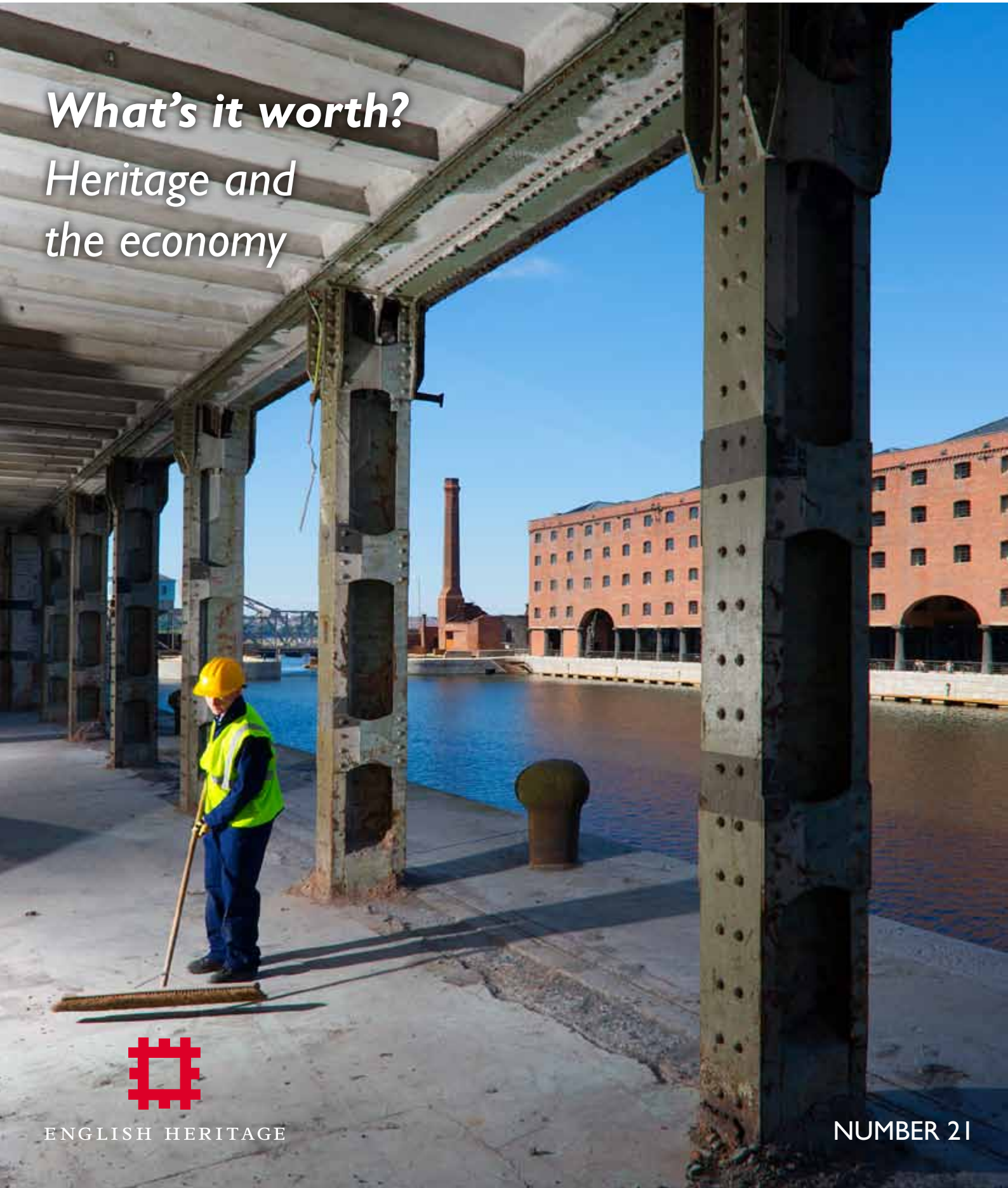
RESEARCHNEWS

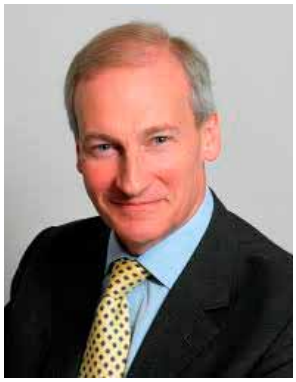
CURRENT RESEARCH INTO THE HISTORIC ENVIRONMENT



What's it worth?
Heritage and the economy

ENGLISH HERITAGE

NUMBER 21



Welcome to the second digital edition of *Research News*. High-quality applied research lies at the heart of the English Heritage mission. It is vitally important in enhancing understanding and enjoyment of the rich historic environment all around us. The process of identifying and assessing our heritage is also crucial in providing a context for our designation and constructive conservation work. Since becoming Chairman I have been hugely impressed by the range and quality of the heritage-related research we undertake and it has been a real privilege to meet the expert staff responsible for taking this forward. I know from various consultations, including the recent one on the National Heritage Protection Plan, that this expertise is respected and valued by the heritage sector as a whole.

In this issue we report on a wide range of research, from policy-related initiatives focusing on the development of tools for calculating the economic and social value of heritage, to projects undertaken in response to major infrastructure developments, such as the proposed electrification of the Midland Main Line. There are also intriguing items on individual buildings and sites including a piece on England's earliest surviving open-air school in Birmingham. Alongside our in-house research work we also fund important research by others through our National Heritage Protection Commissions Programme. Without this programme it is doubtful that the remarkable and highly threatened Viking-age cemetery at Cumwhitton in Cumbria (discussed on pages 16-19) would have been excavated, analysed and recorded.

At this critical point in the history of English Heritage, I'm determined to ensure that our research is disseminated as widely as possible, through serial publications such as this, annual publications such as the Designation Yearbook, books and guides produced by our Publishing Team, best practice guides, research reports and our website. The great advantage of electronic publications like this is that they make it much easier to link together the various outputs and thus to provide an enhanced awareness of the totality of our research activity.

Sir Laurie Magnus
Chairman
English Heritage

Inside this issue...

Why do economists think heritage is worth protecting?

Various methodologies are being developed by which the value of the historic environment can be assessed in monetary terms. They reach well beyond a narrow definition of economic value.

If the historic environment is worth protecting, it must be because it has value. Economists have developed ways of trying to measure this value in monetary terms. The aim is not to assess such things as the number of jobs the sector provides, or the economic output created by heritage-related activities, though these are important to do in their own right; rather it is to find a way of putting a figure on the value that individuals ascribe to the heritage itself. The value itself may be aesthetic, scientific, social or spiritual in nature: the aim is to find a way of assessing it.

It is clear from the behaviour of the general public that, whatever motivates them, they do value England's heritage. In 2013, according to the Taking Part survey, 73 per cent of adults in England visited heritage sites. In 2012, according to Visit England, there were 57.9 million visits to historic properties in England, a number greater than the population as a whole, which at that time was 53.5 million.

Economists have developed the concept of total economic value (TEV) to categorise the different ways in which individuals value goods and services which

Patricia Payne, © English Heritage

A visit to Kenwood House as part of English Heritage's education programme.

Bob Skingle, © English Heritage

Warkworth Castle, Northumberland.

are not (fully) traded in markets, of which the historic environment is an example. TEV consists of four components: direct use value, indirect use value, option value and non-use or existence value.

Direct use values come from individuals' actual usage of goods or services. In the case of the historic environment, it is the benefit of visiting a heritage site, such as ruined monastery or a historic town.

Indirect use values are benefits that are received from heritage sites without the need to visit them. An example would be the benefits that result from living in the area around a landmark heritage site.

Option value relates to such benefits as potential for future use, whether it be for oneself or for others. In the case of heritage assets, option values relate to the fundamental premise, inherent in the very idea of conservation, that heritage should be preserved for the benefit of the future.

Finally, the public – in the UK or even internationally – may value the existence of a heritage asset, even though they may not visit it, or do not live near it. This is non-use value or existence value. For example many people consider heritage to be important in defining national identity.

Drawing on these concepts, two broad approaches can be used to make a monetary estimate of the value people ascribe to the heritage. The longer-standing of these is an assessment of individuals' willingness to pay, for example to visit a heritage site or to preserve it for posterity.

Within this approach two methods are commonly used: stated preferences and revealed preferences.

Stated preference techniques use questionnaires which describe a hypothetical choice in order to obtain estimates of the willingness to pay for a particular outcome. For example, 'Which of the amounts listed below best describes your maximum willingness to pay to visit Stonehenge?', together with a card showing different payment levels. A copious literature has developed around the different ways in which to ask willingness-to-pay questions and the implications of these, a subject well beyond the scope of this article.

Revealed preference techniques involve inferring the price or value which individuals place on something by examining their actual behaviour. Here the main approach uses a technique known as hedonic pricing, which relates a price to a range of factors, and obtains estimates of the contributory value of each of them. An example is the relationship between house prices and a range of features related to the localities in which houses sit, such as access to good schools, the extent of local green space, or the presence of local historic assets. These can be analysed and a monetary value calculated for the particular factor under consideration.

A more recent approach attempts to measure the impact of undertaking a particular activity, such as visiting a heritage site, on an individual's reported levels of well-being. A monetary value can be created by looking at the impact of an activity on well-being and then finding an amount of income which has a comparable impact on that well-being.

An interesting example of the use of the stated preferences approach is a 1996 study of Warkworth Castle in Northumberland (Powe and Wallis 1996). Visitors to the castle in June to September 1994 were surveyed about their willingness to pay for entry in overall terms, in relation to the preservation of the castle, and to the recreational and educational benefits they derived from their visit. In terms of the components of TEV identified above, the latter is an example of direct use value and the former of option value. The researchers used the results of their survey to estimate that in 1994 the total annual willingness to pay for, or value of, Warkworth Castle was £152,000, of which £82,000 was related to its strength as a place of recreation and education, and £70,000 to the importance of its preservation.[1]

An example of the revealed preference approach is an analysis of the relationship between residential property prices and conservation areas undertaken for English Heritage (Ahlfeldt *et al* 2012). This showed a price premium for residential properties inside conservation areas that averaged around nine per cent after being controlled for a range of other factors that affect house prices. This premium roughly doubles when properties in the centre of a conservation area are compared with those on the edge of one. There is a smaller premium, but one that is still statistically significant, for properties just outside a conservation area. This suggests that an increase in the intensity of the heritage character of an area increases the value of the residential properties within it. In turn this indicates that home owners are willing to pay for the benefits bestowed by living in an historic area and to increase the amount they are willing to pay as the significance of the built historic environment improves or intensifies.

A recent report for DCMS (Fujiwara *et al* 2014) found a positive, but not statistically significant, impact on well-being from visiting heritage sites. This was a reflection of the data limitations associated with the study. Another recent study (Bickerton and Wheatley 2013) found that visiting historic sites did have a statistically significant impact on well-being, one that was similar to attending arts events, greater than that for visiting museums, and less than that for playing sports.

At the moment there are not many studies which have applied either the willingness to pay or the well-being approach to assessing the value of the historic environment. This year's Heritage Counts seeks to tackle this scarcity of evidence by commissioning two pieces of research. One of these investigates the impact of visiting heritage on well-being, while the other carries out willingness-to-pay studies at two sites: Castle Acre Priory, Norfolk and Walmer Castle and Gardens, Kent.

To conclude, the economic approach to assessing the value of the historic environment attempts to measure it in monetary terms, so as to create a common standard for comparisons. The underlying motivations for these valuations can lie far from the economic realm as traditionally understood. The approach nevertheless utilises a series of robust and useful methodologies. It can be of real value to those charged with making a case for the value of the historic environment.

Duncan Melville MSc is an economist with over 25 years' experience in both the private and public sectors in New Zealand and the UK. He works in the Government Advice Team in English Heritage. Previously, he was an economic consultant, Deputy Chief Economist of GLA Economics, and head of the Macroeconomic Analysis Unit in HM Treasury.

For more information contact Laura Clayton, Head of Social and Economic Research.

FURTHER READING

Ahlfeldt, G M, Holman, N, and Wendland, N 2012 *An Assessment of the Effects of Conservation Areas on Value*. London and Swindon: London School of Economics and English Heritage, available at: http://www.english-heritage.org.uk/content/imported-docs/a-e/assessment-ca-value.pdf

Bickerton, C and Wheatley, D 2013 *Arts, Cultural Activity, Sport and Wellbeing*. Nottingham: Nottingham Trent University

Fujiwara, D, Kudrna, L, and Dolan, P 2014 *Quantifying and Valuing the Wellbeing Impacts of Culture and Sport*. London: Department for Culture, Media and Sport, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/304899/Quantifying_and_valuing_the_wellbeing_impacts_of_sport_and_culture.pdf

Heritage Counts, more information at: http://hc.english-heritage.org.uk/

Powe, N A and Willis, K G 1996 'Benefits Received by Visitors to Heritage Sites: a Case Study of Warkworth Castle'. *Leisure Studies* **15**, pages 259–75

The Taking Part survey, more information at: https://www.gov.uk/government/collections/taking-part

James O. Davies, © English Heritage

Initiatives like Heritage Open Days highlight the positive nature of heritage, here at Kings School, Gloucester.

[1] These figures are in 1994 prices. Allowing for inflation, the overall figure in 2013 would be £264,000, consisting of £143,000 for recreation and education and £122,000 for preservation. These figures have been rounded to the nearest £1,000 and so do not exactly add up to the overall value.

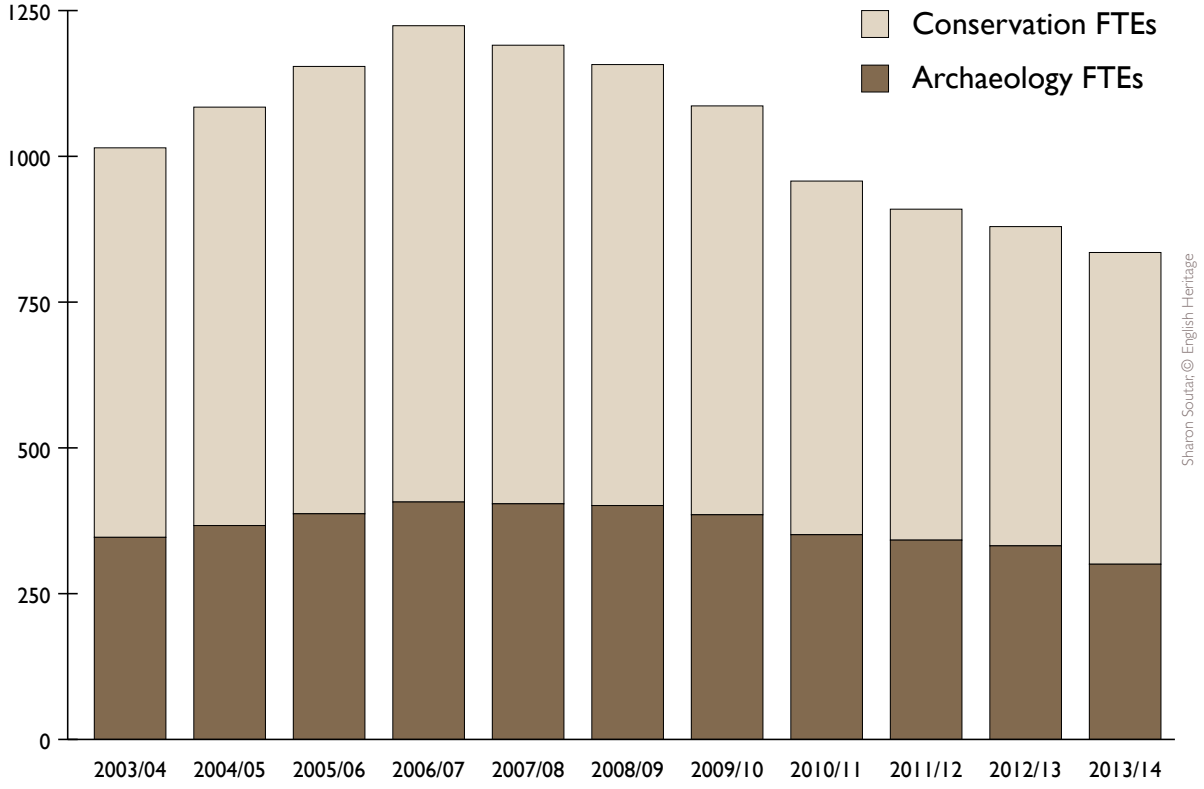
Shared services: assessing the phenomenon

Conservation services are increasingly shared between cash-strapped local authorities and there is a need to better understand the strengths and weaknesses of these arrangements.

NATIONAL PROBLEM, LOCAL CRISIS

Local government is facing budget cuts on a scale not seen since World War II. It is also staring at a demographic time-bomb, with social care costs expected to rise steadily over the next 10 years. The impact of these pressures varies greatly from one authority to another. Figures developed by Paul Wood, treasurer for Newcastle City Council (Watt 2014), identified that between 2010/11 and 2015/16 councils in the 10 most deprived areas of England face cuts of an average of 25.3 per cent, whereas those in the least deprived areas face cuts of 2.54 per cent. This means that the funding black hole being faced by some authorities is considerably larger than figures quoted at a national level suggest. According to the Local Government Association (LGA), the estimated income for 86 councils will account for less than 85 per cent of projected spend in 2015/16 (Blyth 2013). To respond to the situation, these authorities are fundamentally re-evaluating what they do and how they do it.

Historic environment services have not been immune to these cuts. Since 2006, the number of full-time equivalent historic environment specialists advising local government has fallen by 32 per cent. This equates to cuts of 35 per cent to conservation advice and 26 per cent to archaeological advice (See Tables 1 and 3 for the distribution of cuts over time). As with the uneven impact of the national cuts, these have not been evenly spread (Table 2). There is now considerable concern that some authorities no longer have adequate access to the advice needed to make informed decisions relating to the local historic environment. In some areas this is placing heritage assets and the wider historic environment at risk.



Number of Full Time Equivalent historic environment specialists advising local government.

THE LOCAL RESPONSE

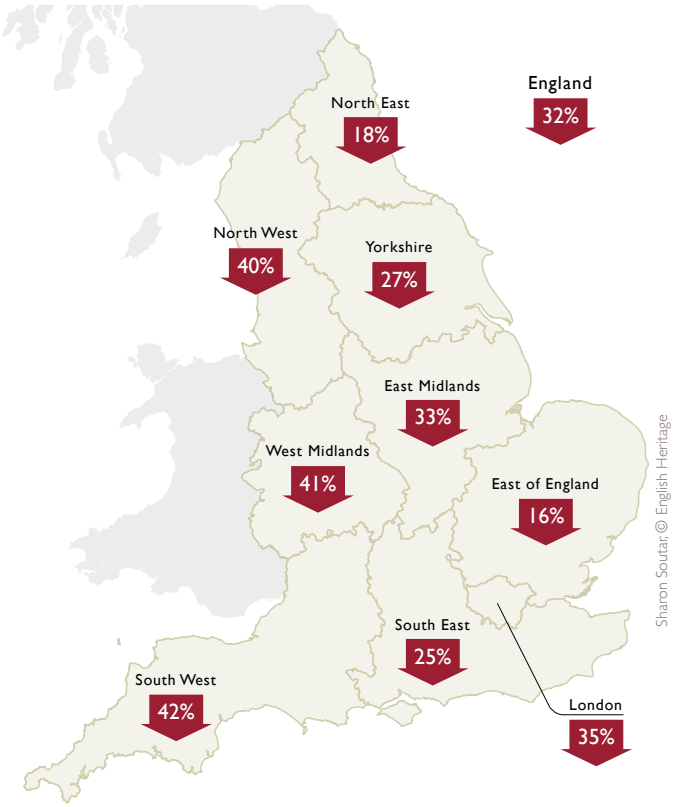
Authorities are responding to the challenges set by these shrinking budgets in a variety of ways. For many the landscape has shifted to such an extent that the salami-slicing of budgets is simply inadequate and a more fundamental review is required. New ways of delivering services are being developed.

Of course, everywhere is different. What works in Devon might not work in Durham. There are, however, lessons to be learnt from the approaches taken in particular places. In 2013 English Heritage and the LGA jointly published *Making the Most of your Heritage Assets: The Future of Local Historic Environment Services*, which showcased a number of approaches being taken. It identified a shift towards the shared service model, concluding that 'In the majority of the case studies we can see a move towards the sharing of local services… Many authorities have identified that the most effective way to provide sufficient expert capacity is to take advantage of economies of scale.'

The sharing of services between authorities is not peculiar to historic environment services. According to the LGA, around 95 per cent of local authorities in England are involved in some kind of service-sharing. These arrangements, it is claimed, are resulting in £357 million of efficiency savings (http://www.local.gov.uk/shared-services-map).

These models are not without risk. As decision-making moves away from a local area, understanding of local conditions decreases. There is thus an increased danger that local identity, with its positive contribution to place, will be lost. In-house services often benefit from a strong connection with place, and from close contact between key staff members, improving the links between historic environment and other local authority services. Such close relationships can improve the prospect of the historic environment being taken into account in strategic thinking about planning and economic growth. The profile of heritage at a strategic level can thus suffer if the bought-in service is limited to handling casework and does not include wider levels of engagement. A service that is not directly controlled by an authority also runs the risk of becoming inflexible and unable to respond to increases in workload.

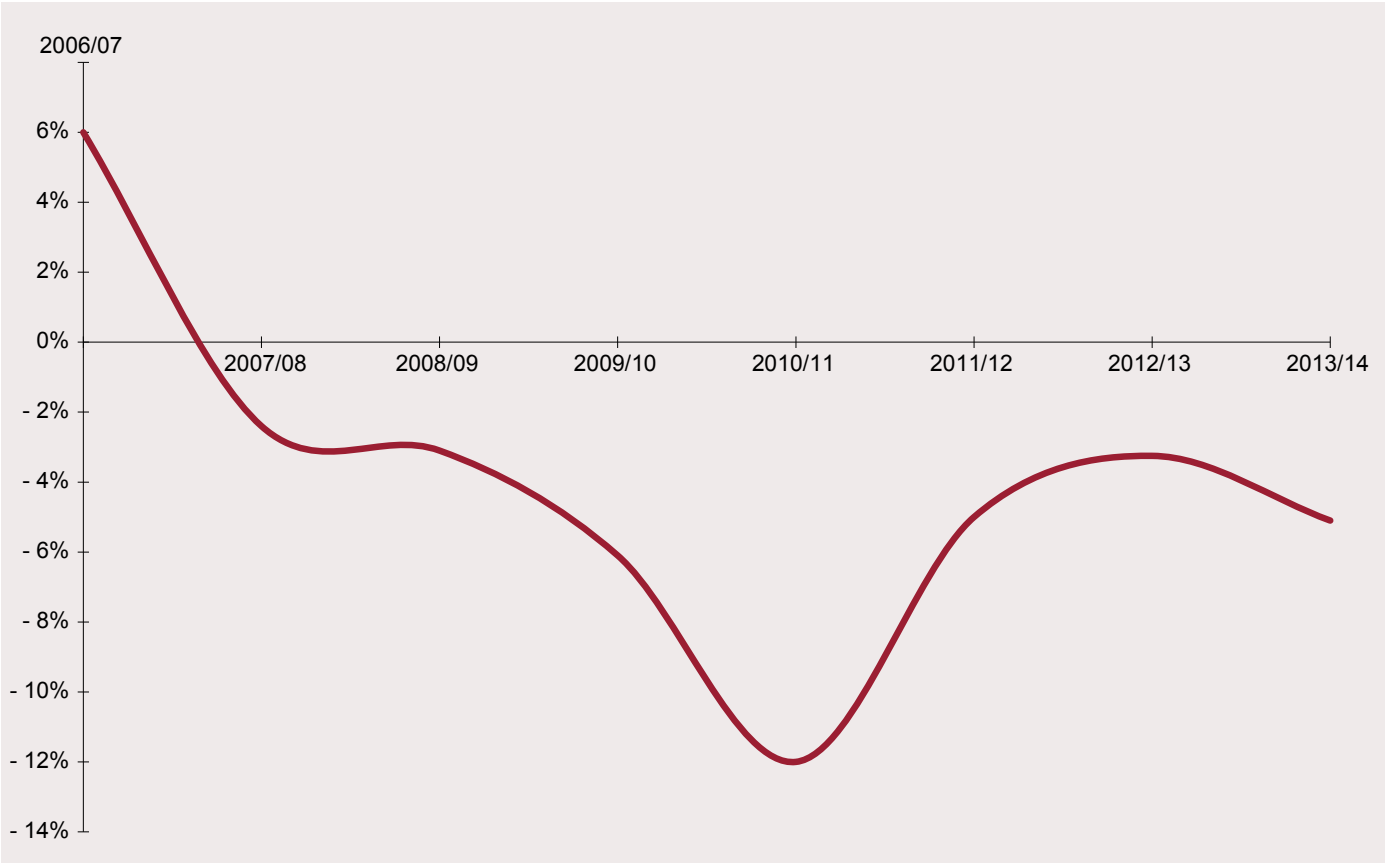
These arguments do not in themselves represent a case against the sharing of services. They do, however, highlight some issues that need to be taken into account by authorities considering introducing such services. Any agreement between authorities needs to consider issues such as the potential need to increase capacity when workloads increase, and the breadth of work undertaken by an effective local service.



Fall in historic environment specialists advising local government since 2006 by region.

There are of course, compelling advantages to the sharing of services, and these go beyond 'efficiency savings'. The income a local authority derives from selling a service to other authorities can be used to fund a level of expertise that would otherwise not be available. It can represent a way of protecting, and even of developing, strong local services. The sharing of a service with another local authority also means that the supplier of that service remains in the public sector, something the Historic Environment: Local Authority Capacity project identified as being particularly valued by stakeholders. A service that is provided by another local authority is potentially more secure than one delivered by the private sector, as local authorities are less likely to be influenced to the same extent by the ways in which shifts in economic conditions can affect profit margins. The seller of the service may also choose to build upon its reputation as a supplier of expertise and start exploring other ways in which to raise revenue. This is an approach adopted by Essex County Council's Place Services team, which, building on its work with other local authorities, has started to tender for commercial consultancy work.

The sharing of services does not have to be restricted to traditional administrative boundaries. High Peaks Borough Council and Staffordshire Moorlands District Council are sharing services across county boundaries. In this case it is the similarity of conditions between the two areas which means such a partnership makes sense.



Annual percentage change in the number of full-time equivalent specialists advising local government.

It is, of course, also worth emphasising that the shared service model, like all models of service delivery, needs to be adequately resourced. The selling local authority needs to ensure that it has sufficient capacity to take on the additional workload and the buying authority needs to satisfy itself that it is purchasing sufficient capacity.

THE FUTURE

With local government undergoing radical change and an ever-proliferating range of models of service developing, it is more important than ever that the wider historic environment sector is able to influence local decision-making, and to ensure that informed decisions are made about local heritage assets.

To do this we need to improve our understanding of the impact of each of the different models of service that are emerging. Under the National Heritage Protection Plan, English Heritage is identifying different examples of shared conservation services, and developing a library of the different models of service that now exist. This information is maintained by the Historic Environment Intelligence Team and can be used to support local authorities as they consider their options for the future of services.

Owain Lloyd-James MA MIfA is the Historic Environment Intelligence Team's Local Government Analyst. After training as an archaeologist, he worked for the Department for Culture, Media and Sport for six years. Since joining English Heritage in 2007, he has been responsible for managing the national network of Heritage Champions and supporting the co-ordination and development of English Heritage's work with local government.

FURTHER READING

Blyth, A 2013 'The Future Face of Local Government'. *Local Government Chronicle*, 12 September 2013, 16–19

Local authority shared services, more information at: http://www.local.gov.uk/shared-services-map

Local Government Association/English Heritage 2013 *Making the Most of Your Heritage Assets: The Future of Local Historic Environment Services*. Swindon and London: Local Government Association/English Heritage, available at: http://www.local.gov.uk/publications/-/journal_content/56/10180/4062539/PUBLICATION

The historic Environment: Local Authority Capacity project, more information at: http://www.helm.org.uk/managing-and-protecting/delivering-heritage-advice/helac/

Lloyd-James, O 2014 'A sixth report on Local Authority Staff Resources' July 2014 http://www.english-heritage.org.uk/publications/sixth-report-la-staff-resources/

Watt, N 2014 'Local government cuts poorest areas'. *The Guardian* 30 January 2014, available at: http://www.theguardian.com/society/2014/jan/30/local-government-cuts-poorest-areas

Developing the next generation of research frameworks

The first comprehensive evaluation of the use of research frameworks identifies the issues that need to be addressed if they are to retain their value to the sector.

What questions should we ask when we undertake research? Research frameworks provide the answers. They are an agreed set of research topics developed through the collaboration of experts in a given field. Specifically, they help to co-ordinate research efforts: what do we need to know more about? As applied to the historic environment, they also help inform decisions about the significance of a site proposed for development: what questions can investigation of this site answer?

This article is a brief introduction to the findings of a review of research frameworks commissioned by English Heritage. The report makes a series of recommendations that are expected to be put into effect as part of the next iteration of the National Heritage Protection Plan. The full report (Pye Tait Consulting 2014) is available on the English Heritage website.

THE CURRENT MODEL AND THE NEED FOR CHANGE

The current model for research frameworks was established in 1996 with the publication of *Frameworks for our Past* (Olivier 1996). A response to the significant increase in archaeological investigations which took place after Planning Policy Guidance 16 was introduced, the publication aimed to create a research focus for development-led archaeological work and to aid local government historic environment staff in making decisions. The 1996 model was based on three stages:

- *resource assessment – 'a statement of the current state of knowledge and a description of the archaeological resource' – that is, what we know;*
- *research agenda – 'a list of the gaps in that knowledge, of work which could be done, and of the potential for the resource to answer questions' – that is, what we don't know and what we'd like to know; and*
- *research strategy – 'a statement setting out priorities and method' – that is, how that knowledge can be attained.*

Research frameworks can cover a specific geographical area (eg South-West Regional Research Framework), period (eg the Mesolithic) or theme (eg Roman pottery).

The current model has been in place for nearly 20 years, but until now there has been no comprehensive review of its effectiveness. Meanwhile there has been considerable change in the sector, including the introduction of the National Planning Policy Framework; the move towards the electronic management and dissemination of information; the introduction of an increasingly holistic approach to heritage protection, integrating archaeology and the built environment; and the impact of large-scale cuts on national and local historic environment services.

The Southport Group report (Southport Group 2011) recommended the need for a review, and this has been taken forward by English Heritage under the National Heritage Protection Plan. The Pye Tait review was commissioned by English Heritage in October 2013, and reported in June 2014. This consultancy work has provided English Heritage with a better understanding of the use, value and impact of research frameworks in the historic environment sector, as well as the opportunity to capture the requirements of users and non-users alike. The results of the survey will help evaluate whether the current model is fit for purpose and feed into future developments.

© English Heritage

© Oxford Archaeology Ltd

Above left: The cover of the *Review of Research Frameworks*.

Above right: Cover of recently released *Solent-Thames Research Framework for the Historic Environment*.

THE SURVEY

Pye Tait developed a four-stage approach to the review: initial scoping interviews with representatives from 13 historic environment stakeholder organisations; a national online survey of users and non-users of research frameworks; 50 in-depth follow-up telephone interviews; and a round-table discussion workshop. The survey aimed to be as comprehensive as possible and the target audience covered the whole of the professional, academic and amateur historic environment sector. The table below shows the breakdown of respondents to the survey:

Two-thirds of respondents to the online survey classified themselves as existing users of research frameworks. Regional frameworks were the type that was most frequently used. The survey indicated that research frameworks generally meet the needs of current users, with about 50 per cent of respondents agreeing that they are fit for purpose and relevant to their needs. The survey highlighted, however, the varying ways in which research frameworks are used. Within the planning system, both local authority historic environment staff and commercial contractors said they chiefly provided a research focus for development-led investigations. For example:

- *local authorities use research frameworks to help assess the significance of historic environment assets, identify priorities for investigation and to justify planning conditions/advice and proposed mitigation measures; and*
- *contractors use research frameworks in response to briefs, to inform the creation of written schemes of investigation and for background reference information.*

Outside of the planning system, academics and voluntary societies/community groups stated that they use research frameworks to:

- *guide their work and develop methodologies; and*
- *scope out research projects and establish research priorities.*

Just over half the academics consulted also stated that research frameworks are relevant in the context of assessing the 'impact' of their research, for example in relation to Research Excellence Framework impact assessments.

The survey respondents generally considered research frameworks to offer public value, particularly because of the transparency and openness they provide as to why research is being undertaken. The majority of surveyed users agree to some degree that the frameworks provide an effective focus for research and contribute to the effectiveness of research outcomes.

THE FUTURE

A number of issues were highlighted by the survey. There was concern over the currency of research frameworks: as static documents, they could be perceived as out of date or unable to respond to changing circumstances. There was also concern about their disparate nature and the resulting lack of consistency or integration between them. An issue over how to find and consult the various research frameworks was also highlighted. In fact a significant lack of awareness and understanding of what research frameworks are, let alone where they could be found, was identified among some built environment practitioners and local societies. This may partly be due to a historical lack of engagement with these user groups.

A number of such findings will feed into the future development of research frameworks. Over 70 per cent of users believe these documents could be more useful to their organisations in the future, and about half felt it was 'very important' for research frameworks to extend beyond their primarily archaeological focus to include the wider historic environment. A diverse range of needs has to be considered in order to achieve this, and these cannot be covered by a one-size-fits-all approach. There is also the need for research frameworks to 'go digital': the preferred option for their future format was as an interactive web-based resource.

Finally, there is a need to clarify, promote and communicate the role and purpose of research frameworks better. To some sections of the sector, they still remain an enigma.

Dan Miles MA is the Research Resources Officer in the Capacity Building Team, part of the Heritage Protection Department. He is responsible for developing research resources, including research frameworks and sources of reference. He has an archaeology degree and an MA in Museum Studies, and has worked in the heritage sector for a number of years in England and Spain.

FURTHER READING

Miles, D 2013 *English Heritage Strategy for Developing Research Resources.* London: English Heritage, available at: http://www.english-heritage.org.uk/professional/research/strategies/research-resources/

Olivier, A 1996 *Frameworks for our Past: a Review of Research Frameworks, Strategies and Perceptions*. London: English Heritage

Pye Tait Consulting 2014 *Review of Research Frameworks for the Historic Environment Sector in England*. London: English Heritage available at: http://www.english-heritage.org.uk/professional/research/strategies/research-resources/

Research frameworks, more information at: http://www.english-heritage.org.uk/professional/research/strategies/research-frameworks/

Southport Group, 2011 *Realising the Benefits of Planning-led Investigation in the Historic Environment: A Framework for Delivery*, available at: *www.archaeologists.net/southport*

COSMIC 3 – grappling with a 140-year-old conservation problem

Agricultural activity causes more damage to archaeological sites than any other single factor. This project has provided an assessment of the threat to 1,587 scheduled monuments.

First identified as a major issue in 1870 by Colonel Lane-Fox (later to become General Pitt-Rivers, the first ever Inspector of Ancient Monuments), the side-effects of cultivation continue to be the single most significant source of risk affecting archaeological monuments and landscapes today. About 72 per cent of England is classified as agricultural land, with 30 per cent under arable cultivation and 37 per cent pasture and rough grazing. Crucially though, most of the routine farming practices carried out in these areas lie beyond the conventional regulatory systems that seek to mitigate damage to the historic environment.

The risk assessments and mitigation recommendations provided by the Conservation of Scheduled Monuments in Cultivation 3 project (COSMIC 3) represent the culmination of a ten-year programme, in which English Heritage has worked in partnership with the Association of Local Government Archaeological Officers and Natural England, with Oxford Archaeology acting as the archaeological contractor.

Almost all risk models that apply to the historic environment require testing and validation over a considerable period of time, and COSMIC has been no exception, with extensive ground-truthing (by dialogue with farmers and excavation) and modification carried out during the pilot stages. Its recommendations for appropriate risk management and mitigation have been calibrated against a parallel activity, the Trials Project.

The story began in 2003, when English Heritage conducted an awareness-raising campaign which aimed to persuade the Government of the need to provide incentives if farmers were to appropriately manage archaeological sites under arable cultivation. The Ancient Monuments (Class Consents) Order 1994, it was also argued, required legislative reform, as in certain circumstances Class 1 consent permitted the continued and potentially damaging ploughing of scheduled monuments.

It became apparent, however, that existing management datasets (such as the Record of Scheduled Monuments) contained inadequate information on the extent to which designated sites might be affected by cultivation. This was particularly problematic at a time when Government was emphasising the requirement for evidence-based policy.

"Hitherto the neighbouring ground has been grazed, and the harmless sheep is no foe to history; but it has lately occurred to the owner of the ground that a few shillings more of yearly profit might be gained by turning pasture land into arable; and to such a sordid motive as this, these precious antiquities are at this very moment being sacrificed."

Colonel Lane-Fox, ***Saturday Review***, 2 July 1870.

"The most destructive of all processes, however, is the least obvious. Ploughing, especially deep ploughing....poses the major threat to the continued existence of our sites."

Philip Barker, ***Rescue Archaeology***, 1974.

Two quotations separated by a hundred years, discussing the destructive side-effects of cultivation and the risks it poses to archaeological monuments.

Colour-coded COSMIC risk assessments of linear earthworks and barrows.

In their response, the Department for Culture, Media and Sport asked English Heritage to undertake preparatory work on potential reform of the Class 1 consent legislation. As part of this research the Trials Project (Oxford Archaeology and Cranfield University 2010), funded jointly by English Heritage and the Department for Environment, Food and Rural Affairs (Defra), provided a scientific understanding of the effects of tillage and other agricultural operations on surface and sub-surface archaeological remains.

A key conclusion of the Trials Project was that in the majority of cases sites may remain in cultivation and not be at significant risk of degradation or loss, as long as the method of cultivation is suitably tailored. These findings were further supported by the results of the COSMIC pilot projects.

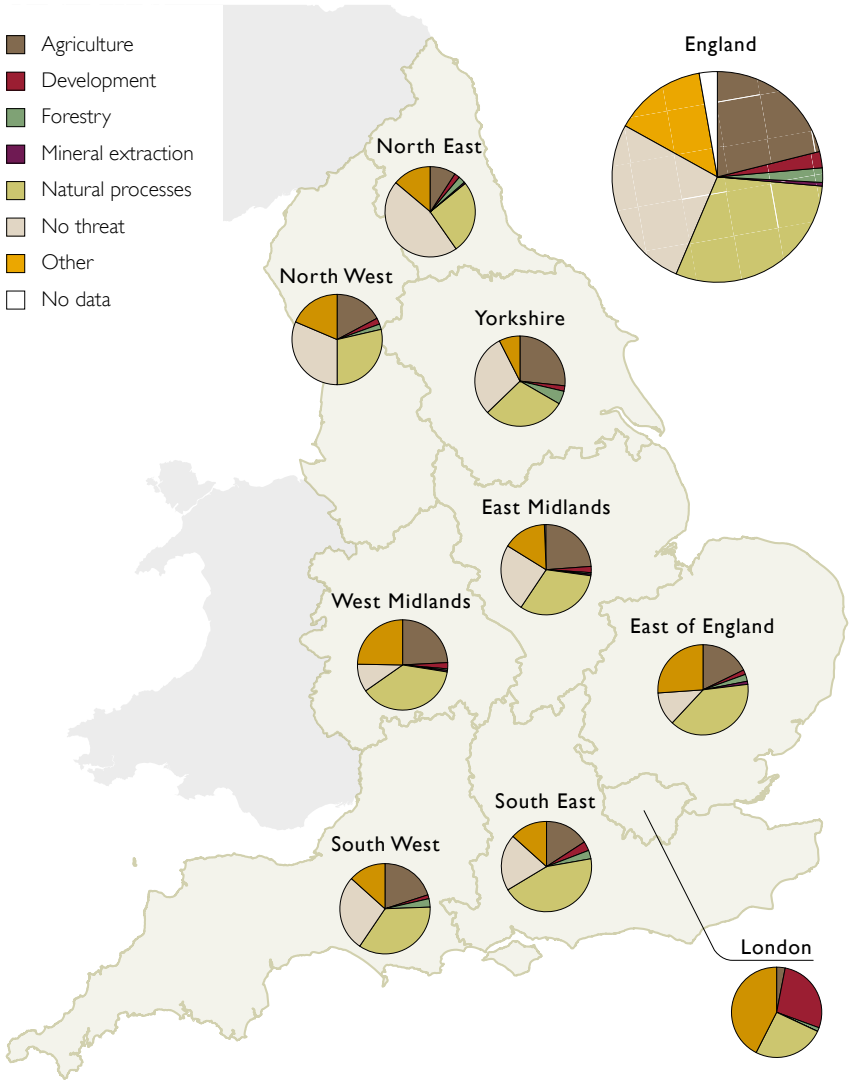
Initiatives such as Scheduled Monuments at Risk, which has now become a part of Heritage at Risk (HAR), employ risk assessment methodologies which are founded on precautionary principles, identifying all monuments under cultivation as *de facto* at risk. It is important to remember here that a dependable assessment of the significance and condition of buried archaeological remains can often only be established by further investigation or by modelling patterns in datasets. COSMIC represents the latter. Following an initial pilot project in the East Midlands which reported in 2006 (COSMIC 1), a subsequent pilot (COSMIC 2) looked at how the process could be delivered nationally, and also reviewed farmer attitudes to the types of mitigation measures being suggested. COSMIC 3, which reported in January 2014, thus represents the culmination of a series of endeavours.

COSMIC 3 provides detailed risk assessment and mitigation recommendations for 1,587 scheduled monuments throughout England that are affected by cultivation. The methodology seeks to model both the assessment and the management of risk, basing its approach on three factors: a site's location; its geomorphological characteristics; the land-use practices that apply there; and the type and significance of the site itself. In some key respects it marks a starting point for further management work, which will take place over the coming years. Its achievements, nevertheless, are considerable:

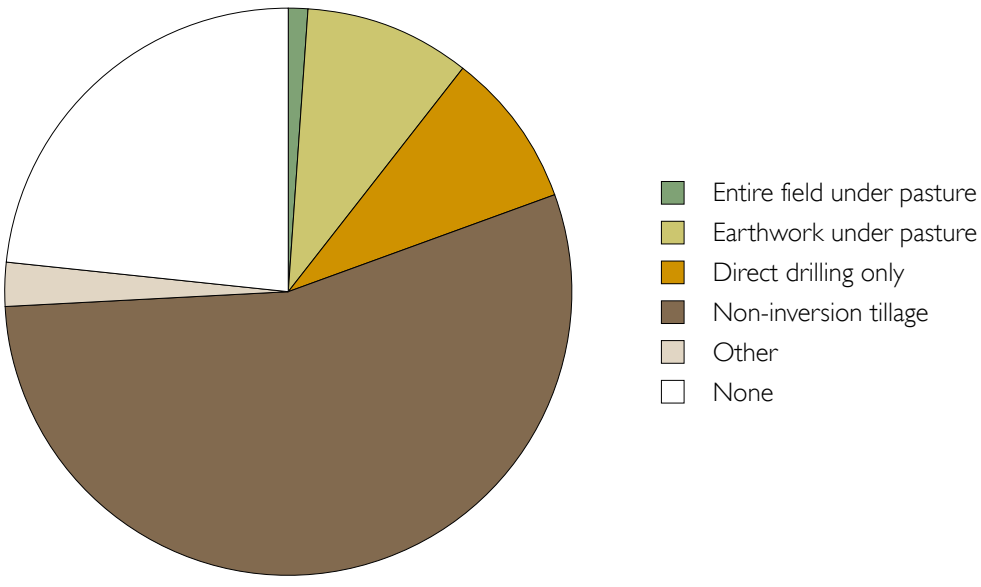
- *because a monument may fall across several land parcels (each subject to different management), such sites have been broken down into fields or land parcels, and separate assessments have been produced for each;*
- *risk assessments and mitigation recommendations have thus been prepared for 1,587 monuments covering 3,953 individual land parcels;*

Many scheduled monuments are subject to a Class 1 consent, which permits ploughing.

The Trials Project: faux archaeological deposits used to assess the affects of various cultivation practices.



Principal sources of risk to scheduled monuments in England, 2008.



COSMIC 2 management recommendations for scheduled monuments in the East Midlands.

- *the data has been presented on an Access database, and graphically depicted within KMZ shape files which can be imported into Google Earth and GIS software;*
- *of the land parcels assessed, the archaeological remains in 51 per cent were considered to be at low or minimum risk, 24 per cent at serious or high risk; with 24% at moderate risk;*
- *the assessments began with farmer questionnaires, to which 49 per cent responded – an unprecedented rate for this type of work, underlining both the goodwill that exists in the farming community and the need to engage more fully with it.*

Cultivation damage continues to be the single most significant reason for placing scheduled monuments on the HAR Register. In 2013, 1,977 monuments (43 per cent of those on HAR) were being affected by cultivation; 1,571 were being ploughed over and 405 were affected by 'arable clipping' (which results in the encroachment of cultivation into the scheduled area of a monument).

In this context, it is essential to note the success of endeavours to raise the profile of the archaeological heritage in Defra-funded agri-environment schemes, together with the enormous contribution that these schemes, administered by Natural England, have made to reducing the levels of risk to heritage assets of all types. Between 2007 and 2013:

- *2,200 scheduled monuments were placed under positive management measures to improve their condition; and*
- *the impact of cultivation was reduced on 29,300ha of archaeological sites affected by it.*

Nevertheless, with resources for this type of work under the forthcoming New Environmental Land Management Scheme likely to be more limited, and given the ever-changing nature of farming techniques, there is little likelihood that, without further concerted action, the prospects for archaeological monuments threatened by cultivation practices, including those on the Heritage at Risk Register, can be improved. COSMIC 3 is thus not a 'point in time' exercise: its fundamental purpose is to provide tools that can be used to manage this class of site, both now and into the future. It is specifically designed to provide much of the information needed by English Heritage's local heritage at risk and development management teams, so as to assist them in refining current and future HAR assessments, and in prioritising future management interventions. The aim is not simply to enable the removal of scheduled monuments from the HAR Register: it is to move towards the more sustainable management of the resource as a whole.

Having reached this very important milestone, and with changes to agri-environment schemes imminent, now is the appropriate time for reflection at a strategic level. English Heritage and its partners need to look again at the need to improve the management of archaeological sites affected by cultivation, taking full and proper account of the implications for famers, land-owners and land-managers.

Jon Humble is Inspector of Ancient Monuments (Programmes & Projects) and Senior National Minerals & Environmental Adviser. Jon joined the Central Excavation Unit in 1985, became an inspector in the East Midlands region in 1997 (where he led on the development of Scheduled Monuments at Risk and COSMIC), and joined the Policy Department in 2005. Currently he works for the Government Advice Team and the Director's Office within the National Planning & Conservation Department. His responsibilities include advice on mineral extraction and renewable energy, together with agri-environmental matters and heritage at risk.

Vince Holyoak PhD MIFA joined EH's Monuments Protection Programme in 1996, and moved to what is now the Government Advice Team in 2001. Here he co-ordinated the completion of Scheduled Monuments at Risk, COSMIC, and the Trials Project. In his current role as Head of National Rural & Environmental Advice he is responsible for EH's liaison with Defra and its agencies, including Natural England.

FURTHER READING

English Heritage 2009 *The Monuments at Risk Initiative 2003–2008*. Swindon: English Heritage

Holyoak, V 2010 'Mitigation Impossible? Practical Approaches to Managing Archaeology in Arable Farming Systems', *in* Trow, S Holyoak V and Byrnes, E (eds) *Heritage Management of Farmed and Forested Landscapes in Europe*. Brussels: EAC Occasional Paper **4**, 135–40

Humble, J 2010 'Assessing and Managing risk: the Scheduled Monuments at Risk (SMAR) and Conservation of Scheduled Monuments in Cultivation (COSMIC) Projects, England' *in* Trow, S Holyoak V and Byrnes, E (eds) *Heritage Management of Farmed and Forested Landscapes in Europe*. Brussels: EAC Occasional Paper **4**, 95–103

Trow, S 2010 'Ripping up History, Sordid Motives or Cultivating Solutions? Plough Damage and Archaeology, a Perspective from England' *in* Trow, S Holyoak V and Byrnes, E (eds) *Heritage Management of Farmed and Forested Landscapes in Europe*. Brussels: EAC Occasional Paper **4**, 129–34

Trow, S and Holyoak, V 2014 'The Erosion of Archaeology: the Impact of Ploughing in England', *in* Meylemans, E Posen, J and In't Ven, I *The Archaeology of Erosion, the Erosion of Archaeology: Proceedings of the Brussels Conference, April 28–30, 2008* (Relicta Monografieën **9**). Brussels: Flanders Heritage Agency, 55–62

The Viking-age cemetery at Cumwhitton, Cumbria

Excavation of the burial places of six early Viking settlers, with their grave goods intact, constitutes one of the most important such finds of recent times.

In March 2004, a Cumbrian metal detectorist, Peter Adams, was given permission by the farmer to examine farmland on the western edge of Cumwhitton, a small village in the Eden Valley south-east of Carlisle. There he found an object in the ploughsoil which was subsequently identified by the Portable Antiquities Scheme as a Viking oval brooch of 9th- or 10th-century date.

These are almost always found in pairs, and in a burial context. Peter Adams therefore returned to the site and did indeed find a second brooch. Given the rarity of such objects in England, the find was clearly of national importance, and the Portable Antiquities Scheme commissioned Oxford Archaeology North to undertake an evaluation of the findspot, to ascertain whether the brooches really did come from a burial. As a result a grave was located. This had clearly been disturbed by recent ploughing, though it was still richly furnished with grave goods. The presence of the oval brooches strongly implied that this was the burial place of a high-status woman.

One of the oval brooches, after conservation.

Several more artefacts of early medieval date were found by metal detecting in the surrounding ploughsoil during the evaluation. These included fragments of another oval brooch, a key, and part of a sword, suggesting that the grave had been part of a cemetery. This important site was under immediate threat from ploughing, and in the summer of 2004 Oxford Archaeology North undertook a full excavation of the site, funded by a grant from English Heritage's National Heritage Protection Commissions Programme (Paterson *et al* 2014). In total, six burials were found, all of which date to the early 10th century. Because of the acidic nature of the soil, almost no skeletal material survived though. Artefactual assemblages were preserved, however, and these suggested the graves were those of two women and four men. The first grave was separated from the rest by about 10m, the other five being clustered in a tight group, which had been carefully organised into two closely spaced rows, each aligned roughly east-west. The central grave of the eastern row was surrounded by a shallow ditch, and was probably once marked by a mound; the proximity of the others suggests that all had originally also been marked in some way, though no evidence of this survived.

All the burials appear to have been richly furnished, and a wide range of artefacts was recovered. Though the objects were poorly preserved, the careful process of excavation, conservation, and analysis has meant that a wealth of information has been recovered from them. There was some broad commonality in the contents of the burials, though there were also some marked differences between them. Most of the men were buried with swords, spears, knives, buckles, and beads. One of the 'wealthiest' burials contained, in addition to these objects, a *seax* (sword or dagger typical of this period) with a silver-inlaid horn handle, a rare decorated drinking horn, a pair of spurs, a chain and hook from a cauldron, and a small pouch containing various disparate items. In contrast, the 'poorest' burial contained only a spear, knife and belt buckle, though analysis of the ploughing patterns affecting the cemetery suggested that many of the finds from the ploughsoil, including the sword, came from this grave. It thus seems that the graves in fact all contained individuals of relatively comparable status.

Peter Adams metal detecting in the area of the findspot.

Differences that stood out between the female burials included that of the woman in the first grave, who had a key and a knife with a silver wire-bound handle hanging from one of her oval brooches. A maplewood box lay at her feet; it contained implements associated with textiles, such as a glass linen smoother, a lead spindle whorl, a comb, and a pair of shears. The other woman had no knife or key, nor oval brooches (though fragments of a third brooch in the ploughsoil might have come from this grave), but she did have a comb and shears, alongside a sickle, a drinking horn, a cluster of beads, and an oil-shale arm-ring.

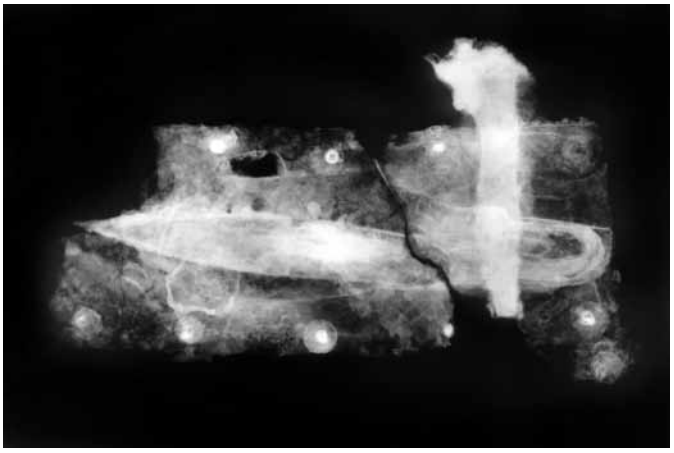
The spatial distribution of the grave goods suggested that all the bodies had been laid with the head to the west, perhaps a gesture to Christianity, though this alignment is also found in pagan graves in Scandinavia. Indeed, it is clear this community was predominantly a pagan one. At least one man and one woman had been placed on biers, and most, if not all, appear to have been shrouded. One striking feature is a unique group of decorated copper-alloy buckles and strap ends, each of which had evidence of tinning. The presence of these in four of the six graves suggested they were quite closely linked. The best parallels for these come from nearby sites at Carlisle Cathedral, Workington, and Aspatria, suggesting these were objects of local origin, perhaps the work of an individual craftsman or workshop. The *seax*, spurs, and textiles (impressions of which survived), are also probably of Insular manufacture. The oval brooches, however, were probably made in Scandinavia, and other objects that could be linked to that part of the world included an axehead, some of the spearheads, and a Borre-style buckle. A sword pommel inlaid with silver wire was of a Carolingian type found mostly on the Continent, yet the design of the inlay was most similar to motifs found in the British Isles, particularly on contemporary Anglo-Saxon strap ends. This suggests the inlay was perhaps made in an Insular context, though the blade and hilt possibly came from the Continent.

The discovery of even a single grave with demonstrably Viking attributes in England is an important event, and the excavation of this small cemetery is almost unique. Cemeteries of the period are very rare, with only the burials found in association with the church at Repton in the Trent Valley, and the unusual cremation cemetery at Heath Wood, Ingleby providing any comparanda,

The hilt of a sword found in the ploughsoil.

The group of five graves.

The drinking-horn mount, showing its incised decoration.

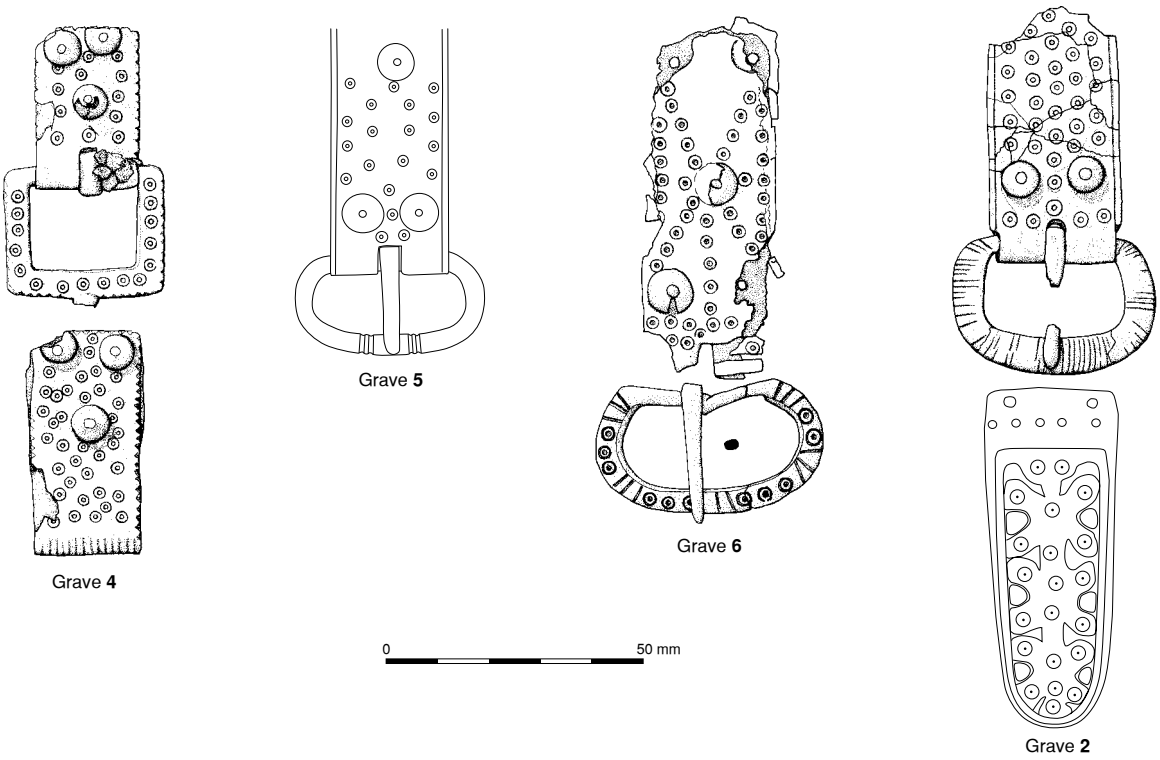


An X-ray of the locking mechanism from the maplewood box.

although graves in Christian contexts at St Michael's Church, Workington, Cumbria and to the west of Carlisle Cathedral seem to be of a similar period. Indeed these were the first pagan Viking graves in the North West, where the majority of graves have been found, to be excavated using modern methods.

The assemblage from Cumwhitton has provided a rare opportunity to research a pagan cemetery arguably created by the first generation of settlers. Whilst the artefacts are of considerable importance in their own right, it is the fact that they were excavated and recorded to modern professional standards in the contexts in which they were originally deposited that elevates them to national significance.

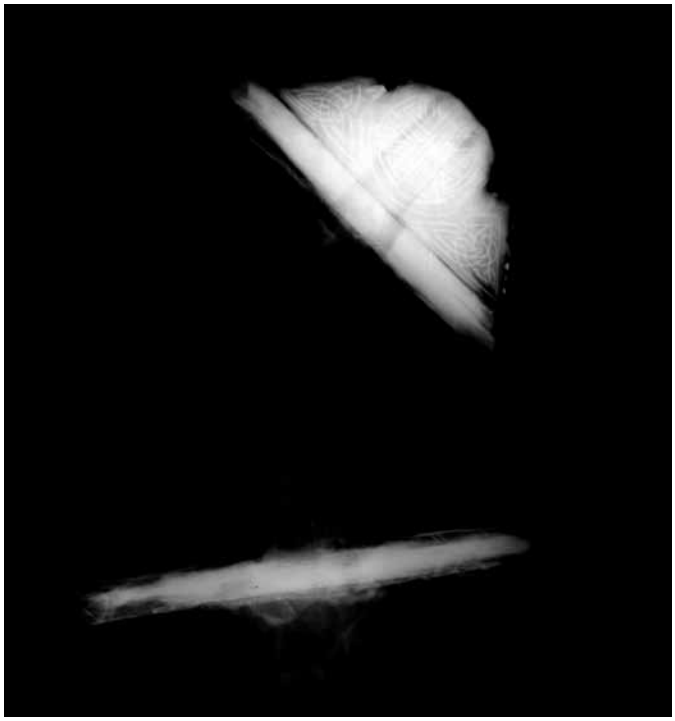
In particular, analysis of the spatial distribution of the assemblage from each grave has addressed questions relating to the selection and deposition of artefacts for burial, and the significance of the positioning of each object within the grave. This has provided a new insight into cultural and ethnic preferences evidenced in the funerary practices of this period. The burials were clearly made following a particular and distinct rite, made all



The unique collection of buckles and strap ends from Cumwhitton.

the more prominent because of its rarity. Equally, the location of the graves within the landscape is likely to be laden with social and political significance.

Most importantly, this site has afforded a tantalising glimpse into the cultural origins, beliefs and status of these people. Whilst the lack of skeletal material has limited scientific analysis of precisely when they died or what their geographical place of origin was, the wealth and variety of the goods buried with them has created a sense of the complex nature of their lives and the way in which they may have fitted into the volatile political landscape of 10th-century Cumbria.



The silver inlaid design on one of the sword pommels.

Rachel Newman FSA is Senior Executive Officer, Research and Publications for Oxford Archaeology North. She has worked in the north west for over 30 years on numerous excavation and post-excavation projects. She was the early medieval co-ordinator for the North West Regional Archaeological Research Framework and is currently President of the Cumberland and Westmorland Antiquarian and Archaeological Society.

Adam Parsons, is a lead author and illustrator for the Cumwhitton volume. He has a special interest in the Viking Age, particularly its material culture, and in understanding and reconstructing early medieval technology. He has worked for Oxford Archaeology North for over ten years on a number of publications and post-excavation projects.

FURTHER READING

Paterson, C Parsons, A Newman, R M Johnson, N and Howard-Davis, C 2014 *Shadows in the Sand: Excavation of a Viking-age Cemetery at Cumwhitton, Cumbria*. Lancaster: Lancaster Imprints, **22**

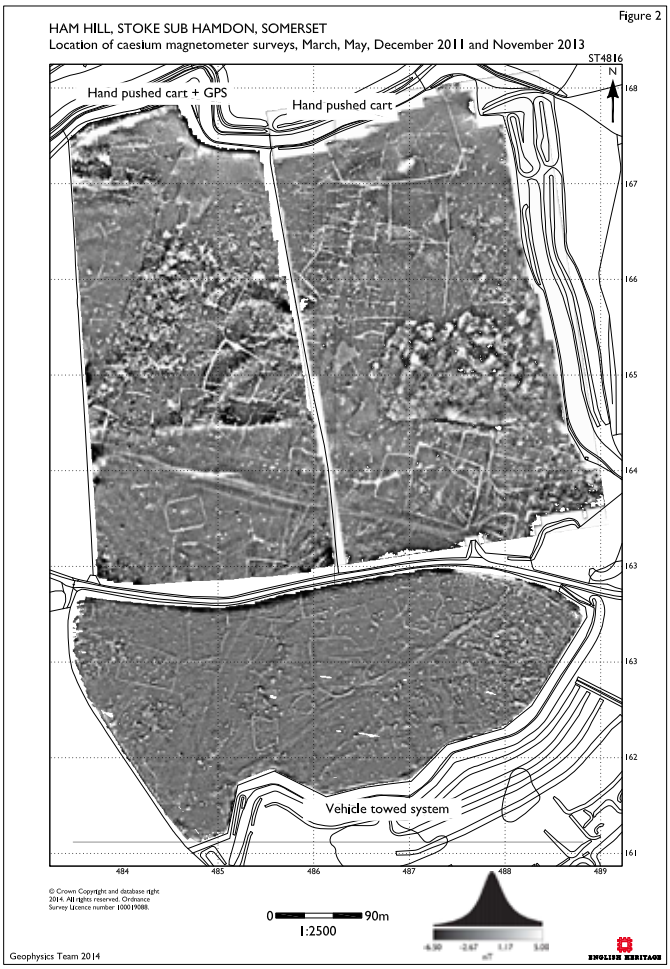
Chasing aeroplanes

Developing a vehicle-towed magnetometer array to complement aerial photography.

A number of recent projects carried out by English Heritage's Remote Sensing Team, which includes specialists in geophysical prospection, aerial investigation and other techniques, have combined the use of extensive aerial photography with the more targeted strengths of ground-based geophysics. This approach delivers many benefits, but it has been a challenge to develop geophysical systems that can provide sufficient coverage to complement the landscape-scale discoveries being made from the air.

The hand-operated caesium magnetometer array used by the team has, over the last decade, produced high-quality magnetic data over a range of sites (see illustration). However it has become clear that the use

Development of the system, from hand-pushed to vehicle-towed. ***Top left:*** Hand Pushed Scintrex 4 sensor system, ***top right:*** Hand pushed system with GPS for "grid less" survey. ***Bottom:*** Vehicle towed system with GPS and 6 Geometrics sensors



Results from Ham Hill, showing evidence for multi-period settlement.

Aerial photograph of Wilsford Henge.

of vehicle-towed platforms and GPS data increases the speed of data acquisition considerably, and techniques to ensure this is done effectively have now been developed.

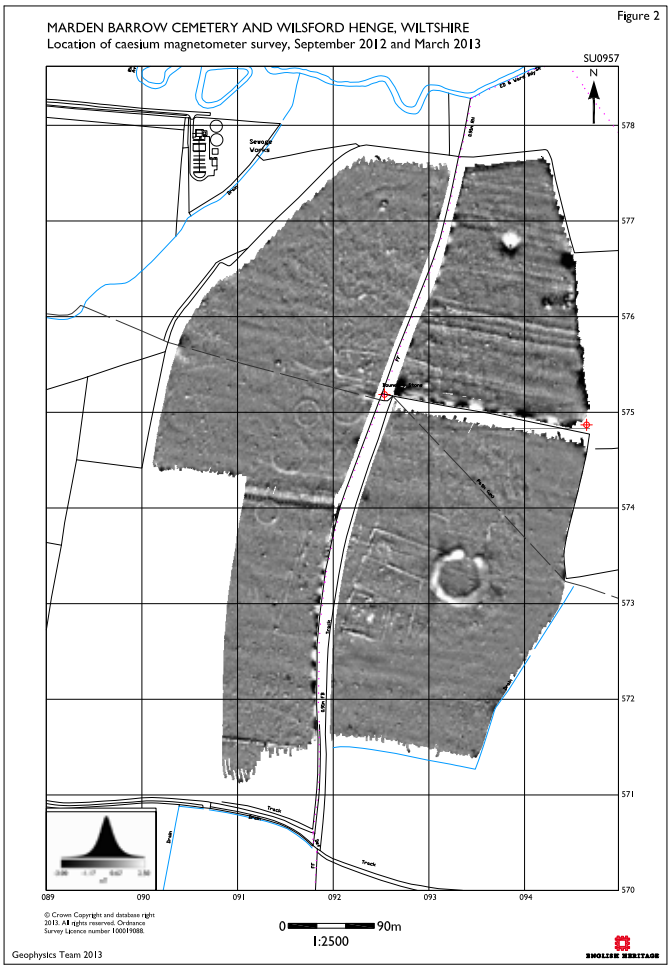
The first step was to attach a GPS antenna to the hand-operated cart array, while also developing a combined data logging system which could provide positional tracking as well as display the signal output from the sensors. High-quality magnetic data could thus be acquired over a site without the need to first set out a survey grid by, for example, constantly laying out ropes on the ground.

Although the idea of towing an array of highly sensitive magnetometers behind a vehicle may, initially, seem to be technically a rather challenging one, the team knew the benefits for large-scale acquisition that could be realised, having already successfully developed a vehicle-towed ground penetrating radar array. Following a series of mechanical refinements and, ultimately, the replacement of the original Scintrex sensors with six even more sensitive Geometrics G862 caesium magnetometers, a successfully field-tested array has now been developed.

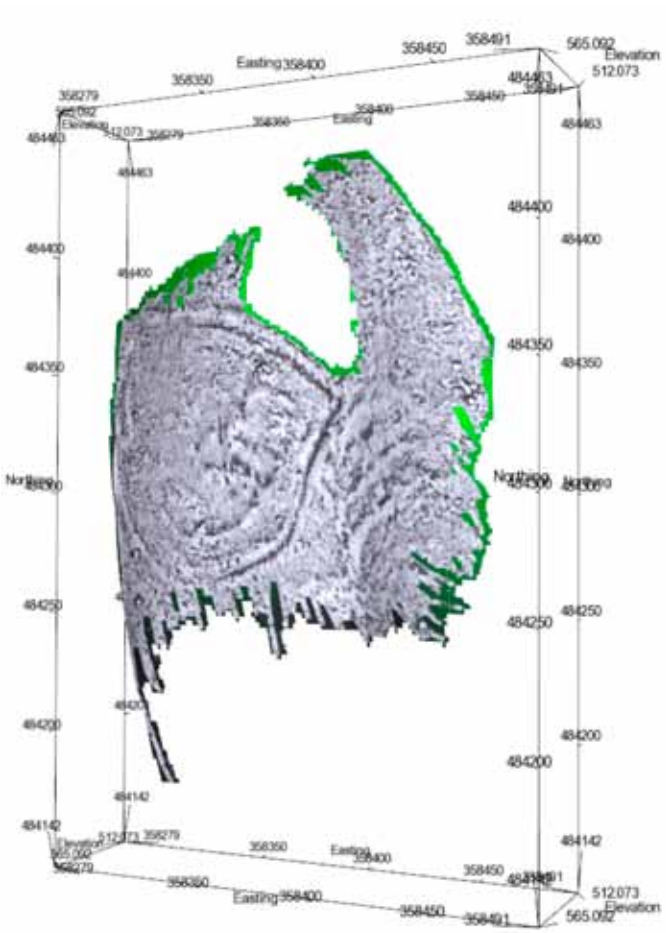
Working together with the instrument suppliers, data from the magnetometers and coordinates from the GPS have both been successfully streamed to bespoke software which provides quality control and guides the driver. One of the team members, Paul Linford, developed this software, which includes algorithms that successfully suppress the local magnetic field produced by the towing vehicle.

The unusually large Iron Age hillfort at Ham Hill, Stoke-sub-Hamdon, Somerset, which covers more than 80ha, is well known to be rich in the remains of later prehistoric and Roman-era activity and, having previously been partially surveyed using both the hand-operated cart and hand-held fluxgate instruments, presented an ideal test site for the newly-developed system. Whilst aerial photography for the site has been of rather limited use – the soil cover is thin, and permanent pasture predominates – magnetic surveys have provided detailed evidence for activity within the hillfort interior, revealing much about patterns of use from the Bronze Age to the Roman periods, as well showing the later quarrying sites that have, in some areas, obscured traces of earlier occupation.

The resulting plan shows caesium magnetometer results collected from three of the fields into which the hillfort is now divided, each of which are approximately 10ha in size. The first field was covered using the standard hand-operated cart array, and data from the second was collected with a mounted GPS receiver. In the third field, that to the south, the new, vehicle-towed sensor array was employed. All the data collected using the grid-free systems was gathered far more quickly than with the traditional method, with an identical 0.125m × 0.5m sample density and no apparent degradation in data



Unrecognised Roman settlement at Wilsford, revealed by the magnetic data.



Animated surface drape of magnetic data from Kitridding Hill, Cumbria., (click link to access 3D PDF).

quality. The survey successfully identified multi-period settlement evidence, including probable Bronze Age field systems and linear boundaries; Iron Age features included a central roadway and numerous ditched enclosures, pit clusters and round-houses; a small Roman corridor villa was associated with further enclosures and quarries.

A near-complete archaeological map of the internal character of the hillfort, combining the evidence from these and previous geophysical surveys, is now available (Payne *et al* 2012). It will be used to inform future management of the monument and balance the protection of an important archaeological resource against the need to allow some limited quarrying of Ham Hill stone for the repair of significant historic buildings in the area.

The hand-operated magnetometer array had also been previously used at the large Neolithic henge at Marden, Wiltshire, in advance of a small-scale excavation. Here, aerial photographic analysis of the site extended beyond the main henge, investigating the distribution of associated monuments throughout the surrounding Vale of Pewsey (Field *et al* 2009). As a result a number of relatively extensive sites were identified at which ground-based work was recommended.

Two sites were initially chosen for geophysical survey: the barrow cemetery and Roman villa at Charlton St. Peter, and the barrow cemetery and Wilsford henge monument which lie immediately south of the Marden henge. The vehicle-towed magnetometer array was first deployed at Charlton St. Peter, where the site was mostly under permanent pasture, before moving on to Wilsford, where the sites were under arable cultivation, a more challenging surface to work over (Linford *et al* 2013a and b).

Surveys at these sites proved highly successful, although the geology produced an extremely weak response to certain features that had showed clearly on the aerial photography. For example, some of the barrow ditches at Charlton St. Peter were only faintly visible, demonstrating the importance of ensuring that the full sensitivity of the sensors was not compromised by the vehicle-towed system. Results from the 16ha survey at Wilsford demonstrated a slightly greater magnitude of response over the barrows (~1.0nT) and also revealed a previously unrecognised Roman settlement abutting the Neolithic henge. The findings of the project will be used to inform decisions on the protection of these sites.

In the summer of 2012 the system was further field-tested at a range of sites situated on challenging upland terrain in the vicinity of the Lune Valley, Cumbria, as part of the National Aerial Identification Survey (NAIS) (Linford *et al* 2013c). Not only did these weakly magnetised sites benefit from the use of high-sensitivity

Oblique aerial photograph of the Kitridding curvilinear enclosure.

Geometrics sensors, but the vehicle-towed system allowed significant areas to be covered in a landscape that presented considerable logistical challenges for any ground-based techniques. The results from the curvilinear enclosure on top of Kitridding Hill are illustrated here and show how the GPS positional data has been used to provide an interactive digital terrain model of the site, with the magnetic data draped over the topography. Clearly, a vehicle-towed geophysical array, employing GPS and using the latest sensors, can be a most effective form of archaeological prospection.

Paul Linford MSc (left), Andy Payne (middle) and Neil Linford PhD (right), based at Fort Cumberland, Portsmouth. are the geophysicists within the Remote Sensing Team. Collectively, their experience of field magnetometers runs from the earliest hand-held analogue fluxgate instruments, which recorded their output directly onto a X–Y pen plotter, to the development of the hardware and software systems needed to support the high sensitivity caesium sensors featured in this article.

FURTHER READING

Field, D Martin, L and Winton, H 2009 *The Hatfield Earthworks, Marden, Wiltshire: Archaeological Survey Report*. Portsmouth: English Heritage Research Report Series, 96-2009, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/096_2009WEB.pdf

Linford, N Linford, P Martin, L and Payne, A 2007 'Recent results from the English Heritage caesium magnetometer system in comparison to recent fluxgate gradiometers'. *Archaeological Prospection* **14** (3), 151–66

Payne, A Linford, N and Linford, P 2012 *Ham Hill, Stoke Sub Hamdon, Somerset: Report on Geophysical Surveys, March, May and December 2011*. Portsmouth: English Heritage Research Report Series 22-2012, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/022_2012WEB.pdf

Linford, N Linford, P and Payne, A 2013a *Marden Barrow Cemetery And Wilsford Henge, Wiltshire, Report On Geophysical Surveys, September 2012 and March 2013*. Portsmouth, English Heritage Research Report Series 8-2013, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/008_2013WEB.pdf

Linford, N Linford, P and Payne, A 2013b *Charlton Barrow Cemetery And Roman Villa, Wiltshire, Report On Geophysical Surveys, July 2012 and March 2013*. Portsmouth: English Heritage Research Report Series 9-2013, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/009_2013WEB.pdf

Linford, N Linford, P Payne, A and Hardwick, I 2013c *Lakes and Dales NAIS, Kitridding Hill, Lupton, Cumbria: Report on Geophysical Survey, July 2013*. Portsmouth: English Heritage Research Report Series 56-2013, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/056_2013WEB.pdf

The baby burials at Yewden Roman Villa

Study of a remarkable group of Roman-era baby burials suggests they were the victims of infanticide, designed to regulate family size.

In 1912, Alfred Cocks excavated the Yewden Roman Villa at Hambleden, Buckinghamshire. He noted a remarkable total of 97 infant burials, mainly from a yard adjacent to the villa buildings. The sheer number led Cocks to suggest that they may have been victims of infanticide – the deliberate killing of unwanted babies, a practice for limiting family size that was tolerated in many earlier societies, including that of Classical Rome.

The Yewden site has become famous for its infant burials, but the suggestion that they were deliberately killed has remained speculative. There were no marks of violence on the bones, but this is not surprising as a newborn baby's life is easily extinguished by such methods as suffocation. New scientific methods have recently been developed for identifying and studying infanticide using skeletal remains, so the time seemed ripe for a re-examination of the bones. A project, led by English Heritage, and involving Chiltern Archaeology, the University of Bristol, the University of Manchester and the Open University, was instituted to study the skeletal remains of the infants and to shed light on why they died.

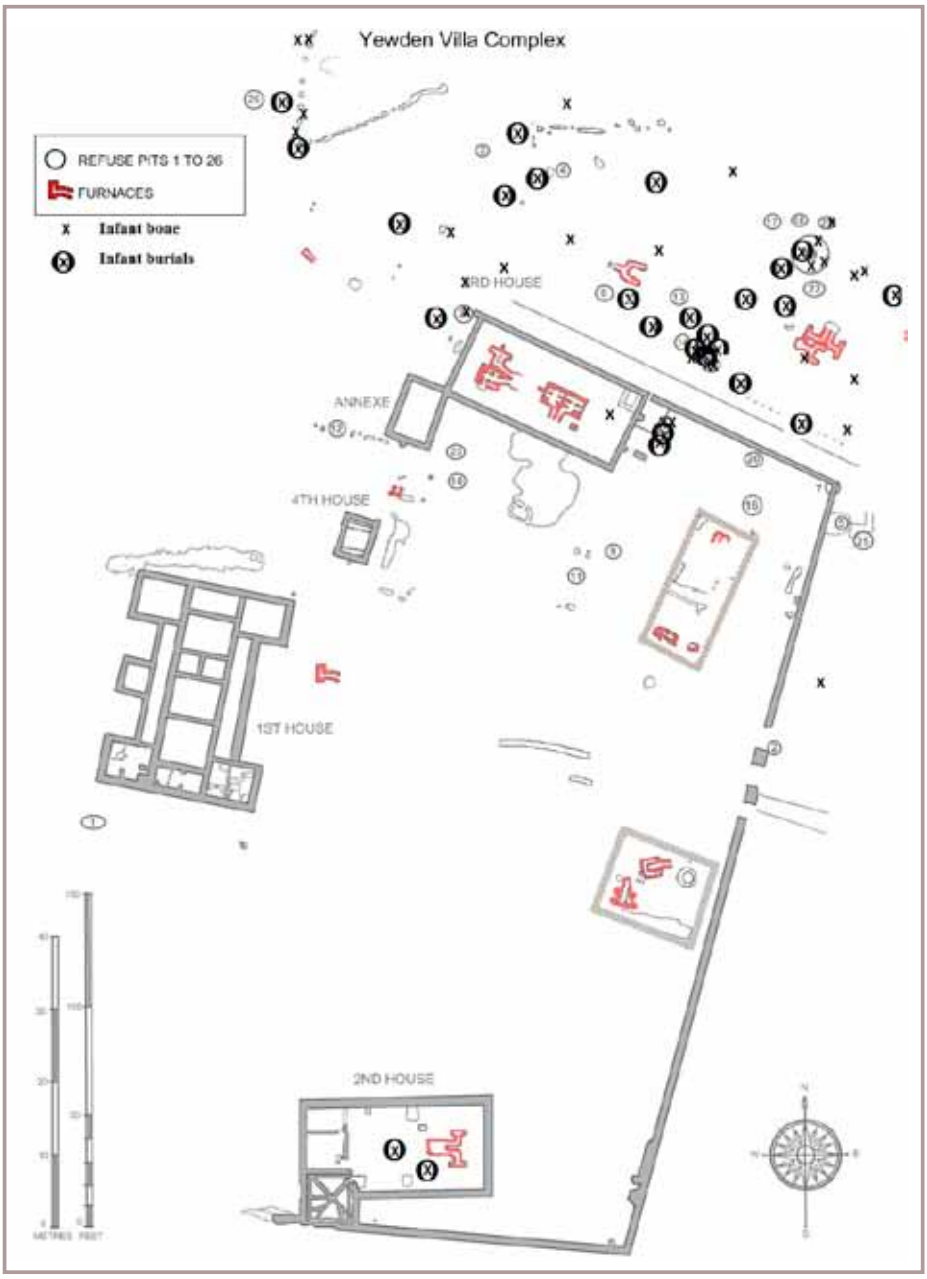
The age at death of a newborn baby can be estimated quite accurately by making measurements of its bones. Infanticide is normally carried out immediately after birth, so its regular practice results in an age-at-death profile with a strong spike at the age corresponding to a full-term baby. By contrast, natural deaths (still births and natural deaths soon after birth) result in a more dispersed age distribution. In the Yewden data there was a strong spike in the age distribution at 38–40 gestational weeks, about the age of a full-term child. While this supports the idea of infanticide, it does not mean that all the Yewden babies died in this way; rather it means that the act was carried out with sufficient regularity to have a marked impact on the age-at-death profile.

Comparison with a Roman site in the Middle East suggested one possible explanation for the infanticides at Yewden. At Ashkelon in Israel, a large number of infants were found casually disposed of in a sewer which ran beneath a Roman bathhouse. As at Yewden, their bone sizes indicated they were mostly full-term babies. As bathhouses often functioned as brothels in the Roman world, the archaeologists studying the Ashkelon site suggested that these babies were the unwanted offspring of the prostitutes who worked at the brothel.

Could a similar explanation apply at Yewden Roman Villa? The site's location, at first glance, made this seem a little unlikely. Those brothels known from the Roman world tended to be in cities, especially ports. However Yewden lay at an important crossing point of the River Thames, and perhaps could have generated sufficient passing custom to make such a business viable.

Location of Yewden Roman Villa, Hambleden, Buckinghamshire.

Excavations at Yewden Villa, 1912, showing a mosaic floor in one of the buildings.



Plan showing the locations of the burials. Crosses in circles are infant burials, while crosses on their own represent finds of small amounts of infant bone which may indicate the presence of further such bodies.

In Roman society, sons were often more valued than daughters, but when the Ashkelon babies were analysed for DNA, it became clear that most of them were male. This seemed consistent with the idea that the site functioned as a brothel: selected female offspring might have been raised as prostitutes, while the (mostly male) remainder were discarded. With this in mind, a DNA study was undertaken to try and determine the sex of the Yewden infants. The results showed a balanced sex ratio, providing no evidence for the selective rearing of babies of one sex over those of the other. The DNA results also showed that all the babies came from different mothers. To some extent this too argues against the brothel theory, which perhaps makes it more likely that there would be repeated unwanted pregnancies in individual women. There is thus little evidence to support the brothel theory. It seems much more likely that the Yewden burials are the result of the routine practice of infanticide to limit family size.

The examination of the infant bones also produced a rather unexpected finding: one skeleton, of a newborn baby girl, showed cut-marks in the form of a series of five parallel incisions on the back of its right femur, near the top. Microscopic study showed these marks had probably been produced by a single, non-serrated metal blade.

Courtesy of Alison Jewsbury

A reconstruction of the Yewden Villa complex from the south-east. Most of the infants were buried in the oblong field whose long edge lies immediately to the north of the buildings.

The location of the marks makes them unlikely to have been inflicted with the intent of killing the infant. Their purpose is unclear, but is possible that they were the result of an obstetric operation. Embyrotomy, the removal of a foetus by dismemberment when it becomes stuck in the birth canal, is an operation detailed in Roman medical texts. These describe the use of knives, hooks and crushing devices to dismember and remove the foetus. The cut-marks on the right thigh of the Yewden baby may have been the result of attempts to free a breech-birth foetus by amputating the leg at the hip. The baby may already have been dead or dying, and the surgeon may have been attempting to save the life of the mother. If this interpretation is correct, it would seem to indicate that the villa inhabitants were able to avail themselves of the best obstetric care on offer in Roman Britain.

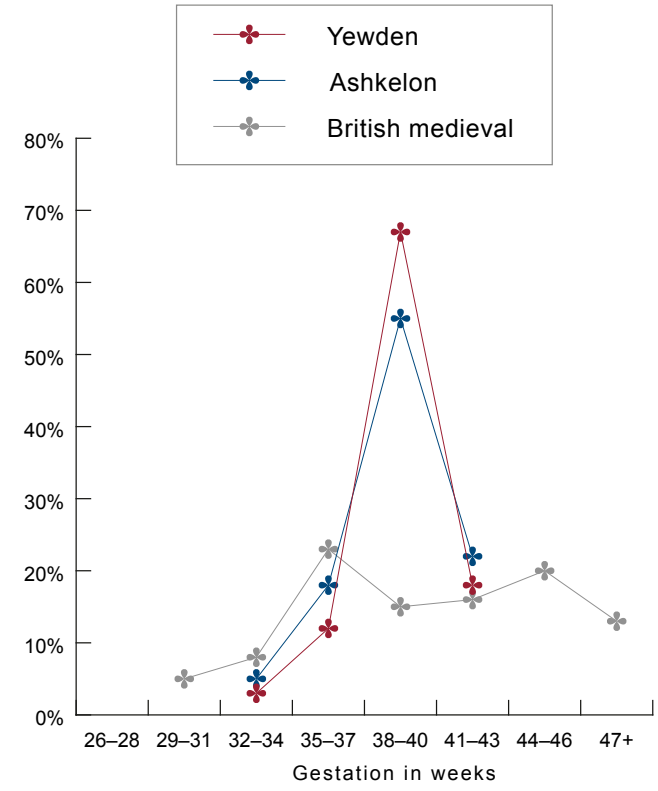
At the time the Yewden site was excavated, there was little that scientific analysis of the infants could contribute to the burning archaeological questions of the day, and so they received only cursory study. However, Alfred Cocks made sure that their remains were kept in the site archive for posterity. One hundred years later we are reaping the benefits of his foresight. The infanticide project is now complete, but the skeletons are being used to advance other areas of research, such as the study of how infant bones decay in the soil. No doubt future scientific developments will teach us more about the inhabitants of Yewden Roman Villa.

Stef Vincent, © English Heritage

Stef Vincent, © English Heritage

Two of the newborn infant skeletons from Yewden.

Sharon Soutar, © English Heritage



Three age-at-death profiles: newborn infants at a Mediaeval English churchyard, Yewden Roman villa and Ashkelon Roman bath-house. The Mediaeval churchyard infants show the dispersed distribution expected of natural deaths. By contrast, the patterns for Yewden and Ashkelon show a strong peak at 38–40 gestational weeks, about the age of a full-term baby.

Dr Simon Mays has held the post of Human Skeletal Biologist at English Heritage since 1988. He is also a visiting lecturer in the archaeology departments of the Universities of Southampton and Edinburgh. He obtained his PhD from the University of Southampton. Current projects with which he is involved include the production of policy documents on the ways in which large cemetery sites are dealt with in archaeological projects, and on developing new ways of estimating age-at-death in skeletal remains.

FURTHER READING

National Heritage List for England no. SM27160: Yewden Roman Villa, Hambleden, scheduled ancient monument

Cocks, A H 1921 'A Romano-British Homestead, in the Hambleden valley, Bucks.' *Archaeologia* **71**, 141–198

Eyers, J E (ed) 2011 *Romans in the Hambleden Valley: Yewden Roman Villa*. High Wycombe: Chiltern Archaeology

Hassan, N A-M Brown, K Eyers, J E Brown, T and Mays, S 2014 'Ancient DNA Study of the Remains of Putative Infanticide Victims from the Yewden Roman Villa site at Hambleden, England.' *Journal of Archaeological Science* **43**, 192–7

Mays, S and Eyers, J 2011 'Perinatal Infant Death at the Roman Villa site at Hambleden, Buckinghamshire, England.' *Journal of Archaeological Science* **38**, 1931–8

Mays, S Robson-Brown, K Vincent, S Eyers, JE, King, H and Roberts, A 2014 'An Infant Femur Bearing Cut-marks from Roman Hambleden, England.' *International Journal of Osteoarchaeology* **24**: 111–15

Stef Vincent, © English Heritage

The back of the right femur from one of the infant burials, showing knife-marks suggestive of Roman obstetric surgery.

The Stephenson legacy: assessing the heritage of the Midland Main Line

Electrification has prompted the listing of 30 of the world's most important early railway structures.

The railway bridges, viaducts and tunnel portals of the Midland Main Line are amongst the oldest and most impressive early railway structures in the world. With electrification imminent, English Heritage has undertaken a survey of the line, ensuring nationally significant structures are identified and listed.

The engineering work to be carried out by Network Rail in 2014–20 requires electric cables to be placed overhead or under the line, a process which can lead to the alteration, rebuilding or demolition of bridges, viaducts and tunnels. In a partnership project with Alan Baxter and Associates, new research into the railway has been undertaken and 900 structures were assessed. Thirty of the most significant examples have now been listed. What follows is an outline of the history and architecture of the Midland Main Line, followed by a brief summary of the designation project.

The Grade II* listed Derwent Viaduct, Derbyshire.

A lithograph by Samuel Russell showing the stone-lined cutting and sequence of bridges through Belper, Derbyshire.

A lithograph by Samuel Russell showing Milford Tunnel North Portal, Derbyshire, under construction.

Although the origins of railway technology lay in the Georgian period, its development was one of the great Victorian achievements. The world's first public railway to convey goods and passengers by steam traction was the Stockton and Darlington Railway, which opened in 1825. The Liverpool and Manchester Railway of 1830 was the first to operate as a twin-track line with timetabled and ticketed trains, the model which remains the norm down to the present. During the 1830s further such lines opened up across Britain: this was the pioneering phase of railway development. Among these were the North Midland Railway and the Midland Counties Railway, built in 1836–40, and today forming the oldest parts of the Midland Main Line. The line is thus one of the oldest in the world.

The low power provided by early steam locomotives meant a railway line had to be as level as possible. Bridges, viaducts and tunnel portals were thus essential elements in its construction. These structures carried the line across, over or through challenging landscape 'obstructions'. Carriages were often open-air and journeys slow, enabling a greater appreciation of the surrounding railway structures and landscapes than is now taken for granted. Bridges and tunnels were thus an important part of the first experiences of travelling by train and were deliberately designed to be impressive visual statements.

The North Midland Railway operated between Derby and Chesterfield and was pre-eminently the work of the father-and-son team George and Robert Stephenson. Along with Isambard Kingdom Brunel, the Stephensons are the most renowned engineers of the pioneering phase of railway development. George developed the groundbreaking *Rocket* locomotive, the design of which influenced every steam engine that followed. Robert was responsible for 2,000 miles of railway construction, more than any other engineer of his time. With the help of their assistant Frederick Swanwick, they designed the North Midland Railway north of Derby so that it had gradients

Derwent Bridge, Derby, built on the North Midland Railway in 1836–40.

© Alan Baxter and Associates

Beatties Bridge, set in the picturesque landscape of the Amber Valley, Derbyshire.

no greater than 1 in 250. Despite challenging terrain the Stephensons ensured the line was carefully moulded to the landscape. Alongside this went a strong sense of the railway's potential as a picturesque feature. The designs for bridges, viaducts and tunnels were carefully conceived to a common architectural vocabulary. All were finely detailed in local stone. Bridges, for example, have large voussoirs (sometimes continuing out from the arch until they fill its spandrels); bold ashlar roll mouldings; parapets formed of huge stone blocks; and impressive wing-walls terminating in semi-hexagonal piers. They must have considerably enhanced the experience of a journey along the line.

The Derwent Viaduct is among the most imposing structures on the North Midland Railway. This five-span viaduct is now listed at Grade II*. Significantly it was built at a skew, which made construction complex, each arch having to be set at an angle. As such it was at the forefront of railway engineering. Near the town of Belper, Derbyshire, the railway had to accommodate local interests. The Strutts, a powerful industrial family, opposed the proposed rail route because it would have been visible from their country residence, Bridge Hill House. An agreement was reached which compelled the line to be taken through the centre of the town in a costly but impressive stone-lined cutting. A sequence of eleven bridges were built to maintain the existing street-plan. All are now listed. Even tunnel entrances could be architectural statements of great power. The north portal of Milford Tunnel, for instance, is formed of a giant Romanesque arch consisting of seven rings of masonry, set into a naturalistic 'rock face' of rubble stones.

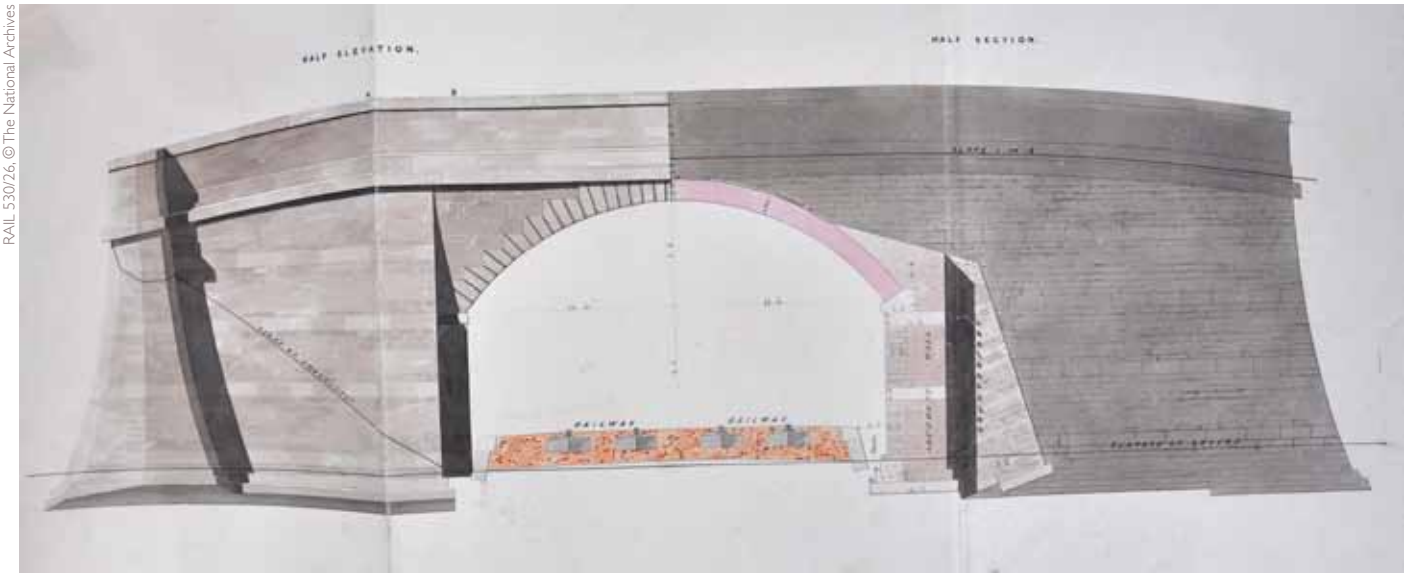
The Midland Counties Railway, which runs between Derby and Nottingham, is the other pioneering route that now forms part of the Midland Main Line. It was not a major branch line, originating instead in a proposal to supply Leicester with coal from Nottinghamshire. The terrain was less challenging than it had been on the North Midland Railway and most structures were modestly built, with red brick the main building material. However there are some exceptions, such as the newly-listed Sawley Road Bridge. This was a fine work of stone, designed to please the owners of the toll road that ran beneath it. The engineer of the route, Charles Blacker Vignoles, went on to utilise his experience on this line by designing railways in Germany, Spain and Brazil.

In 1844 the two pioneering Midland routes merged with the Birmingham and Derby Junction Railway to form the Midland Railway. A single branding was developed for the new line, which focused on providing a high-quality, frequent service: it was, for example the first company to introduce luxury Pullman cars on its trains. The line was extended to London in the 1860s where it terminated in the outstanding, and much celebrated, St Pancras Station. It thus formed a pivotal route linking London to the North, much as it remains today.

RAIL 530/29, © The National Archives

An original elevation drawing showing Clay Cross Tunnel North Portal, Derbyshire.

RAIL 530/26, © The National Archives



An original elevation drawing showing a typical North Midland Railway overbridge.

The Midland Main Line designation survey is being carried out in two phases; the first, in 2013, focused on structures on the line, whilst the second, in 2014, considers Midland Railway buildings that lie off the line. The survey follows another major national infrastructure designation project, which focused on the Great Western Railway. Both have been subject to public consultation, engaging with railway enthusiasts and interest groups. They have provided the line's owners, Network Rail, with the clarity needed before engineering works begin, and English Heritage, by turn, has been able to use the work of Network Rail's consultants to help deliver designation outcomes. As such they have helped streamline the modernisation of the railway, whilst ensuring its unique heritage is taken into account when changes are made and enabling the National Heritage List for England to be appropriately revised. In broader terms electrification will improve links between towns and cities and stimulate economic growth across the region. However the designation of bridges, viaducts and tunnel portals means that the Stephenson's remarkable legacy will continue to form part of the railway's future.

Sebastian Fry is a Designation Adviser based in London. He assesses the significance of buildings and archaeological sites for listing and scheduling. An archaeologist by training, Seb has carried out fieldwork on Iron Age hillforts, Roman villas and medieval manorial sites. He recently provided research for Simon Thurley's book Men from the Ministry: How Britain Saved its Heritage.

© Alan Baxter and Associates

Sawley Road Bridge, Nottinghamshire, originally built on the Midland Counties Railway in 1836–40.

FURTHER READING

Midland Main Line listed buildings mentioned in this article:

National Heritage List for England no. 1417625: Derwent Viaduct, Grade II* listed building

National Heritage List for England, entries for the Belper cutting: Bridge over Railway, Field Lane, no. 1087356; Bridge over Railway, George Street, no. 1100288; Bridge over Railway, Joseph Street, no. 1109236; Bridge over Railway, Long Row, no. 1109242; Bridge over Railway, William Street, no. 1109224; Derby Road Bridge, no. 1417689; Footbridge over Railway, to the west of Pingle Lane, no. 1109218; King Street Bridge, no. 1417621; Matlock Road Bridge, no. 1417623; New Road Bridge, no. 1417620; Walls of railway cutting, no. 1335676, Grade II listed buildings

National Heritage List for England, entries for Milford Tunnel: Stone Arch to Southern Entrance of Milford Railway Tunnel, no. 1349067; Northern Entrance Arch to Milford Railway Tunnel, no. 1366268, Grade II listed buildings

National Heritage List for England no. 1417676: Sawley Road Bridge, Grade II listed building

England's earliest surviving open-air school

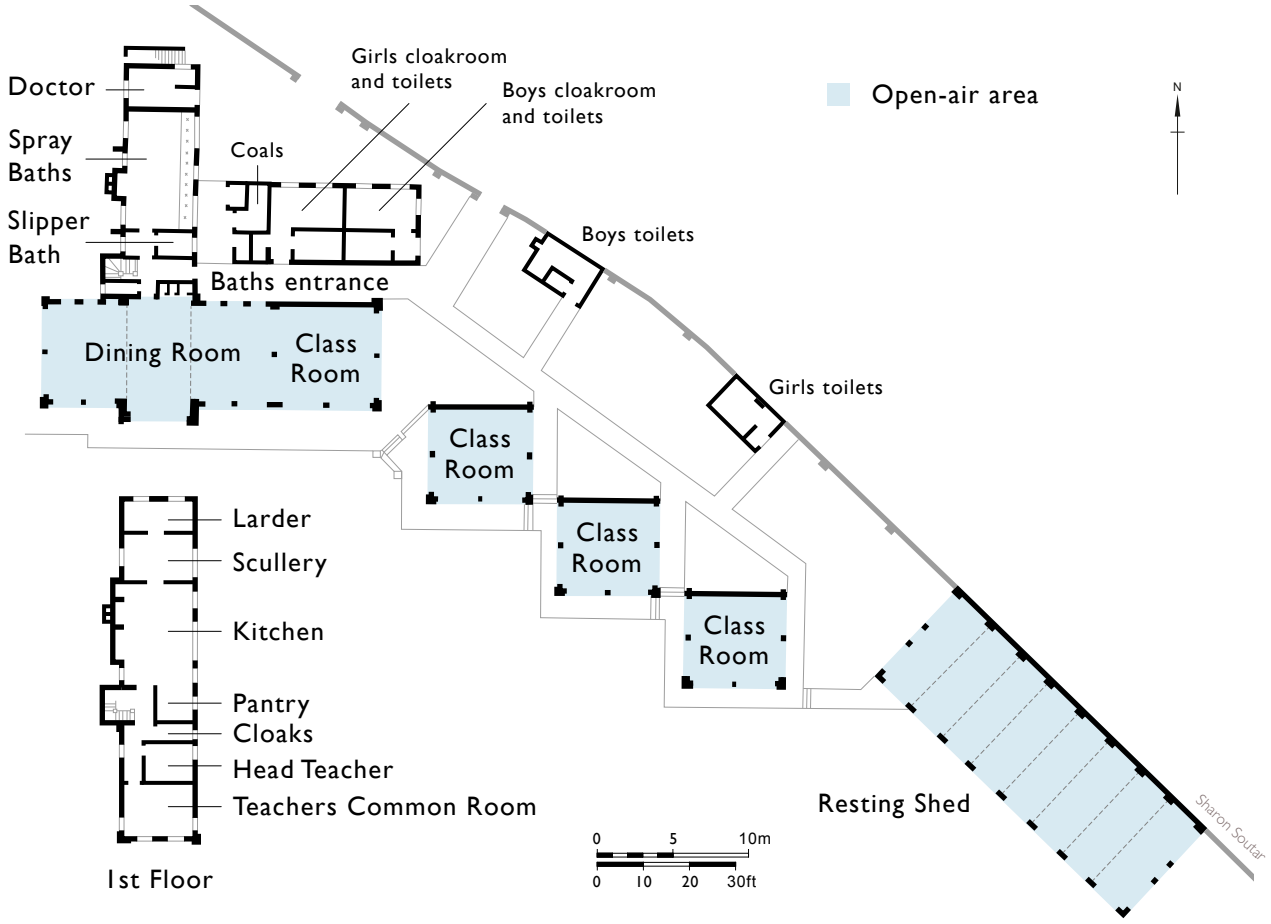
Uffculme School, Birmingham is the earliest surviving example of the buildings created by a once-influential education movement. It has now been listed.

Tuberculosis killed over 31,000 English children in 1907. Poor nutrition and housing, together with pollution, were found to be largely responsible for this dire situation, and the benefit of better ventilation, diet, and exercise in schools was increasingly recognised.

The Continental movement for outdoor schooling, which began in the late 19th century, and had apparently brought considerable benefit to debilitated children, was regarded with interest by English educationalists. The concept of the 'open air', associated as it was with health, freedom, and the moral value of life in the countryside, was one to which Edwardian reformers were receptive, whilst ideas about the benefits of an education centred on the well-being of the child were gaining ground.

In 1904 the first *Waldschule* (forest school) was founded at Charlottenburg, a suburb of Berlin, and it was in the summer of 1907 that the London County Council opened England's first open-air school, at Bostall Wood, Plumstead. The success of this experimental, temporary school led to three further such schools being set up – in London, Bradford and Halifax – in 1908. By 1914 there were examples in ten towns and cities outside London, with Birmingham a notable centre; by 1939 England had 127 open-air schools.

Like their Continental models, the buildings of the earliest English open-air schools were generally simple, modest structures. They were often established in the grounds of large houses, with existing buildings being



Plan of Uffculme School in its original form.

Uffculme School

Aerial photograph of the school.

Uffculme School

Classroom pavilion in use during the school's early days.

adapted for school use and groups of huts erected of timber or other materials. Partly due to necessity, this was in any case in keeping with the principles of the movement, reflecting the views of the progressive educationalist Margaret McMillan, who advocated cheap shelter-like structures for schools rather than complex and expensive buildings. Indeed, only four architect-designed open-air schools were built in Europe before the outbreak of World War I; of these, three were in England, and one in Barcelona. The only one of these to survive is Uffculme School in Birmingham, designed by the architect Barry Peacock in 1911.

Uffculme School was established thanks to the generosity of Barrow and Geraldine Cadbury of the Birmingham-based chocolate-manufacturing dynasty. The philanthropy of this Quaker family extended beyond provision for their own workforce at Bournville, and the couple took a particular interest in the education and welfare of children and young people. Their own son's ill-health had responded well to a programme of regulated exposure to the open air, and Mrs Cadbury wished to make similar treatment available to the many Birmingham children who were suffering from the effects of malnutrition and poverty. Uffculme House – its name taken from the Devon village from which the family originated – was built by Barrow's father Richard in 1891, and the couple inherited it in 1908. They never lived there, but used it for philanthropic purposes, donating the house to the City of Birmingham in 1916. The site, in a leafy suburb of the city, was ideal for an open-air school: the buildings were constructed above a south-facing slope, with the grounds of the house available for nature study and recreation, whilst trams running by the back gate delivered children to it from their inner-city homes.

Barry Peacock, of the local firm Cossins, Peacock and Bewlay, had previously worked for the Cadburys on a number of projects concerning children, and in 1922–5 would adapt Cropwood, the Cadbury's home in the Lickey Hills for conversion to an open-air residential school.

Uffculme School was designed in consultation with Birmingham's Chief School Medical Officer, Dr George Auden (father of the poet, W H Auden). It consisted of three square classroom pavilions, staggered to catch maximum sunlight, with folding glazed screens between brick piers; here formal lessons could be taken in the open air, the children being appropriately wrapped in cold weather. A dining-room block operated on the same principles, and there was a timber 'resting shed', also open, for the regular sleep which formed an important part of the school routine; besides academic study, pupils engaged in activities such as gardening and 'handwork' or craft. Auden insisted that improved health should be the primary object of the open-air school, with the educational aspect being of secondary importance, and regular and substantial meals, together with exercise, sleep, and ablutions, played an important part in the recognised success of such schools. In many cases it was found that a much longer attendance than the prescribed three to four months stay was required, and many children spent extended periods at Uffculme over a number of years.

Peacock's apparently simple design was in fact considerably more adventurous than that of any other open-air school of its period. During the second half of the 19th century hospital planning had made use of pavilions for the improvement in light and ventilation they offered, but Peacock's development of permanent pavilions for the open-air school in place of temporary shelters was an original and creative one, providing

Uffculme School

Children resting in the open air.

Steven Baker, © English Heritage

Classroom pavilions at Uffculme today.

durable and practical accommodation whilst allowing informality and an uninterrupted flow between internal and external spaces.

The school's innovative configuration provided a starting point for the later development of open-air school architecture: it is mainly the architect-designed buildings belonging to the second wave of open-air schools constructed between the wars that have survived. Eight have received protection through designation. Uffculme was illustrated in detail in the 1929 third edition of the important *Modern School Buildings*, by long-serving architect to the Board of Education Felix Clay, and its design continued to be followed, sometimes closely, as at the 1937 Joicey Road School in Gateshead, listed in 2008.

On the Continent, ideas about open-air school design were carried considerably further, but it is difficult to assess the extent to which Uffculme School was influential there. However, the Modernist open-air school at Suresnes outside Paris (Eugène Beaudoin and Marcel Lods, 1934–5), has sophisticated glazed pavilions with folding sides, set on a staggered alignment, recalling the much earlier Birmingham school. Undoubtedly, Uffculme's pioneering design had a part to play in the impact made by open-air ideas on 20th-century English school design more generally, with better ventilation and lighting, and a closer relationship between indoors and out, increasingly becoming the norm.

The decline of tuberculosis, thanks largely to improved living standards and the development of antibiotics, hugely ameliorated the conditions out of which the open-air schools had grown. Few examples were built after World War II, though many existing schools continued to function, making provision for children with special physical or educational needs.

In the 1960s, Uffculme School took a leading role in providing education for autistic children, and today it accommodates 125 pupils aged between 3 and 19, diagnosed as within the autistic spectrum, or with other communication and social skills disorders. Changing requirements have led to some significant modification to the fabric of the school over time, with the pavilions' folding doors having been replaced by fixed screens, and the group of three distinct blocks linked at the corners. However, the original plan can still be read, and the simplicity of the buildings, and the proximity of their interior spaces to the outdoors, has not been obscured. Now entering its second century in educational use, Uffculme School was listed in 2013, in recognition of its important role in a hugely influential educational movement. Uffculme School was identified as meriting consideration for listing as part of English Heritage's thematic study of inter-war schools, which will be the subject of an article in *Conservation Bulletin* 73.

Esther Godfrey MA has worked as a researcher and consultant for English Heritage, Historic Royal Palaces and the National Trust. She is now a Designation Adviser at English Heritage, advising on the legal protection of historic buildings, designed landscapes and archaeological sites in the South West.

FURTHER READING

National Heritage List for England no. 1411681: Uffculme School, Grade II listed building

Author Unknown 1912 'The Open Air School, Uffculme, Birmingham'. *Modern Building Record*, 64–5

Ballard, P (ed) 2009 *Birmingham's Victorian and Edwardian Architects*. Wetherby: Oblong/West Midlands Group of the Victorian Society, 221–52

Châtelet, A-M 2008 'A Breath of Fresh Air: Open-air schools in Europe', *in* Gutman, M and de Coninck-Smith, N (eds) *Designing Modern Childhoods: History, Space and the Material Culture of Children*. New Brunswick, New Jersey and London: Rutgers University Press, 107–27

Clay, F 1929 *Modern School Buildings*, 3 edn. London: Batsford, 127–40

Franklin, G 2009 *Inner-London Schools 1918–44*. Portsmouth: English Heritage Research Report Series, 3-2009, available at: http://services.english-heritage.org.uk/ResearchReportsPdfs/043_2009WEB.pdf

Harwood, E 2010 *England's Schools: History, Architecture and Adaptation*. Swindon: English Heritage, 57–60

Saint, A 2003 'Early Days of the English Open-Air School (1907–1930)', *in* Châtelet, A-M, Lerch, D and Luc, J-N (eds) *Open-Air Schools: An Educational and Architectural Venture in Twentieth-Century Europe*. Paris: Recherches

Wilmot, F and Saul, P 1998 *A Breath of Fresh Air: Birmingham's Open-Air Schools, 1911–1970*. Chichester: Phillimore

Unlocking the past: Her Majesty's Prison Northallerton

As historic prisons close, new research enhances our understanding of one of them.

BACKGROUND

Since 2010, 16 English prisons have been closed. HMP Northallerton in North Yorkshire was one of several of those affected that preserve, alongside later additions and alterations, important examples of Georgian prison architecture. Recent research has delivered significant new insights into the development of this prison.

Building on the national record created in 1995–2000 and published as *English Prisons* (Brodie, Croom and Davies 2002), this research was part of a wider project to support designation assessments of eight of the prisons undergoing closure. Documents were re-examined, fresh sources of information uncovered, and a new set of record photographs created as these prisons approached this milestone in their history.

HMP NORTHALLERTON

Early investigation soon revealed that the original design for the prison, opened in 1788, came from John Carr (1723-1807). Carr, a very significant architect of the late 18th century, also designed the Grade I-listed prison at York. Three buildings, once enclosing a quadrangle to the south of the courthouse (which was demolished in the 1980s), had been identified as part of the original prison, these being the Governor's House with a cell range to the east (the Female Wing) and a former staff tenement range to the west. Courtyard plans with quadrangles were much used in the 18th century for institutions such as prisons, hospitals and almshouses, being loosely derived from monastic cloisters. The history and attribution of the Northallerton courtyard has now been reinterpreted.

The Female Wing is of two storeys and features distinctive lunette windows with interlocking iron bars built into the stonework. Each floor consists of a broad corridor with cells on the eastern side, the corridor running alongside the western outer wall. Historically this cell range was used for women prisoners; it was for a time reserved for those with children: on an 1877 plan of the prison, three cells are marked for the use of a schoolmistress.

New documentary research identified Northallerton as one of the prisons visited by the prison reformer James Neild (1744–1814) in 1802; his description of it was published in the *Gentleman's Magazine* in 1805. This noted that the cell block was of two storeys, with male inmates housed on the ground floor and women on the floor above. Crucially, Neild describes each floor as having an axial corridor flanked by cells on either side. Site inspection clearly indicated that the Female Wing shows no evidence of ever having been arranged

The Governor's House: once attributed to John Carr (1780s), now credited to George Atkinson (1820s).

Female Cell Block, Northallerton, added 1848-52, and modelled on those at Pentonville, London.

James O. Davies, © English Heritage

Typical mid-19th century style cell block as first used at Pentonville.

James O. Davies, © English Heritage

Typical mid-19th century style cell.

in this way. However, the Chapel Wing to the south of the Governor's House has on its ground floor an axial corridor, flanked by former cells. Although the upper floor was rebuilt and heightened in 1848–52 to form a chapel, and the ground floor has also been significantly modified, this wing appears to be the cell block that was visited by Neild, and is thus now thought to be that built by Carr in 1788.

Documentary research also now indicates that Northallerton Prison gained a new cell block in 1818, giving us a probable date for the Female Wing. Interestingly, although the brickwork differs in both form and bonding pattern between the Female Wing and the early part of the Chapel Wing, the latter retains some original lunette windows identical in design to those of the Female Wing. This suggests that, although it was built 11 years after his death, the Female Wing may have been designed by Carr or is at least strongly influenced by him.

Neild's account also notes that the gaoler lived on the ground floor of the courthouse, suggesting that the Governor's House was also not in existence in 1802. Further documents indicate that a new gaoler's house was built in the 1820s, when a further two cell blocks were added to the prison. This house is now identified as being the Governor's House, while the 1820s cell blocks are amongst several buildings demolished in the 20th century. The few, utilitarian architectural details of the former staff tenement range could possibly date it to the 1780s, but this is also now thought more likely to be early 19th-century in date, indeed probably again a work of the 1820s. Thus although the Northallerton Prison quadrangle was initially regarded as representing Carr's 1788 prison, it has now been shown to be a product of the early 19th century.

This re-interpretation deepens our understanding of the development of HMP Northallerton. Although the Prison Quadrangle is no longer thought to represent Carr's 1788 prison, it is still a Georgian prison complex. Consequently the Northallerton Prison Quadrangle was recommended for listing at Grade II as Allan Brodie's previous research into prisons had shown that Georgian prison buildings were rare nationally. The Chapel Wing, although earlier in origin, was considered to be too seriously altered to qualify for designation.

The prison was again significantly enlarged in 1848–52 with the addition of two new three-storey cell blocks, a large (118-cell) block for men extending south of the Chapel Wing, and a smaller, 46-cell Female Block extending east from the south-east corner of the quadrangle. The design of the Female Cell Block contrasts with that of the 1818 Female Wing, in that cells are accessed from gallery walkways flanking an open central hall which extends the length of the building. This design, which allows easy supervision, was first used at Pentonville in 1840–2. It became the typical design for prison wings from the 1840s onwards.

James O. Davies, © English Heritage

Female Cell Block, Northallerton, 1848-52.

James O. Davies, © English Heritage

Lunette-windowed Female Wing (1818, perhaps designed by Carr in the 1780s).

Although a number of cell blocks of this form survive nationally, the example provided by the Female Cell Block at Northallerton is well preserved, and given its strong group value with the contrasting and immediately adjacent 1818 Female Wing, it was also recommended for listing at grade II.

THE FUTURE

Listings at the former HMP Northallerton were confirmed on 11 March 2014. Attention then turned to the implications for the Ministry of Justice's disposal of the site and the need to fully explore options for its adaptive re-use. Shortly after the listing decision, a meeting with the site's managers and local planning officers was held and English Heritage's 'constructive conservation' approach to managing change was explained. Constructive conservation is the art of the possible and this philosophy has fed directly into Hambleton District Council's draft Development and Design Framework for Central Northallerton, which has itself been evolving since 2013.

The heritage interest of the listed buildings and their special qualities are recognised in this document as something that can contribute positively to new developments in the wider area of the town. The removal of the 20th-century brick perimeter wall offers the opportunity to weave the listing buildings meaningfully into the urban fabric. 'Positive re-use of the Grade II listed buildings' has been included as a key driver in the framework and an additional options study is to be appended, making full use of the new-style list description, which identifies what is of special interest and what is not. The listing has usefully been brought up to date in a timely manner: a reminder that the designation record is in constant need of maintenance itself'.

Potential developers have thus been equipped with a robust understanding of the significance of these buildings. This in turn should inform and inspire proposals for change, so that a viable and characterful mixed-use scheme can be developed and the sustainable future of the listed buildings be ensured.

Kerry Babington joined English Heritage in 2008. Prior to that Kerry worked as a Conservation and Design Officer for Cambridge City Council after obtaining a degree in History and History of Art and a Masters from the University of Leeds. Following further studies in historic building conservation, her first role with English Heritage was the provision of development management advice in the East Midlands. Having also worked in the North West, she is now an Inspector of Historic Buildings and Areas in Yorkshire.

Eric Branse-Instone is a Designation Adviser. He has been carrying out designation assessments since the early 1990s, initially with the Cranstone Consultancy (an industrial archaeology specialist), and joined English Heritage in 1996. A prehistoric archaeologist by training, he is now (like most of his colleagues) a period and subject generalist, equally at home assessing a Georgian prison, a Bronze Age round barrow, or a Capability Brown-designed landscape. He advises on the legal protection of historic buildings, designed landscapes and archaeological sites, mainly in Yorkshire.

Allan Brodie MA FSA is a Senior Investigator in English Heritage's Assessment Team. He has written books on everything from prison architecture to the buildings of the English seaside.

FURTHER READING

National Heritage List for England no. 1418864: Female Cell Block, Former HMP Northallerton, Grade II listed building

National Heritage List for England no. 1418378: The Quadrangle, Former HMP Northallerton, Grade II listed building

Brodie, A, Croom, J and Davies, J O 2002 *English Prisons: An Architectural History.* Swindon: English Heritage

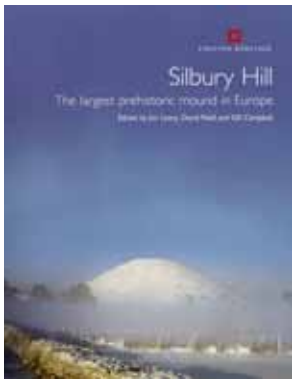
English Heritage Publishing

Varied, rigorously researched, authoritative and always generously illustrated the English Heritage publishing programme reflects the aims and ethos of the organisation. To find out more about all of our titles go to http://publishing.english-heritage.org.uk and view our 2014 catalogue.

SILBURY HILL: THE LARGEST PREHISTORIC MOUND IN EUROPE

Edited by Jim Leary, David Field and Gill Campbell

Silbury Hill has long been an enigma. Set within the chalk downlands of the Stonehenge and Avebury World Heritage Site, it is traditionally thought to have been the burial place of King Sil.



First investigated in 1776, then again in 1849, successive archaeological interventions culminated in Professor Richard Atkinson's televised campaign in the late 1960s. Following the dramatic collapse of the 1776 excavation shaft at the summit of the hill in 2000, detailed surveys revealed that voids associated with the earlier excavations existed deep within the mound.

This report discusses the resulting stratigraphical and palaeoenvironmental evidence as well as new radiocarbon dates and offers a re-interpretation of the construction of the Hill, setting it in its late Neolithic context. It also details the later history of the site and conservation measures undertaken.

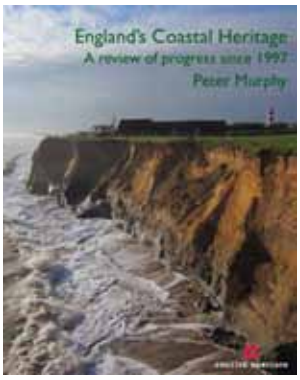
£100 : January 2014 : 978-1-84802-045-0 : hardback 384pp : 276x219mm : 210 illustrations including three fold-out maps

http://www.english-heritage.org.uk/publications/silbury-hill/

ENGLAND'S COASTAL HERITAGE: A REVIEW OF PROGRESS SINCE 1997

Peter Murphy

The English Heritage Rapid Coastal Zone Assessment Survey (RCZAS) programme has produced a wealth of new information, with over 45 survey reports now completed.



It is now timely to review what has been achieved and learnt from the RCZAS and other recent coastal historic environment studies. The book includes an introduction to the coastal historic environment, a consideration of long-term coastal change, an outline of survey, recording and characterisation methodology, a national review of the coastal historic environment and a separate discussion of regional significance, a set of research priorities for the future, and a final section considering how England's coastal heritage should be managed in the future. The fact that climate change will impact significantly, and mostly adversely, on the coastal historic environment gives a special urgency to this new publication.

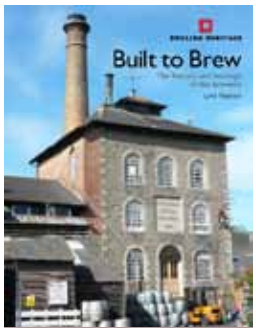
£50 : April 2014 : 978-1-84802-107-5 : hardback 184pp : 276x219mm : 149 illustrations

http://www.english-heritage.org.uk/publications/englands-coastal-heritage/

BUILT TO BREW: THE HISTORY AND HERITAGE OF THE BREWERY

Lynn Pearson

Beer has been brewed in England since Neolithic times, and this book combines a thoroughly enjoyable exploration of beer's history and built heritage with new in-depth research into the nuts and bolts of its production.



Detailed chapters explain what makes a brewery work, revealing the functions of sometimes enormous brewing vessels, the astonishing skills of coppersmiths and engineers, the work of heroic mill horses and the innovative steam engines which replaced them.

A brewery index allows readers to find which sites are extant and can still be visited. Traditional working breweries are to be treasured and celebrated, but complementing these, the book looks to the future, considering constructive redevelopment as part of our national brewing heritage.

£25 : June 2014 : 978-1-84802-238-6 : paperback 264pp : 240x189mm : 326 illustrations

http://www.english-heritage.org.uk/publications/built-to-brew/

EARLY STRUCTURAL STEEL IN LONDON BUILDINGS: A DISCREET REVOLUTION

Jonathan Clarke

In 1909, one of the world's great cities, London, finally sanctioned steel-frame architecture. For the previous quarter century, a new structural material – steel – had been discreetly changing the anatomy and physiology of the capital's new buildings, and shifting dynamics between architects, engineers, and contractors.

This richly illustrated book takes a refreshing new look at Victorian and Edwardian architecture, examining how mild steel – which superseded cast and wrought iron – was put to use in theatres, hotels, clubs, offices and many other building types.

The book is about much more than rivets and girders; it embraces architectural and construction history in one of its most exciting periods.

£50 : February 2014 : 978-1-84802-103-7 : hardback 320pp : 276x219mm : 357 illustrations

http://www.english-heritage.org.uk/publications/early-structural-steel-london-buildings/

ENGLAND'S MOTORING HERITAGE FROM THE AIR

John Minnis

When Aerofilms fliers first went up in the skies in 1919, they captured a country that, with the obvious exception of some large-scale structures such as aircraft hangers and munitions factories, had more or less been preserved in aspic in 1914. The streets of many towns have an orderly, almost pristine appearance to them, with the Victorian and Edwardian houses undisturbed by any out-of-place redevelopment.

This book shows just how radically that position changed over the ensuing half-century. We trace the outward expansion of places brought about by the availability of the car: the new suburbs and ribbon development. We see how new arterial roads came into being to meet the needs of motor transport and how the centre of cities started to be rebuilt to accommodate it. We witness the growth of sprawl around road junctions on the edge of built-up areas and the arrival of new types of building there to service both cars and people: the filling station, the roadhouse. We see how the car encouraged more people to go further afield for sport and pleasure: to the seaside, the races or to new forms of attractions such as the amusement park in the country.

£35 : February 2014 : 978-1-84802-087-0 : hardback 320pp : 219x276mm : 155 illustrations

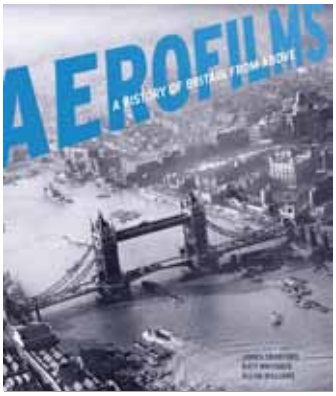
http://www.english-heritage.org.uk/publications/englands-motoring-heritage-from-air/

AEROFILMS: A HISTORY OF BRITAIN FROM ABOVE

James Crawford, Katy Whitaker and Allan Williams

Aerofilms Ltd was born on 9 May 1919. An unprecedented business venture, it hoped to marry the still fledgling technology of powered flight to the discipline of photography.

Aerofilms lived through and recorded one of the most tumultuous periods in British history. The book draws on thousands of images, including many that are rare or previously unseen, to present a vivid picture of the nation in the first half of the twentieth century. Following the company's enigmatic founders, daredevil pilots, skilled photographers and innovative advertisers, it explores how a potent sense of place and identity was manufactured and sold to the British people.



£25 : February 2014 : 978-1-84802-248-5: hardback 224pp : 300x245mm : 200 illustrations

http://www.english-heritage.org.uk/publications/aerofilms-history-britain-from-above/

New research publications from English Heritage staff **November 2013 - July 2014**

Adams, A 2014 various architectural illustrations of historic buildings *in* Rees, R and Robson, J *Drawing in Architecture*. Rotherfield: The Society of Architectural Illustration

Barton, S and Brodie, A 2014 *Travel and Tourism in Britain, 1700–1914*, 4 vols. London: Pickering & Chatto (Allan Brodie wrote and edited vols 2–4)

Bayliss, A Marshall, P D Meadows, J Bronk Ramsey, C Cook G and van der Plicht, H 2012 'Radiocarbon Dating', *in* Ripper, S and Beamish, M 'Bogs, Bodies and Burnt Mounds: Visits to the Soar Wetlands in the Neolithic and Bronze Age'. *Proceedings of the Prehistoric Society* **78**, 180–187

Bayliss, A 2013 Radiocarbon Dating of Hollow 2', *in* Jones, P *Upper Palaeolithic Sites in the Lower Courses of the Rivers Colne and Wey: Excavations at Church Lammas and Wey Manor Farm*. Woking: SpoilHeap, 69–70

Bayliss, A Bronk Ramsey, C Cook, G McCormac, G Otlet, R and Walker, J 2013 *Radiocarbon Dates: from Samples Funded by English Heritage Between 1988 and 1993*. Swindon: English Heritage

Bayliss, A and Grogan, E 2013 'Chronologies for Tara and Comparable Royal Sites of the Irish Iron Age', *in* O'Sullivan, M, Scarre, C and Doyle, M (eds) *Tara – from the Past to the Future: Towards a New Research Agenda*. Dublin: Wordwell, 105–44

Bayliss, A Hines, J Høilund Nielsen, K McCormac, F G and Scull, C 2013 *Anglo-Saxon Graves and Grave Goods of the Sixth and Seventh Centuries AD: a Chronological Framework* (Medieval Archaeology Monograph **33**). Leeds: Maney

Bayliss, A and O'Sullivan, M 2013 'Interpreting Chronologies for the Mound of the Hostages, Tara and its Contemporary Contexts in Neolithic and Bronze Age Ireland,' *in* O'Sullivan, M, Scarre, C and Doyle, M (eds) *Tara – from the Past to the Future: Towards a New Research Agenda*. Dublin: Wordwell, 26–104

Beacham, P and Pevsner, N 2014 *The Buildings of England: Cornwall*. New Haven and London: Yale University Press, for which Pete Herring wrote the sections on the prehistoric, Roman and early medieval periods and the prehistoric gazetteer entries

Brightman, J Bronk Ramsey, C Cook, G Marshall, P Meadows, J and Waddington, C 2012 'Radiocarbon Dates, 193–203', *in* Waddington, C 'Excavations at Fin Cop: an Iron Age Hillfort in Conflict'. *Archaeoogical Journal* **169**, 159–236

Brock, F Wood, R Higham, T F G Ditchfield, P Bayliss, A and Bronk Ramsey, C 2012 'Reliability of Nitrogen Content (%N) and Carbon:Nitrogen Atomic Ratios (C:N) as Indicators of Collagen Preservation Suitable for Radiocarbon Dating'. *Radiocarbon* **54**, 879–86

Brunning, R with Bronk Ramsey, C Cameron, N Cook, G Davies, P Gales, R Hamilton, D W Hogan, D Jones, J Jones, M Kenward, H Kreiser, A Locatelli, C Marshall, P Straker, V Tinsley, H Tyers, C and Tyers, I 2013 *Somerset's Peatland Archaeology: Managing and Investigating a Fragile Resource*. Oxford: Oxbow

Bryan, P Dodson, A and Abbott, M 2014 'Using Geospatial Imaging Techniques to Reveal and Share the Secrets of Stonehenge'. *International Journal of Heritage in the Digital Era* **3** (1), 69–82

Carey C, Wickstead H, Juleff G, Anderson, J and Barber, M 2014 'Geochemical Survey and Metalworking: Analysis of Chemical Residues Derived from Experimental Non-ferrous Metallurgical Processes in a Reconstructed Roundhouse'. *Journal of Archaeological Science* **49** (September 2014), 383–397

Campbell, G 2014 'Charred plant remains', *in* Bennett, B Parfitt, K and Rady J *Prehistoric and Anglo-Saxon Discoveries on The East Kent Chalklands: Investigations along the Whitfield–Eastry Bypass 1991–1996* (Canterbury Archaeological Trust Occasional Paper **9**). Canterbury: Canterbury Archaeological Trust, 1724

Campbell, G with Davies, P Edmunds, M Hall, A Marshall, P Robinson, M and Worley, F 2013 'Silbury Hill: Understanding the Environment', *in* Leary, J, Field, D and Campbell, G (eds) *Silbury Hill: the Largest Prehistoric Mound in Europe*. Swindon: English Heritage, 157–202

Cook, G T Higham, T F G Naysmith, P Brock, F Freeman, S P H T and Bayliss, A 2012 'Assessment of Infinite-age Bones from the Upper Thames Valley, UK, as C^{14} Background Standards'. *Radiocarbon* **54**, 845–54

Chapman, H, Gearey, B Whitehouse, N Marshall, P Taylor, M Bamforth, M and Powlesland, I 2013 'Archaeological Investigations of a late Neolithic site on Hatfield Moors', *in* Chapman, H and Gearey, B (eds) *Modelling Archaeology and Environments in a Wetland*

Landscape: the Hidden Landscape Archaeology of Hatfield and Thorne Moors. Oxford: Oxbow, 119–30

Chapman, H Gearey, B and Marshall, P 2013 'Conclusions: Themes in the Archaeo-environmental study of Peatlands', *in* Chapman, H and Gearey, B (eds) *Modelling Archaeology and Environments in a Wetland Landscape: the Hidden Landscape Archaeology of Hatfield and Thorne Moors*. Oxford: Oxbow, 153–66

Emery, K and Baker, P 2014 'Vertebrate Animal Remains from Classic Period Pacbitun', *in* Healy, P F and Emery, K (eds) *Zooarchaeology of the Ancient Maya Centre of Pacbitun (Belize)* (Trent University Occasional Papers in Anthropology **16**). Peterborough: Trent University Press, 34–55

Farrelly, J O'Brien, C Paynter, S and Willmott, H 2014 'Excavation of an Early 17th-century Glassmaking Site at Glasshouse, Shinrone, Co. Offaly, Ireland'. *Post-Medieval Archaeology* **48** (1), 45–8

Field, D Leary, J and Marshal P 2013 'Neolithic Silbury in Context', *in* Leary, J, Field, D and Campbell, G (eds) *Silbury Hill: the Largest Prehistoric Mound in Europe*. Swindon: English Heritage, 223–54

Fyfe, R M Bray, L Juleff, G Woodbridge, J and Marshall, P 2013 'The Environmental Impact of Romano-British Ironworking on Exmoor', *in* Humphries, J and Rehren, T (eds) *The World of Iron*. London: Archetype Publications, 462–72

Greenwood, D Batt, C Meadows, J and Roberts, I 2013 'Dating the Kiln', *in* Roberts, I 'A Stamford Ware Pottery Kiln in Pontefract: a Geographical Enigma and a Dating Dilemma'. *Medieval Archaeol*ogy **57**, 120–1

Johnston, B Marshall, P D and Waddington, C 2013 *Archaeological Excavations at Curzon Lodge, Longcliffe, Derbyshire* (Archaeology Research Papers **8**). Bakewell: Archaeological Research Services Ltd

Kenney, J with Bermingham, N Cook, G Cool, J Evans, J R Marshall, P McKenna, R Mills, P Rátkai, S and Smith G 2012 'Excavation of a Romano-British Roundhouse at Rhiwgoch, Harlech'. *Archaeologia Cambrensis* **161**, 203–31

Leary, J Canti, M Field, D Fowler, P Marshall, P and Campbell, G 2013 'The Marlborough Mound, Wiltshire: a Further Neolithic Monumental Mound by the River Kennet'. *Proceedings of the Prehistoric Society* **79**, 105–36

Leary, J with Bishoph, B Campbell, G Canti, M Cleal, R Cromwell, T Davies, P Field, D Ixler, Marshall, P Pollard, Robinson, M and Worley, F 2013 'The Evolution of Silbury Hill: the Prehistoric Phases', *in* Leary, J, Field, D and Campbell, G (eds) *Silbury Hill: the Largest Prehistoric Mound in Europe*. Swindon: English Heritage, 31–62

Marshall, P 2013 'Appendix 1: Radiocarbon Dating Protocol and Bayesian Chronological Modelling Methodology', *in* Chapman, H and Gearey, B (eds) *Modelling Archaeology and Environments in a Wetland Landscape: the Hidden Landscape Archaeology of Hatfield and Thorne Moors*. Oxford: Oxbow, 167–84

Marshall, P 2013 'Radiocarbon Dates', *in* Stevenson, J *Living by the Sword: the Archaeology of Brisley Farm, Ashford, Kent* (SpoilHeap Monograph **6**). Woking: SpoilHeap, 374–5

Marshall, P Bayliss, A McCormac F G and Bronk Ramsey, C 2012 'Radiocarbon Dating', *in* Cowie, R, Blackmore, L, Davis, A, Keily, J and Rielly, K *Lundenwic: Excavations in Middle Saxon London, 1987–2000* (MoLAS Monograph **63**). London: Museum of London Archaeology Service, 307–312

Marshall, P D Cook, G and Prior, C 2013 'Appendix 1: Bayesian Analysis', *in* O'Connell, A *Harvesting the Stars: a Pagan Temple at Lismullin, Co. Meath* (National Roads Authotity Scheme Monograph **11**). Dublin: Wordwell, 141–5

Marshall, P D Prior, C and Waddington, C 2012 'Radiocarbon Dating', *in* Brightman, J and Waddington, C 'Archaeological Excavations at Mercia Marina, Willington'. *Derbyshire Archaeological Journal* **132**, 29–34

Marshall, P D Allen, T Bronk Ramsey, C and Ambers, J 2013 'Radiocarbon Dates from the Area 6 and 10 Middens', *in* Allen, T Barclay, A Cromarty, A M Anderson-Whymark, H Parker, A, Robinson, M and Jones, G *Opening the Wood, Making the Land: the Archaeology of a Middle Thames Landscape Mesolithic, Neolithic and Early Bronze Age. The Eton Rowing Course at Dorney and the Maidenhead, Eton and Windsor Flood Alleviation Scheme* (Oxford Archaeology Thames Valley Landscape Monograph **38**). Oxford: Oxford Archaeology Unit, 236–43

Marshall, P D Bayliss, A Bronk Ramsey, C Cook, G Toms, P and Bailey, R 2013 'Scientific Dating' *in* Jones, P *A Mesolithic 'Persistent Place' at North Park Farm, Bletchingley, Surrey* (SpoilHeap Monograph **8**). Woking: SpoilHeap**,** 100–5

New research publications from English Heritage staff (continued)

Marshall, P Bayliss, A Leary, J Campbell, G Worley, F Bronk Ramsey, C and Cook, G 2013 'The Silbury Chronology', *in* Leary, J, Field, D and Campbell, G (eds) *Silbury Hill: the Largest Prehistoric Mound in Europe*. Swindon: English Heritage, 97–116

Marshall, P and Whitehouse, N 2013 'Modelling, Dating and Contextualising Palaeoenvironmental Records', *in* Chapman, H and Gearey, B (eds) *Modelling Archaeology and Environments in a Wetland Landscape: the Hidden Landscape Archaeology of Hatfield and Thorne Moors*. Oxford: Oxbow, 77–98

Mays S 2014 'The Palaeopathology of Scurvy in European Populations'. *International Journal of Palaeopathology* **5**, 55–6

Mays S 2014 'The Bioarchaeology of Infant and Child Homicide' *in* Thompson, J L, Alfonso-Durruty, M P and Crandall, J J (eds) *Tracing Childhood: Bioarchaeological Investigation of Early Lives in Antiquity*. Gainesville: University Press of Florida, 99–122

Meadow, J Bronk Ramsey, C Cook, G Timberlake, S and Marshall, P 2013 'Radiocarbon dating', *in* Timberlake, S 'Prehistoric Copper Extraction in Britain: Ecton Hill, Staffordshire'. *Proc Preh Soc* (doi:10.1017/ppr.2013.17), 29–32

Middleton, A 2014 provided a contribution to the Heritage Highlight campaign: http://www.english-heritage.org.uk/caring/listing/showcase/heritage-highlights/wood-survive-underground-for-thousands-of-years (accessed July 2014)

Paynter, S Jennings, S and Price, J 2014 'Glassworking at Whitby Abbey and Kirkdale Minster in North Yorkshire', *in* Keller, D, Price, J and Jackson, C (eds) *Neighbours and Successors of Rome*. Oxford: Oxbow Books, XX
Parker Pearson, M Cox Willis, C Marshall, P Mulville, J Smith, H Cowie, T Craig, O Deluis, I Juddery, M Manley, H Schwenninger, J-L and Taylor, G 2013 'After the "Frankenstein Mummies": Cladh Hallan in the Bronze and Iron Ages'. *PAST* **73**, 11–13

Parker Pearson, M Marshall, P Pollard, J Richards C Thomas, J and Welham, K 2013 'Stonehenge', *in* Harding, A and Fookens, H (eds) *The Oxford Handbook of the European Bronze Age*. Oxford: Oxford University Press, 159–178

Reimer, P J Bard, E Bayliss, A Beck, J W Blackwell, P Bronk Ramsey, C Buck, C E Cheng, H Edwards, R L Friedrich, M Grootes, P M Guilderson, T P Haflidason, H Hajdas, I Hatté, C Heaton, T J Hoffmann, D L Hogg, A G Hughen, K A Kaiser, K F Kromer, B Manning, S W Niu, M Reimer, R W Richards, D A Scott, E M Southon, J R Staff, R A Turney, C S M and van der Plicht, J 2013 'IntCal13 and Marine13 Radiocarbon age Calibration Curves 0–50,000 years cal BP', *Radiocarbon* **55**, 1869–87

Reimer, P J Bard, E Bayliss, A Beck, J W Blackwell, P Bronk Ramsey, C Brown, D M Buck, C E Edwards, R L Friedrich, M Grootes, P M Guilderson, T P Haflidason, H Hajdas, I Hatté, C Heaton, T J Hogg, A G Hughen, K A Kaiser, K F Kromer, B Manning, S W Reimer, R W Richards, D A Scott, E M Southon, J R Turney, C S M and van der Plicht, J 2013 'Selection and Treatment of Data for Radiocarbon Calibration: an Update to the International Calibration (IntCal) Criteria,' *Radiocarbon* **55**, 1923–45

Timberlake, S and Marshall, P 2013 'Understanding the Chronology of British Bronze Age Mines – Bayesian Modelling and Theories of Exploitation', *in* P Anreiter, P, Brandstätter, K, Goldenberg, G, Hanke, K, Leitner, W, Nicolussi, K, Oeggl, K, Pernicka, E, Schaffer, V, Stöllner, T, Tomedi, G and Tropper P (eds) *Mining in European History and its Impact on Environment and Human Societies* (Proceedings for the 2nd Mining in European History Conference of the FZ HiMAT, 7–10 November 2012). Innsbruck: Innsbruck University Press, 59–66

Wilmott, T 2014, Portico entry on Harrow's Scar Milecastle and Hadrian's Wall http://www.english-heritage.org.uk/daysout/properties/harrows-scar-milecastle-and-wall-hadrians-wall/history-and-research/ (accessed July 2014)

Wilmott, T 2014, Portico entry on Birdoswald Roman Fort http://www.english-heritage.org.uk/daysout/properties/birdoswald-roman-fort-hadrians-wall/history-and-research/ (accessed July 2014)

Winton H 2014 'The use of Aerial Photographs for Conservation and Research', *in* M Harney (ed) *Gardens and Landscapes in Historic Building Conservation.* Oxford: Wiley Blackwell, 163–171

Wysocki, M Griffiths, Hedges, R Bayliss, A Higham, T Fernandez-Jalvo, Y and Whittle, A 2013 'Dates, Diet, and Dismemberment: Evidence from the Coldrum Megalithic monument, Kent'. *Proceedings of the Prehistoric Society* **79**, 1–30

Research Report Series January 2014 - July 2014

2011 SERIES

3. Dungworth, D *Kenwood House, Kenwood House, Uxbridge, London: an Investigation of the Music Room Window Glass*

11. Cocroft , W D, Newsome, S, Williams, A and Pullen, R *Curtis's and Harvey Ltd Explosives Factory, Cliffe and Cliffe Woods, Medway: Archaeological Survey and Analysis of the Factory Remains*

17. Worley, F *Silbury Hill, Wiltshire: the Antler Assemblage Excavated from Silbury Hill in 2007-8*

102. Moorhead, S *Silbury Hill, Wiltshire: Roman Coins from the Silbury Region*

2012 SERIES

23. Cromwell, T *Kenilworth Castle, Warwickshire: Survey of Possible Elizabethan Stairs in Southwest Corner Tower of the Keep*

2013 SERIES

12. Castagnino, V *Surrey and Sussex: Chemical Analysis of Production Waste from Wealden Glasshouses*

20. Timby, J *Silbury Hill, Wiltshire and Fields South of Silbury Hill: the Romano-British and Later Saxon Pottery from Excavations at Silbury Hill (1969) and the Romano-British Roadside Settlement (2010)*

31. Pelling, R *Fields South of Silbury Hill: the Charred Plant Remains from Excavations at the Romano-British Roadside Settlement (2010)*

36. Middleton, A, Graham, K and Goodburn-Brown, D *Barking Abbey, London Borough of Barking and Dagenham: the Recording and Conservation of Middle Saxon Waterlogged Woodwork*

48. Howard, R E and Arnold, A J *Auckland Castle, Bishop Auckland, County Durham: Tree-ring Analysis of Timbers*

49. Linford , N T *Stonehenge, Wiltshire: Report on Magnetic Susceptibility Survey, January 2013*

52 Newsome, S, Pullen, R *St Mary's Marshes, Hoo St Mary, Medway, Kent: an Assessment of the Late 19th-Century Explosives Magazines*

53 Howard, R E and Arnold, A J *Kirkleatham Hall Stable Block, Kirkleatham Lane, Redcar, North Yorkshire: Tree-ring Analysis of Timbers*

54. Bridge , M C *The Roof of the Bailiff's Cottage, St Osyth's Priory, Burn Road, St Osyth, Essex: Tree-ring Analysis of Timbers*

56. Linford, N Linford, P Payne, A and Hardwick, I *Lakes and Dales NAIS, Kitridding Hill, Lupton, Cumbria: Report on Geophysical Survey, July 2013*

58. Linford, P K, Payne, A W, Linford, N T *Lakes and Dales NAIS, Howerigg Settlement, Barbon, Cumbria: Report on Geophysical Survey, August 2013*

60. Howard, R E and Arnold, A J *Nappa Hall, Askrigg, North Yorkshire: Tree-ring Analysis of Timbers*

2014 SERIES

1. Smith, J *Isle of Grain, Hoo Peninsula, Kent: Outline Historic Area Assessment*

3. Edwards, Z *Warbstow Bury, Warbstow, Cornwall: Archaeological Survey Report*

5. Payne, A W and Hardwick, I *Horton Enclosure, Bishops Cannings, Wiltshire: Report on Geophysical Survey, October 2013*

8. Small, F *All Hallows, Kent: A Second World War Oil QF Bombing Decoy*

10. Hardwick , I *NAIS Upland Pilot, Burton-in-Kendal and Dalton, Cumbria and Lancashire: an Archaeological Landscape Investigation*

13. Bridge, M C *Manor Farm Barn, Winterborne Clenston, Dorset: Tree-ring Analysis of Oak Timbers*

14. Howard, R E and Arnold, A J *Wood Barn, Fairfield House, Stogursey, Somerset: Tree-ring Analysis of Timbers*

15. Hendricks, S *The Gunboat Yard, Haslar, Gosport: Historic Buildings Assessment*

16. Carpenter, E *The London Stones: Marking the City of London's Jurisdiction over the Thames and Medway*

17. Carpenter, E *Halstow Marshes Decoy Pond*

18. Howard, R E and Arnold, A J *Dronfield Hall Barn, 19 High Street, Dronfield, Derbyshire: Tree-ring Analysis of Timbers*

20. Middleton, A *Conservation of a Mammoth Tooth Reported Under The Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest*

21. Edwards, Z *Two Wealden Glass Furnaces, Surrey and West Sussex: Report on Geophysical Surveys, March 2014*

22. Howard, R E and Arnold, A J *Dandra Garth, Garsdale, Cumbria: Tree-ring Analysis of Timbers*

23. Howard, R E and Arnold, A J *Groby Old Hall, Markfield Road, Groby, Leicestershire: Tree-ring Analysis of Timbers* Heritage by the Landscape Group, University of East Anglia'

24. Howard, R E and Arnold, A J *Sockburn Hall, Sockburn, Darlington: Tree-ring Analysis of Timbers*

25. Howard, R E and Arnold, A J *Langley Abbey, Langley with Hardley, Norfolk: Tree-ring Analysis of Timbers*

28. Linford, N T *Bruton Abbey, King's School, Bruton, Somerset: Report on Geophysical Survey, October 2014*

KEEPING UP TO DATE
Expert, in-depth articles available

CONSERVATION BULLETIN

Conservation Bulletin 72, the theme of which is housing, is now available online at http://www.english-heritage.org.uk/publications/conservation-bulletin-72/. Housing has remained near the top of the public policy agenda, and the increasing need to ensure the existing residential building stock is energy efficient, alongside the reorganisation of national planning policy and the general under-supply of new housing units, are just some of the issues arising that have profound implications for the historic environment. This edition also explores the contribution that traditional housing, historic building conversions and sensitively designed new homes can make to the built environment of the future.

HERITAGE CALLING

The *Heritage Calling* blog provides short articles from our specialist teams who champion historic places and advise Government and others. In the latest posting, Caroline Starkey from the University of Leeds looks at Buddhism in Britain and reports on a project sponsored by English Heritage that is researching 16 Buddhist buildings in England.

Read and subscribe to the Heritage Calling blog

HELM

English Heritage's *Historic Environment Local Management Newsletter* provides a quarterly update by email on initiatives to improve the management of England's historic environment. Subscription is free to all: details are on our website at http://www.helm.org.uk/about-us/newsletter-sign-up. Each issue includes news of developments in national policy and heritage protection, details of new advice and sources of information and guidance, examples of local initiatives that can act as models for work elsewhere, details of training courses, and a featured case study of good practice. Previous issues are available online at http://www.helm.org.uk/about-us/newsletter-archive/.

Research News appears twice per year.
Published August 2014 © English Heritage 2014.
Edited by Jon Cannon. Designed by Vincent Griffin.

Cover picture: Stanley Dock, Liverpool. Photograph by Alun Bull, © English Heritage

To subscribe to Research News Online:
Subscribe online at www.english-heritage.org.uk/rnsubscribe
Comment should be sent to Paul Backhouse at: ResearchNews@english-heritage.org.uk

Product Code: 51931

ISSN 2055-2718

ENGLISH HERITAGE