

NRA Archives

THE WATER ENVIRONMENT

OUR
CULTURAL
HERITAGE



**Proceedings of a conference held at the
National Exhibition Centre on Wednesday, June 13th 1990**



Watermills, bridges and pumping stations are just some of the historical features associated with rivers and wetlands.

Important archaeological artefacts

- boats, armour and weapons - have been retrieved from rivers during dredging operations, and the waterlogged conditions in river valleys and wetlands have helped to preserve some notable archaeological sites, such as Flag Fen near Peterborough and the Sweet Track in the Somerset Levels.

Under the Water Act 1989, the National Rivers Authority, Water PLCs and Internal Drainage Boards were given a duty of "protecting and conserving buildings, sites and other objects of archaeological, architectural or historic interest." What does this mean for those bodies; how is this duty to be carried out? This conference was to help clarify the issues involved for those working in the water environment, and the speakers, mainly professional archaeologists, explained how features important to our cultural heritage can be identified, documented and preserved for the future.



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NRA

National Rivers Authority

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National Rivers Authority

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National Rivers Authority.

AN INTRODUCTION TO THE NATIONAL RIVERS AUTHORITY (NRA)

Why do we need an introduction to the National Rivers Authority? I think this is desirable because some of you may not be aware of how the fundamental split that occurred in the water industry on the 1st September 1989 affected our areas of responsibility. The utility or private water companies deal with the treatment and transfer of water and of sewage on a commercial basis. The NRA on the other hand is an environmental and regulatory body. We are a national organisation working not only with rivers but with other inland waters, ground waters, estuaries and coastal waters. The NRA is a non-departmental public body and as such we have a parent department, the Department of the Environment. Because of the nature of our responsibilities, however, we also have very strong links with the Ministry of Agriculture Fisheries and Food and in Wales, with the Welsh office. Our mission statement summarises what we do:

"The National Rivers Authority will protect and improve the water environment. This will be achieved through effective management of water resources and by substantial reductions in pollution. The Authority aims to provide effective defences for people and property against flooding from rivers and the sea. In discharging its duties it will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries and coastal waters. The Authority will be businesslike, efficient, and caring towards its employees."

The NRA comprises 10 regions, based on the areas of the old water authorities, and our headquarters in London. The NRA Board, our Chairman, Lord Crickhowell and our Chief Executive, Dr John Bowman are responsible for policy and for governing our business aims. At regional level, there is a series of Boards; the Regional Fisheries Advisory Committee, the Regional Flood Defence Committee which replaces the old Regional Land Drainage Committee and a new committee, the Regional Rivers Advisory Committee. This covers other interests in rivers including agriculture, industry, landowners, local authorities and of course conservation and recreation.

I will now briefly describe the main functions of the National Rivers Authority, which are Water Resources, Environmental Quality, Flood Defence and Fisheries, Conservation and Recreation. The overall aim of the Water Resources function is to assess, manage, plan and conserve water resources including redistributing and otherwise augmenting water resources and securing their proper use in England and Wales. Work

involves overseeing water resource management schemes agreed with the plcs, establishing minimum acceptable river flows, collecting and reporting hydrometric data and taking appropriate action during droughts. The NRA also is responsible for licensing abstractions for which it makes a charge. General monitoring of groundwater quality is necessary because of problems caused by badly managed abstraction schemes, by land fill sites, by nitrates, pesticides and other toxic chemicals. The water resources function has close links with Flood Defence in respect of flood warning, weather radar, flood hydrology and aspects of climate change. It also has close links with the water quality function in respect of groundwater protection and quality monitoring.

The aim of the Environmental Quality Department is to control pollution and achieve a continuing improvement in water quality in rivers, estuaries and coastal waters. The quality of waters is controlled by the setting of discharge consents, for which we shall soon be charging, and the NRA prosecutes those responsible for infringing the consents and for other illegal causes of pollution. The NRA is a firm believer in the "polluter pays" principle. The work of the Environmental Quality Department includes the chemical and biological monitoring of rivers, reservoirs, canals, estuaries and coastal waters within a three mile limit and of course ground waters. The department also devises classifications for water quality and sets statutory water quality objectives. The NRA assesses the compliance with these objectives and the related standards. The NRA has its own laboratories in some regions which not only analyse the samples taken by the NRA but also undertake some commercial work.

The aims of the Flood Defence Department are to provide effective defences for people and property against flooding from the rivers and sea. We also provide arrangements for flood forecast warning and for responding to flooding events. Flood defence work is carried out only on Main River and has shifted in emphasis from land drainage to the protection of urban and coastal areas. The Flood Defence Department is also responsible for issuing consents for works by other people which affect the flow in any watercourse whether main or non-main river. The Land Drainage Act 1976 requires the NRA to arrange for its flood defence functions to be carried out through the Regional Flood Defence Committees which are the only executive committees in the NRA. Flood Defence is our largest operational department and is the one most likely to encounter historic finds.

The prime duty of the Fisheries Department is to maintain, improve and develop the salmon, trout, fresh-water and eel fisheries within the region. We monitor the fisheries populations of rivers, stillwaters and, where appropriate, coastal waters by electric-fishing, by netting and by catch returns. We regulate, protect and conserve fisheries through the enforcement of fishery legislation which means that we control illegal fishing, poaching and licence evasion and of course we prosecute offenders. Fisheries staff help to restore and rehabilitate damaged fisheries by restocking and by giving advice to angling clubs and fisheries owners.

The NRA's recreation duties include development of the amenity and recreational potential of waters and associated land. We are to promote and protect public access and take account of the needs of the disabled and chronically sick. Although only three regions are statutory navigation authorities, Anglia, Southern and Thames, most regions are involved in navigation issues, either through conflicts between recreational users or because of the promotion of new navigations by private bodies.

The conservation function of course has most relevance to the conference today. The aim of the NRA is to conserve and enhance wildlife, landscapes and archaeological features associated with waters under NRA control. We are to conserve and enhance in relation to all our operational and regulatory activities. The regulatory functions consist of abstraction licences, discharge consents, land drainage consents and fisheries consents. Whilst flood defence operations are the ones most likely to affect ancient and historic sites, the regulation of abstraction licences is important because raising or lowering of water tables could have effects on certain features. Conservation staff must help other departments to conserve and enhance in all their duties and also to promote conservation independently of other functions. The NRA also monitors the conservation status of inland and coastal waters and associated land. Much of this work is done by river corridor surveys which are being developed to include features other than the in-river wildlife.

The National Rivers Authority is a new organisation and has many policies to determine. The policy on archaeology has not yet been established but is under active consideration by the Conservation Managers and by Head Office. We are taking steps to train our staff to recognise historic finds and to seek specialist advice on how to preserve or move or store them. Today's conference will provide an ideal opportunity for an exchange of ideas on archaeology and conservation within the NRA which will be of use to professional archaeologists and NRA staff alike.

1.1 Summary

This paper is, of necessity, a personal view, because the writer has been the only water industry archaeologist for 17 years. The paper examines the whole of the 'new' water industry, and attempts to examine the strengths and weaknesses of the systems now in place.

Roman Foundations discovered during sewer-laying works in Darent Valley, Kent.



1.2 Introduction

Public perception of the major elements of the water industry is very often simplistic, or even ill-informed.

Until privatisation, the media and the public were still calling us the Water Boards rather than Water Authorities, even though both titles are now obsolete. It is fair to guess that, if the public do not know what we are called, they probably do not know exactly what we do, either.

In practice, because of the diverse and wide-reaching nature of the water industry, - both private and public sectors - water operations have the potential to have a major impact on archaeology and its related disciplines. (These may be taken to include Industrial Archaeology, Historic Buildings and Archives, in addition to the more obvious "under the ground" elements).

In legislative terms, the responsibilities placed on the 'new' water industry, by the 1989 Water Act, are very similar to those first articulated in the 1973 Water Act, and amended by the 1981 Wildlife and Countryside Act.

In real terms, however, the duties of the new companies, and of the National Rivers Authority, are made more onerous by two separate shifts in emphasis.

The first of these is also applicable outside the water industry, and concerns the more central role that

archaeology has begun to play in the planning process. I will not concern myself with this at present, as Helen Maclagan's paper will address the subject in more authoritative terms.

The second is the Code of Practice on Conservation, Access and Recreation, which has been generated as a direct result of the 1989 Water Act. This document above all has given the water industry a very clear and explicit set of instructions and examples as to how water heritage should be identified and safeguarded. The nebulous terminology, such as "have regard to the desirability of" still exists, of necessity, in the act, but the Code gives specific examples of the kind of problems which may be encountered, and even introduces new concepts for consideration, especially with regard to:-

- waterlogged sites
- industrial archaeology and archives
- pipelaying

The Code also - and archaeologists should note and welcome this - puts archaeology firmly in place as a 'conservation' discipline, which gives it a recognisable form and function in today's world. However, archaeology should be prepared to show itself worthy of that position, particularly in its perception of the vital role which the water industry plays in all aspects of community life.

The majority of work undertaken by the industry is non-speculative, essential and for the benefit of public health, safety and amenity. Water engineering is therefore, like archaeology, a service to the whole community. Thus, the two disciplines need not approach each other in a spirit of confrontation.

1.3 Methods and Issues

Let us examine some of the functions of the water industry which are likely to have impacts on archaeology and related disciplines.

FIGURE ONE

WATER INDUSTRY OPERATIONS AFFECTING ARCHAEOLOGY & RELATED DISCIPLINES

PIPELAYING
RESERVOIRS
WATER TREATMENT
SEWAGE TREATMENT
DREDGING & LAND DRAINAGE
(inc. CHANNEL CREATION)
WELL-DRILLING & ABSTRACTION
TELEMETRY AND INSTRUMENTATION,
COMMUNICATION AND AUTOMATION
BUILDINGS RE-USE
BUILDINGS REPAIR
BUILDINGS DECOMMISSIONING
NAVIGATION
FISHERIES
SLUDGE DISPOSAL
LANDSCAPING

The majority of the activities listed involve land-take, and their archaeological implications are therefore quite obvious. Others, such as abstraction, are less direct, concerned as they are with secondary processes, such as de-watering of waterlogged sites.

Other functions, such as those relating to buildings, have implications under the Town and Country Planning Acts, particularly with regard to Listed Buildings and Conservation Areas.

What is clear is that these varied functions embrace, between them, almost the whole range of activities undertaken within the industry.

If outside bodies were to be set up to monitor the activities of the industry, the resultant bureaucracy, high staff levels and tensions would seriously hamper the day-to-day work of the water bodies. Thus while some externally regulated performance measures are necessary, to monitor compliance with the 1989 Act, internal systems have a major part to play.

However, for the water industry to comply with its varied archaeological responsibilities, it must first know what they are. As has been stated, the Code of Practice helps here, but the companies, and the NRA, must first have, or have access to, the basic data about the protected sites, monuments and buildings:-

- in their ownership
- in their sphere of operation

Mesolithic site under excavation at Newbury S.T.W. Berkshire.



**FIGURE TWO
A DATABASE SURVIVAL KIT FOR THE
WATER INDUSTRY**

IN - HOUSE

1. SCHEDULED MONUMENTS - OWNED / OPERATED
2. SCHEDULED MONUMENTS - WITHIN AREA OF OPERATIONS
3. A.A.I.'s - WITHIN AREA OF OPERATIONS
4. LISTED BUILDINGS - OWNED / OPERATED

READILY - ACCESSIBLE

1. ALL S.M.R.'s (SPECIALIST ADVICE THEREON)
2. ALL CONSERVATION AREAS
3. LISTED BUILDING'S - UPON WHICH OPERATIONS MIGHT IMPACT

The 'In-house' information is a basic requirement that should be instantly available when any capital works are being planned. To slip up on any of the sites and monuments within these categories is to break the law.

The 'Readily-Accessible' information cannot possibly be collected In-house, because of the sheer volume of data involved, and the complexity of its interpretation. However, such information will be relevant to the determination of any planning application, and will need to be discussed at some stage, with a county archaeologist, before a scheme can proceed to an implementation stage.

Without this basic information, the possibility of an 'own goal':-

- digging up a Roman villa
- damaging a Listed Building

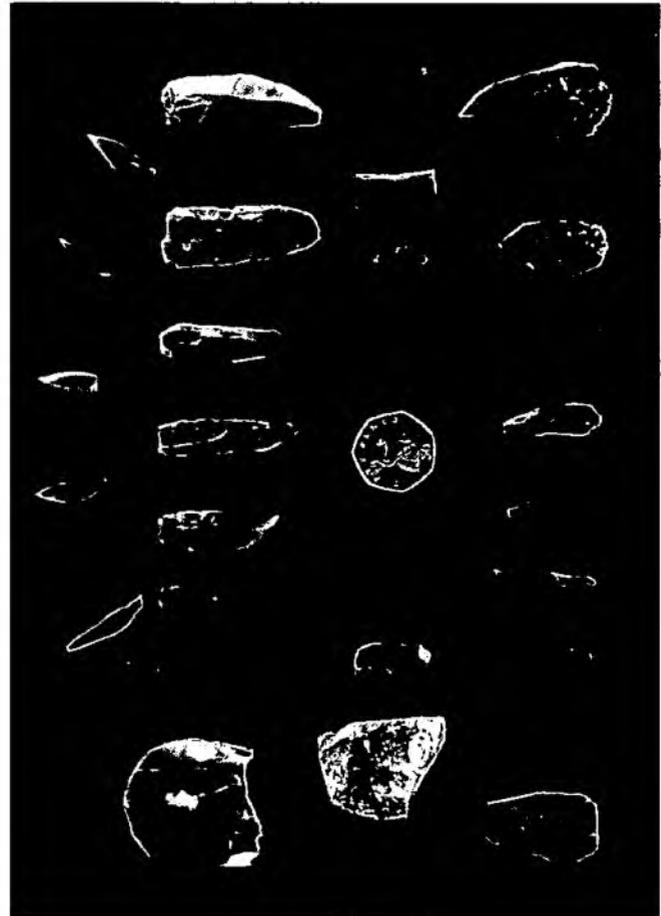
is always just around the corner, for even the most conscientious organisation.

It is therefore vital that staff at all levels are aware of the need of be mindful of the duty of care which binds all of the new water bodies. In effect, staff education and sensitivity to heritage issues must be stimulated and sustained, in various ways, by means of:-

- seminars
- site visits
- videos
- house journals
- leaflets and other non-specialist publications

Furthermore, it is essential that Management Plans should be put in place for all sites and monuments within the operational sphere. Such initiatives can usefully be undertaken in conjunction with representatives of other environmental disciplines - in the water industry, the Conservation Managers - so that the idea of total landscape, both natural and manmade, is recognised.

Small artifacts of worked flint found at the site of archaeological excavations at Thames Water's Lower Way Sewage Works at Thatcham, near Newbury in Berkshire, are helping to shed light on one of the least known episodes of human history, the Stone Age.



Where the various conservation disciplines vary notably is in the fact that, while natural landscapes can often be replaced, regenerated or enhanced, archaeological landscapes are fragile and irreplaceable. Thus, within the bounds of common sense, preservation of the archaeological heritage should be the aim of the water industry.

When such preservation is not possible, steps must be taken to:-

- secure all the necessary consents
- instigate other mitigating measures, where appropriate

In the latter case, the choices for action include:-

- survey
- document search
- watching brief
- excavation

Each of these options, in turn, requires the employment or services of specialist staff, in exactly the same way as any other technical investigation.

1.4 Conclusion

In summary, it is fair to assume that archaeology and the water industry will inevitably work even more closely together in the future. In order to make this relationship sustainable, productive and even pleasurable, certain changes of attitude are needed.

a) What can archaeologists do?

- i) Present their requirements in plain language.
- ii) Present their results in plain language.

It is sensible, and courteous, when dealing with specialists of another discipline, to seek to communicate concisely and with minimum recourse to jargon.

b) What can the water industry do?

- i) Acknowledge that archaeologists are professionals, doing a legitimate job.
- ii) Involve archaeologists in plans, at the earliest possible stage, to minimise disruption and maximise results.

When all else fails, Hall's Rule of Archaeology and Water Engineering states that:-

"the scale of a scheme is not commensurate with its potential archaeological impact".

Excavations at Beddington S.T.W. near Croydon.



2.1 Introduction

2.1.1 Preface

This paper considers the relationship between the water industry and the cultural environment from a regional and local perspective - the scale on which a water company or a local authority works. It considers how those involved in the water industry should approach and plan for the historical and archaeological heritage in the local context. It draws attention to the need for specialist advice and liaison with local expertise, and suggests how these issues might be addressed under the headings of policy, procedures and planning.

2.1.2 The relationship between the Water Industry and the Cultural Heritage

The responsibility of the Water Industry towards the cultural heritage arises in three principal ways.

Firstly, there is the industry's own heritage, involving the physical evidence of the industry itself, in the form of structures, buildings, machinery and artefacts.

Secondly, water undertakers, as large scale landowners, have become the owners of a considerable number of ancient monuments, and of some landscapes of high archaeological sensitivity.

Thirdly, in common with other bodies involved in substantial construction and engineering projects, water and sewerage undertakers have a marked and in some respects irreversible impact on the landscape in which they work.

2.1.3 What is the archaeological resource?

Let us consider what kinds of remains are involved. In the context of this paper I have taken the archaeological resource to consist of the physical remains of human activity in the landscape. Industrial features will be given detailed consideration in another paper. Written, drawn and photographic archive material, important in its own right, requires separate specialist consideration.

This archaeological resource includes not only obvious and well known sites and monuments such as stone circles, castles and abbeys, but also below-ground remains of rural and urban settlement and other activities, many of which leave no surface trace. These remains constitute the only surviving evidence from which we can study prehistoric times, and the only source for specific types of information even in the historic period, when written records may also survive. Generally, wood, leather, cloth and other organic remains do not survive well in buried deposits. However, in water-logged conditions, which water industry projects are particularly likely to encounter, such items may be

well-preserved, and therefore of exceptional value and importance. Water-logged deposits may also yield a much wider range of biological material, for example pollen, crucial for the study of past environments and environmental change.

This resource can be affected directly by ground-disturbing operations, such as construction or indeed erosion, or indirectly by activities such as de-watering. Despite the popular image of archaeologists as people obsessed with digging things up, our primary objective is now preservation *in situ* of this irreplaceable evidence.

2.1.4 Why bother?

General duties of regard for the natural and cultural environment are imposed on the National Rivers Authority, the water and sewerage undertakers and the internal drainage boards by the 1989 Act. However, the importance of its heritage has long been recognised by the water industry, and steps to safeguard it considerably predate this Act, as the publication in 1987 by the Water Authorities Association of 'The Water Heritage' recognised. The responsibility is a moral as well as a legal one. The archaeological resource is finite, fragile and non-renewable, and its protection is therefore an obligation which extends beyond individual generations.

2.1.5 Environmental framework

Archaeological conservation should be considered not in isolation, but as part of the approach to the wider natural and cultural environment (Lambrick 1985). Concern for this environment must be integrated into the strategy of all bodies whose activities might adversely affect it.

2.2. Policy

2.2.1 Local Policies

Local archaeological policies are framed and implemented within the context of national policies and advice, which have been discussed in detail elsewhere. The emphases differ from those of the national policies, indicating the contribution which the cultural heritage makes to the identity of a local area (Baker 1983).

The archaeological policies of local authorities are expressed in County Structure Plans, Unitary Development Plans, Local Plans, Subject plans, and sometimes in other non-statutory policy documents (for example Hampshire County Council's Countryside Heritage Policy, 1984). These policies vary in emphasis, wording and detail, reflecting the traditions, characters and priorities of the area, but many of the same themes recur. In keeping with the primacy afforded to preservation in national policies, there is usually a

presumption against proposals which would cause destruction to the archaeological heritage. Such policies normally cover both Scheduled and other archaeological sites and monuments, and may also include their settings.

Policy documents may draw attention to sites of local or regional importance, and to those which while not rare nationally are significant in a local context. These may in some instances be designated as an informal 'second tier' of County Level monuments. Areas to which more rigorous constraints are applied may also be identified, for example as Areas of High Archaeological Potential, Areas of Particularly Attractive Countryside, or Areas of Special Restraint and these may include urban or rural areas or landscapes of particular archaeological importance, sensitivity or potential.

While physical preservation *in situ* is usually the primary objective, policies may also tackle the problem of how conflicts between pressures for development and preservation should be resolved. Issues covered will include the mitigation of adverse consequences and/or the need for archaeological investigation and recording when preservation cannot be achieved.

In addition, local authorities may have policies promoting the beneficial management and enhancement of archaeological sites, and for encouraging public access and enjoyment. Grants may be available to further these policies which recognise that the quality and character of the local environment are highly valued by those who live and work within it, and therefore merit protection.

Implicit or explicit in such policies is the need for local authorities to acquire and maintain information on the cultural heritage of their area. These databases, commonly known as Sites and Monuments Records (SMRs) are discussed further below.

Increasingly, policies for archaeological conservation treat the cultural heritage from a landscape perspective, rather than as a series of sites, and will often be framed as part of wider conservation and environmental strategies.

2.2.2 Local Roles in Archaeological Conservation

All County Councils in England, or their equivalents, maintain Sites and Monuments Records, and SMRs also exist for all of Wales and much of Scotland. The history and evolution of these records is discussed in a volume published by the Association of County Archaeological Officers (Burrow 1985). Although there is no statutory requirement for local authorities to hold SMRs, their existence is mentioned in the General Development Order and their key role is recognised by

national bodies such as English Heritage, and acknowledged in the forthcoming Planning and Policy Guidance (PPG) on Archaeology and Planning. The Royal Commission on the Historical Monuments of England (RCHME), the keeper of the National Archaeological Record, is the national body given responsibility by government for oversight of the system of local Sites and Monuments Records. The relationship between local and national archaeological records in England has recently been defined in a policy statement from RCHME, which describes 'the combined contents of the National Archaeological Record and of the County SMRs as the extended national archaeological database'.

SMRs, which are now usually centred on computerised databases, contain details of the location, nature, type, form, date and condition of archaeological features, identified on an Ordnance Survey map base, and backed up with further references and documentation. They are maintained and staffed by Archaeological Officers, often with considerable local expertise, whose role includes the provision of advice and the implementation of the authorities' archaeological policies.

These records are fundamental to local authority involvement in archaeological conservation. Some, but not all, SMRs include information on listed and other historic buildings: approaches are not uniform in this respect, but there is some prospect of a nationally inspired consistent approach emerging soon.

Local authorities may also be the owners or occupiers of archaeological sites and historic landscapes, and will have specific policies relating to these, usually with an emphasis on public access and appreciation. They may also carry out research into the heritage of their area, and offer management agreements and/or other grants to further their policies.

Some local authorities employ field units which carry out excavation, survey and other fieldwork projects. Archaeological fieldwork is also undertaken by other local, regional and national bodies, with a variety of institutional bases, including independent trusts and university based organisations.

2.2.3 Water Authorities' Policies

In addition to national and local conservation policies, the policy framework of the NRA and the undertakers will be crucial to the success of the industry in fulfilling the obligations laid down in the Act.

2.3. Procedures

2.3.1 Formal procedures

The cultural environment is protected by a range of general measures and by specific protective designations.

Where works proposed require planning consent, the impact of the proposal on the cultural environment will be considered by the local planning authority, whether or not formal Environmental Assessment is appropriate. From the point of view of the cultural heritage, the proposal will be considered against the Sites and Monuments Record and any other relevant information, and a judgement reached about its likely impact. Where existing information is inadequate for an informed decision to be reached, the local authority may require further information to be supplied to enable it to reach such a decision, using the provisions of Article 4 of the Town and Country Planning (Applications) Regulations 1988 if necessary. This may necessitate an archaeological field evaluation - a small-scale assessment exercise which should be carried out by a suitably qualified archaeological organisation. This approach is endorsed by the draft PPG on Archaeology and Planning referred to above.

I shall not dwell long upon the range of formal designations and procedures specifically aimed to protect the cultural heritage, as these are discussed elsewhere. Some of these, such as Scheduled Monument Consent, are administered nationally, although local archaeologists are often consulted on an informal basis. Local authorities have a greater involvement in Listed Building and Conservation Area matters. In following any of these procedures, the advice available locally can be advantageous.

2.3.2 Informal procedures

Informal procedures can be at least as important as formal ones in ensuring appropriate treatment of the cultural environment. In order to carry out their conservation duties effectively, undertakers should be aware of, and equipped to make use of, the full range of expertise and specialist advice available both locally and nationally. Regular contacts with and channels of communication to County SMRs and other sources of local knowledge and specialist expertise need to be established and maintained.

Effective consultation procedures should form an integral part of working practices. If undertaken at an appropriately early stage and with adequate time for response, consultation can achieve worthwhile results at minimal cost, as indicated in the Code of Practice on Conservation, Access and Recreation. Consultation procedures should form part of the strategy of relevant bodies for dealing with environmental matters.

Fundamental to the success of this approach will be suitably trained, qualified and aware staff within the relevant bodies. Staff need to be aware of the importance of the cultural environment, of how their activities may impinge on it, and of the appropriate formal and informal procedures to follow.

2.4. Planning for the Cultural Heritage

2.4.1. General approach

In order to ensure that the duties imposed by the 1989 Act are carried out efficiently and effectively, the new bodies will need to set up, implement and regularly review working systems in which environmental concern is recognised as an integral part of all planning.

2.4.2 The Industry's Own Heritage

The wealth of the Industry's own heritage, in terms of structures, buildings, machinery, artefacts and associated records has already been well described (Water Authorities Association 1987). This is probably the aspect of water industry conservation which is most advanced, and which existing staff and working practices are best equipped to deal with.

Essential to the care of this resource is an adequate system of records, actively curated and maintained. The records set up by the new bodies should incorporate the results of survey work already carried out. Specialist advice and training are likely to be needed in these areas. Consideration should be given to making copies of appropriate material available for public consultation through recognised public repositories.

The industry's record systems should be co-ordinated with and cross-referenced to other established local and national records. At present, it is admitted that industrial archaeology is a weak point of many SMRs. This field has been identified as one in which future work should concentrate and present shortcomings should not distract from the crucial role of the SMR in the national network of record systems.

The duty of encouraging public access may be a difficult one to fulfil. The possibility of co-operative endeavours with local voluntary and professional bodies may be worth exploring. This could cover anything from shared advertising, through joint facilities to formal arrangements with voluntary groups or museums, whose role is discussed elsewhere.

2.4.3 The Role of the Landowner

Attention has already been drawn to the responsibilities towards the heritage which form part of the role of a major landowner. In order to fulfil those responsibilities, there is first and foremost a need for comprehensive coherent and retrievable information about each landholding. This must be seen as an ongoing rather than a finite requirement - the database will need continuing curation and updating as circumstances change and new information comes to light. Data relating to the cultural heritage should be integrated with other environmental information to guard against a fragmented approach, as well as closely tied into the wider management strategy for the landholding, to avoid marginalisation of conservation issues.

These landowners' records, which should also be cross-referenced to existing local and national record systems, should include information on the location, extent, nature, history and condition of all known features, as well as any special legal or other designation of sites or landscapes. Sources of further information, documentation and specialist advice should also be noted.

A profile of and a management plan for each major landholding should be prepared, drawing upon this information. The plan should consider not only how existing features and landscapes can best be conserved, but also how they can be enhanced, and where appropriate, made more accessible to and enjoyable by the public. All proposals affecting landholdings, including routine maintenance works, should be assessed against these plans and should be the subject of proper consultation with relevant specialist bodies. (Fairclough this volume, Hughes & Rowley 1986)

2.4.4. Intervention in the landscape

Operations such as new water resource and supply schemes and the laying of trunk sewers and mains have considerable impact on the landscape and environment. These works, usually affecting land owned by others, call for a different approach. In view of the extensive landscapes affected, information held by the undertakers' own records cannot be adequate. There can be no substitute for early reference to local records held by others, usually starting with the relevant County Sites and Monuments Records.

In planning such operations, undertakers should aim to build on the best practice developed by other bodies carrying out works involving major ground disturbance. The importance of early and thorough consultation, usually with the Archaeological Officers of the appropriate local authorities, cannot be over-emphasised. Their Sites and Monuments Records will hold crucial data, which will usually be the fullest and most up-to-date information available for that area. Nonetheless, in many cases, further research and fieldwork may be necessary to enable the impact of a proposal to be fully assessed. Adequate time and resources must be allocated for this work.

Initial consultation should be undertaken as soon as a general proposal or corridor is being considered, so that particular sites or areas of sensitivity can be identified as constraints and avoided at the design stage, before it becomes a matter of altering a proposal or diverting a route - or worse still, delaying works in progress. In general, as indicated above, preservation of archaeological remains *in situ*, undisturbed, should be the prime objective. However there may be circumstances where it is not possible for all sensitive areas to be avoided - for example where a pipeline has to cross the route of a Roman Road.

Where proposed works would damage or disturb deposits of archaeological significance, and physical preservation *in situ* is not possible, arrangements should be made for an appropriate level of investigation and recording to be undertaken by a competent archaeological organisation. This work, which should include the reporting of the results, should normally be programmed in advance of construction works. In the case of works affecting or passing through ill-defined deposits of uncertain significance, it may also be necessary to arrange for archaeological observation and recording while work is taking place.

Careful background research, advance planning and consultation should usually avoid the unexpected discovery of archaeological remains during construction operations. Nonetheless, contingency arrangements will always be necessary.

The extent of knowledge of archaeological deposits is not uniform, and is influenced by factors such as subsequent land use and local antiquarian interest. River gravels, which are highly susceptible to aerial reconnaissance, and ploughed fields, where artefacts brought to the surface may have been observed, will be better charted than areas of alluvium, hill-wash, or long-term pasture and heavier soils. Extensive archaeological deposits of which no trace has hitherto been recorded do survive, and it is just such activities as pipe-laying, cutting swathes across the landscape, which are most likely to reveal them.

Detailed plans cannot, by definition, be made for the unexpected. General arrangements for unpredicted discoveries can and should be made, and will prove worthwhile by minimising both disruption to engineering operations and unrecorded archaeological destruction. For such plans to be effective it is crucial that both those with overall responsibility for planning and executing projects and those 'at the sharp end' are familiar with the detailed arrangements and procedures.

The cost of all archaeological work made necessary by such projects, including background research, on-site investigation, observation, recording and reporting of results must be regarded as part of the costs of the project.

2.5. Conclusions

The commitment of the water industry to the heritage has been well demonstrated in the past. It is to be hoped that the restructuring of the industry will provide an opportunity for these benefits to be consolidated. Consultation, co-ordination and co-operation at national, regional and local level offer the way forward. With effective management strategies, the cultural heritage, far from representing a problem or a liability, can become a positive asset.

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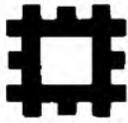
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3.1 Preface

This paper was prepared as a contribution to a conference concerning the conservation of the cultural heritage by the water industry. It was written in the context of the new structure for the industry established by the Water Act 1989 but from the perspective of English Heritage. In particular, I have taken the new Water Act Code of Practice as a starting point, whilst recognising that it is as yet untried and that close monitoring of both its effectiveness and its relevance is required. I have given greatest prominence to archaeological conservation, partly because the new Act and Code gives this a greater prominence than previous legislation and because this aspect of the cultural heritage is probably the least familiar to those working in the industry.

The paper has three main sections. The first, "Policy", outlines the policy framework within which we preserve our cultural heritage - national policies for cultural heritage conservation, and the work of the main national conservation bodies active in the field. The second part, "Procedures", summarises the legislative structure within which conservation operates, and discusses some of the principal ways in which the industry will need to work within this structure. The final section, "Planning", gives a brief overview of the wealth and diversity of the archaeology and buildings which the industry is likely to

encounter. It attempts to identify some of the methods which the industry could adopt to fulfil its statutory conservation duties.

3.2 PART 1 - Policy

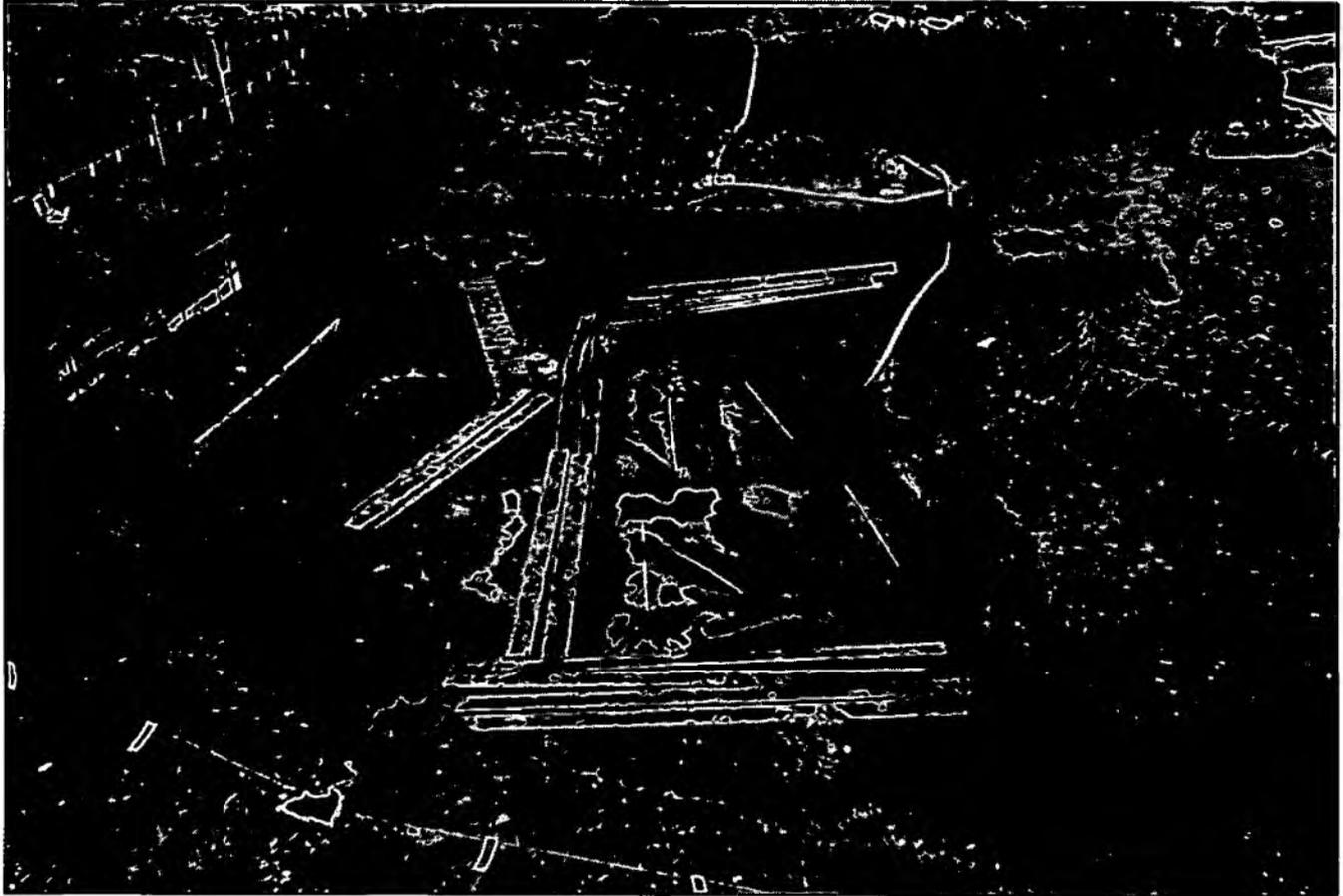
3.2.1 Philosophy

Recognition of the crucial role of owners and others involved in detailed land-management is fundamental to English Heritage's approach to the conservation of archaeological and historic landscapes. Indeed, an owner's responsibility for preserving ancient monuments and historic buildings has been the basis of all legislation since the 1882 Ancient Monuments Protection Act. Those who use, occupy and work the land remain in the vanguard of attempts to provide a secure future for the archaeological fabric of the countryside. This approach was underlined recently in English Heritage's published management review "Ancient Monuments in the Countryside" (EH 1987). This underlines the maxim that the success of conservation rests upon public understanding of the value of our past and on the support and actions of land managers such as farmers,

A bronze age burial mound under excavation in a riverside context at Roxton in Bedfordshire. Archaeological sites are often disturbed during flood defence and other riverside work, but early operational planning can often avoid unrecorded destruction of sites. (Beds County Council)



A neolithic (c2,500 BC) revetment or jetty under excavation alongside a filled-in river channel of the Nene at West Cotton. (Northamptonshire County Council)



planners, owners and of public undertakers such as the water industry. Conservation to be successful must engage the commitment of those who work on the land, and it must involve all conservation interests in a wholly integrated approach to the conservation of both natural and cultural heritage. Ancient Monuments in the Countryside also emphasise once again two well known characteristics of our cultural heritage.

First, we need to recall that archaeology is omnipresent in the British countryside. Most countryside and landscapes in this country are products, direct or indirect, of human activity over the last 10,000 to 12,000 years. There are even, in southern Britain, slight traces of an hominid presence as far back as 400,000 years ago. Any piece of land is likely to contain evidence of the past, whether archaeology in the conventional sense or the many features such as hedgerows, woodland, field boundaries, trackways and roads which form the grain of the landscape.

Secondly, we need to recognise the fragility of our archaeology. Our "resource" of archaeological remains, as has often been remarked, is finite and non-replaceable, and has already suffered serious depletion, espe-

cially during the 20th century. We should remember that ill-considered actions within the water industry could seriously threaten the preservation of archaeological remains which, once destroyed, cannot be replaced and which cannot regenerate themselves. Archaeological sites which are the product of several thousand years' of activity cannot be recreated in the same way as we can sometimes re-introduce locally-extinct bird species, replant woodland or recreate natural habitats.

Fortunately, however, the opportunities for preserving our cultural heritage now generally outweigh the possibility of destruction. The careful management of our archaeological sites and the proper maintenance of our historic buildings is not beyond our resources, particularly in the context of a conservation strategy which regards conservation as being necessarily attuned to the contemporary needs of the land and its owners and managers. As far as the water industry is concerned the starting points for turning this philosophy into practice are two: the general conservation duties of the industry in sections 8 and 9 of the 1989 Act, with the associated Statutory Code of Practice and its monitoring by DOE Standing Committee; and, second, the corporate

objectives and policies of the NRA, the water companies and drainage undertakers. In many ways, we have all been here before, insofar as the 1973 Water Act established conservation duties for the old water authorities which have since been followed with general success. It is in this light worth quoting the views of the old Water Authorities Association on the effects of the 1973 legislation -

"There is little doubt that had the powers been expressed as wholly permissive rather than in part mandatory, authorities would still have been willing to exercise them. Perhaps the main value of the legislation has been the provision of a peg on which to hang expenditure, thus putting the legitimacy of this activity beyond doubt" (WAA 1987, p2))

There is doubtless still much truth in this comment today. The world has moved on since 1973, we have a much stronger and broader-based conservation framework and theory, and the gains to be made from conservation, in an environmentally-conscious, "green-minded" and leisure-oriented society are much the greater. There is thus much room for optimism that the privatised water industry will not be slow or reluctant to build on the conservation achievements of their public predecessors. The Code of Practice was drafted in 1989 as a summary of best practice, but the best indicator of its success will be an early need for a new edition to catch up with developing best practice among water companies.

Because the newly-privatised water industry and the NRA are major managers and users of archaeological land, the whole industry has a substantial role to play in promoting the conservation of our cultural heritage and enhancing public appreciation of the past. In fact the industry has a threefold responsibility for the cultural heritage -

- a responsibility to preserve the industry's own heritage of industrial archaeology,
- an owner's responsibility for ensuring good management within the industry's major land-holdings, especially in the uplands, and
- a developers responsibility to ensure that the adverse effects of essential operational duties such as pipe-line and new reservoir construction are minimised, wherever possible avoided altogether, and where damage to archaeology is finally unavoidable, to ensure the recording, study and publication of what is to be lost.

3.2.2 National Archaeological Conservation Bodies

There are a number of national organisations directly or indirectly involved in archaeological conservation, with whom NRA and the industry needs to establish close working links. There are in addition local authorities

whose involvement is described elsewhere in these papers.

ENGLISH HERITAGE has national responsibilities and duties laid down in the 1983 Heritage Act. In general terms, its objective is to secure the long-term conservation and widespread understanding and enjoyment of the historic environment for the benefit of present and future generations, using expert advice, education, persuasion, intervention and financial support. In detail, English Heritage is involved in statutory processes such as the scheduling and listing of ancient monuments and listed buildings, and in the respective consent procedures, in the giving of advice and financial assistance for repair and management projects, and in carrying out and commissioning archaeological survey, excavation, and other research. In the remainder of the United Kingdom, similar responsibilities fall to CADW (in Wales), Scottish Historic Monuments, and DOE Northern Ireland.

These activities take place within a series of interlocking policy frameworks. Central to our work in archaeological conservation is the philosophy set out in "Ancient Monuments in the Countryside", within a strategy of selecting the best and most important sites, and underpinned by an approach which recognises three distinct elements of conservation. These are:-

- identification and characterisation of ancient monuments, with assessment of their condition and evaluation of their importance
- active conservation, which may be curatorial management and/or exploitative use (study or display)
- investigation and recording if a monument's destruction is unavoidable in order to retrieve some at least of a monument's informational value.

This approach gives primacy in the first instance to the physical preservation of monuments and sites, and regards excavation and recording as second best to keeping the actual fabric of the site and its historic evidence. A similar premise underlies our repair and management philosophy, which follows a principle of conservation "as found", ie with the minimum of change, alteration or addition consistent with survival in order to retain as much of the historic fabric as possible. For similar reasons, it is preferable where practical to preserve machinery such as pumping engines in the buildings designed for them, rather than transferring them to another building for display in a museum context.

Our archaeological research policies are also dictated by these conservation strategies, for instance for identification and prospection purposes, or to provide detailed information on a site's archaeology in order to

allow repair and management plans to be developed. 1990 will see the publication of our Forward Strategy, based upon these premises, for archaeological work in the next decade.

Three other national archaeological bodies need mention. The ROYAL COMMISSION FOR HISTORIC MONUMENTS (and Welsh and Scottish counterparts) is primarily a body concerned with recording the cultural heritage; much of the work of identification and survey which is the starting point for all conservation strategies has traditionally been the domain of the Royal Commissions, although this work is now partly carried out also by county councils in close partnership with RCHM. The COUNCIL FOR BRITISH ARCHAEOLOGY is a nationally-representative but regionally-organised body which can draw on much expertise from all parts of the archaeological profession, and in particular for water industry purposes it has a Countryside advisory committee and regional panels on Industrial archaeology. Finally, and most recently established, the INSTITUTE OF FIELD ARCHAEOLOGISTS is the professional body with responsibility for the development and maintenance of professional standards and principles. As both employer and client of archaeologists, the Water Industry will become rapidly acquainted with its work and ethos.

An important part in archaeological conservation is also played by national organisations not primarily concerned with the cultural heritage, notably the NATURE CONSERVANCY COUNCIL and the COUNTRYSIDE COMMISSION. The NATIONAL RIVERS AUTHORITY, with its duties towards river corridor conservation generally, is likely to become a third major participant over the next few years. The NCC's interests overlap directly with those of English Heritage in the area of archaeological conservation. Many SSSIs and Nature Reserves occupy archaeological sites. These are often the product of natural regeneration, escaping the worst effects of modern agricultural methods, following abandonment of ancient sites such as fishponds or prehistoric settlements on subsequently marginal land. Semi-natural ancient woodland often covers and protects prehistoric and Roman earthworks, while similar sites elsewhere have been erased by centuries of ploughing. Certain elements of the natural world, for example water meadows or for that matter the Norfolk Broads, are in their own right relict archaeological features created by now obsolete human practices and land use. The aims of nature and archaeological conservation are generally closely attuned, although conscious integration is always worthwhile. (Lambrick 1985, Streeter 1986). In particular, close links with local FWAG (Farming and Wildlife Advisory Group) officers are to be strongly recommended.

The Countryside Commission has a more general approach to the landscape which has developed considerably in recent years from its primary duties with respect to natural beauty. The importance (if not yet in all quarters, the primacy) of the landscape's historic components is now widely recognised. The protection of our National Parks and AONB's, the encouragement of public access to the countryside, the pursuit of careful conservation strategies to encourage more sympathetic farming practices are all policies from which archaeological conservation is benefiting. Further steps in this direction are the introduction of the concept of Environmentally Sensitive Areas in 1986, and the development of set-aside, particularly the Countryside Commissions's experimental premium scheme in eastern England. The Countryside Commission has also carried out much conceptual work on historic landscapes, and with the NCC is developing guidelines for local authorities on the treatment of landscape in development plans. English Heritage hopes to supplement this for the historic landscape in due course, and has established a Historic Landscapes Panel which draws its membership from a wide range of disciplines to foster a specifically historic approach to landscape. The NRA through its river corridor surveys, and through the development of planning guidelines for LA's to protect catchment areas from adverse development, will also have a major contribution to make.

Finally, but not least, LOCAL AUTHORITIES make a crucial contribution to archaeological conservation. Their work is described elsewhere in these pages, and all that needs emphasising is the importance of regional or local expertise on the ground when preparing and implementing conservation strategies and management plans, and in working with regional NRA units or territorial water companies. County Council Sites and Monument Records in particular must become the water industry's close working partners.

3.3 PART 2: Procedures

3.3.1 Designations

A variety of protective or indicative designations apply to the cultural heritage, and these carry with them a range of greater or lesser restrictions intended to ensure its survival. Some of the designations are very broad, others are site-specific.

In the first category are National Parks which comprise historic landscapes within which operate special planning policies and favourable conservation initiatives. Over the years, arguably at the expense of other equally important areas, they have tended to attract resources, special schemes (eg the Peak's Farm Conservation Scheme, focussing the full range of financial assistance for farmers pursuing conservationist

policies) and specific legislative measures (eg the Moor and Heath maps of the 1981 Act; and S152 of the Water Act). Water industry activities in these areas must continue to be informed by full recognition of the special and sensitive character of these areas, and of the historic value and special management needs of Park landscapes. The same considerations apply to Areas of Outstanding Natural Beauty (34 in England) (and on a smaller scale to SSSIs and designated Nature Reserves), whose eligibility for designation often stems indirectly from significant archaeological and historic components in the landscape simply because landscape beauty in Britain is almost exclusively the product of past human use of the land. Finally, those local authorities which have either produced subject plans for conservation or used local or structure development plans to define areas or landscapes of high archaeological importance or potential are particularly far-sighted, as such plan designations allow special planning strategies and policies to be formulated to direct future land-use in appropriate directions. The water industry needs to be aware of all such designations, and of their special character, when drawing up any operational or conservation plans. In the same way, ESA designation, while imposing no restrictions on activity except within the context of voluntary management-type agreements with farmers, (or indeed on a much smaller scale English Heritage's non-statutory register of historic parkland), is a useful indicator for the industry of areas where special attention to the cultural heritage is required. Ramsar sites, wetlands of international importance, will also frequently have archaeological interest.

A further area designation, which carries precise restrictions on new development and is specific to the historic environment, is the conservation area (CA) designated by local authorities under the Town and Country Planning Acts. Primarily used in urban areas, there are examples of rural use (for example the upper Wey valley in Hampshire, the Glaven valley in N Norfolk, areas in Somerset, village environs in many parts of the country, and the recent Swaledale designation designed to protect the historic landscape of field walls and barns). Many water industry buildings will stand within conservation areas, and some operational activities may also affect their historic character. Relevant proposals in CAs should therefore be discussed with the local authority at early stages of planning. Lists of CAs should form part of a water company's conservation database; local authorities have details and English Heritage has recently published a four-volume gazetteer of the 6000 English CAs designated by 1989.

The two statutory designations most likely to be encountered by water organisations are SCHEDULED

ANCIENT MONUMENTS and LISTED HISTORIC BUILDINGS. Scheduling and listing is carried out by the Secretary of State, on advice from English Heritage following standard criteria. Scheduling is far more selective than listing - whilst there are currently over 430,000 listed buildings, there are only c13,000 monuments on the current Schedule, probably only c3% of known archaeological sites. English Heritage is running a major re-scheduling exercise, known as the Monuments Protection Programme (MPP). This is intended to increase this proportion by a factor of four or five, producing a representative sample of the most important and typical archaeological sites though with concentration on, for example, those most representative of period or culture, those belonging to the rarer types of monuments, those of greatest age, and those offering the greatest potential for information about our past.

3.3.2 Scheduling and Listing Consents

Both scheduling and listing have related consent procedures, although they operate in different ways. Listed building consent (LBC) procedures are largely operated by local authorities, with English Heritage involvement where grade II* and I buildings are concerned and with provision for the Secretary of State's involvement, through "call-in" mechanisms. Local authorities are guided by government advice in circular 8/87, and most LBC applications are determined within the planning system. Applications for scheduled monument consent (SMC), in contrast, are determined directly by the Secretary of State on the advice of English Heritage. The procedure is quite separate to the planning process, and without formal local authority involvement, although in practice, there is informal local authority participation, especially by county archaeological officers and their Sites and Monuments Records.

The range of applicability of LBC is well-known, and should not need repeating here. Circular 8/87 provides guidance, and local authorities are also ready to offer help. A valuable overview for the water industry, "The Water Heritage" was produced by the Water Authorities Association (WAA 1987). It provides a summary of the range of listed buildings owned and used by the water industry, with special reference to industrial archaeology. It also lists sources of specialist advice available to water companies on this issue.

The applicability of SMC is perhaps less well-known, but a greater range of works is covered by this legislation than by LBC. In practice, almost any works carried out on scheduled monuments will require consent from the Secretary of State; this includes any ground disturbance or works altering the monument's appear-

Roadford reservoir (with the new dam visible in the background), the scene of extensive archaeological survey and excavation of late medieval and later settlement patterns achieved after full integration of archaeological conservation with operational planning. (Devon County Council)



ance, visual amenity or historic character, any repair work, and flooding and tipping operations. It is therefore probably true that any water industry activity on a scheduled monument will require consent. While applications, which must be detailed, are made to the Secretary of State, pre-application consultation of the SMR and discussions with English Heritage are always worthwhile, in order to define potential adverse effects on monuments and to identify ways of avoiding damage. There is a presumption that damaging works will not normally receive consent, although unavoidable works may be allowed as long as appropriate provision is made for the recording, study and publication of the site's archaeology. Careful preliminary planning, in consultation with the SMR and English Heritage, can often avoid damaging works, the loss of archaeological remains, or the reduction of a site's amenity and historic value. This is particularly so when pipelines are being planned, as consideration of known archaeological sites at the beginning of the project can allow routes to avoid the most important sites. Subsequent fieldwork

on the line of proposed routes will produce further archaeological information which in turn can be used to design any necessary re-alignments or to devise strategies for the recording of archaeology whose destruction is unavoidable. For large-scale projects such as reservoirs, of course, such early planning is even more important. Roadford, for example, was 15 years in planning through the search for the least environment-ally damaging site.

The vast majority of archaeological sites are not scheduled, although many may be of national or regional importance and worthy of preservation, for instance, through the Town and Country Planning system. Government advice (circular 8/87, the new PPG, "Archaeology and Planning", and several appeal decisions) is clear that the preservation of unscheduled sites is a material consideration in development control. The procedures are dealt with in detail elsewhere in this volume, but it is worth emphasising that the principles outlined in the preceding paragraph are equally valid for

non-scheduled sites.

There is an overlap between scheduling and listing which causes some buildings and structures to be doubly protected by both legislations. The English Heritage re-scheduling programme will reduce this overlap by de-scheduling in cases where listing provides adequate protection. Some buildings will always require both types of protection, however, because scheduling provides greater protection in certain circumstances, while the listing of eligible buildings is non-discretionary. Where buildings are both scheduled and listed, scheduling legislation takes precedence and SMC is required for all works.

PART 3 - Planning

The preceding pages have outlined the current framework of national policies for the conservation of the cultural heritage, and the institutional and legislative structure within which conservation operates. This final section first indicates some of the wealth and diversity of the archaeology and buildings likely to be encountered by the water industry, and then attempts to suggest the type of approach which will help the industry to fulfil its statutory obligations under the Act, to work within the Code of Practice, and to exploit the wide opportunities which conservation offers for improved public access to the countryside.

3.4.1 Archaeology and the Water Industry

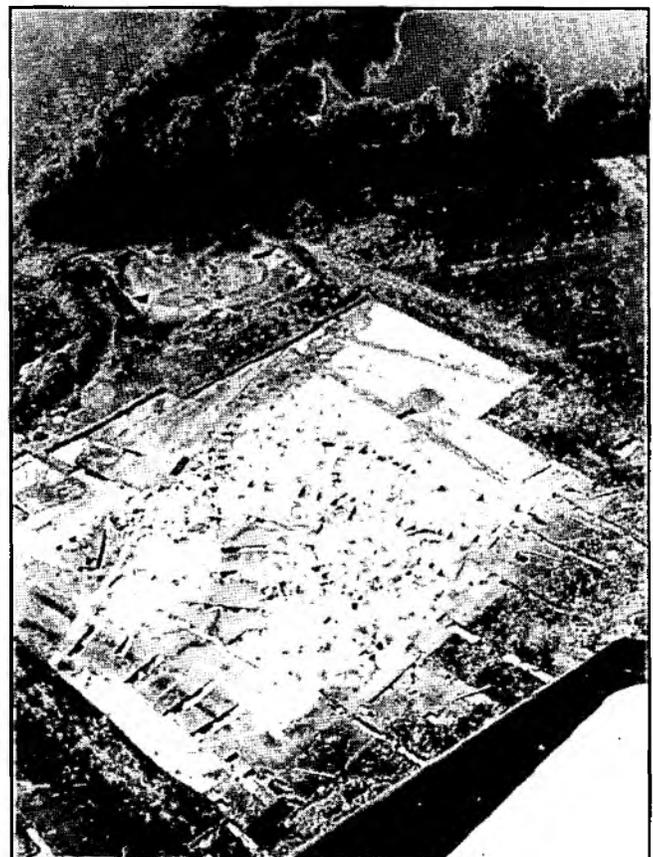
The present structure of the industry is established by Act of Parliament, and each of the three main sectors of the industry, ie the National Rivers Authority, the private supply and utilities companies and the drainage undertakers have different contributions to make to archaeology and conservation depending upon their spheres of operation.

The NATIONAL RIVERS AUTHORITY (NRA) has far-reaching responsibilities, among other duties, for river corridors and their conservation, from water management and riverbank maintenance to flood defence. River valleys are particularly sensitive archaeological zones, and much NRA activity will have a direct physical impact on the historic landscape. NRA work on recreation and amenity will also provide good opportunities for promoting public appreciation of archaeology.

The archaeology of rivers includes some of the country's best and most important remains, out of proportion to the small percentage of the country's land area. The wealth and diversity of archaeology in river valleys is well-known (Darvill 1987 pp64-78). On the one hand, there is the archaeology of the river itself - sites of travel and communication (waterfront and boat remains, for instance), of economic use (eg mill-sites, fish-farming,

agricultural uses such as water meadows or drainage), or of religious and political focus (notably, for example, the late Iron Age deposition in rivers of valuable metal-work as a form of conspicuous consumption to legitimise power). Riverside locations have often in the past also been attractive sites for both rural and urban settlement. At the same time, river archaeology has special importance because the circumstances of survival often provide unusually good preservation of archaeological and palaeo-environmental remains through water-logging or because they have been protected from the usual agencies of destruction (eg erosion or ploughing) by deep covering of more recent alluvial deposits. River valleys also provide some of our best and most extensive "windows" onto past landscape because of the good results obtained by aerial photography on the gravel terraces of major rivers. Valleys are also ubiquitous across the whole country, and thus provide comparable data for all periods of the past irrespective, for instance, of regional, cultural or geographical differences; in short, and with obvious limitations, river archaeology can provide a very valuable and relatively balanced sample of the full national range of our cultural heritage.

River corridors throughout England are major resources of archaeology - an iron age settlement, originally sited on a gravel island in the Thames valley, under excavation. (Oxfordshire Archaeological Unit)



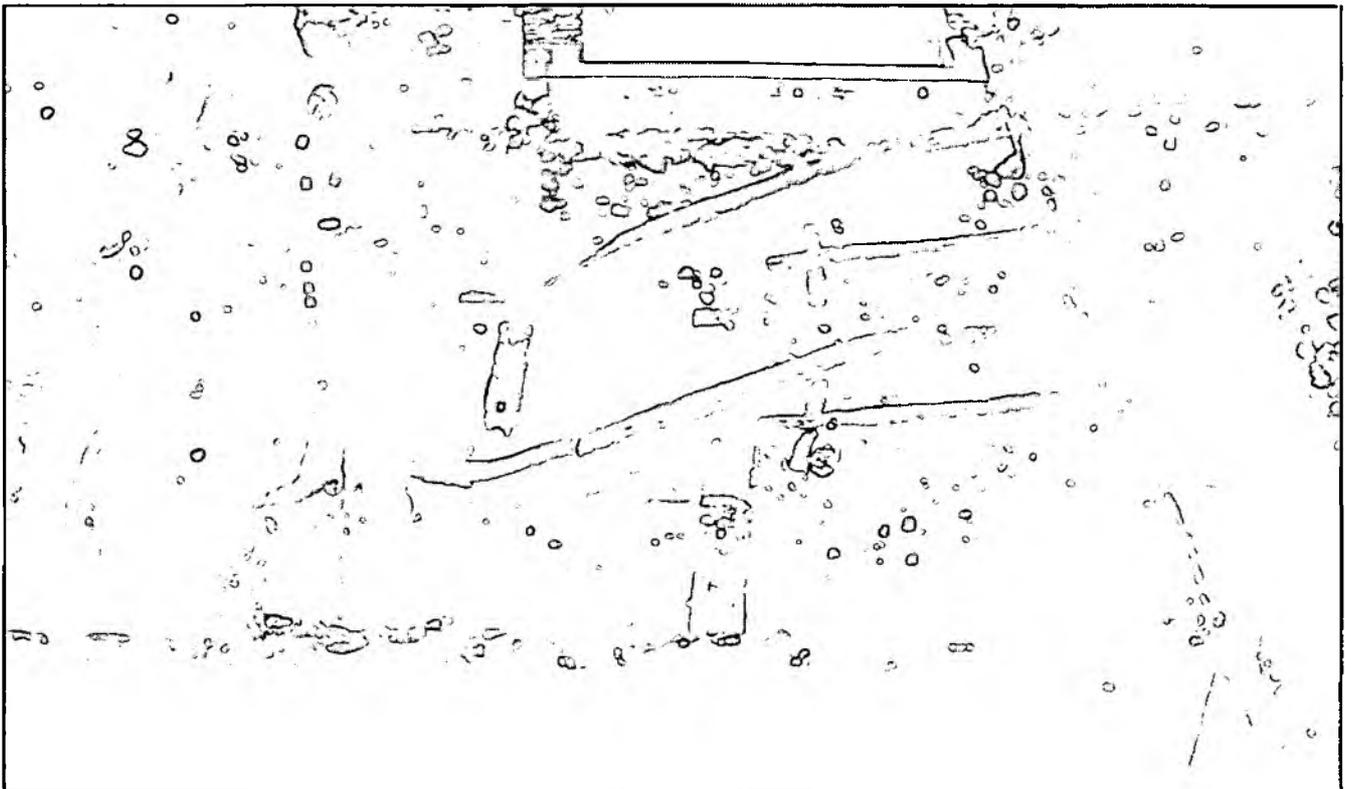
Much of the importance of river valleys, particularly the value of water-logged remains, is also shared by coastal and wetland areas where the NRA also has important duties. The future of the archaeology of both types is at present in some doubt, as major drainage work continues on our wetlands and (particularly on the east coast) as an over-riding need for major coastal flood defences increases. The cultural importance of such areas continues to be confirmed by English Heritage-funded work over the last two decades in wetlands from the Somerset levels to the eastern Fenland, and on coastal zones such as Morecambe Bay, the Essex estuaries, and the Lincolnshire coast. Time and again in recent years, the central place of wetlands in British archaeology has been re-emphasised by new work and discoveries such as the Lindow bog-body, the Fengate causeway and the Stumble's Neolithic land-surface and structures, but less dramatic and less well-publicised work is often of equal significance - the archaeology of coastal industries such as salt-working for example, and the long history of organised land reclamation often from as early as the Roman period. The proper management of wetland sites (as in the Somerset Levels by maintaining the water-table in selected areas) will be a major task for the NRA, as will the establishment of appropriate methods of exploitation

Historic riverside waterfronts (such as this major urban medieval example from London, preserved under later land reclamation) can be vulnerable to flood defence and river improvement works. (GF)

including survey and prospection for unknown sites, the excavation of sites threatened by drainage and drying out, and public explanation of the land's history as part of riverside trails and visitor centres.

The PUBLIC COMPANIES, the water and sewerage undertakers, have a no less important role. They have, first, a major task as stewards of the remains of the historic water industry and its heritage as a major, and essential, public utility since the last century. In 1987, for example, a Water Authorities Association survey revealed 80 locations where water authorities were responsible for surviving steam, gas, diesel or water-powered machinery, many of which were among the earliest or best of their type in the country. Many more listed buildings without plant also exist in water ownership, ranging from historic farmhouses to industrial buildings, while even the great 20th century reservoir dams in, for example, the Pennines can now claim significant architectural, historic and perhaps most of all cultural value. Looking forward, there is arguably also a responsibility for the industry to design new buildings or structures bearing in mind that today's plant will be tomorrow's cultural heritage.

Beyond this guardianship of their own past, however, the private companies have an archaeological role in two other directions. First, the new water companies have inherited large tracts of land acquired since the 19th century to protect catchment areas. These areas are often concentrated in countryside of the greatest



Excavation of the waterlogged timbers of the Flag Fen bronze age settlement platform associated with the Fengate causeway in the Cambridgeshire Fens. The discovery of important surviving prehistoric timbers and environmental evidence is an increasingly common result of major land drainage in wetlands such as the Fens. (Fenland Archaeological Trust)



natural and historic interest, and often in parts of the country subsequently recognised as being of national importance by designation as National Parks or Areas of Outstanding Natural Beauty. The companies are thus the owners of much land of archaeological interest, particularly in the archaeologically - rich moorland uplands. With such ownership comes a responsibility, both social and statutory, to manage land in a way which fully recognises conservation and amenity interests, and maintains our cultural heritage in good condition for us and future generations to enjoy.

These moorland areas, like the river valleys though for rather different reasons, contain major reserves of archaeological remains (EH 1987 pp 148-163; Darvill 1986). Frequently their archaeological value is mirrored by National Park status or AONB designation, and many of them will probably become "section 8" land, notified as having special conservation interest under s9 (2) of the Act. Upland archaeology, particularly relict landscapes of prehistoric settlement or industrial activity, is important for a variety of reasons. First, these areas are some of the largest uninterrupted expanses

of prehistoric landscape left to us after two thousand years of continuing agriculture in the lowlands. Archaeology on moorland also has unusually high levels of preservation, caused by a variety of factors not least water-logged conditions in peat areas, and the good environmental preservation due to acidity of soils in general. Finally, low intensity recent land-use has allowed an exceptional level of earthwork survival, and this has led to high amenity and educational value with much potential for public display.

The extensive moorland holdings of water companies contain important archaeological landscapes such as this stone circle in Cumbria. (GF)



Upland moorlands are often thought of as natural wildernesses; they are however demonstrably the product principally of human activity and their continued existence requires positive management. Direct threats to these areas from the water industry's activities may be relatively infrequent (although often significant, for instance new reservoirs) but they are under increased pressure from other land use. Water companies will need to exercise good stewardship over their lands if they are to be passed on in good condition to future generations. The first step, as explained in the Code of Practice, must be the collection of up-to-date information on archaeological sites in their ownership, on which can be based detailed estate management plans, drawn up in collaboration with farmers and national and local archaeological bodies. The preparation and full implementation of such management plans will require a high level of expertise within individual companies; the benefits to be gained from proper management and enhanced amenity value will justify the effort.

Second, the companies' operational requirements, especially new construction, will often affect archaeological sites and the wider historic landscape throughout the country. This role, in essence comprising the standard responsibility of any developer to mitigate the adverse environmental effect of their proposals, will

An abandoned medieval settlement on high moorland, partly under excavation. (GF)



draw companies into all aspects of archaeological conservation.

Water storage schemes, especially the enlargement or construction of reservoirs, can irrevocably affect large areas of historic landscape, in terms both of the physical destruction of sites and of alterations to the amenity and character of landscapes. Choice of site for such works will be dictated by many factors, including the need to minimise archaeological destruction. Final design work should be preceded by full site surveys, and later prior recording of the most significant features to be destroyed or flooded. The new South West Water reservoir at Roadford provides a good modern example of the necessary procedures for such a project, starting from careful (not to say prolonged) site selection to ensure a location with the minimal conservation loss, and ending with large scale research in advance of construction and flooding which is enlarging our understanding of the history of lowland rural settlement in the South West. Throughout the project, detailed attention to interpretation and explanation of the project for the public has secured the greatest dividends and laid foundations for permanent visitor facilities and recreation at the site.

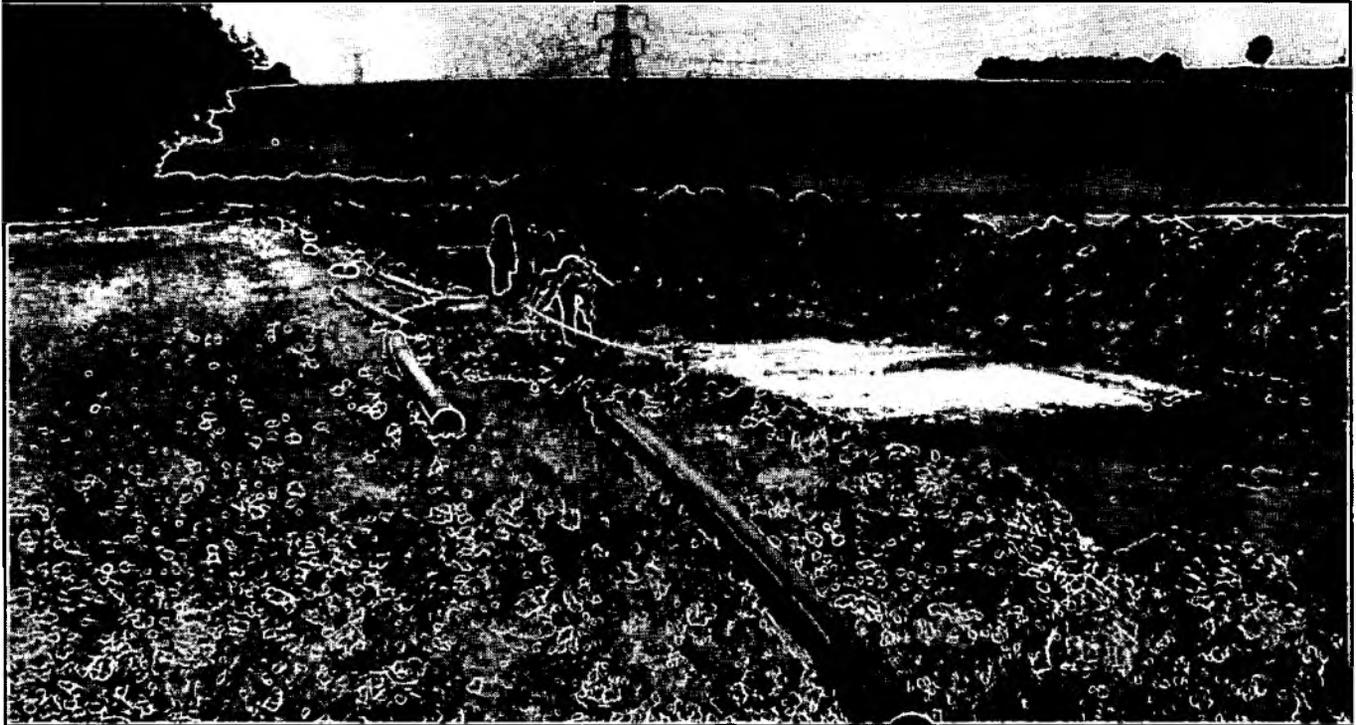
More difficult to reconcile with archaeological conservation are water abstraction schemes which cause lowering of water levels in the vicinity of wetland and water-logged archaeological sites. In such cases, even seasonal and temporary drying out of archaeological deposit can significantly reduce, or destroy, a site's

importance. New abstraction schemes should therefore be discussed at early planning stages with relevant archaeological bodies; obviously however not all wet archaeological sites are yet identified and in some areas of greatest potential companies will need to arrange more detailed field surveys in order to establish adequate databases to allow full adherence to the Code of Practice.

A third main category of works with archaeological consequences includes the construction of new water pipes. Access to data on known sites is of the greatest importance here, to minimise disturbance of known sites by allowing careful selection of routes to avoid the most important. Again, however, the archaeological impact of any route cannot be quantified without full information and it will generally be necessary for archaeological field survey to be commissioned at early stages of planning in order to identify new sites, evaluate their comparative importance, identify any need for further realignment and, finally formulate strategies for appropriate prior archaeological recording if disturbance of sites is unavoidable.

The work of the third sector of the industry, the DRAINAGE AUTHORITIES, has a direct impact upon the preservation of rare organic and environmental material in wetland and water-logged sites. Good guidelines for drainage bodies already existed before the new legislation, and these remain in place. There is thus already recognition of the need for carefully-designed strategies for preserving archaeological sites during

Pipelines and archaeology - a Roman building (its white chalk floor is visible in the centre of the photograph) under excavation at Great Wilbraham, Cambridgeshire during NRA pipelaying operations. (Cambs County Council)



drainage work. But the scale of the problem is great, and further archaeological survey is required in most areas before we can confidently establish conservation priorities for existing or proposed drainage work. It will be crucial for drainage bodies to compile or have access to up-to-date records of known archaeological sites within their areas of operations, and to prepare detailed management guides to ensure that the most important archaeological sites do not suffer from drying-out.

3.4.2 Policy Framework

In order to maximise the opportunities given by the water industry's involvement with the cultural heritage, clear objectives within a consistent and statutory framework, such as outlined earlier, are essential. To convert these to good practice requires a further stage of definition of policy for the industry as a whole, however, which needs to operate at three superimposed levels -

First, the overall direction of work should follow the broad lines of national conservation policy, as established by

- a) the various legislations governing conservation which have been outlined above;
- b) organisational policy such as English Heritage's AMiC approach and the Countryside Commission/NCC landscape guidelines,
- c) local authority development plan policies

d) central government policy and guidance such as circular 8/87 and the new Archaeology and Planning PPG, the EIA procedures, and present and future Codes of Practice as monitored by DOE's standing committee;

Second, the water industry as whole will require its own broad formulation of policy to provide an overall framework based on national policies. The lead in this, as recognised by the Code of Practice, will need to be taken by the NRA using its own corporate policy towards conservation, its regulatory functions with respect to the industry as a whole, and its research and development work.

Third, and most important, individual companies will need their own corporate policies for conservation, while NRA Regional Units will wish to develop detailed strategies consistent with conservation priority in their areas. These detailed groundwork policies will allow the application of wider national policies to specific opportunities, sites and projects. Some of the issues these policies will need to address, and methods of implementing them, are outlined below.

3.4.3 Database

The necessary pre-requisite of all conservation and cultural heritage management work is knowledge and information about the cultural resource (see, eg Fraser 1986). No scheme (whether a project of positive

conservation or an operational project taking full account of cultural heritage constraints and opportunities), should commence on the ground without full information on the character, comparative importance, condition and degree of fragility of any archaeological or historical remains or structure which exist. This principle is recognised in all areas of conservation - see, for example, the NCC's registers of semi-natural ancient woodland, the National Park Moor and Heathland Maps, or the work being developed in recent years by the Countryside Commission on landscape assessment.

For the cultural heritage there are a number of existing databases. Primary among these are the county-based Sites and Monuments Records maintained now by (or on behalf of) every county in England and Wales, whose creation has been a priority for English Heritage since the later 1970s following the development of the concept by a few pioneer counties. They are primarily archaeological records, map and text-based, with close links in most areas with the development control system. A number also contain information on historic buildings, whether listed or not; data on listed buildings is of course also published by district. Some SMRs also record natural elements of the historic landscape such as ancient hedges and woodland. Further information (and increasingly an index to SMRs) is also maintained by the Royal Commission (RCHM). Data on industrial archaeology is also maintained by RCHM, and by the Ironbridge and (for machinery) Science Museums, among other bodies.

The Code of Practice is clear on the importance of databases. NRA units, water companies and drainage bodies should as priority ensure that links and detailed consultative procedures exist between their conservation sections and at the least the local SMRs. Many will also wish to maintain their own records, at least for land in company ownership (see eg Thackrey 1986). It should be remembered, however, that an archaeological database can by its nature never be complete - "new" sites are continuously being identified (and the importance of specially commissioned prospection surveys has been mentioned earlier), existing sites are continuously being re-assessed in the light of new knowledge, and the very scope and range of the cultural heritage is expanding, as our concepts of the past widen.

3.4.4 Consultation

Consultation is here taken in its very broadest sense to include continuous liaison, joint development of databases, use of advisory committees and site-specific discussions. Its importance is a central theme of the Code of Practice. The need to involve relevant

conservation partners in all aspects of the industry's planning cannot be over stressed. Perhaps most of all, there is a need for continuous consultation with SMRs in order to maintain up-to-date databases of information on the archaeological interest of industry land. Consultation is not a one-off, single-stage process, nor one confined to a dedicated conservation unit at HQ. Concern for the cultural heritage and any successful policy of protection, conservation and legitimate exploitation (for, say, amenity or educational purposes), has to be an integral and consistent part of the industry's daily activity. The industry, and most of all the NRA, will need their own specialist professional staff to establish and maintain appropriate levels of conservation input into operational planning; conservation training for non-specialist staff must also be given priority.

3.4.5 Staffing

External advice, whether from local authorities and national conservation agencies such as English Heritage or from project based archaeological consultants, cannot be a substitute for in-house archaeological and building conservation officers who are attuned to corporate policy and fully acquainted with company procedures and practices. There will be many tasks, from drawing up specific policy documents or estate management plans to carrying out field evaluation along proposed pipeline routes to major set-piece archaeological projects, for which the industry will need to look to consultants or archaeologists under contract. In-house staff with relevant expertise will however still be required to draw up consultants' briefs and project specifications, and to monitor and control the quality of subsequent work. This is recognised by the Code of Practice, which emphasises the need for professional staff; more important, the industry's direct access to its own conservation officers is implicitly regarded as the only method of achieving the objectives and high standards set up by the Code.

This recognition of the need for specialist conservation and archaeological staff does not reduce the importance of basic training within the industry to ensure that all staff are aware of corporate conservation objectives, strategies and policies. As in other aspects of countryside conservation, it is the staff on the ground who in the last analysis have detailed responsibility for putting policy into practice. Just as it is the tractor driver who makes final decisions regarding the implementation of management plans in agricultural areas and who most of all must fully understand and be committed to policy, so in the water industry the role of design engineers, project site managers and contractors will be crucial. The Code's encouragement to full training is therefore central to the conservation of the cultural heritage in the water industry. Specialist staff will have a role in training

too of course; and above all what must be avoided is the creation of "separatist" conservation units.

3.4.6 Impact Assessment

The majority of industry operations, at least new works such as the construction of new flood defences, pipelines and water storage schemes, will have an archaeological impact, and the assessment of this impact should become an essential part of the early planning stages of any project. Government guidance on the use of Environmental Impact Assessment is a useful guide for the industry, but for archaeology the EIA procedures often need supplementing with field work and excavation, because of the nature of archaeological sites, which are often hidden and unrecognised without carefully designed field survey. The importance of field evaluation as part of the assessment process is also emphasised by the new Archaeology and Planning PPG.

3.4.7 Management Plans

The production of site - or area-specific management plans for land in the specific ownership of the water industry is one of the main keys to good conservation practice (see eg Evans 1987). Such plans should be produced for all land of conservation interest, after consultation with appropriate conservation agencies such as local authorities and English Heritage. There is now a considerable literature describing the aims and content of management plans (EH 1987, Lambrick 1986). In brief, they should incorporate descriptions of the land's conservation interest, a simple statement of management objectives, and detailed management prescriptions accompanied by plans and maps for the use of land managers. The plan should cover management, conservation and amenity issues including definition of appropriate levels of public access and display.

The production of management plans is not of course an end in itself; it is their successful implementation which is the real objective. Implementation will need to be monitored, and the plans themselves should be kept under continuous review to allow revision in the light of inevitably changing management needs. Monitoring of plans, even more than their production, has staffing implications and supports the case for in-house staff with appropriate professional expertise.

3.5 Conclusion

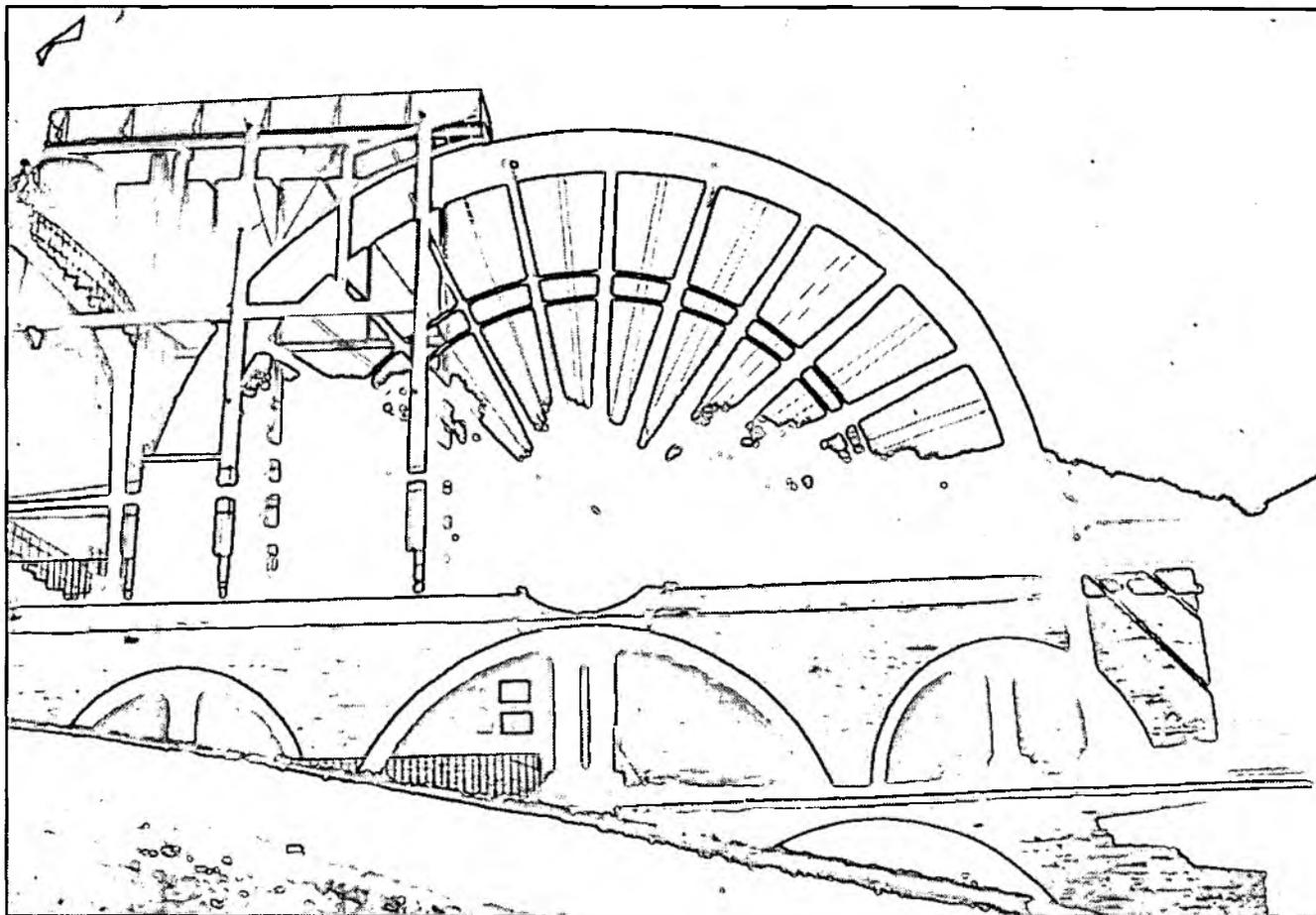
The newly-shaped industry, and in particular the NRA, is in an exceptionally good position to seize major opportunities for enhancing the conservation of our cultural heritage, bringing its educational and amenity value to a wider public and by improved access and display, increasing public appreciation of the historic landscape and its development. With minimal care, and the help of conservation partners in local authorities and

national agencies, any adverse environmental effects of water industry activities can be identified and avoided or exploited. The industry's ownership of important land holdings, and the NRA's wider remit to secure good management of river valleys, working within an established conservation framework, both provide great opportunities for enhancing public appreciation, enjoyment and understanding of this country's rich cultural heritage.

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The Great Laxey Wheel, Isle of Man (Michael Stratton)



4.1 Introduction

To begin with, I would like to dispel a common misconception about the industrial archaeology of water - that is that it consists primarily of pumping engines and great dams, dating mainly to the second half of the 19th century. These are indeed very spectacular and certainly evocative of a particularly important period in the history of the technology of water supply, but they are not all. Water has been important throughout the whole of the industrial development of England - water power was the basis of most industries until well into the 19th century. Water was also necessary for transport, through the development of first rivers and then the canal network. Thus power and transport are as important in the history of water as sewage and supply.

Other papers have already noted the two basic categories into which archaeological remains on Water Authority lands fall - the general category of remains which are purely incidental to owning large areas of land and the category of remains which relate specifically to water supply. The first category comprises mainly early sites preserved by the remoteness or lack of development in the large rural areas needed to protect catchment. The second is in effect the industrial archaeology

of water - as a source of power, as a means of transport and as a public utility. The archaeology of the first category has been well covered and so I propose to concentrate on the second.

4.2 The Industrial Archaeology of Water

4.2.1 Water as a source of power

For centuries, water power was the basis of most British industries. Water was a cheap, renewable resource and it was on or near water courses that most major industries located. We tend to assume that water was replaced by steam as soon as effective engines became available in the late 18th century, but this is not the case. Steam power was expensive, required coal, often inefficient and involved a huge investment in new equipment which firms could not always afford. So water power remained important throughout the 19th century (as the construction of the Bilberry dam scheme shows) and well into the 20th century in some areas. The large hydro electricity schemes demonstrate that it remains a perfectly viable power source today.

The industrial archaeology of water power is thus varied and not just confined to the 18th century. It is also not just about waterwheels or turbines. In order to under-

stand water power it is vital to understand the whole of the landscape in which it operated and to look at pools, dams, sluices and leats, as well as water wheels, power trains and the mechanism for getting water away. And it is these landscapes which are likely to be - or to become - the concern of the NRA and other bodies.

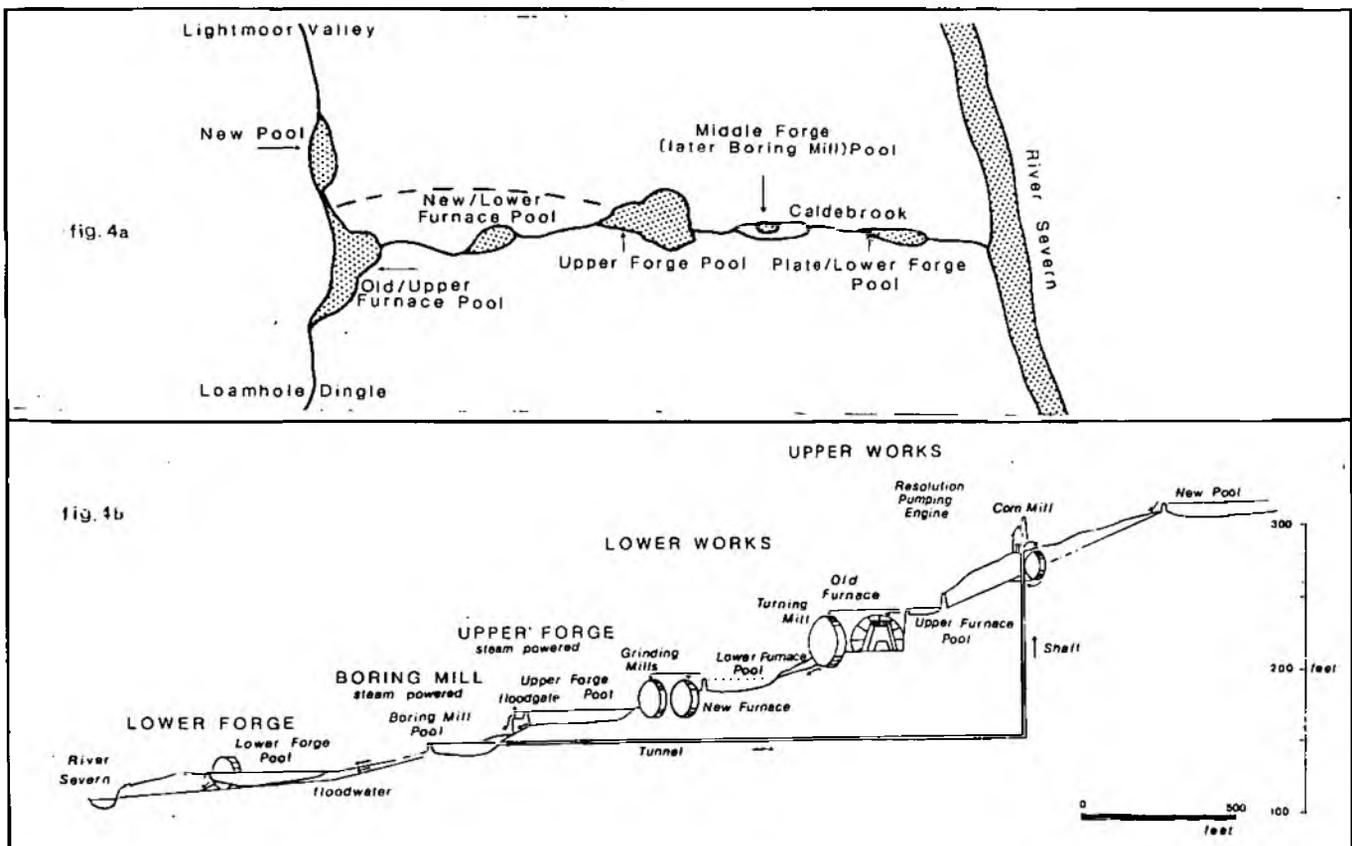
A very clear example of the complexity of a water system comes from Coalbrookdale, where many of the early pioneering achievements of the industrial revolution took place. Here a complete waterpower system survives on a tiny tributary of the River Severn. Discussions are currently underway between Telford Development Corporation who will have to dispose of the system and the NRA as the body responsible for surface drainage.

When Abraham Darby came to the area in 1709 he found a complete charcoal ironmaking complex, with a series of pools to provide power to blow air into the furnace and work hammers needed in forging. He was able to successfully smelt iron in the old charcoal furnace, using coke, and within six years set about expanding the complex. He added another furnace, and with it another pool, and by 1715 there were seven pools down the valley, each supplying an ironworking site. By 1734 there were problems with the amount of

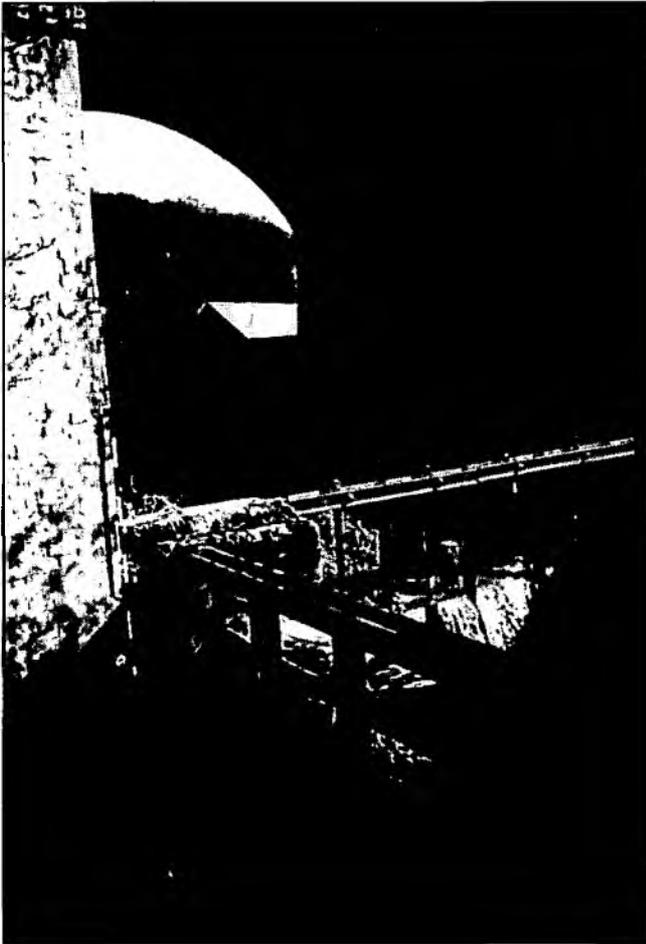
water available and so the company installed a horse gin to pump water round the system again. This was successful, and replaced in 1743 with a Newcomen Steam engine. By the 1770s there were further problems and instead of installing the then newly available equipment for blowing furnaces directly by steam engine, the company decided to retain the old equipment and install a new recycling engine. The Resolution, completed in 1781, was at that time the largest engine ever built, and lifted water along a tunnel half a mile long, and up a shaft of 120 ft deep in order to send it around the system again. Rather than adopt the latest steam technology, the company chose to keep old water powered equipment in operation.

At other sites, the company (and their contemporaries) were more innovative. At Bedlam furnaces, a steam engine was installed, not to blow the furnaces, but to lift water from the River Severn, up over a waterwheel which powered the bellow. The same principle applied at Horschay furnaces, where water was lifted from a pool below the furnaces and over a water wheel. Both furnaces still required to be on a stream, but quantity was more important than height in producing power. By the 1780s, new furnaces were incorporating steam technology directly, and they moved away from streams and rivers and closer to first raw materials, and later markets. Nevertheless, some ironworking activities, such as forging, remained dependent upon water.

Cross section of the water power system at Coalbrookdale (Nicola Smith)



Sluice gates at the Upper Furnace Pool, Coalbrookdale



In Coalbrookdale, the company continued to use water power until well into the 20th century, when grinding and turning still used water wheels. Thus a company in the forefront of technological development seem to have been, on the surface, remarkably slow to adopt the latest innovation.

Water power is a complex issue, but remains important well after the introduction of steam. However this type of information is rarely documented and the only way of understanding it is through study of the landscape. It is vital, therefore, that installations be treated not just as waterwheels or sluice gates in isolation, but whole, complex functioning systems. Water power was also used extensively in mining.

One of the best examples of this comes from Laxey on the Isle of Man. There we studied a 19th century lead mining complex with an extraordinary water supply system. Water brought via lades or mill races from several reservoirs was needed to power mine winding and pumping systems, the crushing and grinding of ore as well as ore washing. Water was even used to provide ventilation through an unusual water blast system. The first adit or mine was dug in 1780, but by the mid-nine-

teenth century there were a whole group of shafts and adits. Early problems came with mine drainage, and winding, and in 1828 a waterwheel was installed. This was insufficient and in 1846 a Cornish beam engine was added next to it. A further waterwheel was installed in 1848, and in 1852 the largest waterwheel yet built in the British Isles was installed to replace the other systems. Unfortunately, as a crank lying near the wheel shows, the wheel never gained its full potential of 200hp. The reason was the installation of a turbine house in 1862, which effectively reduced the watersupply to the wheel and meant that the largest waterwheel in Britain only ever worked at about 45hp.

Once again, it is clear that water can only be understood by looking at the whole of the landscape and how that changes, it is not possible to just look at individual wheels or pumps.

Laxey is outside the area of the NRA, but were it on the mainland it would be typical of the type of installation found on streams and rivers. The purpose of this example was to demonstrate the sheer complexity of any such system and the importance of understanding all of it. Such matters are of direct concern to the new authorities where these systems "continue to play a role in surface drainage". At Coalbrookdale, the overflow will pass through a medieval pool, restrained by an unsafe dam, and through culverts dating to the 18th century. The whole is complicated by being, in part, a Scheduled Ancient Monument. In such cases, public safety has to be balanced against the historical importance of these sites.

4.2.2 Water as a means of transport

There have always been conflicts over the use of water. One of the oldest was that between the use of rivers as a source of food and power and the use of rivers for navigation. Here again, the Severn is an excellent example - vested interests resisted frequent calls to make it navigable and in fact the first locks were only built in the 19th century (1852). This conflict continues today, with a Trust calling for navigation on the Upper Severn being strongly resisted by local pressure to keep the river wild. This is a decision which the National Rivers Authority will have to face in the near future.

The active management of rivers is extremely old. Cutting back banks, dredging, weed cutting and piling are all ancient methods, which were followed by more active management such as the construction of weirs, most of which were opposed by mill owners and others dependent upon water for their living. The history of lock development is complex and fascinating, but because rivers have remained in constant use, the remains of many early types have been lost. These are more likely to survive on tributaries or abandoned sites.

Although the upper reaches of the Severn have largely avoided being made navigable, navigation and river improvement comprise a very large category in the cultural heritage to be inherited by the new authorities. The leisure boating market is now well established, but it is important not to forget the recent lessons of the British Waterways Board, taking over canals after years of neglect. A low level commitment to constant maintenance now, is surely better than abandonment, and inheriting a far worse problem in a decade's time.

Decaying sluice gates, Coalbrookdale



4.2.3 Water supply and sewage

The problem of supplying water to concentrated populations dates back to antiquity. In Britain, there are certainly remains of systems supplying cities such as London, Cambridge and Leeds (1694) from the medieval period onwards. In fact, Petworth was possibly the first town in England to have pumped water, in about 1500. But the great expansion in the provision of clean water and sewage to British towns followed Edwin Chadwick's paper of 1842, entitled "Report on the Sanitary Condition of the Labouring Population of Great Britain".

Overcrowding and speculative building in towns had brought with it serious health problems in the early 19th century. TB and typhus were endemic and life expectancy amongst labourers in Manchester was only 17 years. Although the precise biological mechanisms underlying the spread of disease were poorly understood, Chadwick recognised the importance of cheap, self cleansing water-borne sewerage systems and also

an effective mechanism for local control. Rivers were described as 'elongated cess pools', and there were damning descriptions of the state of major towns.

The most immediate outcome was the setting up of local Boards of Health with the power to raise money to pave streets, and invest in water supplies. Acceptance was slow, however, and it was only with the outbreaks of water-borne cholera in 1831, 1848 and 1866/7 that disease began to seriously threaten the better off classes and Chadwick's ideas gained wider acceptance. In 1855 John Snow published a paper, "On the Mode of Communication of Cholera" linking the disease to water, by noting the distribution of cases around a pump in Broad Street, London.

By the mid 19th century, the concept of public control of water was generally accepted and by 1899 the many private water companies were bought out in favour of municipal control.

The result of all this was investment in water supply and the construction of the great schemes to supply towns. One of the earliest was perhaps the Eccup scheme for Leeds but others soon followed; the Longdendale (1848) scheme for Manchester and the Rivington Scheme for Liverpool were some of the earliest. These schemes were on a vast scale and most remain in operation today. The potential of these for public display is perhaps best explored at Lake Vyrnwy, built in 1891, where a combination of walks and an interpretation centre provide an excellent public amenity.

There was also investment in towns and it is interesting to note the choice of architecture. Engines were often landscaped so as to resemble Georgian country houses, a tradition which sewerage pumping took even further. The Abbey Mills Pumping station of 1868 is in a richly ornamented, Gothic style, and has been said to "resemble a cathedral from Southern Europe rather than a public health establishment in the capital of a Protestant nation" (Trinder 1982). The provision of sewerage was as important as water supply and developments such as the 'egg' shaped sewer were central. The current display at Manchester's Museum of Science and Industry provides a graphic account of the history of the town's supply, enlivened by some very authentic smells. Sewers have not yet been scheduled, but it may be that now is the time to identify some of the earliest and best, and make sure that they survive the advent of the plastic pipe.

4.2.4 Water in the Landscape - the Leighton Estate

So far, power, transport and water supply have been kept separate. But this is not always the case. The Leighton estate near Welshpool is an example of bringing all of these aspects of water together in one extraor-

Model Farm, Leighton Estate (Michael Stratton)



inary scheme. James Naylor was a Victorian entrepreneur who decided to develop his farm as the quintessential agricultural show piece. The farm was on a hillside, overlooking Powis Castle, and there was no doubt an element of competition in his schemes. There is little documentation for Leighton, but three years of survey work by students have shown the extent of Naylor's vision. Two streams were dammed to provide water for a series of turbines which powered saw mills and other estate equipment. One turbine powered a pump which lifted manure collected from the piggeries and cow sheds up to a vast tank on the top of the hill. There it was allowed to run down through early pitch and cardboard pipes to be distributed across the fields. There were also several canals, a funicular railway and broad gauge railway. In the river at the bottom were hydraulic rams, and other water based equipment. The whole was conceived as one water based operation and relied on a networks of pools, pipes and supply systems.

Once again, the Leighton system will remain relevant to the present surface drainage and any failings in the old system will create problems for the local community. So it is important to understand the water system simply in order to maintain it. At the same time, Leighton is a unique landscape, to which the dams, pools and old turbines make a vital contribution. Leighton is almost

certainly not unique, and illustrates the need for a wide ranging examination of water systems.

4.3 Taking responsibility for the Historic Landscape

4.3.1 Conservation

It is not possible to deal adequately with the industrial archaeology of water in half an hour but what I have tried to do is to go beyond the pumping station and highlight the importance of water in the landscape. This importance is both practical (in the sense that the better a complex system is understood, the easier it is to maintain) and in the public interest. It is also academic, in that water in the landscape is a source of information about the past which we should not wilfully destroy.

This then raises the problem of conservation. The 1989 guidelines suggest that the authorities shall "have regard" to archaeological sites, but then go on to suggest strategies which involve little more than contacting English Heritage and the local Sites and Monuments Record. Unfortunately, there are problems in the use of the existing legislative and information structures to deal with industrial sites and landscapes.

4.3.2 Statutory Protection

The strongest protection a site can have is to be Scheduled as an Ancient Monument. There are

relatively few such monuments in Britain, and within this category, industrial monuments are poorly represented. In recognition of this, English Heritage have launched the Monuments Protection Programme, hoping to extend the range of monuments. But Scheduling will never provide adequate protection for more than a small handful of nationally important monuments. Scheduling also relies on strict boundaries to a site - it would be almost impossible to schedule the whole of one of the large complexes mentioned earlier.

Listing is the main means of protecting buildings, but again the bias has been away from industrial sites, often because architectural criteria have dominated the judgement of inspectors. It was therefore possible recently to list the facade of an important tile factory in the Gorge, but not the manufacturing buildings. This means that it will be easy to list the ornate Victorian pumping buildings, but not the more mundane but technically interesting ones.

However, there remains a problem with machinery. Machinery can only be listed if it is part of a listed building and if removing the machinery will damage the building. A large engine could be listed but a small gas engine probably could not. The alternative form of protection is Scheduling. Technically it is possible to Schedule machinery and there are many bridges and some engines which are scheduled, but again, the

proportion of Scheduled monuments is so small that this may often not be possible.

Thus the situation arises where it is relatively easy to protect buildings but more difficult to protect the machinery in them, or indeed, the landscapes around them. This then raises the issue of the next line of protection - adaptive reuse - the reuse of buildings as houses, museums or offices. With high property values this is an increasingly popular practice. However there are dangers - it is not too late to learn the lesson of barn conversion, where a whole class of agricultural buildings have been converted into houses. Buildings have been kept - but the cost has been high in visual terms, in landscape terms and in terms of potential information. Meanwhile farmers continue to build sheet steel clad structures with the profits of conversion.

4.3.3 Recent developments in protection

Until recently, Scheduling and Listing have been the main means of protection for sites. However, there are signs from the DOE that this is changing. The most recent DPPG on planning and archaeology states that, "where nationally important ancient monuments, whether scheduled or not, and their settings, are affected by proposed developments, there should be a presumption in favour of their preservation".

"Many nationally important monuments merit preservation but are not yet Scheduled. In certain circumstances which should be defined in development plans,

Water-powered funicular, Leighton Estate, Powys. (Michael Stratton)



Mill Meece pumping station, Staffordshire (Michael Stratton)



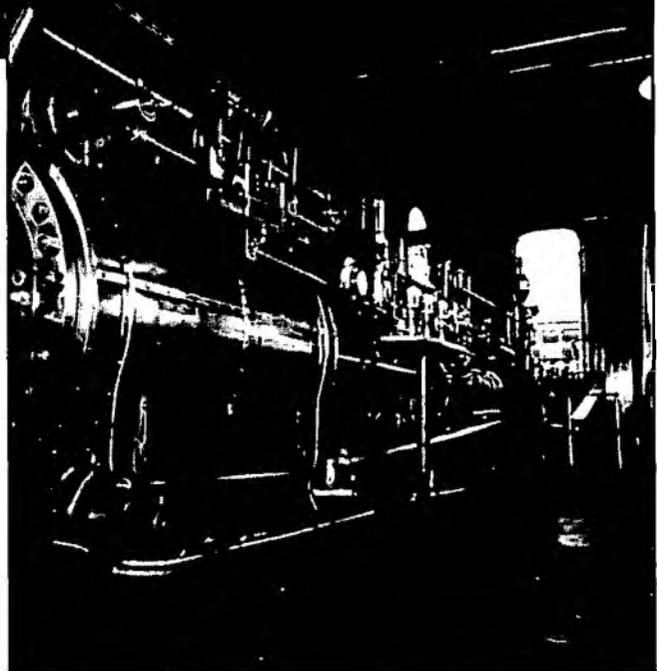
other monuments of lesser importance may also be preserved as particularly worthy of preservation for local reasons. Where any such monuments are altered by development proposals, early consultation between developer and local planning authorities is vital".

In other words, there is now a mechanism for protecting monuments which are not scheduled. What is more, the onus is now moving from the archaeologist to the developer, as the guidelines state that, "local planning authorities can reasonably expect developers to provide (evaluation) as part of their application for sites where there is good reason to believe there are remains of archaeological importance".

This last point is very important. Developers are expected to provide information. Normally the main source of archaeological information is the County based Sites and Monuments Record, but these are inevitably poorly resourced and providing coverage on a huge scale. The examples I quoted at the beginning showed just how complex a water based site can be and no County based record can ever adequately reflect this. A Sites and Monuments Record must always be seen as a starting point and never as a comprehensive record. Therefore there is a need for information on the ground.

4.3.4 Information and Protection

I believe that in order to fulfil their responsibilities to "have regard for" the conservation of archaeological features, Water Bodies have to begin by taking responsibility for collecting information about that resource.



To be fair, an important initiative has already been undertaken. The Water Space Amenities Commission undertook a systematic survey of the industrial archaeological sites in the care of the different authorities. A booklet was published, highlighting the industrial heritage and forms distributed to each authority (Water Space Amenities Commission 1987). So far, several hundred forms have been returned. The response to this exercise was varied - figures for return from different authorities range from over 200 forms, to three. Some responses only mention plant, others include everything from bridges to sewage pipes. A programme

to computerise the results was never put into practice and at present the forms are stored in the Ironbridge Gorge Museum library. This initiative deals with information at a national level, but day to day management involves local information.

I believe that each authority has to undertake such an exercise individually, to collect information about the whole range of sites in their care. From this it is possible to make (and if necessary, defend) decisions about what to protect and what not to protect. Information is the key to adequate protection. More importantly, it is the key to good management. It is more cost effective to know about a site in advance and if necessary, to avoid it, than to be called to a Public Inquiry.

The industrial archaeology of water is not just a site here, and a pumping station there; it is about the role of water in shaping the landscape. Conserving the landscape is therefore as much about conserving its historical structure, as its natural structure. This is no longer just a matter for English Heritage, restricted to Scheduled Ancient Monuments and Listed Buildings. It is a wider issue, where the onus is now on the developer as much as the archaeologist. The water industry has always been proud of its heritage and taken a lead in protecting individual sites. It is now time to take the initiative and widen the management of the landscape to include its history. Unlike trees, archaeological sites never grow back.

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- Students of the Ironbridge Institute, 1987, 1988, 1989 **Leighton Farm Powys - a survey** Ironbridge Institute
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- Pearcey O, & White P, 1989 "The Water Heritage: is privatisation a threat or an opportunity"? **English Heritage Conservation Bulletin**

5. I should perhaps start with a number of disclaimers - to explain what I will not be talking about.

A museum may be home to an archaeological Sites and Monuments Record and provide liaison with the local planning authority. However, since this is an area already discussed this morning by Mike Hall, Helen MacLagen and Graham Fairclough I shall be excluding this from my talk.

Similarly a museum may be the base for an excavation unit but I intend to leave discussion of the role of such units in the capable hands of Simon Buteux.

Finally (and I must admit with some personal relief) I propose to leave to one side the subject of Industrial Archaeology which Kate Clark has just covered.

Instead I would like to begin by making two basic points about museums. The first may seem obvious enough but is worth re-stating - museums are primarily concerned with objects. I would define a museum's basic functions as being the collection, preservation, documentation and interpretation of the objects which are the material remains of our heritage.

The second point is that, even given their shared interest in objects, there is no such thing as a typical museum. Museums in Britain are funded nationally, by local authorities, by companies, by charitable trusts and by local societies, to name only a few. They vary dramatically in terms of size, the scope of their collections, their budgets, the numbers and expertise of their staff and so on. Even if we think only in terms of what we may call 'heritage specialists' a large museum or museum service may have numbers of archaeologists, industrial archaeologists and social historians on its staff. A smaller institution may have only one curator covering the whole range of all these disciplines. You will also find cases where a specialist in a completely different

subject - for example, the decorative arts - may have charge of the museum's archaeological and historical collections.

In these circumstances I should make it clear that the following remarks are going to be almost exclusively devoted to objects rather than to preserved monuments or excavations. Further, when I mention museums I will have in mind those that do have archaeological collections in the care of specialist curators. My emphasis will also be on material that pre-dates the Industrial Revolution. Nevertheless I hope that comments that I do have to make will be of some relevance to other disciplines.

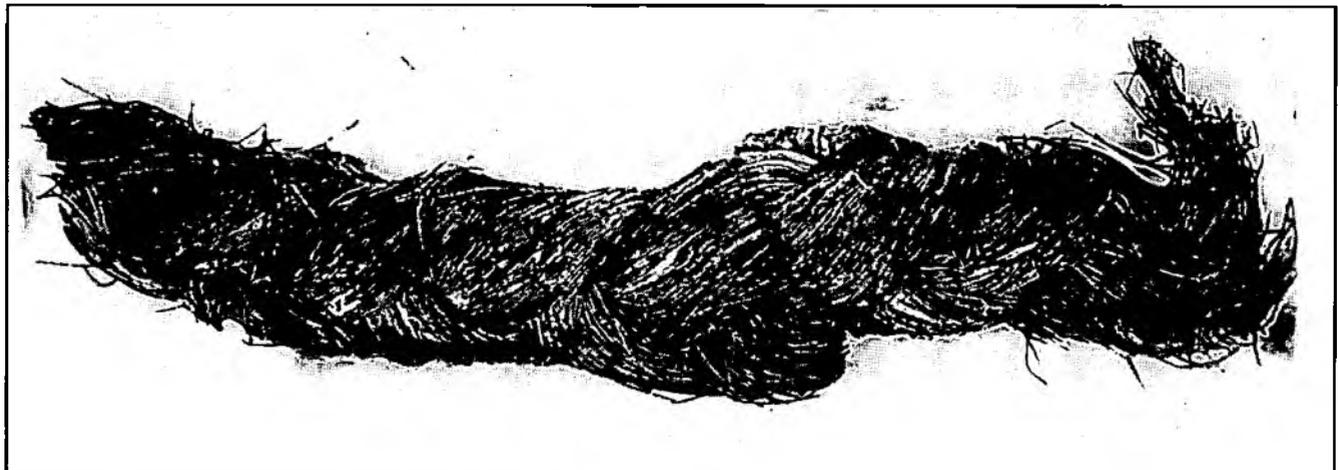
I am also proposing to aim my talk largely at those members of the audience from the various branches of the water industry and to concentrate on how the industry and museums may help each other and ensure a harmonious and fruitful relationship.

Archaeological finds can be crudely divided into two large groups - excavated finds and chance finds.

Under excavated finds I am grouping all those objects discovered during the course of archaeologically conducted excavations or recovered as a result of other controlled fieldwork, for example during watching briefs or gathered during archaeological survey work. All such projects should, of course, be carried out by professional archaeologists.

Speaking from a strictly museum point of view I would only stress certain points. First and foremost a final home for any material recovered should be agreed before any project begins. (I am here taking it for granted that a properly staffed and funded museum is the correct choice for such a final home. This is a point that I shall return to later). It is unacceptable that, at the end of the project, the finds are simply dumped without any warning on a museum's doorstep. Regrettably, even professional archaeologists can be guilty of this, as I know from personal experience.

Organic material preserved by waterlogged conditions: a length of rope dating to c. 1100. Found in excavations at Weoley Castle, Birmingham.



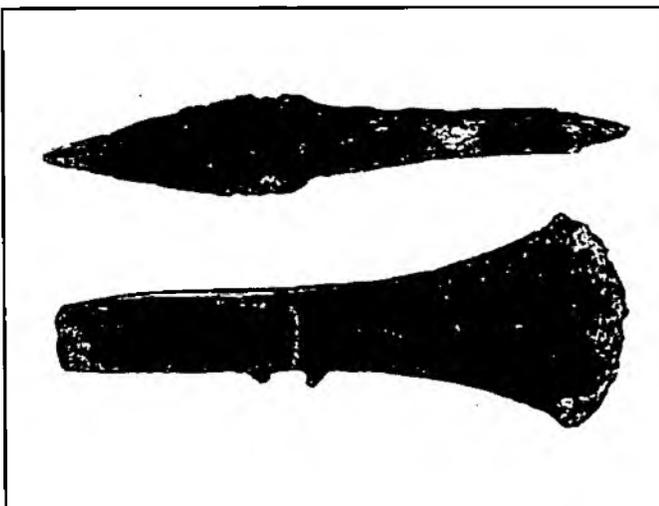
Every museum will have its own constraints in terms of staff, money and storage and display space and can be put in a difficult position by such behaviour. It may even have to refuse to accept the material being offered.

This is obviously a situation that can be avoided if the museum is involved from the earliest stages of the project. There will still remain an element of uncertainty for the museum in what to expect in the way of finds since it is an archaeological truism that you never know what is there until you dig it up. However, if the site is expected to produce, for example, waterlogged organic material, then the museum needs to know this. It can then decide if it would be able to care for the material properly or whether some other museum would be better placed to do so. Further, if it does agree to accept the finds, the museum can then plan to provide the facilities (and funds) for conservation, storage and so on which are likely to be required.

One other point, which will be familiar to the archaeologists in the audience, but not perhaps to others. It is important that the complete excavation or fieldwork archive be deposited as a single entity. This means not only the finds but also all the samples taken and all the primary records, plans and photographs. Survey work, for example, can produce a minimal amount of objects but a large amount of records and again the museum needs to be forewarned of what to expect.

The second group of finds, chance finds, are those items that may come to light during any work that involves ground disturbance or dredging operations. They can cover the complete range of archaeological material, extending from single, unspectacular finds of pottery or metalwork to coin hoards, complete boats and even groups of objects which indicate the existence of a site that requires immediate excavation. Chance

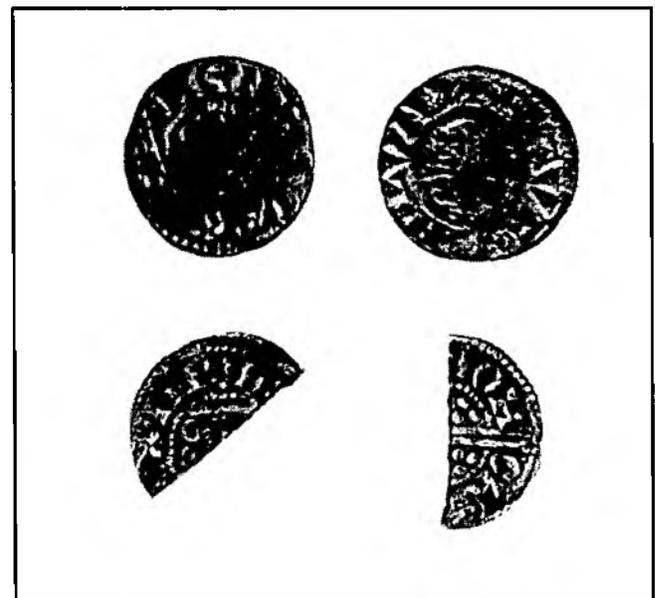
A typical chance find: two views of a Middle Bronze Age palstave (axe) found at Solihull, West Midlands. c. 1300 B.C.



finds can, therefore, be more complicated to deal with than those produced from even large scale excavations. Because they are unexpected, chance finds cannot be planned for, but their correct handling is a vital part of the duty established by the 1989 Water Act to protect and conserve objects of archaeological or historical interest. For this reason I was especially pleased to hear of the NRA's training plans in this respect because I am sure that training staff who are "at the sharp end" of any work is the best answer.

Chance finds can be very inconvenient. Managers in the water industry may, as I have said, find that such discoveries indicate the need for rescue excavations to take place and this can obviously have a disruptive

Potential Treasure Trove items: top, a silver penny of King John (1199 - 1216); bottom, a cut halfpenny of King Henry III (1216 - 42). Both found in excavations at Weoley Castle, Birmingham.



impact on their planning. Indeed, in the construction industry it is not unknown for inconvenient finds to be hurriedly destroyed or covered over to avoid exactly such delays. In the light of the duty laid on the water industry I am sure that this sort of cultural vandalism need not concern us here.

Taking the reverse of the coin, while a preserved neolithic log-boat may be an important find, most museum curators would turn pale at the prospect of suddenly being confronted with a dozen feet of waterlogged wood that they can neither conserve nor subsequently house. Nevertheless, a museum is an obvious first place to turn when chance finds are made. You will generally find the staff only too pleased to help to the best of their ability. At the very least they can tell you what you have got, offer immediate advice and put you into contact with those best able to help, such as the County Officer.

Some chance finds may pose unexpected legal problems. I am thinking here specifically of the legislation concerning Treasure Trove, which affects all items made (substantially) of gold or silver. There is a legal obligation on all who find such items to report their discovery, technically to the local coroner but in practice to the police. It is then the coroner's duty to decide, by means of an inquest if necessary, whether the items were lost or hidden with an intent to recover them. If lost, then they are legally the property of the landowner. If hidden they are the property of the hider's heirs. Since it is usually impossible to identify the heirs in the case of archaeological items they fall to the Crown as Treasure Trove. In practical terms this means that they are initially offered to the relevant national museum (the British Museum, the National Museum of Wales or the National Museum of Scotland - legislation in Ulster is different). If they refuse the appropriate local museum is offered the chance to acquire them. Any items not so claimed are returned to the finder, who also receives from the museums the market value of any objects they retain. However, largely as a result of the surge of metal-detected finds, some museums now have arrangements with their local coroners to "group report" single finds. Obviously a museum is in a good position to advise you on this aspect of chance finds and would be a sensible choice as your first point of contact.

I should point out that the legislation covering the discovery and reporting of antiquities is generally agreed to be extremely unsatisfactory and attempts are in hand to change it. If successful this will introduce more stringent obligations to report a much wider range of items.

In the foregoing comments I have assumed that the water industry organisation that makes such finds, or on whose land they are made, does not wish to retain the objects in its own care. I would suggest that it should not. The museum profession in the UK has well over a century's experience in dealing with the material heritage. Museum curators are, without doubt, the best people to guarantee its long-term preservation. The alternative would be for water industry organizations to devote sufficient resources to, in effect, establishing their own museums with the appropriate professional staff.

While opinions will vary among curators as to their willingness to accept items on loan, they would all prefer to receive material as a straight gift to the museum. This makes curation of the material and administration of the collections much easier. It also means, for example, that they do not face the sudden loss of half the items in a display. I would therefore suggest that, unless there are overwhelming reasons why it cannot be done, all

excavation items or chance finds should be presented to the museum as a clear gift. If necessary, specific conditions can be attached to the gift by agreement with the museum. For example, it can be stipulated that, when displayed, an object is always clearly labelled as your gift.

(This presupposes that your ownership of the objects is clear. You will find that any museum curators worth their salt will want to establish the legal title to the objects anyway).

Assuming that the material is presented to a museum, what happens to it then? Two of the main functions of a museum that I listed as the start of this paper were preservation and documentation. The two go hand in hand. It is the responsibility of the museum to ensure the physical survival of the material by storing it in optimum conditions and monitoring it for signs of deterioration. The museum should also record, research and publish information on the objects. All this is unglamorous but essential work without which the more prestigious 'front of house' activities like exhibitions would not be possible.

I would suggest that, for more significant gifts at least, it would not be unreasonable to ask the museum to supply photographs of the objects and copies of the information resulting from such research. This could indeed be another of the conditions attached to the gift. Such photographs and information can be used to great advantage in publicity material, as Lloyd's Bank has been showing for a number of years now. They can also be exploited to good effect in such things as in-house company magazines, something I have myself seen done on a number of occasions.

(I should point out that these comments apply more to chance finds. I assume that full information on material from planned excavations will already have been supplied by the archaeologists employed to carry them out).

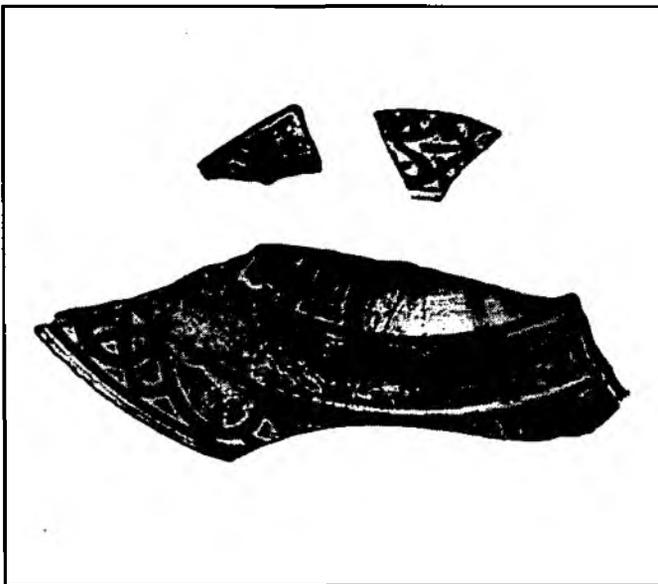
The final museum function I mentioned was interpretation. This can include such varied activities as lecturing on the collections or using objects to work with school-children both in the museum and in their own classrooms. For the purposes of this talk, however, I want to concentrate on the most obvious interpretative activity carried out by museums - the mounting of exhibitions.

Having presented something to a museum, what you can expect in terms of seeing your gift on display will vary with a number of factors. First among these are, as always, the resources the museum has at its disposal, especially in terms of staff, display space and budget. (I make no apology for returning to this point again. I am sure that no one here will be surprised to hear that, in

these days of financial stringency, museums are usually short of both staff and funds).

A second factor affecting decisions over the display of material is the nature of the material itself. What may be, from an archaeologist's perspective, very significant and important finds can look like nothing on earth

Significant but unprepossessing finds: sherds of pottery imported from Spain in the 15th century. Found in excavations at Weoley Castle, Birmingham.



and are simply not the stuff from which popular exhibitions can be made.

The final factor I would mention is the strength of your own desire to exploit the material for your own purposes, and I am thinking here again primarily of publicity purposes. I shall return to this point in a moment.

It seems not unreasonable for you to expect major chance finds to be displayed fairly soon after they have been presented to the museum, either in a temporary exhibit or by inclusion in the museum's permanent displays. Despite the name 'permanent' displays are regularly revised and replaced. They will, however, be designed to last for a number of years as opposed to the months or even weeks of a temporary exhibition.

Larger groups of objects derived from controlled excavation or other fieldwork could well form the basis of just such a temporary exhibition. You will usually find that museum staff are keen to produce such exhibitions if their resources allow. Here you may well be in a position to help by a little judicious sponsorship. This need not be an expensive undertaking. Museum staff are used to working to tight budgets and soon learn that it is possible to be creative without spending large amounts of money. The publicity and public relations value of

such exhibitions can be very large indeed. This is a lesson that a number of firms in, for instance, the construction and gravel extraction industries have learned, to the advantage of firm and museum alike. With environmental issues likely to come increasingly to the fore the value to the water industry of such public relations investments could be considered a cost-effective use of resources.

I should not end without making one brief aside. This talk has concentrated on co-operation between museums and the water industry in the archaeological field. However, museums also house collections and have specialist staff from other disciplines. In particular I am thinking of colleagues in natural history departments. They are also there to offer advice on the environmental impact of water industry plans and it would be remiss of me not to mention them.

To sum up, my main points are that museums are a resource waiting to be used. They can offer advice when it is needed. They are the obvious permanent home for material found during work you carry out, although they should whenever possible be involved at the planning stage of such work. They also present the water industry with various cost-effective means of bringing its conservation credentials to a wider public.

With only half an hour available to me I have had to cover the ground in a superficial way. However, I hope you will agree that the scope exists for fruitful co-operation between the water industry and the museums of Britain. Recreation is recognized as being one of the growth areas in all our lives. A desire to learn about and enjoy the surviving remains of our heritage is going to be one of the major elements in that recreation. Museums have a major role to play in the process. Museums can therefore offer the water industry an ideal showcase to display its commitment to the preservation of our common past.



6. 'GETTING THE WORK DONE': THE ROLE OF ARCHAEOLOGICAL CONTRACTORS

Simon Buteux

Birmingham University Field Archaeology Unit

6.1 Introduction

As the previous papers have amply demonstrated, the water environment is an archaeological resource of exceptional importance and sensitivity. If it is to be paid more than lip service, the duty to protect and conserve buildings, sites and objects of archaeological, architectural or historical interest will, in a diverse variety of circumstances, involve the commissioning of archaeological contractors to undertake archaeological work. The purpose of this paper is to provide a practical guide to who these archaeological contractors are and how they are regulated, what services they provide, the procedures by which archaeological work is commissioned and monitored, and how much archaeology costs.

6.2 Who are archaeological contractors and how are they regulated?

By-and-large archaeological contractors are the archaeological 'field units' which were set up, mainly in the 1970s with the support of the Department of the Environment, to respond to the varied but growing threat to the nation's archaeological heritage posed by urban and rural development - road schemes, urban redevelopment, new agricultural practices, minerals extraction, 'green field' industrial complexes, new towns, etc. The archaeological units therefore came into existence in response to diverse needs and in diverse situations, leading to a consequent diversity in their organisation, size, specialisms, and institutional affiliations. Units may be attached to city museums, to county museums, to new town development corporations, to county leisure services or planning departments, to universities, or they may be independent trusts or companies. As a general rule, however, the intention was that archaeological units should have responsibility for the archaeology of a particular area, be it a historic town, a county or a larger region. The 'territory' covered by a particular unit is often, but not always, evident from its name - e.g. 'York Archaeological Trust', 'Hereford and Worcester County Council Archaeology Section', 'Trust for Wessex Archaeology'.

When established, most archaeological units saw themselves as providing a public service in their particular 'territory'. They were primarily funded by public money, in the form of grants from the Department of the Environment (more recently English Heritage) and - more rarely - local government, and in the form of sponsorship through the MSC Community Programme Scheme or its various predecessors. At that time, it would seem fair to say, most units would not have seen themselves as 'contractors'; they were rather engaged in the business of 'Rescue Archaeology' salvaging what they could of the past from the bulldozer, the plough or the drag-line. The distinction between archaeological

'contractors' and archaeological 'curators' was, at best, fuzzy.

The past decade has seen profound changes in the organisation of field archaeology, in the funding of field archaeology and the whole philosophy behind it. One aspect of these changes which has had a major impact on the nature of archaeological units is the emergence of 'developer funding', which is a consequence of the extension of the principle 'polluter pays' from the natural environment to the historic environment. A developer or other body, whether in the private or public sector, is expected to pay for whatever archaeological work that is necessary as a result of its actions. This is all good and proper, but it has had many consequences for the archaeological units. A developer or other body which has to pay for archaeological work usually expects value for money, some degree of choice in the organisation that carries out the work, and guarantees that the work will be carried out within the budget, within the timetable and to the required standard - in short, according to contract: with or without changes to their structure, constitution or even name, the old archaeological units have become the new archaeological contractors, some wholly new archaeological units have emerged (although not as yet in great numbers) and the archaeological 'consultant' has appeared, often taking on the role of advising developers on the 'best deal'.

Some archaeological units have adapted well to the new circumstances consequent upon the advent of developer funding and 'contract archaeology', others are less willing or able to adapt fully, and many express concern about the impact which contract archaeology may have on both academic standards and the overall provision of a public service. A particular area of concern is the emergence of competitive tendering - something very new to most archaeologists - as a consequence of developer choice. It is feared by some that competitive tendering may lead to a lowering of standards as archaeological units attempt to undercut each other to win contracts, or as 'outsiders' seek contracts in areas where they have little or no experience, undermining the coherence of regional archaeological strategies and the stability of the local archaeological unit.

These anxieties are probably exaggerated: the feared 'cowboy' units have failed to materialise and, although some archaeological units now work further afield than they did in the past, experienced and effective locally-based units continue to carry out the majority of the work in their 'territories' simply because they can usually provide the best service from most points of view. Nevertheless, the effective regulation of contract archaeology is one of the most important challenges which the profession now faces, although the neces-

sary structures, checks and balances are already largely in place. At the national level, and particularly in respect of scheduled ancient monuments and listed buildings with statutory protection, monitoring the projects undertaken by archaeological contractors is one of the functions of English Heritage. At the local level regulation is a function of county, borough or city archaeological officers, who, through their role in the planning process, generally set the specifications for archaeological work (although there is a potential clash of interests in the not uncommon situation where a county archaeologist is also manager of a local authority-based unit, and therefore 'curator' and 'contractor' at one and the same time). The Institute of Field Archaeologists (IFA), which comprises archaeologists from all spheres of the discipline, sets standards for good professional practice in field archaeology, and has recently circulated a draft code of practice for the regulation of contract archaeology. Membership of the Institute is restricted on the basis of experience, competence and adherence to a code of professional ethics, although it is only fair to point out that these qualities are not the sole preserve of members of the Institute. At present, IFA membership is open only to individuals, which presents difficulties for the archaeologist's clients, who generally find themselves dealing with organisations rather than individual archaeologists. However, preparations are well advanced for the introduction of corporate registration, which will enable units to achieve IFA recognition subject to adherence to the Institute's standards.

6.3 What services do archaeological contractors provide?

Most archaeological units attempt to offer a comprehensive archaeological service in the geographical area in which they operate, undertaking a wide variety of types of archaeological work. Few specialise only in the archaeology of one particular period - Roman or Medieval for example - one good practical reason being that many sites, most towns and all landscapes are 'multi-period'. Some contractors, however, do specialise in particular techniques - geophysical survey, for example, or underwater archaeology. Others have developed the special skills and resources to deal with particular types of site - complex, deeply stratified urban sites, for example, or (particularly relevant in the present context) waterlogged sites.

Until recently the primary role of archaeological units was generally seen as rescue excavation, indeed many were described as 'rescue units' although they often did much else besides. Along with the emergence of 'developer funding', a second major change in British archaeology which has had a profound effect on what archaeological units do has been the widespread acceptance of the principle that preservation of

archaeological sites *in situ* is the most desirable option when any site is threatened. Rescue excavation - 'preservation by record' as it is sometimes termed - is seen as very much a second best option, while last minute salvage recording in the shadow of the bulldozer, although still all too common, is rightly viewed as a failure to take archaeology properly into account. The principle of 'preservation first' is now the keystone of English Heritage policy, is increasingly being taken up at local government level, and has found recent clear expression in the 1989 Water Act and subsequent NRA policy documents.

In practical terms the 'preservation first' principle has meant that units are increasingly being commissioned to undertake archaeological evaluations in advance of proposed new developments or other works. Individual archaeological sites may be evaluated in order to determine the quality of survival of archaeological deposits, their depth, extent, nature, date and significance in order that appropriate solutions may be formulated to the archaeological 'problem'. These solutions may include abandonment or relocation of the proposed works; design modifications to maximise archaeological preservation; 'preservation by record'; or 'no further archaeological action required' in cases where the survival of archaeological deposits is poor and their significance minimal. Larger scale archaeological evaluations may encompass whole landscapes in cases where the proposed works are the like of road construction programmes, pipeline projects or flood defence works. Archaeological evaluations - 'archaeological impact assessments' in effect - should be seen as an integral part of nearly all environmental impact assessments.

Archaeological evaluations are not only triggered by specific works projects, they are also increasingly undertaken in both urban and rural areas as an aspect of the formulation of long-term planning documents or management strategies. They are undertaken, too, not only with conservation in mind, but also with the aim of devising or enhancing policies for public presentation and interpretation.

Many archaeological units also undertake the recording and interpretation of standing buildings and other structures, either in advance of conservation or restoration work or as an adjunct to public display. For similar purposes detailed surveys of earthwork monuments - prehistoric forts, medieval moated sites, etc - are increasingly being commissioned.

In summary, rescue excavation is only one aspect of the service provided by archaeological units today: evaluation, survey, building recording, interpretation - these are now an equally, if not more, important part of their work.

6.4 When and how should an archaeological contractor be engaged?

Seeking the right advice at the right time and getting the right work done at the right time is undoubtedly the key to dealing successfully with archaeology. At the very earliest possible stage in planning a project which might have archaeological implications - even if the possibility seems only remote - archaeological advice should be sought. As a good rule of thumb, in the absence of an in-house archaeologist the first person to consult will be the relevant county archaeological officer (or officers if more than one county is involved). He or she will start the ball rolling, contacting relevant specialists or English Heritage as appropriate. (Where the normal planning procedures apply, applications will usually be referred to the archaeological officer for comment at the pre-application enquiry stage.)

If a project does have potential archaeological implications the county archaeologist will often recommend that an archaeological evaluation be carried out to determine and clarify those implications. The county archaeologist will provide a specification for the evaluation and will be able to supply a list of archaeological contractors able to carry out the work.

The next step will be to commission the archaeological evaluation, usually the direct responsibility of the client not the county archaeologist although the procedures vary from county to county. Generally, the specification is circulated to all archaeological contractors on the list and quotations sought, although naturally the client is at liberty to invite quotations from any suitably qualified archaeological unit. Obviously price and archaeological qualifications will not be the only considerations taken into account, but also factors such as familiarity with contractual procedures, insurance and safety arrangements, negotiation and public relations skills, etc. The conduct of the actual work will generally be monitored by the county archaeological officer as well as the client or his nominated representative.

From the evaluation an illustrated report and a set of recommendations will emerge. As has been already noted, the purpose of these recommendations will be to suggest solutions which will minimise the archaeological impact and ensure maximum preservation of important archaeological remains. As the recommendations of the archaeological report may have considerable implications for the design of the proposed project and its timetabling, the advantages of undertaking an archaeological evaluation at the earliest possible stage will be clear.

Should it be impracticable to arrive at a solution which achieves the preservation of all significant archaeological remains *in situ*, further archaeological work - 'pres-

ervation by record' - may be appropriate. The specifications for this work will again generally be set by the county archaeological officer, and the procedures for commissioning and monitoring the work will be broadly the same as for the initial evaluation.

The procedures for taking proper account of archaeology outlined above do not, of course, cover all eventualities, for example if scheduled ancient monuments are to be affected. In such cases the county archaeologist and English Heritage will be able to advise on the appropriate procedures, which can be lengthy. Furthermore, it is assumed above that the archaeological evaluation will take place in isolation, whereas such evaluations are increasingly being undertaken as an integral part of environmental impact assessments. One of the practical advantages for a client of such an approach is that the responsibility for appointment of an archaeological sub-contractor generally rests with the environmental consultants.

Taking proper account of potential archaeological implications at the earliest possible stage may, in the light of the above, be seen as unnecessarily time-consuming and expensive. The following two 'cautionary flow-charts' (based on numerous real instances) are intended to demonstrate that in practice it can be quite the opposite:

Scenario 1 (good but unusual)

Planning begins for a major works project....

Action: Archaeological advice is sought.

Result: Potential archaeological implications are identified.

Action: Archaeological evaluation commissioned.

Result: Archaeological implications confirmed and defined.

Action: Project specifications modified to take account of archaeological implications (possibly some further archaeological work commissioned)

Result: Project completed without delays.

Expenditure on archaeology minimised and budgeted for.

Important archaeological remains preserved.

Good public image maintained.

Scenario 2 (bad but usual)

Planning begins for a major works project....

Action: No archaeological advice sought.

Result: Threat to important archaeological site goes unrecognised until plans finalised.

Action: Costly last-minute rescue excavation mounted.

Result: Unnecessary delays to project.

Unnecessary unbudgeted costs.

Unnecessary destruction of archaeological remains.

Unnecessary public embarrassment.

6.5 How much does archaeology cost?

The only realistic answer to this question when it is asked in general terms is, of course, how long is a piece of string? However, as expectations vary widely an attempt must be made to give some indication, albeit a very impressionistic one. An evaluation, depending on the scale and amount of fieldwork involved, will generally cost somewhere in the region of £1,000 - £10,000 (an evaluation involving 'desk-top' study alone may be less). An excavation, on the other hand, including post-excavation analysis and publication, will generally cost somewhere between £10,000 for a small excavation and £100,000 for a large one. Quite a few major excavations cost in excess of £100,000, but perhaps an average range would be £25,000 - £75,000.

It must again be stressed that these figures provide only the most general indication of cost, but the essential point to note is that evaluations (along with survey and building recording projects) are generally much cheaper than excavations. Evaluations, therefore, not only represent good practice but also, as they often lead to solutions which eliminate or minimise the need for excavation, make good financial sense.

The costs of archaeology are not inconsiderable, which raises the question of whether an organisation which finds itself encountering archaeology on a regular basis might not find it cost effective, as well as beneficial in many other respects, to appoint an in-house archaeologist. Certainly such an appointment would help to ensure that the organisation got the best deal from archaeological 'curators' and 'contractors' alike, and one major excavation avoided would more than offset the cost.

7. DISCUSSION

Chaired by K. Bryan

Comment. D Goodburn -

There are two national guideline publications concerning ancient timbers: "Waterlogged Wood" (English Heritage/Wetland Archaeology Research Project) and "Archeological Excavations Underwater" (Archeological Diving Unit, Aberdeen University).

Comment. R Middleton -

Environmental archaeology is important for the reconstruction of ancient climates and vegetation, and this is only available in wetland sites: peat and alluvial deposits hold an important archive which needs to be sampled. If the NRA is working in such deposits, specialist archaeological advice is needed to assess if there may be some interest.

Comment. J Thompson -

There needs to be greater integration between disciplines. Almost all "natural" habitats are part of the cultural heritage - the results of interaction between man and nature. There may also be conflicts digging ponds in monuments.

Reply. K Bryan -

"Conservation" includes nature conservation and cultural heritage.

Question. N Field -

Do all NRA regions automatically contact archaeological bodies at the beginning of works?

Reply. K Bryan -

There is an increasing trend to invite archaeologists to liaison meetings, but there is still a need to strengthen liaison.

Question. S Catney -

What money is available for archaeological works?

Reply. K Bryan -

For flood defence schemes, the flood defence budget can probably fund archaeological work; there are also separate conservation budgets.

Reply. Andy Cominski -

Before constructing new pipelines, etc, the PLC will automatically write to county archaeologists; works on capital schemes will be incorporated into capital budgets.

Reply. M Hall -

Costs for archaeology go in to the budget at design stage; it is only a small proportion of the engineering costs.

Question. C Woodhouse -

Is there a national NRA policy on archaeology?

Reply. K Bryan -

A draft document has been considered by the regions and will be incorporated into the NRA conservation strategy; comments today will be taken on board and the NRA will also talk to English Heritage.

Question. C Woodhouse -

Are there proactive management plans for river catchments, including archaeology?

Reply. K Bryan -

There is a national initiative on catchment management.

Question. D Mitchell -

There are four PLC people present today; are the PLC's interested?

Reply. K Bryan -

The NRA has no control over the PLC's. The PLC's are under the same statutory conservation responsibilities.

Question. G Llewellyn -

How is competitive tendering seen to be a problem?

Reply. S Buteux -

It is not wrong, but archaeological contractors have to sort out how to deal with it.

Question. A Heaton -

If tenders are invited from several areas, is territoriality a sensitive issue?

Reply. S Buteux -

Competence is more important than territoriality.

Comment. S Catney -

The county archaeologist is always the first person to contact, and they can put you on to appropriate consultants, etc.

Comment. D Goodburn -

In London, the Museum of London acts in that capacity. There is no central point of contact for archaeological diving (unless it be Aberdeen University).

Comment. H Maclagan -

Diving archaeologists should be lobbying county archaeologists to take their interests on board, rather than trying to get at all developers directly.

Question. L Wilson

What thought has been given to on-site interpretation?

Reply. K Bryan -

There is no formal budget - it would have to be associated with schemes; it is early days yet.

Comment. F Frears -

It is sometimes very difficult to get information from county archaeologists.

Reply. Hilary White -

County archaeologists cover large areas and they won't always have comprehensive information, but they will give what they can to the NRA, for free at the moment. If consultants working on environmental assessments ask for information, county archaeologists may give it or may request payment for comprehensive evaluations (which they don't always have the resources to do).

Comment. H Maclagan -

If there are specific problems, write to the Association of County Archaeologists.

Question. J Wheatley -

The NRA is a new organisation which needs to consult others, and this conference is a part of that. Conservation and recreation must be considered together as one issue; archaeology is important within the overall conservation strategy. How is the NRA to judge its performance?

Reply -

We must look at the quality of what we do in relation to archaeology.



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8. THE CULTURAL HERITAGE AND THE WATER INDUSTRY - THE WAY FORWARD

George Lambrick

This volume presents a wide ranging series of papers which explain many of the issues surrounding the water industry's duties and responsibilities towards the heritage under the Water Act 1989 and its Conservation Code of Practice (DoE et al 1989). The conference discussed not only the issues, but also the practicalities of how best to fulfil those duties and responsibilities.

Certain themes recur through the papers. These include the need for good communications; the wide range and large scale of the tasks required by the Code of Practice; the need to integrate the cultural heritage with other conservation interests; and the need for an appropriate organisational framework dealing with the heritage.

In these concluding remarks my aim is to draw out the points which seem particularly worth highlighting within those themes, and which seem to me to point the way forward. The future is what these papers are all about. They lay the foundations for stimulating a wider process of fulfilling the duties and responsibilities laid on the industry by Parliament.

8.1 Communication

One of the clearest requirements of the Code of Practice is good communication between those involved with the primary functions of the industry and those involved with its conservation duties. This conference and the publication of these papers exemplify such communication in action. We can identify three key areas, all of which are discussed in more detail in the papers presented here:

Liaison between the industry and specialists, consultants, conservation bodies and statutory organisations concerned with the heritage.

Internal training and education to heighten the awareness of the industry's own work force with regard to the cultural heritage.

Public relations and access providing clear display and explanation of heritage features.

We can also identify a number of ways in which such communications can be made effective. They must obviously be clearly intelligible to non-specialists. Liaison procedures, training etc. must be seen as a continuous process, not just a one-off effort. They must also reflect the full integration of conservation interests which the Code of Practice envisages. Helen Maclagan clearly illustrates the need for communication to proceed within a logical structure of information gathering and decision making. This equally reflects the need to start the process early in the development of policies and detailed planning, and to ensure that sensible priorities are maintained. The last point underlies the important requirement that all the areas and aspects of

communication must be based on a full professional understanding of cultural heritage issues, policies, procedures, legislation and the varying value of the great diversity of individual features involved.

8.2 The Complexity of Cultural Heritage Issues for the Water Industry

The cultural heritage is a complex issue as far as the NRA and Water PLC's are concerned. That clearly emerges from the diversity of the topics covered in this volume and the more detailed intricacies which it illustrates. But this is worth putting in the perspective of a wider professional viewpoint: is the water industry exceptional in this respect? I believe that in some ways it is. What other industry has such large land holdings in both urban and rural environments, *and* a rich archaeological, architectural and documentary history of its own, *and* undertakes major civil engineering developments affecting town and country, coast and river? What other industry is so intimately concerned with water and the special conditions of preservation that it can provide for archaeological artefacts and deposits? You could perhaps find another such industry for any one of these characteristics, but no other encompasses them all.

The foregoing papers illustrate some of the different aspects of this complexity in the range of cultural heritage involved: historic buildings, archaeology, machinery, artefacts and documents, marine and riverine archaeology and historic landscapes and townscapes (Darvill 1987). Kate Clark gives a graphic illustration from the industrial era of how sites and structures form part of a coherent landscape. The point was also made very clearly that wildlife and the cultural heritage are part of a seamless whole: the ecological character of our woods and meadows is very much the result of past human management (Lambrick 1985).

We have also seen complexity in the variety of activities carried out by the industry which impinge on the heritage which Mike Hall illustrates so clearly: its use of old buildings and machinery, its management of our rivers and large areas of the countryside, its construction of reservoirs, flood defence and drainage.

Finally we have seen the complexity and variety of action that can be taken to conserve the heritage: protecting it, restoring it, managing it, presenting it to the public, recording it or investigating it by digging it up.

The one thing that can never be achieved is for the man-made heritage to regenerate once it is damaged or destroyed. In this respect the duties and responsibilities for conserving the cultural heritage are more onerous than for the ecological heritage which can often repair itself if the damage is not too serious. This point, so

clearly made by several speakers, emphasises how vital it is to know and understand what features of the cultural heritage could be affected by particular activities: only then can sensible policies be developed.

8.3 Practical Tasks and their Organisation

This is where we come to the practicalities. Anyone in the industry who underestimates the complexity of the issue is not only deluding themselves but also runs the risk of not fulfilling a Code of Practice which I believe has taken this on board. The Code well deserves close reading.

It requires comprehensive coverage of the cultural heritage in all aspects of the work of the water bodies whether in the field of conservation, recreation or their primary operational activities. It is very important to appreciate that the Code (and indeed the Act itself) gives equal weight to the cultural heritage alongside other conservation interests, and that it demands a fully integrated approach. It is also important to appreciate the wide range of activities that it requires, to deal with the cultural heritage implications of the water industry's work.

By my count there are at least 19 major areas in which the Code requires the industry to undertake specific activity or tasks with regard to the cultural heritage:

- 1 Formulate general policy
- 2 Assess conservation interest of land and property
- 3 Draw up integrated management plans for significant areas, buildings etc.
- 4 Monitor and review management plans
- 5 Ensure up-to-date information is available at an early stage and is considered in design of new works so as to minimise damage
- 6 Consider the need for field assessment of sites potentially affected by new works
- 7 Set up and monitor investigations and publication of archaeological sites or structures which cannot be saved
- 8 Ensure that landscaping design does not conflict with conservation of the cultural heritage
- 9 Monitor the effects of routine maintenance and review policies
- 10 Consider the effects of water abstractions on preserved organic remains
- 11 Consider and monitor the effects of dredging and other navigation works
- 12 Provide training for staff within each organisation
- 13 Disseminate information about the cultural heritage as it is affected by the activities of the industry
- 14 Organise appropriate research to assist policy development
- 15 Integrate heritage and nature trails

- 16 Ensure appropriate management and signposting of monuments, buildings etc. with public access
- 17 Organise formal displays, museums, demonstrations or open days
- 18 Make provision for preservation and access to study machinery, objects, documents and plans of historic interest
- 19 Establish and maintain channels of liaison and consultation with all appropriate conservation bodies, statutory and non-statutory

All of these require close liaison with statutory and non-statutory bodies; many of them require very close integration into other aspects of the industry's work; several of them require very clear early consideration in the formulation of new policies and new development proposals; most of them require consideration of the full range of cultural heritage features in the environment; archaeology, historical buildings and historic landscapes. These points are admirably illustrated by the other contributors and through points raised in discussion.

Given the scale, scope and complexity of the work required by the Code of Practice, I do not believe that the industry can properly fulfil its obligations under the 1989 Water Act and the Code without employing its own full time heritage advisors to formulate policy, and provide a full internal service on all those aspects of the cultural heritage which we have discussed. As various speakers have shown there is also a great deal of work that has to be done by external consultants on the basis that Simon Buteux describes. This alone requires professional advice to specify, commission and monitor the work.

The water industry has long seen the need to employ ecologists and landscape designers. To give equal weight to the cultural heritage is not just window-dressing so as to be seen to be striking the balance the Code of Practice envisages, it is a necessity to achieve that balance. Managers will need to consider whether it is fair on members of other professions to expect them to deal with the complex issues of the cultural heritage. Would it be appropriate to expect archaeologists or historic buildings experts to be able to provide expert advice on, for example, ecology? All the tasks set out above require professional judgement: establishing priorities and identifying the most important issues on the basis of sound specialist knowledge.

Currently only one of the 20 principal organisations which now form the industry has a full time professional advisor on the cultural heritage. Whether the other 19 bodies all need their own specialists, must now be carefully assessed in relation to the requirements of the Code of Practice and the detailed discussion of the

issues set out in the papers presented here. Any decision *not* to appoint such a specialist should be very carefully considered and fully justified by demonstrating positively that the role can be fully covered to a high professional standard by other arrangements.

The employment of internal professional advisors is arguably the most important single step needed at present: we have seen this work well in National Parks and the National Trust; we are beginning to see it work in the Forestry Commission. The water industry needs it just as much or more: its obligations under the 1989 Act and the Code of Practice are more explicit and significantly more onerous.

8.4 Future Trends

I would like finally to touch on some current and future developments in our mutual concerns. As regards the water industry there are some important trends emerging concerning the activities of the various bodies involved.

One is flood defence. Archaeologists will already be aware of major new capital schemes likely to affect river valley bottoms and tidal zones - those areas where such exceptional archaeological preservation can occur. These are likely to increase substantially in the next few years.

Clearly replacement of sewerage infrastructure is going to be another area of growing concern, as is water supply following the increasingly drought ridden eighties and nineties.

Land management, river corridor surveys and provision for access are other major concerns of the water industry which have major implications for the cultural heritage.

There are perhaps equally relevant trends in cultural heritage affairs. The place of the cultural heritage in environmental assessment is becoming much better established and should now be regarded as a standard part of any EA.

The strong trend towards prior archaeological field assessment of areas subject to development threat is becoming well established and is producing very significant vindication of the planning policies which support this means of ensuring a sound basis of information for decision making. In over 30 such assessments carried out by The Oxford Archaeological Unit in the last few years just on river gravels, about half produced either totally new sites or very significant new information (such as to alter the perceived importance of the area); only 7% were negative. For upland catchments the Council for British Archaeology produced some equally striking statistics: less than 5% of the Uplands of England and Wales have been subjected to adequate modern survey. Where this has occurred the number of

sites identified has risen by between 25% and 300 - 400% (Darvill 1986). The issue of the current inadequacy of our knowledge of what is beneath our feet is a very serious one.

Another area of long standing and growing concern among archaeologists, which is repeatedly highlighted in these papers and in the Code of Practice, is that of desiccating and destroying waterlogged organic deposits by hydrological draw-down effects. This surely is an area for co-operative research: there is plenty of anecdotal evidence for the effects but virtually no scientific evidence for the rate of decay or how decay rates are affected by different physical, chemical, sedimentary or hydrological factors.

We are all concerned about providing a service to the public which is as environmentally sound as possible. The industry now has a sound legislative framework and set of standards within which to work. Severn-Trent NRA are to be congratulated and thanked for their admirable initiative in organising the public discussion of the issues involved with the cultural heritage which are presented here.

8.5 References

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