The Management of Archaeological Sites in Arable Landscapes BD1701

Final Project Report
Supporting Documentation

Appendix A:
Initial Brief and Summary of Final Approach, Methodology and Outputs

Oxford Archaeology
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Appendix A
Initial Brief and
Summary of Final Approach, Methodology and Outputs

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1 INITIAL DEFRA BRIEF FOR CTE9806 MANAGEMENT OF ARCHAEOLOGICAL SITES IN ARABLE LANDSCAPES

Background\(^1\)

A recent comprehensive survey by English Heritage, the Monuments at Risk Survey (MARS), has established that arable cultivation poses one of the greatest threats to the national archaeological resource. In the MARS study, 37% of all archaeological sites are, or have been, under arable cultivation and at risk from damage. It also identified the possible threat to sites posed by changes in arable land-use, such as set-aside, although the precise consequences of such changes are unknown and require clarification.

Arable landscapes cover a very significant part of the country, concentrated in those areas with fertile soils, low rainfall, and warm summers. These are precisely the qualities that have made such areas attractive for settlement in the past. Many of the most intensive arable areas in the country, notably in eastern England, contain dense concentrations of archaeological sites of all periods.

Despite the lack of obvious surface indications, archaeological material and intact stratigraphy often survives underneath the plough layer. Many of these ‘flat’ sites in arable areas are detectable from the air as cropmarks in ripening cereals.

Since WW2 the area of land under cultivation has extended into land formerly under pasture which has led to either the removal of earthworks, or their isolation within arable fields, where they have degraded through neglect and marginal ploughing.

As a belated response to these threats, several studies were undertaken of ‘plough-damage’ to archaeological sites in the late 1970s. These established that ploughing poses an acute threat to sites particularly through the loss of sub-surface features and disturbance of intact deposits. It should be noted in this context that grass leys also present a threat to archaeological sites.

Significant areas of arable land, particularly field margins and winter stubbles, are under ESA, Countryside Stewardship, and Arable Stewardship agreements. In each case there is arable land which is under agreement and on which archaeological sites are at risk. In some ESAs there are measures for the protection of such sites, mainly through arable reversion. This can be costly to public funds and there are not yet data indicating whether the measures in place are effective.

The protection of archaeological sites forms an important part of agri-environment legislation. All agreement holders are required to prevent damage to sites known to them on their holdings. Data are therefore required to understand how sites may be more effectively managed and to provide a basis for advice to agreement holders on the protection of sites on their holdings.

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\(^1\) In this paper the term ‘archaeological’ has been used to describe physical remains of sites and relic landscapes. In this sense it is synonymous with the term ‘historic’ more conventionally used in agri-environment literature. The term ‘sites’ refers to archaeological sites.
Research Needs

Research is required to:

1. Assess the current state of knowledge, primarily by literature review, of techniques for the conservation of archaeological sites under arable cultivation.

2. Develop cost-effective and practicable techniques for the protection of archaeological sites in arable land from damage by cultivation and other farming activities and/or develop means of mitigating the physical impacts of such activities.

The final report should identify any gaps in knowledge and recommend further avenues for research into the effective management of sites currently in arable cultivation.

There will be opportunities to undertake small-scale excavations on a sample of arable and reverted arable sites to inform the development of techniques but the application of experimental treatments to archaeological sites will not be permitted.

Bids will be expected to include proposals for the production of written guidance for farmers, FRCA advisers and other land managers about the management of archaeological features.

It is expected that this project will last for up to 3 years and will cost up to £50,000 per annum.

The closing date for the submission of bids is 6pm on Monday 5 October and it is expected that the project will commence on 1 April 1999.

Further Information

No specific further information is available, as all bids will be assessed against this specification. No advice can be provided about the relative merits of different scientific approaches. However, if you need further information about specific issues relating to this competition, please contact:

R Brand-Hardy
2 INTRODUCTION

2.1.1 Oxford Archaeology (OA) formerly Oxford Archaeological Unit (OAU), has been commissioned by DEFRA to undertake a study looking at the management of archaeological sites in arable landscapes. The objective of this three-year study has been to establish the basis for developing best practice solutions for preserving archaeological sites on arable land that focuses on where damage is most serious and which provides sustainable remediation of the problem. To be sustainable, solutions must be both effective in substantially reducing the medium- to long-term threat of damage (within a clear perspective of where damage is most likely to occur), while also maintaining agricultural viability and minimising extra cost to the exchequer or loss of revenue to the farmer.

2.1.2 The project was started on April 1st 1999, a draft copy was submitted in May 2002 and the final, revised report was issued in December 2002. Active research for the project was completed on the submission of the draft report in May 2002.

2.1.3 Mr R Brand-Hardy of the Agriculture, Environment and Food Technology Division oversaw the project for DEFRA and Klara Spandl co-ordinated and managed the project for OA. OA realised that to successfully undertake this project, specialists in both agricultural and erosion issues would need to be brought on board at the very beginning of the project and for consultation during the life of the project. Consequently, OA contracted Dr John Boardman (University of Oxford’s Environmental Change Unit) and Howard Elliot (Reading Agricultural Consultants), to be integral members of the project team. George Lambrick, formerly of OA, was also sub-contracted to continue working on the project after he left OA to become Director of the Council of British Archaeology. His contribution has been continuous and significant throughout the life of the project. The final report has therefore been co-authored by Klara Spandl (OA) and George Lambrick, with contributions from Howard Elliot and Dr John Boardman.

2.1.4 OA wish to thank the above consultants for their input into the project and members of OA staff who have contributed: especially Matt Bradley and Paul Miles for their help in the compilation of the National Model, Angela Boyle, Anne Dodd and David Wilkinson for help in the final editing, members of the graphics office, including Sarah Lucas and Bethan Charles and all those who helped test the site-specific models. We would also like to thank all those people both within and outside the archaeological profession who willingly provided information and advice, without whose help this study could not have been as comprehensive or informed. A list of all those who assisted in the project can be found in Appendix K.

2.1.5 OA are also very grateful to the members of the Steering Group set up specifically for this project and who provided valuable experience, knowledge and guidance towards achieving the projects aims. The Steering Group comprised: Bob Middleton (DEFRA), Steve Trow (English Heritage), Frances Griffith (Devon County Council), Jan Wills (Gloucestershire County Council and ALGAO) and Ken Smith (Peak District National Park and ALGAO).

2.1.6 This project was undertaken during a time of increasing concern and debate centring on the detrimental effect farming was having on the environment as a whole. During the last three years, the project has witnessed the effects of both BSE and the outbreak...
of Foot and Mouth. The end of the project saw the production of the Curry report, which had been preceded by various government initiatives setting out a long-term strategy for the future of the agricultural industry. These included the New Direction for Agriculture (December 1999), Action Plan for Farming (March 2000), and the Rural White Paper - Our Countryside: the future (November 2000). OA has kept abreast of these new trends and policies throughout the life of this project, and has attempted to predict the implications of these changes on the rural archaeological resource.

3 PRESENTATION OF THE RESULTS

3.1.1 The final deliverables for this project are split into 3 main components:

- An Executive Summary - (two pages) with recommendations (DEFRA requirement CSG15)
- A Scientific Report - a concise document of c 25 pages which fulfils the main section of the DEFRA final report requirement (CSG15). This reports on all issues required by the brief and is available on the DEFRA website.
- Supporting Documentation has been supplied to DEFRA in PDF format on CD ROM available on the DEFRA website as a series of Appendices:
  - Appendix A - Initial brief and summary of final approach, methodology and outputs
  - Appendix B - Details of regional plough damage studies
  - Appendix C - Legislation and policy for archaeological conservation
  - Appendix Di - Introduction to arable issues
  - Appendix Dii - The relationship between agronomic factors and archaeological survival and the advantages of minimal cultivation and direct drilling techniques
  - Appendix Ei - Introduction to erosion issues
  - Appendix Eii - The relationship between erosion and archaeological survival on arable land
  - Appendix F - Case studies of archaeological damage from arable activities
  - Appendix G - Site-specific assessment and monitoring
  - Appendix H - National model of plough damage and statistics
  - Appendix Ji-ix - Work commissioned as part of this study and stand alone documents of unpublished archaeological work
  - Appendix K - Consultations (undertaken as part of this project)
  - Appendix L - Bibliography

3.1.2 The report CSG15 should be seen as the main narrative report for this project, with the Appendices providing supporting information which is:

- not covered in detail in the main report CSG15
- and where it clarifies understanding of specific topics

3.1.3 The final stage of the project was the development of a guidance note for farmers, land managers and others involved in the conservation of the landscape, who have archaeological sites on their land. This has been developed as an illustrated leaflet with text and is also included on the DEFRA website.
4 METHODOLOGY

4.1 Overall approach

4.1.1 It was necessary as a first step to understand where and how archaeological sites might be affected by cultivation and associated activities. This required a thorough appreciation of the following:

- Processes of soil erosion, and scale of erosion risk
- The nature of different types of archaeological sites and monuments
- Types of cultivation method, what they are designed to do and how they are applied
- How different agronomic factors (including straw and stubble treatment, herbicides, fertiliser, irrigation, drainage and soil structure) may affect the application or physical effect of different cultivation techniques
- The likely affects of business, financial and cost factors which can affect the extent or application of different cultivation regimes

4.1.2 From this a number of best practice measures were developed.

4.2 Methods

4.2.1 The methodology outlined here closely relates to the specification for works submitted as part of the tendering process to MAFF (now DEFRA) in 1999, but with variations where better ways were found to complete the objectives. It basically divides into seven main stages. At the end of each of the initial stages a Working Paper was produced and submitted to DEFRA. The final report was based on each of these Working Papers, including any significant updates. Information from these Working Papers has been included as supporting documentation as Appendices where not covered in detail in the main report CSG15 or where it was thought specific supporting documentation was required to either clarify or provide further information on particular topics. One significant change to the project methodology as originally outlined in the specification document was that a greater proportion of time was spent consulting specialists in a variety of fields, to ensure that the results of the project reflected both current and future thinking.

4.3 Stage 1 - Identification of issues: review of existing relevant literature

4.3.1 As a first step a project database was established (using Access software), constructed as a series of linked tables and designed to cover all the information needed throughout the project. This ensured that there was no duplication of effort in the compilation of data at different stages throughout the life of the project.

4.3.2 A literature search was then instigated to establish the extent of relevant published material and other sources of data likely to be relevant to the study. This was divided between the following broad topics:

- Mechanics and relative importance of factors influencing soil erosion on arable land (published research papers, reports, digital modelling)
- Current cultivation methods, their agronomic and cost advantages (MAFF/DEFRA advice notes, reports on trials, published agricultural literature etc)
Other agricultural and economic factors (farm business structure, the range and terms of existing agri-environmental, heritage conservation and general price support schemes and how they affect cultivation and management of arable land)

• Previous general studies and regional reviews and surveys of archaeology and agriculture

• Site-specific archaeological survey or excavation reports covering plough damage

• The range and availability of information about the condition of archaeological sites and monuments in arable areas, including:
  • MAFF/DEFRA, ESA and Countryside Stewardship monitoring reports
  • Monuments at Risk Survey data
  • Sites and monuments information
  • General reviews of the issue
  • Data gathered for responses to government consultation papers
  • Other data compiled by archaeologists

4.3.3 This work was combined with an initial stage of extensive consultation with members of the profession including Contracting Archaeological Units, Local Authority Archaeologists and Heads of University Archaeology Departments. This took the form of a questionnaire which covered topics on plough-damaged sites and surveys, information held and management issues. Consultation was also undertaken with national bodies concerning what data they held and could supply for use in the project. Extensive consultation with identified individuals and organisations continued throughout the life of the project.

4.3.4 A fundamental objective of this stage was to identify in broad terms which sources would be specifically relevant to subsequent stages of the research.

Summary of methods for first stage:

• Database design based on detailed consideration of all stages of project development and the relationships between different types, sources and uses of information

• Knowledge of literature amongst team specialists

• Searches through bibliographies of key publications

• Consultations with relevant organisations (DEFRA; ADAS; English Heritage; CADW; Royal Commissions on Historical Monuments) and individuals

• Development of searchable bibliographical database for the project, including key-word subject indexing related to issues to be covered in subsequent stages

Milestone 1 deliverables:


• Working Paper giving critical bibliography divided by broad topic, indicating the scope and importance of different publications for the study, including general, regional and site-specific case studies (Working Paper 2 - Critical Bibliography, OAU June 1999)


• Working Paper summarising responses to initial consultations with individuals and organisations (Working Paper 4 - Responses to Initial Consultation, OAU June 1999)
4.3.5 A summary of the updated legislative and policy context included within Working Paper 1 is summarised in Appendix C, Working Paper 2 has been updated and included as Appendix L and Working Paper 4 has been summarised and updated in Appendix K.

4.4 **Stage 2 - Review of issues**

4.4.1 The purpose of this stage was to review the range of issues and factors influencing the occurrence of plough damage, needed to be weighed and assessed in subsequent stages of the project.

4.4.2 The variables affecting the occurrence of damage are numerous and their potential interaction is extremely complex. It was therefore essential to retain a focus on what were the key issues. This stage involved thinking about types of damage, and then considering the factors that affect how serious damage may be. Factors considered divide into three main areas; the types of damage done to the archaeological resource, the site intrinsic factors which affect this damage (including erosion issues), and thirdly the specific agricultural operations which cause damage (including farm management regime, farm type and agronomic factors).

**Summary of methods for second stage:**

- Review and analysis of literature identified in Stage 1 relating to the factors noted above
- Consultation with archaeologists and others with experience in the field
- Use of expert knowledge and judgement of team participants for assessment of likely significance of different factors in influencing the occurrence and scale of damage
- Updating bibliographic database

**Milestone 2 deliverables:**


4.4.3 The relevant information from these Working Papers have been updated and included as Appendices Di-ii (agronomic), Ei-ii (erosion) and F (archaeological).

4.5 **Stage 3 - Creating Methods to predict the risk of cultivation to archaeological sites**

4.5.1 Three Methods were developed; one national and two site-specific, to assist in predicting where risk of cultivation is most likely to occur, and the circumstances in which they are most likely to be serious.

4.5.2 The National Model was developed to allow reasonably robust assessments to be made of:

- the geographical extent of where archaeological plough damage is likely to be most frequent
- the areas where different kinds of damage might be most likely to occur

4.5.3 The development of this model also allowed an assessment to be made as to whether recognised agri-environmental designated areas (eg. ESAs, CSSs) correspond with areas identified as being at high risk of plough damage therefore pinpointing areas which need targeting, where a response is required to address the problem.
4.5.4 At the site-specific level, two Methods were developed to allow an assessment of whether damage or potential damage is likely to have occurred or may occur on a particular archaeological site, on the basis of the site characteristics and farming regime factors. The development of these models was seen as important, because it will not always be possible, in allocating support for best practice measures on a day-to-day basis, to carry out detailed archaeological site investigations or long-term measurement of degradation. It is intended ultimately that the Methods will be used by all those identifying archaeological sites at risk in arable areas for inclusion within agri-environmental and other management agreements.

4.5.5 The National Model is map-based, the site-specific Methods are based around a Scoring Method and a Flow Diagram Method.

**Summary of methods for third stage**

4.5.6 The models were developed in the light of a review of sources identified through the literature search and through additional consultation with relevant bodies and individuals.

4.5.7 The National Model was compiled to address the question of where geographically the problems are most likely to occur, this was undertaken using the following digital data:
- Soil Association data, from the National Soils Resources Institute, Cranfield, based on dominant soil association type on a 1 km² grid
- Farm type data from DEFRA GIS Unit in York showing cropping based on a 2 km² grid
- Erosion risk (both water and wind) was mapped using Evans 1990
- Depth and drainage information taken from Legend for the 1:250,000 Soil Map of England and Wales - A brief explanation of the constituent soil associations

4.5.8 These sources were analysed and selectively combined to create a composite plough-damage risk map. Other datasets were investigated for their suitability for inclusion within this Model, but rejected.

4.5.9 For the site-specific Methods a logical sequence of questions about the archaeological resource, specific site conditions and cultivation regime were developed which built up an assessment of cultivation damage risk.

**Milestone 3 deliverables:**
- Composite general map of plough-damage risk
- Working Paper explaining general map of risk
- Working paper setting out analysis and development of site-specific risk assessment methodology and model

4.5.10 All these were combined in Working Paper 6 - National Plough Risk Model and Site-Specific Model for Assessing Risk of Cultivation Damage to Archaeological Sites in Arable Land, OAU March 2000.

4.6 **Stage 4 - Evaluating and testing the models**

4.6.1 The National Model of plough-damage risk was tested by comparison with:
- previous regional and landscape studies of plough damage where data was easily converted to digital form
- data supplied by RCHME/EH from the aerial photographic mapping programme (NMP), which differentiated between sites surviving as cropmarks/soilmarks and earthworks
4.6.2 The site-specific Methods were tested on a number of individual cases through a mixture of desk assessment and field investigation. The model was tested by:

- pre- and post-excavation desk-based testing by OA
- pre- and post-excavation testing on a number of sites excavated by OA
- pre- and post-excavation testing by some of the individuals and archaeological organisations during excavations commissioned by OA, as part of this project
- pre and post-excavation testing by other interested parties

4.6.3 The Methods were also distributed to individuals for testing on monuments visited during the course of their work or for general comments. These included:

- FRCA Archaeological Officers
- Field Monument Wardens
- Countryside Archaeological Advisors

4.6.4 A number of others were also invited to test/comment on the models including: members of the Project Steering Group, other archaeological organisations, members of universities, English Heritage’s Field Unit at Fort Cumberland and local authority archaeologists.

4.6.5 This testing resulted in revisions both to the structure of the Methods, improvements to aid its user-friendliness and to the development of a booklet explaining the procedure.

4.6.6 This stage of work also saw the commissioning of specific fieldwork and research projects to aid in the understanding of specific key issues essential to this project.

**Milestone 4 deliverables:**

- Working Paper setting out the initial results of testing of the Methods, with commentary on any limitations and the implications for their refinement and further use
- Summaries of archive records and reports on field testing

4.6.7 The initial results of testing were produced in *Working Paper 7 - Evaluation and testing of National plough risk and site-specific models for assessing risk of cultivation damage to archaeological sites in arable land*. OAU April 2001. The development and testing of the site-specific Methods taken from both Working Papers 6 and 7 has been summarised in Appendix G and the statistical analysis associated with the National Model has been summarised in Appendix H. Appendix G also contains a comparison of other approaches developed to assess and monitor sites.

4.6.8 Specific work commissioned by OA and key unpublished work pulled together by others for inclusion within this report have been included in Appendix J.

4.7 **Stage 5 - Developing “best practice” options for management of archaeological sites in arable for different circumstances**

4.7.1 In drafting recommended best practice options to conserve archaeological sites in arable landscapes, four fundamental requirements were considered:

- Clear long-term physical benefit in preventing damage or risk of further damage
- Cost-effectiveness
- Practicability within the business circumstances of the farm holding concerned
- Capability of being monitored and enforced at minimal cost
4.7.2 Development of these issues was carried out in consultation with various stakeholders and members of both the farming and archaeological profession, the most significant stage of which was a seminar held at The Society of Antiquaries, London in November 2001. Issues considered during this work divided into two main categories:

- key requirements for effective best practice measures to conserve archaeological sites in arable landscapes
- options at site and farm level for best practice prescriptions (including no-till cultivation solutions, minimum cultivation and ICM solutions, grassland reversion and cropping pattern solutions).

4.7.3 Following on from this OA outlined a series of recommended solutions for preserving archaeological sites in arable landscapes.

4.7.4 The final part of this study considered proposals for further development and piloting of schemes and future work.

4.7.5 All these themes are discussed and developed in CSG15 and developed from themes discussed in detail within Appendices B-L.

**Summary of methods for Stage 5:**

- Document and literature review and analysis (including Working Papers from earlier stages of project)
- Internal round-table discussion of team experts

4.8 **Stage 6 - Report preparation**

4.8.1 Reporting for this project has been broken down into the three main components as discussed above.

**Summary of Methods for Stage 6:**

- Review comments received on Working Papers
- Assemble and edit texts already prepared
- Update and add new text as necessary
- Assemble supporting evidence (statistics, appendices etc)
- Produce report CSG15
- Submit supporting documentation

**Milestone 6 deliverables:**

- An Executive Summary (two pages) with recommendations (DEFRA requirement CSG15)
- A concise document of c 25 pages which fulfils the main section of the DEFRA final report requirement (CSG15). This reports on all issues required by the brief and is available on the DEFRA website.
- Supporting Documentation has been supplied to DEFRA in PDF format on CD ROM and added to the DEFRA website as Appendices A-L.
4.9 **Stage 7 - Preparation of guidance to farmers**

4.9.1 As a final deliverable a guidance to farmers/landowners with archaeological sites on their land has been prepared.

**Summary of Methods for Stage 7:**
- Review comments
- Consultation
- Draft guidance
- Finalise guidance
- Issue final guidance in hard copy and digital form for mass production by DEFRA and in PDF form suitable for inclusion on the DEFRA website.

5 **BIBLIOGRAPHY**

5.1.1 See Appendix L