in situ* deposits survive that predate the construction of the mills.

3.14.3 Management recommendations

Pleasley Vale is unusual among the valleys in this study in being so heavily developed. Bolsover District Council, the owners of the mills in the valley bottom, are currently developing the old mills as a Business Park. The current development plan for the business park is only concerned with heritage in relation to the mills and their reuse (Roger pers. comm.) Bolsover and Mansfield District Councils jointly commissioned Anthony Short and Partners to produce and a report the *Pleasley Park and Vale River Corridor Study*. This attempted to put the redevelopment of Pleasley vale into context and make recommendations for the management of the site. However, the section on History and Archaeology was short, confused and demonstrated a lack of understanding of archaeology, history and geology. The report contains so many omissions and factual mistakes that the recommendations relating to archaeology should be disregarded.

3.14.3.1 Immediate Actions

Of immediate concern is the condition of Pleasley Vale Cave PLT5. This is in poor condition being surrounded by rubbish and has a 6m high exposed sediment section inside it of unknown stability. The land that this site, and Vale House, is located on is subject to a legal dispute between between Bolsover District Council and a former developer of the site. However, Bolsover District Council should be encouraged, as responsible land owners, to clean up the site, and stop further dumping and storage of material on the site. This should be done through the education programme.

The breccia deposits exposed in the bottom of the valley near the mills are a cause of some concern, due to their exposed state, particularly PLT17. These can be protected through the monitoring programme and the planning process, but as of yet it is not known if they contain any deposits of archaeological/palaeontological potential. Exploratory work on these deposits should be a priority of future research work as the exposed state of these deposits makes them highly vulnerable and future developments on the business park could threaten them. If the deposits are confirmed to contain archaeological/palaeontological material then their long term future should be better managed.

3.14.3.2 Public Education

Public education should be achieved by the production of short information guides to be circulated to interested parties including land owners, local councils, wildlife groups/trusts, local schools and local groups that may be interested. For more details see **section 3.15.2**.

3.14.3.3 Monitoring

Within Roche Abbey valley there should be a programme of long term monitoring to regularly visit the sites and compare the current condition of the sites in the terrain unit database, details of how such monitoring should operate are outlined in **section 3.15.3**.

The monitoring should take particular care with the exposed sections of breccia in the cut back rock faces around the mills, one of which (PLT13) has patches of fresh surface exposed probably due to collapses. These breccia deposits have high archaeological/palaeontological potential are potentially of great importance.

Long term protection of the breccia deposits on the cut back rock faces will also be provided through the planning process under Planning Policy Guidance note 16, Archaeology and Planning.

3.15 General management Recomendations

In general, monitoring of sites allied with some tidying up of graffiti, rubbish and discouragement of fires, while accepting that this will be difficult to enforce. In a few cases where sediments are eroding it may be worth stabilising these, however, in many cases we do not know if these sites contain archaeologically or palaeontologically important deposits so it may be worth determining this prior to undertaking stabilisation measures.

There is also a general recommendation that all proposed development in the gorges should involve an archaeological assessment under PPG16 prior to planning being approved. This is particularly important in Roche near the village of Stone, Lindrick Dale, in the villages of Elmton, Whaley and Langwith as well as Pleasley Vale.

3.15.1 Immediate Actions

These are actions taken to remediate immediate threats to sites.

3.15.2 Public Education

Public Education involves informing the public about the importance of the sites and educating them as to what can damage the archaeological/palaeontological potential of a sites. This information will be aimed at land owners, public bodies, and visitors.

This is the preferred method, as persuading landowners and visitors to look after sites is both cost effective and in the long term the best option as it is the people that have day to day dealings with sites that can most effectively manage them. Sending in workers to undertake remedial actions can clean up a problem (e.g. remove graffiti) but it does not necessarily remove the underlying cause of the problem (e.g. youths creating the graffiti). The problem can only be removed by effective long term management by landowners and regular visitors. This can result in remedial actions to clean a site, but this will only have a long term impact if this is followed up by monitoring and management.

It is proposed that a short information guide is produced for each valley this will include the following sections:

1. Background to the Creswell Crags Limestone Heritage Area.

2. The nature and importance of Ice Age archaeology, this would describe the nature of the archaeology, the types of sites and what it can tell us.

3. A description of the sites in the valley.

4. An explanation of what processes could damage the archaeology and natural environment. This will cover such issues as natural erosion, land use, farming practices, rubbish tipping, informal footpaths, vandalism and fire lighting.

5. Recommendations for best practice in looking after the sites and their environment. This will cover such issues as maintenance (removal of rubbish and graffiti), site use, access and management. These recommendations will cover all sites whether on farmland, in a garden or in woodland.

6. Contacts to report damage or get further advice. This will include county archaeologists for concerns about planning issues, English Heritage for general advice on archaeology and Creswell Heritage Trust for reporting concerns about the condition of sites unless they are scheduled in which case it should be English Heritage. In some cases the contacts could include land owners or managers if they are councils or wild life trusts.

Sections 1, 2, 4 and 5 can be largely generic while sections 3 and 6 will be valley specific. Section 5 may need focussing for each valley taking into account current land use and possible future developments. It is intended that the guides are not long documents but will be short and accessible. The guide will not be guide to the sites but a guide to the importance and management of the sites. It is therefore envisaged that it will be used as a reference work for people to consult when they have concerns or are looking for advice. As such large numbers of the guides will not be needed, maybe 30 copies of each guide will suffice.

In all cases the guides will be sent to land owners, tenant farmers and local councils, in areas where public access exists the guides will also be sent to bodies promoting the access such as wild life trusts, local societies and groups that use the land and local schools. Copies of all the guides should be sent to the local offices of national organisations such as English Nature, the Countryside Commission and the Department for Environment Food and Rural Affairs.

3.15.3 Monitoring

Management recommendations for some valleys have included the development of a programme of long term monitoring. This will aim to provide specialist archaeological assessments of site conditions to supplement any information received from members of the public through the public education programme. Monitoring is required for the site due to the rarity of Palaeolithic remains in the archaeological record. Many of the sites are only potential sites and the presence of archaeological/palaeontological remains has not been confirmed, this can only be done through excavation. Further research on the area may well extend our current knowledge of these potential sites but until this exists the more prudent strategy will be to monitor all sites with archaeological/palaeontological potential until they are proved to be sterile. It is proposed the Creswell Heritage Trust act as the coordinating body for the monitoring and act as the first point of call for members of the public wishing to report damage to sites.

This long term monitoring will aim:

to check up on any reports of damage received from members of the public,

to identify any damage that has occurred to the sites since the last visit,

to identify any human actions that may be detrimental to the sites through disturbing deposits or encouraging erosion,

to identify any threats to the site from ongoing natural erosion,

to identify any threats to the sites from bioturbation by animals or plants,

to identify any other threats to the sites,

to make recommendations for any actions required to protect the sites.

Monitoring will be undertaken on a valley by valley basis with the frequency of monitoring visits determined by the perceived threat of damage to the sites. This is a subjective assessment based on the current condition of the sites, the degree of public access and use of the sites, potential developments in the valleys and the archaeological potential of the sites in the valley.

In general monitoring visits are recommended every 4 years but in the case of three valleys more frequent visits are recommended every 2 years. More frequent visits are recommended for Roche Abbey Vale, Anston Stones and Pleasley Vale. In Roche Abbey this is due to the presence of informal bare footpaths through areas without public access, in Anston Stones it is due to this being the most visited valley where sites were most likely to contain rubbish fires and graffiti, and in Pleasley Vale it is due to this being the most developed valley with exposed breccia deposits on cut back rock faces.

Table 4 Valleys to be Monitored

Vale or Gorge	**Period between visits**	**No. of sites**	**Expected time duration of monitoring visits (days)**
Roche Abbey Vale	2	17	1
Anston Stones	2	38	2
Red Hill	4	1	0.5
Thorpe Common and Lob Wells Wood	4	5	1
Ash Tree Gorge	4	5	0.5
Markland Grips	4	58	2
Elmton and Whaley Valleys	4	10	1
Langwith Vale	4	6	1
Pleasley Vale	2	22	1

When a valley is monitored all the terrain units identified as caves or rock shelters will be visited and checked. Rock faces without any cave or rock shelter sites will be scanned for obvious damage while passing but will not be checked in detail.

The current survey has provided baseline data which will be used in the monitoring programme to check for any changes in site condition. The description of the terrain units from the sensitivity survey will be compared to the condition during the monitoring visit and any changes noted. A guideline of the expected duration of monitoring visits is given in Table 4.

On complete of the monitoring survey for a valley a short report will be prepared this will note any damage or increased threats to sites and make recommendations if action is required. Each report is likely to take between a half and one day to produce unless damage requiring complicated actions are required.

3.15.4 Protection through the planning process.

Protection of archaeological sites from large scale development is undertaken through the planning process. PPG16, Archaeology and Planning, provides the framework by which this is undertaken. Under this process the state of current knowledge is a key factor in informing the planning authorities deliberations. These will determine whether evaluation is required before determination or whether mitigation is required before or during development. By providing copies of the Management Action Plan including the survey database and maps to the County Sites and Monument Records for South Yorkshire, Derbyshire and Nottinghamshire their knowledge of the Palaeolithic and Mesolithic archaeological potential of the vales and gorges in the Creswell Crags Limestone Heritage Area will be considerably enhanced. This will enable the council archaeological officers to give more informed advice to the planning authority on the caves and rock shelters and their archaeological potential. This in turn will enhance the protection and management of the cave and rock shelters to preserve them over the long term.

4 PREDICTIVE MODELLING FOR THE EXISTENCE AND LOCATION OF OTHER POTENTIAL PALAEOLITHIC/ PLEISTOCENE PERIOD SITES

4.1 Introduction

Previous research, whilst effective in identifying the significance of the vales and gorges for Palaeolithic and Mesolithic archaeological research, and for Pleistocene and early Holocene palaeontological research, has often been poorly recorded or published. There is a need to establish the potential of the area for further research, and to develop a coherent research framework within which such research can be carried out. This will help to promote the significance of the area for Palaeolithic and Mesolithic research, and contribute to strategic planning and management. This will also contribute to the significance of the Creswell Crags Limestone Heritage Area as a centre for promoting awareness and understanding of Quaternary environments.

The vales and gorges also contain archaeological remains from later periods from later prehistory through to the industrial revolution and this is discussed in chapter 5.

In order to develop a research framework it is first necessary to assess the character of the surviving sites. This report attempts to use predictive modelling to assess the archaeological and palaeontological research potential of the cave and rock shelter sites in the Creswell Crags Heritage area. In the model previously investigated sites are used as a control with which to compare previously uninvestigated sites.

The predictive modelling can not be used on open air sites as there are no control sites and no specific potential sites. Instead a more speculative approach based on desk-top research and consideration of the potential preservation of Pleistocene and early Holocene deposits in the valley bottoms was applied.

4.1.1 Aims

The aim of the predictive model is to identify all the known and potential cave sites in the main limestone gorges and to assess the potential of these sites to contain archaeologically or palaeontologically significant remains. The caves that are known to contain archaeological or palaeontological remains together with those known to be devoid of such remains act as a control with which to compare the unknown sites.

The predictive modelling has a number of aims:

- To assess what environmental/site characteristics can be used to asses the research potential of cave and rock shelter sites.
- To use the environmental/site characteristics to develop a predictive model that can be used to assess the archaeological and palaeontological research potential of cave and rock shelter sites.
- Through desk-top research to assess the potential for the existence of open air sites in and around the vales and gorges.

To achieve these aims a number of objectives must be met:

- Establish integrated reference databases of caves in the study area, incorporating information from national mapping, caving organisations, archaeological and environmental records, museum records and walkover field survey.

- Use the reference databases to investigate factors favouring preservation of archaeological and palaeoenvironmental deposits, and develop a multivariate predictive model based on current knowledge, using standard statistical procedures.
- Attach estimated potentials to all caves in the database, and estimate the extent of the currently unidentified cave archaeological resource.

4.1.2 Study area

The study areas for this research are the eleven vales and gorges in the Creswell Crags Limestone Heritage, excluding Creswell Crags. This is the same study area as was covered in the report on the Identification and Assessment of Management Issues Relating to the Known Sites. The vales and gorges in the study are, Roche Abbey Vale, Firbeck Valley, Anston Stones, Red Hill Valley, Thorpe Common and Lob Wells Wood, Steetley Quarry Caves, Ash Tree Gorge, Markland and Hollinhill Grips, Elmton and Whaley Valleys, Langwith Vale, and Pleasley Vale.

4.2 Methodology for predictive modelling

4.2.1 Definition of a cave for the purposes of the study

For the purpose of this study the term *cave* was used to refer to all caves, rock shelters and similar features, as defined below, however, in general terms a *cave* is:

An enclosed but accessible natural void within a rock formation which has dimensions minimally sufficient to accommodate a person.

Although there are several different types of sites that could be called caves, using the definition above, three types were recorded in the survey:

- **Caves** have an entrance and up to five structural surfaces (roof, floor, walls on either side and a back/end wall).
- **Rock shelters** are caves of restricted depth which have a roof, a floor and a back wall but the side walls of a shelter are poorly defined or absent.
- **Fissures** are horizontal or vertical entry caves which lack a well-defined roof, while potholes are vertical entry caves with limited horizontal development of passageway.

Cave deposits include both consolidated and unconsolidated sediments and clastic deposits that have accumulated within a cave or at the entrance to a cave. As cave entrances are subject to erosion, some deposits that were previously contained within a cave can eventually end up outside the cave, as can spoil excavated from within the cave by human or animal agents. For this reason, external talus deposits adjacent to cave entrances also have the potential to contain archaeological and palaeontological remains. These remains are considered part of the cave site when it can be shown that there is spatial continuity with deposits contained inside and outside the cave.

4.2.2 Inclusion criteria

The audit covered the caves types mentioned above but excluded the following types of caves from the study, when encountered in the survey:

- Hidden, natural cave systems which have been intersected by ground works such as mines, tunnels and quarries: these were excluded if the intersected

caves could not be demonstrated to have or to be likely to have had a natural entrance other than that created by recent human activity.

- Artificial caves and grottoes, except where these represent a modification of a pre-existing natural cave system.

4.3 Data Acquisition

Data on which to base this study were derived from both desk-top study and field survey. The data were used to identify the location of all known caves and potential caves in the search areas.

4.3.1 Desk-top study

The following were the main sources of data for the desk-top study.

Creswell Crags Conservation Plan: The Creswell Crags Conservation Plan contains a gazetteer of all known Pleistocene sites with archaeological or palaeontological remains in the gorges in the Limestone Heritage Area other than Creswell Crags. It also contains an *Assessment of the Pleistocene collections from the cave and rock shelter sites in the Creswell Area*, (Appendix 2). These provide data on the known archaeological and palaeontological cave sites in the area and this provided the control data for the predictive modelling.

Archaeological records: The Derbyshire, Nottinghamshire and South Yorkshire Sites and Monuments Records were consulted to locate any cave sites within the search areas which have been added since the Conservation Plan Gazetteer was produced and gather any additional information held on the known sites.

Online databases: including the Gazetteer of English Caves, Fissures and Rock Shelters Containing Human Remains on the CAPRA (Cave Archaeology and Palaeontology Research Archive) web site, the CBA radiocarbon database, and Oxford Radiocarbon Accelerator Unit database.

4.3.2 Field survey

Following the desk-top study a programme of field survey was undertaken, this was combined with the survey on management issues. All of the known and previously unrecorded caves and rock shelters were visited and information collected on the sites.

The main part of the field survey was a walkover survey of all the gorges within the study; this included any potential cave sites identified by the desk-top study and looked to locate any unknown caves and rock outcrops that may have contained caves.

The walkover survey mainly took place in the summer (July and August, 2003) which meant that the vegetation was a problem in some of the gorges, particularly Markland Grips. All landowners and tenants were contacted before entering private land.

Due to the dense vegetation, particularly tree growth, the walkover strategy outlined in the project design had to be modified as in most cases it was found to be impossible to view one side of the valley from the other. It was found that the only effective strategy was to identify all known or possible rock faces or outcrops and then to walk along the base of the rock face examining it for openings and overhangs.

Where caves were identified these were entered to identify their size and the nature of any surviving and exposed deposits. The recording of individual caves was based on visible surface features and did not involve any ground disturbance or entry into

narrow underground passages. Particulars were recorded on proforma and photographs taken. The data recorded was directly related to the fields in the cave database.

4.4 Results of the Survey

4.4.1 Survey maps

The data from the survey was used to draw up maps of each gorge. These maps were the same as those produced for the Identification and Assessment of Management Issues. O.S. data obtained from Digimap was used as the base for the maps; this was overlain with data from the field survey showing all rock edges, caves, rock shelters, fissures and terrain unit boundaries.

4.4.2 The cave database

A database of all the cave and rockshelter sites was produced in Microsoft Access, this incorporated data from the field survey and from the desk-based survey. This database was a combined database with the proposed Terrain Unit database. The two databases were combined for two main reasons:

- much of the data was duplicated in the two studies and combining the two databases minimised data inputting.
- management of the database is simplified, as any additions or alterations to the database will only have to be done once

The numbering of sites followed that used in the Identification and Assessment of Management Issues with the terrain unit numbers being used. This meant that there were gaps in the numbering system but it avoided the possibility of confusion from two numbering systems.

Structure of research archive: the research archive consists of the Microsoft Access database with associated map files. An outline data structure is provided below:

Terrain Unit Number

Site Name

Site Number (Creswell Crags Conservation Plan Gazetteer)

NGR

SMR No.

Description (terrain unit)

Surface Condition

Vegetation Cover

Archaeological Potential (plus notes)

Palaeontological Potential (plus notes)

Vulnerability (plus notes)

Sensitivity

Action (proposed management action)

Access

Management

Location/Landscape Description

Site Description

Site Condition

Land Use on Site

Land Use Around Site

Site Type

Rock shelter length (m)

Rock shelter Depth (m)

Rock Shelter Height (m)

Cave Shape

Cave entrance height (m)

Cave entrance width (m)

Cave Depth (m)

Cave internal height (m)
Cave internal width (m)
Fissure width (m)
Fissure Height (m)
Fissure Depth (m)
Aspect (deg)
Altitude (m)
Light zone extent (m)
Grouping with other sites
Ground slope inside (deg)
Ground slope outside (deg)
General Slope Above (deg)
General Slope Below (deg)
General slope Left (deg)
General Slope Right (deg)
Bedrock Geology
Deposit Geology Inside
Deposit Geology Outside
Notes Comment (from gazetteer)
Notes Potential (from gazetteer)
Planning Designation
Excavation (History)
Collections/Archive
Publications
Stratigraphy
Categories of Finds
Phasing of Cave Usage
Dating Evidence
Deposits Status
Owner
Tenants
Catchment
District

Parish

The data in the database was then exported to SPSS to enable statistical analysis and predictive modelling to be undertaken.

4.5 Statistical Assessment of the Data

Prior to constructing the Predictive Model the data was assessed using basic graphical statistical techniques. This was undertaken to assess the suitability of the data for predictive modelling and to understand the nature of the variability of the data.

In all the figures below the valleys are arranged in order from north (Roche Abbey Vale) to south (Pleasley). The valleys are identified using their three letter terrain unit code:

rat –Roche Abbey Vale

ast – Anston Stones and Lindrick Dale

rht – Red Hill

tlt – Thorpe Common and Lob Wells Wood

sct – Steetley Caves

att – Ash Tree Gorge

mgt – Markland and Hollinhill Grips

ewt – Elmton and Whaley Valleys

lbt – Langwith Bassett Valley

plt – Pleasley Vale

4.5.1 Numbers and types of sites

The field survey has significantly increased the number of recorded sites, with a threefold increase on the number recorded in the Creswell Crags Conservation Plan Gazetteer, from 50 to 163. The number of possible caves has doubled from 22 to 42 while the number of rock shelters has increased fourfold from 28 to 108 (**Table 1 and Fig.1**). Fissures had not been listed on the Creswell Conservation Plan Gazetteer so the 13 large fissures with sediment listed were all new.

The numbers of sites in each valley varies enormously from none in Firbeck valley to 58 in Markland Grips (**Fig.1**). This variation in number is the result of a number of factors including size of valley, length of exposed rock faces, local geology and survival. The increase in numbers of sites also varied greatly between the different valleys. Roche Abbey Gorge, Anston Stones and Markland Grips had large increases, and to a lesser extent Pleasley Vale. With the other valleys the number of sites remained relatively unchanged.

Table 1 Number of sites per valley

Vale or Gorge	No. of previously recorded caves	No. of previously recorded rock shelters	No. of caves in the survey	No of rock shelters in the survey	Large fissures with sediment
Roche Abbey Vale	0	1	2	14	1
Firbeck Valley	0	0	0	0	0
Anston Stones Wood and Lindrick Dale	2	2	7	29	2
Red Hill	1	0	1	0	0
Thorpe Common and Lob Wells Wood	0	4		5	0
Steetley Quarry Caves	2	0	1*	0	0
Ash Tree Gorge	1	2	1	3	1
Markland and Hollinhill Grips	3	8	13	41	4
Elmton and Whaley Valleys	2	6	3	7	0
Langwith Vale	3	3	3	3	0
Pleasley Vale	8	2	11	6	5
Total	22	28	42	108	13
	50		**163**		

* - Steetley Quarry Cave no longer exists as it has been quarried away.

The relative proportions of the different types of sites is difficult to see in the raw counts (**Fig.1**) so a percentage histogram (**Fig.2**) was produced of caves and rock shelters by valley. Valleys with less than 5 sites were excluded so as to avoid skewing the pattern with small samples.

The percentage figures for caves, as a total of known sites, varied from around 15% in Roach Abbey Vale to 60% in Pleasley Vale. **Fig.2** also shows that there is a general trend from north to south with an increasing proportion of caves and a decrease in rock shelters.

This variation and trend could be due to variation in geological factors, which influence the creation of sites, and/or factors related to the destruction and survival of sites, which may operate differently on different types of sites. Factors related to destruction and survival could be a factor in the proportion of caves and rock shelters in Pleasley Vale; here the rock faces have been cut back, possibly resulting in a selective preservation of caves which are likely to extend further back from the original rock face than rock shelters. However, this does not hold true for Elmton and Whaley Valley or for Langwith valley where there is no obvious evidence for the cutting back of rock faces. It would therefore appear that the most important factor in

the variable proportion of different types of sites is geological variation. There must be some variation in the bedrock geology which influences the development of different types of features and that these factors vary across the Magnesian Limestone from north to south.

Fig.1 Site counts by valley

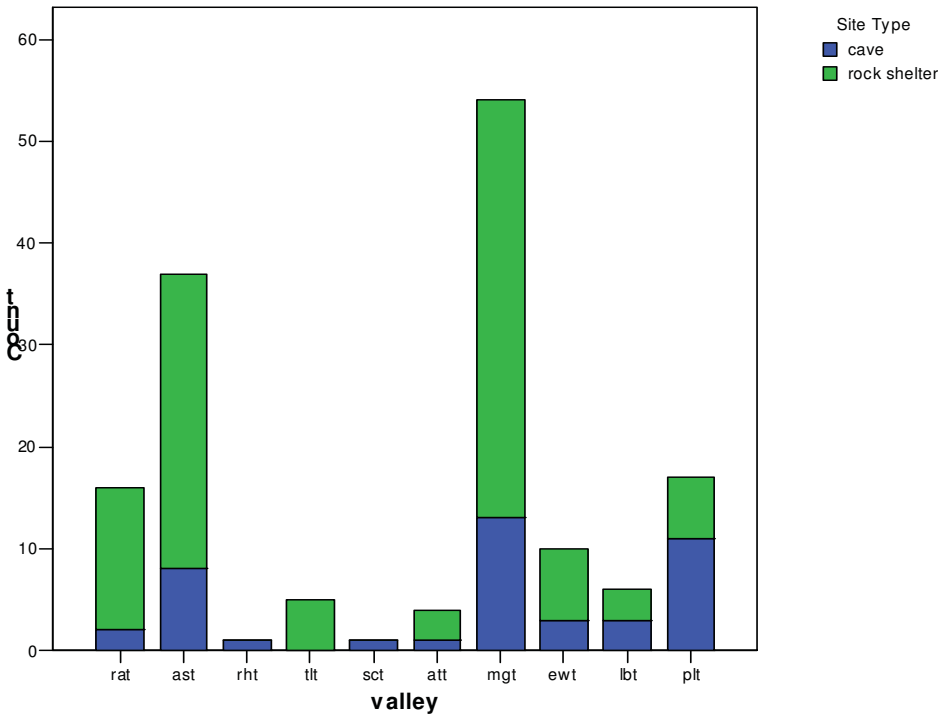
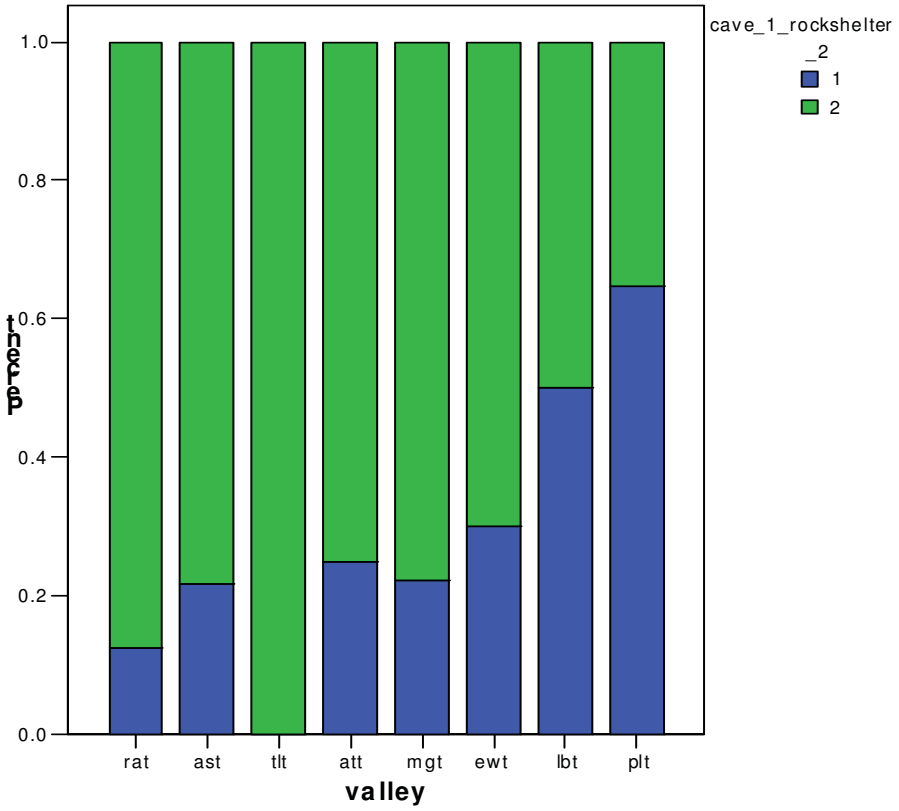


Fig.2 Percentage of site types by valley



4.5.2 Excavated sites

The number of sites that have been excavated is very small compared to the total number of sites now known. The number of sites that have been excavated in each valley is a small proportion of the total number of sites in each valley. The relative proportion of sites that have been excavated in each valley is difficult to see in the raw counts (**Fig.3**) so a percentage histogram (**Fig.4**) was produced to show the percentage of sites excavated in each valley. Valleys with less than 5 sites were excluded from the analysis so as not to skew the pattern with small samples.

The percentage of sites that have been excavated in each valley varies from 2.5% to 40%. The valleys with the greatest proportion of excavated sites are those with the smallest number of sites, Thorpe Common and Ash Tree Valleys, while the valleys with the lowest proportion of excavated sites are in the valleys with the largest number of sites, Anston Stone, Markland Grips, Roche Abbey Vale and Pleasley Vale. In reality, excavation has been unusual in all of these valleys and the apparent focus of excavation on the valleys with fewer sites is the result of the disproportionate impact of a few excavations in small populations of sites.

Fig.3 Numbers of sites excavated by valleys

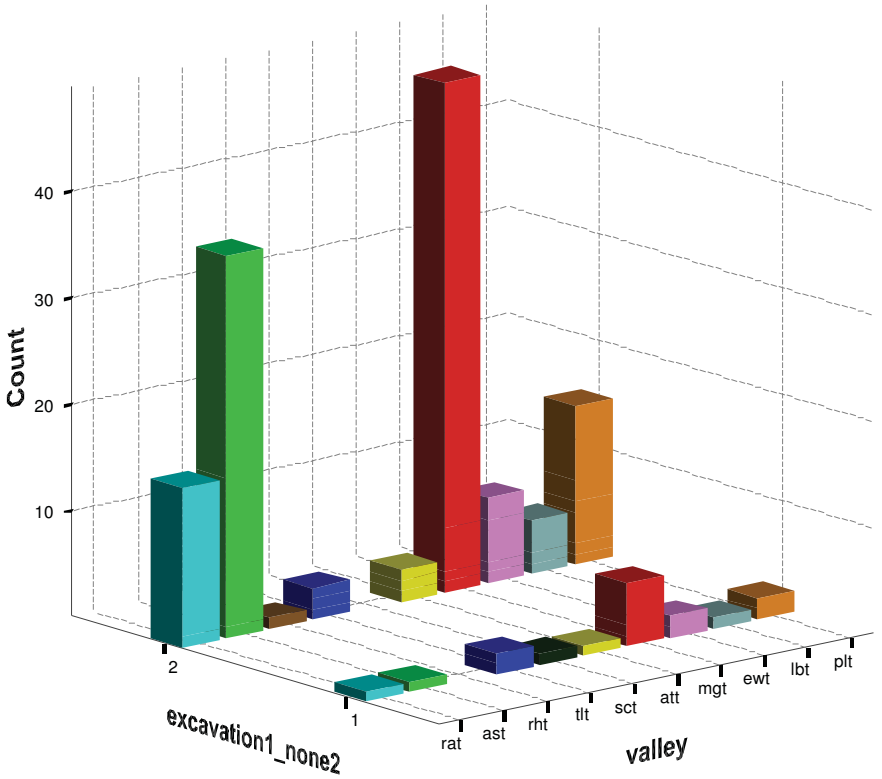
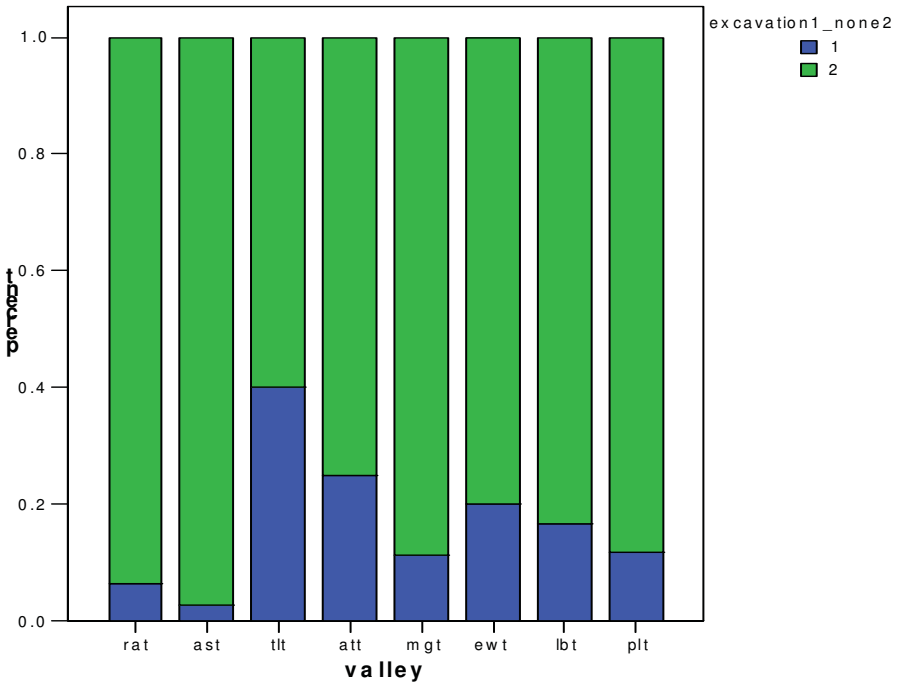


Fig.4 Percentage of excavated sites by valley

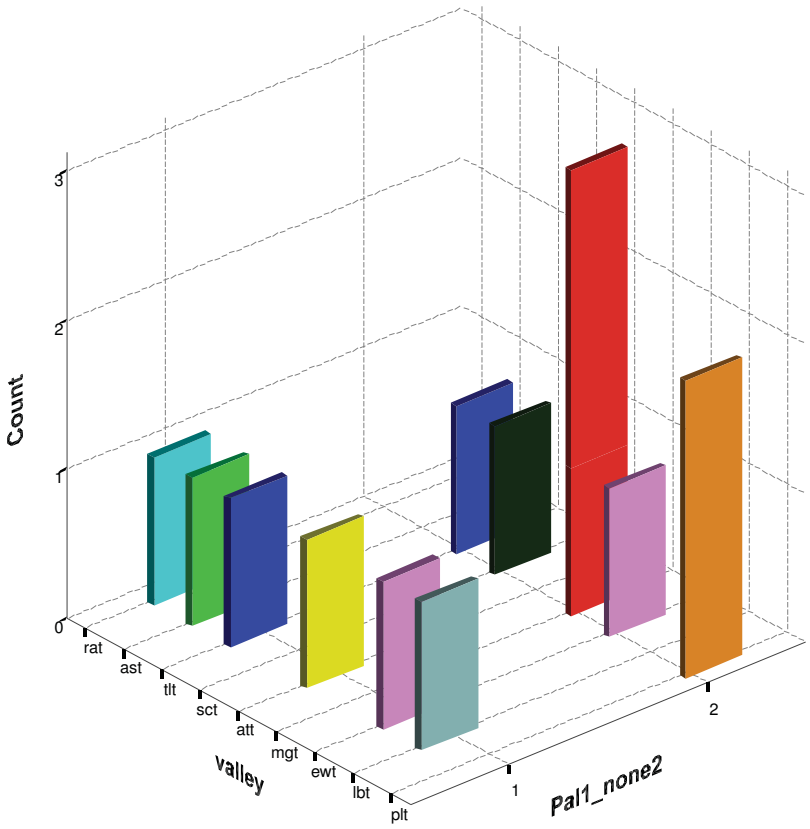


4.5.3 Archaeology and palaeontology recovered during excavations

As stated, the number of sites that have been excavated is relatively few, and there are only 14 recorded excavations known from the study area for which we have details. This represents only 8.5% of the 163 possible sites identified in the survey.

Of the 14 sites, six contained Palaeolithic material (**Fig.5**), with one site each in Roche Abbey, Anston Stones, Thorpe Common, Ash Tree, Elmton and Whaley, and Langwith valleys. In two of the larger valleys, Markland Grips and Pleasley, excavation has recovered no Palaeolithic material despite three excavations in the former and two in the later.

Fig.5 Number of excavated sites containing Palaeolithic remains by valley

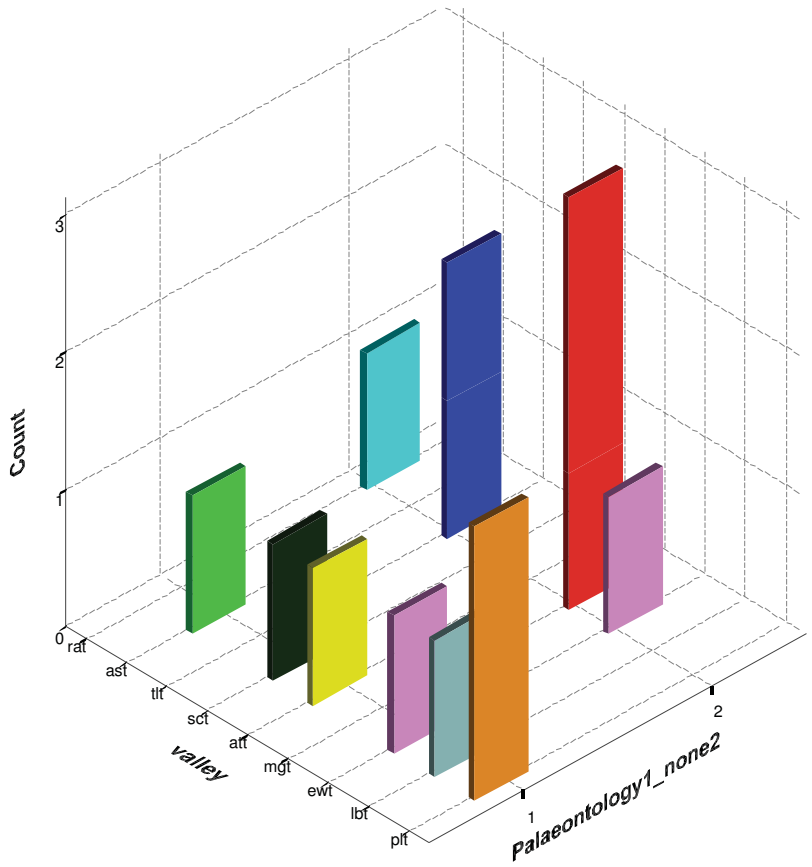


N.B. It is unclear how many sites, or which sites, Armstrong excavated in Markland Grips so the figure of three sites excavated may be an underestimate.

Material of palaeontological interest has been recovered from 7 of the sites, including some such as Ash Tree that also produced archaeological material (**Fig.6**). However, the main difference with the distribution of Palaeolithic material was in the Pleasley Vale where the two sites produced large assemblages of palaeontological material.

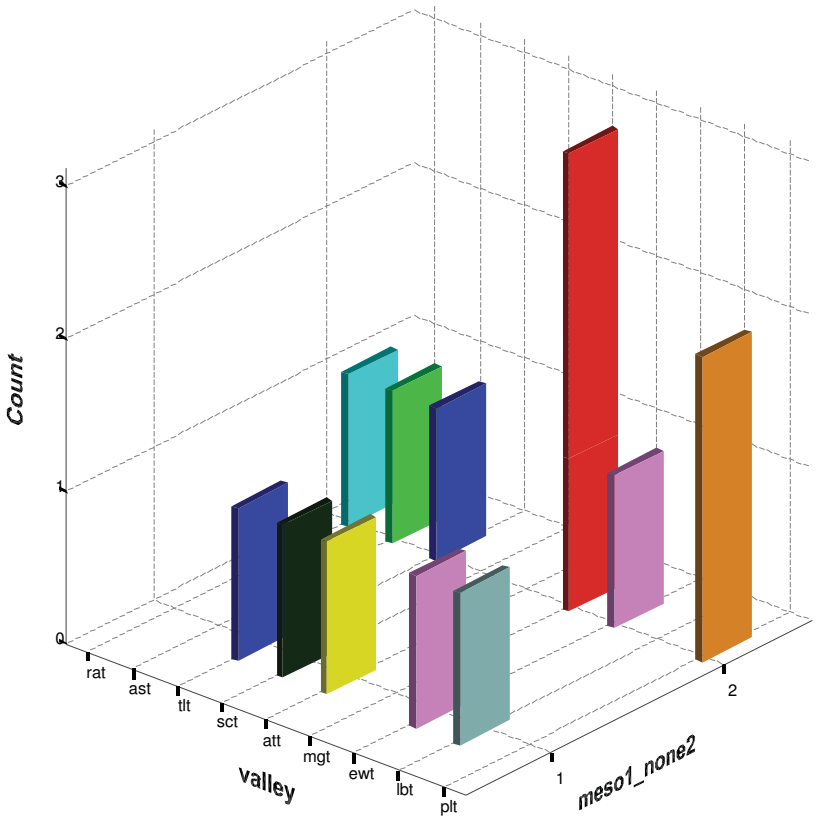
Palaeontological material was absent from Markland Grips, and also from Thorpe Common and Roche Abbey valleys.

Fig.6 Number of excavated sites containing palaeontological remains by valley



The distribution of Mesolithic material was similar to that for the Palaeolithic, although in this case it was slightly more restricted being found on only five sites (**Fig 7**). Pleasley and Markland Grips again lacked any material and in this case Roche Abbey and Anston Stones did not contain any Mesolithic remains from the excavated caves.

Fig.7 Number of excavated sites containing Mesolithic remains by valley



For later prehistoric periods (Neolithic to Iron Age) material was recovered from most valleys (**Fig.8**). Again there was no archaeological material of this date from Pleasley, and none from Anston Stones, though in the later case Roman material was recovered from Dead Man's Cave.

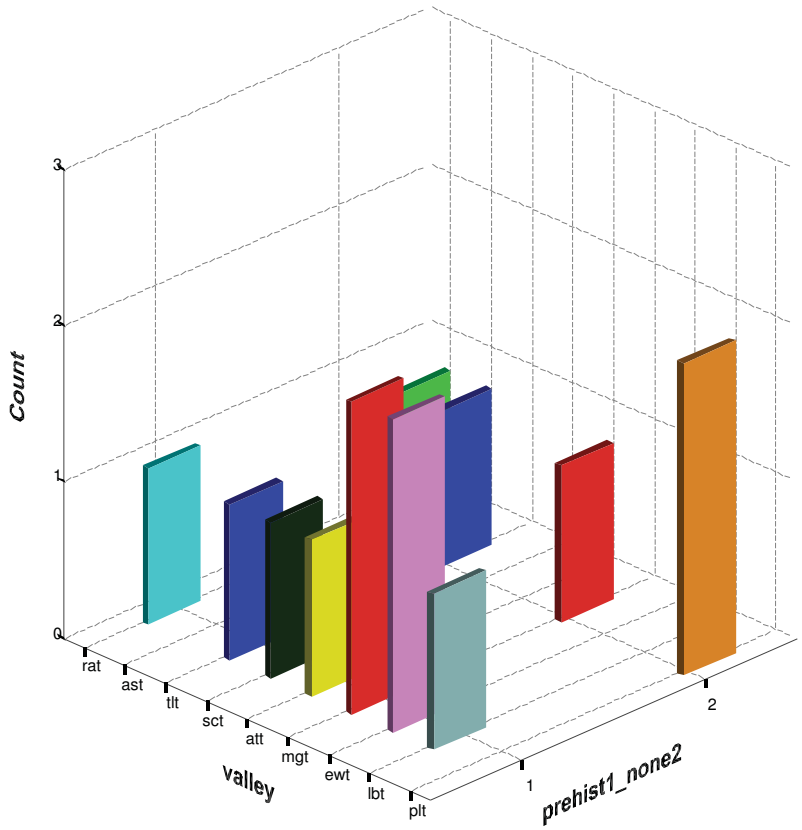
Considering the number of excavations that have been undertaken, and what they represent as a proportion of all the potential sites, one must be cautious in extrapolating from the data available and not over interpreting it. However, there are two valleys, Markland Grips and Pleasley, that are notable for the absence of either Palaeolithic or Mesolithic material. In both cases it is worth considering whether this is an accurate picture of human use of these valleys and their sites, or a reflection of the limited sample of excavated sites available.

In Markland Grips the sites excavated were relatively small caves and rock shelters with some later prehistoric material but nothing earlier. The three sites excavated represent a tiny proportion of the 58 possible sites identified in the survey. There are several sites that demonstrate a human presence in the vicinity as Creswell Crags is just over 2km to the east and Ash Tree Cave 1km to the north, also one upper Palaeolithic flint blade has been recovered from the valley bottom (Jacobi pers. comm.). There is therefore extensive human activity in the area during the Palaeolithic and this combined with the very small number of excavations means it is

impossible to discount the possibility that other sites within Markland Grips could contain Palaeolithic or Mesolithic material.

At Pleasley the two excavated caves have produced large assemblages of palaeontological material, one with Pleistocene material and one with early Holocene material, but no archaeological material of any date has been recorded. However, previous field walking in the area has produced both Mesolithic and Neolithic flint scatters on the top of the limestone plateau, and both scatters were within 300m of the valley. This demonstrates the presence of human groups in the area in the Holocene but not during the Pleistocene. The nearest Palaeolithic cave to Pleasley is Langwith Bassett which is over 4km away. With the likely low population levels in Britain during the Palaeolithic it is possible that the caves and rock shelters in Pleasley were not used, however, further investigation of some of the 20 other sites in the valley would be required to confirm this.

Fig.8 Number of excavated sites containing later prehistoric remains by valley

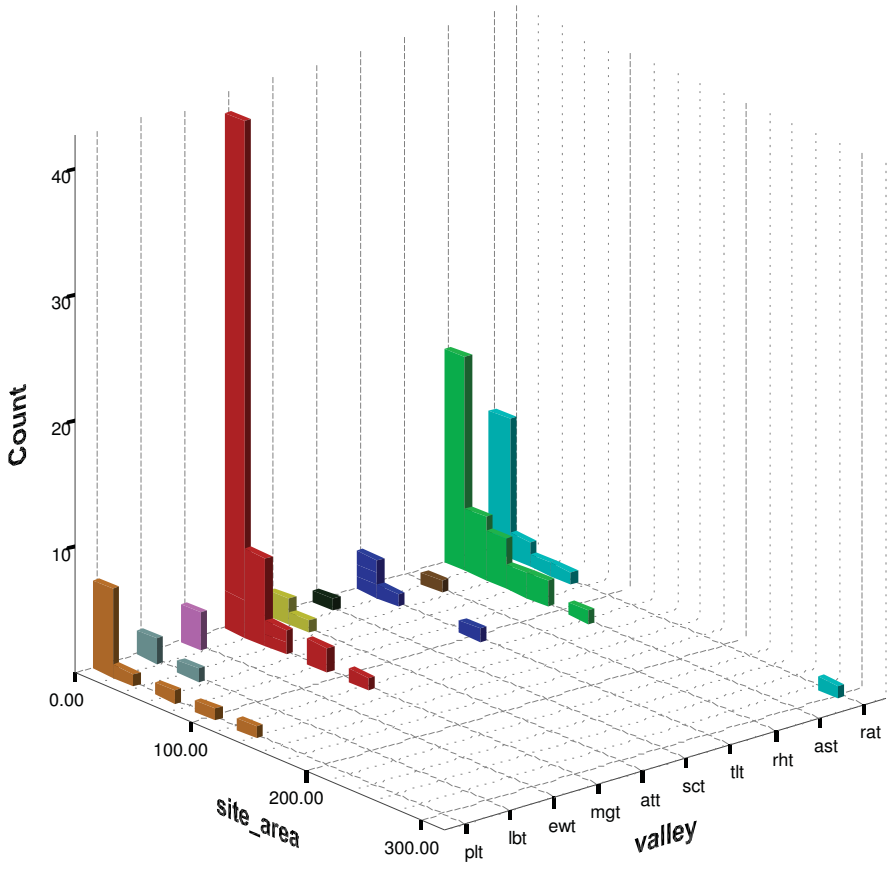


4.5.4 Size of sites

The area of each site was calculated to enable comparisons to be made. Figures wer produced multiplying the length by the depth of overhang for rock shelter and the depth by width for caves. This only produces an approximate figure as it does not take into account irregularities in the shape of caves and rock shelters. It also does not take into account the area of the site that is buried and therefore inaccessible. However, it does enable the relative sizes of the sites to be assessed.

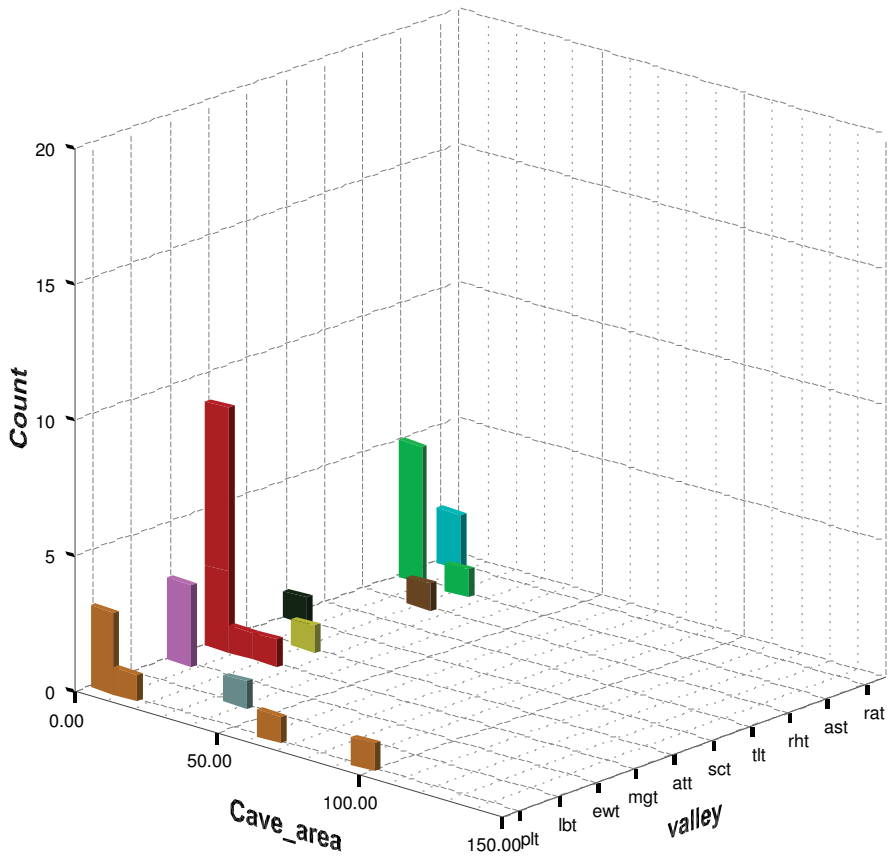
Generally most sites were fairly small with the majority of sites having an area of less than 20m^2 (**Fig 9**). There were a few sites that had areas of up to 140m^2 and one very large site with an area of 300m^2.

Fig.9 Size of sites by valley



In general the pattern for the histograms of site sizes for all the valleys was for a peak at 0-20m^2 with a rapid tail off up to 140m^2. However, this pattern oversimplifies the picture as can be seen in **Fig.10** and **Fig.11.**

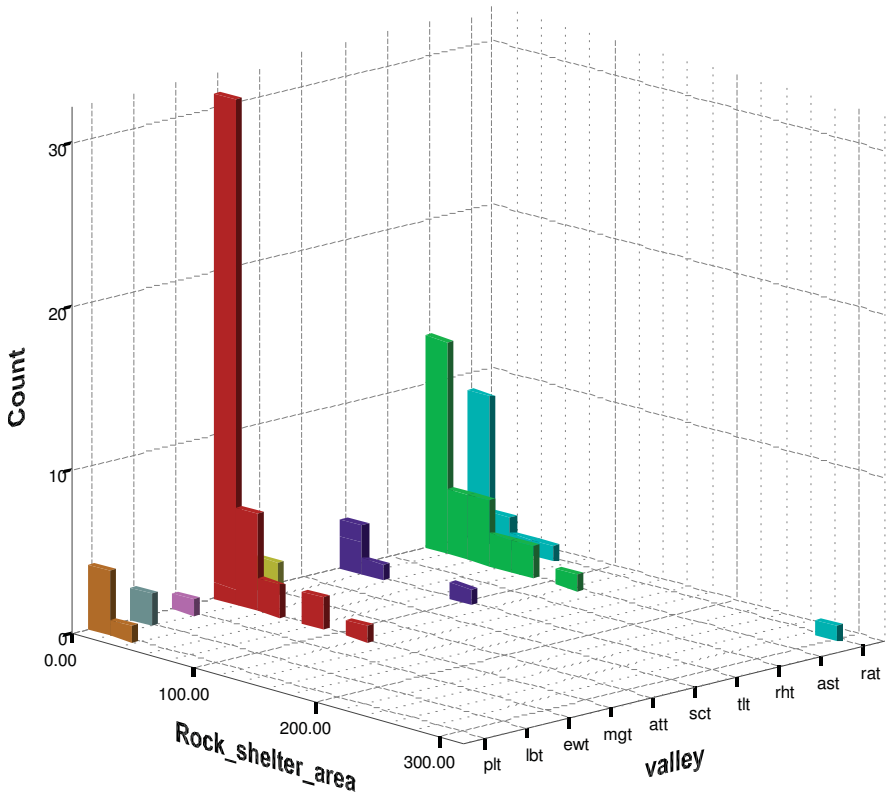
Fig.10 Size of cave sites by valley



All bar three of the cave sites were under 20m^2 in area and the three larger sites are all in the two southern most valleys Langwith and Pleasley (**Fig.10**). The rock shelters are also generally less the 20m^2 in size, although there are several larger sites up to 140m^{2,} and one very large site of 300m^2 (**Fig.11**). The larger rock shelters tend to be in the more northerly valleys including Roche Abbey Vale, Anston Stones Wood, Thorpe Common and Markland Grips.

This pattern again suggests a change in the nature of the sites from north to south across the study area, as was seen in the types of sites (**section 5.1**). This is again probably due to geological variations in the nature of the rock and the development of the valleys.

Fig.11 Size of rock shelters by valley



4.5.5 Altitude and location of sites

The altitude was measured for each site, this was recorded as meters above ordnance datum at the entrance of each site. The location for each site on the valley side was also recorded. This was a subjective assessment with each site being recorded as being at high, mid or low level on the valley side.

Fig.12 shows histograms for each valley for site altitudes. There is a wide degree of variation with sites spread over a range from 45m AOD to 130m AOD. However, within each valley the range of altitudes is more restricted; in Roche the sites are between 45m and 100m AOD while in Pleasley the sites are between 95m and 130m AOD. This also demonstrates that there is a general increase in the altitudes at which sites are located across the study area from north to south. This reflects a general increase in altitude across the landscape with the base of Roche Abbey Vale at about 45m AOD and the base of Pleasley Vale at about 95m AOD.

The distribution of site altitudes within valleys also varies; Markland Grips has close to a normal distribution, while in the Elmton and Whaley Valleys the sites were relatively evenly spread over a wide range of altitudes. In most valleys the histograms show bimodal peaks, in Anston Stones these overlapped while in Roche, Langwith and Pleasley they were separated. This could relate to the dates and means by which the sites were formed.

Fig.12 Site altitude by valley

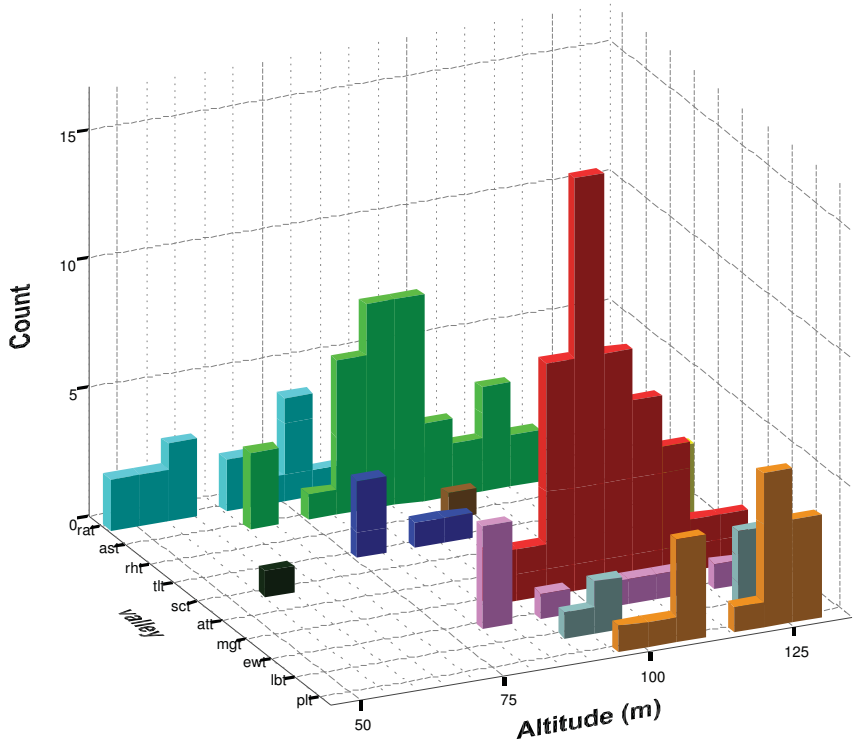
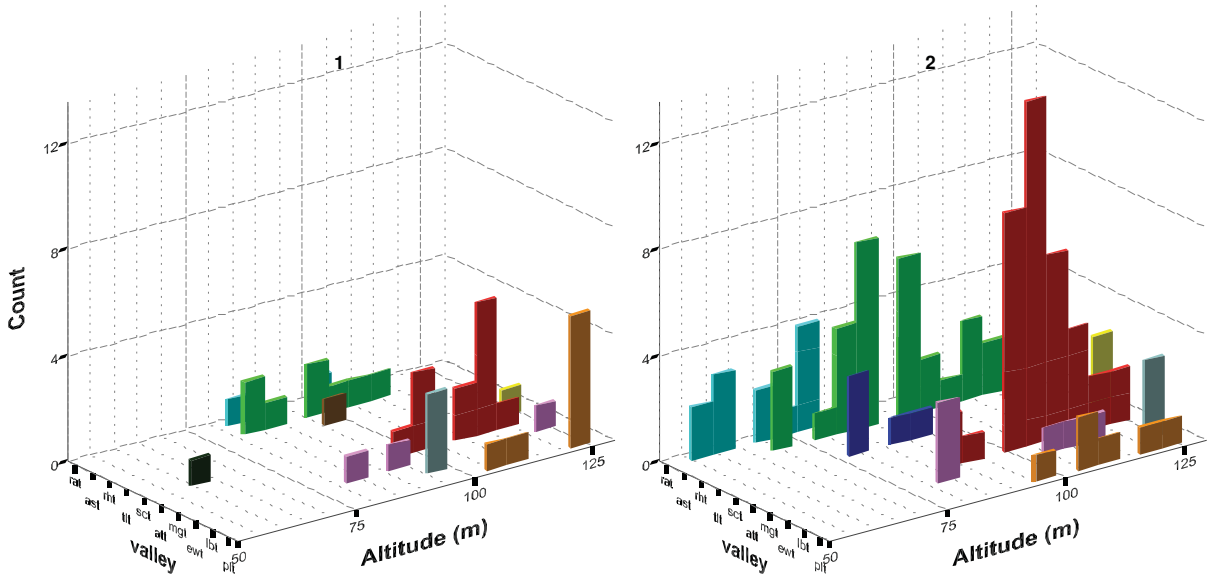
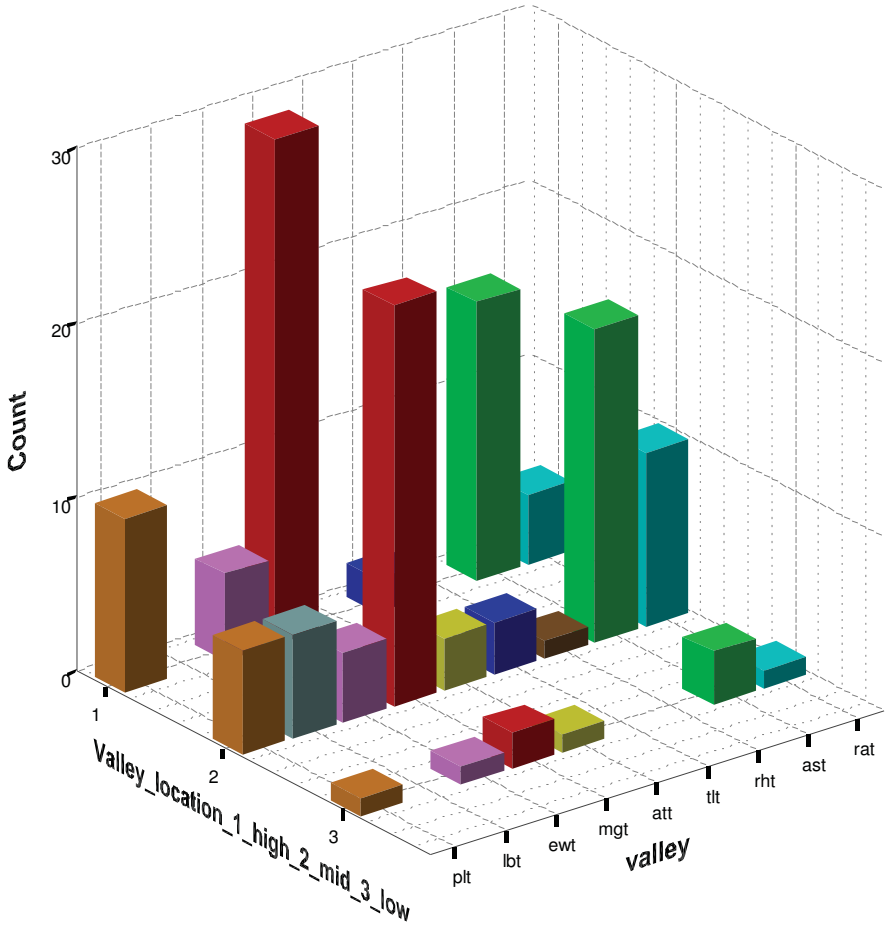


Fig.13 Site altitudes by valley for caves (1) and rock shelters (2)



A comparison can be made of the altitudes of caves and rock shelters for each valley and between valleys (**Fig.13**), these histograms show that the picture is even more complicated. In the case of caves, Anston Stones, Markland Grips and Pleasley show evidence for cave formation at two separate altitudes while no clear pattern is observable in the other valleys, this may be due to the small sample size. In the case of rock shelters any pattern is less clear. Markland Grips has close to a normal distribution, but all other valleys have rock shelters scattered over a range of heights, which in the case of Anston Stones has resulted in a histogram with four peaks. The more scattered pattern observed in the case of rock shelters is probably the result of the processes that act to form the sites. Rock shelters can form where ever a rock face is exposed on the surface, irrespective of height, while caves usually form due to the movement of water underground which relates to water table levels and subsurface hydrological flows.

Fig.14 Site location on valley side by valley



The site location as recorded on the valley side is a subjective measure but patterns are observable with most sites located at high or mid levels with few at low level (**Fig.14**).

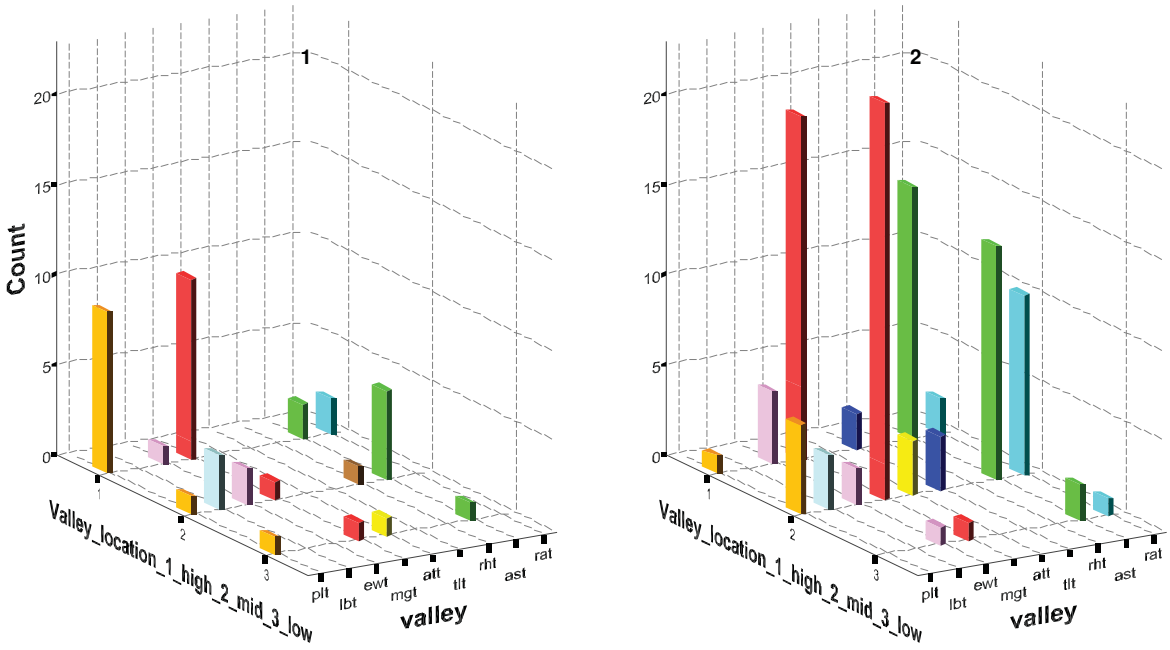
For all site types in the north of the study area (Roche, Anston and Thorpe Common) there are more sites at mid level and slightly fewer at high level. Further south, in Markland, Elmton and Pleasley there are slightly more high level sites than mid level sites.

In Langwith all the sites are at mid level although the altitude figures suggested sites were in two groups (**Fig.12**). This may reflect that the altitude of the valley base changes with all sites at mid level but unevenly distributed along the valley.

If the data is displayed for caves and rock shelters separately (**Fig.15**) it is clear that the two types of sites do not show the same pattern. It is only in Anston Stones, Markland Grips and Pleasley that there are enough caves to give a clear pattern. In these cases the caves are much more common at mid level in Anston Stones, while in Markland Grips and Pleasley they are much more common at high level. With the more common rock shelters, most show similar numbers at both mid and high level. Exceptions are found at Roche and Pleasley where rock shelters are much more common at mid level.

In the case of the caves their location is the result of a combination of factors including water movement and water table levels and faulting and fissuring. It is the combination of these underground factors that determines cave formation, while in the case of the rock shelters their locations reflect the locations of the rock faces on which they develop.

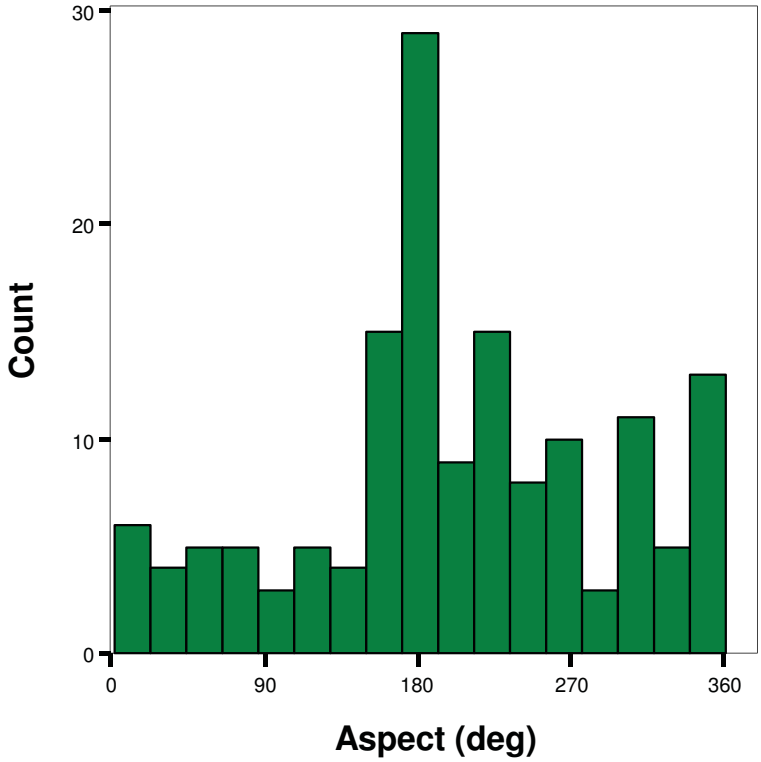
Fig.15 Site location on valley side by valley for Caves (1) and Rock Shelters (2)



4.5.6 Site aspects

The site aspect was recorded in the field as the angle perpendicular to the entrance of a cave or a rock shelter. **Fig.16** shows a histogram of the distribution of site aspects and as can be seen there is a clear preference for 180° (due south) or 360° (due north), with a series of subsidiary peaks between 220° and 300°.

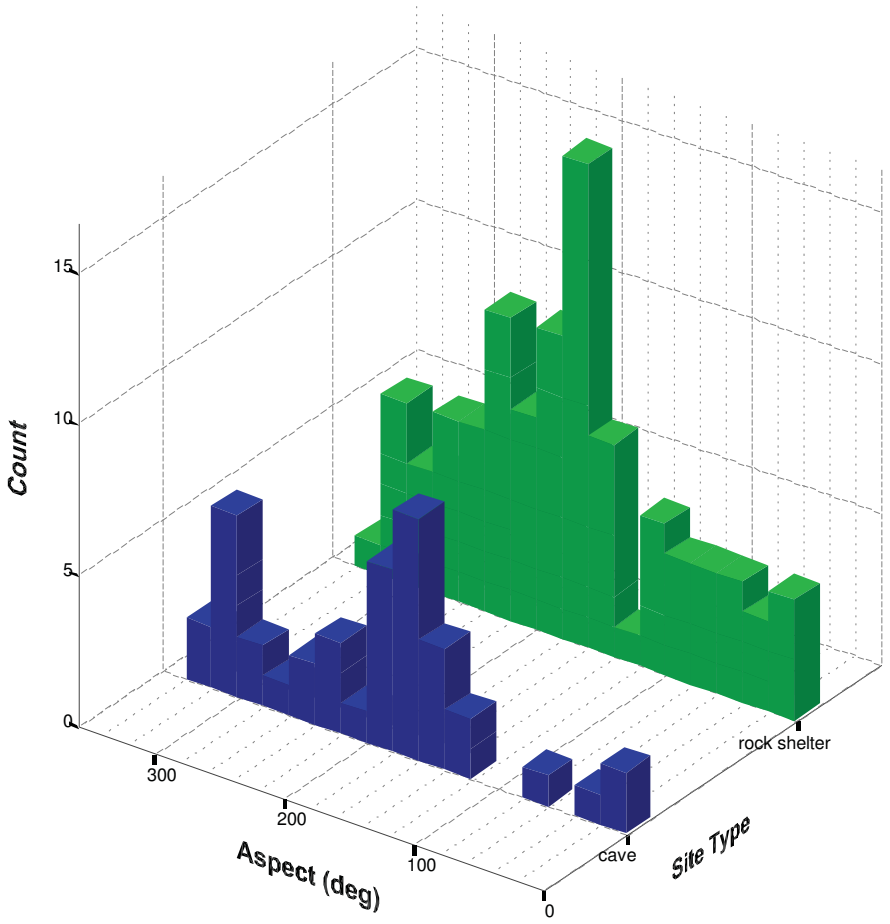
Fig.16 Site aspects for all valleys



The main factor determining this pattern is the orientation of the valleys. They are primarily aligned east-west with the main rock faces facing either north or south. The majority of sites would therefore be expected to face north and south. As these figures cover all possible sites that were identified, the preponderance of south-facing over north facing sites must be geological in origin. There would appear to be are two possible reasons for this; either sites on the north-facing rock faces are more often obscured, or the weathering processes that result in the formation of sites operate with greater effect on south-facing rock faces creating more sites. In the later case sites formed by surface weathering processes, i.e. rock shelters, might be preferentially formed on south-facing rock faces due to increased temperature ranges on the rock faces, possibly increasing freeze thaw effects. If this was the case one might expect a difference in the distribution of rock shelters and caves, as the caves were formed by sub surface ground water and faulting processes. Also if the sites were preferentially obscured this should also be visible in the caves. As can be seen in **Fig.17** the rock shelters have one large peak at 180° while the caves have two peaks one at 180° and one at 340°. The peak for caves facing south is slightly larger than that for north-facing caves, but the overall pattern suggests that caves and rock

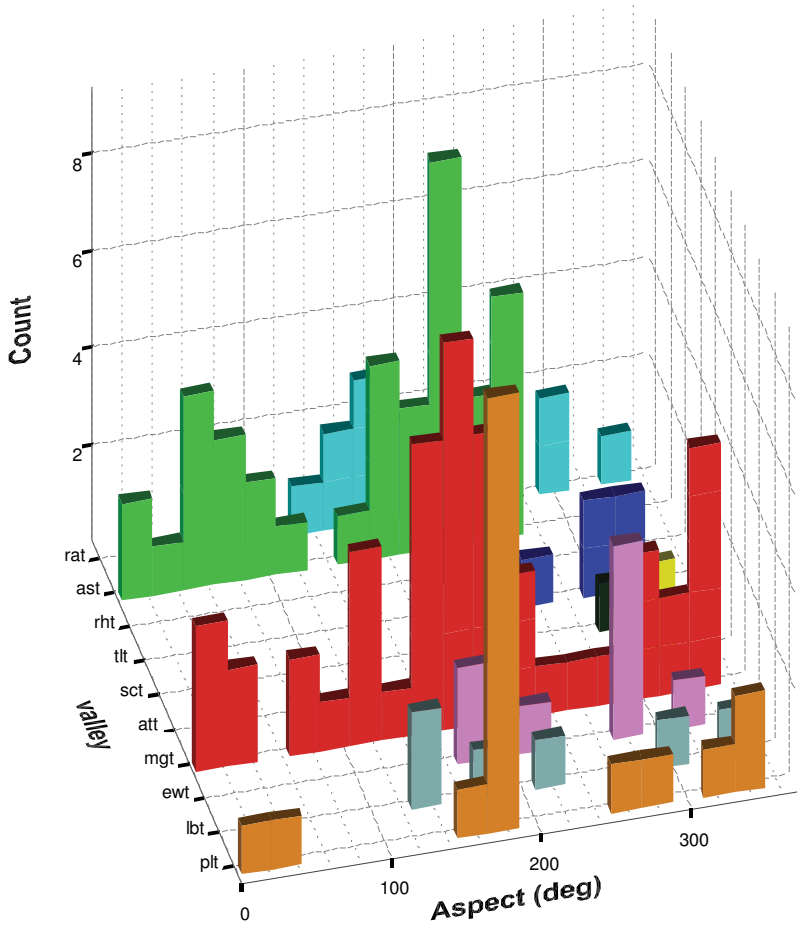
shelters are formed by different processes and that variations in surface weathering on north- and south-facing rock faces are probably primarily responsible for the greater number of south facing rock shelters.

Fig.17 Site type by aspect



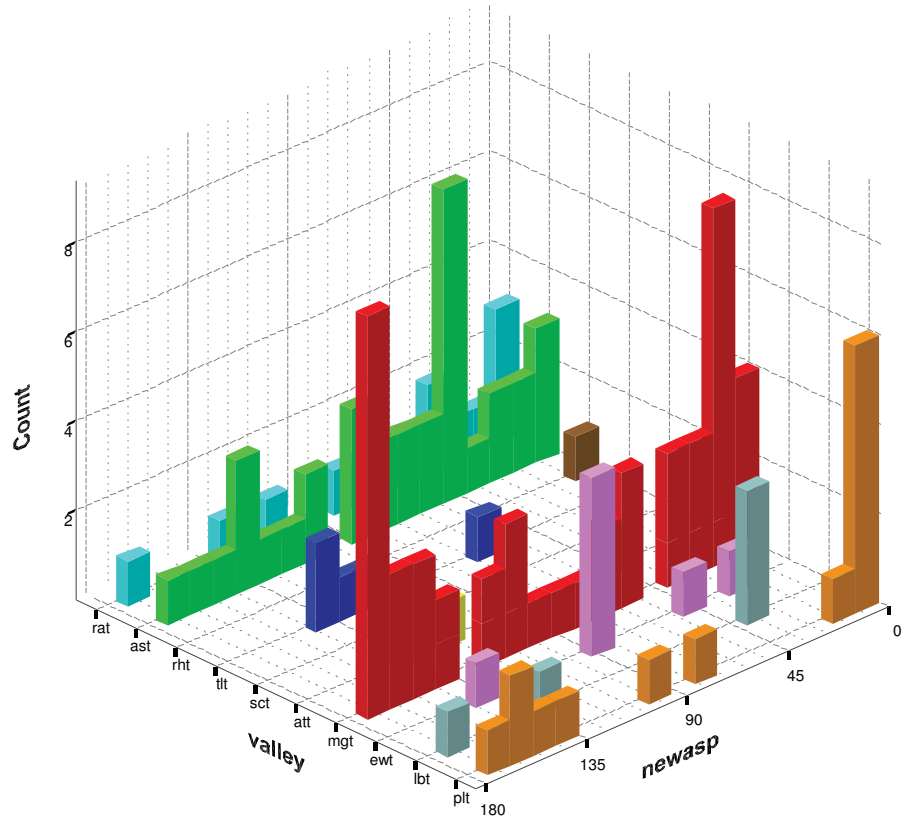
Many of the subsidiary peaks in **Fig.16** can be explained by examination of the data for each valley as shown in **Fig.18**. Although most valleys trend east-west this does vary. The main peaks on the histograms for Anston Stones and Elmton and Whaley are at 220° and 290°. This is because these valleys are generally orientated nearer to north-west south-east than east-west. This means their main south-facing rock faces have aspects of around 220° and 290°. In Thorpe Common and Lob Wells Wood the aspects range from 250° to 330°. However, in this case the valley includes sections orientated approximately east west and north south, with most of the sites in the section orientated north to south.

Fig.18 Site aspects by valley



For the model building it was necessary to modify the site aspect figures. This was undertaken to avoid the use of circular data. If this wasn't undertaken 0° and 360°, which are in fact the same aspect, appear as numerical extremes. To avoid this the data was transformed with zero set at due south and all other figures given as degrees away from due south, so north becomes 180° and east and west are both 90°. This does distort the data slightly in that there are two different aspects that produce the figure of 90°, east and west, but only one each for both 0° and 180°, south and north. However, it avoids the problems associated with circular data and as such is required for the modelling. The results of this transformation are shown in **Fig.19**. As can be seen in the histograms for most valleys there are still peaks near to 0° (south) and at 180° (north).

Fig.19 Modified site aspects with south at 0° and all sites shown as degrees from south



4.5.7 Valley slopes around sites

The slopes around each site were recorded to provide information on the detailed topographic location of each site. Measurements were taken of the valley slope above, below, left and right of each site. The measurements were taken as the angle above horizontal and represent the average for a distance of 5m to 10m away from the site, in some cases a lesser distance was used where areas were overgrown and the ground could not be seen. The angles recorded were only recorded to the nearest 5°. A greater accuracy could not be recorded as all the slopes had variations and changes in them making greater accuracy impossible. Where a vertical rock face was encountered this was recorded as 90° ignoring any overhangs from rock shelters.

A figure was calculated for the general valley slope, averaging the slopes below, left and right for each site. The figure for the slope above each site was excluded, this was often a vertical rock face of 90° and inclusion of this figure would give a false impression of the general shape of the valley slope. The figures produced should therefore be representative of the shape of the valley slopes around each site excluding the rock face on which it is located.

Fig.20 General valley slopes around sites all valleys

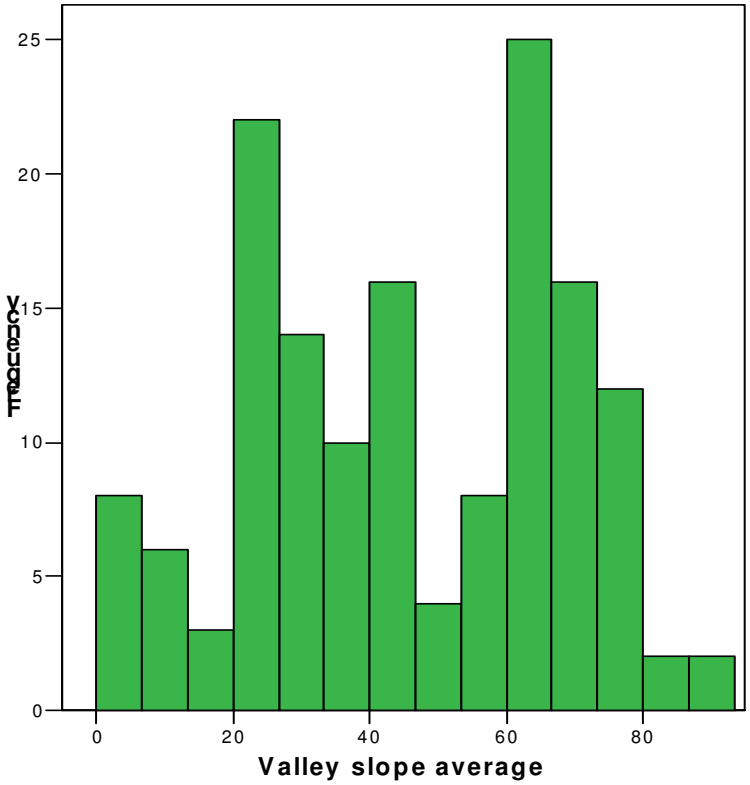
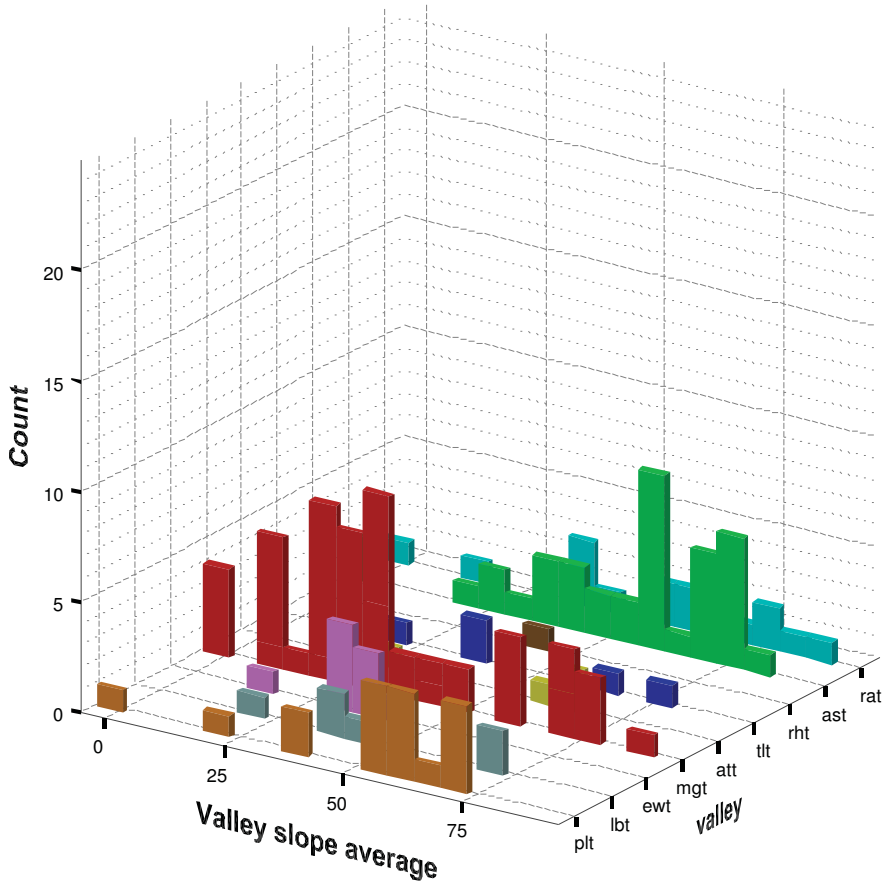


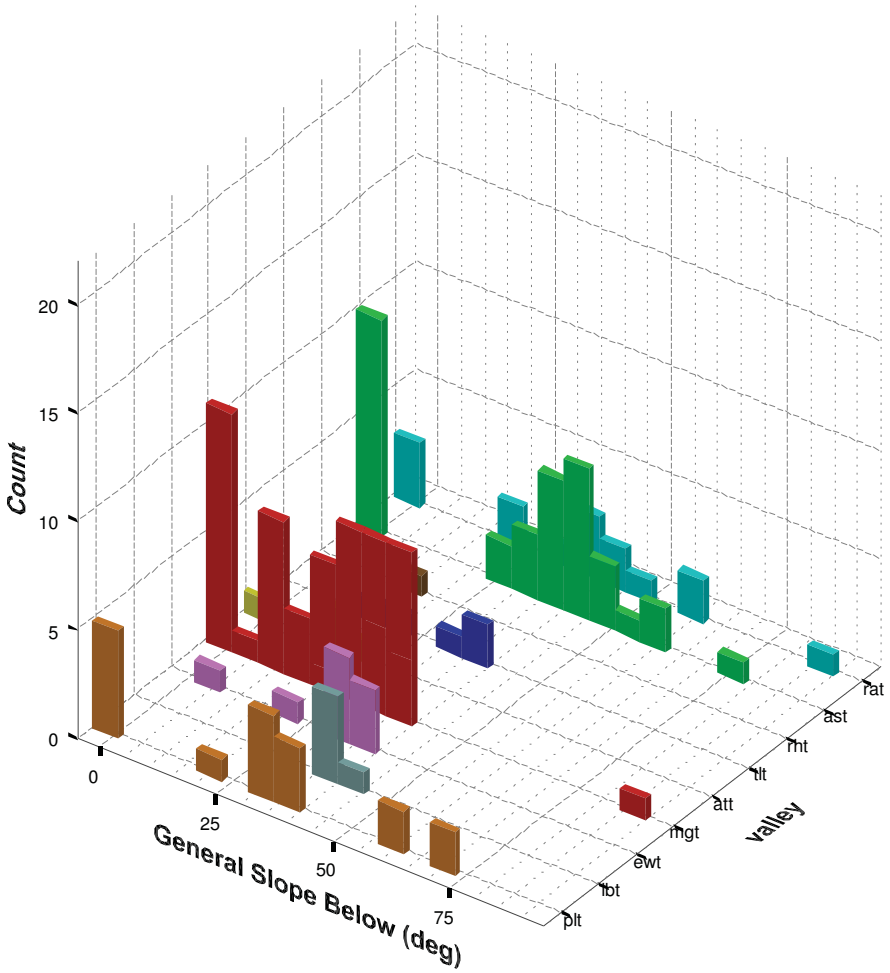
Fig.20 shows a histogram of the counts for valley slope averages for each site. At first sight the valley slope average for all sites appears to separate into three groups. A more detailed analysis (**Fig.21**) showing histograms of the valley slope average for sites by valley shows that the valleys have different slopes on their valley sides. Anston and Pleasley have high average figures with peaks over 50^{o} while Markland and Elmton have low figures with peaks around 25^{o}, the rest of the valleys have a more general spread with no clear peaks. This shows that generally there are steeper slopes below the rock faces where sites occur in Anston and Pleasley than there are in Markland or Elmton.

Fig.21 Valley slope average by valley



Looking at the data in more detail one sees that the average figures used in **Figs.20** and **21** are a simplification of what at times can be a very complex picture locally. Histograms of the valley slope below by valley (**Fig.22**) show a very different picture to that seen in **Fig.21**. The two main differences seen are that in most valleys there are several sites with no slope below, and also the slopes below sites are generally less steep than the valley slope average. In most valleys the valley slope below histograms peak at 30 - 40°, the figure is slightly less in Markland Grips at 25 – 40° with a smaller peak at 10°. The general picture that appears is that the valley slopes below sites are shallower than for the general valley sides.

Fig.22 Valley slope below by valley



The histograms (**Figs.23** and **24**) for valleys slopes to the left and right of sites show patterns that are very similar to each other but very different to the pattern observed for the slope below sites (**Fig.22**). There are many cases with vertical slopes to the left and right of the site. This is due to a number of sites where the rock shelter or cave is located in a slight recess or gully in the rock face thus resulting in vertical rock faces to the left and right of the site. These are most common in Roche, Anston Stones and Markland Grips.

Aside from the sites with vertical slopes, most sites have slopes between 30° and 40° to the left or right of them, although this is less in Markland Grips where the histograms peak for slopes of around 25° to 30° with a smaller peak at 10°. These figures are very similar to that seen for the slope below sites.

Fig.23 Valley slope left by valley

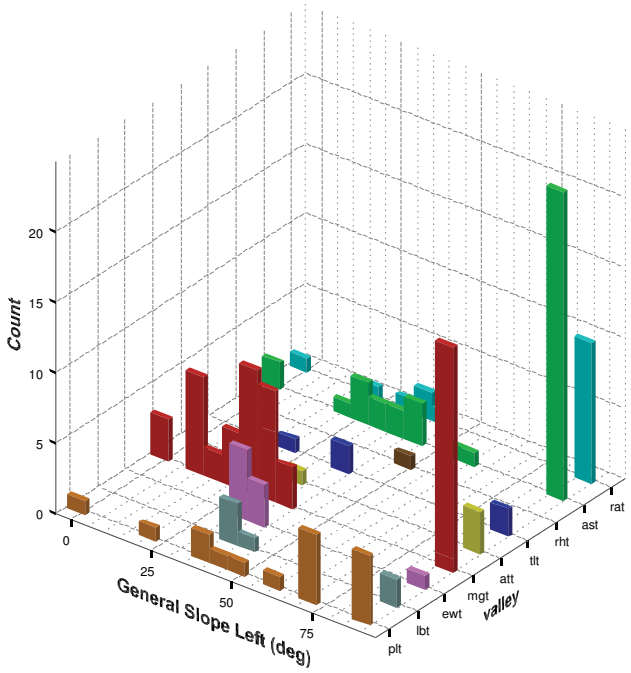
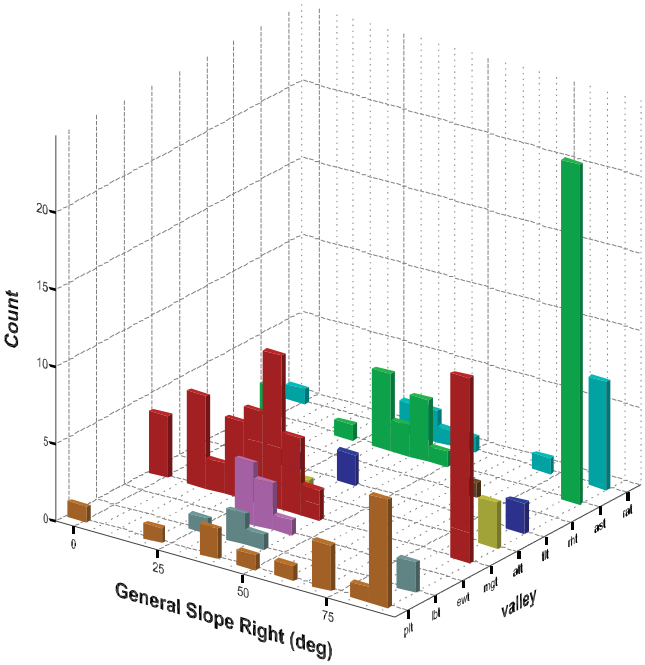


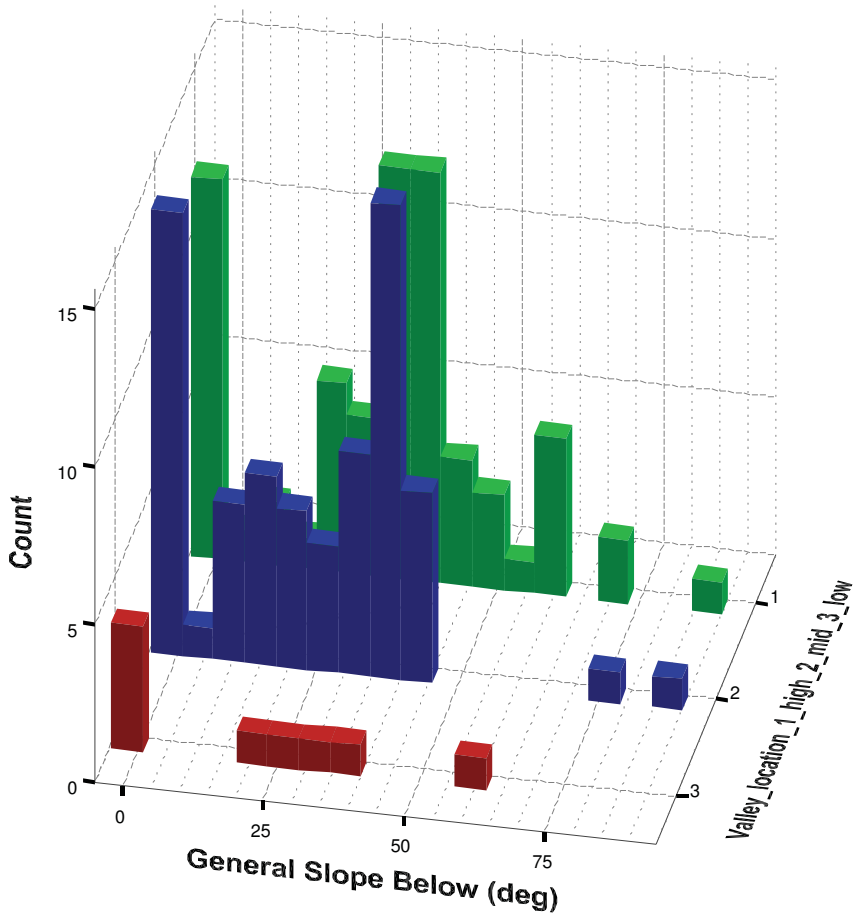
Fig.24 General valley slope to the right



The histograms for valley slopes show that for most valleys the average slope angle is between 25° and 40°. However, many sites have shallower or flat slopes below awhile many sites have vertical faces to the left and right of the sites.

In interpreting why there are many sites with no slopes below one must remember that these histograms show all cave and rock shelter sites not just those known to contain archaeology. Possible reasons for this may be geological factors during the formation of the sites, materials weathered out of sites levelling off the slope below, or archaeological factors, use of the sites resulting in deposition of material below to level off the slope, or a combination of both.

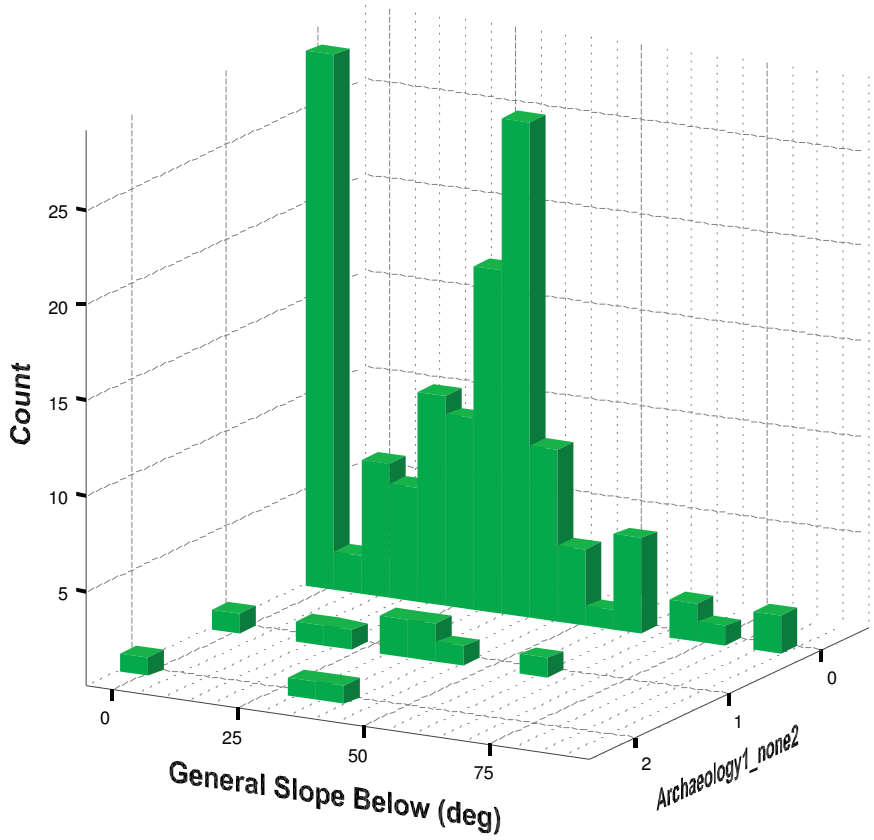
Fig.25 Valley slope below v valley location



A histogram (**Fig.25**) of valley slope below the site against valley location shows a consistent pattern across the valley side from high to low level. A similar pattern is evident for low level sites though they are relatively few in number. In all cases there are several sites with no slope below, and a peak of sites with slopes below of between 25° and 40°. This demonstrates that the sites with shallow or no slope below are not valley bottom sites.

Histograms were produced of the slope below for sites with archaeology, without archaeology and with unknown archaeology (**Fig.26**). These were produced to test whether the slope below may relate to archaeological activity. However, as the number of sites that have been excavated is very small only the broadest conclusions can be drawn. In all cases there appear to be several sites with no slope below with the main group having slopes of between 25° and 40° below. This conclusion must be considered as tentative as the addition of a few more excavated sites could change the picture completely.

Fig.26 General slope below for sites with archaeology and for sites without archaeology.

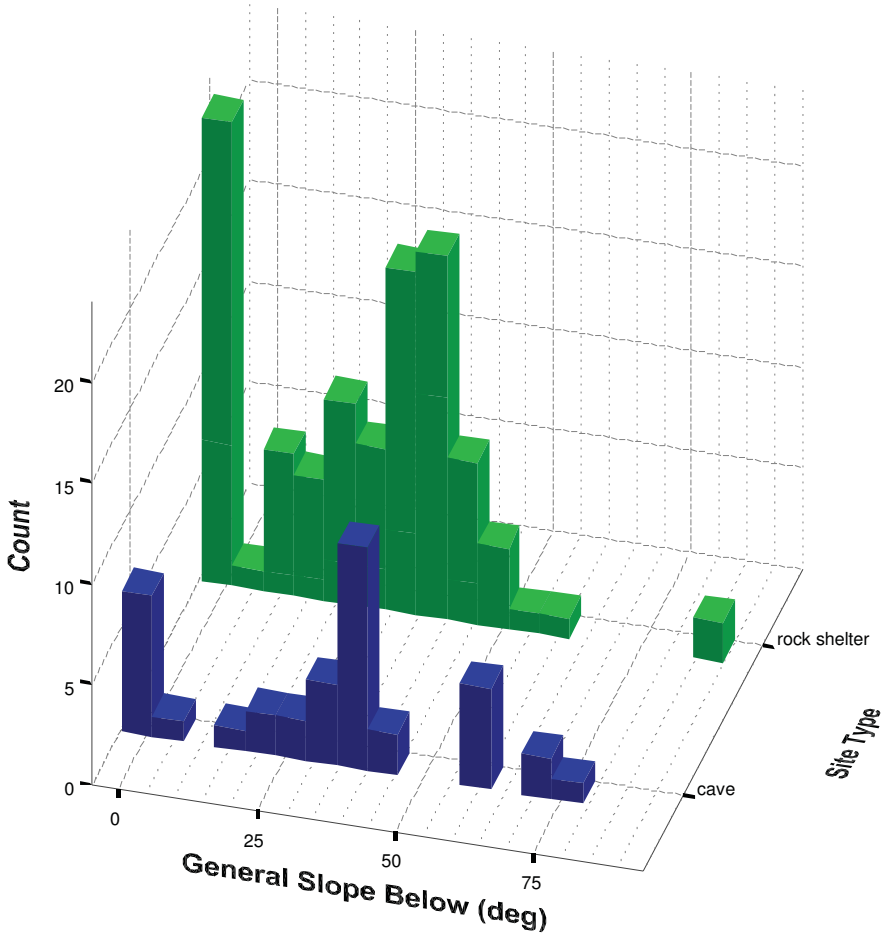


As topographic location and site use do not appear to relate to the general slope below the site it appears most likely that geological factors can in some cases result in the slope immediately below the site being levelled off. If this is so it may be that the caves and rock shelters might show different patterns for the histograms of slopes below the sites (**Fig.27**). However, the histograms for caves and rock shelters appear fairly similar, although there is a small group of caves sites with steep slopes below between 60° and 80° and one rock shelter at 90°. Also for caves sites the peak for 0° or no slope below is less pronounced than that for rock shelters.

It has therefore not been possible to determine why there are a number of sites hich lack a slope below them, but it seams likely that geological factors possibly related to

the formation of the sites may play a part, possibly material collapsing of the rock face to leave an overhanging rock shelter is spreading out below the rock shelter to form a level area.

Fig.27 General slope below for site types.



4.5.8 Site proximity to water

All the sites (except Steetley caves) lie in valleys and all of these valleys except Ash Tree Gorge have streams flowing through them today. It is impossible to determine whether any of the valleys have been dry in the past but this is probable, particularly during the last ice age.

Although Ash Tree Gorge although it is dry now it is probable that a small stream may have existed in it in the past, as it is likely to have been at least partly created by water. However, as the gorge is very small based on current topography, its potential catchment and any stream would also have been very small.

As Steetley caves were located in an area where the local topography has been heavily modified by quarrying it is not possible to say if there was a stream nearby in the past. However, as the caves were located on the top of the Magnesian Limestone plateau it may well be that there were no significant water sources near by.

A local water supply may have been important in determining which sites were utilised in the past. However, all of the site here have local water supplies except those in Ash Tree Gorge and at Steetley caves, and in both these cases human occupation is known from the sites. Streams exist today approximately 1km away from both groups of sites.

4.6 Sites with known archaeology compared to other sites

The second stage in examining the data was to compare the sites that have been investigated by excavation, to those that have not been investigated. This has been undertaken for all the different types of data that were examined in **section 4.5**. The small number of investigated sites (**Fig.3**) makes it difficult to draw definite conclusions in some cases. However, some general points can be made.

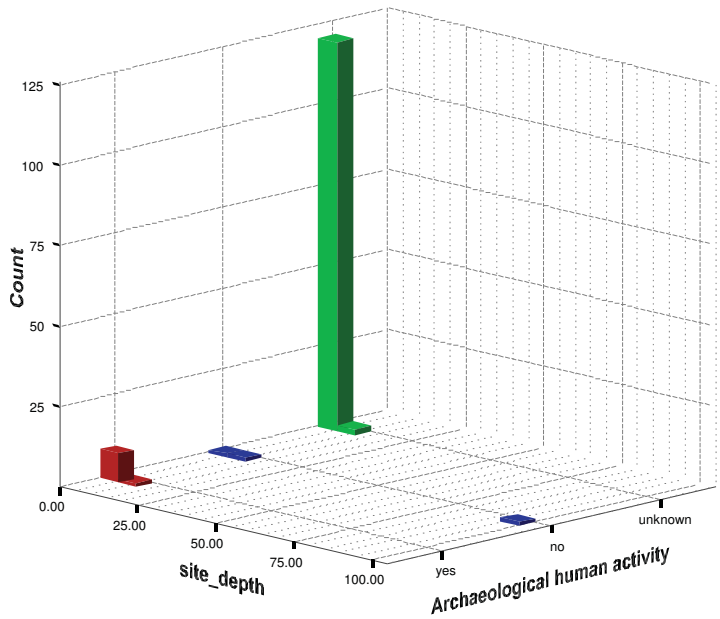
4.6.1 Size of sites

The size of sites have been compared for all sites together and for caves and rock shelters separately.

4.6.1.1 All sites

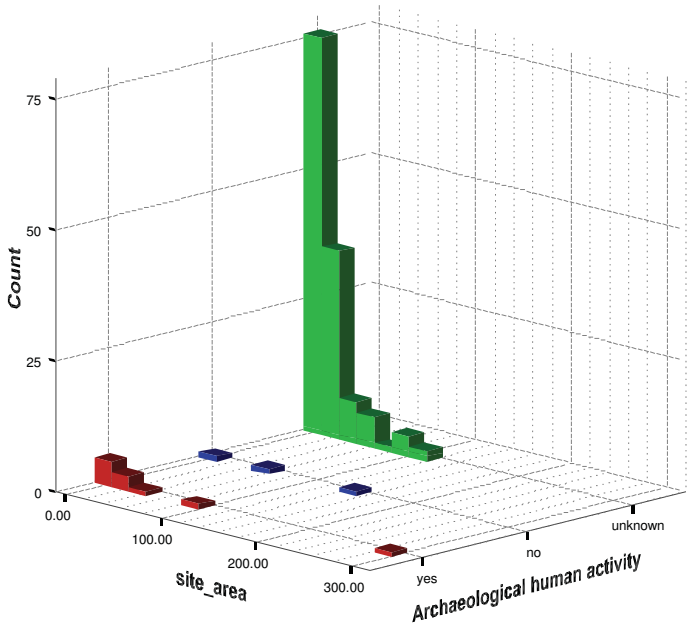
The site depth and site area were used to compare sites. The data on site depth (**Fig.28**) shows that both caves and rock shelters, were relatively shallow (generally less than10m deep) with the exception of one site (96m deep). Also the uninvestigated sites are all within the same size range as the archaeological and non archaeological sites.

Fig.28 Depth for all sites with archaeology or without archaeology



The site area were calculated by multiplying the site depth by site width (cave) or length (rock shelter) (**Fig.29**). With the exception of one site most sites were relatively small, less than 100m^2. There was a general overlap of sizes for all archaeological, non archaeological and uninvestigated sites and the one large site did contain archaeological remains.

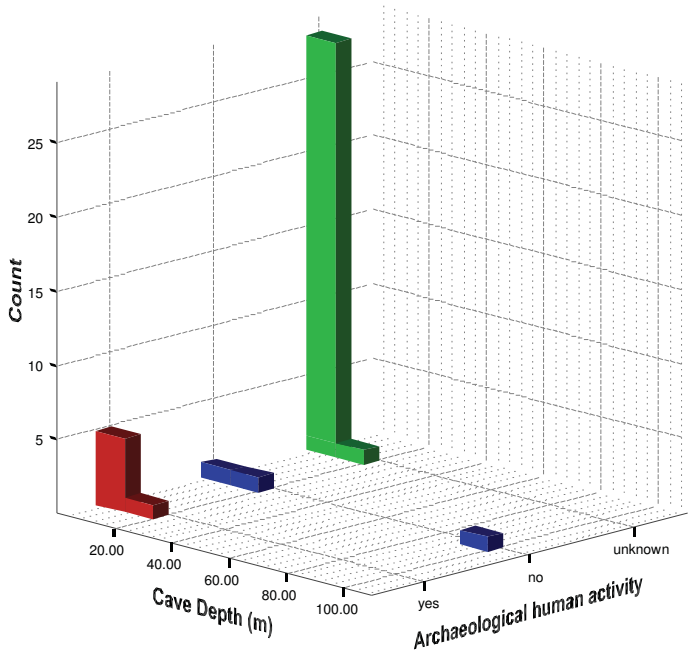
Fig.29 Area for sites with archaeology or without archaeology



4.6.1.2 Caves

Cave depth, entrance size and cave area (undercover) were used to identify pattern of size in relation to archaeological remains. **Fig.30** shows that all the caves were relatively shallow (less than 20m deep) except one which was 96m deep. With this exception there was no obvious preference for caves of a specific depth that differed to the general population of caves.

Fig.30 Depth of caves for sites with archaeology or without archaeology



The entrance size (**Fig.31**) was calculated by multiplying the cave entrance height by the cave entrance width. When comparing the known with non archaeological caves there is the suggestion of some difference, with the archaeological caves having smaller entrances, around 5m^2, while the unoccupied sites have larger entrances of up to 14m^2. There would therefore appear to be a preference for specific sized cave entrances. With the uninvestigated caves the majority of entrances are smaller than the average size for archaeological caves but the majority are within the size range for archaeological caves. There were also four unexcavated caves with much bigger entrances of up to 32m^2.

The areas of cave sites were calculated by multiplying the depth by the width. Again the caves with archaeology tended to be smaller that those without archaeology (**Fig.32**). Archaeological caves were up to 45m^2 in area while non archaeological caves were up to 145m^2 in area.

Fig.31 Cave entrance size for sites with archaeology or without archaeology

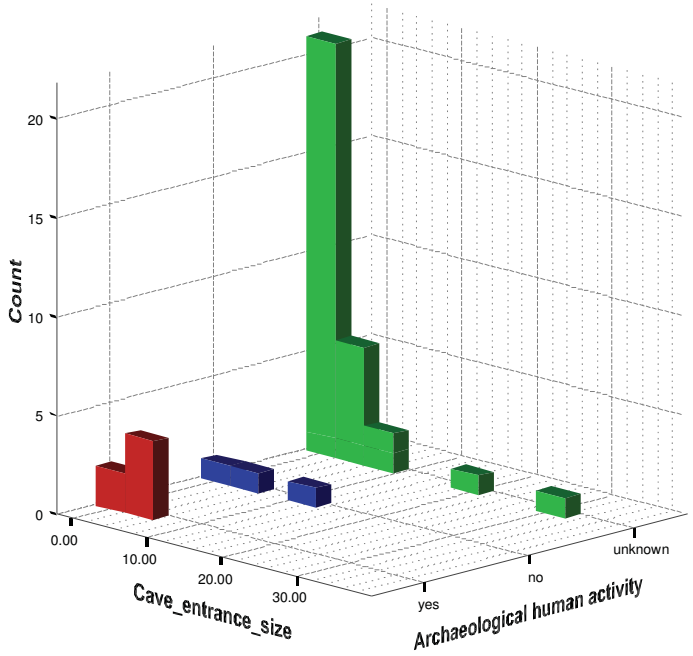
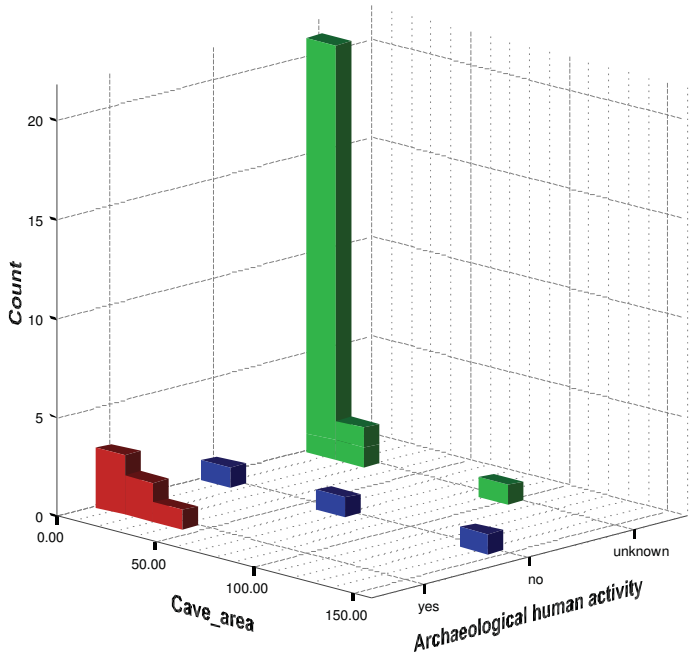


Fig.32 Areas of caves for sites with archaeology or without archaeology



In general it does appear that the size of a cave affects the likelihood that is will contain archaeological remains. The smaller, possibly more sheltered caves, having

a greater chance of containing archaeological remains, they also tend to have entrances of around 5m^2.

4.6.1.3 Rock shelters

The depth, length and area of rock shelter were use to compare these sites.

Fig.31 shows the depths of rock shelter sites. Comparing the known archaeological rock shelters with the non archaeological rock shelters suggests that there may have been the non archaeological rock shelters are all shallow while the archaeological rock shelters include the full range of depths of investigated sites. This may suggest that where available deeper rock shelter might be preferred though a larger sample of investigated sites would be required to confirm this. All bar one of the uninvestigated rock shelter fall within the range seen for the archaeological rock shelters.

When comparing the lengths of archaeological rock shelters with the non archaeological rock shelters (**Fig.32**) there again appears to a be a preference for the larger rock shelters. Of the sites that have been investigated the non archaeological rock shelters are all in the smallest size group while the archaeological rock shelters cover the full size range of investigated sites, including the two longest sites identified in the survey. All of the uninvestigated sites fall within the range of the known archaeological rock shelter sites.

The final measure of size that was examined for rock shelter sites was the area under cover. This was calculated by multiplying the length by the depth for the site. Again, for the investigated sites, the non archaeological sites are all in the smallest size group while the archaeological sites are spread over the full size range. The uninvestigated sites all fall into the range of the archaeological sites.

Fig.31 Depth of rock shelters sites with archaeology or without archaeology

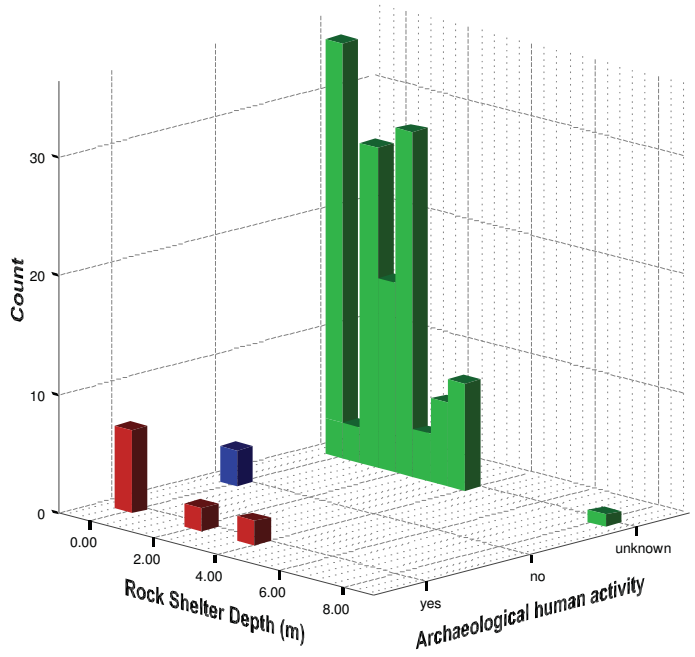


Fig.32 Length of rock shelters sites with archaeology or without archaeology

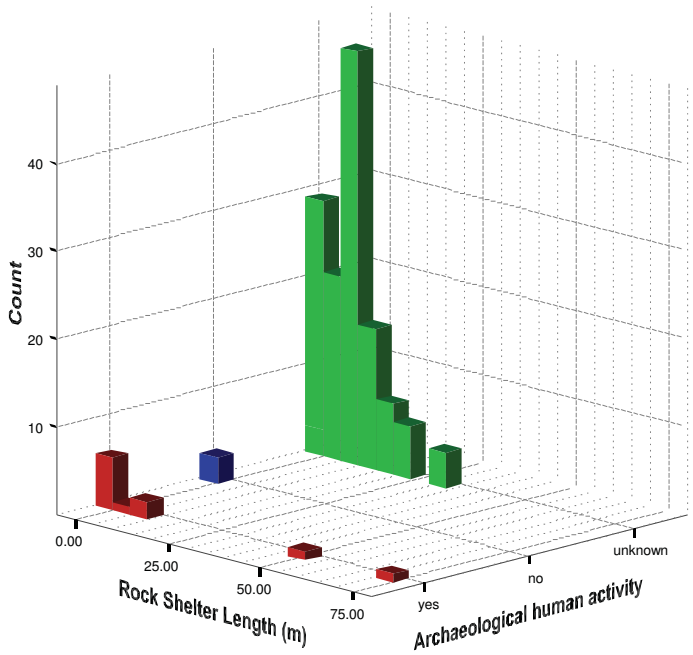
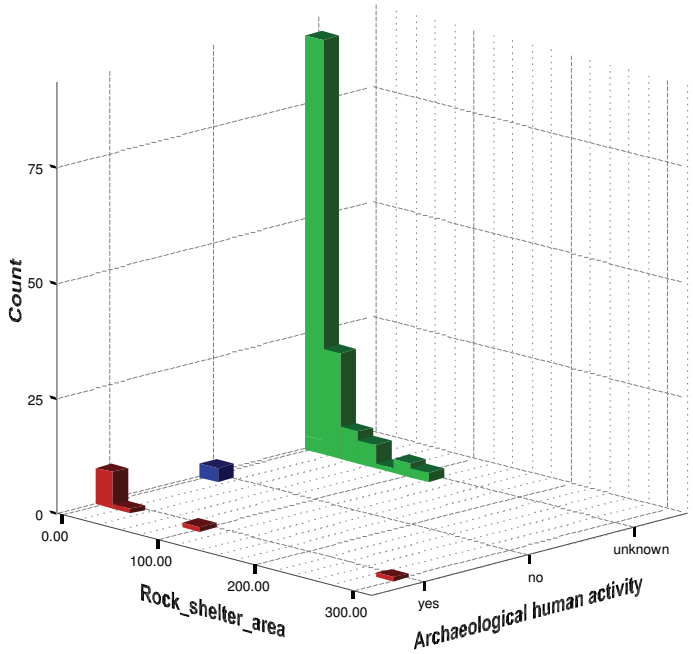


Fig.35 Areas of rock shelters sites with archaeology or without archaeology



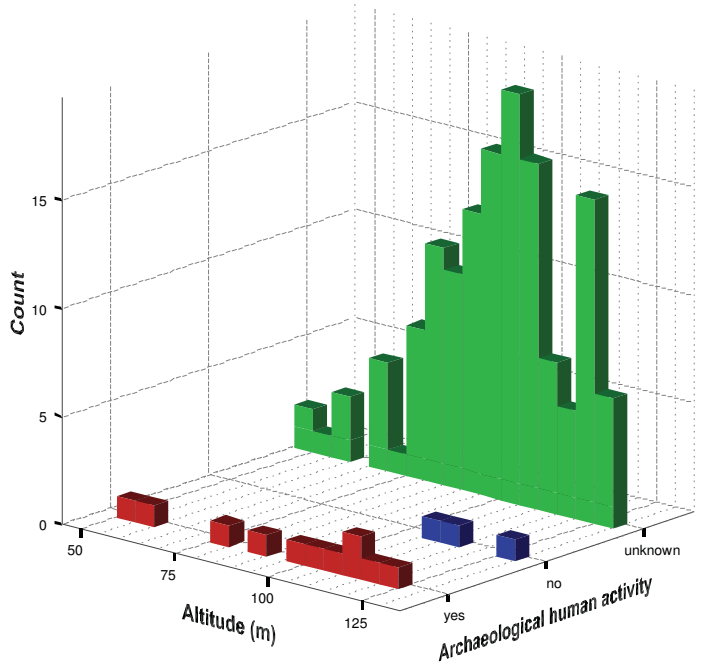
For the rock shelters where large sites have been investigated they have all been used, possibly suggesting a preference for large rock shelters where they are available. This is in contrast to the cave sites discussed above where the smaller

sites appeared to be the preferred archaeological sites. However, there is a large overlap in sizes between the archaeological an non archaeological sites and the vast majority of uninvestigated sites fall into the size ranges of both archaeological and non archaeological sites. In drawing these conclusion it should be emphasised that the sample of uninvestigated sites is very small and a larger sample would be needed to confirm these conclusions.

4.6.2 Altitude and location

In comparing the altitude of archaeological and non archaeological sites it should be remembered that the analysis of the altitude of sites (**section 4.5.5**) identified that the main factor affecting on the altitude of a site was the valley in which it was located. This is because the altitude of the valleys increases towards the south. Examination of (**Fig.36**) shows that although the distribution of archaeological and non archaeological sites overlap, the non archaeological sites appear to tend to higher altitudes. However, this is due to the absence of archaeological material in caves in Pleasley Vale which is at the southern end of the heritage area and therefore at a higher average altitude.

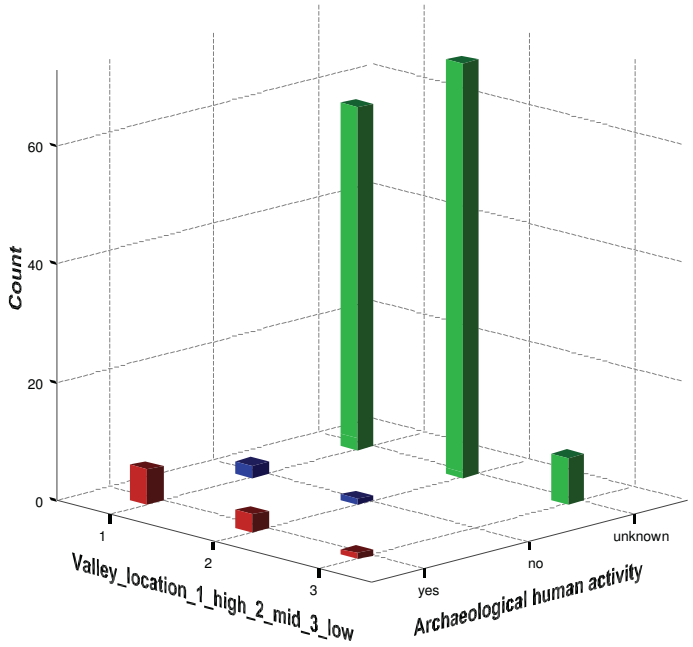
Fig.36 Altitude for sites with archaeology or without archaeology



A comparison can be made of the valley location of the sites through their allocation to high, mid or low on the valley side, **Fig.37**. This shows that for the investigated and uninvestigated sites the majority are at a high or mid level on the valley side. There is a difference in that for all the investigated sites there are more sites located at a high level rather than a mid level by a factor of near to 2 to 1. However, for the uninvestigated sites there are slightly more at mid level than high level. This could suggest that the investigated sites are not a representative sample of the whole population of sites. Why this should be is unclear but it may be due to the visibility of

sites or ease of access. Visibility may be greater at high rather than mid level and the high level sites may therefore have been more likely to be subject to investigation. High level sites may have been easier to access from above, when they were investigated, although this was not the impression gained during the field survey.

Fig.37 Valley location for sites with archaeology or without archaeology



4.6.3 Aspect and light zone

The aspects of each site and how this related to their respective valleys was discussed extensively in **section 4.5.6**. It was identified that the aspect of the sites was largely determined by the orientations of the valleys.

A comparison of the aspects for archaeological, non archaeological and uninvestigated sites (**Fig.38**) shows that the archaeological and non archaeological sites generally appear to be located in areas where there are peaks in the histogram for uninvestigated sites, e.g. 180° and 300°. Suggesting that the investigated sites show the same general pattern as the uninvestigated sites.

When the aspect is modified with south at 0° and all other aspects given as distance from south (**Fig.39**), all the investigated sites are within the range of uninvestigated sites. There may be some difference in the preferred aspect for the archaeological and non archaeological sites. However, the number of investigated so small that it is difficult to determine whether this is a real pattern or a result of the small sample size.

Fig.38 Aspect for sites with archaeology or without archaeology

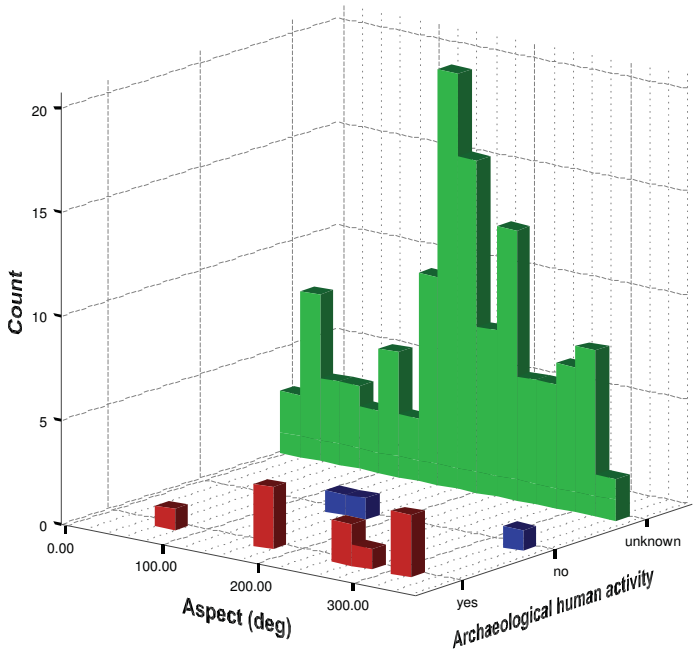
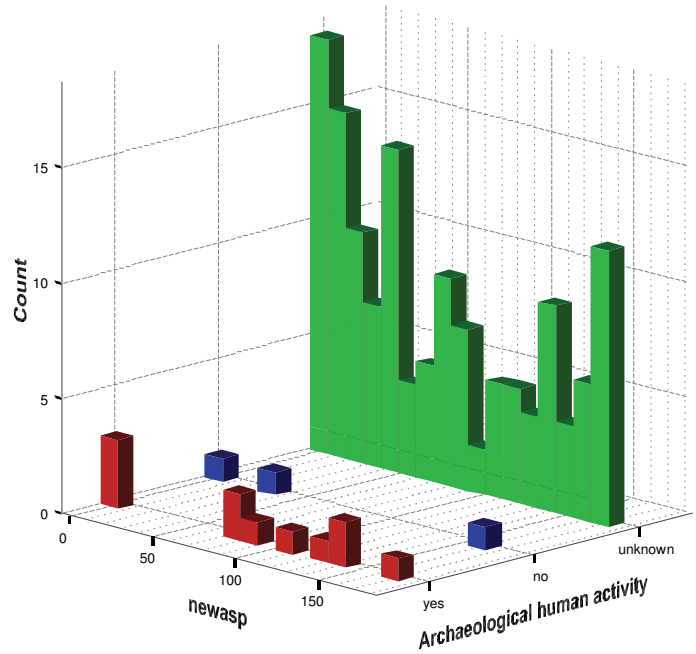


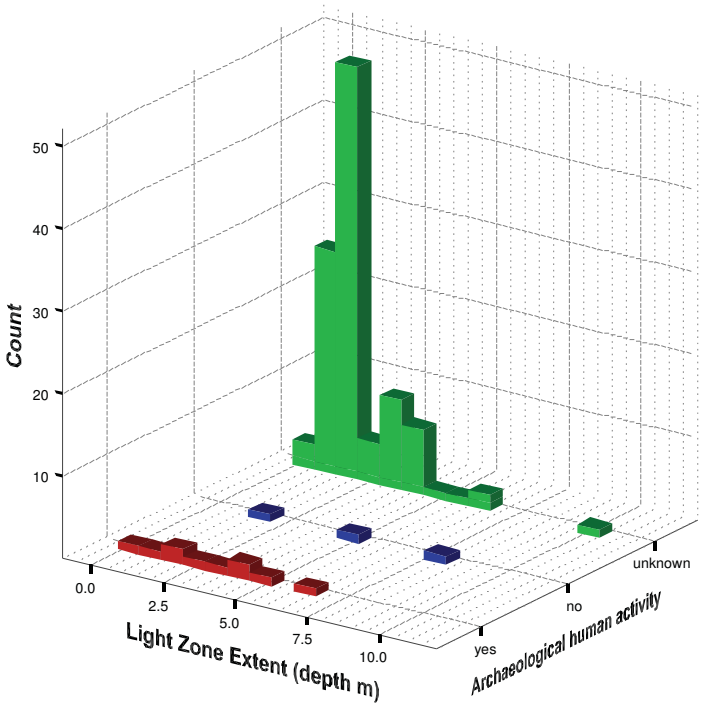
Fig.39 Modified aspects for sites with archaeology or without archaeology



An examination of the light zone within caves and rock shelters suggests that archaeological, non archaeological and uninvestigated sites all show a similar range

of light zone depths (**Fig.40**). This suggests that light zone depth was not an important factor.

Fig.40 Light zone for sites with archaeology or without archaeology



4.6.4 Valley slopes around sites

Various measures were recorded for the valley slopes around each site, as was explained in some detail in **section 4.5.7**. These included the slope above the site, the slope below the site, the slopes to left and right and the slope inside the cave or rock shelter.

A comparison of the valley slope above sites shows that the histogram patterns observed for archaeological, non archaeological and uninvestigated sites are very similar (**Fig.41**), with the highest number of sites having vertical slopes (i.e. rock faces) above them.

In the case of the valley slope below sites, there were some differences between the different types of sites (**Fig.42**). All of the site types had a similar range of slopes below, but whereas the uninvestigated sites had very clear peaks in the histogram at 0^{o} and 35^{o} this was not seen in the archaeological sites where there was a more general spread slope angles with a small peak at 35^{o}. However, with the small sample size for archaeological sites one should be careful not to over interpret this data.

Fig.41 General slope above for sites with archaeology or without archaeology

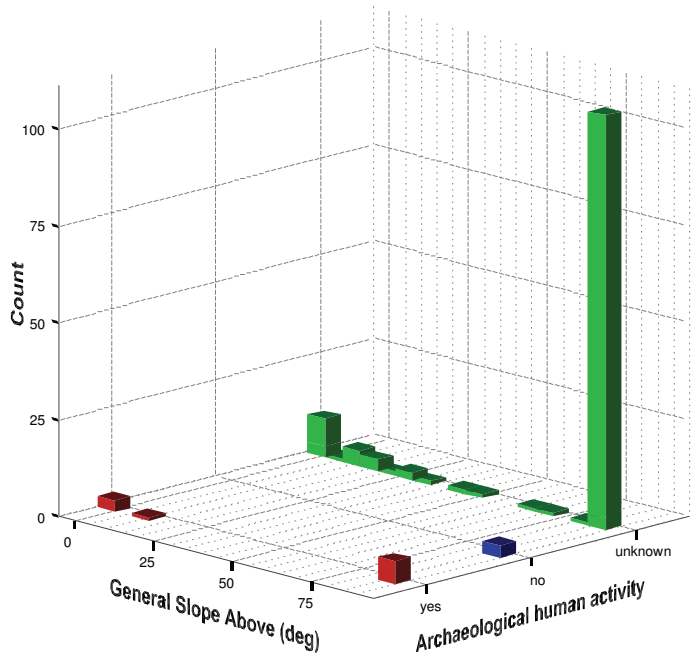
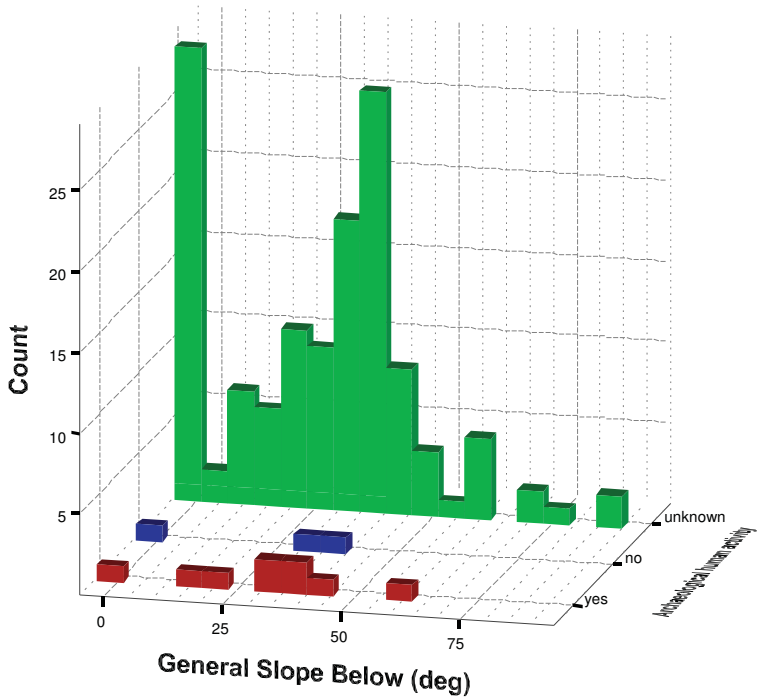


Fig.42 General slope below for sites with archaeology or without archaeology



The valley slopes to the left (**Fig.43**) and the right (**Fig.44**) for archaeological, non archaeological and uninvestigated sites showed similar histogram patterns for all types of sites and for both the left and right slopes.

Fig.43 General slope to the left for sites with archaeology or without archaeology

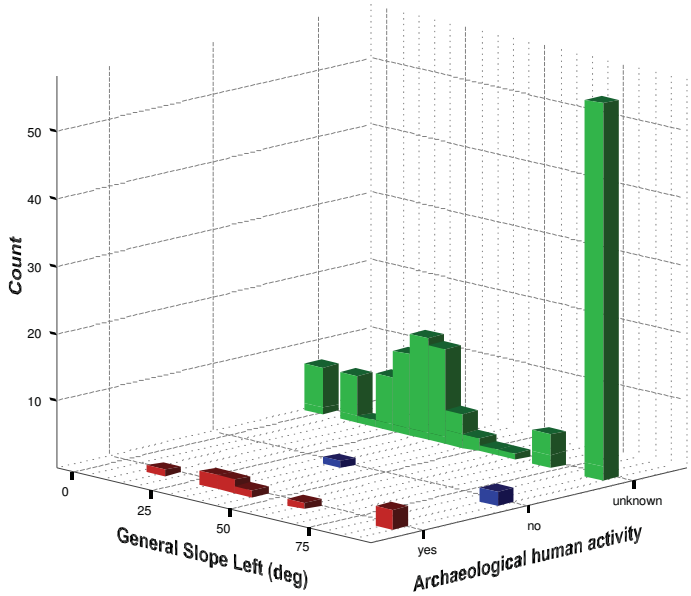
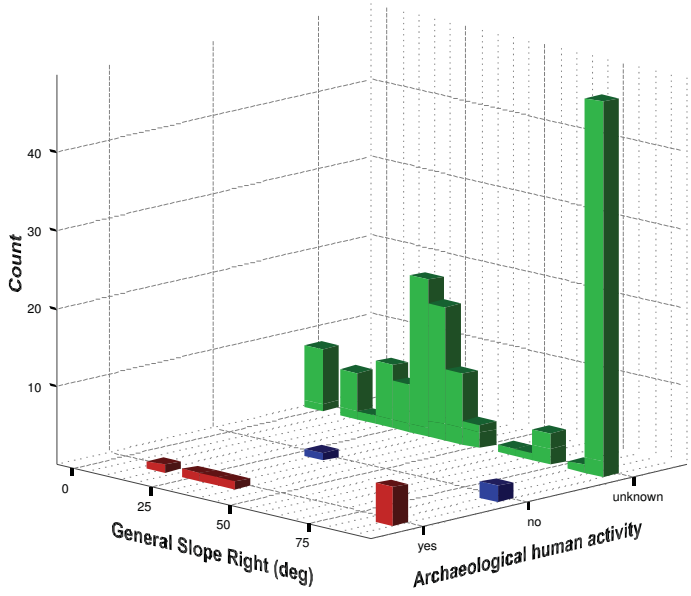
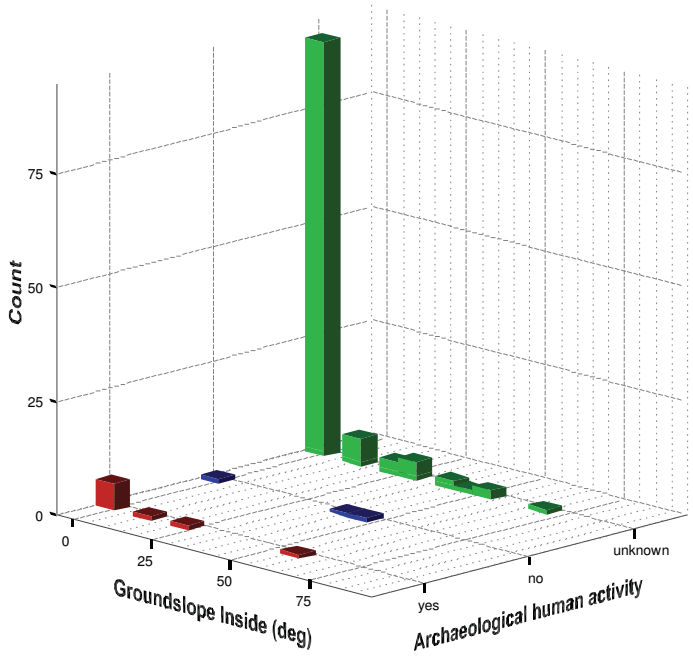


Fig.44 General slope to the right for sites with archaeology or without archaeology



In the case of the ground slope inside caves and rock shelters (**Fig.45**) the vast majority of sites had level ground surfaces, although a few sites had sloping surfaces. This pattern was observed for both archaeological and uninvestigated sites. This may well be the case for the non archaeological sites as well but the small number of these sites means that this could not be confirmed.

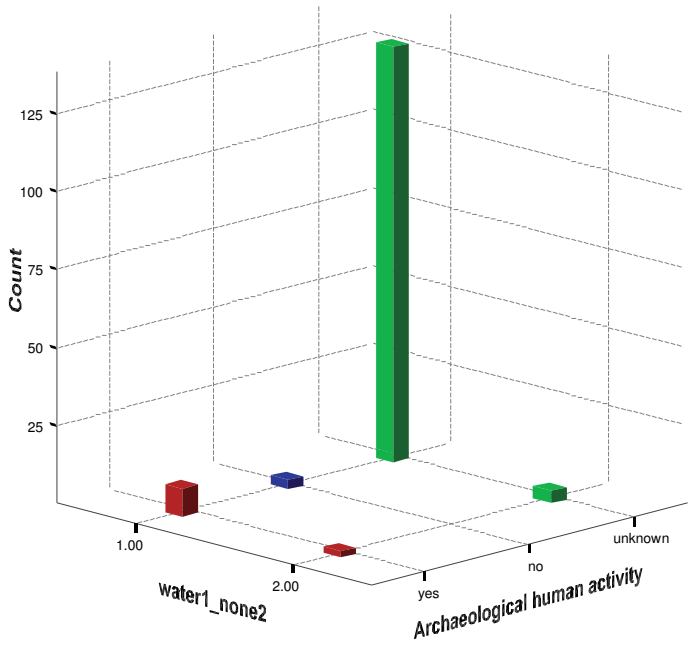
Fig.45 Ground slope inside for sites with archaeology or without archaeology



4.6.5 Proximity to water

The proximity of the sites to water was discussed in **section 4.5.8** where it was noted that almost all the sites are currently near to a source of water. This is not overly surprising considering that the vales and gorges were created by water. For both the archaeological and uninvestigated sites the same pattern is observed, the vast majority of sites are in proximity to water with a few that are not. It is important to remember that this data records the current proximity to water which may have changed over time, most specifically in the case of Ash Tree Gorge which was probably made by water and thus is likely to have had running water in it at some time in the past.

Fig.46 Proximity of water for sites with archaeology or without archaeology



4.6.6 Characteristics of the archaeological sites

This brief comparison of archaeological, non archaeological and uninvestigated sites shows that there are few obvious major differences in the topographic or environmental location between those sites that are archaeological, non archaeological or uninvestigated. A few observations can be made.

Archaeological cave sites tend to exclude the long deep caves. They also tend to have entrances around 5m^2, avoiding the very large or small entrances.

The archaeological rock shelters cover the full range of sizes identified whereas all the non archaeological rock shelters identified were small. This possibly suggests that large rock shelters were more likely to have been used by humans in the past.

There is no identified relationship between altitude and archaeological occupation though there may be relationships within valleys that are obscured by the varying altitude of the valleys.

Investigated archaeological and non archaeological caves tend to be high on the valley side. However, the highest number of uninvestigated sites are located at mid level on the valley side. This demonstrates that previous excavations have focused disproportionately on high level sites, possibly for reasons of easier access/visibility.

There is the suggestion that for uninvestigated and non archaeological sites site aspects tend to be towards the south while for archaeological sites it tends to be towards the north.

There is no identified relationship between archaeological sites, non archaeological sites and light zone extent.

There was no significant variation in the distribution of slope angles for archaeological, non archaeological and uninvestigated sites, with the exception of

slopes below sites where a difference between the slope angles for archaeological and uninvestigated sites was identified. The histogram for slope below for uninvestigated sites had peaks at 0^{o} and 35^{o} while the histogram for archaeological sites showed a spread over the whole range with a small peak at 35^{o}. The small sample size of investigated sites should, however, be taken into consideration.

As virtually all the sites are near to water there is no identified relationship between water and site use.

4.7 The Predictive Model

Predictive modelling is a powerful tool for landscape archaeology and cultural resource management that has been deployed in many studies over the last decade (for examples, see papers in Allen et al., 1990, and Westcott & Brandon, 2000). The essence of predictive modelling in landscape archaeology is to identify combinations of environmental variables that together are correlated with (and hence predictive of) the occurrence of archaeological sites.

The small number of investigated sites posed a significant problem in producing the predictive model. **Table 2** show figures for the number of sites identified, the numbers with known excavations and the numbers with or without archaeology present. **Table 3** gives details of the excavated sites. Fissures were excluded from the predictive modelling as none have been excavated and there was therefore no comparative data on which to base the model.

Table 2 Numbers of sites with and without archaeology

	frequency	percentage of total known sites	percentage of investigated sites
Total sites	151	100%	
Excavated sites	17	11%	100%
Archaeology present	11	7%	65%
Palaeolithic archaeology present	6	4%	35%
Mesolithic archaeology present	5	3%	29%
No archaeology present	3	2%	18%
Known excavations but no details	3	2%	18%

Note: Fissures were excluded from this analysis as none have been excavated

As can be seen in **Table 2** the excavated sites represent a small percentage (11%) of the total number of known sites. There was limited information for three excavated sites, so only 7% of the total number of sites are known to contain archaeology.

Table 3 Presence of archaeology and palaeontology in excavated sites

Site	Archaeology [1]	Palaeolithic	Mesolithic	Palaeontology [2]
RAT10	yes	yes	yes	no
AST20	yes	yes	no	yes
TLT5	yes	no	yes	no
TLT17	yes	yes	no	no
SCT1	yes	no	yes	yes
ATT12	yes	yes	yes	yes
MGT52	?	?	?	?
MGT55	?	?	?	?
MGT77	yes	no	no	no
MGT78	?	?	?	?
MGT81	no	no	no	no
MGT82	yes	no	no	no
EWT6	yes	no	no	no
EWT13	yes	yes	yes	no
LBT7	yes	yes	yes	yes
PLT5	no	no	no	yes
PLT30	no	no	no	yes

[1] - archaeology covers all periods

[2] – palaeontology covers bone deposits with no archaeological activity

To produce a reasonable sample size for the archaeological caves and rock shelters it has been necessary to use all sites known to contain archaeology as one group and not to subdivide by periods.

Some of the sites recorded in the survey had to be excluded from the modelling due to an absence of data on some variables. This was because some data could not be recorded leaving incomplete data sets in some cases.

The option of producing separate models for caves and rock shelters was considered. This was done for the caves where there were 6 caves out of 43 that had been investigated, a sample of 14%. However, as there was no data on investigated non archaeological rock shelters a model could not be produced for rock shelters. It was therefore decided to also produce a composite model including both caves and rock shelters.

The figures for investigated sites containing archaeology show that 65% contain archaeology of which 35% contain Palaeolithic remains and 29`% contain Mesolithic remains. These figures are much higher than those produced in other surveys, 19% of caves were found to contain some archaeology in the Manifold Valley (Trent and Peak Archaeological Trust, 1993) and 14% on the Malham plateau (Donahue pers.

comm.) It is possible that this is partly due to a lack of reporting of sterile excavations by early archaeologists in the study area; three sites were noted in the survey where possible unrecorded excavations may have taken place. The excavated sites might also be a biased sample and not representative of all the sites, as excavators generally choose the most promising sites. However, it might be due to the character of the Magnesian Limestone where the caves generally occur in discrete groups in the vales and gorges, often in very close proximity. This may result in caves being used differently in this area resulting in a greater proportion of sites being used than in the rest of the country.

4.7.1 The predictive model for caves

The predictive model for caves was undertaken using discriminant analysis in SPSS V12.0. All sites were coded to one of three categories; archaeological, non archaeological and unknown. The predicting group membership option was then used to assign all the unknown sites to either the archaeological or non archaeological categories. The full results of the analysis are provided in **Appendix 4.1**.

Several sites were excluded from the analysis as they did not contain complete data sets for all the variables used in the analysis. This left 27 sites in the analysis of which 4 were archaeological and 3 non archaeological.

Examination of the **Tests of Equality of Group Means** table showed that none of the variables were particularly significant individually. In fact most appeared to have very limited significance. The table of **Functions at Group Centroids** showed that Function 1 for archaeology was negative and that for non archaeology was positive. This meant that when reading the **Structure Matrix** functions, which show the importance of the different variables to the groupings, those that were negative related positively to the archaeology and visa versa. The table of **Casewise Statistics** gives actual group, predicted group and function for all the cases, and a summary of these results is given in **Table 4 Classification Results**.

As can be seen from the classification results, all the archaeological and non archaeological sites were correctly classified and 15 out of 20 (75%) of unknown sites were predicted to be archaeological. At first sight this appears a very significant result but with only 4 and 3 sites defining the archaeological and non archaeological groups one should be careful of placing too much importance on the results. However, the figure of 75% is not dissimilar to the 65% of investigated sites that have archaeology present.

Table 4 Classification Results

			Archaeology1_none0	Predicted Group Membership		Total
				0	1	
Cases Selected	Original	Count	0	3	0	3
			1	0	4	4
			Ungrouped cases	5	15	20
		%	0	100.0	.0	100.0
			1	.0	100.0	100.0
			Ungrouped cases	25.0	75.0	100.0

100.0% of selected original grouped cases correctly classified.

4.7.2 The predictive model for all sites

As with the predictive model for caves, the model for all sites was undertaken using discriminant analysis in SPSS V12.0. Again all sites were coded to one of three categories archaeological, non archaeological and unknown, and the predicting group membership option was then used to assign all the unknown sites to either the archaeological or non archaeological categories. The full results of the analysis are provided in **Appendix 4.2**.

The variables used in the analysis were different to those used in the cave model. The variables used can be seen in the **Group Statistics** tables in **Appendices 4.1** and **4.2**. Again, several sites were excluded from the analysis as they did not contain complete data sets for all the variables used in the analysis. In this model this left 110 sites in the analysis of which 8 were archaeological and 3 non archaeological.

The results of the modelling were very similar to those from the caves predictive model. Examination of the **Tests of Equality of Group Means** table showed that none of the variables were particularly significant individually. In fact most appeared to have very limited significance. The table of **Functions at Group Centroids** showed that Function 1 for archaeology was negative and that for non archaeology was positive; this meant that when reading the **Structure Matrix** functions, which show the importance of the different variables to the groupings, those that were negative related positively to the archaeology and visa versa.

The table of **Casewise Statistics** gives actual group, predicted group and function for all the cases, and a summary of these results is given in **Table 5 Classification Results**.

The classification results tables shows that all the archaeological and non archaeological sites were correctly classified and that 86 out of 99 (86.9%) of unknown sites were predicted to be archaeological. This appears to be a very high figure, although it is only 10% higher than that for the cave model (75%). The same caution should be placed on these results that were placed on the results of the cave predictive model, again group sizes for archaeological and non archaeological sites are small and in relation to the unknown sites very small.

The higher percentage of predicted archaeological sites for all site compared to caves sites may be due to the fact that there are no investigated rock shelters that are devoid of archaeology. This may have resulted in characteristics related to rock shelters being more predictive for archaeology raising the number of predicted sites.

Table 5 Classification Results

			Predicted Group Membership		
		Archaeology 1_none0	0	1	Total
Original	Count	0	3	0	3
		1	0	8	8
		Ungrouped cases	13	86	99
	%	0	100.0	.0	100.0
		1	.0	100.0	100.0
		Ungrouped cases	13.1	86.9	100.0

a 100.0% of original grouped cases correctly classified.

4.7.3 Predictive Modelling Conclusions and Recommendations

In assessing the results of the predictive models one must take into account the problems with predictive modelling and the small sample size of investigated sites available to develop the models. However, despite these reservations, the results are very similar, with both models suggesting that the majority of sites, around 75-85%, have the potential to contain archaeology. This appears to be very high but is not dissimilar to the number of investigated sites known to contain archaeology (65%).

There were 17 sites in the analysis that were included in both the Caves Predictive Model and the All Sites Predictive Model (**Table 6**). Of these, all bar three were classified in the same way in both models which means that 82% received the same predicted group membership in both models. This demonstrates a high degree of agreement between the two models despite one model having four times as many cases in it and some of the variables differing between the models.

Table 6 Predicted group membership for sites in both discriminant analyses

Site terrain unit number	Cave sites analysis	All sites analysis
AST26	archaeological	archaeological
AST33	archaeological	archaeological
AST19	archaeological	archaeological
EWT37	archaeological	archaeological
MGT106	non archaeological	non archaeological
MGT108	non archaeological	archaeological
MGT112	archaeological	non archaeological
MGT118	archaeological	archaeological
MGT125	archaeological	archaeological
MGT52	archaeological	non archaeological
MGT54	archaeological	archaeological
MGT74	archaeological	archaeological
PLT20	archaeological	archaeological
PLT23	non archaeological	non archaeological
PLT31	non archaeological	non archaeological
RAT25	archaeological	archaeological
RHT1	archaeological	archaeological

To investigate the reliability of the model it is necessary to test it by investigating some of the sites to see if there predicted group membership is correct. This would increase the sample size for investigated sites, allowing the model to be refined. It is proposed that a programme of test pitting is used to investigate a number of sites. These would help to establish the presence or absence of archaeology, and the date of any archaeological remains.

It is proposed that 30 test pits are excavated. These will be chosen to sample a range of sites, both caves and rock shelters based on their predicted group

membership. The chosen sites will be representative of three groups based on the models.

- sites strongly predicted to be archaeological
- sites predicted to be archaeological
- sites predicted to be non archaeological

The sites chosen will depend on a number of factors including, access, distribution across the valleys and site type.

Further details of how the test pitting programme would be undertaken are included in **Chapter 7 The Research Priorities**. Following on from the test pitting the predictive model should be revised, costs are outlined in **Appendix 4.3**.

4.8 The Potential for Open Air Sites

Throughout the Creswell Crags Limestone Heritage Area there is the possibility that open air sites from the Palaeolithic exist and that further Mesolithic sites exist. These could include both archaeological deposits related to such sites as camp sites and kill sites, as well as palaeoenvironmentally important sites including Pleistocene and early Holocene deposit sequences.

If Pleistocene deposit sequences do survive they are more likely to date from the later rather than the earlier Pleistocene, although the latter can not be excluded. Survival of such sites is most likely where they are deeply buried, if they are shallowly buried later farming activities and natural processes of bioturbation could have seriously damaged the integrity of any such deposits. As the soils on the Magnesian limestone are often relatively thin significant Pleistocene deposits are most likely to survive in valley bottoms under sequences of later alluvial deposits.

Early Holocene deposits may be more widespread and Mesolithic flint scatters are known from outside the valleys on the limestone plateau. In and around the vales and gorges a number of Mesolithic flint scatters have been found by fieldwalking.

This study focuses on identifying which of the valleys and gorges in the Creswell Crags Limestone Heritage Area have the potential to contain buried deposit sequences with archaeological and/or palaeoenvironmental potential that could extend back to the Pleistocene. However, the limestone plateau also has the potential to contain small buried valleys which could contain buried Pleistocene deposits. The potential of such locations was demonstrated by the discovery of lower Palaeolithic material in a small buried valley at Harnham near Salisbury (Wittaker et al 2004). In the case of the Magnesian Limestone such sites if they existed would most likely be later in date possibly from the Upper Palaeolithic.

For the Holocene period the study again focuses on the vales and gorges but also includes the plateau tops around each gorge.

4.8.1 Desk-top assessment methodology

The desk-top assessment searched published sources and archives for information relating to potential open air Palaeolithic and Mesolithic sites in the gorges and vales. The data collected was collated and assessed to determine if the information is sufficient to produce either:

- deposit models of the gorges which have the potential to identify the location of Pleistocene and early Holocene deposits which might contain archaeological or palaeoenvironmental sites.
- a predictive model of the potential for the gorges and vales to contain Palaeolithic or Mesolithic open air sites

The sources consulted included:

Local Sites and Monuments Records

British Geological Survey Borehole Logs

Geological maps (Solid and Drift)

Soil Survey maps

This was used in conjunction with information gained during the field surveys of the valleys.

4.8.2 Deposits with potential for open air sites

Within the valleys there are two different types of deposits that have the potential to bury Pleistocene and early Holocene deposits containing material of archaeological or palaeoenvironmental interest, these are shown on geological maps by the British Geological Survey (BGS 1:50,000 Sheets 100, 101 and 112). The two types of deposits are alluvium and head and the following simple descriptions are based on the BGS Rock Classification Scheme (McMillan and Powell, 1999).

Alluvial deposits are those derived from fluvial processes and include all water-borne deposits of rivers and streams excluding glacial deposits of proglacial or glacigenic origin. Alluvial deposits are made up of unconsolidated detrital material deposited by a body of flowing water as a sorted or semi sorted sediment. It ranges from fine grained (clay) to coarse grained (gravels). Alluvial deposits can be subdivided into *fluvial deposits*, *alluvial fan deposits* and *fluvial terrace* deposits

Head deposits are poorly sorted and stratified deposits mantling hillsides and deposited by hillwash (solifluction and gelifluction). Solifluction involves the slow down slope flow of waterlogged superficial deposits while gelifluction refers to the slow flow of superficial deposits during the thawing of seasonally frozen ground. Head can be subdivided into *hillwash* deposits (*colluvium*) and *combe deposits* (solifluction and gelifluction deposits, including frost shattered material, found in some valleys on chalk and limestone bedrock).

On the BGS 1:50,000 sheets the deposits are marked as alluvium, head and terrace deposits and are not further subdivided. From the geological maps it is impossible to determine the depth of any of these deposits but bore hole data can help if the boreholes are located in the right place.

4.8.3 Roche Abbey Gorge

Roche Abbey Gorge has a wide flat bottom with sections of both vertical and sloping sides, the latter being the more common. The valley has three arms which intersect at Roche Abbey. BGS Sheets 100 and 101, show that the north west arm contains no drift geology, the south west arm contains head deposits at the base of the valley, and the intersection of the three arms contains head deposits. In the east arm there

are deposits of alluvium in the valley bottom which extend eastwards along the valley beyond the section of the valley with rock faces. This alluvium extends all the way down Firbeck Dike and Oldcoats Dyke to the River Ryton.

The SMR does not record any open air Palaeolithic or Mesolithic sites in the valley or in the vicinity of the valley.

At the west end of the north west arm a sewage works would have impacted on any surviving sites, but the absence of suitable deposits in this section of the valley means that there was little likelihood of sites in this area. At the intersection of the three valley arms the construction of Roche Abbey and later landscaping by Capability Brown will have impacted on deposits in this area. However, it is not known how deep the head deposits were originally or how deep the works associated with the abbey and landscaping will have impacted. In the south west and east arm impacts on the alluvial and head deposits will be restricted to areas such as the village of Stone where substantial impacts will have been made by construction of buildings and by the water management features associated with the former mills. In general, the valley does appear to contain some deposits that could contain or bury archaeological or palaeoenvironmental remains.

4.8.4 Firbeck Valley

Firbeck valley has a narrow flat bottom with sloping sides. There are several water management features, dams and wears on Lamb Lane Dike which runs down the valley bottom. On BGS Sheet 101 a thin band of alluvium is shown running down the centre of the valley. This alluvium extends the length of Lamb Lane Dike until it joins to Firbeck Dike.

The SMR does not record any open air Palaeolithic or Mesolithic sites in the valley or in the vicinity of the valley.

The construction of the dams and wears will have resulted in localised impacts on alluvial deposits. As the ponds and reservoirs created by the dams and wears are no longer in use they have all at least partially silted up. This will have buried any older alluvial deposits under an unknown depth of modern sediment.

4.8.5 Anston Stones and Lindrick Dale

Anston Stones Wood and Lindrick Dale originally formed a continuous valley over 4km long, however, the two sections are now separated by the A57. Anston Stones Wood is a deep, generally V-shaped, valley with substantial sections of vertical rock faces, often high up, on the valley side. Lindrick Dale is shallower with vertical sides and a flat bottom.

Anston Stones Wood and Lindrick Dale are on BGS Sheets 100 and 101. For most of the length of Anston Stones Wood there is no drift geology present, but from the west end of Anston Stones and throughout Lindrick Dale head deposits are shown on the geological maps.

The records for three boreholes that have been drilled in Anston Stones Wood show very little as one (SK 58 SW 7) was an underground borehole that did not examine the surface geology and two others (SK 58 SW 60 and SK 58 SW 63) were located in the water works on the north side of the valley where shallow concrete and made ground deposits were identified over the Magnesian Limestone. They were therefore of no value in interpreting the drift geology.

The SMR does not record the presence of any open air Palaeolithic or Mesolithic sites in the valley or in the vicinity of the valley.

The limited drift geology, and the presence of the railway line that runs along it, means that there is little likelihood that there will be deposits in the bottom of Anston Stones Wood that have the potential to contain archaeological or palaeontological remains. In Lindrick Dale there is greater potential for open air archaeological or palaeontological sites buried within or under the head deposits. There will have been some loss of potential deposits in Lindrick Dale from the houses that have been built in it. However, as most of the houses are on the east side of the valley up against, or even on, the rock face the impact on the head deposits in the valley bottom will have been limited. The gardens that spread across the valley bottom will have had some impact on shallow deposits but any deeply buried material will be unaffected.

Borehole data SK 58 SW 60
Anston W R W Improvements Borehole 1

SK5253 8384

Borehole sunk 1992 on top of valley side in water works

Borehole identified 0.15m of concrete over Magnesium Limestone

Borehole data SK 58 SW 63
Anston W R W Improvements Borehole 4

SK5267 8377

Borehole sunk 1992 on top of valley side in water works

Borehole identified 0.80m of black ash and gravel made ground over Magnesium Limestone

Borehole data SK 58 SW 7
Kiveton Park Colliery No.2 underground Borehole

SK52430 83876

Bborehole sunk 1969 from 1215.08ft B.O.D. therefore no data on drift geology

4.8.6 Red Hill

Red Hill Valley has moderately sloping valley sides with a narrow flat bottom. BGS sheet 100 shows head deposits in the valley bottom.

The SMR does not record the presence of any open air Palaeolithic or Mesolithic sites in the valley or in the vicinity of the valley.

The north side of the valley is partially disturbed by quarrying but survives in some areas including around Red Hill Cave. A railway runs along the valley bottom and this has been partially constructed within a cutting. The construction of the railway will have severely impacted on any deposits on its line. On the south side of the valley there are several large industrial buildings towards the east end of the valley with arable farming to the west. The valley is relatively small and deposits within it will have been disturbed by the railway and other features.

4.8.7 Thorpe Common and Lob Wells Wood

The valley of Thorpe Common and Lob Wells Wood is a long sinuous valley. This generally has shallow sloping sides and flat bottom. Most rock faces are short outcrops, although in Lob Wells Wood the rock faces are more extensive with one

face around 300m long. BGS sheet 100 shows a narrow band of head deposits along the full length of the valley, following the line of the Bondhay Dyke.

The SMR records several finds of Mesolithic and possibly upper Palaeolithic flints in the area. The flints include three scatters described as Mesolithic or generally Mesolithic (SMR738, SMR1013 and SMR1050). There is also one isolated long flake which Armstrong identified as late Creswellian (SMR1012).

Towards the northern end of the valley lies the village of Netherthorpe, beyond this the main impacts on the deposits in the valley will be through farming and forestry, the latter particularly in Whitwell Wood. In general the valley does appear to hold deposits that could contain or bury archaeological or palaeoenvironmental interesting remains as well as further flint scatters near the surface.

Thorpe Common and Lob Wells Wood

SMR ref	Description	NGR
Early Prehistoric:		
738	Flints and chert finds, Mesolithic, concentrated in an area 20 yards across on a hill overlooking the stream near Bondhay Dike. Four cores, 1 core trimming, ?microburin or broken microlith, notched blade and 4 scrapers. 15 pieces of black chert including a core and scraper.	SK 534 806
1012	Long flake described by Armstrong as Late Creswellian.	SK 525 790
1013	Flint assemblage “generally Mesolithic in character”. Around 50 patinated flints, including 3 small scrapers, a double brim and part of a polished flint axe (Neolithic).	SK 522 792
1050	Group of Mesolithic flints from a restricted area.	SK 526 797

4.8.8 Steetley Quarry Caves

Steetley Quarry Caves were not in a valley but were located on top of the Magnesian Limestone plateau. BGS sheet 101, shows that there is no drift geology shown in the area, therefore only the plateau topsoils would be present.

The SMR records four flint scatters in the area, SMR5958, SMR4359, SMR4367 and SMR5956. Of these SMR5958 contains material that has been identified as Mesolithic. All the other material is undated.

The area around Steetley caves has suffered extensive modification through quarrying and industrial works which have limited the potential of the area. The presence of the flint scatters shows the area has the potential for Mesolithic sites but earlier material is unlikely.

Steetley Quarry Caves

SMR Ref	Description	NGR
Prehistoric:		
5958	Assemblage of flint scrapers, arrowheads and other material of Mesolithic and later date, found during systematic field-walking of fields recently cleared of woodland in or near Scratta Wood in the 1960s.	SK 5460 7970
4359	Flint spearhead found during fieldwalking. No further details.	SK 547 795
4367	Twenty-four flint waste flakes found during fieldwalking. No further details.	SK 546 798
5956	Twenty-five flint waste flakes found during fieldwalking. No further details.	SK 549 794

4.8.9 Ash Tree Gorge

Ash Tree Gorge is a small, flat bottomed valley with vertical sides between 2m and 4m tall. The BGS Sheet 100 does not mark any drift geology in the gorge but the gorge is so small that it may not have been included on the 1:50,000 geological map. The gorge lies on top of the limestone plateau overlooking a shallow dry valley to the east which runs towards Creswell.

Excavations in 1960s by the Hunter Geological Society included the cutting of a trench across the base of the valley. This work is not published but a photograph suggests that this trench was about 2m deep, it is not known if bedrock was reached in this excavation. From photographic evidence the sediment exposed by the trench appears to be fine grained, with occasional rocks in it. Neither the origin or date of this material is known but it may have potential to contain archaeological remains.

No open air sites are recorded on the SMR in the vicinity of Ash Tree Gorge.

The presence of sediments in the bottom of the gorge would have potential to contain archaeological remains, and flint scatters could be located in the surrounding fields on the plateau of the Magnesian Limestone.

4.8.10 Markland and Hollinhill Grips

Markland and Hollinhill Grips contain three arms that join together at their eastern or northern ends. The northern most arm running east west is Hollinhill Grips, while the other two Markland Grips arms run southwest to northeast and south to north. The valley arms are generally vertical or steep sided with flat bottoms and extensive rock faces up to 15m high. The valley arms in Markland and Hollinhill Grips are generally about 50m wide.

BGS Sheet 100, marks head deposits through most of the length of Markland and Hollinhill Grips. These continue on along the line of the River Wallend to Creswell Crags. Within Creswell Crags gorge the deposits are absent, although through the village of Creswell these deposits are up to 250m wide in the valley bottom.

One borehole (SK57 SW 8) has been sunk in the bottom of Markland Grips, located near the intersection of the two arms. The log does not record the nature of the drift Geology but records its depth as 9ft (2.75m).

None of the caves in the valley are known to contain Palaeolithic or Mesolithic material and the SMR does not record the presence of any open air Palaeolithic or Mesolithic sites in the valley or in the vicinity of the valley. However, one upper Palaeolithic flint blade has been recovered from the valley bottom (Roger Jacobi

pers. comm.) and Ash Tree cave is only 1km away. Also the stream through Markland Grips connects with Creswell Crags which has an abundance of Palaeolithic material.

Development in Markland and Hollinhill Grips has been very limited. However, there are two areas where water management features have been constructed. A mill was constructed at the intersection of Hollinhill Grips and Markland Grips and this had an associated dam and water channels. The dam is now silted up but some of the water channels still flow including sections that are underground. It is not known how much excavation, may have been involved in the construction of this dam and its pond. In the north to south arm of Markland Grips silted up channels and ponds from water management features are visible on the ground as earthworks and one pond still contains water at the northern end of this arm.

There are deposits in this valley that have the potential to contain or bury archaeological or palaeoenvironmental remains, while flint scatters could exist on the plateau above the valley.

Borehole data SK 57 SW 8
Markland Grips Borehole

SK5066 7484

Borehole sunk 1957 in valley bottom

Geological Classification	Description	Thickness	Depth
Drift?	no core	9 ft (2.75m)	9 ft (2.75m)
Permian, lower Magnesain Limestone	Limestone Grey marly (8ft of fragmentary core, 11ft of core missing, thickness according to boremaster.)	19 ft (5.75m)	28 ft (8.5m)
Permian, lower Magnesain Limestone	Marl grey becoming brownish grey occasional thin limestone bands	84 ft (25.5m)	112 ft (34m)
	borehole continues to 2090ft		

4.8.11 Elmton and Whaley Valley

The Elmton and Whaley valley is a wide valley with shallow sloping sides and a narrow flat bottom. The base of the valley is shown to contain alluvium on BGS sheet 112. At the southern end of the valley the stream ijoins on to the River Poulter which runs through Langwith Vale, where the alluvial deposits from both valleys join together. There are also 1st terrace gravels marked on the geological map downstream from the confluence of these two rivers.

Data was obtained from three boreholes that have been sunk in the Elmton and Whaley Valley over the years. One of these, SK 57 SW 92, was of no value as it was an underground borehole. Another SK 57 SW 96 was of limited value as no core was recorded for the first 39ft 4inches (12m), however a note on the log stated that the Boremaster records this as limestone. Unfortunately there was no reference to the drift geology so we don't know if there was none preent or it was unrecorded. The

final borehole, SK 57 SW 74, was located high up on the west side of the valley. Here there was 0.3m of soil over 0.6m of clay and loose limestone drift. The clay and loose limestone does not appear to be the alluvium recorded on the geological maps but is more likely a deposit derived from the weathering of the limestone bedrock possibly mixed with other material. This deposit could be a form of head deposit though it is impossible to judge how extensive it is.

The SMR records three open air sites in the valley. SMR 11257 is an isolated end-scraper possibly of upper Palaeolithic date, however, as it was found near to Whaley II rock shelter it may well relate to this site. The other two sites are flint scatters; SMR 12345 is recorded, on the SMR, as dating to the Late Upper Palaeolithic and Early Mesolithic, however, Roger Jacobi has re-examined the material and could not identify any Palaeolithic material in it. The second scatter, SMR 12346, is Mesolithic and the grid coordinates puts it within 50m of SMR 12345. It is not impossible that the two sites are part of the same very large flint scatter.

The valley of Elmton and Whaley has good potential to contain further open air sites beyond those already known. This could include flint scatters on the valley sides and top, most likely to be of Mesolithic date, or material of any date buried beneath the alluvium in the valley bottom. There is also the potential for archaeological or palaeontological material to be buried in the alluvial and terrace deposits further down stream, in and around the confluence with the River Poulter in the Langwith Valley. The terrace deposits here are one of only two such deposits shown on the BGS 1:50,000 maps of the southern Magnesian Limestone. The other deposit is near Shirebrook although the current state of it is uncertain as the latest O.S. 1:25,000 Explorer map (sheet 270) shows the area to include disused workings.

Borehole data SK 57 SW 92
56's Bore Langwith Colliery

SK5178 7191

Borehole sunk 1965 is located on top of east side of valley

Is recorded as an underground borehole commenced at O.D. –13.74ft (4.2m)

Borehole data SK 57 SW 96
Elmton Green Borehole

SK5066 7317

Borehole sunk 1957 on east side of valley,

No core was recorded for the first 39ft 4inches (12m), but a note on the record said the Boremaster recorded this as limestone.

Borehole data SK 57 SW 74
Whaley Well

SK5086 7185

Well sunk in 1929, located near the top of west side of valley

Geological Classification	Description	Thickness	Depth
Drift	soil	1ft (0.3m)	1ft (0.3m)
Drift	clay and loose limestone	2ft (0.6m)	3ft (0.9m)
Permian	Magnesian Limestone	29ft (8.8m)	32ft (9.75m)
Permian	Blue Limestone	2ft (0.6m)	34ft (10.4m)
	plus a further 3 layers		50ft (15.25m)

Elmton and Whaley

SMR ref	Description	NGR
Early Prehistoric:		
11257	Possibly Upper Palaeolithic end-scraper found downslope from the RB settlement in the vicinity of Whaley II Rock Shelter. Other flints were Neolithic and Bronze Age.	SK 5121 7212
12345	Palaeolithic/Mesolithic open camp site. Fieldwork by the North Derbyshire Archaeological Trust between 1976-78 revealed c.384 flints from plough soils above Mill Farm, Scarcliffe, and suggested an open Late Upper Palaeolithic/ Early Mesolithic site in this locality. The products were of narrow blade type flint industry and the assemblage comprises mainly waste and core materials. The finds are comparable with material from Mother Grundy's Parlour. The site is situated to the south of the Whaley Rock Shelters. This is the first open site of this period to be recognised in Derbyshire (Hart 1981, p19-21). Note Roger Jacobi has re-examined at the material and did not find any Palaeolithic material within it. The material he examined appeared to be late Mesolithic.	SK 517 711
12346	Mesolithic flint collected in large quantities by L B Cooper from a series of fieldwalks in early 1978 at Mill Farm. This material included microliths.	SK 5170 7115

4.8.12 Langwith Vale

The Langwith Valley runs south west to north east. For much of its length the shape of the valley is difficult to observe due to dense woodland. Generally it has moderate to steep sloping sides with occasional small rock outcrops. At the east end of the valley where there are fields of pasture the valley sides are moderately sloping with a flat bottom.

BGS Sheet 112, shows that alluvial deposits have been deposited along the length of Langwith vale by the River Poulter. The alluvial deposits extend east along the valley beyond the area where rock faces are found. Further east Whaley Valley joins from the north just west of Nether Langwith where the spread of alluvial deposits extends over a much greater width in the valley bottom, growing from 50m wide to 220m. The alluvium continues along the valley east of Nether Langwith where a small section of terrace deposits are shown on the map (see **Section 4.8.11**).

Data was available from the BGS on two boreholes in the valley, one of which was sunk twice. Boreholes SK 56 NW 17A and SK 56 NW 17C were originally sunk in 1942 during the war and on SK 56 NW 17A is a note on the record stating that,

"The bores were sunk rather hurriedly during the war years as an emergency measure and more detailed information is not available [WQ/112/172. 18.9.50]"

This may explain why although the two boreholes were only 10m apart they have quite different sequences recorded, and why there was no attempt on either of them to differentiate drift from Permian marl. Borehole SK56 NW 17C was deepened and enlarged in 1956 and this produced yet another very different sequence. The borehole data is so contradictory and confusing that it is impossible to draw meaningful conclusions from it.

The SMR records three finds spots in Langwith Vale. One was a possible Palaeolithic implement (SMR12307) found on the valley side near rock shelter LBT18 and LBT21. The other two sites recorded are flint scatters, one Mesolithic scatter (SMR12325) and one Mesolithic and Neolithic scatter (SMR12352). These were both found near the top of the valley side.

In Langwith Vale there will have been damage to potentially interesting deposits in the valley bottom from the railway that runs along the western half of the valley. Any shallow sites on the south side of the valley in Langwith Wood could also have been disturbed by bioturbation in the woodland from tree roots. In general, Langwith Vale has good potential to contain further open air sites beyond those already known. This includes potential flint scatters on the valley sides and top, most likely of Mesolithic date, as well as material buried beneath the alluvium in the valley bottom, which could be of any date. The potential also exists for archaeological or palaeontological material to lie buried in the alluvial and terrace deposits further down stream, around the confluence of the River Poulter with the river from Elmton and Whaley Valleys.

Borehole data SK 56 NW 17A
SK5116 6919

Well sunk 1942 in valley bottom near Gildwells Farm

Note on log from 1950 says that the bores were sunk rather hurriedly during the war years and more detailed information is not available.

Geological Classification	Description	Thickness	Depth
Drift and Permian Marl	Blue Clay	41ft 6inch (12.6m)	41ft 6inch (12.6m)
	Blue clay and grey shale	9ft 1inch (2.8m)	50ft 7inch (15.4m)
	Blue clay	4ft 5inch (1.4m)	55ft (16.75m)
	Grey shale	4ft 9inch (1.5m)	59ft 9inch (18.2m)
	Hard grey shale	3ft 9inch (1.2m)	63ft 6inch (19.4m)
	Blue and yellow clay	10ft 3inch (3.1m)	73ft 9inch (22.5m)
	Blue clay	4inch (0.1m)	74ft 1inch (22.6m)
	Blue shale		

It is not clear where the boundary between the drift and Permian Marl lies

Borehole data SK 56 NW 17C, 1942
SK5115 6918

Chesterfield and Bolsover Water Board Borehole No. 3

Borehole sunk in 1942 in valley bottom near Gildwells Farm

As with SK56 NW17a this bore was sunk during the war years and more detailed information is not available.

Geological Classification	Description	Thickness	Depth
Drift and	soft stone	10ft 7inch (3.3m)	10ft 7inch (3.3m)
Permian Marl	yellow clay	1ft 5inch (0.4m)	12ft (3.7m)
	grit, yellow clay and limestone	3ft 2inch (1m)	15ft 2inch (4.7m)
	brown grit	2ft 1inch (0.6m)	17ft 3inch (5.3m)
	grey grit	3ft 3inch (1m)	20ft 6inch (6.3m)
	yellow clay and limestone	3ft 0inch (0.9m)	23ft 6inch (7.2m)
	hard limestone	5ft 5inch (1.7m)	28ft 11inch (8.9m)
	blue clay	2ft 3inch (0.7m)	31ft 2inch (9.5m)
	brown and blue grit	9ft 8inch (3m)	40ft 10inch (12.5m)
	blue stone	1ft 8inch (0.5m)	42ft 6inch (13m)
	blue clay and limestone	4ft 1inch (1.2m)	46ft 7inch (14.2m)
	blue clay	3ft 5inch (1m)	50ft (15.2m)
	blue clay and limestone		

It is not clear what the ‘soft stone’ refers to. It could refer to the drift geology but it might not.

Borehole data SK 56 NW 17C, 1956
SK5115 6918

Chesterfield and Bolsover Water Board Borehole No. 3

Deepened and enlarged in 1956 in valley bottom near Gildwells Farm

Geological Classification	ɔtion	Thickness	Depth
Drift and Permian Marl	broken limestone	7ft (2.1m)	7ft (2.1m)
	limestone with clay beds	5ft (1.5m)	12ft (3.6m)
	broken limestone	10ft (3m)	22ft (6.6m)
	yellow clay with stone beds	6ft (1.8m)	28ft (8.4m)
	blue clay	6ft 6inch (2m)	34ft 6inch (10.4m)
	yellow clay	1ft 6inch (0.5)	36ft ((10.9m)
	blue clay	10ft (3m)	46ft (13.9m)
	yellow loamy sand	1ft (0.3m)	47ft (14.2m)
	blue loamy sand	8ft (2.4m)	55ft (16.6m)

This bore hole does not appear to record the presence of any drift geology. However, the significant differences between this log and the earlier log on Borehole No. 3 suggest there might be some problem with this data or the earlier data. All of the data on this borehole should therefore be treated with caution.

Langwith Vale:

SMR ref	Description	NGR
Early Prehistoric:		
12307	Possible Palaeolithic flint implement found in 1936.	SK 5038 6844
12325	Mesolithic flint scatter at Scarcliffe. Fairly dense scatter, averaging 1 flint per square yard over an area along the 450 feet contour overlooking the River Poulter.	SK 4995 6805
12352	Mesolithic/Neolithic flints recovered near Roseland Wood. 5 found by L B Cooper in 1978 near the woodside, 11 by Hart and Cooper on the slope nearer to the pond in 1979.	SK 498 679

4.8.13 Pleasley Vale

Pleasley Vale is orientated east west and subdivides into three sections topographically, a central section and eastern and western ends. The eastern and western ends are not as deep or steep as the central section. There are no rock faces in the western end, large extensive rock faces at various levels in the central section and intermittent sections of occasionally large rock faces in the eastern end. There is generally a flat bottom to the valley though this is very narrow in the western end.

The River Meden which runs through the gorge in Pleasley Vale has deposited alluvial deposits along most of its length extending well beyond Pleasley Vale (BGS Sheet 112). A small stream enters Pleasley Vale from the north on the west side of Pleasley Park and a narrow band of alluvial deposits have been deposited in the base of this side valley.

Four Borehole logs were identified in the BGS archives for Pleasley Vale, two of these were underground boreholes sunk in mine workings (SK 56 NW 90 and SK 56 NW 78) and one did not record the drift geology (SK 56 NW40). However, one was of

use for the purposes of this study (SK 56 NW 19). This borehole was sunk in the west end of the valley bottom near Little Matlock. This recorded a total of 11ft 6inches (2.6m) of drift geology including a 9inch (0.2m) deep soil and 10ft 9inches (3.3m) of brown clay and loose stones. This suggests that substantial depths of Pleistocene and/or Holocene deposits survive in at least parts of the valley bottom.

The SMR records one Mesolithic flint scatter (SMR12532), on the top of the valley side overlooking the valley. This is the only known Palaeolithic or Mesolithic archaeology in the valley as none is known from any of the caves in the valley.

Pleasley Vale is the valley that has been most altered by human activity and as such is likely to have suffered the greatest losses of deposits with archaeological or palaeoenvironmental potential. This is particularly so with the deposits in the central section of the valley where the construction of mills and dams over the last 200 years has seriously degraded the potential of this area. There is also extensive woodland in and around the valley which will have resulted in bioturbation of the soils on the valley sides and tops.

Although the archaeological and palaeoenvironmental potential has been compromised in the central part of the valley some areas have good potential to retain deposits of significance. The possibility exists for more flint scatters to be present on the valley sides and on the plateau above the valley. These are mostly likely to be Mesolithic or later in date. Away from the mills and dams there is the potential for buried deposits to be present in the valley bottom. Here the alluvium could contain or bury archaeological or palaeontological deposits of any date. It should be remembered that no Palaeolithic material has yet been recovered from Pleasley Vale though this does not preclude the possibility of recovering Palaeolithic material in the future.

Borehole data SK 56 NW 19
SK5272 6513

Well sunk 1956 in valley bottom near Little Matlock

Geological Classification	Description	Thickness	Depth
Drift	soil	9 inch (0.2m)	9 inch (0.2m)
Drift	brown clay and loose stones	10ft 9inch (3.3m)	11ft 6inch (3.5m)
Permian, lower Magnesain Limestone	hard stone with banded grey clay	35ft 6inch (10.8m)	47 ft (14.3m)
Lower Permian Marl ?	hard grey clay	13 ft (3.9m)	60 ft (18.2m)

Borehole data SK 56 NW 90
Shirebrook Colliery No.38 underground borehole

SK52826 65145

Borehole sunk 1991 in valley bottom near Little Matlock

Bore started at 30m depth therefore no data on the drift geology

Borehole data SK 56 NW 78
Silverhill Colliery underground borehole

SK50738 64796

Borehole sunk 1981 in valley bottom Near St Michael Church Pleasley

Bore started at 33m depth therefore no data on the drift geology

Borehole data SK 56 SW 40
Hollings Mill

SK51643 64813

Borehole sunk 1974 in Pleasley Vale on top of valley side

No details recorded of the drift geology

Pleasley Vale:

f	Description	NGR
Early Prehistoric:		
12532	Mesolithic flint scatter, very thin, across 10 acre field comprising 7 waste flints, a utilised flake and a battered back microlith.	SK 5282 6552

4.8.14 Conclusions

The aims of the desk-top assessment of the potential for open air sites were to determine if sufficient information was available to develop:

- deposit models of the gorges which have the potential to identify the location of Pleistocene and early Holocene deposits.
- a predictive model of the potential for the gorges and vales to contain Palaeolithic or Mesolithic open air sites

From the currently available data it has not been possible to develop deposits models for the vales and gorges. This was due to a lack of detailed borehole data from which the deposit sequences in the bottom of vales and gorges could be identified. To develop deposit models for each valley would require more detailed information on the nature and dates of deposits within the valleys. This would require additional, preferably dated, borehole data for each valley.

It has been possible to identify which valleys contain drift geology that could bury archaeological or palaeoenvironmental remains. This, combined with the background archaeological information, has been used to produce a simple model of the potential of each valley to contain open air sites.

The model is displayed as a table (**Table 5**) with assessments of the potentials for different types of open air sites shown on a scale from high to low. In assessing the potential for archaeological deposits or remains to survive the following principals were followed. If an appropriate location exists and finds are known from the locality the potential is deemed to be high. If an appropriate location exists but no finds are known from the locality the potential is deemed to be moderate. If no appropriate location exists the potential is deemed to be low.

The assessment of the potential for deposits that may contain significant palaeoenvironmental sequences in valley bottoms is limited by the lack of any direct dating evidence on deposits. However, the head deposits in the bottom of some valleys will have originated through solifluction or gelifluction processes that are often associated with periglacial conditions. These deposits therefore would be of interest. The alluvial deposits in the valley bottoms are probably post-glacial although whether from the immediate post glacial period or later is unknown. The terrace deposits at the confluence of the Whaley and Langwith valleys are of unknown date but may be early post glacial and therefore of interest.

The potential preservation conditions within deposits were also considered as were potential human impacts on the valley bottom deposits. For example the palaeoenvironmental potential of Ash Tee Gorge was downgraded as this is now a dry valley, reducing the potential for the preservation of remains requiring damp conditions. Firbeck was down graded due to the extensive water management features that have been built in the valley potentially disturbing deposits.

The model produced is qualitative rather than quantitative and should be seen as a guide to potential rather than as a predictive model.

Table 5 Potential for open air sites in the vales and gorges.

Vale or Gorge	presence of archaeological caves or rock shelters [1]	presence of open air archaeological sites [1]	presence of alluvium deposits in the valley bottom	presence of head deposits in the valley bottom	potential for valley side or valley top sites	potential for buried archaeological sites in the valley bottom	potential for buried palaeoenvironmental deposits in the valley bottom
Roche Abbey Gorge	yes	no	yes	yes	moderate	moderate	high
Firbeck Valley	no	no	yes	no	moderate	low	moderate
Anston Stones	yes	no	no	no	moderate	low	low
Lindrick Dale [2]			no	yes		moderate	moderate
Red Hill	no	no	no	yes	low	low	low
Thorpe Common and Lob Wells Wood	yes	yes	no	yes	high	high	high
Steetley Quarry Caves	yes	yes	no	no	high	none	none
Ash Tree Gorge	yes	no	no	?	moderate	high	moderate
Markland Grips	no	yes	no	yes	moderate	high	high
Elmton and Whaley Valleys	yes	yes	yes	no	high	high	high
Langwith Vale	yes	yes	yes	no	high	high	high
Pleasley Vale	no	yes	yes	no	high	moderate	high

1 – Presence of Palaeolithic or Mesolithic archaeology.

2 –Lindrick Dale has been considered separately to Anston Stones for valley bottom deposits due to its differing depositional sequence.