BOSWORTH BATTLEFIELD INVESTIGATION Project Specification	
The Battlefields Trust	**August 2005**
	Prepared: G Foard 29/06/05 Updated: G Foard 11/10/05

This project specification is presented in two parts: firstly short statements covering the issues defined in the brief, following the headings of that document; secondly more detailed supporting information in the appendices, including a detailed specification which explores the fine detail of the methodology.

CONTENTS

1. Methodology

The detailed study of the battlefield defined here will integrate the techniques of military history, historical geography and landscape archaeology. Building upon tried and tested techniques it will work at the cutting edge of battlefield studies, drawing lessons from past and ongoing work, particularly in the UK, Europe and the USA.[1] The methodology applied in these studies enables the accurate placing of the events within their contemporary landscape.

Within the programme of work there are a number of tasks that must be approached in two stages. First there needs to be a rapid assessment of the potential and then, after discussions with LCC and relevant specialist advisors, the detailed programme agreed. This includes the palaeo-environmental, taphonomy, historical landscape documentary research; geophysics and trial trenching. To a limited degree it will also need to include the fieldwalking and metal detecting survey, although there has already been a significant degree of piloting work on this at Bosworth. The results of this pilot work will in each case determine the exact focus and scale of the main phase of work in that subject area, a process which may involve decisions about reallocation of resources from one area of work to another and, probably at a later date, allocation of contingency funds.

Military History
The primary sources for the military history will be re-analysed in the light of current knowledge of military theory and practice of the later 15th century, to define the likely scale and form of deployments and key elements of the action with their related topographical clues. It will also examine the military technology of the period with regard particularly to archery and ordnance, both of which may have left a significant archaeological record from the battle. This area of research will be conducted under the direction of Professor Anne Curry, a specialist in 15th century military history.

Historic Terrain
The historic terrain of the five townships which impinge upon the battlefield (Shenton, Sutton Cheney, Dadlington, Stoke Golding and Upton) will be comprehensively reconstructed, following established techniques of battlefield terrain study. This will integrate the methodology for the integration of archaeological and historic map data developed (by the same team working on this theme for Trust in the Bosworth project) for a major new AHRC funded research programme in digital historic landscape mapping at the University of East Anglia. This mapping of the open and enclosed field systems, road network and other features, will be complemented by detailed investigation of written documentary sources, drawing upon the expertise gained in the major landscape research recently completed in the Whittlewood Project, for which the documentary specialist consultant recruited by the Trust was the specialist.

The terrain investigation will be complemented by soils, palaeo-environmental and other work in order to reconstruct, as far as practicable, the landscape as it was at the time of the battle. The key initial information on soils and work on the field systems will be undertaken at the outset to ensure that all potential locations for the marsh, which is the key element in the location of the battle, are identified in the first stage of work. These locations will then be tested with the palaeo-environmental pilot work to confirm that they could have been marshland in 1485.

[1] Foard, 1995; Sutherland and Schmidt, 2003.

Once these are securely established then the comprehensive survey of the historic terrain can be completed with certainty that the correct areas are being investigated. This will include a programme of more detailed palaeo-environmental investigation of the early character and date of drainage of the marsh areas, critical to understanding the exact location of the battle action and the tactics employed, the exact work programme being determined on the results of the pilot work. Fieldwalking survey will be undertaken to complement the other survey and documentary research in determining the likely land use pattern in the later 15th century on the battlefield and in its environs. In early summer 2006, once the key archaeological and documentary terrain data is in, there will a rapid hedgerows assessment by Dr Jackson, University College Northampton, to determine if a detailed survey is appropriate. If the conclusion is positive then the Trust will seek to build upon similar hedgerow research being undertaken in the Edgehill battlefield survey by Dr Jackson working with several suitably qualified local volunteers.

Integration

Using the topographical evidence contained within the accounts of the military action, enhanced, where necessary by the principle of Inherent Historic Military Probability, the initial deployments of the armies together with the subsequent action will be placed within this reconstruction of the historic terrain of 1485, using principles of analysis first developed in the study of 17th century battlefields. This process will draw heavily upon research being undertaken by the Project Officer at the University of East Anglia into the integration of military history, historic terrain and battle archaeology to the investigation of historic battlefields. It will also be complemented by computer modelling and viewshed analysis undertaken by Michael Athanson, drawing upon his ongoing research at the University of Oxford into computer based 3 D of battlefields and investigation of issues of trajectories of ordnance and firearms within a battlefield context.

Battle Archaeology

In order to test these hypotheses the evidence of battle archaeology will be employed. An investigation of the physical evidence left in the ground by the battle will comprise a systematic, accurately recorded metal detecting survey to recover a representative sample of the artefacts deposited on the field during the action. Work at Towton and elsewhere has demonstrated the potential to recover metal artefacts of 15th century date related to major battles and work at Bosworth has shown that artefacts of the period survive across the Registered battlefield. The wider potential for such survey work has also been confirmed by the Assessment that has shown that the vast majority of the battlefield remains largely unaffected by large scale earthmoving and other modern disturbance, and thus there is a high potential for the survival of battle archaeology in good condition across almost the whole area.

This investigation will begin with a reassessment of the results so far achieved on this by LCC, particularly from the 2004-5 season. There will then be a systematic large scale metal detecting survey of the preferred battlefield and sample areas on the alternative sites, decisions as to the exact areas to be surveyed being closely informed by the developing results of the terrain study. Consideration for limited work will also be given to the 'Jones' site should it prove possible, in consultation with Jones and Austin, to define a sufficiently clear and concise area for sampling. This testing of the alternative sites will provide important comparative evidence to the currently preferred location, as the battle site should show a quite different archaeological signature to all others, but comparative data from such other locations will be essential to enable that distinctiveness to be recognised. Fieldwalking survey will also be undertaken in sample areas within each zone of metal detecting survey, to provide critical supporting evidence of pottery scatters. This will assist in the analysis of the archaeological signature of metal artefacts as the fieldwalking will provide independent evidence on the intensity of manuring scatters to assist in establishing where the density of metal artefacts is likely to be the result of manuring activities rather than battle action

and conversely where the metal artefact distribution significantly diverges from the norm, as would be expected in the heart of the battle action.

There is a wide range of research questions which surround the survival of battle related artefacts on medieval battlefields, many of which relate to the processes of decay of metal artefacts in the ground. These factors will have resulted in many artefacts, particularly ferrous items which include the all important arrowheads, having been decayed and lost. The problems have been pointed up by work at Towton. These issues of taphonomy relate closely to factors such as soil pH and past land use history. It is essential that these factors are explored in detail in the Bosworth project to enable the presence of absence of particular artefacts to be understood. This is an issue which is being explored in the English Battlefields Resource Assessment by the Trust's Project Officer, with advice from Rob Janaway of Bradford University. The Bosworth research will draw upon this low intensity consideration nationally and develop a detailed assessment running in parallel with the metal detecting fieldwork for the Bosworth battlefield to enable interpretation of the results of the battle archaeology survey and to assist in the further focussing of both detecting and the trenching work in the later stages of the project.

The methodology applied in the metal detecting survey will be based around that developed and implemented by the Trust for the ongoing Edgehill Battlefield Survey. This will be enhanced through input by Sutherland and Richardson based on the Towton Battlefield Survey. This will take place during the initial training period at Towton for the metal detecting team and by review and consultation during the initial pilot period of fieldwork. The methodology applied in the fieldwalking survey will be based on that developed by Liddle, with recording implemented in a digital environment.

Finds will be processed by the volunteers under supervision accordance with the guidelines of the PAS scheme and, where appropriate IFA Finds Guidance. Pottery will normally be marked as will other individual finds where appropriate, based on agreement over current best practice between the Project Officer, the FLO and other relevant LCC staff. All data will be in collected, stored and analysed in digital form using the MapInfo format developed for the Edgehill Survey, complemented by the PAS database. Initial identification will be undertaken by the Finds Liaison Officer, with artefacts likely to be battle related being taken to the Royal Armouries for specialist examination and, where appropriate, reporting. All artefacts will be assessed for conservation requirements by the PAS and, in consultation with the Project Officers, those metal finds likely to be related to the battle and other highly significant artefacts needing attention will be selected and given remedial conservation treatment.

Fieldwork will normally be under the direct supervision of LCC staff, working to strategy and programme agreed between the Trust's Project Officer and LCC, though the Trust's Project Officer will be involved directly in this fieldwork from time to time as appropriate. Also, in line with Battlefields Trust practice which is based upon experience in the Edgehill Survey, a limited supervisory role will be undertaken by a specific metal detectorist trained for the purpose, to ensure efficient management of work in the field. Day to day programming and supervision will be subject to direct liaison between the Project Officer, the relevant LCC staff on the ground, and where appropriate the supervising metal detectorist.

Geophysics and trenching

This evidence of the battle archaeology will then be analysed and used to test, enhance and revise the initial interpretation of the battle based on the integration of the military history within the reconstructed historic terrain. This will be an iterative process running through the length of the project, aimed at a progressive narrowing down of the options.

This process of progressive focussing down is intended to enable, in the later stages of the project, the specific testing of key locations using geophysical survey, possibly phosphate analysis and then trial trenching. The latter techniques will be used firstly to test and confirm any key features of the historic terrain identified by the terrain survey, such as the Roman road which is likely to have been a key element of the terrain and may pinpoint the location of Sandyford. Trenching will also be undertaken to investigate the state of preservation of battle archaeology (subject to results of work in 2006 in the Edgehill Survey) where, hopefully, the metal detecting and terrain research reveals a significant battle archaeology scatter extending to and stopping at the edge of an alluviated, former marsh area. Geophysics and trenching will also be used to test possible locations for mass graves suggested by the other research, though this will always be a highly difficult exercise given previous experience on other battlefields. These techniques may be complemented by phosphate analysis, though this will be subject to re-assessment of its use on battlefields in the USA, an assessment to be undertaken by the Project Officer as part of the English Heritage battlefields resource assessment.

Reporting, Consultation & Archiving

Seminars will be held in collaboration with the Institute of Medieval Studies, University of Leeds at the end of each fieldwork season. Interim reports will be published at the end of years 1 and 2 following the seminars. In the final phase of the project all the data will be reviewed by the Project Officer in the light of battlefield study elsewhere in the UK and a detailed interpretation of the battle and battlefield prepared. The results of the research will be presented in a detailed project report, edited by the Project Officer, provided in digital form and integrating the specialist reports by each of those working on specific areas of research. In any case where photographic presentation of finds is not adequate then specific finds drawings will be commissioned for the final publication. The full report will be published on the web.

From the full report an overview paper or papers will be prepared for publication in a national or international journal and a supporting paper will also be offered to the county journal. However the exact form and vehicle for the final publication will need to be subject to detailed discussion with LCC during the life of the project as the nature, scale and significance of the evidence is revealed. It is also anticipated that particular elements of the research will also be published in individual papers in academic journals by various of the participants.

The results will also be provided progressively in a form to enable the effective interpretation of the research, as well as the battle and battlefield, to the public. Most data will be collected in digital form and this data will be securely managed, with metadata prepared as the project progresses. The data will then be copied to the SMR as well as the Battlefield Visitor Centre and securely archived with the Archaeology Data Service at the end of the project.

Intellectual Property Rights relating to the investigation would normally rest with The Battlefields Trust, who would grant a license to Leicestershire County Council and their agents to use and reproduce the material contained within the report. However the matter of intellectual property rights will need to be subject to detailed discussion between the parties, given the interests and direct involvement of LCC, the significant component of ‘in kind’ and volunteer work incorporated in the project design, and the degree to which the work will draw upon experience, methodology and data from other research programmes, including work in various universities and work funded by English Heritage and others.

2. Indicative Time Plan

	2005	2006				2007				2008		
	Oct-Dec	Jan-Mar	Apr-June	July-Sept	Oct-Dec	Jan-Mar	Apr-June	July-Sept	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sept
MILITARY HISTORY												
Advisory *(Curry)*												
Doc. research *(Page)*		PILOT										
Advisory *(Foss)*												
HISTORIC TERRAIN												
(Hall & Partida)												
(Page)	PILOT											
Advisory *(Foss)*												
Palaeo-environ. *(Howard)*		PILOT										
Soils *(Burton)*												
Hedgerow assessment												
ARTEFACT SURVEY												
Metal Detecting												
training *(Richardson)*												
Survey	PILOT											
Fieldwalking		PILOT										
Taphonomy *(Janaway)*		PILOT										
GEOPHYS / TRIALING												
Geophysics *(Sutherland)*												
trial trenching *(Sutherland)*												
MANAGEMENT												
major reviews				REVIEW				REVIEW				
seminars	team			external				external				external
ANALYSIS / REPORTING												
Interim / final reports												
viewshed analysis												
ARCHIVING												
digital archiving												
finds archiving												

3. Statement of Experience and Expertise

The Bosworth project will work at the cutting edge of battlefield studies. No single organisation can marshal the necessary level and range of skills and expertise required for such an investigation and thus the Battlefields Trust has brought together a team of leading national experts in each relevant area of research from a range of universities to deliver the project. This team has not only high level skills in each of the subject areas, but also where the historic terrain is concerned all the relevant members of the team have detailed knowledge of the historic landscape of the region, and extensive experience of working with its archaeological and documentary record.

3.1 The Battlefields Trust

The Battlefields Trust was registered as a charity in 1993, being established in response to the major threat the battlefield of Naseby. Its objectives are to save battlefields from destruction by motorways, housing developments and other threats; develop understanding of our battlefields and provide activities and information and access to them; liase with local and national organisations to preserve battlefields for posterity; improve the interpretation and presentation of battlefields.

The Trust has a wide range of experience and expertise in battlefield investigation, interpretation and conservation. Its trustees and officers include leading figures in battlefield studies and military history. Its Project Officer is a leading battlefield archaeologist with extensive experience in landscape archaeology and military history, specialising in the integration of these three strands in the study of historic battlefields across the UK; also has more than 25 years experience of archaeological research and projects management, having for many years managed a team of more than 10 people and an annual budget of over £200,000. In addition, the Trust has a membership upon whose support it can draw, with a wide range of skills including specialists in various aspects of battlefield study and interpretation, and including a team of volunteer metal detectorists specialising in battle archaeology.

Recent major projects undertaken by the Trust include the creation of the web based UK Battlefields Resource Centre, created with a substantial HLF grant. Currently the Trust is completing a resource assessment on Scottish battlefields, including the creation of a Fields of Conflict Database, for Historic Scotland (2004-5); it is also in the middle of a major new two year investigation of the Edgehill battlefield, with LHI funding, including substantial volunteer involvement by the local community in both intensive metal detecting survey and aspects of terrain reconstruction. It is also developing a project to investigate the Barnet battlefield, another Wars of the Roses action, which will represent an important complement to the Bosworth study. It is currently implementing an long distance battlefield trail with on site interpretive material on three battlefields (Edgcote, Cropredy and Edgehill). Other projects it is developing include an interpretive scheme for Naseby battlefield and is collaborating in schemes on other battlefields such as Cheriton.

The Bosworth Project, would also run in parallel with the resource assessment on English Battlefields, being undertaken for Leeds University and English Heritage (2005-2007) in collaboration with the Trust by the Trust's Project Officer. This project will include the extension of the Fields of Conflict database to cover the whole of England and will also involve detailed case studies on a number of battlefields. Such investigations will offer considerable added value to the Bosworth project through

the potential it provides to view Bosworth in the context of the terrain and archaeology of other medieval battlefields in England.

Through the Edgehill Project, the first comprehensive systematic battle archaeology survey in England covering battle archaeology and historic terrain as well as military history, the Trust has piloted a range of techniques and approaches that will be directly relevant to the Bosworth investigation. It has developed a good working relationship with the FLO for Warwickshire; has set up, managed and trained a team of metal detectorists who are now probably the most experienced battle archaeology detecting team of its kind in the UK. The Trust is organising a visit by top battlefield archaeologists from the USA to work in the UK at Edgehill in September 2005 and would be able to extend this programme to include their involvement in and contribution to the Bosworth study.

The Bosworth project would fit closely within the programme of research being pursued by the Trust's Project Officer, further advancing the methodology of battlefield studies. The project would also benefit from the wider advisory experience of the Trust on battlefield surveys throughout the UK but also including current project in Sweden at Sodra Stoket (1719) and Badelunda (1521).

Glenn Foard FSA MIFA: Project Officer of the Battlefields Trust

Gained a BA in Geography from University College London. Initial archaeological experience from excavation in the East Midlands and Yorkshire and subsequently gained an MA in archaeology from the Institute of Archaeology of the University of London. Worked for Northamptonshire County Council for 25 years, first as Sites and Monuments Officer and then from 1995-2002 as County Archaeological Officer. During this period regularly managing a team of over 10 staff and budgets of over £200,000, and designing and managing various substantial survey projects in landscape archaeology, including the Raunds Area Project.

From June 2002 has been Project Officer for the Battlefields Trust, now continuing on a part time project related basis, conducting research on battlefields of all periods. In 2002-2004 developed for the Trust the web based *UK Battlefields Resource Centre (http://www.battlefieldstrust.com/resource-centre/)*. For the Trust currently (2004-5) conducting an assessment of Scottish battlefields, on behalf of Historic Scotland, and managing a comprehensive archaeological survey of Edgehill battlefield (2004-6).

Since 2002 has also undertaken a range of archaeological consultancy work for various organisations including South Northamptonshire Council, the Rockingham Forest Trust. In 2003-4 undertook, for Leicestershire County Council, a review of current evidence for the battle of Bosworth and prepared a research design for its comprehensive investigation. On behalf of Northants County Council is managing and contributing to the publication of an English Heritage funded project on the aerial archaeology of Northamptonshire (projected completion 2005). From September 2005 will be conducting an assessment of English battlefields for Leeds University on behalf of English Heritage (2005-7); and will be acting as a specialist for the University of East Anglia (UEA) on a major four year Arts and Humanities Research Council (AHRC) funded research project to map and analyse the historic landscape of Northamptonshire.

Since the early 1970s has specialized in landscape archaeology with particular experience in aerial archaeology, fieldwalking survey, earthwork survey, documentary research and metal detecting survey. First research interest was in the evolution of the English landscape, with particular reference to the

nucleated settlement and open fields of the Midlands over the last two millennia. This has involved the reconstruction of historical topography, including interdisciplinary work at the boundaries of archaeology, historical geography and history. Also extensive experience in the application of GIS to the mapping, analysis and management of the historic environment, and pioneered the application of GIS to the mapping of the prehistoric and Roman landscape from aerial photographic evidence. More recently, through the Rockingham Forest Project, has developed and managed the application of a complementary methodology for the detailed digital mapping of the medieval and post medieval landscape; this has now been developed in collaboration with the UEA as a project to map the whole of Northamptonshire.

From the late 1980s research has progressively extended into the archaeology and history of military action, which has become the central research theme since the late 1990s. From September 2002 has undertaken part time post graduate research, integrating the techniques of military history with those of landscape archaeology to advance the methodology of battlefield investigation (UEA, anticipated completion 2006-7). Initial research, from the late 1980s was on warfare in 17th century England, but since 2002 this has extended to battlefields of the 10th to the 18th century across the UK. Designed and is implementing the comprehensive survey of Edgehill battlefield, managing work by others both professional and volunteer. Has extensive experience, from the early 1980s onwards, of working with metal detectorists in archaeological investigations, including the Grafton Regis siege survey and, most recently, leading the Edgehill battlefield metal detecting survey. This has involved the creation and management of a volunteer metal detecting team; close liaison with the County Archaeological Service, Finds Liaison Officer, Royal Armouries, and the MOD and others landowners. Currently undertaking detail analysis of projectiles and other military artefacts from the survey. Also advising on current and proposed battlefield archaeology projects Sweden (16th & 17th century), Germany (18th century) and Scotland (16th century).

Currently undertaking part time post graduate research in battlefield studies at the University of East Anglia, research which is extending into collaboration with the Defence Academy in the investigation of ballistics and forensic research on projectiles from historic battlefields.

Is a Fellow of the Society of Antiquaries; Member of the Institute of Field Archaeologists; Visiting Lecturer at Institute for Medieval Studies, University of Leeds, where he is developing a module on the investigation of battlefields for 2006 for their MA courses in medieval history and in medieval studies and is involved in the planning of a new MA in landscape studies. Has designed, managed and written up a wide range of landscape and battlefield fieldwork and research projects, for local authorities, the Trust and as an independent consultant; has served on a range of national committees and is currently a member of the English Heritage Battlefields Panel. He has written and lectured extensively on the investigation of battlefields in the UK, military history, the archaeological study of landscape and settlement, and aerial archaeology.

His books include *Naseby: The Decisive Campaign* and, with A E Brown, *The Making of a County History: John Bridges' Northamptonshire*.
Major articles include: 'Systematic Fieldwalking and the investigation of Saxon settlement in Northamptonshire', *World Archaeology*, 1978; 2001, 'The Archaeology of Attack : Battles and Sieges of the English Civil War', *Fields of Conflict I*; forthcoming: 'English Battlefields 991 -1685: A Review of Problems and Potentials', in Scott, D., Haecker, C. and Babbits, L., *Fields of Conflict III*.

The Trustees would aim to meet at least once a year at Bosworth during the life of the project, enabling the wide range of their expertise to be available for the assessment of and development of the work of the project.

The Trustees include:

- Richard Holmes: Professor of Military and Security Studies and Director of Cranfield University's Security Studies Institute. A leading military historian with a wide ranging expertise and research interest.

http://www.rmcs.cranfield.ac.uk/ddmsa/ssi/richardHolmes/view

- Robert Hardy CBE FSA, An expert in historic archery, author of *Longbow: A Social and Military History*; join author of *The Great Warbow*.
- Matthew Bennett MA FSA RHistS, Deputy Head of Department, Royal Military Academy, Sandhurst. A military historian of high national standing.

http://www.atra.mod.uk/atra/rmas/academic/bennett.htm

- Michael Rayner (national coordinator of the Trust), author of *English Battlefields*
- Chris Scott, joint author of *Edgehill: The Battle Reinterpreted*
- Alan Turton, manager, Basing House Civil War site

3.2 List of proposed sub-contractors (with summary CVs)

Full CVs are provided in Appendix 8

David Hall MA FSA MIFA: Open Fields survey
A consultant and national expert on the integrated documentary and archaeological study of the open field landscapes of England. He has lectured and published extensively on the medieval and post medieval landscape, particularly of Northamptonshire, and is currently completing a national overview of open field systems of England. He is Honorary Research Fellow at the University of Exeter, and a specialist to the University of East Anglia's AHRC project on the mapping and analysis of the medieval and post medieval landscape of Northamptonshire.

Tracey Partida MA: Historic map analysis / all digital mapping
T Partida (formerly Britnell) is a consultant with extensive experience in digital mapping of the historic landscapes from historic map and archaeological evidence. She has worked on the mapping of both historic landscapes of Northamptonshire and on terrain analysis of battlefields in England and Scotland, including detailed terrain reconstruction for the Edgehill Survey. She is currently working for the Battlefields Trust on the Scottish Battlefields Assessment and from September 2005 will be Research Fellow at the University of East Anglia on the AHRC project mapping and analysing the medieval and post medieval landscape of Northamptonshire.

Dr Mark Page: documentary researcher on landscape and military history
Former Research Fellow at the Universities of Durham and then Leicester, now Assistant Editor (part time) of the Victoria County History of Oxfordshire. Mark is a specialist in documentary research. His research has concentrated primarily on aspects of the social, economic and landscape history of medieval England, but extending into important aspects of military history, as in his work on Cornwall in the 15th century. He was the documentary researcher in the Dept of Local History, University of Leicester, working on the Whittlewood Project, one of the most significant recent detailed investigations into the medieval landscape of England, which represents ideal background expertise for

research into the documentary evidence for the Bosworth landscape. His background and experience is also considered ideal by Professor Anne Curry for the specialist tasks of detailed documentary research into medieval military history of the Wars of the Roses in connection with Bosworth, when matched with her specialist military expertise.

Dr Rob Janaway: taphonomy of battlefield artefacts
Lecturer in Archaeological Sciences at the University of Bradford. He graduated in Archaeological Conservation from University College Cardiff in 1979. He worked for the Bath Museums Service, and as an Archaeological Conservator at the University of Leeds before joining the staff at Bradford University in 1986. Rob has worked on a wide range of archaeological projects both in the field and the laboratory and has a special interest in textiles, taphonomy, archaeological materials degradation and marine finds. He is the only person in the UK currently investigating battlefield taphonomy.

The University of Bradford is a leading research centre for Archaeological Science which specialises in the conservation of and scientific research into archaeological artefacts.
http://www.bradford.ac.uk/acad/archsci/research.php . The employment of Bradford to conduct the finds conservation is the logical complement to Janaway's detailed research into the taphonomy of the battle archaeology at Bosworth.

Peter Foss: Advisor on documentary research
Peter Foss is a highly experienced and well respected local historian who has extensively researched and published on the history of the Bosworth area and most notably on the battle and battlefield of Bosworth. He also has a range of important local contacts in historic study in the area and has amassed a wide range of documentary evidence for the area and the battle which he will contribute to the project through the present proposal. His publications include: 1985. The battle of Bosworth: where was it fought? Stoke Golding; 1987a. "The Sutton Cheney estates: The Pre Enclosure Landscape." The Hinkley Historian XX: 19-26; 1988. "The battle of Bosworth: towards a reassessment." Midland History, no. 13: 21-33; 1990a. The field of Redemore: the battle of Bosworth, 1485. Leeds; 1987b. "The Sutton Cheney Estates." The Hinckley Historian, no. 20; 1990b. The Field of Redemore: The Battle of Bosworth, 1485. fist edition ed. Headingley: Rosalba Press; 1996. Getting History Right: A Critique of D T Williams, 1996; 1998. The Field of Redmore: The Battle of Bosworth, 1485.

Tim Sutherland PIFA: battlefield archaeologist specializing in geophysics/excavation
Tim Sutherland has specialised in battlefield studies. He instigated and managed '*The Towton Battlefield Archaeological Survey Project'* since 1997 in connection with his PhD research. This was the first successful multidisciplinary approach to the task of systematically accumulating archaeological evidence in Britain for a medieval battle. He has specialist expertise in geophysical survey and is the only person to have successfully designed and implemented a programme of prospection for battlefield mass graves in the UK using geophysics. He also has conducted follow up trial excavation on these graves and undertook the only modern full excavation of a medieval battlefield mass grave (Towton). Sutherland is the originator and moderator of the CAIRN, international battlefield archaeology network. He is experienced in managing archaeological projects, including historical and other documentary project designs, post excavation co-ordination, desk-based research, report writing and publications.

Simon Richardson: metal detecting specialist in medieval battle archaeology
Simon Richardson is a highly skilled metal detectorist who has used his skills in archaeological survey on battlefields since the late 1990s, most notably at Towton but also on other sites such as Agincourt. He is the leading UK archaeological detectorist specialising in the investigation of medieval

battlefields. He has achieved remarkable results in the recovery of the full range of battle related artefacts, most notably at Towton. Here his work has broken new ground in demonstrating how to recover substantial numbers of iron arrowheads from a battlefield.

Dr Andy Howard: palaeo-environmental archaeology
Lecturer in Archaeo-Geomorphology and Remote Sensing, Institute of Archaeology and Antiquity, University of Birmingham. His research interests include the location, preservation, prospection and interpretation of archaeological resources in Holocene temperate alluvial landscapes; the application of remote-sensing techniques to geoarchaeological prospection and cultural resource management; deciphering climatic and cultural signals of environmental change in temperate and semi-arid alluvial basins; and Pleistocene landscape development of midland and northern Britain and the environmental and cultural setting of Palaeolithic communities.

National Soil Resources Institute: Soils Mapping
NSRI at the University of Cranfield, holds the national soils information for England and Wales and has the most comprehensive range of expertise on the mapping of soils in England.
http://www.silsoe.cranfield.ac.uk/nsri/

Mike Athanson: 3 D mapping/viewshed analysis
2005 - 08 University of Oxford D.Phil in Archaeology:
This research centres around studies of bullet trajectories on historic battlefields, using exterior ballistics to calculate bullet path over the terrain and viewshed analysis to determine the visibility of possible target locations. It will examine several case studies of different periods and will develop methods for testing battle hypotheses and analysing artefact patterns.
2004 - 05 University of Oxford M.St in Landscape Archaeology:
The M.St dissertation explored the potential for D.Phil research (above) by modelling possible bullet trajectories and target visibility on Little Bighorn battlefield. He also researched approaches to calculating graded (non-binary) viewsheds.
2000 - 02 Glasgow School of Art M.Phil in 2D/3D Motion Graphics and Virtual Prototyping (i.e. computer modelling and animation):
MPhil dissertation on 3D visualisation of military activity at the operational scale.
1996 - 00 University of Glasgow M.A. (Hons) in Philosophy:
Other research interests:
The architecture of historic fortifications and its implications for visibility and fields of fire; interpretive applications of 3D modelling and animation in archaeology; presentational visualisation; maritime archaeology; military and naval history.

Bradford University / Julia Park: Finds Conservation
It is initially intended that Remedial conservation, as agreed between the FLO, Project Director and the Battlefields Trust, will be undertaken by S O'Connor, Bradford Conservation and Research, Department of Archaeological Sciences
http://www.brad.ac.uk/acad/archsci/depart/contracts/index.htm
However an alternative quote has also been obtained from Julia Park (see CV in attached Appendix). It is proposed that a final decision as to who undertakes the work be taken by the Project Board in the light of all considerations, including any requirements from LCC for display standard conservation.

York Osteoarchaelogy Ltd: Human remains:

If human remains are revealed in fieldwork then essential human palaeopathology will be undertaken from the conservation sum by: Marlin Holst, *York Osteoarchaeology Ltd*. Holst has extensive experience in this research area and was a key specialist on the Towton Mass Grave investigation and has undertaken all the work on subsequent human remains recovered from the Towton battlefield project.

ADS: Digital Archiving
The digital archive will deposited, as recommended by English Heritage, with the Archaeology Data Service (ADS). http://ads.ahds.ac.uk/

3.3 In kind Contributions

In addition to the core paid professional work, there are a range of specific contributions both as in kind contributions and various volunteer contributions. There is also the potential for a range of spin off research resulting from the close links to a number of leading universities.

Professor Anne Curry: Specialist advisor on military history of the 15th century
Professor of Medieval History, University of Southampton. A specialist in medieval history and warfare, and in teaching and learning in Higher Education. Her principal area of research is the Hundred Years War. She has also carried out much original work in the archives relating to the English army which conquered and occupied Normandy in the early fifteenth century. She has written extensively on warfare in the 15th century and especially the battle of Agincourt.

Royal Armouries
The specialist finds and military finds expertise is coming 'in kind' from the Royal Armouries, under the supervision of Graeme Rimer, Academic Director. The Battlefields Trust has developed a close working relationship with the Armouries through the Edgehill Survey, and in collaboration with English Heritage and Leeds University in the planning of the Fourth International Fields of Conflict Conference at Leeds in September 2006. They have offered to provide free of charge specialist advice on contemporary ordnance, firearms and other military artefacts that may be recovered from the battlefield at Bosworth. Where appropriate and practicable they will report on those finds and will give wider advice on military matters of the period.

Following initial terrain research, a hedgerow assessment will be undertaken to establish if a full survey is appropriate to supplement the defined work programme. If so then the Trust will seek to draw upon the support of Dr Janet Jackson, University College Northampton, who is currently overseeing for the Trust the hedgerows survey by volunteers on the Edgehill Survey, and to recruit two suitably experienced volunteers to undertake a survey.

Volunteers
The Trust's objective would include the close integration of volunteer help of all types into the project, when and where this is practicable. In addition to the fieldwalking and metal detecting volunteers already working at Bosworth or within the LCC network, the Trust would aim to draw experienced additional metal detecting volunteers from the Edgehill project, particularly when fieldwork there is completed in June 2006. Other detectorist would also be recruited where practicable.

Relevant LCC Staff

Peter Liddle

Head of LCC Archaeological Services Team and Keeper of Donington le Heath Manor House. Involved in Leicestershire archaeology since 1970. Archaeological Survey Officer for LCC 1976-1997; Keeper of Archaeology/Donington 1997-present. Specialist in Community Archaeology and fieldwalking. Author of many articles on Leics Archaeology and 'Leicestershire Archaeology - the present state of knowledge' (1982) and 'Community Archaeology' (1985); joint editor of 'Leicestershire Landscapes' (2004).

Richard Knox

Assistant Keeper (Archaeology). Involved locally since 1989. Formerly SMR officer. Specialist in fieldwalking and archaeological interpretation.

Dr Richard Pollard

Assistant Keeper (Archaeology). Came to Leics in 1982 as Roman pottery specialist of Leics Archaeological Unit. Specialises in collection management (as well as ceramics) and manages the Leics Archaeology Network of parish wardens.

Wendy Scott

Finds Liason Officer. Formerly worked on SMR and archaeological planning. Specialist in human skeletal material and small finds.

Richard Mackinder

Ranger at Bosworth Battlefield Centre. Has run the Ambion Archaeology Group for a number of years and has acted as the liaison for volunteer metal detectorists working in the battlefield area.

4. Outline Risk Assessment and related issues

A detailed risk assessment cannot be undertaken for any specific element of the project at this stage as individual components of the project will investigate specific pieces of land which cannot at present be identified. Once they are then a risk assessment will be undertaken by the Trust's Project Officer or, where appropriate, by the relevant sub contractor or by/with LCC supervising staff, prior to fieldwork being undertaken. The Project Officer will ensure that appropriate documentation has been created and procedures are being followed by sub contractors and, where appropriate together with the LCC supervising staff, all project members. Risk Assessment will take account of IFA guidelines, except where established procedures are already in existence, as for example with each University Department or LCC.

To ensure consistency of practice, because this is an integrated project which will involved collaborative working between the Trust, sub contractors, LCC staff and volunteers, in undertaking all aspects of the work the Trust, its sub contractors and all volunteers will be expected to follow the Health and Safety policies and procedures of Leicestershire County Council.

Every reasonable action will be taken to minimize or remove the identified risks.

- All project staff, including volunteers, will be given a basic induction into the project where guidance on relevant Risks, other Health and Safety information, safe working practices, insurance cover, survey guidelines
- A record of any accidents will be maintained.

Members of the General Public are not normally to be allowed within the fieldwork context, except by special arrangement and under the direct supervision of LCC staff.

All fieldwork volunteers will, in line with the Trust's general policy on battlefield survey, be freely enrolled as members of the Battlefields Trust and thus brought within the Trust's insurance cover. However it is understood that all the volunteers, when working under the supervision of LCC staff, will be covered by LCC insurance as well as Health and Safety procedures.

Office based work

- Repetitive strain injury and other computer related issues of workstations.

It is not anticipated that long periods of digitising will be required form volunteers or indeed any project workers. However it is important that suitable facilities which meet LCC standards should be provided within the Battlefield Visitor Centre for all volunteers to work at where they have data entry and related work to undertake.

- Lead and copper artefacts

These typically have surface decay deposits which are toxic. It is essential that all volunteers and others working on artefacts follow PAS guidelines on washing of hands, wearing of gloves etc as appropriate. Induction to include provision of advice to volunteers either by or from material developed in consultation with the FLO.

- Manual handling

Ensure awareness amongst all volunteers and staff regarding heavy boxes of finds to be lifted and carried and basic guidance given on manual handling.

Lab work

Lab work will be conducted in the School of Archaeological Geographical and Environmental Sciences, Bradford and in the Dept of Archaeology, Birmingham.
This work will be under the auspice of their health and safety protocols. Their standard operating procedures include the production of specific risk and COSHH assessments. The Bradford Safety Panel and any X-radiographic work is conducted in compliance with their Local Area Rules under the Ionizing Radiation regulations.

General fieldwork risks

- Slips & trips etc

Particularly important to take extra care near trenches and deep ditches, including those with water. Also likely to be exacerbated in icy conditions.
Care to be taken when climbing fences and gates. Dangers of barbed wire also to be noted.
A first aid kit will be carried at all times when a project team in the field and information provided as to the nearest A&E department.

- Digging, pegging etc

Danger of injury, particularly to feet, from digging and inserting grid markers.
Neither metal detectorists nor geophysicists are able to wear steel capped boots or similar protective footwear
Markers for transects to be suitably flagged for visibility
Digging tools to be suitable for the task and well maintained
Metal ranging poles not to be carried vertically within 6m of overhead cables.

- Manual handling

Carrying of heavy or large amounts of survey equipment such as ranging poles, marker flags, detectors and digging tools.

Equipment to be spread between the survey team as far as practicable.
For field survey, where possible work then a wheelbarrow should be used to transport equipment from vehicles to survey area, but care taken in the lifting of that also.

- Low temperatures

Fieldwalkers and Metal Detectorists likely to be in the field for up to 7 hours in very cold conditions in the winter. All should ensure they wear appropriate clothing and footwear.

- High temperatures

Metal detectorists in particular likely to be in the field for up to 7 hours without cover in the summer. They must ensure to carry plenty of water and to wear suitable clothing, especially a hat to protect against sunstroke.

- sharp objects in the ground

Glass attached to bottle tops and other such items. Metal detectorist particularly at risk.
Care to be taken in removing objects

- Road traffic

Fieldwork will involve crossing of roads. Although the roads in the project area are local roads and there is not a high volume of traffic, traffic is often fast and the roads are often narrow and lack a verge. Particular care is needed when walking along or crossing roads, especially the Fenn Lanes where traffic is typically very fast.
Parking of vehicles by fieldworkers to be in suitable locations where they do not cause a safety hazard.

- Stock

Dangers of stock, such as bulls, to be assessed before entering any field. Also care taken to ensure gates are closed to avoid any incidents caused by stock escaping onto roads etc.

- Lone working

Lone working will not normally be practiced. Fieldwalking and metal detecting will normally be conducted with a team of three or more individuals.
Where lone working is unavoidable, most notably for the open field survey fieldwork, then a mobile phone will be carried at all times; also the person undertaking the work will report in to the Project Officer, LCC supervisor or other agreed responsible person as appropriate, when starting work and when completing work on each specific day.

- Weil's Disease

Risk of contracting Weil's desease (Leptospirosis). All personnel to be issued with information on Leptospirosis.
Avoid standing or running water where rats may be active. Wash hands before handling food or eating.

Ground interventions involving machining

- Services: overhead and buried

A search will be conducted in advance of fieldwork.

- Trenching in proximity to Rights of Way

Selection of trenching locations to take account of the dangers to the public particularly where there are rights of way

- Moving machinery

Dangers of working close to mechanical excavators.
Staff should always approach the machine from the front
All trenching under the control of a supervisor
No staff to enter the trench while machine working.
No staff to enter a trench more than 1.4m deep
All staff working in proximity to a machine to wear visibility jacket and safety helmet

- Deep excavations

Dangers of collapse, especially in the waterlogged conditions of the former marsh areas.
Dangers of staff, volunteers or members of the public falling in.

No trench will be dug deeper than 1.4m without widening in a stepped fashion.
Also a visible temporary barrier will be erected 1m from the edge.
The trench should be under supervision and normally will be backfilled within the day. It is not anticipated that any stratified deposits requiring longer access in trenches deeper than 1.4m would be revealed.

Other visitors
Any intended involvement of members of the public, other than project volunteers, in visits to observe any fieldwork in progress will need to be a subject of risk assessment prepared by LCC or their contractors for the educational and interpretive aspects of the project, in consultation with the Project Officer and any relevant investigation project subcontractors.

5. Consultation and Monitoring

It is proposed within the project programme that a series of key monitoring points be established for consultation between the Trust's Project Officer, the Keeper of Donnington le Heath, the Bosworth's Project Director and the LCC fieldwork supervisor. In addition to these, further review meetings are suggested to achieve a minimum of a cycle of quarterly review by this **'project board'** for the battlefield investigation, with any additional membership of that board being agreed with LCC.

In addition to the key strategy meetings required at the beginning of the project, the most important monitoring and review periods will be in Jan/Mar 2006 when major elements of the terrain analysis should be completed. At that point decisions flowing from the results of the pilot work can be taken. The other major review would be in Apr-June 2007, at the end of the second fieldwork season. These meetings will be critical because, while the terrain and military history research is working within well established areas of research where methodology and tasks can in most cases be closely defined, the battle archaeology investigation is pushing the boundaries of existing knowledge. It is therefore likely that significant modifications to the programme and reallocation of resources from one area to another will prove necessary during the life of the project. There fore the ongoing review process will be particularly important to inform the process of reallocation of resources within the overall project structure.

The deliberations of the 'project board' will be supplemented by the series of seminars to involve a range of specialists from within and, where appropriate, outside the project in the review of the methodology, results and strategy for the project. These, together with any other key academic presentations, will be organised in collaboration with the Institute for Medieval Studies, University of Leeds. The project team and various additional advisors, including the Keeper of Donington le Heath, Bosworth's Project Director, Finds Liaison Officer, County Archivist, SMR Officer and the Regional and Battlefields Inspectors of English Heritage would also be involved in the site seminars.

An initial seminar (which may need for practical reasons to be more restricted in composition) would consider the project design and offer advice on the fine detail of methodology during the early stages of the project. This will review and develop the project's research strategy and methodology and, within the constraints of agreed objectives and resourcing, suggest modifications to better achieve the objectives. Similar seminars will be held at the end of each season's fieldwork to review progress and

develop initial ideas on interpretation, with the final seminar feeding into the final phase of analysis and reporting.

The English Heritage Battlefields Panel, of which the Trust's Project Officer is a member, would be invited to visit to review progress at least once during the life of the project. The Battlefields Trust Trustees would aim to meet at least once a year at Bosworth during the life of the project to review progress and provide guidance. Where appropriate, issues will be aired on CAIRN (international battlefield archaeology discussion list).

It will also be essential at the outset of the work to consult with a wide range of local interest groups and particularly with key individuals who have undertaken work on the Bosworth problem, including Foss, Jones, Austin and Wright. Through this we will seek to ensure both that all important and relevant knowledge is taken account of, and that no party with a significant contribution to make is missed out of the consultation process. A regular series of reports will also be issued on progress in the project to interested parties both locally and nationally. Detailed reporting of progress on the project can also be delivered through the Trust's UK Battlefields Resource Centre, as with the Edgehill project.[2]

[2] http://www.battlefieldstrust.com/resource-centre/civil-war/battlepageview.asp?pageid=500

APPENDIX 1: BOSWORTH BATTLEFIELD DETAILED SPECIFICATION

Summary

The battle of Bosworth, fought on the 22nd August 1485, is one of the best known and most influential of English battles. It saw perhaps the most dramatic of military reversals in English history. A rebel force defeated a royal army more than twice its size leaving Richard III, the last Plantagenet king, dead on the field and placing Henry VII on the throne as the first of a new, Tudor dynasty.

Today Bosworth is the most contentious of English battles, because at least three alternative sites have been proposed for the battlefield. When the dispute is finally resolved and the detail of the action is accurately placed within the historic terrain of 1485, our understanding of the battle is likely to be transformed. This should give us a far better understanding not only where but also how the battle was fought and why it had the outcome it did.

The Assessment Report on Bosworth battlefield, prepared in 2004, summarised the current state of knowledge, provided limited new detailed mapping of the historic terrain, identified the significant gaps in knowledge and indicated the evidence which might reasonably be collected to address these shortcomings.[3] The importance of a detailed study to answer the major questions about the battle cannot be overemphasised. This most significant of English battles may prove to have been won and lost on the field through the tactical exploitation of the terrain not, as has often been said, by treachery. It is thus a battle well worth detailed study, where the understanding of the historic terrain, of the initial deployments within it, and of the movement of the action across that terrain may reveal a quite different story to any of those which have been previously told. In so doing it may also cast valuable light on the nature of warfare in the 15th century.

The Assessment pointed to the core of the battlefield lying more than a mile (1.5 km) to the south west of the currently interpreted Ambion Hill site, the broad topographical context of the battle having been determined thanks mainly to the work of Foss.[4] However major uncertainties were shown to remain over the detail of key elements of the historic terrain, the positioning in the landscape of the initial deployment of the armies and the location of the main phases of the action. There also remain issues regarding the terrain evidence for the other alternative sites which require definitive resolution before absolute certainty as to the siting of the battle can be achieved, hence limited and very specific data must also be initially collected from these sites.

Without resolution of all these questions it was argued that an effective interpretation of the battlefield for the public is not achievable. The extent and character of the surviving physical evidence of the battle itself and of the historic terrain of the battlefield within which it was fought has never been adequately defined. As a result it has not been possible to define an adequate interpretive scheme for the battlefield or to determine the conservation needs of the site. The existing gaps in knowledge, the needs and potentials are defined in the Conservation Statement

[3] Foard, 2004.
[4] Foss, 1998

prepared for Leicestershire County Council by Chris Burnett Associates, which includes a detailed reassessment by G Foard of past studies of and existing evidence for the battle and battlefield.[5] The Assessment also concluded that at Bosworth there is a high potential within both the physical and the documentary record to enable the major gaps in knowledge to be filled, through an intensive investigation of the battlefield.

The present document defines an interdisciplinary research strategy involving documentary study and field survey to address these gaps in knowledge. This work is defined in the context of the evolving methodology for the investigation of historic battles and battlefields in Britain, including the ongoing resource assessment of battlefields in the UK being undertaken by the Battlefields Trust, in collaboration with the University of Leeds, for Historic Scotland and English Heritage, and ongoing research programmes based in several major UK universities by members of the team brought together for the present project.[6] Through the collection and analysis of this evidence the present proposal aims to resolve the key issues regarding the location and character of the action at Bosworth and in so doing to set new standard for the investigation of medieval battlefields across Europe. It applies current best practice in battlefield studies but also proposes specific enhancements of these proven techniques, and draws upon the expertise of leading specialists in a range of disciplines to ensure the work is conducted to the highest standard.

While the terrain and military history research is within well established areas of research where methodology and tasks can in most cases be closely defined, the investigation of the battle archaeology is pushing the boundaries of existing knowledge and methodology. It is therefore likely that significant modifications to the programme and reallocation of resources from one area to another will prove necessary during the life of the project, decisions being made in consultation with the County Archaeologist and other relevant advisors. This is why key elements of the work have been defined with pilot phases in year 1.

To achieve this challenging research programme the Trust has brought together a hand picked team of leading experts in each field. The programme of investigation over a 3 year timescale enables three years of fieldwork, assuming a summer 2005 start, enabling completion in summer 2008. However, subject to the farming regime, the work on the historic terrain reconstruction should be largely completed within the first year.

The on-going research will provide an exciting interpretive opportunity for the three year period, as up to the minute information could be made available to virtual as well as actual visitors to the battlefield, while the completion of the field investigation will enable final completion of the interpretive scheme in the Visitor Centre (the Battle Room) and on the battlefield itself during 2008.

1. Management

Project Design and Management

[5] Chris Burnett Associates, 2004. Foard, 2004.
[6] Foard et al., 2003. Foard, 2001. Foard and Partida, 2005. Foard, 2005a. Foard, in preparation.

This is a specialist project that will employ a combination of both well tried and tested, and cutting edge methods to push the boundaries of battlefields research. The management role will involve the supervision of leading specialists and advisors from different disciplines. It will require the implementation of data standards; the integration and analysis of a wide range of data to develop a coherent interpretation of the battle and battlefield; and writing of key sections of, as well as editing, the interim and final reports. This will require high level expertise in battlefield studies, and in project design and management.

The work of professionals and volunteers will be closely coordinated, to produce a high quality output. Community involvement in the project will be encouraged wherever practicable. There will also be close liaison with the designers of the interpretive scheme to feed the results of the research into the interpretive programme.

All fieldwork will be undertaken with IFA standards and guidelines and in accordance with the methods and practices defined in the 'Management of Archaeological Projects' (English Heritage, 1991 (revised 1996)).

Project implementation on site

It is assumed that, working under the overall direction of G Foard, the Trust's Project Officer, the LCC staff will deal with day-to-day practicalities and issues of coordination with the Visitor Centre and the interpretation project. The tasks involved will include liaison with landowners over access, farming regime etc; liaison with fieldwork volunteers on the metal detecting and fieldwalking survey; supervision of the input of data into relevant databases by volunteers; other public liaison, practical arrangements for seminars, public open days etc.

It is assumed that a PC with MapInfo and other software and space within which supervisor and volunteers can work to enable, finds processing, data input and other tasks to be undertaken by the volunteers. It is also assumed that a digital camera would be provided for volunteers to photograph all the finds and enter that data into the databases.

Consultation, Monitoring etc

Within the project programme a series of key monitoring points are identified for consultation between the Trust's Project Officer, the Keeper of Donnington le Heath, Bosworth's Project Director. In addition further review meetings are suggested to achieve a minimum of a cycle of quarterly review by this **'project board'** for the battlefield investigation. The most important monitoring and review periods will be in Jan/Mar 2006 when major elements of the terrain analysis should be completed. At that point decisions flowing from the results of the pilot work can be taken. The other major review would be in Apr-June 2007, at the end of the second fieldwork season.

The deliberations of the 'project board' will be supplemented by the series of seminars to involve a range of specialists from within and, where appropriate, outside the project in the review of the methodology, results and strategy for the project. The project team and various additional advisors, including the Keeper of Donington le Heath, Bosworth's Project Director, Finds Liaison Officer, County Archivist, SMR Officer and the Regional and Battlefields Inspectors of English Heritage would be involved in the site seminars. The initial seminar would consider the project design and advise the Bosworth Battlefield Archaeological Research Committee as to the fine detail of methodology prior in

the early stages of the project. This will review and develop the project's research strategy and methodology and, within the constraints of agreed objectives and resourcing, suggest modifications to better achieve the objectives. Similar seminars will be held at the end of each season's fieldwork to review progress and develop initial ideas on interpretation, with the final seminar feeding into the final phase of analysis and reporting.

Where appropriate, issues will be aired on CAIRN (international battlefield archaeology discussion list).

The English Heritage Battlefields Panel would be invited to visit to review progress at least once during the life of the project and the Battlefields Trust Trustees would aim to meet at least once a year at Bosworth during the life of the project to review progress and provide guidance.

It will also be essential at the outset of the work to consult with a range of local interest groups and particularly with key individuals who have undertaken work n the Bosworth problem, including Foss, Jones, Austin and Wright. A regular series of reports will also be issued on progress in the project to interested parties both locally and nationally. Detailed reporting of progress on the project can also be delivered through the Trust's UK Battlefields Resource Centre, as with the Edgehill project.[7]

While the terrain and military history research is working within well established areas of research where methodology and tasks can in most cases be closely defined, the battle archaeology investigation is pushing the boundaries of existing knowledge. It is therefore likely that significant modifications to the programme and reallocation of resources from one area to another will prove necessary during the life of the project. There fore the ongoing review process will be particularly important to inform the process of reallocation of resources within the overall project structure.

Consultation with landowners

This will be a specialist area and should ideally be undertaken, in consultation with the Trust's Project Officer, via the LCC fieldwork supervisor, who has a good working relationship with most landowners in the project area. In all cases a clear statement of the fieldwork methods will be provided indicating relevant re-instatement procedures to ensure that the landowner is fully aware of the nature of the works. In each case contact of substantial intervention involving machining then there will be subsequent contact with the landowner to ensure they are happy with the quality of re-instatement.

2. Military history

Although Michael Bennett's book on Bosworth provides most of the primary source material, this is all in modern translation. The project will therefore produce a research archive of documentary sources of the period, interpreted by Professor Anne Curry a specialist in the military history of the period. A definitive parallel text will be produced in digital form as part of the research archive, with images of the original document, transcripts where possible and, where appropriate, translations. This will be accompanied by a detailed assessment of each source, including its proximity in time and source of information together with a more general consideration of its broader value in the study of other military actions. To complement this, a comprehensive bibliography of all secondary works on the battle will be compiled and a research archive developed which, as far as practicable, contains copies of all these sources in paper or digital format.

[7] http://www.battlefieldstrust.com/resource-centre/civil-war/battlepageview.asp?pageid=500

The concordance of primary source information presented in rough draft in appendix 4 of the Assessment Report will be developed into a definitive presentation of the sequence of the action as provided by the primary sources for the military history and highlighting any topographical or other significant information.

The evidence for troop numbers and method of deployment will be analysed using contemporary military manuals (most notably Vegetius and its translations) to determine the likely extent and form of deployments. This will be complemented by evidence on the composition of armies, experience of the commanders, types of troops etc. Particular attention will also be given to the identification of key topographical components in the primary sources which may enable the deployments and main phases of the battle to be accurately positioned in the landscape. An analysis of military practice of the period will be prepared to provide the basis for a re-interpretation of the primary evidence and its later integration with the historic terrain and battle archaeology evidence discussed below. This will include

- *interpretation of the topographical evidence in the primary accounts in the light of contemporary military practice to assist in positioning of action within the reconstructed historic terrain*
- *interpretation of the primary sources for Bosworth in the light of 15th century military practice in order to calculate possible frontages and formations of the battle arrays*
- *Guidance on military equipment and practice to assist in the interpretation of the probably battle related artefacts and their distribution patterns*

This work would be undertaken by Mark Page a medieval documentary historian. Professor Anne Curry will supervise this work and to provide specialist input on relevant aspects, as well as preparing a contribution to the final report. They will also both provide limited guidance on the interpretive scheme, as appropriate. Additional advice will be obtained from Matthew Bennett, Robert Hardy and other Trustees of the Battlefield Trust as appropriate.

Specific advice on the sources relating to the battle of Bosworth itself will also be provided by Peter Foss, who has conducted the most detailed research on the battlefield so far published.

3. Battlefield: Historic Terrain

The specialist advisor overseeing work in this area will be the Trust's Project Officer, taking additional advice from other specialists as listed below.

3.1 Relief

3.1.1 Viewshed Analysis

To allow detailed analysis of the impact of relief on the tactical battlefield opportunities a high resolution 10cm contouring will be generated from the NEXTmap Britain digital terrain model (dtm) for the whole battlefield. A limited area of data additional to that already acquired by LCC will be purchased, the exact area determined by the terrain survey work and other early pilot investigation. This will enable construction of a 3D model in GIS with the superimposition of the historic terrain and troop deployments within which viewshed analysis can be conducted.

There will be various work required, removing as far as possible the distorting effects of woodland on the dtm and removing the substantial post battle modifications of landform, most notably the railway and canal embankments and cuttings. This data can then be used more effectively in a sophisticated viewshed analysis to consider issues such as the invisibility of potential deployment positions and possibly the impact of relief on the range and effectiveness of artillery fire.[8] An initial viewshed study will then be undertaken once the initial historic terrain data is available, enabling this to inform the further investigations of the battlefield. Then there will be follow up work once the main metal detecting data and other data sets are available towards the latter stages of the project.

This analysis will be undertaken by Mike Athanson, post graduate researcher at the University of Oxford. For details of the scheme of work see appendix 5.

3.2 Geology & Soils

British Geological Survey mapping of the surface geology is already available in digital form from LCC. There is however no large scale soils mapping for the area. Such data will be of high importance both as an indicator for earlier land use, especially marsh areas, but also relevant to the issue of battlefield artefact survival from 1485 to the present.

Understanding the nature of the soils across the battlefield will be an important component of the study, as it will contribute to several themes. Firstly, it will provide contributory evidence as to previous land use. Most notably soils should retain evidence of previous waterlogging and so will provide evidence towards the definition of the former extent of the marsh. Together with the other studies it should also enable any other potential smaller areas of marsh that might accord with the marshy area at Sandyford in which Richard III's horse became mired and where other battle artefacts might have been preserved in a buried soil by alluvium or colluvium. However, due to the progressive nature of silting, especially under man's impact on run off and soil erosion in the catchment area, and also the progressive drainage works, both before and after 1485, will confuse matters and require complementary detailed archaeological investigation by a specialist in palaeo-environmental issues (see below).

Secondly to identify any areas of colluvium or alluvium which may have built up since 1485 and thus have buried battle artefacts and protected them from the destructive effects of mechanical damage in ploughing, but also mask them from recovery through the metal detecting survey.

Thirdly the mapping will contribute information on soil ph, which is discussed below under battle archaeology as a major influence on the preservation of ferrous artefacts, a major consideration in assessing the archaeological potential of and interpreting the results from the survey of the battle archaeology.

The National Soil Resources Institute (NSRI), based at Cranfield University will produce a 1:25,000 scale soils map for a 3*3 km area centred on the heart of the battlefield (see Appendix 3) with the

[8] Trees and especially woods both affect the height recorded in some places and also providing a barrier to viewshed where none existed before, thus as far as practicable all tree data needs to be excluded someway from the model. Account also needs to be taken of the fact that the armies themselves will have carried standards and many troops will have been on horseback so that this should be taken into account when carrying out viewshed analysis to see what troop deployments could have been visible from the enemy positions. It may also be that some form of composite viewshed is needed to show what can be seen from the whole of a battle array rather than just from one point.

potential for a further comparable area to be mapped if required. They hold the national archive of field sheets and other records from the last fifty years of soil survey activity in England and Wales and have some detailed (1:25,000) mapping of the Bosworth area but would need to undertake a limited amount of further fieldwork to complete the mapping. In their analysis the impact of intervening land drainage activities would be taken into consideration in the assessment. The output would be a report by soil specialists, with the aid of the 1:25,000 mapping and probably also aerial photographic interpretation. It would briefly outline the nature of soils in the area, the methods employed to produce the soil map and the assumptions made in coming to our conclusions. The data would be supplied in digital format for incorporation into a GIS.

3.3 Palaeo-environmental

Detailed palaeo-environmental investigation will be undertaken by Andy Howard, Lecturer in Archaeology, University of Birmingham. This element of the study will look at the extent of marsh before 1485, at the time of the battle and at its later drainage. It will aim to provide a reconstruction of both its extent and its likely character in 1485. This will include information on the depth of burial of any 1485 land surface beneath later alluvial deposits, in order to be able to determine where the battlefield artefacts are likely to be in the present topsoil, where they are likely to be buried and how deeply. This evidence would also feed into the work by the University of Bradford on the taphonomy of the battle archaeology (see below).

An initial assessment, comprising three stages, will be undertaken. This includes one day of test pitting; one day walkover to draw preliminary conclusion; two radiocarbon dates obtained because organic sequences tend to range in age across an area due to progressive development. Thermal imagery already produced by NERC for the Bosworth survey will also be assessed to determine if it has a value for the palaeo-environmental element of the project.[9] The conclusions of this pilot work will be presented in a short assessment report (c. 5 pages). This will determine if there is peat/organic silt at this site and whether it is likely to yield palaeo-biological indicators and thus determining which elements, if any, of the quoted full project work are recommended. This report will then be considered by the Project Board in collaboration with relevant specialist advisors, and part or all of the sum specified in the budget for stage 2 will be allocated to realise the identified potential. The details for this element of the work are defined in Appendix 2.

3.4 Landscape of open and enclosed field systems

This section has been prepared in discussion with David Hall FSA, a specialist in open field studies and with Tracey Partida, a specialist in the digital mapping and analysis of historic landscapes. The methodology applied will be that defined by Foard, Hall and Partida for the major Arts and Humanities Research Council (AHRC) historical landscape mapping and analysis project, refined from that which was piloted in the Rockingham Forest Project, which they will be undertaking with Dr Tom Williamson at UEA.

This data set will then be enhanced by more detailed study, undertaken by Dr Mark Page, of the written sources for the medieval landscape, to enable a far more exact reconstruction of the terrain of 1485.[10] In addition, the fieldwalking survey (see 4.5 below) should yield important data on medieval land use, an issue on which there will be consultation with Dr Richard Jones, regarding the results of the

[9] Donoghue et al., 2003
[10] Foard et al., 2004 (unpublished report in Northamptonshire SMR).

Whittlewood Project, which is currently being completed for publication and on which Dr Page was also a key researcher.

Open field landscape

Fieldwork

All five townships, comprising 7244 acres or 29km sq, will be surveyed on the ground by D Hall to record all headlands and other key features, enabling the reconstruction of the open field system. This will be supplemented by him with data from relevant RAF vertical air photography of the 1940s and any relevant later photography. A high medieval land use map will be prepared. A source map will also be prepared. A modern land use map for October/November 2005 will also be produced. All this data is then to be turned into digital form by T Partida, producing furlong maps with schematic strip direction, headlands, slades etc; furlong defined as polygons; land use mapping. The air photos will also be scanned and registered in GIS by Tracey Partida to facilitate further analysis. All this work to be carried out to the methodology and standard defined in the AHRC 'GIS-aided study of agriculture and the landscape in Midland England' project being undertaken at the University of East Anglia.

The open field specialist will consult with Dr Page and the project director on use of documentary data in conjunction with the field name evidence (see below) to prepare furlong mapping including road names and other topographical data as available.

This data, where appropriate, will be added to the digital mapping by Tracey Partida.

Historic documents

Dr Page will work through relevant written documents, under the guidance of the open fields specialist and the Project Officer. The sources will include field books, terriers, charters; extents, surveys, rentals etc. These sources are likely to be mainly at the LRO, but other material is expected in the National Archives and British Library, whilst some additional Glebe terriers may be available amongst the Lincoln diocesan records. Also there will be important documents in some other archives, which will be identifiable through the use of the A2A national web based catalogue. The Assistant will produce all the data in digital form in Word, to enable integration into the digital archive.

The full potential of this element of the research can only be determined after a brief trawl by a specialist of the detailed range of sources available in the local and national collections.[11] This will involve initial examination of range of the documents to assess their content. This task would take a specialists approximately 5-6 days. This will include discussion with Foss whose valuable work was however based largely on the LRO collection. Discussion will also take place with the senior archivist at LRO. A further initial check will be made of Farnham's Village Notes to establish the presence of any major documentary collections in the public records which cannot be identified from online searches.[12]

[11] These proposals for dealing with the documentary sources have been prepared following brief discussion with Professor Chris Dyer, Department of English Local History, University of Leicester.
[12] Farnham, 1933.

On the basis of experience of work elsewhere, it is suggested that if there are a limited range of sources available for the five townships then a period of some 3 months would be adequate whilst if an exceptional volume of documentation was to be revealed then something of the order of 6 months might be closer to the time required.

The research assistant is a specialist used to dealing with agrarian and local history sources. In addition specialist advice on the documentary sources will be sought from Peter Foss, to assist the landscape researcher to pull together the documentary sources from Foss's notes etc.

This work, as with the military history should be expected to provide not just a resource archive of value for the analysis and reconstruction of the historic landscape for the battlefield study. It would also produce a valuable educational and interpretive resource for use in the interpretation of the battlefield and the general earlier and later evolution of the landscape.

Enclosed field landscape

The work in this section to be undertaken by T Partida. It is an essential component both in order to understand the later evolution of the landscape, to be able to explain to the visitor the way in which the terrain has been transformed since 1485 and why. It is also an essential pre-requisite for the accurate reconstruction of the open field landscape of 1485.

Where not already available, digital images will be taken of the relevant historic maps for battlefield townships. These will then be transcribed on screen to the Ordnance Survey 1st edition map base using a standardised battlefield terrain mapping methodology.[13] In the case of Sutton Cheney the enclosure award will be used to complement the evidence of the enclosure map. All field name data will be collected for each township and mapped using polygons for each field separately for the relevant historic map, providing an essential resource for use in the detailed reconstruction of the earlier, open field mapping.

It will also be important to determine the degree to which, in recent centuries, the pattern of streams has been altered by drainage works. The drainage pattern will be mapped from the 1st edition six inch Ordnance Survey mapping, corrected with reference to earlier historic map data where accurate transcription is practicable. This will be supported by mapping of any abandoned stream channels recorded as earthworks of the RAF vertical air photographs of the 1940s.

Understanding the main road system in west Leicestershire in the 15th century will be important in determining the likely approach to the field of both armies, the location of their camps and the tactical decisions made when deploying the armies, as the major road will have been a consideration in this. To assist in this analysis the turnpike road system for this part of the county will be mapped and the historic county maps will be examined to recover, as far as practicable, the pre turnpike road system. Any other substantial constraints in this wider historic terrain will also be mapped from primary and any relevant secondary sources.

All land use information in the tithe maps will also be mapped to the field polygons, because of its relevance to the taphonomy issues discussed below. To supplement this information on land use the 1920s land use survey maps will be digitised to distinguish arable and pasture, and the RAF vertical air photos will be analysed and polygons defined for all the surviving ridge and furrow in the 1940s.

[13] Foard, 2003

On present evidence it is not considered likely that many, if any, of the hedgerows of the enclosed field system, other than in the immediate environs of the medieval settlements, will have been in existence in 1485. It is not therefore initially proposed to conduct a comprehensive hedgerow dating analysis of the landscape, but in early summer 2006, once the key archaeological and documentary terrain data is in, there will a rapid hedgerows assessment by Dr Jackson, University College Northampton, to determine if a detailed survey is appropriate. If the conclusion is positive then the Trust will seek to build upon similar hedgerow research being undertaken in the Edgehill battlefield survey by Dr Jackson working with several suitably qualified local volunteer(s). If suitable volunteer(s) with the requisite skills could be identified then such a survey could be undertaken in year 2, examining selected areas identified from the historic map and documentary study.

3.5 Roman / medieval major road

With the exception of the trenching and test pitting required for the palaeo-environmental survey work (see above) it is not currently felt necessary for any geophysical or trial excavation work to be carried out to clarify the nature of the landscape of 1485, however this view needs to be reviewed at the end of the main phase of terrain reconstruction.

The one exception is the exact location and character of the Roman Road, the Fenn Lanes, where it runs through the marsh. Given the potentially critical nature of this location in terms of the final stages of the battle, particularly the location of Sandyford, a costing has been included for two trial trenches of 10m length to test the potential line of the Roman road where it crosses the marsh. The location and exact objectives of the trenches will be guided by both the results of the historic landscape mapping and by the palaeo-environmental work. It will therefore be undertaken in year 2 at the earliest.

4. Integration

Integration of the evidence of military history with that of historic terrain is essential if the battle is to be adequately assessed. As with the study of any historic battle, the primary objective should be to define the probable initial deployments as accurately as possible within the landscape of the day. For this it will be necessary to take the evidence of military practice in the period in relation to the opportunities provided by the historic terrain (as discussed above under military history). The interpretation proposed will be of very limited detail given the relatively sparse nature of the documentary sources for the military events, compared to later battles. However this hypothesis can then be tested with reference to the battle archaeology, as revealed by the metal detecting survey.

5 Battle Archaeology

The distribution of unstratified military artefacts represents the critical resource of battle archaeology. The artefact pattern must be subject to systematic and accurately recorded survey, to current standards of best practice in battlefield studies. This will then provide the opportunity to test the validity of the interpretation of the battle based on the military history set within the framework of the reconstruction of the historic terrain. Where this has been done at Naseby and Towton, it has enabled a dramatic reinterpretation of the exact location and character of the events of the battle, whereas at Edgehill the study is confirming the broad picture of the traditional interpretation but indicating more subtle but still significant modifications of placing of the events with the battlefield.

In addition there is a proposal for very small scale geophysical and excavation sampling, led to a degree by the artefact scatter evidence and by local tradition and antiquarian reports, to try to identify potential mass grave sites. A volunteer will be sought collate all information on traditional and antiquarian reports and current local stories of potential battle related finds and human remains. Also to carry out any additional searches of primary sources that consultation with Foss and others reveals have not been searched. This is likely to be a very limited

The specialist input on battle archaeology will be provided by the Trust's Project Officer, taking broader advice from a range of other specialists as necessary.

There will be reporting to all landowners at least at the end of each fieldwork season, and more often if appropriate, of the artefacts recovered on their land.

5.1 Metal detecting survey

A new metal detecting survey of the battlefield will form a central element of the investigation. It will be conducted using volunteer metal detectorists, with ideally a team of about 6 or 7, normally working one day each weekend throughout the fieldwork season. The survey team will be built around the detectorists currently working on Bosworth, with who will form the essential core of the detecting team. Additional detectorists will be recruited from experienced and reliable detectorists recommended by FLOs in the region. The Trust would also seek to involve experienced battlefield detectorists from the Edgehill survey to augment the expertise already available, especially after that survey is completed in summer 2006. If practicable an attempt will also be made to involve other metal detectorists from the area in the project, but within a clearly defined framework, to conduct testing of other suggested sites for the battle (see below)

The fieldwork will be carefully planned in relation to the farming regime, in discussion with the relevant farmers, to enable the greatest length of working through the year (for Edgehill it has been possible to continue fieldwork for 10 months) given cropping practices at Bosworth during the life of the project.

The work will be conducted under the overall management of the Project Officer, with day to day supervision normally by LCC staff, but with specific supervisory responsibilities being taken by one or more of the volunteers. All data download can be carried out by the supervisor but data import, processing and archiving will be carried out by the Project Officer to ensure a full control of the developing data set. As with the Edgehill survey the Project Officer will undertake metal detecting on the survey, especially during the early stages, in order to ensure his input in to the decision making processes over methodology is fully informed. It will also ensure more realistic assessment of the constraints and influences on recovery rates etc. This is essential given the critical, cutting edge character of this element of the Bosworth investigation.

Survey and recording techniques will be based around the Battlefield Trust's Edgehill Survey, where a team of volunteers has been working almost every Sunday for the last 10 months in a systematic survey under the direction of the Trust's Project Officer. This survey methodology is detailed on the Edgehill Survey web pages on the UK Battlefields Resource Centre.[14] It has been developed with reference to the experience gained in battlefield research in the USA[15] and in the surveys of other English

[14] http://www.battlefieldstrust.com/resource-centre/civil-war/battlepageview.asp?pageid=542&parentid=500
[15] E.g.: Scott, 1989

battlefields. [16] It will be further refined with reference to the dramatic results currently being achieved on the 15th century battlefield Towton (North Yorkshire, 1461).[17] Both Richardson and Sutherland, who are responsible for the Towton survey will advise on the Bosworth survey and provide specialist training at Towton for the Bosworth metal detecting survey team.[18] However the first step will be to assess the result of the 2004-5 fieldwork conducted at Bosworth before finalising the exact fieldwork arrangements for an initial month of survey work. This will be followed by a rapid review leading to appropriate modification of the method to meet problems and potentials recognised, and in the light of the training at Towton and the specialist input from Simon Richardson. The Edgehill survey is at 10m transects but for the Bosworth survey the interval will probably need to be at 5m intervals. However this should be finally determined after detailed discussion, taking into account the methods applied effectively on other battlefields of later date and taking account of the special circumstances of this site and battlefields of this period.

It is anticipated, based on the Edgehill survey, that a volunteer detectorist working at 5m transects should cover on average 0.75 ha per day. A team of 5 thus cover 3.75 ha per day. Allowing up to 40 survey days in a fieldwork season then 150 ha should be covered. Overall this may enable up to 450 ha to be surveyed in the life of the project. However given the need for more intensive and all metal re-survey of specific areas it should be anticipated that up to circa 300 ha may be covered by standard reconnaissance survey with the remainder of the work being specialised, more intensive re-survey of key areas, including all metal survey. The exact detail of this programme can however only be determined after initial pilot work and then periodic review.[19]

Intensive work will lead to substantial wear and tear on volunteers' equipment and other costs. It is proposed that nominal expenses are paid to each based on the number of days they spend on the survey during a fieldwork season. An initial sum of £2000 has been allocated for this purpose, and we will also seek further support from metal detector companies as received for Edgehill, but this may need to be enhanced after close monitoring of the actual costs being incurred.

All artefacts retrieved should be accurately plotted using GPS. Metal detecting should be by highly experienced detectorists. Guidance is to be provided by a metal detectorist with demonstrated specialist expertise in the systematic investigation of battlefields working in collaboration with the project manager. Survey will be undertaken according to a systematic method ensuring even coverage of the area and with accurate recording of the time spend in each area, using the continual logging system provided by GPS units. Only a small number of detectorists will be used and the efficiency of each should be assessed by the comparative assessment of the nature and quantity of the artefacts recovered by each. All potentially significant artefacts will be individually bagged and located to ± 5 metres using Garmin eTrex Venture GPS units employing the Wide Area Augmentation System (WAAS). The Edgehill study has shown that an off the shelf download software can be made to work but has demonstrated the desirability of a more efficient and simple tailor made download software. We will

[16] Foard, 2005b. For USA see for example Scott, 1989; Haecker and Mauck, 1997.
[17] Sutherland and Schmidt, 2003; Sutherland, (forthcoming).
[18] Sutherland, (forthcoming)
[19] Assume average of 5 detectorists for 1 day each weekend with 5-6 hours detecting per day.
Basedon Edgehill survey 1500m per full 7.5 hour day maximum; thus 5 hours gives 1000m
Average of c.200m per hour (including breaks, setting out grid etc) for full day average of 5 hours:
At 10m transects = 1.5ha per day (1ha = 1000m @ 10m transectd)
At 5m transects = 0.75 ha per day (1ha = 2000m @ 5m transects)
At 2m transects = 0.3ha per day (1 ha = 5000m at 2m transects) giving full coverage of ground surface

therefore seek to commission from within the IT budget the writing of such a specialised download programme if this proves to be the most cost effective approach.

The problems of survival and interpretation of artefacts has already been explored at Towton, another Wars of the Roses battlefields. This has shown that items of personal equipment, especially non ferrous items, will be a major component of the project study, enabling the location of the core of the action. All detecting will therefore be undertaken in discrimination mode to exclude as far as practicable ferrous signals. This is essential given the quantities of later ferrous items on most fields. Only in this way will a reasonable rate of coverage be achieved in the survey. Once one or more foci of probable battle related artefacts is identified and this considered in the light of the terrain research, then intensive all metal survey can be undertaken on specific areas, a procedure followed on the Towton survey. It is in this way that realistic intensive survey can be undertaken to search for arrowheads. The Towton results have yet to be fully analysed and published but guestimates of recovery rates suggest in core areas of the action, a relatively restricted part of the battlefield, as many as 3 or 4 battle related artefacts may be recovered in 10 man hours, both ferrous and non ferrous. In contrast, in lower density areas a recovery rate of less than 1 artefact per 10 man hours survey may be expected.

The interpretation of the finds distribution will be dependent upon control information from a representative transect of nearby landscape which was certainly not involved in the action. This will enable the variable density of artefacts and the range of types in different types of location and deriving from manorial and other domestic deposition activities in the 15th century to be determined. Composition and density will be expected to vary significantly from areas close to the villages through open fields and into areas not under cultivation at the time, including meadows. Ideally therefore this control sample should be from one of the townships where the medieval landscape is to be reconstructed. The most likely sample would be Upton this provides a substantial area clearly beyond the action but covers broadly similar terrain. However it may be more efficient to choose a location on one of the other suggested battlefield sites, probably that defined by Jones and Austin, if in consultation with them a more discrete and realistic area for testing for battle archaeology can be defined.

All finds to be washed and re-bagged and boxed by volunteers following training by the Project Officer and FLO, all in accordance with the Portable Antiquities Scheme guidelines. All relevant finds will be photographed in digital form by volunteers trained by the FLO. It is assumed that artefacts will be housed in the Battlefield Centre, when they are not required for specific identification and research or for remedial conservation work, and that space will be provided in the Centre for processing, basic analysis as well as storage of the collection.

Initial induction will be provided for all metal detectorists in the survey, including health and safety / risk assessment advice. In addition they will be given training on the methods of survey and matters such as the reinstatement of the ground. The latter will be under constant review during the survey work by the LCC officer, Project Officer or, in their absence, by the supervising volunteer metal detectorist. All work will be undertaken within the Battlefields Trust's guidelines for battlefield survey, which takes account of the requirements of the Treasure Act, and every detectorist will be required to sign a formal agreement, based on the Trust's Agreement form, which will be modified if necessary in discussion with LCC (see Appendix 6).

The focus of investigation will be initially the site identified in the 2004 Assessment Report, with limited sampling also taking place on the Ambion Hill site. Other locations within the Bosworth area that have been proposed by Jones, Austin , Wright and others will be considered for sample metal detecting survey, possibly using additional volunteer metal detectorists, enabling a wider involvement

of metal detectorists for the area in the survey project. However the practicalities of such involvement and of survey in these other locations will need to be reviewed during the pilot phase and following discussion with the proponents of the other sites.

The objective of the survey is to advance understanding of the battle and thus no intensive work will be undertaken on sites of other period that are revealed in the survey, but the artefacts recovered in the standard reconnaissance will need to be processed as is any other material. An assessment will also be undertaken prior to fieldwork to establish any constrains on survey work, including SAMs, SSSIs and other important sites which should not be disturbed. A check will also be made for any Agri-environment (Stewardship) agreements using Magic online GIS and wit the landowners. If any are extant within project area then consult with DEFRA and in cooperation with the relevant landowner(s), submit request for exemption to allow survey, under the new DEFRA archaeological survey procedures.

5.2 Fieldwalking Survey

Systematic fieldwalking will be undertaken with the local volunteers from the Leicestershire network developed by LCC. These will test sample areas of the battlefield and of other sites (as in the metal detecting sample), to provide data on probable land use of the 15th century and to provide a control as to the likely intensity of manuring at that time and more widely in the medieval and post medieval period. This should assist interpretation of the relative density of metal finds to be assessed in terms of the likely manuring origin of the finds as opposed to battle related origin. Initial pilot work to enable comparison in first major project review (Jan/March 06). The survey methodology will be that developed by Liddle but with mapping undertaken in GIS with the detailed digital format being agreed in discussion between Liddle and the Project Officer at the outset of the project and reviewed after the pilot phase. This system will be defined so as to enable effective and efficient comparison between the metal detecting data set and the fieldwalking data set. The Project Officer &/or digital mapping specialist will also provide basic training in GIS for volunteers who will input fieldwalking data. Fieldwork and processing will be supervised by LCC staff.

5.3 Taphonomy: post depositional factors

There is the need to take account of the likely post depositional effects of land use change (development and quarrying included), the effects of subsequent collection of objects and other impacts such as soil pH, past land use and chemical application, on the survival of the unstratified, and to some degree the stratified, artefacts. Only with such information will it be possible to understand the nature of the distributions of unstratified artefacts collected in the survey. If particularly difficult conditions are encountered in some parts of the battlefield then it may be shown that ferrous and even in some cases non ferrous artefacts may not have survived in the topsoil from 1485.

The work has been defined as a staged programme, with initial scoping work that will then be refined and developed as results progress. An initial phase 1 piloting of the methodology is included because there has been no previous work of this kind on medieval battlefields in the UK. The specialist lab work is integral to the package with Janaway developing the ideas at each stage and key decision-making taking place between him and the project board. There will be will be consultation with the specialists at the Royal Armouries, especially Dave Starley, who has undertaken detailed analysis on the Towton arrowheads, as and when appropriate.

The section of the proposal has been prepared following discussion with Rob Janaway, Department of Archaeological Sciences, University of Bradford. The detailed proposal presented in appendix 4 is presented there in the form of a staged process of evaluation and implementation. However it may be that their contribution is merely complementary, building upon their experience working on the Towton battlefield finds. It may also be possible to secure Natural Environment Research Council (NERC) small grant schemes funding for some of the more detailed work, for instance more detailed soil chemistry, but such an application cannot be put together until the first stages of fieldwork and assessment are completed.

The material of which the item was made will be critical to the length of time it survives. So too will be the soil conditions since the battle, including soil pH[20] which may have been modified in recent times by agricultural practices such as liming; the impact of modern farming chemicals; whether stratified or not and whether the land has been cultivated or not, with all the resulting impacts of mechanical damage. For the organics there may be exceptional survival if waterlogged conditions remain in part of the former marshland, but such conditions are relatively rare. For the ferrous items in particular there is a high vulnerability to both oxidisation and then to mechanical damage, especially when oxidisation has progressed a long way. Only the largest of items such a round shot will be relatively persistent unless there are special conditions enhancing preservation. For non ferrous metals the survival will generally be very good, for items such as personal accoutrements in bronze etc and especially if in precious metals, but also for projectiles of lead.

Depth of burial will be a factor on some battlefields, especially if there has been alluvial or colluvial deposition, protecting the artefacts from mechanical damage. But such burial will also cause problems in the recovery of those artefacts. A strategy has been defined to identify those deposits, firstly to explain absences in the recovered distribution pattern of unstratified artefacts; also to identify the potential for exceptional preservation. Which will then enable the assessment and investigation of the buried material. Such deposits may prove of exceptional value because they may preserve surfaces largely unaffected by the destructive effects seen on most battlefields. It will be at the transition zones where the unprotected become the protected buried battlefield surface that investigation will be most practical. However given the burial is likely to have been a long term process in most cases, especially if resulting from alluviation or colluviation, then it will be the more deeply buried of the areas that will have been protected for the longest period. In this context it will normally be in the valley situation that protection will have occurred.

Finally there is the problem of removal of material from the battlefield from the day of the battle onwards, right through to the archaeological and non archaeological recovery of the evidence.

A strategy of assessment:

- Soil pH: general assessment based on the geological and soils mapping (see above); case study testing to be undertaken in the field, combined with testing of artefact preservation.
- Compare preservation in buried and unburied topsoils; also where the land has and has not been under pasture for long periods since the battle.

If Bosworth battle archaeology is on Greenhill and does extend beneath the alluvial deposits then the site may prove to have an exceptional potential to contribute to the understanding of battlefield artefact

[20] Acidity or alkalinity the soil is defined numerically as a pH level, expressed as the logarithm to the base 10 of the reciprocal of the activity of hydrogen ions, with a pH of 7 being neutral, acidic being less than 7 and alkaline greater.

survival rates. This would be enhanced further if waterlogged conditions also prevail. Not only would this offer good preservation of battle archaeology, it may also enable the recovery of detailed information on land use character in 1485, complementing any documentary evidence as to land use. In addition there are in this area a number of fields still under pasture with surviving ridge and furrow, possibly not ploughed since the battle or at least since enclosure in the 17th or early 18th century. Again this should protect any battle archaeology. We may therefore be able to compare the processes of artefact degradation between the 15th and 21st centuries under different environmental conditions. Such understanding is critical to the interpretation of battle archaeology not just at Bosworth but across the country.

Past agricultural practices, particularly in the second half of the 20th century will be important to determine. There is a project here which may be suitable for a competent volunteer, to contact and discuss the issues with all the farmers and tenants in the project area. It may however in the end prove more effective for this contact to be made by the LCC officer who conducts all other liaison with the landowners.

5.4 Artefacts

Artefact Identification & cataloguing

All finds work will be conducted in line with PAS finds guidance and, where appropriate, IFA Guidelines for Finds Work. All pottery and, as appropriate, other finds will be marked with the site code and spatial reference number in accordance with current LCC practice. For the metal detecting survey specific numbering etc on the bags will be in accordance with the Trust's battlefield survey practice, as applied in the Edgehill Survey, thus fully coordinated with the GIS and PAS database records.

Initial guesstimates from identification by the Finds Liaison Officer (FLO) for Leicestershire and Richard Knox of LCC of a sample of circa 500 objects collected in the survey so far is that perhaps as little as 1% are likely to be battle related. In addition there are circa 2-3% that might prove to be battle related but would need examination by a specialist in military material of the 15th century to determine if they can be securely identified. Of the rest a substantial proportion are of post battle date, many of modern date. Thos of modern date will not be logged in the GPS system but the quantity of those of modern date recovered by each detectorist from each field each day will be recorded and the objects then discarded. All other finds will be logged and these should be recorded as they may yield information on the recovery and preservation rates in different parts of the battlefield, valuable information in judging the variable efficiency of the survey and of the preservation conditions. The detail of the discard policy should be agreed in discussion between the Project Officer, FLO and CAO.

Experience from the Edgehill Survey has demonstrated that it is essential that initial recording be on GIS to enable correlation of the GPS data with the finds themselves. This must all be completed within a week of the data being collected from the field to enable the download and correlation to be validated before the GPS units are zeroed for the next days' fieldwork. As part of this process the finds will be re-bagged and the bags annotated with the reference numbers, NGR etc derived from the GPS/GIS data. Any problems with correlation can then be referred back to the detectorists which the day's survey work is fresh in their minds.

It is anticipated, following discussion with the FLO and with the IT specialist at the Portable Antiquities Scheme (PAS) that it should be possible to exchange data between the GIS and the PAS

database, to enable more effective cataloguing of the Bosworth Survey finds. Subject to discussion during the pilot phase, the FLO will carry out the initial finds identification, assisted by the SMR Officer as appropriate. Paper records will be prepared for each artefact based on output from the GIS which matches the PAS record system. The data will then be entered onto the PAS database using an online input system on a computer with internet link at the Battlefield Visitor Centre. This data will then be validated by the FLO using the existing validation process for work by volunteers. Similarly all the artefacts determined by this initial identification as being of potential significance for the battlefield study will be photographed by a volunteer, the digital image then being loaded with the other data into the PAS database. Training for the volunteers will be provided by the FLO. All this fids data will need to be held in the GIS as well to facilitate spatial studies. Additional information not required by the basic PAS records but essential for the project will be added, such as issues of condition relevant to the taphonomy study (see above).

Once the potentially military artefacts of 15th century date are identified by the FLO / SMRO then a follow up specialist identification is required. The Royal Armouries, Leeds will provide specialist identification of military artefacts of the 15th century from the Bosworth study. Any artefacts of importance which require specialist reporting but for which this cannot be undertaken by the Armouries or others providing resources in kind, then reports will be commissioned. In a very small number of cases the photographic record may not be adequate for publication purposes and there again finds drawings may need to be commissioned. Such additional work would need to be funded form the contingency.

Conservation issues

On the basis of the assessment noted above and also by reference to the Towton battlefield survey, the numbers of battle related artefacts likely to be recovered in a three year survey programme are likely to be numbered in hundreds rather than several thousands.

Remedial conservation will be undertaken only where essential. Given the number of artefacts likely to be generated by the project a very selective, targeted approach to conservation needs to be applied otherwise the costs will be prohibitive. It is suggested that only artefacts that are highly likely to be battle related should normally be conserved from the battle survey finds. The FLO in consultation with the Project Officer should identify all objects requiring and worthy of conservation. These should also be validated by the specialists at the Armouries or other relevant specialists before conservation is approved and funding allocated. It will also be essential to agree a discard / non conservation / non reporting policy between the FLO, Project Officer and Leicestershire Museums Service.

It is initially proposed that remedial conservation work will be undertaken by Bradford University, on a consultancy basis, because of the key role in taphonomy being taken by Rob Janaway in the same Bradford Department and thus the complementary nature of this work should give added value to the work. However an alternative, marginally cheaper quote has also been obtained from Julia Park. It is proposed that this issue be subject to further consideration with LCC when the first batch of material is identified for conservation in the light of any requirements that LCC have for display quality conservation work on some of the artefacts. A turn round time of 3 months would be expected on average for such work. For all ferrous finds xrays would be produced, where not already dealt with through the taphonomy component of the project, and the plates, normally with a group of objects on an A4 sheet, but with full size plates where any large objects are concerned, will form a part of the project archive together with the conservation records.

No costs have been included for display standard conservation work as this is anticipated as being a responsibility of the 'interpretation' project. Similarly long term archiving of the artefacts is taken to be the responsibility of Leicestershire Museums Service.

5.5 Geophysical survey & trial excavation

This strategy is proposed in order to assess the potential of several mass grave sites that have been reported in the literature, as reviewed in the Assessment Report, and which may be expected to be revealed by more intensive study of the wide range of sources on the battle and battlefield and possibility even by the intensive study of the documentary sources for the late medieval and post medieval landscape. The strategy will also take account of the results of the metal detecting survey and terrain reconstruction. It is therefore anticipated that all this work will be undertaken in the third year of the project.

Implementation would need to follow a reconnaissance stage, assessment of potential and then allocation of detailed geophysics and then reassessment and allocation of appropriate scale of trenching. The investigation for mass graves may be supplemented by the use of phosphate sampling, which has been used on several battlefields in the USA, but the suitability of this technique in the present case will be investigated as part of the work undertaken by the Trust's Project Officer in the English Battlefields Resource Assessment, for English Heritage in 2005-2007, which includes consideration of methodologies applied in the USA and Europe. The detailed geophysics and trenching methodology will be defined in the later stages of the Bosworth investigation with reference to the results of comparable research investigations currently underway by Sutherland at Towton.

Geophysical survey

The location of mass graves is a particular problem in battlefield studies. Research is to be undertaken into the issue on a national scale by the Trust's Project Officer as part of the Leeds/English Heritage battlefields project, and this may assist in the reconnaissance for the sites at Bosworth. Of even more importance will be the results of the ongoing research at Towton, where Sutherland is using a combination of geophysics and trial trenching in addition to metal detecting results, to identify mass graves. Given the important results being achieved, Sutherland has been included here as the contractor for the geophysical survey and trial trenching work at Bosworth.

Geophysical survey is the most appropriate technique to search for mass graves using magnetometry followed by selective resistively. Such survey work is time consuming and, because it all would have to be conducted by a specialist, would be expensive. If used it must be closely targeted. It is suggested that, if the review of past evidence enables the location of the possible mass graves to be tied down to a close location requiring no more than 1 ha to be surveyed per grave site then it will become practicable.

Once the potential locations are identified with sufficient accuracy then it is possible to use geophysical survey techniques to test for the presence and exact location of any anomalies which might represent such mass grave pits. At present the exact targets to be investigated cannot be identified with certainty. What is provided here therefore is a contingency figure of both reconnaissance magnetometry and then detailed magnetometry and resistivity. Similarly the detailed strategy for geophysics can only be defined when the exact targets have been defined. AT that point a detailed specification for the work will be produced by the sub contractor in consultation with the Trust's Project Officer and LCC.

Trial trenching

The objective of the overall project is to define the battlefield and the distribution and nature of the action within the historic landscape. As part of this it is highly desirable to identify the location and confirm the potential of mass graves relating to the action. However this work should not include detailed excavation of any burial site related to the battle that may be located. Such investigation is a very specialist and expensive task that should be conducted to the highest standard within a specially defined and quite separate research project.

If any human remains are revealed in the trial trenching then it is not intended that they be lifted, unless there are overriding conservation reasons to do so. In these circumstances then in accordance with section 25 of the Burial Act 1857, and in line with local environmental health regulations, a Home Office license will be obtained. If this does take place then specialist advice on palaeo-pathology will be provided by Malin Holst of York Osteoarchaeology, funded from the contingency.

In addition the trial trenching will need to assist in the metal detecting testing of any areas of probable battle related artefacts which extend to the edge of alluvial spreads. Trenching will be undertaken in collaboration with metal detecting, on a 10 cm depth spit basis, to test the alluvial periphery for exceptional survival of artefacts beneath the alluvial protection. Implementation is anticipated to be in year three and the methodology will need to be determined using the results of planned work of a similar nature by the Trust as part of the Edgehill survey in 2006.

There may also be other targets for trial trenching identified during the other elements of the investigation programme. It is therefore impossible at this stage, prior to any intensive mapping or field survey, to provide exact costings for archaeological trial trenching to test the various anomalies that may be revealed by geophysical survey work or other targets. However the trial trenching needs can be defined in broad terms as the targets are likely to be relatively limited in nature. A total of 100 metres of trenching is proposed. This includes the cost for the trial trenching listed above in connection with the assessment of the Roman road and the assessment of finds survival issues.

The detail of the trenching methodology can only be defined later in the project when the aims and objectives of each trench is clearly defined. At that stage a detailed specification for this work will be produced by the sub contractor in consultation with the Trust's Project Officer and LCC.

Given the substantial health and safety issues that surround trial trenching compared to other aspects of the survey, it is not anticipated that volunteers will be included in this element of the fieldwork, with the very specific exception of the metal detecting task.

6 Outputs

Analysis and reporting will be undertaken progressively during the life of the project. Interim reports will be prepared at the end of each fieldwork season. The first interim will include the results of a substantial analysis of the historic terrain work and the initial military history research, together with an overview of the first year's metal detecting and fieldwalking results. The second year review will integrate with a key phase of reassessment and enable the strategy for the final year to be clearly and concisely defined. Each interim will be prepared in draft in advance of the annual seminar, where the results will be presented and discussed. The interim report will reflect discussion at the seminar in defining the coming year's fieldwork. In addition the project will be subject to international review

with a field visit being built in to the International Fields of Conflict IV Conference to be held at Leeds in September 2006, for which the Project Office is a joint organiser.

The final report will be prepared under the editorship of the Project Officer towards the end of the final fieldwork season in 2008, with again a discussion at the end of project seminar after which relevant revisions will be made to the report.

6.1 Report formats

It is anticipated that technical elements of the project will be published by the various specialists in a number of individual articles in academic journals. Publication of the overall report of the project may be achieved in various forms but at present no vehicle can be realistically approached. Examples of publication vehicles are Oxbow, who produced the Towton battlefield volume,[21] and possibly the Council for British Archaeology who run a publication series. Alternatively Internet Archaeology might be a suitable vehicle as so much of the data will be in digital form. The latter could then be linked through to a digital archive for the project which should be held by the Archaeology Data Service, York University, which also runs Internet Archaeology.

The full, 'unpublished' technical report will be produced as a word document, with an Adobe Acrobat copy incorporating all illustrations, for delivery over the web and on CD. Copies of these will be deposited at the Battlefield Visitor Centre, with the SMR, English Heritage and the Battlefields Trust. It is assumed here that the costs of all web delivery of the results of the project will be incorporated into the design of the website for the interpretive scheme. Where appropriate the Trust can also mount technical reports and popular reports on the UK Battlefields Resource Centre web pages, alongside the reports n the Scottish and English battlefield studies that will also be mounted there on behalf of Historic Scotland and English Heritage.

An overview article will be prepared for publication in a national or international journal, possibly the *Journal of Conflict Studies*, with an appropriate report also being proposed for the *Transactions of the Leicestershire Archaeological and Historical Society*.

At this stage no detailed costings can be prepared for paper or digital publication of the report as the scale and nature of the reporting will depend to a great degree upon the nature of the results. Costs for publication should be allocated from within the contingency sum and initial discussion should be held at the end of the first season's fieldwork. All mapping will be produced in digital format from GIS. It is also anticipated that a photographic record will be adequate in most cases from finds, but in important cases where photography of artefacts are not adequate for reporting purposes then specific finds drawings will be commissioned from a suitably qualified specialist, funded from within the contingency.

Copyright in the final report would normally rest with the Battlefields Trust as contractor granting a licence to Leicestershire County Council and their agents to use and reproduce the material contained within the report. However the matter of intellectual property rights will need to be subject to detailed discussion between the parties, given the interests of LCC, the significant component of 'in kind' and volunteer work incorporated in the project design and the degree to which the work will draw upon experience, methodology and data from other research programmes, including work in various universities and work funded by English Heritage and others.

[21] Fiorato et al., 2000.

6.2 Research Archive

All data will, wherever possible, be collected and prepared in digital form. All mapping will be conducted in GIS using MapInfo. The Ordnance Survey Landline or Mastermap digital mapping will be used as the modern map base for all work, however for the historic terrain reconstruction the map base will be the 1st edition six inch (1:10,560 scale) Ordnance Survey maps warped and registered in GIS.

As data collection proceeds metadata will be prepared which conforms to the Dublin Core, MIDAS and other related standards, as recommended by ADS. This will be reviewed and enhanced as necessary in the final archiving stage of the project.

A research archive will be compiled from each element of the research. The military history research will consist of a full bibliography of primary and secondary works on the battle; a comprehensive collection of transcripts and translations of primary sources; and a full collection of copies of the secondary works. That from the investigation of the historic terrain will, where possible, include copies of all relevant documentary data on the historic landscape, where appropriate with transcriptions and/or translations. That from the archaeological survey will include comprehensive records of all archaeological data for the battle, including digital photographs of all significant artefacts. This research archive will be in digital form, as far as practicable and allowable within copyright restrictions and permissions. It will be delivered on CD to researchers, and also in the Visitor Centre and as far as practicable over the web to make it accessible to a wider educational and public audience. As such it will form a valuable component of the interpretation as well as the battlefield investigation.

All original data collected by the project will also be submitted to the SMR and for long term digital archiving by the Archaeology Data Service (ADS) at the University of York.

Digital data management

There will be an ongoing requirement for the efficient management of the digital data generated by the project. This will include the integration, and where necessary conversion, of digital data sets provided by various contributors as well as digitising of specific data delivered in non digital form by any specialist. There will also be regular processing and integration of GPS survey data and finds record data (output from the Portable Antiquities Database) into the GIS. Metadata will be prepared for the data sets as the data is collected and then reviewed and validated in the archiving stage.

With the exception of the PAS database, the master data set will be held on the Battlefields Trust computer system. During periods of data collection, data will be backed up according to the Trust's established backup system. That is backed up on a daily basis using the Maxtor OneTouch system to an external hard drive. Data will also be backed up on a weekly basis to DVD and these rotated on a monthly basis, with one copy taken out for secure storage away from base (the suggested remote site is the Battlefield Visitor Centre). During the periods of data collection, on at least a monthly basis all project data from computers at the Visitor Centre will be integrated into the main data set held on the Battlefields Trust computers, for backing up of the full data set. The computers at the Battlefield Visitor Centre will also be updated from the full data set.

APPENDIX 2: ENVIRONMENTAL SURVEY

1. Introduction

The palaeoenvironmental survey has a number of discrete aims:

- To reconstruct the development of the valley floors in the vicinity of the battlefield site, in particular the timing of alluviation and incision events which may affect the preservation and prospection of archaeology around Bosworth.

- To identify the thickness and extent of wetland (marshy) deposits (peats, organic rich silts and clays) in the low-lying alluvium filled stream bottoms in the immediate vicinity of key localities and the wider battlefield environment.

- To date these marshy deposits using radiocarbon techniques to determine whether any recorded wetland deposits are broadly contemporaneous with the date of the battle.

- To assess from dating, whether there is the potential for buried land surfaces in the valley floors, which are broadly contemporaneous with the battle and on which evidence of the battle may be preserved.

- To recover organic deposits and undertake detailed palaeoenvironmental analysis using insects, pollen and macroscopic plant remains to reconstruct the landscape around Bosworth during the 15th century.

2. Methodology

A three stage approach is suggested for the environmental survey

A. Initial assessment of the site by walkover survey and ground inspection followed by a limited programme of test pitting (1m X 1m) and cleaning of ditch sections (1m wide) using a machine excavator (JCB) to provide a base-line stratigraphy for the site. A maximum of three days is suggested for this work, which includes recording of test pits (it is estimated that up to five test pits could be dug in a single day). In addition there would need to be a visit if and when the Roman road alignment across the marsh was being trenched. This should however follow stage A.

B. Supplementary augering (maximum of 5 transects to a depth of 2m [this assumes contingency will be used]) to complement test-pitting results. The position of these transects will be determined following initial evaluation and discussions with other members of the project team. Augering will be undertaken using variable size gouge augers and the stratigraphy recorded using standard geological descriptions.

C. Once a model of site stratigraphy has been established, a single day will be spent machine test–pitting to recover bulk organic samples for environmental analysis. It is suggested that a maximum of two organic rich profiles are studied in detail.

3.2. Pollen Analysis

It is suggested that a maximum of 10 pollen samples are studied in detail from up to two organic profiles.

3.3. Macroscopic Plant & Insect Remains

As with pollen, it is suggested that a maximum of 10 samples are studied in detail for insects and plant macros. from up to two organic profiles.

Nominated Palaeoenvironmental Specialists

Dr David Smith, Institute of Archaeology, University of Birmingham (insects)
Dr Wendy Smith, Institute of Archaeology, University of Birmingham (plant remains)
Dr James Greig, Institute of Archaeology, University of Birmingham (pollen)

Radiocarbon dating will be undertaken by Beta Analytic Inc., Miami, Florida, USA unless undertaken by English Heritage.

Dr Andy Howard
Dept of Archaeology
University of Birmingham

APPENDIX 3: SOIL INVESTIGATIONS

It is assumed that the field of investigation is a 3*3 km area around centroid SK400010. NSRI has 10 – 15 observations of soils within this area from the Naitonal Soil Map and there is a detailed 1:25000 published map of SP39 that fors the SW quandrant of the area.

The general pattern of soils is lime-rich glacial tills in the wider area with an island of soils from Permo-Triassic rocks in the immediate vicinity of the battlefield. The alluvium along the stream running SW from the Duckery is not delineated on the National Soil Map.

Description of general soil conditions across the 3*3 km area
We can delineate the general pattern of soils across the area and describe their properties including soil water regimes from existing records and a single day of targetted field work. The day in the field would be focused on areas of key importance following discussions with the contractor.

Dick Thompson
National Soil Resources Instutute
Cranfield University
Silsoe
Bedfordshire

APPENDIX 4: ASSESSMENT OF CORRODED FERROUS ARTEFACTS

The study of the ferrous artefacts in terms of their technology, condition and field burial conditions for the battlefield provides a number of important scientific opportunities. Firstly this integrated study will allow for assessment of the quality of other battlefield metal find spots. Secondly the metallographic analysis of a large finds group, for instance arrow heads, will facilitate an evaluation of metallurgic variation which of interest both in terms of technological history and corrosion potential. The strategy is to utilise radiography to screen all battlefield ferrous artefacts, and then to study in detail a sub sample using metallography and chemical analysis. This is critical if the condition of the objects is to be directly related to the depositional chemistry of the soils from which they come.

The following phases of evaluation and implementation are proposed:

Phase 1: Metal detector survey followed by radiography of the metalwork, possibly just a sample representing the probable battle material.

Phase 2: Interpretation of artefact distribution based on finds location, condition score, ratio of ferrous to non-ferrous finds overlaid on the land use data.

Phase 3: A number of specific field areas selected for detail study. This based on artefact survival, poor condition or absence. Collate 20th century farming records, including ploughing, differential use of agro-chemicals etc. From these areas a subset of ferrous metals to be selected for more destructive sampling (the absolute numbers will depend to a large extent the number of field areas used) to characterise the nature of corrosion and in particular chlorides, but also to examine the metallurgy. It might be appropriate to select a limited artefact type, such as arrow heads, if they are found. It is important to know the details of metallurgical structure, for instance the quantity and distribution of slag inclusions, as this has a bearing on the corrosion.

Detailed specification:

Stage 1 : X-radiography and general assessment of condition (conservation assessment)
Assumption that between 200-400 artefacts will be recovered

This is an essential base-line study of the metalwork recovered by the metal-detector survey. Conventional film radiography will be undertaken in a Faxitron Industrial X-radiographic unit. This will provide a permanent film record of the penetration of corrosion into the metallic core relative to the original surface as well as provide an additional interpretative tool for more heavily corroded fragments. All metalwork recovered from should be stored according to current best practice in sealed polythene boxes and desiccated with silica Gel packs to below 15% relative humidity and radio graphed as soon as possible after recovery. This should include all battlefield related ferrous metalwork.

R.C.Janaway

Lecturer in Archaeological Sciences
School of Archaeological, Geographical and Environmental Sciences
University of Bradford

APPENDIX 5: 3D MODELLING AND VIEWSHED STUDY

I. Outline

1. Given the historical landscape data and historical interpretation of the battle, calculate binary viewsheds from points, lines, areas on the reconstructed site, representing possible positions of combatants at various stages of the battle.

2. Modify viewsheds as necessary to accommodate obscuring topography, e.g. hedgerows, stands of trees, etc; ambient conditions; effects of distance - if these are relevant

3. Document the analysis with respect to spatial data quality

4. Stylise and render the viewshed data as map images

5. Write an analysis of the visibility conditions on the site, focusing on what parts of the reconstructed site are visible from where, possible impact of "modifying" factors (2), and general conclusions about relevance of visibility to the battle interpretation

6. Once the battle archaeology data is available, reiterate the analysis as needed

7. Depending on battle archaeology, model possible trajectories of recovered projectiles, using exterior ballistics and considering visibility of targets. Or, given firing positions, determine fields of fire.

Subject to negotiation in AY 2007-8, incorporate analysis of trajectories into my DPhil thesis (to be submitted mid to late-2008)

II. Source Data

1. NextMap Britain DTM
2. Historic landscape data
3. Historic interpretation of battle (for initial analysis)
4. Battle archaeology data
5. Archaeological interpretation of battle (for revised analysis)

The battle interpretations needn't be too specific, but should identify possible troop posistions for study.

III. Deliverables

1. Viewshed data (GIS format)
2. Viewshed map images
3. Metadata / documentation
4. Written analysis of results (c. 5000 words?)

IV. Schedule

1. Spring / Summer 2006: Historic landscape data gathered
2. Academic Year 2006-7: Visibility analysis, based on historic data
3. Academic Year 2007-8: Battle archaeology data gathered
4. Spring / Summer 2008: a) Revision of visibility analysis, based on battle archaeology;
b) Modelling projectile trajectories

APPENDIX 6: METAL DETECTING GUIDELINES AND AGREEMENT

www.battlefieldstrust.com

31/07/2004

GUIDELINES ON METAL DETECTING ON BATTLEFIELD SURVEYS UNDERTAKEN BY THE BATTLEFIELDS TRUST

1. Introduction

1.1 Metal detector users play a central role in battlefield survey. Across the world, collaboration between them and battlefield archaeologists has led to the recovery of a wide range of data which is transforming our understanding of past military action.

1.2 This document has been prepared by **The Battlefields Trust** to define how it aims to achieve the most fruitful partnership between *bona fide* detectorists and archaeologists in battlefield survey projects. It should be used in conjunction with the Trust's battlefield survey methodology statement and any specific method statement prepared for an individual survey.

2. Project Coordinator

2.1 All battlefield surveys or excavation projects involving metal detector users will have a nominated Project Coordinator, who will have the necessary battlefield archaeology experience and expertise to achieve the best results from metal detector operators in the field.

2.2 The Project Coordinator will be responsible for maintaining a register of nominated detector users involved in the survey; arrange site access; ensure best practice in survey and recording methodology is applied throughout the survey; seek to ensure appropriate arrangements are made for essential conservation of and deposition of finds in an museum archive; brief the nominated detector users and ensure that they adhere to the principles set out in the written agreement.

2.3 The Project Coordinator will liaise with the appropriate Local Archaeological Officer and the Finds Liaison Officer regarding all relevant aspects of the survey. Where the survey is on a Registered Battlefield the Project Coordinator will advise the Battlefields Inspector of English Heritage.

3. Nominated detector users

Nominated metal detector users on battlefield surveys must agree to abide by the Guidelines and Agreements of **The Battlefields Trust** and to follow the specific survey and recording methods defined for the survey.

4. Written agreements

4.1 All such work will be regulated by formal written agreements, signed by the Project Coordinator and the nominated detector users. This is to ensure that all work is carried out in accordance with a set of principles agreed at the outset of the project.

5. Health and Safety

5.1 All those working on a battlefield survey have a responsibility at all times to look after their own welfare and those with whom they work.

6. Insurance

6.1 Nominated detector users will be given free membership of The Battlefields Trust for the duration of their involvement in the survey and will be covered by The Battlefields Trust insurance while undertaking survey work.

7. Finds ownership

7.1 Nominated detector users will be required to sign a written agreement waiving their rights to ownership of all finds, so that these may be incorporated into the site archive. They will also be required to waive all rights to claim any reward under the Treasure Act 1996, in accordance with section 81 of the *Treasure Act Code of Practice*.

8. Access and supervision

8.1 Access times shall be agreed between the Project Coordinator and the nominated detector users.

8.2 No detecting should take place except under supervision of the Project Coordinator or a representative of the Battlefields Trust specified by him.

9. Acknowledgement

9.1 The role of metal detector users in the project will be acknowledged in all publicity, interim reports, museum displays or final publications arising from it.

FORMAL AGREEMENT FOR METAL DETECTORISTS WORKING ON BATTLEFIELD SURVEYS WITH THE BATTLEFIELDS TRUST

TO BE COMPLETED BEFORE STARTING WORK ON SITE

BATTLEFIELD NAME: ……

I agree, when working on the above survey, to abide by the principles and conditions set out in the Trust's **GUIDELINES FOR METAL DETECTING ON BATTLEFIELD SITES**

I agree to waive all rights of ownership to all finds so that these may be incorporated into the site archive.

I also agree to abide by section 81 of the Treasure Act (1996) Code of Practice[1] and, as such, I hereby waive all rights to rewards for objects discovered that could otherwise be payable under the Treasure Act 1996.

I, (Name in block capitals)……
have read and understood the above agreement and will abide by its conditions.

Signed:
Detectorist:…….……..……..…….Date: …../…../…..

Signed:
On behalf of The Battlefields Trust.……..……..…….Date: …../…../…..

[1] Section 81 of the Treasure Act Code of practice:
"Rewards will not be payable when the find is made by an archaeologist or anyone engaged on an archaeological excavation. In cases of uncertainty archaeologists are recommended to require any individuals for whom they are responsible, or to whom they have given, or for whom they have sought, permission to search, to sign a statement waiving their right to a reward. If there is doubt as to whether the finder was an archaeologist (or a person engaged on an archaeological excavation or investigation), the Treasure Valuation Committee shall decide". Treasure Act 1996. Code of practice (Revised) (England and Wales, DCMS, London (2002).

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