A NEWSLETTER OF HISTORIC ENVIRONMENT RESEARCH

RESEARCH NEWS

The MAN gasholder of 1930-2 at Battersea – see story page 14

Inside this issue...

ENGLISH HERITAGE

NUMBER 17/18
SPRING 2012
ISSN 1750-2446

This special double edition of *Research News* is devoted to recent English Heritage applied research into our industrial heritage. It complements last year's Industrial Heritage at Risk (IHAR) initiative, the main outputs of which are highlighted by Shane Gould on pages 38-40 of this issue.

Much of the recent and ongoing work reported here is being taken forward within the framework of the four-year National Heritage Protection Plan (NHPP) launched in May 2011. As both Keith Falconer and Shane Gould make clear, industrial heritage figures prominently in the Plan. For more information on the NHPP visit http://www.english-heritage.org.uk/professional/protection/national-heritage-protection-plan.

England's industrial heritage has been a focus of sustained activity for more than 50 years and very often it has been central to the wider conservation debate. Yet, industrial buildings are three times more likely to be at risk than the national average and the threats remain, particularly to highly distinctive structures like the MAN gasholder at Battersea (pages 15-16) which by their very nature can be difficult to re-use. However, most redundant industrial structures are eminently suited to sensitive conversion as is evident from the many successful examples across the country.

Much remains to be done to improve understanding of industrial buildings, sites and landscapes to ensure they are appropriately protected and managed. Even well-known iconic buildings like Ditherington Flax Mill (see pages 3-9), the first-framed building in the world, are, upon further investigation, offering up important new insights into the Industrial Revolution. The ever broadening definition of what is legitimately encompassed by industrial archaeology is focussing attention on hitherto largely neglected facets of the industrial heritage; the mid-nineteenth century steamship building industry (see Stuart Churchley's fascinating account of the *Iona II*) is a case in point. Multi- and inter-disciplinary studies, such as those being undertaken in Luton and on Hoo Peninsula in Kent, are greatly improving our understanding of industrial landscapes and providing a wider context for assessing and protecting individual heritage assets. Archaeological science, too, is playing its part in elucidating industrial processes and production, as the piece on Alexander Raby's ironworks at Downside Mill in Surrey makes clear.

Just as important as obtaining an improved understanding of our industrial past is increasing access to the vast amount of information on such sites gathered over the last fifty years and more, and the resources of the National Record of the Historic Environment are an important source in this regard. Also, as Edmund Lee explains, more training opportunities and guidelines are needed to ensure skills and knowledge in industrial heritage are shared and developed across the sector.

John Cattell
Head, Investigation & Analysis Division
Heritage Protection Department

If you would like this document in a different format, please contact our Customer Services department:
Tel: 0870 333 1181
Fax: 01793 414926
Textphone: 01793 414878
Email: customers@english-heritage.org.uk

Research News appears twice per year.
Published March 2012
Edited by Tony Wilmott. Designed by Vincent Griffin.
Printed by TBA
Product code 51763

Comment should be sent to Tony Wilmott at: English Heritage, Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth, PO4 9LD.
Telephone: 023 9285 6700. Fax: 023 9285 6701.
Email: fort.cumberland@english-heritage.org.uk

Industrial antiquaries

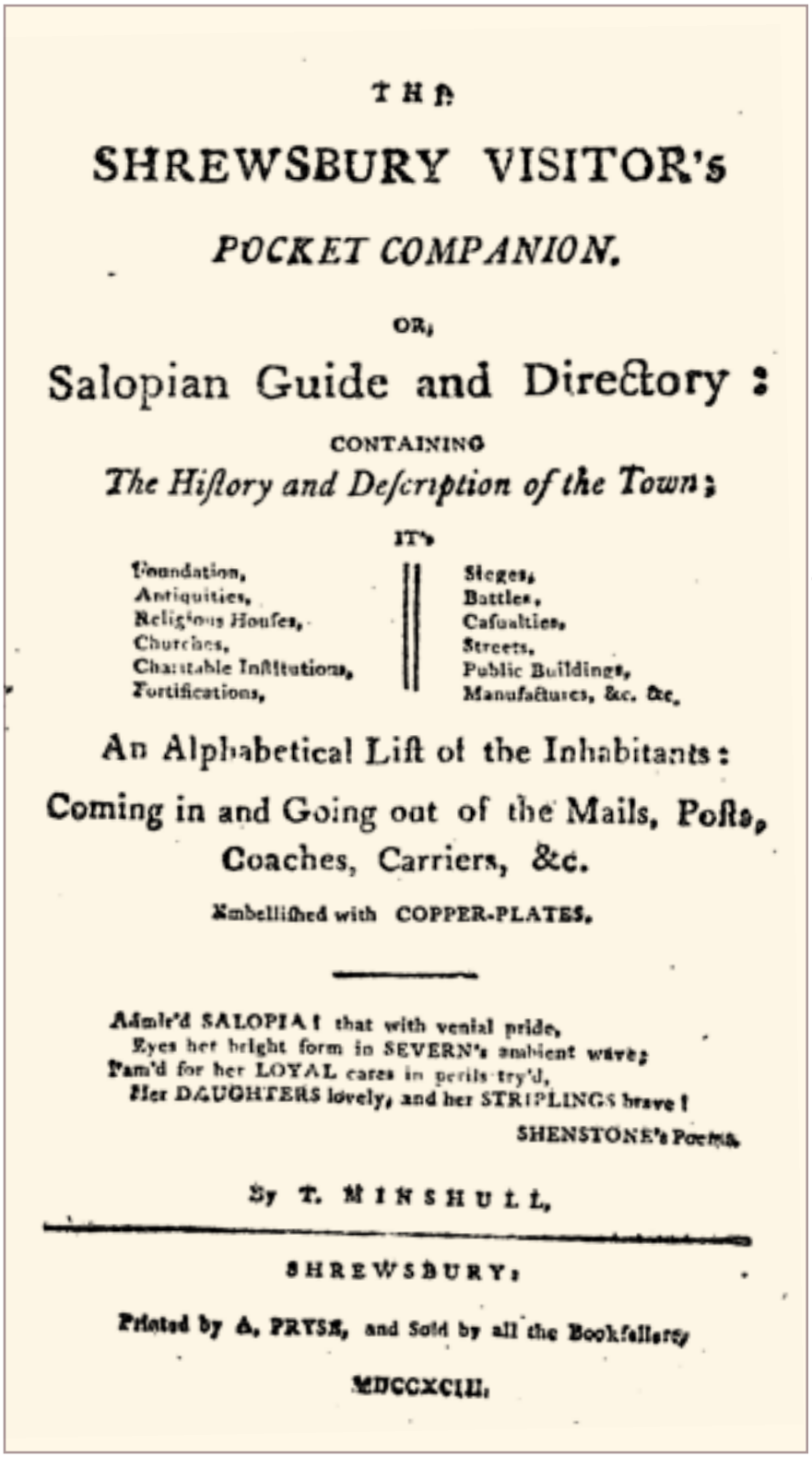
Using antiquarian sources to elucidate industrial sites.

Industrial heritage, with its associations to modernity and progress, might seem an unlikely subject for the pens of historically minded antiquaries. The writings of 18th-century county historians and topographers are well known for their accounts of hoary antiquity through Saxon vestiges, Roman remnants and medieval memorials, but many authors also had a keen eye for novelty and innovation. The past was the perfect foil for the future, which often made an appearance in guide books, and under chapter-headings on 'Manufactures' and 'Industry' in topographical publications. Antiquarian sources therefore provide invaluable material for the study of emergent industrial Britain in the late 18th and early 19th centuries. Not only do they offer commentary on a subject for which sources are often sparse, but they also supply a different kind of evidence from that covered by business accounts and technical specifications. Research on Ditherington Flax Mill demonstrates how antiquarian writings can enhance our understanding of specific structures and the early character of industrial areas, as well as illuminate contemporary perceptions of the birth of the industrial age.

James O Davies © English Heritage

Ditherington Flax Mill, photographed in 2000, where the use of cast-iron to make a fireproof construction impressed early 19th-century commentators who declared the building to be 'an honor … to the town of Shrewsbury'

The title-page of *The Salopian Guide* by T. Minshull, a pocket-sized volume describing the history and contemporary condition of Shrewsbury, now available in pdf form via ECCO. This edition was published in 1793 when the site of Ditherington Flax Mill was still open fields



THE

SHREWSBURY VISITOR's

POCKET COMPANION.

OR,

Salopian Guide and Directory:

CONTAINING

The Hiſtory and Deſcription of the Town;

IT's

Foundation,
Antiquities,
Religious Houſes,
Churches,
Charitable Inſtitutions,
Fortifications,

Sieges,
Battles,
Caſualties,
Streets,
Public Buildings,
Manufactures, &c. &c.

An Alphabetical Liſt of the Inhabitants:

Coming in and Going out of the Mails, Poſts, Coaches, Carriers, &c.

Embelliſhed with COPPER-PLATES.

Admir'd SALOPIA! that with venial pride,
Eyes her bright form in SEVERN's ambient wave;
Fam'd for her LOYAL cares in perils try'd,
Her DAUGHTERS lovely, and her STRIPLINGS brave!

SHENSTONE's Poems.

By T. MINSHULL.

SHREWSBURY:

Printed by A. PRYSE, and Sold by all the Booksellers

MDCCXCIII.

Access to printed resources from the 16th to the 19th centuries has been transformed in recent years by the information revolution and advances in the digital humanities. Databases, amongst them Early English Books Online (EEBO) and Eighteenth Century Collections Online (ECCO) are available by subscription, or via library memberships, and Google's book digitisation project has made thousands of volumes available free of charge. Not only are these texts easy to obtain but search facilities also now make it possible to hunt effectively for specific sites, buildings or materials. Although images of buildings in such publications are rare prior to the mid-19th century, as illustration was expensive, there is much to be gleaned from the text.

Scholarship on Ditherington Flax Mill, built in 1796-97, has long recognised the value of antiquarian evidence, since the earliest-known description of the mill appears in a small guide-book on Shrewsbury. One of the benefits of locally published guides is that they were frequently updated, and examining a sequence of editions can therefore re-create unfolding change. Originally published in 1784, when the site was still open fields, the 1803 edition of Minshull's *Salopian Guide* admiringly recorded the mill's features, including its distinctive construction:

> … of brick, upwards of two hundred feet in length, and five stories high; the floors of each story [*sic*] are of brick, arched, thro' which is perforated
> Full many an iron friend, whose massive strength
> Seems to defy old time's long threatening stroke!
> These were cast at Mr. HAZELDINE'S foundery [*sic*] in this town; and, as well as supporting this extensive fabric, serve as principal instruments, thro' which the multiplicity of machinery … performs.

Such an account is remarkably detailed given many early guides simply mention the existence of buildings rather than recount any of their particulars. Further amplification on Ditherington Flax Mill is offered by Hugh Owen in *Some Account of the Ancient and Present State of Shrewsbury* (1808). He observed that the mill's buildings 'are secured from the ravages of fire by the exclusion of timber from almost every part of their construction, the roofs and floors are supported on brick vaults, the window frames, and all other parts where wood is used in buildings, are here of cast-iron'. Such details confirm elements of the design which are no longer extant, such as the cast-iron window frames, and underline the contemporary importance of the mill's innovative solutions to fire-proofing.

As Minshull noted, Ditherington Flax Mill's cast-iron columns were produced at Hazledine's foundry in the suburb of

The site of William Hazledine's iron foundry in Coleham, Shrewsbury where the cast-iron columns for Ditherington Flax Mill were produced by workmen who, according to an 1818 description, were 'true sons of Vulcan'. Its present-day condition gives little indication of the awe-inspiring industrial processes once conducted there

Coleham. Only two brick ranges of that site survive, but an evocative account of the area is provided by a footnote in Charles Hulbert's *History and Description of the County of Salop* (1837), which characterised Shrewsbury's industrial south bank as a place populated by 'individuals of enterprize' where fortunes were made and sometimes lost. Of the successes he singled out the 'spirited' William Hazledine, engineer and iron-founder, from whose furnaces 'have issued all the castings of the magnificent Menai Bridge, and other national erections of similar magnitude'. *The Stranger in Shrewsbury* (1818) described the foundry itself with its 'wonderful and gigantic machinery' operated by workmen who 'mingle with the fire like salamanders'. The sight was so inspiring that it would, the author avowed, have given Homer imagery by which to improve his description of the abode of Vulcan.

The mill at Ditherington was hailed by Minshull as 'one of the greatest *Linen-yarn Factories* in the kingdom; the erecting of which strongly evinces the patriotic and public spirit of the proprietors, Messrs MARSHALL, BENYON'S, and BAGE!', indicating how industrial initiatives were focal points for local and national pride. The legacy of this is still tangible today: the findings of Heritage At Risk 2011 show that 71% of the public value industrial heritage because it is a reminder of what made England great. The history of early industrial buildings is often difficult to trace, their status has until relatively recently sidelined them in our historical consciousness, and their functional role has often resulted in insensitive adaptation or destruction. Antiquarian sources recapture the thrill of the new for structures that we see all too often in a disused and precarious condition, and remind us of the need to protect them – both as pivotal sites in our nation's history and as future inspiration for their viewers.

Olivia Horsfall Turner

Ditherington Flax Mill: a new beginning for an icon of industry

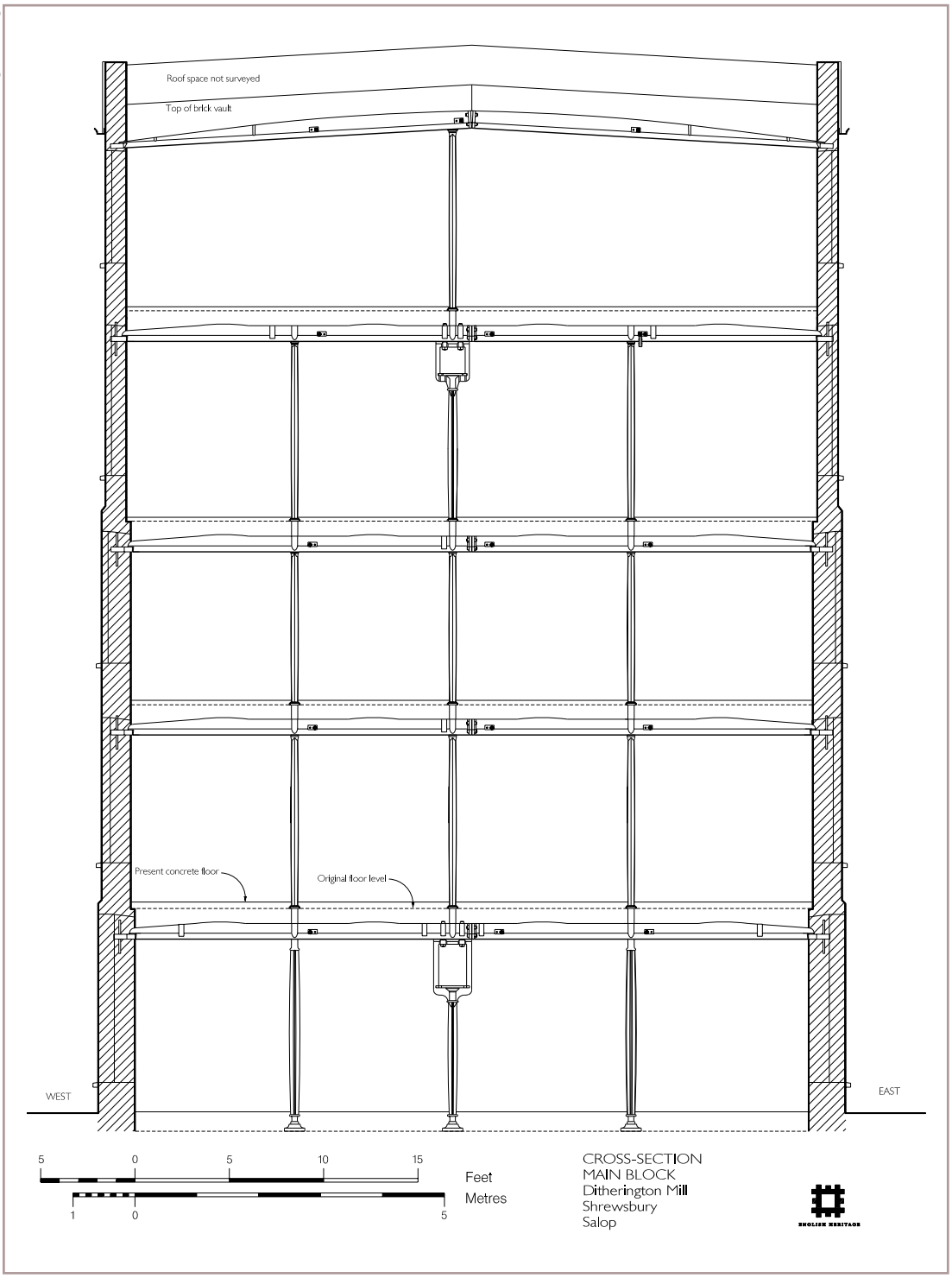
Forthcoming publication draws together five decades of research on an internationally important Industrial Heritage at Risk site.

Ditherington Flax Mill, built in 1796-97 in a northern suburb of Shrewsbury, is one of the iconic buildings of the Industrial Revolution. Built during a period of intensive development of the early factory system, it was the world's first building with an iron frame, one of the first purpose-built steam-powered factories, and when completed was one of the largest textile mills in the country. In the mid-20th century it also became one of the first textile mills to be recognised as of international historic importance, and the developing methodologies of investigation at the site since that time have paralleled the emergence of industrial archaeology as a field. In 2005 the mill was acquired by English Heritage, with support from Advantage West Midlands and Shrewsbury and Atcham Borough Council, latterly Shropshire Council. Through its main contractor, Feilden Clegg Bradley Studios, the partnership has concentrated on both economic and complex structural problems in its efforts to secure a viable future for the site as the focal point in Shrewsbury's Northern Corridor regeneration area.

Damien Grady © English Heritage

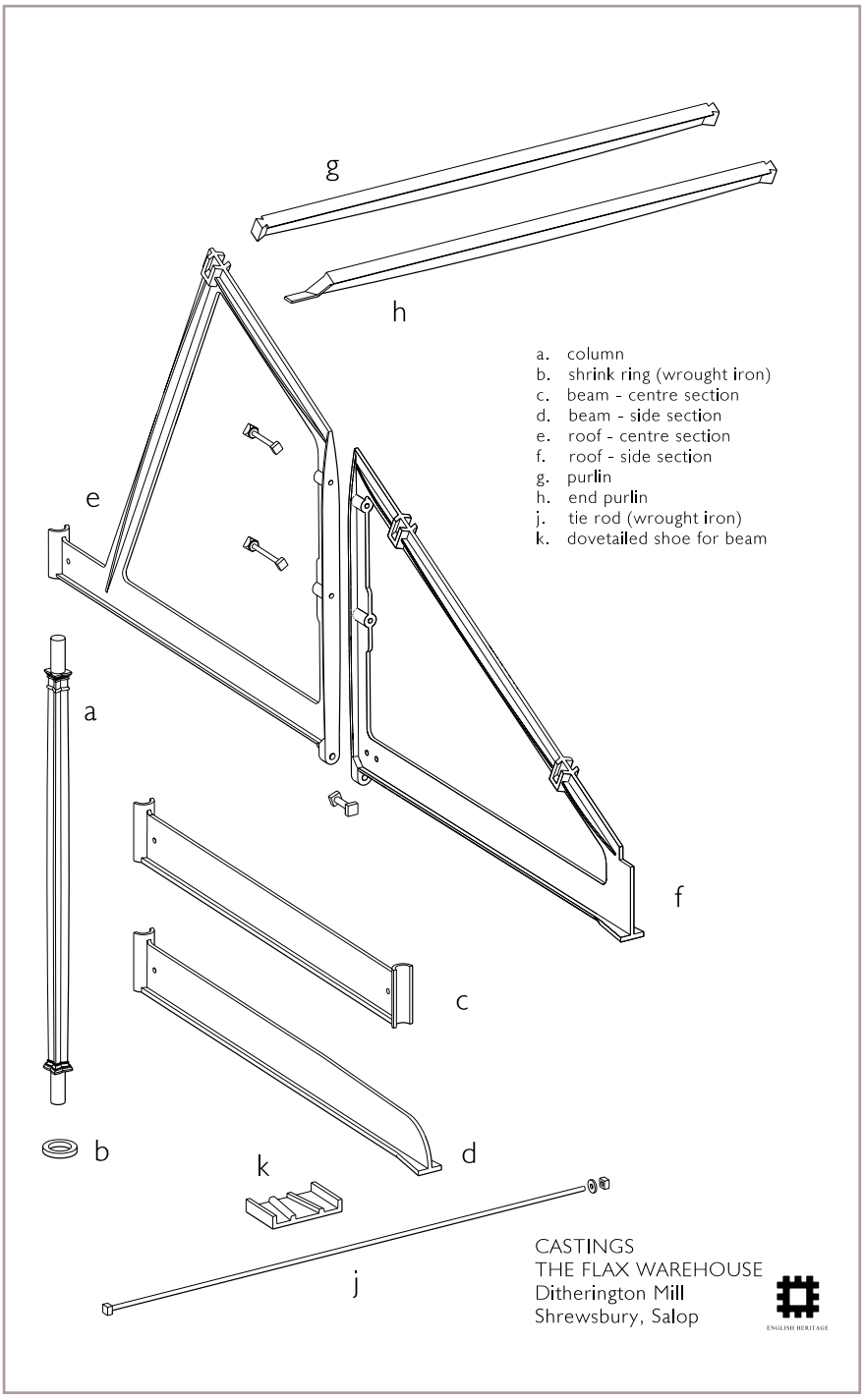
Ditherington Flax Mill in 2001, before the addition of external and internal scaffolding to secure the structure of the main block. The detached warehouse and apprentice house are at upper right, the dye house in the yard

The mill is a large and imposing industrial building even by 21st-century standards, and is architecturally distinct from other early textile mills. It certainly astounded visitors at the turn of the 19th century (see *Industrial Antiquaries*). The principal buildings are all of 'fireproof' iron-framed construction, their structural design fitting into a sequence of development from fire-resistant timber-floored mills of the 1790s to greatly improved types of iron-beam and brick-floored construction in the 19th century. Earlier mills had used iron columns and brick-vaulted ceilings with timber floor-beams, but Ditherington was the first to use cast-iron beams. The complex is dominated by the mill itself, comprising the five-storeyed main block of 1796-97, with a full-height wing, the Cross Mill, originally added by 1803 but then rebuilt with an iron frame following a fire in 1811. To the north of the wing is a detached flax warehouse, built by 1805 and of similar iron-framed construction to the Cross Mill; the main block, Cross Mill and warehouse are respectively the first-, third- and eighth-oldest iron-framed buildings in the world: a remarkable collection of innovative structures at one



Detailed survey of the iron frame designed by Charles Bage was only possible after parts of it were exposed by structural engineers in the late 1990s. The original windows were blocked when the building was converted into maltings

site. A variety of historic ancillary buildings also survive, related to the changing use of the flax mill and its eventual conversion to a maltings in the late 1890s. A two-storey stable near the site entrance is notable for its iron-framed construction, similar to that of the Cross Mill and warehouse. To the west of the main block is a large dye-house, rebuilt in the 1850s, with earlier drying stoves attached to its southern end. Perhaps the most evocative building is the Apprentice House, built by 1812 to accommodate mainly children and women, often from workhouses, who were brought in to work at the mill; a common practice in the early 19th century. The site was altered extensively when it was converted in 1897 into a maltings to the designs of Henry Stopes. Many of the original windows were blocked, hoist towers were added, and the original floors were replaced with concrete poured on top of the brick-vaulted ceilings, but the conversions



The cast-iron frame of the warehouse already included many changes to that of the 1797 mill, but was itself quickly superseded by iron-framed mills in other areas

fortunately retained the main buildings and their iron-framed structures. In the mid-20th century, large concrete grain silos were erected, and the maltings remained in use until 1987.

Ditherington Flax Mill was built in a period marked by profound changes in the distribution of industries, in particular by the construction of factories in newly created industrial suburbs. The mill was also closely linked with another sign of industrial growth: the opening of the Shrewsbury Canal in 1797, the route of which was diverted to run alongside the main block. The site was not suitable for water power, so the canal was essential, providing water for steam engines and coal for boilers, as well as facilitating transport for raw materials and finished goods. The mill was the initiative of a partnership of three Shrewsbury merchants, Thomas and Benjamin Benyon and Charles Bage, with John Marshall, a highly successful flax manufacturer in Leeds.

The radical design of Ditherington Flax Mill has been credited to Charles Bage, although it is clear that he sought advice from other pioneering industrialists, notably William Strutt of Derby, and was fully aware of recent developments in structural engineering in the West Midlands. Techniques of iron construction were developing rapidly in the 1790s, and Bage's surviving letters indicate that Ditherington Flax Mill is one of the first examples of the use of empirical testing of iron to inform structural design. The sectional forms and methods of joining the beams, columns and roofs show considerable development even within the construction of the main block, Cross Mill and warehouse, reflecting the innovative and experimental nature of the design. An important limiting factor, particularly in the design of the beams, appears to have been the casting techniques that were available in the 1790s. The beams contain many casting defects and design flaws that have greatly complicated the re-use of the buildings. Many aspects of the mill's construction had already been superseded by the first decade of the 19th century, in some cases by Charles Bage himself.

Textile-mill architecture is strongly influenced by the type of power and the means of transmitting it to the machinery, and the early steam-power system of Ditherington Flax Mill is also of great historic interest. Mills built solely for steam power were still unusual in the mid-1790s, and Ditherington is possibly the oldest known surviving example. The original Boulton and Watt beam engine, of only 20 horse power, was housed in the south end of the main block, but by 1799 it had been supplemented by a larger engine at the north end, and in 1811 the southern engine was completely replaced by a new 60 horse-power engine. The expansion of steam power reflects the gradual replacement of

hand-powered processes with new types of powered machinery. Power was transmitted to the machines via upright and horizontal main shafts and drive belts, the location of the original horizontal shafts at Ditherington being indicated by the square housings incorporated in the central columns of the ground and third floors. Further engines were installed in the 1820s and 1870s. The survival of the full sequence of engine houses is unusual; at many mills the installation of later engines entailed the removal of the smaller earlier engine houses, but at Ditherington they are preserved.

The international significance of Ditherington Mill has been widely recognised, and it is generally agreed that the site represents the critical first step in the long and very complex development of iron- and steel-framed buildings. English Heritage acquired the site as part of a rescue package, funding essential urgent repair works and working closely with Feilden Clegg Bradley Studios and engineers Adams Kara Taylor to develop creative and technically complex proposals for re-using the buildings while retaining their historic integrity. A forthcoming publication jointly authored by English Heritage staff and external specialists will present the results of six decades of varied research alongside new insights made possible by further investigation of the iron structure in the course of stabilisation work.

Mike Williams

Nigel Fradgley © English Heritage

Reconstruction of the iron frame of the wing, as it was rebuilt following a fire in 1811

Peter Williams © English Heritage

Third storey of the main block, 2001, showing housings for the horizontal main shaft. Proposals for the re-use of the building have necessarily focussed on issues with the iron frame, including problems with the pioneering design and casting defects

A landscape of mills, walks and workshops

The assessment of textile mills in south-west England has redefined the history and significance of the region's textile industries.

The textile industries are an intrinsic part of the industrial heritage of the South-West and have had a profound influence on the development of market towns and their surrounding landscapes. They cover a greater area and a wider chronological range than many of the historic textile industries in other regions, but in spite of a wealth of previous research surprisingly little has been published on the nature and significance of their buildings. A forthcoming English Heritage publication aims to fill this gap, providing the first comprehensive appraisal of the subject. Based on extensive investigation, it concentrates on historical context in order to shed new light on the early origins of the mill-building industries that had such a strong influence on the development of south-west towns in the 19th century. The surviving buildings are more dispersed than in the northern textile areas, but have faced similar threats from the decline of traditional industry and, in recent decades, have seen a similar increased demand for information on their significance from planners and developers – a need the new publication aims to meet.

James O. Davies, © English Heritage

The recently converted Longfords Mills, one of the largest 19th-century integrated mills in Gloucestershire, was built close to the site of a much earlier fulling mill

The project originated as an appraisal of textile mill designations, which was accompanied by targeted investigation of those mills requiring urgent assessment. This led to detailed reports on buildings which were well known but had not previously been studied, such as Coldharbour Mill in Devon (Architectural Investigation Reports and Papers B/065/2001) and Tone Works in Somerset (RDRS 72/2007 and Research News 13), and to the publication of *Bridport and West Bay: the buildings of the flax and hemp industry* (2006). The project has benefitted from the availability of a vast amount of local history research, although most of it does not deal specifically with landscapes or buildings. More recently, growing public awareness, and English Heritage support for research by local groups and contractors, has led to an increase in external publications, including new studies of the region's textile workshops and the flax and silk industries.

In comparison with other areas, the south-west textile industries followed a distinctive historical development related to the geography of the region. Most of the indigenous industries, those which were originally associated with locally sourced raw materials such as wool, worsted and flax, can be traced back to at least the 13th century, in some cases earlier. In contrast to other industrial regions, the geographical extent of the south-west woollen industries had been achieved by the 17th century. Most of the later woollen factories were built on the sites of earlier vernacular mills, and were not related to a further expansion of the industry into new areas. In the 18th and 19th centuries, additional industries spread into the region as part of the national redistribution of manufacturing associated with the early factory system. Silk, cotton, hosiery and factory-made lace were all originally financed from outside the region, but benefitted from the vacant buildings and a redundant workforce made available by the decline of older industries. The development of power in the South-West was also distinctive, with both water- and hand-powered processes continuing well into the 19th century, after steam-powered factories and urban living had become a characteristic feature of the northern mill towns. The prolonged importance of textiles in the South-West has also strongly influenced the region's townscapes, including varied examples of vernacular workshop development, the use of open spaces for textile processes and the creation of planned industrial suburbs.

Perhaps the best known of the region's textile industries, and the subject of much previous research, is the fine woollen industry of the West of England, centred on Gloucestershire and Wiltshire with adjoining parts of northern Somerset. The Wiltshire and Gloucestershire industries both had medieval origins, and showed distinctive characteristics from an early date, qualities that were eventually reflected in the nature of 19th-century factory buildings. The Gloucestershire trade was closely associated with the distinctive topography of the Cotswold Hills, where a dense network of small streams, in an area suited to sheep farming, encouraged the construction of fulling mills. The local industry specialised in super-fine woollens, which required the prolonged fulling of high-quality wools.

James O. Davies, © English Heritage

Castle Factory in Trowbridge, Wiltshire, built for steam power in 1825, was notably similar to contemporary urban factories being built in northern textile areas

Wiltshire's industry was of similar size but less specialised, and was more concentrated in towns from an early date. The 'wool towns' of Wiltshire now include several notable examples of distinctive townscapes formed by the addition of textile workshops to late-medieval clothier's houses. This urban focus continued into the 19th century, when steam-powered factories and associated housing, notably similar to those being built in other regions, were added to towns such as Trowbridge and Bradford on Avon.

Further West, the economies of countryside and towns were historically associated with the serge industry in Devon, Cornwall and Somerset, and the flax and hemp industry in South Somerset and West Dorset. Based on a complex system for organising country spinners and weavers, the serge industry was

Abbey Mill, Bradford on Avon, introduced late-19th-century mill architecture to the townscape of one of Wiltshire's oldest wool towns

James O. Davies, © English Heritage

tremendously successful in the 17th and 18th century, its output exceeding both the Lancashire and Yorkshire industries in the period leading up to the introduction of factories, but contracted dramatically in the early 19th century. The wealthy clothiers and merchants who controlled the industry did not adapt quickly to the new factory methods and so failed to compete with the modernising businesses in the North. Flax and hemp production was an ancient industry across large parts of the Dorset and Somerset countryside, and was closely related to the regional demand for ropes, sailcloth and netting, in particular for the fishing industry. Growth of the export trade in nets and cordage for fishing led to the rejuvenation of the traditional industry in Bridport in the late 18th century, where centuries of twine-, rope- and net-making have created a highly distinctive townscape of small industrial workshops and long, narrow, open walks.

Silk, lace, hosiery and cotton developed later in the South-West than elsewhere, but have had a marked influence on the region's 19th-century townscapes. These industries were less restricted to particular areas than the earlier ones, with silk in particular being widely distributed across the region. The silk industry remained connected to the London trade, financed by London merchants and concentrating on throwing and spinning to provide thread for the Spitalfields weavers. The lace industry was dramatically transformed by the innovative factory system established in Tiverton by John Heathcoat and his associates in the early 19th century, but continued to trade its products in the Nottingham lace markets. The manufacture of hosiery was also widespread in the South-West, but retained its connections with the national centre of the trade in the East Midlands. In contrast, the south-west cotton industry was not extensive, but one notable example was the Great Western Cotton Factory in Bristol, an exceptionally large concern set up in the 1830s by an enterprising Manchester manufacturer in partnership with wealthy local merchants. It was associated with the Great Western Steamship Company and was intended to resurrect the former glories of the port of Bristol, but in spite of its advanced design it was not able to compete with the cotton industry in the North.

The South-West Textile Mills Project aims to provide understanding and context for the rich variety of textile-related historic sites in the region, many of which face significant change or are otherwise at risk. The project firmly establishes the national significance of the South-West's textile heritage, and although a high proportion of the region's textile-industry sites are already protected by designation, many are derelict and awaiting viable reuse. The conservation of historic textile-industry buildings has become widespread in the last decade or so, and some sites of national importance are currently being considered as focal points in major regeneration schemes. The publication is therefore well-timed to meet a high demand for informed statements on significance, and provides decision-makers with much-needed information on the historic features which define these important industrial monuments.

Mike Williams

Peter Williams, © English Heritage

Mike Hesketh-Roberts, © English Heritage

Above: Drying lofts above cottages in Buckfastleigh, Devon. These highly distinctive features of industrial-vernacular buildings were used for preparing the worsted yarns used by the local serge industry

Left: Chipping Campden Silk Mill, Gloucestershire, used vernacular materials and details in several phases of late-18th- to early 19th-century workshops

Germans, guns and gas in south London

In the closing stages of its work on Woolwich and Battersea, the *Survey of London* has encountered important but unexpected German contributions to each area's industrial history.

THE ROYAL LABORATORY, WOOLWICH

The barricades erected in Dresden's Republican uprising of 1849 were said to be of a quality not seen before in street fighting. This has been attributed to supervision from Gottfried Semper, the head of the department of architecture in Dresden's academy of fine arts, and architect of the city's opera house and art gallery. The rebellion was crushed, and Semper forced into exile, aged 45. A year later he pitched up in London. At first he wrote, publishing *Die Vier Elemente der Baukunst* (The Four Elements of Architecture), then he found work arranging the Canadian, Turkish, Swedish and Danish exhibits for the Great Exhibition, from which he drew great intellectual inspiration. But, cerebral and accomplished, he was underemployed, and fell into impecunious depression. Rescue came in 1852 when he gained a government appointment, as Professor of Architecture at Henry Cole's Department of Practical Art, the precursor of the V&A.

The Royal Laboratory's main machine shop in the Royal Arsenal, Woolwich, showing the cast-iron frame designed by Gottfried Semper in 1853–4

The Royal Arsenal, the British state's principal arms factory, was emerging from peace-time doldrums in the 1840s. Following the example of the royal dockyards, the Board of Ordnance had adopted steam-powered machinery as the modernizing way forward. Little progress was made until panic about French invasion and looming war with Russia focused minds in 1852. The Board had grown dependent on private suppliers and was uneasy about arms-making capacity. The Royal Laboratory, the Arsenal's ammunition-manufacturing department, housed in buildings of the 1690s and especially ill-equipped to cope with increased demand, was the target of the first major mechanizing reconstruction. Building design in the Arsenal was generally handled by Royal Engineers. A recent arrival, Capt. Thomas Bernard Collinson, RE, age 31, was given a lead role. He had helped map Hong Kong and New Zealand for the Ordnance Survey, but his sole architectural experience had been a stockade in Wanganui and some barracks in Wellington.

A scheme for enclosing the Royal Laboratory's open quadrangle was devised in 1853. An area about 300ft (92m) by 138ft (42m) was to be covered on a grid of ninety cast-iron columns for a vast open-plan steam-driven ammunition factory with a north-lit 'saw roof' and around 500 lathes, for productivity that would reduce labour costs by two thirds. At this point, and at the direction of his commanding officer, Collinson sought help. Capt. Henry Charles

Owen, RE, who had superintended the foreign side of the Great Exhibition, advised him to write to Semper, understanding that the professor was 'prepared to give architectural elevations suitable for manufacturing buildings'. Semper travelled to Woolwich and took on the job. Collinson's letters to Semper, which survive in Zurich, indicate that Semper was given responsibility for the entire form in detail of the iron frame and roof. His designs were resolved in early 1854, just as war was declared on Russia. Ironwork was supplied by Benjamin Hick and Son of Bolton and the factory was hastily erected.

It was unusual for an architect of pedigree to be involved in the design of this kind of structure. The frame here was robustly moulded with octagon-section columns, as in the Crystal Palace, which Semper knew intimately and admired, though he deprecated the spindliness of iron in other contexts. The north elevation was eccentrically ornamental, with reliefs of cannon in the spandrels and a circle-pattern frieze depicting ammunition under a cornice bearing the initials of members of the project's committee. This may have been more Collinson than Semper. The former altered the latter's designs for the engine house, expressing presumptive if not simple-minded concern for aesthetic fitness for purpose with the explanation that he wanted an elevation to be 'taken from the outline of a cannon, and I should like to give the chimney some resemblance to that suitable object'. For Semper this was a demeaning assignment, what his German biographers have called *Handlangertätigkeit* (dogsbody work). To make things worse, he had to harry Collinson for payment.

Semper's career recovered after he moved to Zurich in 1855. His best known theoretical work, *Der Stil in den technischen und tektonischen Künsten* (Style in the Technical and Structural Arts), drew on his English experiences and articulated strong reservations about iron architecture. Yet his Royal Laboratory frame had become an archetype. It was the model for numerous later iron-framed workshops at the Arsenal, even into the 1880s. Some of these still stand. Semper's factory continued as the Royal Laboratory's main machine shop until after the First World War. It was not taken down until the 1970s.

Ornamental cast iron on the north elevation of the Royal Laboratory's machine shop of 1854

MAN GASHOLDER, BATTERSEA

The so-called Field Gasholder Station near Battersea Park is now the only remaining major monument other than Battersea Power Station to this area's rich industrial past. It is scheduled for demolition in 2012 as part of the comprehensive regeneration of Nine Elms. As well as two important Victorian gasholders, the site contains a towering 300ft-high 1930s steel holder of German design that has become a local landmark.

It was erected in 1930–2 on a waterless system patented by a leading Bavarian mechanical engineering company, Maschinenfabrik Augsburg-Nürnberg AG (MAN). The firm had a long history of pioneering work in the design of diesel engines and rotary printing machinery, and by the early 1900s had branched out into locomotion and steel structures such as bridges and plant for gasworks.

Waterless gasholders originated with the firm in the 1910s, evolving from a characteristically Teutonic drive to improve industrial efficiency. They were intended for use in heavy industrial districts such as the Ruhr valley, where subsidence from mining and other factors often caused traditional telescopic gasometers to list and jam. A prototype was erected by MAN in Germany in 1918, and its effectiveness saw the design

The Field Gasholder Station and Battersea Power Station, seen from the south-east in 1938

spread throughout Europe, the British Empire and the USA in the 1920s and '30s. Gas companies and local authorities took to them not just for their stability but for also their economy. Their great size might suggest otherwise, but without the need for an underground tank they could be erected in half the time of heavier water-sealed holders, and much more cheaply. Also, their modernity and bigger capacity befitted an era increasingly reliant on gas supply, both in industry and in the home.

The technology was simple. An external polygonal shell of pressed steel plates was constructed on a frame of steel standards and horizontal ribs, above concrete foundations. Rigid and stationary, this did not rise and fall with the level of the gas, like a water-sealed holder; instead the gas capacity and pressure were controlled by a floating cap or piston fixed inside, sealed at the edges by a ring of tar oil.

Instantly recognizable, tall MAN holders thus became familiar sights across the country, and were not always regarded as eyesores; one example over 200ft high was even allowed to be built close to York Minster. By 1933 there were 32 MAN holders in Britain and Ireland, ranging from 250,000 cubic feet to 8 million cubic feet in capacity (that at Battersea was one of the biggest), and around another 200 worldwide. The Gas Light & Coke Company, which ran the Battersea site from the 1880s until nationalization in 1949, relied heavily on large-capacity MAN holders to deal with increased demand, erecting seven of them across its various London gasworks during an interwar period of intensive growth.

The MAN gasholder of 1930–2 at Battersea, photographed from Queen's Circus in 2011

International contracts and the sale of patents and licenses in this way were invaluable to MAN and German industry at a time of national crisis. The Ruhr had been occupied and its industries seized in the 1920s by French and Belgian troops in retaliation for unpaid war reparations. American loans that had then shored up the German economy were withdrawn in 1929 with the Wall Street crash. As the world slid deeper into depression the German economy and ruling Weimar coalition eventually collapsed, leaving a political vacuum that was eagerly filled by the rising Nazi party under Hitler. The waterless gasholders brought an important boost to MAN's civil business in the years around 1933, after which they came under increasing pressure from the Nazis to concentrate production on major public works and armaments. Thus MAN became heavily involved with Daimler Benz and other German engineering firms in the design and production of, among other things, Panzer and Panther tanks, and Marder tank destroyers. Allies seized MAN's factories after the war and split it from its parent company to prevent a repeat. The company still flourishes as a provider of heavy motor-vehicles and marine engines.

Though the technology was imported from Germany, most of the gasholders, including that at Battersea, were built by R & J Dempster, a Manchester firm of engineering contractors with offices in Westminster, who were principal licensees under MAN of its waterless gasholder patent in Britain. Dempsters must have been well regarded, as they even 'took coals to Newcastle', building gasholders for MAN in its German homeland.

Reminders of industry are increasingly rare in modern Battersea. The MAN gasholder is one of the few examples of this particular form of pre-war Anglo-German industrial exchange left in Britain. It will come down later this year, along with its fellow Victorian holders, and a fourth modern spiral-guided steel holder of 1963 (the site is a really good 'pocket' guide to the evolution of gasholder design) to make way for what London really needs most: another anonymous 'mixed use' high-rise development.

Peter Guillery and Colin Thom

The story of the *Iona II*: England's only protected paddle steamer

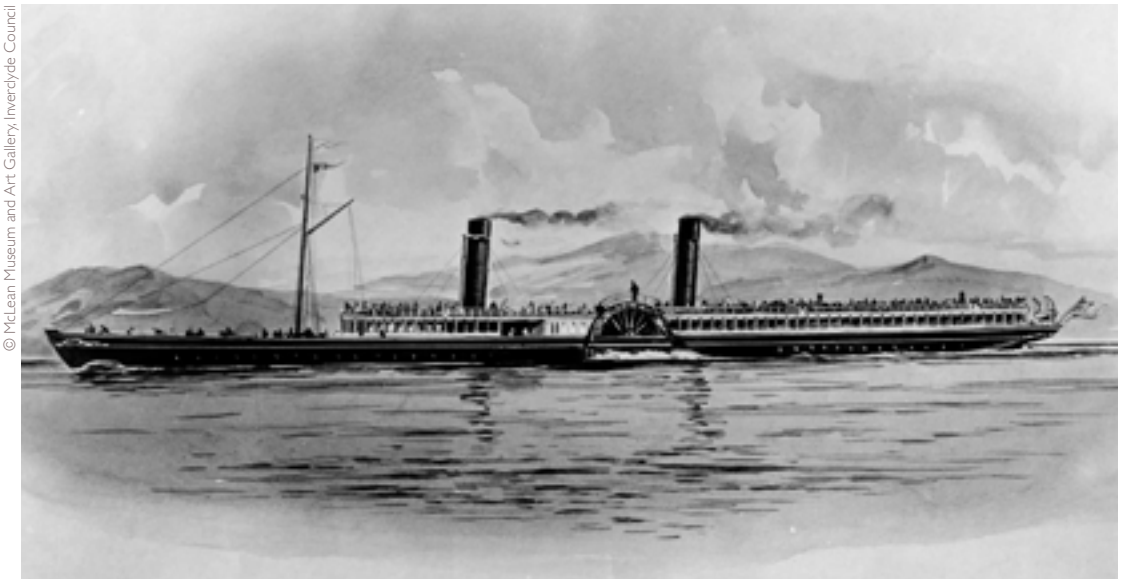
A British built ship, running the Union blockade of the American Civil War, 1861-1865.

The *Iona II* wreck site, situated 1 mile east of the island of Lundy in the Bristol Channel, is the only paddle steamer presently designated under the Protection of Wrecks Act 1973 and is managed by English Heritage on behalf of The Department for Culture, Media and Sport.

The site was discovered accidentally in 1976 during a diving excursion whilst looking for the MV *Robert* and was designated in 1989 because of its historical significance. Under the National Heritage Act (2002), English Heritage has responsibility for managing access to designated wreck sites from low water out to the 12 nautical mile (nm) territorial limit around England, and has powers to aid conservation management of those and other sites, subject to prioritisation and resources.

Intriguingly, the historical background that surrounds the *Iona II* wreck site is that of British mercantile complicity during the American Civil War (1861-1865) and is an often overlooked aspect of the British industrial age. Broadly speaking the American Civil War was not something the British government wished to have direct involvement in and much of this stemmed from a resistance to recognise the Confederate cause and the unwillingness to support a Federal nation in the north that at this point was not openly against slavery (in effect to avoid volatile 'slave states' close to the border switching allegiance).

In order to isolate the Confederate campaign the proclamation of April 1861 by Abraham Lincoln announced the naval blockade of the 3,500 miles of North America's Atlantic and Gulf coastline to isolate the Confederacy and choke its economy and supply lines. The Union Blockade, or the "Anaconda Plan" as it was known, would continue until the final days of the Civil War. With only a small armed fleet capable of responding, the Confederates reaction was to acquire sleek, quick vessels to run cargo through the blockade.



The *Iona II* under steam before her passenger saloons were removed. Please credit McLean Museum and Art Gallery, Inverclyde Council.

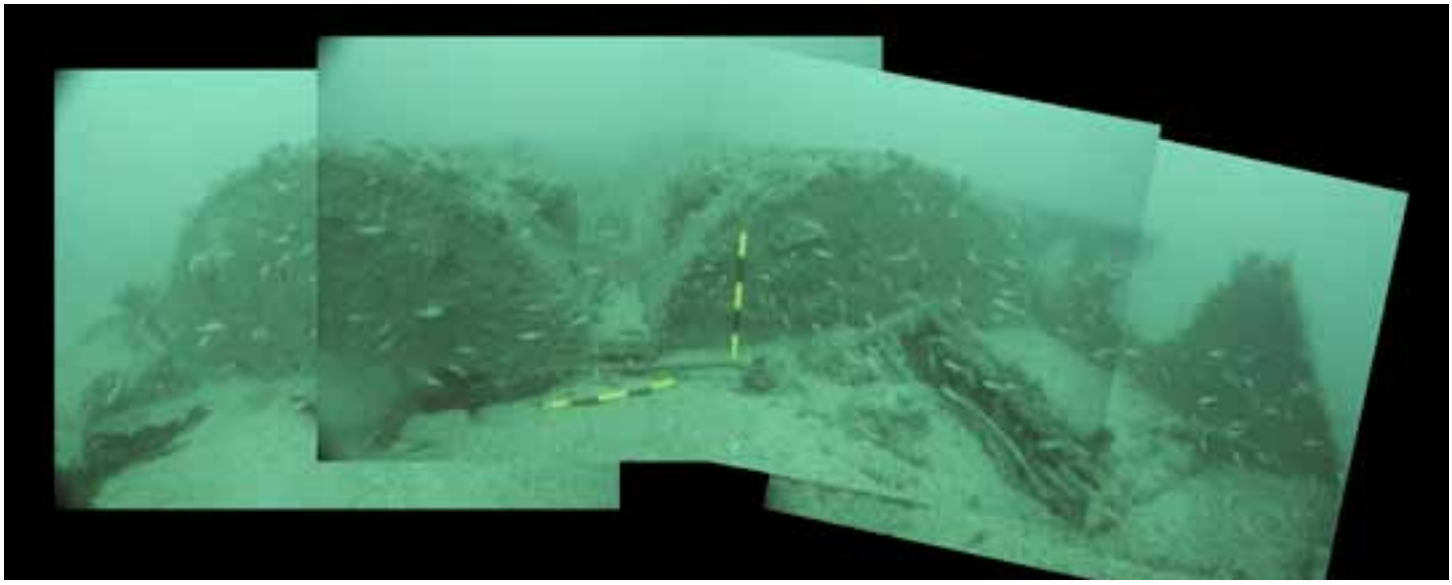


Photo mosaic of the forward boilers, taken in 2004

Much has been documented as to the effectiveness of the blockade, especially considering the scale and nature of the coastline and the size of the United States Navy available to the Union cause. However, of the 6,316 blockade running attempts made, 5,389 were successful (Edwin Davies & Engerman 2006) and it has been suggested that the measure of success of the blockade was how effective it worked as a deterrent to private speculators and patriots rather than down to the number of ships that were captured (McKenna 2010).

By 1862 the type of vessel that proved the most formidable blockade-runner was the modified passenger paddle steamer (some like the *Denbigh* and *Robert E Lee*. successfully completed more than 25 blockade runs). Designed with graceful lines, low sided wheels, engines below the waterline and coal bunkers constructed on either side as protection, most paddle steamers did not exceed 600 tons as they had to be fast enough to break blockade lines.

Primarily, blockade-runners were split between the patriots and the profiteers. Undeterred by the prospect of capture, British merchant enterprises sprung up in Liverpool, Manchester or London as a direct response to the prospects of a 700% profit (*ibid*: 205). Evidence for this can be seen in the shift of management and control of the runners to that of the English Merchants who in 1862 bought up the majority of the 117,000 tons of registered American merchant shipping. A year later this total had doubled (*ibid*: 133).

With outward cargoes of arms and ammunition, coal, machinery and tools, general and luxury goods the blockade-runners sailed for British colonial or neutral ports, as far as Halifax in the north and Cuba in the south. At these staging posts the cargoes were broken down and split between the runners. Burning Welsh anthracite coal in the boilers to avoid smoke plumes the runners would then sail to the next destination at a port along the Confederate held coastline, typically returning to England with a full cargo hold of cotton.

The number of ships of British origin known to be involved in the blockade running is unclear. An indication is the fact that Glasgow's Clyde shipyards (one of the dominant suppliers of steam propulsion ships in the mid-19th century) produced 133 vessels that would be used (either purpose built or re-sold) as blockade runners during the American Civil War (*ibid*: 211).

IONA II

Originally manufactured for the luxurious Glasgow to Ardrishaig ferry route the *Iona II* was built by the J and G Thomson Shipbuilding Company in the Govan shipyard on the Clyde in 1863. Fitted with compact and specially designed twin oscillating cylinder engines, tubular boilers, super-heaters and every well-tried improvement of the age the *Iona II* reputedly had a top speed of 24 knots.

Catching the eye of an agent of the Confederacy, Charles Hopkins Boster of

Richmond, Virginia, the *Iona II* was acquired for a sum close to £20,000. Re-fitted with a schooner rig (for assisted sail) and with the lavish passenger comforts stripped (including the 75ft dining room and 180ft saloon's velvet sofas), the paddle steamer was destined for a life of running guns and supplies for the Confederate Forces (Duckworth & Langmuir 1987).

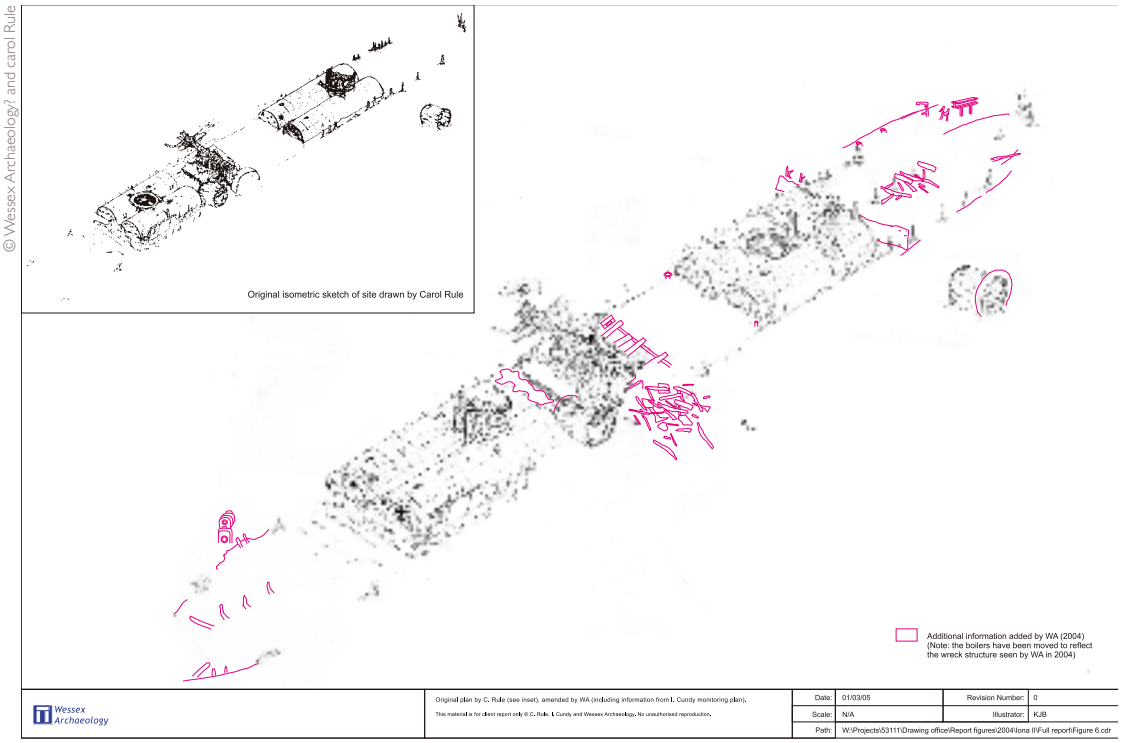
The first transatlantic voyage the *Iona II* attempted, in 1864, proved to be its last. Whilst en route to Kingston, Jamaica via Madeira and possibly Nassau from the River Clyde, with an undisclosed cargo and a crew of 40 (or less if the tales of a mutinous dispute at Cobh, formally Queenstown, in Ireland are to be believed) the paddle steamer foundered. In dense weather, it was probable that the ship was running without lights to avoid detection, and sank in unknown circumstances just a mile east of Lundy Island.

THE WRECK

Prior to national designation in 1989 the site was partially excavated from the stern to the after coal bunkers. Subsequent archaeological surveys and monitoring investigations have built up a coherent picture of the site, with the remains of the hull structure approximately below a point between the bulwark plates and the waterline. The most recent archaeological divers observed a minimal bow section that still reflects the sleek slender lines of the original vessel. Amidships the dominant features recorded are the four boilers (three of which are in a reasonable condition), the crank shaft and the partial remains of the paddle wheel assemblies. The two oscillating pistons and the valve gear also survive intact and are still connected to the crankshaft. Both paddle wheels are disarticulated, with the spokes and the complex feathering mechanism attached to the hubs only partially evident. The two iconic cylindrical funnels are also evident, with the forward funnel in two large pieces, one half *in situ* and the other section resting between forward boilers and the crankshaft. The rear funnel lies to the east of the site on its side. At the stern, the vessel is intact below the seabed sediment.

The *Iona II* represents an age of technological crossroads in shipbuilding with the beginning of the gradual demise of sail. However, the full extent of British involvement in the American Civil War has not been truly recognised, and only through sustainable management of the site and the values it contains, *and* thorough investigation of the relevant statistics available for steam ship building in Britain during the 1860s, will British complicity in the extremely lucrative Confederate blockade running become clear.

Stuart Churchley



An Isometric sketch of the wreck of the *Iona II*, originally drawn by Carol Rule, which has proved invaluable to the sites monitoring. Additional information was attached to the plan after a Wessex Archaeology Survey in 2004. Further monitoring information was gathered by Ian Cundy and his team of the Malvern Archaeological Diving Unit which is attached to subsequent plans

Significant signal boxes

An NHPP project assesses the significance of England's remaining signal boxes.

Signal boxes have been a distinctive feature of the English landscape for 150 years. The oldest operational boxes date from 1870 and there are many more from the 1870s and '80s, some still containing their original signalling apparatus, in daily use on today's railway network. My article 'The Signal Box – a great survivor' (*Conservation Bull.* **65**) drew attention to them as a building type where nineteenth-century technology had survived into the twenty-first century and also highlighted the challenges they present in terms of heritage management. In 2011, Network Rail announced plans to concentrate signalling in just 14 rail signalling centres over the next 30 years with 80% of the work to be accomplished within the next 15 years. Such long term plans effectively spell the end of the signal box as a building type.

The proposals have implications for English Heritage as past experience has shown that resignalling schemes generate many requests to spot-list signal boxes, both from those interested in railways and people in local communities who view signal boxes as landmark buildings. In the light of the level of the threat, it was considered essential to ensure that an assessment of the remaining signal boxes was made to identify the best examples and enable a review of the building type as a whole to be undertaken, including those examples already listed. Assessment will be made upon a sound initial understanding of significance, enabling any designations to be sensibly selective. Consequently, a national overview of significance of surviving signal boxes was included in the National Heritage Protection Plan.

The assessment is being undertaken in partnership with Network Rail and the National Railway Museum. Network Rail has publicly expressed its commitment

Two signal boxes built for the London, Brighton & South Coast Railway by the signalling contractors, Saxby & Farmer, both listed grade II:

Right: Billingshurst, West Sussex, photographed in 2000. It is the sole survivor of the first design of signal box by Saxby & Farmer. The LB&SCR's signalling records state that the box was erected in 1876. Most of the boxes built to this design were constructed in the 1860s. Assuming the records to be correct, it is probable that it was an older box moved here from another location, a practice not uncommon at the time. Whatever its origins, it is an important link with the earliest days of railway signalling, a field in which Britain was a world leader

to 'identifying the most significant signal boxes so they are safeguarded for future generations' and has welcomed the project as a contribution to achieving this. It has set out its plans well in advance to give plenty of time for conservation decisions to be taken. A workshop at the National Railway Museum was organised jointly by the NRM and Network Rail at which those organisations concerned with signalling heritage were represented; among them English Heritage, Historic Scotland, the Railway Heritage Trust and the Institution of Railway Signal Engineers.

A desk-based rapid assessment of the boxes is being carried out by the writer. We are fortunate that signal boxes are one of the best documented building types. All the surviving examples have been identified, their dates in most cases are known, and a comprehensive typology was established 25 years ago. Consequently, with the availability of photographs of the vast majority online, it is possible to conduct an initial assessment quickly and cheaply. Some of the most significant boxes are already listed. They include the oldest signal box to survive, that at Weston-super-Mare, built in 1866, the last example of the earliest type of box introduced by the signalling pioneers Saxby & Farmer at Billingshurst, West Sussex, and the largest remaining mechanical signal box in Great Britain, Shrewsbury Severn Bridge Junction of 1903. The focus of the signal box project is to identify other boxes of comparable quality, looking particularly at gaps in the present listing. There are a number of cases where particular signalling contractors or railway companies are under-represented among listed boxes. Some, such as the South Eastern & Chatham Railway, a major company with an extensive network of lines in Kent and the London suburban area, are not currently represented at all. The project is examining all traditional signal boxes, whether on the operational rail network and those on heritage railways, in museums or used for other purposes so as to obtain a complete picture of what still exists.

An illustrated report, setting out the findings of the project, will be published in the Heritage Protection Department Research Report series in April and, as with other Research Reports, will be available to download on the English Heritage website.

John Minnis

Left: Isfield, East Sussex. The most familiar type of Saxby & Farmer signal box design, constructed in large numbers between the 1870s and the 1890s. One of the most distinctive types of box, with its toplights above the operating floor windows and curved eaves brackets, it was long-lived and a number survive in operational use today. This example, built in 1877, was photographed in 1969 while still in use on the Uckfield-Lewes line which closed that year. Isfield station now forms part of the Lavender Line, a heritage railway, and the box is preserved as a museum exhibit

‘Green meadows surround the fence’: industry on the Hoo Peninsula, Medway, Kent

A multi-disciplinary project on the historic landscape of Hoo reveals the impact and legacy of industry on the Peninsula.

The Hoo Peninsula is on the north Kent coast, bounded by the rivers Thames and Medway. Proposed changes on Hoo, combined with the threat from rising sea levels, highlighted the need to increase knowledge and promote awareness of how the peninsula’s historical development has contributed to its character. English Heritage has undertaken an investigation of Hoo exploring the changing landscape (and more recent seascape) from prehistory to the modern period. The results of this project will help to ensure that the historic environment plays a positive role in any future changes to this part of Kent.

A third of Hoo is low-lying and consists of flat, expansive marshland protected by substantial sea defences. Perceptions of Hoo are often associated with these remote, open areas populated with grazing animals and wild birds. This marshland character is used to great effect in Charles Dickens’s *Great Expectations* (1861-62) and in Howard Clewes’s *The Long Memory* (1951). But mention of the Hoo Peninsula can also evoke an entirely different set of images predominantly associated with 20th-century industry. The chimneys of Kingsnorth and Grain power stations form prominent landmarks while the now overgrown imprint of the vast former BP oil refinery extends behind wire fences on either side of the Grain Road.

The earliest industrial remains seen on Hoo’s marshes are the grass-covered mounds of medieval salt production, but the greatest

Looking west along the peninsula from where the Thames and Medway meet

Details of RAF 540/393/PO-0021, 23 & 28 30-JUL-1950
© English Heritage (NMR), RAF Photography

This mosaic of photos shows the Royal Navy's refuelling station on the Medway. The Admiralty began to switch from coal to oil as a fuel in the early years of the 20th century and this station was built in 1908. Oil powered ships had many advantages: greater speed, increased range, they could be refuelled at sea and did not produce tell-tale smoke

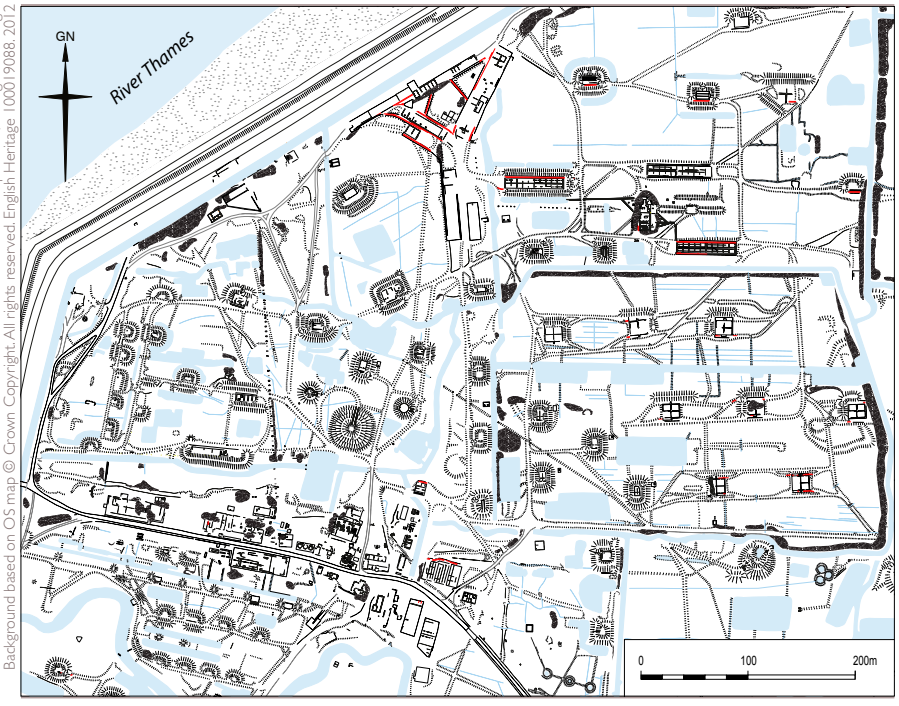
impact on the landscape came with the new industries that were established there in the 19th and 20th centuries. These industries were based on new technologies and new materials or substances and as such form part of what has been termed the Second Industrial Revolution.

Portland cement - in its own right and as an ingredient of concrete - is one of the 20th century's characteristic building materials. Clay found in the marshes and saltings of Hoo attracted the cement industry from the mid-19th century; it was generally considered that the best Portland cement could only be made with Medway clay. Although large quarries were dug on the Thames-side marshes the greatest impact of this industry is seen in the dramatic change to the Medway coastline between Hoo St. Werburgh and Grain where clay digging resulted in the almost complete removal of the saltings. The cement industry made extensive use of the rivers for transport and this is reflected in part by the numerous abandoned barges on the Medway mudflats.

Oil is another key industrial product of the 20th century, not just for the various lubricants and fuels produced, but also for its use in the petrochemical industry. Oil has done much to shape our modern world and some of the earliest British oil refineries were established on Hoo between the two World Wars while the refinery built on the Isle of Grain in the 1950s was part of the post-war expansion in domestic refining capacity. Evidence for the Royal Navy's switch from coal to oil as a fuel for its vessels is seen on the Medway marshes and was part of a gradual shift away from the use of coal in Britain. Access to deep water anchorages led to the construction of an Admiralty fuel oil depot on the south coast of Grain in 1908. This eventually consisted of 40 closely spaced oil tanks.

Little crude oil was refined in Britain between the two World Wars and yet Hoo was the location of two oil refineries, one at Kingsnorth (Berry Wiggins & Co) and another on Grain (Medway Oil and Storage Company or MOSCO). MOSCO was one of the few independents challenging the major oil companies at that time and it marketed its petrol under the brand name Power Petrol. The domestic refining of Power Petrol was probably emphasised because MOSCO, by using Russian oil and a seemingly related acronym, was threatened by anti-Soviet feeling in 1920s Britain. A 1929 advert for Power Petrol stated that it was 'Made in England by British Labour' – a claim few other petrol producers could make at this date.

Britain's economic plan for 1948-49 included a substantial programme of oil refinery construction and BP began building a huge refinery on Grain in the early 1950s. This involved the realignment of the road across Grain, the filling-in of fleets and channels and the alteration of the coastline including the enclosing of a bay to create a reservoir. The BP refinery made use of the



Philip Sinton © English Heritage.
Background based on OS map © Crown Copyright. All rights reserved. English Heritage 100019088. 2012

The north-western part of Curtis and Harvey Ltd's explosives factory on Cliffe Marshes taken from the detailed analytical field survey, reduced from the original at 1:10,000. It shows a variety of different features once connected by narrow gauge tramway (surviving rails shown in red). These include the nitroglycerine hill, guncotton stoves, cordite drying stoves and the acid factory

The cement manufacturers Francis and Company provided accommodation for its workforce. This photograph shows 1-5 Concrete Cottages and 1and 2 Cliffe Villa Cottage (in foreground). In 1881 Cliffe Villa Cottage was home to 19 people including five cement labourers and one engine driver! The grandest house built by the company was for the Foreman at the works but this no longer survives

Jon Clarke, © English Heritage

existing Admiralty and MOSCO oil storage and the buried fuel tanks built during the Second World War which supplied fuel to the continent as part of the PLUTO network of undersea pipelines.

Hoo's strategic geographical position resulted in a legacy of defence-related establishments, some of an industrial nature. These included the airship design and construction undertaken at Kingsnorth and the experimental aircraft depot at Grain Air Station, both operational from the early years of the 20th century. The open and unpopulated nature of marshland made it particularly attractive as a location for explosives works and the building of an explosives factory commenced on Cliffe Marshes in the 1890s. This site eventually produced a range of chemical explosives, but mainly cordite for use by the Royal Navy. The site consisted of numerous buildings and structures, often of light construction within protective earthwork embankments, set well apart in case of an explosion. The works was extended during the First World War and the space offered by the marshes allowed the distance between buildings to be increased to the extent where protective earthworks were not always required. It also allowed the layout of the site to facilitate a logical and efficient process flow. A number of incidents that occurred at the site demonstrate the dangerous nature of explosives production. In 1911 an explosion was of such force that, in the words of contemporary newspaper report, 'three men were blown to atoms' and windows in Cliffe village, 2km to the south-east, were smashed. Others were injured and one worker, Herbert Dobinson, was awarded the Edward Medal (awarded to industrial workers for acts of bravery) for rescuing a colleague who was trapped, having been blown by the explosion under a wagon of burning guncotton. Before it closed in 1921, the works had grown to occupy some 128 hectares. Most of the buildings have been partially demolished but the plan form of much of this evocative site is still legible.

For Hoo, one of the enduring industrial legacies is the growth in its population and the resultant increase in housing. Temporary settlements were constructed for workers, such as those building the BP refinery, or housed in Bungalow Town working at Grain Air Station. Permanent houses were also required. Brick terraces and semi-detached houses built in Cliffe during the late 19th century reflect the doubling of the population due to the presence of the cement works and had a lasting affect on the character of the village. The influence of the BP refinery was wider reaching as Strood Rural District Council undertook house

building in Grain, Allhallows, Lower Stoke and Hoo St. Werburgh while BP funded the construction of a number of village halls.

General accounts of Hoo written before the building of the refinery emphasise the rural nature of the area and ignore existing refineries and oil storage. Possibly in an attempt to emphasise their achievement in building on the marshes, BP also ignore the existing facilities in their published history. The BP book emphasises the harmony between the industrial and rural on Hoo by evoking the green meadows that surrounded the refinery, the abundant birdlife and the sheep that graze between the storage tanks.

The impact of industry on Hoo is not consistent across the peninsula and the industrial character of the Thames-side marshes, despite the well-preserved remains of the Cliffe explosives works, is less pronounced than on the Medway coast. The water-filled quarries of the cement works near Cliffe now form a nature reserve. The lofty power station chimneys on the Medway and the remaining parts of the refinery at Grain contribute to a modern perception of Hoo as an industrial landscape. One of the criticisms of the mid-20th century industries on Hoo was that they were out of scale with their surroundings and it can be argued that their monumental size has come to disproportionately dominate perceptions of this landscape; only 10% of the peninsula can be characterised as industrial. However, the industries are a significant part of the history of Hoo and its inhabitants, and played a role in shaping 19th- and 20th-century Britain.

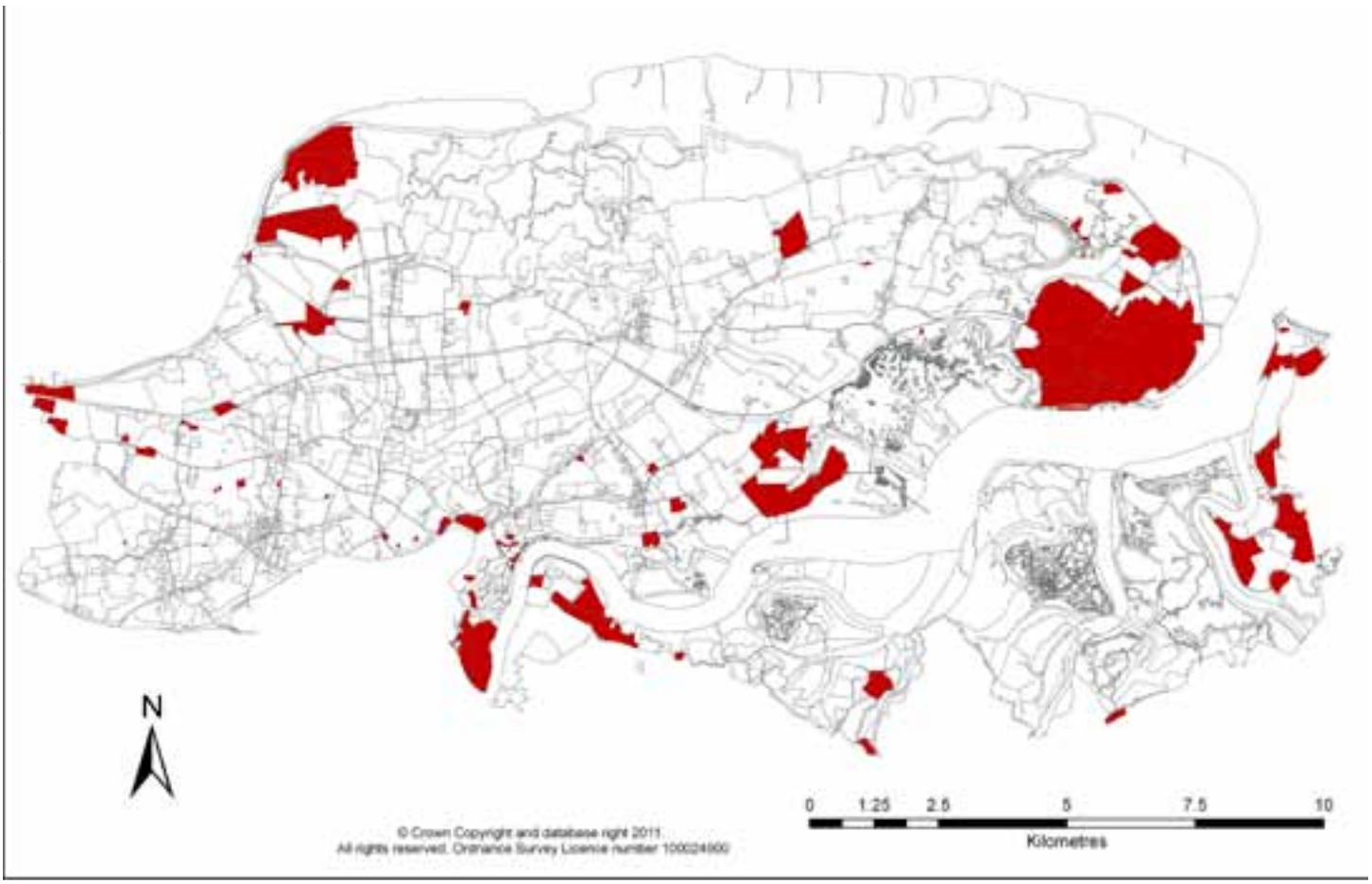
The industry on Hoo is one aspect of the evolving story of this landscape and the surrounding seascape. The Hoo project team is bringing together many strands of research to highlight the relevance of the historic landscape to informing strategic decisions on managing sustainable future change in the area.

For further information contact sarah.newsome@english-heritage.org.uk

Edward Carpenter
(on behalf of the Hoo Project team).

Map showing industrial character in the modern landscape

Historic Landscape Characterisation by Dr Nicola Bannister



Puddling, recycling or reheating?

The archaeological evidence from Alexander Raby's ironworks at Downside Mill, Surrey.

The 23-year-old industrialist Alexander Raby acquired Downside Mill on the River Mole in Surrey in 1770. Alexander grew up around metalworking. He was the eldest son of Edward Raby, a skilled founder who cast iron and bronze guns in the Weald, and from the age of 15 had been apprenticed to his uncle, Alexander Master, also an ironmaster. Raby converted Downside Mill for metalworking and towards the end of the 18th century expanded the site, adding a second mill as shown in a contemporary map, believed to date to the 1790s. Raby sold the site in 1806 when he relocated to South Wales but the later, larger mill complex still survives.

Raby's activity at Downside coincides with a fascinating period in the evolution of the ironworking industry. In the early 18th century coke began to replace charcoal as the fuel for blast furnaces and by the end of the century coke-fuelled furnaces were widespread. The blast furnaces made high-carbon pig (cast) iron, – coke pig was excellent for casting, but the main demand was for carbon-free bar (wrought) iron, which could be forged and welded and was tougher than pig iron. Cast iron could be converted to wrought iron by burning out the carbon it contained but the old-style 'finery' forges used for this conversion process did not work well on coke pig and relied on charcoal fuel, of which there were only restricted supplies. Consequently a lot of bar iron had to be imported and the wrought iron in circulation was recycled wherever possible.

From the Buttriss Archive, courtesy of the Surrey Archaeological Society

A plan of Cobham (Downside) Mills belonging to Alexander Raby from the 1790s, showing the later, more complex mill building top left, with the tilt hammer, forge and iron foundry labelled and the other mill and copper foundry top right. The map is orientated with south to the top

The challenge was to find a way of using coal (or coke) as the fuel for the conversion process. In the second half of the 18th century a number of methods using reverberatory furnaces were devised, both for converting cast iron to wrought iron and reworking scrap, using coal fuel. In these furnaces, fuel and metal were kept separate, helping to prevent contamination of the iron with sulphur from the coal. Surviving documents from this period (such as patents) only tell part of the story however, and archaeologists and historians are now attempting to fill in the gaps. The problem is how to distinguish between the archaeological remains of the various ironworking processes that took place.

The method that came to dominate, called *puddling*, was patented in 1784 by Henry Cort. The cast iron was melted and stirred under an air blast in a reverberatory furnace. Cort stated that it also helped if he added pieces of spoiled iron and wrought iron scrap. Contemporary accounts described how the mass heaved and hissed, producing a slag waste and emitting a blue flame as the carbon was burned off. Cort's process

also relied on grooved rollers rather than hammers to form the iron into bars and the iron also had to be reheated in between rollings. However puddling as first patented was not very successful, and was not widely adopted until quality issues were solved around 1790, largely by adding a prior refining step.

Previous research has focused on puddling but there is a growing appreciation that the recycling of wrought iron scrap was a major function of many smaller forges and mills. In the second half of the 18th century, reverberatory coal-fired furnaces were used for this process too as described in another of Cort's patents. The iron scrap was cleaned, corroded ends were removed and then the iron was piled up, heated and hammered. Some ironworkers also passed the iron through rollers to consolidate the metal.

Raby provided wrought iron hoops for the Victualling Board over this period and it is likely that he made these from reworked wrought iron scrap. In the 1790s, however, he expanded his interests into cast iron, investing in blast furnaces elsewhere. At Downside Mill he added an iron foundry, for remelting and casting iron, and a new forge. Raby was familiar with reverberatory furnace technology, both for puddling and reworking scrap: in a letter in 1812 to Henry Cort's son, Raby explains that "I was in the habit of intimacy with your father several years before he began his Puddling System". So when Raby expanded the works at Downside, did he install a reverberatory furnace, and if so did he use it for puddling, reworking scrap, reheating bar iron either made at the site or brought in, or some combination of these?

A team from Surrey Archaeological Society, led by Richard Savage and Tony Howe with the advice of local historian Dr David Taylor, carried out a small training excavation at Downside Mill in 2008 in the area where the older mill building and copper foundry, both since demolished, had stood. They found 50kg of waste slag as well as sections of the north, and narrower south, mill race and the probable location of the south waterwheel and gear mechanism. The slag had been produced during Raby's ownership of the site between 1770 and 1806; a time of rapid innovation driven by the adoption of mineral fuel. This waste material had the potential to tell investigators which metalworking processes Raby used and made an ideal case study for a student on a training placement at the English Heritage archaeological science laboratory at Fort Cumberland, Portsmouth.

Courtesy of Richard Savage

A view of the wheelpit of the surviving mill complex at Downside Mill, in between the forge and tilt hammer looking north, as labelled on the plan

A wide range of slag was recovered from Downside Mill, including waste from bronze and iron casting. Intriguing, however, were large lumps of dense, dark slag with flowed surfaces, like lava. We used analytical techniques to determine the chemical composition of this slag, confirming that it was from an ironworking process using a coal- or coke-fuelled reverberatory furnace. Tiny crystals in the slag proved to be an oxide of iron called magnetite, which forms when there is plenty of oxygen present. Magnetite has been found in slag from puddling, including a small number of published examples from the site of Cort's ironworks.

So this may have been an early puddling-type furnace – however it is possible that a reverberatory furnace used for reworking iron scrap or for reheating already-formed bar iron during heavy forging, could also have produced similar slag. At this early stage in the development of the puddling process, there was also considerable overlap between these processes. As there are no detailed studies of slag from scrap recycling or reheating with which to compare, a definite answer will have to await future discoveries.

Matt Phelps, Sarah Paynter, David Dungworth

Below top: The lava-like slag, produced by a reverberatory furnace at Downside Mill

Below bottom: The slag contained tiny crystals of magnetite, an oxide of iron, which sometimes forms tree-like crystals called dendrites, pictured here with an electron microscope

Matt Phelps. © English Heritage

Sarah Paynter. © English Heritage

Luton hatting industry

An Historic Area Assessment of Plaiters' Lea, Luton has placed the surviving buildings of the hat making industry at the heart of regeneration plans in the town centre.

Luton, undeservedly perhaps, gets a lot of 'bad press'. Talk to anyone about the place and you know that, eventually, two things will surface – firstly, the airport and, secondly, current social tensions in the town. The reality is different – it is a vibrant, energetic, and youthful town which owes not only its social and ethnic diversity, but also a legacy of declining industry, to massive expansion in the 19th and 20th centuries. By any measure, Luton is remarkable. It is especially notable for its industrial heritage: this has been dominated since 1905 by the development of the Vauxhall car plant to the east of the town centre, itself built upon the strength of industry that had already been created by the trade for which Luton became famous – hat making.

By the middle of the 19th century Luton was established as the focal point of ladies' hat making in the region and by the 1930s it was producing in excess of 70 million straw and felt hats a year. Certainly, other regional centres existed – nearby St Albans, for instance, specialised in men's hats and, further afield, Stockport (which has an excellent museum dedicated to the industry) specialised in the production of fur hats. In Luton, as elsewhere, the surviving fabric of the hatting industry is fast disappearing along with most traces of supporting trades such as dyeing and bleaching as well as ribbon-making. In response to this, English Heritage is undertaking a project which aims to assess the remains of the hatting industry in and around Luton. The first stage has been the recent completion of a Historic Area Assessment of the Plaiters' Lea Conservation Area in Luton town centre, and the second stage of the project will result in a publication examining the industry within the wider landscape.

Women at work c.1940 at the Barford Brothers dye and bleach works in High Town, Luton

The local straw-plait trade, upon which the hatting industry was based, is known to have been well established by the late 17th century. The English plaiting industry received a crucial boost during the Napoleonic Wars when supplies of straw-plait from Italy were cut off and hatters became increasingly reliant on local supplies – by the time Italian imports resumed in c.1815 the sizeable duties imposed made them increasingly unprofitable. It was believed that the best straw for plaiting was grown on the chalklands of Hertfordshire and southern Bedfordshire, and by 1851 80% of all straw plaiters in England, around 22,000 people, were based in the south-east Midlands and 50% of those were to be found in southern Bedfordshire. Most straw plaiters were women and children – children as young as two were sent to plait schools in the small towns and villages around Luton and at least 10,000 children are believed to have attended such schools in Bedfordshire at any given point during the first half of the 19th century. Although called 'schools' these institutions were in fact little more than workshops where the master's or mistress's sole duty was to oversee the work of the children. Many of the mistresses could not even read or write, some could not even plait. The schools charged weekly fees of 2d. or 3d. and the children were expected to earn as much as 3s. a week by the age of 14.

Over time the focus of trade in the area shifted from the production of straw-plait to the production of completed straw or felt hats. Again, many of the workers involved in sewing the hats were highly trained women who could command much higher wages than straw plaiters and were very much in demand. Consequently, the women enjoyed an unusual level of independence and took great pride in both their work and their appearance. One account by a factory inspector recalled how the girls resented being classed as factory workers, with one girl complaining that a factory inspector had been rude to her when he addressed her as a 'straw-plait girl' and not 'young lady' in the manner to which she was accustomed. Even today hat making and straw-plaiting are deeply embedded in the town psyche: many residents are aware of the industrial history of Luton and, particularly, the role straw-plaiting and hat making has played in the development of the town. The Luton arms, granted in 1876, incorporate sheaves of straw and the Luton Town football badge features an additional straw boater – the source of the team's nickname of The Hatters should be obvious by now!

The first stage in our project has concentrated on the area of Luton town centre known as 'Plaiters' Lea' which was granted Conservation Area status in 1991 in an acknowledgement of the crucial role it played in the development of the industry. The Plaiters' Lea Conservation Area lies at the heart of the town centre, occupying the area between the railway station to the north and the Mall to the south. Despite degradation in the second half of the 20th century, and a number of more recent unsympathetic alterations, the surviving fabric within the Conservation Area retains a level of integrity and coherence which deserves greater recognition – particularly at a time when the area is facing proposed redevelopment and a possible expansion of the Mall.

The area that would become the centre of hatting in Luton had, until the middle of the 19th century, been a mix of common land and a small private park. Changes in land ownership, however, encouraged speculative development and an industrial quarter soon emerged. The decades between 1860 and 1880 witnessed the most intensive and widespread growth and this may well, in part, have been associated with the establishment of Luton's first railway station

The earliest surviving hat factory in the Plaiter's Lea Conservation Area, built c.1840-1850

at the relatively late date of 1858. This meant that there were excellent transport links in place for both finished goods and raw materials and that buyers' and wholesalers' agents could visit the town regularly and easily. Perhaps the main reason, though, for the success and rapid expansion of the industry, was the relatively low set-up costs for new businesses and the high returns that might reasonably have been expected. For instance, one shilling's worth of straw could be transformed into between £7 13s and £15 of finished goods – a return of between 15,000% and 30,000% less labour and

A typical hat factory of c.1900 with Neo-Jacobean detailing and characteristic ground-floor showroom over raised basement

A smaller plait warehouse built c.1930 in a Neo-Georgian style, but still incorporating a ground-floor showroom and raised basement

production costs! For the next century or so, hatting and related industries flourished in Luton with the majority of firms and workers located close to the town centre and train stations.

The vast majority of the surviving buildings within the Conservation Area are industrial or commercial in origin and use, with smaller numbers of domestic properties as well as public houses. The most distinctive and significant buildings are the large hat factories with integral showrooms, workshops, and warehouse facilities. Many of these are substantial buildings, some with highly decorative façades, but others are more domestic in appearance and scale. The street frontages within Plaiters' Lea, whilst varied in detail, have a particular cohesion of design resulting from the rapid development of this small area. However, they are frequently interrupted by vacant plots and large open areas, now generally used as temporary car parks. Indeed, many buildings at the heart of Conservation Area have been demolished and replaced by car parks and others are under imminent threat from the huge economic pressure in favour of regeneration in Luton. Our work has underscored the significance and potential value of the historic environment at a time of great change: the Pre-Submission version of the Luton and Southern Central Bedfordshire Core Strategy explicitly draws upon the historical and geographical character of the area in order to shape new growth and the hope is that the existing structures can be integrated with new buildings in such a way as to enhance the experience of visiting, shopping, working or living within the Plaiters' Lea Conservation Area.

Cheapside, one of the streets in the Plaiter's Lea Conservation Area, showing the Arndale Centre (now called The Mall) behind

Katie Carmichael and David McOmish

From the Euston Arch to NHPP – half a century of official involvement in industrial heritage

From 'upstart subject' to serious protection: a sea-change in attitude.

Industrial heritage features strongly in the National Heritage Protection Plan launched in May 2011. There are 35 specifically industrial projects grouped in four main Activities. There are also numerous other Activities of a generic nature which are relevant to industrial heritage including the National Mapping Programme, marine and coastal surveys, protection of mining remains in areas affected by the extraction industry, energy generation and power transmission and sustainable re-use of buildings. Such an involvement is very different from the situation 50 years ago when the Government Ministries were agonising over the fate of the Euston Arch and how to deal with the upstart subject of industrial archaeology. Now, with industrial heritage the theme of Heritage At Risk 2011 producing a vast array of outcomes and outputs, interest in industrial heritage has never been higher and this slight piece, prompted by the recent unearthing of some material dating from the 1960s, reviews that sea-change in attitude.

Half a century ago, Government interest had first been prompted by representations from the Council for British Archaeology (CBA) following a conference convened by the CBA in 1959 when a Resolution was passed urging the formulation of a national policy of protection and recording. The CBA created a Research Committee to liaise with the Ministry of Works and the Ministry of Housing and Local Government to give parity of treatment to threatened industrial sites. A handful of the most notable industrial sites such as the Ironbridge and Cromford Mill were of course already designated but in May 1959 a list of 127 industrial sites was brought to the attention of the Ancient Monuments Division and an augmented list of key sites was presented to the MH&LG in 1961 for consideration for Listing. But the Ministry perceived difficulties: '*the selection of our investigators does not fit them to discover and assess items the importance of which is based on their technical interest in industrial history, and not their architectural-historical-interest. Indeed both we and the Ministry of Works are very conscious of our lack of expert knowledge and experience in this field*'. The augmented list was deemed inadequate and the CBA in 1961 initiated some regional surveys using a specifically designed record card which was printed in bulk to ensure uniformity.

Demolition of the Euston Arch photographed by Eric De Mare, 1963. The decision to demolish Philip Hardwick's Euston Arch caused a public outcry and gave great impetus to the conservation movement generally and industrial heritage in particular

Cromford Mill, Derbyshire c 1990. Richard Arkwright's cotton mills dating from 1771 onwards were listed in 1950 and were amongst the first industrial sites to be designated

Throughout 1962 pressure was maintained on Government to appoint an Advisor. This included LTC Rolt addressing the Conservative Arts and Amenities Committee at the House of Commons and as a result Rex Wailes was appointed as consultant to the Ministry of Works in 1963. For two years Wailes toured the country lecturing to local societies and urging them to engage with the National Survey of Industrial Monuments. In 1966 funding for the NSIM was extended for another three years with the CBA asked to assume responsibility for the direction of survey. An Advisory Panel (precursor of EH's IA Panel) was set up to administer the survey and Dr Buchanan at the University of Bath agreed to establish the National Record of Industrial Monuments (NRIM) dependent on volunteers submitting record cards of historic industrial sites. Following a somewhat acrimonious conference convened by the CBA in 1969 at which the conduct and output of the survey was criticised, Rex Wailes retired in 1971 and the survey itself was put on a full-time basis with the appointment of Keith Falconer as Survey officer and became the Industrial Monuments Survey (IMS).

The IMS conducted two types of survey – county surveys which identified all types of industrial sites meriting designation within a defined area and thematic surveys of sites such as steam pumping engines, seaside piers, brickworks, canal structures and signal boxes. Between 1963 and 1981 the Survey looked at over 4000 sites and submitted 2325 sites (2100 in England) to the Advisory Panel for consideration for designation or for recording or museum preservation. In England 853 sites were recommended for Listing and 371 sites for Scheduling. (In 1977 a separate survey was established in Scotland, managed by John Hume at Strathclyde University with Miles Oglethorpe as Survey officer. It was subsequently transferred to RCAHMS.)

In 1980 the demolition of the Art Deco frontage of the Firestone Building immediately prior to its proposed listing so outraged the Secretary of State for the Environment Michael Heseltine, that he ordered a great acceleration in the rate of assessment of historic buildings. The massive increase in staff resources now being applied to these surveys around the country rendered the efforts of the lone IMS survey officer rather puny and in 1981 the IMS was transferred to the Royal Commission on the Historical Monuments of England (RCHME), upon the condition that the Survey Officer should continue to advise the DoE on the assessment of industrial sites. The NRIM, which by then contained some 8,000 entries, was closed and absorbed into the National Monuments Record.

The CBA Record Card was designed in 1961 for use in a survey in CBA Group 5 area (the North West) and was rolled out across the country to ensure uniformity in the recording of industrial sites

NATURE OF SITE (Factory, mine, etc.) HORSE DRIVEN CLAY MILL. | COUNTY HERTFORDSHIRE | REF. No. Duplicate

Grid Reference or Location TL 373 071. | Industry BRICKMAKING & TERRA COTTA | Dating 19TH C. | Parish/Township BROXBOURNE | Date of Report 19 - 4 - 1973.

DESCRIPTION: dimensions; present condition; architectural features etc. JAMES PULHAM FOUNDED A TERRA COTTA WORKS ON THIS SITE IN 1868. THE CLAY MILL & SINGLE KILN HAVE BEEN RETAINED AS A FEATURE OF A CAR PARK. THE C.I. RIM GRANITE EDGE RUNNERS ARE ROTATED IN A PAN OF STONE & CONCRETE BY TWO HORSES. WOOD SHAFTS AND SUPPORTS.

(Further remarks or photo/sketch may be recorded on the back)

Machinery and Fittings

Danger of Demolition or Damage VANDALISM - FENCE SHOULD BE PADLOCKED.

Printed, Manuscript or Photographic Records PHOTOS. JRM - PAGE 90 I.P. OF HERTFORDSHIRE - BRUNCH JOHNSON.

Reporter's name and address:- | Return to:-

Institution or Society:-

C.B.A. Industrial Archaeology Report Card. LOWER

In 1984 English Heritage was created and, in the aftermath of the accelerated survey, immediately undertook designation programmes, notably the Monument Protection Programme and the Thematic Listing Review, which were to primarily encompass industrial sites. Meanwhile, the RCHME throughout the 1980s and 1990s undertook and supported surveys of key types of historic industrial sites including textile mills in West Yorkshire, Greater Manchester, East Cheshire, North East Derbyshire and the Derwent Valley, workers housing in West Yorkshire, potteries in Staffordshire, military gunpowder and explosive works, ironworks in Furness and workshops in the Birmingham Jewellery Quarter. Some of the later surveys were designed from the outset to inform designation through an RCHME/EH Liaison Committee. In 1999 the RCHME merged with English Heritage and the work on industrial surveys has continued and expanded.

The Monuments Protection Programme which was initiated in 1986 to increase the number of nationally important monuments that were designated, developed a systematic approach for classifying, evaluating and selecting sites for designation and for other forms of management. When the industrial component of MPP ground to a halt in 2004, Step 1 reports had been produced on 33 industries and nearly 5,000 sites and buildings had been evaluated in the field. Fourteen Step 4 reports were produced, covering 20 industries with recommendations for over 1,000 new Scheduled Ancient Monument designations and around 350 candidates for listing consideration. The Step 1 and 3 national overviews retain high research and operational value and as they constitute an authoritative source of information on industrial heritage Step 1 reports are being made accessible on the EH web pages.

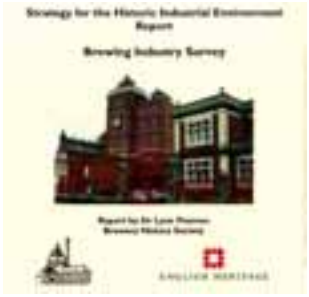
Thematic Listing Review (TLR) was born out of an appreciation that the traditional geographical approach to listing had not provided adequate cover for many types of building. Two approaches were adopted – to attempt as comprehensive cover as possible for each building type or, alternatively, to evaluate a number of examples of each building type that would then serve as a benchmark for further listing. The former approach, when focused on small areas such as the Birmingham Jewellery Quarter, worked well and a comprehensive conservation strategy emerged from the large number of listings. However, of the larger regional textile mill surveys, for example, only the Greater Manchester survey has as yet been carried through to completion.

Following the end of MPP in 2004, a less resource-hungry successor programme – SHIERs (Strategy for the Historic Industrial Environment Reports) – was begun. National in scope, these projects were designed to provide an introduction to historic industries and to assess the current state of the resource providing sufficient contextual information on levels of survival, protection and significance to guide future designation. Lack of resources has impeded their progress but the two published SHIERs – on Maltings and on Breweries – have demonstrated their potential while the as yet uncompleted reports on the Atomic Age and Engineering Works are informing EH's involvement in those fields.

These various surveys and studies have now enabled the sector to aspire to a comprehensive overview of the industrial heritage resource and this has enabled the selection of thematic industrial landscapes to be nominated as World Heritage Sites. Internationally, sites celebrating industrial heritage have proliferated in the last decade – in 1999 there were just 20 sites and only one British, now following the successful implementation of the 1999 UK Tentative List the UK share has risen to eight out of 42. These eight landscapes – the Ironbridge Gorge, Blaenavon, Derwent Valley Mills, New Lanark and Saltaire textile Mills and settlements, Liverpool Maritime City, Cornish Mining Industry and the Pontcysyllte Aqueduct (with 10km of canal approaches) represent Britain's outstanding contribution to global industrialisation and EH's IA Panel was instrumental in elaborating the concept of such thematic landscapes.

Half a century on from the demolition of the Euston Arch, NHPP is therefore building on a sure foundation of understanding and achievement. Tens of thousands of historic industrial assets are already designated and despite Industrial Heritage at Risk showing them to be amongst the most threatened historic environment resource, their management is reaching ever higher levels of sophistication. English Heritage has an enviable international reputation for its work in protecting the nation's industrial heritage – long may it continue!

Keith Falconer



The Brewing Industry SHIER – CD cover 2010. The Brewery History Society's survey of the brewing industry's legacy is the most comprehensive SHIER yet undertaken

Cover of The UK 1999 Tentative List of World Heritage Sites. The Tentative List included 11 proposals for industrial sites based on the concept of themed industrial landscapes developed by EH's Industrial Archaeology Panel

National recording of industrial heritage

Bringing together the results of past recording projects enhances knowledge and informs protection.

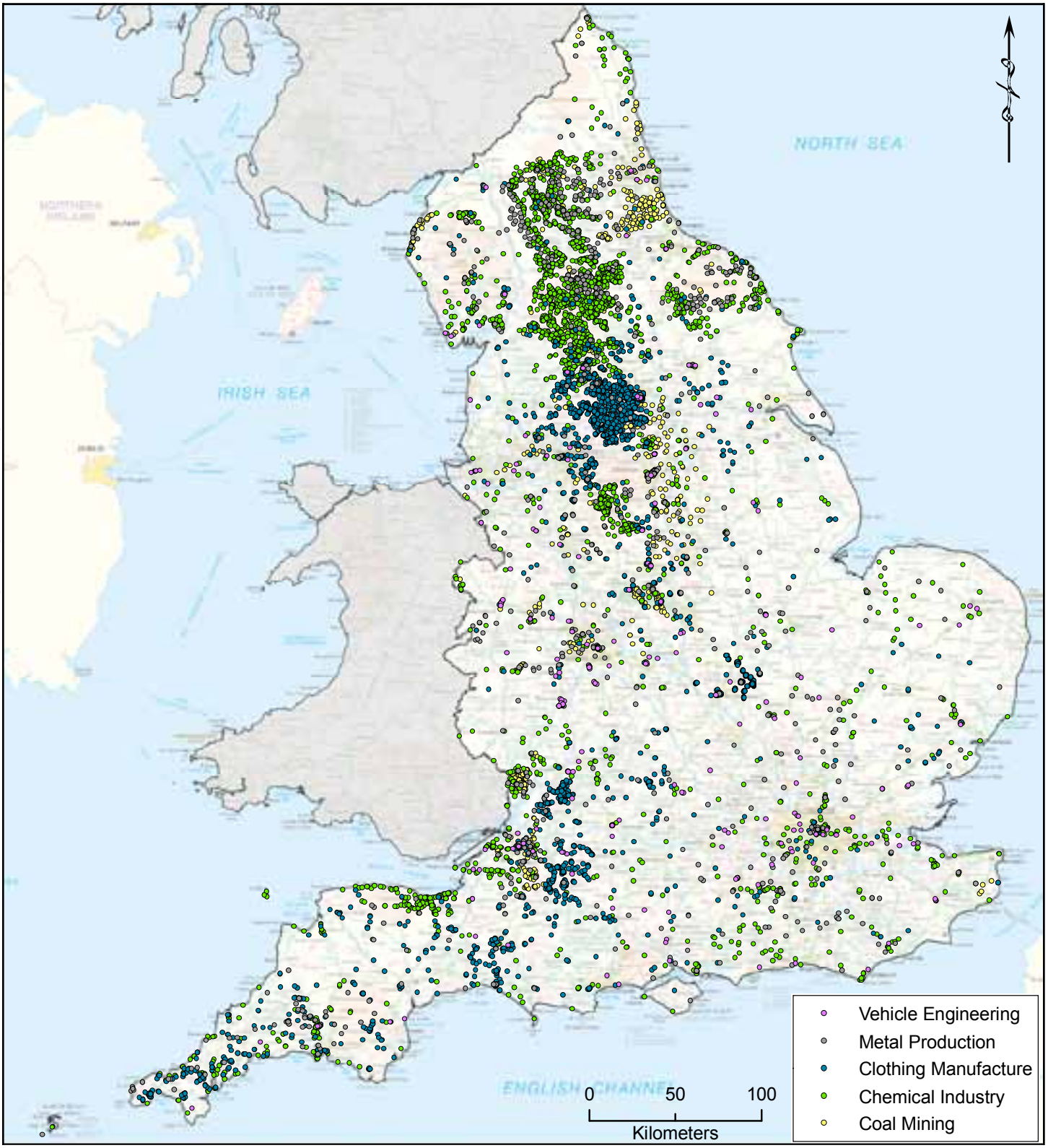
Since the former Royal Commission on the Historical Monuments of England (RCHME) lifted its recording cut-off date of 1715 in 1963, industrial archaeology has been a significant part of the national desk-based recording programme that complements the parallel work of local Historic Environment Records (HERs). The National Record of the Historic Environment (NRHE), now managed by English Heritage, currently contains information about more than 45,000 different industrial sites. Alongside them are a further 12,000 records of survey and excavation events that have taken place on industrial sites, which are being constantly added to via OASIS (an online system for recording details of fieldwork, http://oasis.ac.uk) as more fieldwork takes place. In addition to these documentary records, English Heritage Archives contains more than 60,000 photographs, plans and drawings of historic industrial sites and buildings.

Two recent projects have looked at past industrial recording initiatives in order to improve the completeness of the NRHE.

English Heritage's Monuments Protection Programme (MPP), which ran from 1986 to 2004, took a thematic approach to the designation of industrial sites, the results of which were presented as a series of 'Step reports'. The first Step report was an overarching evaluation of an industry, while Step 3 comprised a detailed gazetteer of known sites ordered by county. These reports were designed to identify potential sites for scheduling rather than add to the national record. To make this information more widely available and improve our understanding of the totality of our industrial heritage a project was undertaken to systematically concord all the available Step 3 data against existing sites in the NRHE, to create new records where appropriate, and to reference the report as the source. As a result, no fewer than 2000 separate NRHE records were created or augmented, all of which can now be interrogated on line not only on the basis of county and type of industry but by a range other search criteria.

The second and still-ongoing project takes as its starting point the National Record of Industrial Monuments (NRIM) card index that was begun in 1963 by the Council for British Archaeology in partnership with the Ancient Monuments Inspectorate and the University of Bath, before being closed in 1981. During that time a team of volunteer recorders completed some 8000 separate cards, which now form part of the English Heritage archive. A pilot project demonstrated that the index included a significant number of sites which were unknown to either the NRHE or to the relevant local HER. This is partly due to the large number of minor sites that were recorded as well as others that have since been destroyed. It is this documented history of destruction that highlights the risks faced by the remaining elements of our industrial heritage and thus the importance of the industrial focus of this year's Heritage at Risk campaign.

Where the NRHE has comprehensive coverage of a subject area it can be of great value to the process of protection. As well as providing information about individual sites, it is able to present a valuable overview of different types of industrial activity that can in turn help establish the principles and guidelines by which sites are selected for statutory designation. The NHRE also contains details of buildings and sites which were investigated but which did not meet the criteria for listing or scheduling but which may still be of significance at a more local level, these include many industrial sites.



The distribution of sites from five industries in the National Record of the Historic Environment

The continued recording of industrial heritage for the purpose of providing national overview and context is formally endorsed in English Heritage's recently published National Heritage Protection Plan. Meanwhile, the records resulting from the MPP reports and those being created from the NRIM cards are being made publicly available via PastScape (www.pastscape.org.uk). Catalogue information and, images, where available, can be accessed through English Heritage Archives (www.englishheritagearchives.org.uk).

Martin Newman

Skills and knowledge – developing capacity to support the NHPP

A new Capacity Building Team will develop the ability of English Heritage staff and the wider sector to respond to the National Heritage Protection Plan.

The new Capacity Building Team will be concerned with skills acquisition and knowledge sharing. To develop skills, the Team will co-ordinate the development and delivery of training courses, both face-to-face and via e-learning, building on the success of the Historic Environment Local Management (HELM) courses and professional development courses run with Oxford University. To develop and transfer knowledge the Team will examine three areas that underpin research: what we know, what we want to know, and how we find out. Plans for this will be developed as a supporting action for the NHPP. Initiatives supported by English Heritage to increase skills and knowledge in industrial archaeology illustrate how a co-ordinated approach to capacity building can support improving practice.

ACQUIRING SKILLS: TRAINING

The new Team will work to ensure that relevant skills exist to deliver the National Heritage Protection Plan aided by a new training delivery strategy. Two initiatives illustrate English Heritage funded work for two different audiences with an interest in industrial heritage.

A HELM training course field visit in progress

Working with the Association for Industrial Archaeology (AIA) and the Council for British Archaeology (CBA), in 2008, EH launched a series of day schools aimed primarily at volunteers working, for example, on behalf of a society or local community. Topics covered included the archaeology of buildings, and issues in adaptation and reuse. The series ran until 2011. At the same time, and for a more specialised audience the EH Science Advisor team developed and ran the Industrial Residues Training programme at regional venues. This gave researchers hands-on experience in the use of samples of iron and non-ferrous industrial slag and waste to understand in detail the processes in use at particular sites.

SHARING KNOWLEDGE: WHAT WE KNOW, WHAT WE WANT TO KNOW, HOW WE FIND OUT

Effective research builds upon a clear understanding of what is already known. For industrial heritage, an example is the publication of the latest Heritage At Risk database in October 2011, the result of the largest ever research project to assess the condition of England's industrial heritage. Other research results are made available in publications such as *Energy Efficiency and Historic Buildings*, published in 2011, which presented results of experiments in improving the thermal efficiency of sash windows, alongside guidance on improving insulation.

The Capacity Building Team will assist and advise upon EH strategies to take maximum advantage of the opportunities presented by new technologies for the dissemination of results.

What are the priorities for acquiring new knowledge? Fifteen years ago in '*Frameworks for our past'* English Heritage established a three-part approach to focussing research resources to enable the broader sector to first assess current understanding, then to set an agenda for necessary research and supporting strategies. Frameworks for industrial heritage have been developed by professional associations and specialist societies, for example *'Understanding the Workplace: a research framework for industrial archaeology in Britain'* (Industrial Archaeology 2005 D Gwyn, M Palmer). More specific research frameworks for industrial heritage continue to be developed with English Heritage support. One such is the *'Research Framework for the Archaeology of Extractive Industries in England'* currently in preparation by the National Association of Mining History Organisations (http://www.vmine.net/namho-2010/research.asp).

A particular example of knowledge transfer to be addressed by the Capacity Building Team will be to improve access to the wide range of current and developing research frameworks, so that knowledge captured through the research questions in these documents can be quickly identified and made available as opportunities for research arise. This will be particularly significant in formulating heritage responses to planning applications, or assessing projects for commissioned work and grant-aid.

Written guidelines are an effective route to transfer knowledge and expertise acquired over many years in a form that's available for reference when needed. 'Finding out' might be improving understanding, or establishing new approaches to valuing or caring for heritage. As examples for industrial buildings, English Heritage expertise in site investigation is communicated in recently published guidelines on '*Archaeological Evidence for Glassworking'*. The expertise we have in assessing the value and significance of industrial buildings is captured in the Selection Guidelines series, including '*Transport Buildings'*, '*Utilities and Communications Buildings'*, or '*Industrial Structures'*, all available via http://www.english-heritage.org.uk/publications. Our expertise in specific site management is likewise put into practice in English Heritage support for Telford and Wrekin Council to develop design guidance for the management of the Iron Bridge World Heritage Site management Plan, forthcoming from Telford and Wrekin Council. http://www.telford.gov.uk.

© LGA

A screen-shot of the Knowledge Hub site that EH is using to engage communities on the NHPP

Work in the Capacity Building Team will focus on co-ordination of guidelines development, and improving access to and application of English Heritage guidelines.

COMMUNITIES OF PRACTICE

Work in these areas cannot succeed fully in isolation, nor can they be regarded as static. Research results will be re-interpreted, or new techniques brought to bear to yield further knowledge. Research frameworks need to respond to reflect the completion of work in some areas, and the emergence of new priorities elsewhere. Guidelines on good practice need to adapt as changes in national policy, or new techniques, or entirely new tasks or ways of working as these become embedded in professional practice. This need for integration and adaptation validates the association between knowledge transfer work and training, established in the Team.

A function of capacity building will be to encourage the development of communities of practice to promote the sharing of professional knowledge. In addition to face-to-face groups this will build upon experiments with well-established email discussion lists and new collaboration platforms such as the Knowledge Hub site developed in 2011 by the Local Government Association. Those attending training courses, those undertaking research, or developing new ways of working need to do so in a culture of continuous professional dialogue. In this way skills and knowledge will improve the capacity of the sector to better understand and protect England's heritage.

Edmund Lee

Industrial Heritage at Risk

The Industrial Heritage at Risk project, was formally launched on 19 October 2011. Here, we describe the outputs arising from the project, their purpose and where this information can be found.

The Industrial Heritage at Risk website (www.english-heritage.org.uk/industrial-heritage-at-risk) is the primary vehicle for finding out more about the project. It is arranged under four main headings:

'What we Know' provides an overview of the key research findings including an analysis of the Heritage at Risk Register. Of Grade I and II* listed industrial buildings, 10.6% are at risk, making industrial buildings over three times more likely to be at risk than the national average. The results of the public attitudes survey are also presented here together with an analysis by region. There is overwhelming public support for the industrial heritage with over 80% of those surveyed agreeing that it is as important to preserve as castles and country houses.

© English Heritage

The 'industrial' themed *Conservation Bulletin* provides an introduction to the subject, considers the key issues and contains articles from many of the organisations involved

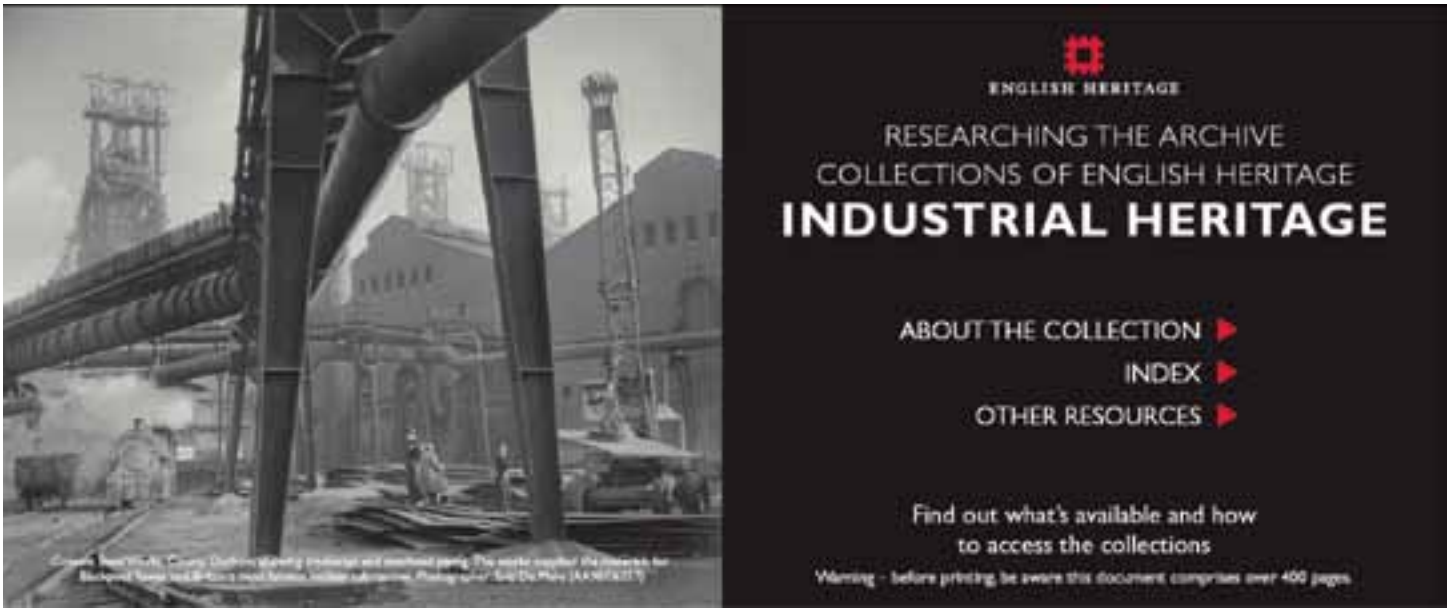
'Protecting Industrial Sites' outlines the approach to the statutory designation of industrial sites. Links are given to the relevant industrial selection guides for listing and an introduction to the National Heritage Protection Plan highlights those activities which relate to the industrial heritage.

'Looking after our Industrial Heritage' is a signposting page for those who are involved in the management and conservation of industrial sites. It provides links to the following:

'Information for Heritage Specialists'. Aimed at local authority historic environment officers, consultants and contractors who offer their services to developers and the voluntary sector, both new and existing information and advice is described. An 'industrial' themed *Conservation Bulletin* has been produced which provides an introduction to the subject, considers the key issues and contains articles from many of the organisations involved.

At a more general level advice and training is to be given to local authorities on enforcement action to tackle buildings at risk (including industrial buildings at risk) and measures for underused and vacant historic properties. The publication of updated guidance on *Stopping the Rot* and *Vacant Historic Buildings: An Owners Guide to Temporary Uses, Maintenance and Mothballing* is a response to this. It is hoped the latter will be particularly helpful to owners and developers given the current economic situation.

'Owning and Developing an Industrial Site'. Although this page deals specifically with owners and developers of industrial sites, a new 'developer's portal' has also been created on the English Heritage website to



At over 400 pages this new guide to the industrial collections held in the English Heritage archive is indexed by industry type and provides access to a wealth of information

offer help and advice on the reuse of heritage assets including industrial buildings. For the first time this year each of the English Heritage local offices have identified ten priority sites from the Heritage at Risk Register where additional help and advice will be given to owners and developers. The industrial examples include Bowes Railway, Grassington Lead Mine, Ditherington Flax Mill (see pages 3-9), Sleaford Bass Maltings and Tone Mills (*Research News* **13**).

The guidance on *Vacant Historic Buildings* will be helpful for those who are currently experiencing difficulties with underused or empty industrial buildings whereas in the North West, English Heritage has supported Lancashire Fire and Rescue in preparing a booklet on arson risk reduction. This has been produced to assist owners and managers of historic industrial buildings in Lancashire, but may be of help elsewhere.

'Setting up a Building Preservation Trust'. Where the private sector is unable or unwillingly to provide a solution for redundant industrial buildings charitable organisations such as building preservation trusts, development trusts, groundwork trusts and civic societies may be able to step in. This page describes their work and as part of the Industrial Heritage at Risk Project, the Architectural Heritage Foundation with the support of English Heritage has established three Regional Development Officers in the north of England, the midlands and the south west. Focusing on the industrial heritage, the aim of these posts is to bring together voluntary bodies with sites that are at risk.

A grant scheme for industrial sites has also been created by the Architectural Heritage Fund with funding from English Heritage, the John Paul Getty Junior Foundation and the Pilgrim Trust. This is to support voluntary organisations at the earliest stages to determine whether possible projects can be taken forward.

'Running an Industrial Site'. There are over 650 industrial sites in England that are preserved with public access and a number retain historic and sometimes working machinery. Many were established in the 1960s and 1970s, and are owned or managed by voluntary bodies or local authorities. The webpage considers these sites and highlights the research findings of two English Heritage commissioned reports which raised concerns over their long-term sustainability. This situation is being heightened by the current budgetary pressures on local authorities which is likely to result in further sites being taken on by the voluntary sector.

To address these concerns and help build capacity English Heritage is to part-fund an industrial heritage support officer. The Ironbridge Gorge Museum Trust working in partnership with the Association of Independent Museums has recently been awarded a grant to manage the post.

A new English Heritage teacher's kit has also been prepared on investigating industrial

sites and it is hoped this will encourage and support school visits as well as stimulating interest amongst the younger generation.

'Re-using Industrial Sites'. Finding an alternative use for functionally redundant industrial sites is often one of the best ways of securing their long-term future. To help inform the Industrial Heritage at Risk project and the Heritage at Risk strategy in general English Heritage commissioned a survey to consider how private developers could be encouraged to invest more in historic buildings. The findings are presented here together with links to the research reports and case studies which are all based on industrial buildings.

There is also a report by Heritage Works on the *Economics of Industrial Conservation Projects in Pennine Lancashire*. This looks at the typical construction defects, repair requirements and re-use options when dealing with redundant textile mills. It complements an earlier project that considered the conservation and re-use of north lit weaving sheds in Lancashire and the information contained in both reports may be of help in other areas where similar structures can be found.

'Getting Involved' provides information on some of the key voluntary groups that work in the sector together with useful resources for researching industrial sites. This includes a new guide to the industrial collections that can be found in the English Heritage archive (see image on page 39). The archive contains photographs, plans and drawings as well as individual site reports prepared by the English Heritage survey teams. There are further pages on books on the industrial heritage published by English Heritage together with places to visit.

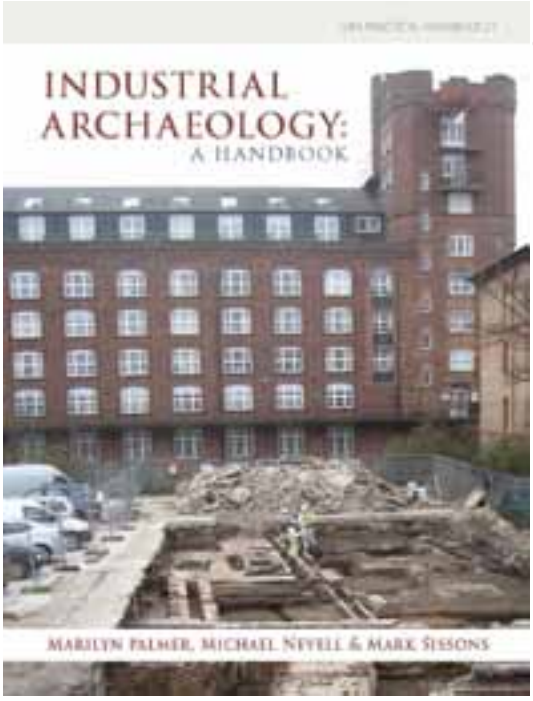
It is also possible to look at all the individual entries for industrial sites that are on the Heritage at Risk Register as well as a case study bank of more than 40 sites which are either at risk or have been saved through the action of private developers, local bodies or voluntary organisations.

NEXT STEPS

Over the coming months further pages will be added to the website which will include all the Monument Protection Programme Step 1 Industry reports. English Heritage is also supporting the publication of a *Handbook of Industrial Archaeology* by the Council for British Archaeology. This developed from a series of day schools arranged in partnership with the Association for Industrial Archaeology and is aimed at all sectors with a professional or volunteer interest in industrial archaeology and the industrial heritage. The handbook is due to be published in spring 2012 and further details can be found at www.britarch.ac.uk/books/handbooks.

Further projects arising from the Industrial Heritage at Risk initiative will be taken forward as part of the National Heritage Protection Plan 2011-15. The industrial heritage features strongly in the Plan and there are more than 35 specific projects grouped into four main activities – 4A3 Historic Ports, Dockyards and Coastal Resorts, 4B1 Historic Water Management Assets, 4B2 Traditional Industry, Modern Industry, Mining and Associated Housing, and 4B3 Transport and Communications. The projects include national reviews of twentieth century industry and worker's housing, Lancashire textile mills Phase II and a study of railway signal boxes (pp 20-21).

Shane Gould



The Council for British Archaeology *Handbook of Industrial Archaeology* is to be published in spring 2012 with the support and funding from English Heritage

NOTES & NEWS

A round-up of activities and developments showing some of the scope and variety of projects that are ongoing in the Heritage Protection Department.

GLASSWORKING GUIDELINES

The latest edition in the English Heritage series of Guidelines has now been published and a copy can also be downloaded FREE from the English Heritage website at: http://www.english-heritage.org.uk/ (go to Professional > Publications > Guidelines and standards). **Archaeological Evidence for Glassworking** Guidelines for Best Practice Sarah Paynter and David Dungworth. English Heritage, Swindon, 2011.

This latest edition in the English Heritage Guidelines series focuses on the identification, investigationand interpretation of glassworking evidence at sites in England from the Bronze Age until the 20th century. Comprising 12 chapters, with numerous photographs and illustrations, this guidance draws oncontributions and case studies from experts in the field, includingarchaeologists, glass specialists, glassworkers and archaeological scientists.

The guidelines can be reached by smart-phone apps using the QR-code QRGlassworking

RESEARCH (DEPARTMENT) REPORT SERIES: July 2011 – December 2011

2009 SERIES

53. Winton , H, 'Mere End Down, Letcombe Bassett, Oxfordshire: Aerial Photographs as a Resource For Conservation Management '

2010 SERIES

9. Watson , J and McCormick , E, 'Collingbourne Ducis, Wiltshire: Examination and Analysis of the Metalwork from the Anglo-Saxon Cemetery'

64. Jessop , L, and Whitfield , M, 'The Parish of Alston Moor, Cumbria: Historic Area Assessment'

2011 SERIES

4. Brown, G , Oswald, A, Burn, A, and Jecock, M, 'Byland Abbey, North Yorkshire: Archaeological Survey and Investigation of Part of the Precinct and Extra-Mural Area'

14. Hazell, Z, 'Hoo Peninsula, North Kent coast, Thames Estuary : A Palaeoenvironmental Review of the Development of the Hoo Peninsula'

18. Worley, F, 'A Reanalysis of the Antler Assemblage Excavated from Silbury Hill in 1969-70'

27. Skinner, R, 'Kitchener's Camps at Seaford: The Aerial Survey of a First World War Landscape'

31. Dungworth, D, Cooke, J, Cooke, R, and Martlew, D, 'St Michael's and All Angels' Church, Thornhill, Dewsbury, West Yorkshire. Scientific Examination of Stained Window Glass'

35. Toms, P S, and Pope, M, 'Beedings, West Sussex: Optical Dating of Sedimentary Deposits'

36. Toms, P S, Brown, A G, Jackson, R, and Mann, A, 'Lower Severn Valley: Piloting Optical Dating of Terraces'

39. Brodie, A, 'The Garrison Defences, St Mary's, Isles of Scilly : The Development of its Defences 1500 – 1945'

40. Brodie, A, 'Arthur's Hall, Dover Castle, Kent: Analysis of the Building'

41. Brodie, A, and Higgott, G, 'Inner Bailey, Dover Castle, Kent: The Development of the Buildings 1200 -1800'

42. Lane, R, 'Stonehenge World Heritage Site Landscape Project: Architectural Assessment'

43. Dungworth, D, Paynter, S, and Phelps, M, 'Downside Mill, Cobham, Surrey: Analysis of the Metalworking Remains'

45. Gregory, D, 'RAF Stanbridge, Leighton Buzzard, Bedfordshire: Desk Based Assessment'

48. Cocroft, W D, and Gregory, D, 'Barnham, St Edmundsbury, Suffolk: RAF Barnham, Special Storage Site. Documentary Analysis of Sources in The National Archives'

50. Girbal, B, '4 Low Forge, Wortley, South Yorkshire : An Investigation of the Slags'

51. Girbal, B, 'Roman and Medieval Litharge Cakes : A Scientific Examination'

55. Gravgaard, AM, 'West Heslerton, Yorkshire: Investigative conservation of a human skull and associated textiles'

56. Bowden, M, 'Isles of Scilly: Military Defences, 1540-1951: Earthworks and Minor Sites'

57. Jones, B V, and Horsfall Turner, O, 'Westacott Barton, North Tawton, Devon: Analysis and Interpretation of a Devon Hall House'

58. Canti, M, 'Silbury Hill, Wiltshire: Geoarchaeological Analysis from Silbury Hill Excavations 2007/2008'

59. Radford, S, 'Norton Priory, Cheshire: Air Photograph Assessment'

62. Linford, N T, 'Lullingstone Roman Villa, Eynsford, Kent. Report On Geophysical Survey, January 2011'

65. Ayton, G, 'Carisbrooke Castle, Isle of Wight: The Mammal and Bird Bone from the 2006 and 2008 Evaluations'

68. Hunt, A, 'English Heritage Coastal Estate Risk Assessment'

69. McOmish, D, Graham, K, and Grech, D, 'Plaiters' Lea Conservation Area, Luton: Historic Area Assessment

72. Jones, J, Fell, V, Watson, J, Graham, K, Skinner, L, Schaeder, U, Gao, J, Karsten, A, and Penton, S, 'Townfoot Farm, Cumwhitton, Cumbria : Investigative Conservation of Material from the Viking Cemetery'

73. Smith, P, 'The 'Umbrello', Great Saxham Hall, Suffolk: Recording and Analysis'

74. Smith, P, 'St Osyth's Priory, St Osyth, Essex: Historic Buildings Report'

79. Tyers, I, 'Brunel Court, Preston, Lancashire: Dendrochronological Analysis of Oak Timbers'

80. Noel, M, 'Ashtead Roman Villa, Ashtead Common, Surrey: Archaeomagnetic Analysis of a Roman Tile Kiln'

81. Toms, P S, 'Seabed Prehistory Area 240: Optical Dating of Submarine Cores'

82. Bishop, S, 'Stonehenge World Heritage Site Landcape Project: Level 1 Field Investigations'

83. Bishop, S, 'Stonehenge World Heritage Site Landscape Project: King Barrow Ridge'

84. Graham, K, and Gravgaard, AM, 'St. Augustine's Abbey, Canterbury, Kent: Investigative Conservation of a Human Skull'

85. Graham, K, 'Church End, Chesterton Manor, Warwickshire: Investigative Conservation of Glass'

86. Howard, R E, and Arnold, A J, 'Church of St James, Whiston Street, Bristol: Tree-Ring Analysis of Timbers of the Nave and Chancel Roof'

87. Knight, D, 'Brompton-by-Sawdon: A New Villa Site in North Yorkshire'

92. Bowden, M, 'Stonehenge World Heritage Site Landscape Project: Earthworks at Lake and West Amesbury'

93. Alexander, M, 'A Look in the Rear-View Mirror: Roads and Archaeology'

94. Linford, N T, 'Arbor Low: Geophysical Survey Report'

100. Payne, A W, 'Penhale Round, Cornwall: Report on Geophysical Surveys, February and November 1991'

106. Howard, R E, and Arnold, A J, 'Church of St Peter, Swingfield, Kent: Tree-Ring Analysis of Timbers'

109. Bridge, M C, 'The Jewel Tower, Abingdon Street, Westminster, London'

110. Bishop, S, 'Castle an Dinas, St Columb Major, Cornwall: Archaeological Survey Report'

112. Howard, R E, and Arnold, A J, '95 High Street, Coleshill, Warwickshire: Tree-Ring Analysis of Timbers'

119. Smith, P, 'Audley End Stables, Saffron Walden, Essex: Record of Areas Opened Up Prior to Repairs'

120. Bridge, M, 'Cockington Court, Cockington Lane, Cockington, near Torquay, Devon - Tree-Ring Analysis of Timbers'

122. Canti, M, and White, H, 'Comparison of Clay with Flints from Silbury Hill and Local Neolithic Pottery Fabrics'

NEW **PUBLICATIONS**

(Continued from back page)

Lowerre, A 2010 'The Atlas of Rural Settlement in England GIS'. *Landscapes* **11(2)**, 21–44

Macleod, D 2011 'Aerial Survey and Heritage at Risk' *Proceedings of the conference: Yorkshire's Landscapes and Historic Buildings at Risk*. PLACE, York St John University 3-6.

Marshall P D, 2011 'The radiocarbon dates', in Lewis, J and Mulling, D 'New excavations at Priddy Circle 1, Mendip Hills, Somerset'. *Proc Univ Bristol Spel Soc, **25**, 154-5*

Marshall, P, 2011 **'**Dating sequence for water-holes and wells G53/53.1 (Phases 3–4)' in Ingham, D, 'Farming at Hill Field, Wilshamstead in the first millennium AD', *Beds Arch,* **26**, 210-12

Marshall, P, 2011 **'**Glass' in Baker, K, Baker, S, and Symonds, J, 'Archaeological investigations at Upper Chapel, Norfolk Street, Sheffield, UK', *Internet Arch* **29/4**

Marshall, P, 2011 'Appendix 4: Other artefactual finds' , in Davies, G, Stenton, M, Fitzgerald, R and Kinchin-Smith, R, *Monk Bridge Ironworks*, York Arch Trust, 169–170

Marshall, P D, Bayliss, A, Meadows, J, Bronk Ramsey, C, Cook, G, and van der Plicht, H, 2011 'Appendix 1: Radiocarbon Dating' in Bridgland, D, Innes, J, Long, A and Mitchell, W (eds), *Late Quaternary Landscape Evolution of the Swale-Ure Washlands, North Yorkshire* (Oxford: Oxbow Books)

Marshall, P, Nowakowski, J, Quinnell, H, and Bronk Ramsey, C, 2011' Absolute Dating' in Nowakowski, J A and Quinnell, H *Trevelgue Head, Cornwall: the importance of CK Croft Andrew's 1939 excavations for prehistoric and Roman Cornwall*, (Cornwall CC), 132–143

Momber, G, Heathcote, J, Scaife, R, Gillespie, J, Robinson, M, Locker, A, Nayling, N, Hamilton, D, Marshall, P, Bronk Ramsey, C, and Cook, G, 2011 Chapter 3. Bouldnor Cliff II: A window into the Mesolithic landscape in Momber, G, Tomalin, D, Scaife, R, Satchell, J, and Gillespie J (eds), *Mesolithic occupation at Bouldnor Cliff and thesubmerged prehistoric landscapes of the Solent*, CBA Research Report **164,** 19–65

Momber, G, Bynoe, R, Bailey, G, Scaife, R, Nayling, N, Hamilton, D, Marshall, P, Gillespie, J, Bronk Ramsey, C, Cook, G, and Taylor, N, 2011 'Chapter 4. Archaeological, palaeoenvironmental, and morphological investigations at BC-V. Momber, G, Tomalin, D, Scaife, R, Satchell, J, and Gillespie J (eds), *Mesolithic occupation at Bouldnor Cliff and thesubmerged prehistoric landscapes of the Solent*, CBA Research Report **164,** 66–93

Momber, G, Scaife, R, Gillespie, J, Nayling, N, Hamilton, D, Marshall, P, Bronk Ramsey, C, and Cook, G, 2011 'Chapter 5. Rising waters, evvironmental change, and humans at BC-IV' in Momber, G, Tomalin, D, Scaife, R, Satchell, J, and Gillespie J (eds), *Mesolithic occupation at Bouldnor Cliff and thesubmerged prehistoric landscapes of the Solent*, CBA Research Report **164,** 94–101

Parker Pearson, M, Pollard, J, Richards, C, Thomas, J, Tilley, C, and Welham, K, Albarella, U, Chan, B, Marshall, P, and Viner, S, 2011 'Feeding Stonehenge: feasting in Late Neolithic Britain', in Aranda Jiménez, G, Montón-Subías, S, and Sánchez Romero M, (eds) *Guess Who's Coming to Dinner: commensality rituals in the prehistoric societies of Europe and the Near East*, (Oxford: Oxbow Books), 73–90

Payne, A, 2011 'The Neolithic and early Bronze Age Archaeology of the Raunds Area Investigated by Geophysical survey', in Harding, J and Healy, F (eds) 2011 *A Neolithic and Bronze Age Landscape in Northamptonshire: The Raunds Area Project, Volume 2 - Supplementary Studies* (Swindon: English Heritage Publishing) 839-865

Roberts C and Mays S, 2011 'Study and restudy of curated skeletal collections in bioarchaeology: a perspective on the UK and its implications for future curation of human remains', *International J Osteoarchaeology*, **21**, 626-630.

Rose, M E with Falconer, K and Holder J 2011 *Ancoats: Cradle of industrialisation* (Swindon: English Heritage)

Saint, A, and Guillery, P, 2011 'Recording the Fabric of Great Cities: report of an international meeting organized by the Survey of London and sponsored by English Heritage', *The London Journal*, **36/3**, 269–74

Schofield J and Cocroft W D 2011 'Hohenschönhausen: visual and material representations of a cold war prison landscape' in Myers, A, and Moshenska, G (eds) *Archaeologies of Internment*, (New York: Springer), 245-61

Drury, P and Smith, P 2010 'Audley End Stable Block in the 17th Century', EH Hist Rev, **5**, 44-81.

Straker, V, 2011 'Science and Archaeology', *Cornish Archaeol*, **50**, 175–186

Vyner, B, and Wall, I, with Bayliss, A, Beswick, P, Bronk Ramsey, C, Brooks, I, Collins, P, Chamberlain, A, Donahue, R, Frederick, C, Garton, D, Marshall, P, Tyers, I, van der Plicht, J, Wagner, P, and Witkin, A V, 2011 'A Neolithic cairn at Whitwell, Derbyshire', *Derbys Archaeol J*, **131**, 1-132

Waddington, C, Marshall, P, and Passmore, D G, 2011 'Towards synthesis: research and discovery in Neolithic North-East England', *Proc Prehist Soc*, 77, 279–319

Went, D, 2011 'Whitley Castle: a long forgotten fort in the shadow of the wall', *in* Mason, D (ed) *Hadrian's Wall Archaeology* **2,** 1-7 (Durham: Durham County Council)

Whittle, A, Healy, F, and Bayliss, A, 2011 Rassembler le temps: la datation des enceintes à fosses interrompus du Néolithique Ancien du sud de la Grande-Bretagne, in *Le Néolithique du Nord de la France dans son contexte européen: habitat et économie aux 4e et 3e millénaires avant notre ère* (eds F Bostyn, E Martial, and I Praud), Revue Archéologie de Picardie, no spécial **28**, 41–54

Whittle, A, Healy, F, and Bayliss, A, 2011 *Gathering Time. Dating the Early Neolithic Enclosures of Southern Britain and Ireland*, (Oxford: Oxbow Books)

Wickstead, H and Barber, M, 2012 'A Spectacular History of Survey by Flying Machine', *Cambridge Archaeol* , **22 (1)**, 71-88

Wilmott, T, 2011 'Richborough; more than a Roman fort', *Current Archaeology*, **257**, 20-25

Wilmott, T, 2011 Review of Vagalinski, L F 2008 *Blood and Entertainments; Sports and Gladiatorial Games in Hellenistic and Roman Thrace*, (Sofia), *Britannia* , **42, 492**

NEW PUBLICATIONS

Baker, P, 2011 'Assessment of animal bones excavated in 2004-2005 at Nogara (Olmo di Nogara)', in Saggioro, F. (ed), *Nogara. Archeologia e storia di un villaggio medievale (Scavi 2003-2008)*, (Rome: Bretschneider), 107-121

Barber, M 2011 A History of Aerial Photography and Archaeology: Mata Hari's Glass Eye and Other Stories (Swindon: English Heritage)

Barclay, A, and Marshall, P, with Higham T F G, 2011 'Chronology and the radiocarbon dating programme' in Fitzpatrick, A, *The Amesbury Archer and the Boscombe Bowmen: Bell Beaker burials at Boscombe Down, Amesbury, Wiltshire,* Wessex Arch Rep, ***27,*** 167–184

Barrett, J C, Bowden, M C B and McOmish, D S, 2011 'The problem of continuity: reassessing the shape of the British Iron Age sequence' *in* Moore, T and Armada, X-L (eds) *Atlantic Europe in the First Millennium BC: Crossing the Divide* (Oxford: Oxford University Press), 439-48

Bayliss, A, Bronk Ramsey, C, Marshall, P, van der Plicht and Watson B, 2011 'Radiocarbon Dating', in Howell, I, Swift, D, and Watson, B, *Archaeological landscapes of east London. Six multi-period sites excavated in advance of gravel quarrying in the London Borough of Havering* , MOLA Monograph **54**, 121–123

Bayliss, A, and Atkins, C, 2011 **'**Chapter 15: Specialist Studies 1, Interpreting Chronology', in Rodwell, W and Atkins, C, *St Peter's, Barton-upon-Humber, Lincolnshire: a parish church and its community. Volume 1: History, Archaeology and Architecture, Part 2* (Oxford: Oxbow), 753–88

Bayliss, A, Finn, N, Higham, T, Meadows, J, and Rhodes, E, 2011 'Absolute Dating of the Cemetery', in Finn, N, *Bronze Age Ceremonial Enclosures and Cremation Cemetery at Eye Kettleby, Leicestershire: the development of a prehistoric landscape* , Leicester Archaeology Monogr, **20**, 53-61

Beavan N, Mays S, Cook G, Ditchfield P, 2011'Stable Isotope Analysis' in Rodwell, W and Atkins, C, *St Peter's, Barton-upon-Humber, Lincolnshire: a parish church and its community. Volume 1: History, Archaeology and Architecture, Part 2* (Oxford: Oxbow), 762-766.

Bishop, B, Leary, J and Robins, P, 2011 'Introducing the "Long-Tailed Oblique" arrowhead: examples from Marden Henge, Wiltshire, and Santon Warren, Norfolk', *PAST* **68**

Brown, Duncan H, 2011 *Safeguarding Archaeological Information. Procedures for minimising risk to undeposited archaeological archives* (Portsmouth: English Heritage)

Brown, Duncan H, 2011 'Sense and Sensitivity – or archaeology versus the 'wow factor' in Southampton, England' in Schofield, J and Szymanski, R (eds) *Local Heritage, Global Context*, (Farnham: Ashgate), 157-72

Brown, Duncan H, 2011 'Imported Pottery and the South Coast Ports of Medieval England' in Anne Bocquet-Lienard et Bruno Fajal (eds) *À propo[t] s de l'usage, de la production et de la circulation des terres cuites dans l'Europe du Nord-Ouest autour des XIVe-XVIe siècles*, Table Ronde du CRAHM, **5**, 221 – 232.

Canti, M G, 2009 'Deposits and site formation processes', in Allen, T, Hayden C, and Lamdin-Whymark, H, *From Bronze Age enclosure to Anglo-Saxon settlement: archaeological excavations at Taplow hillfort, Buckinghamshire*, Oxford Archaeology: Thames Valley Landscapes Monogr, **30**, 159-163.

Dobie, J, 2011 illustrations in Heslop, D and McAuley, Z, *'Digging Deeper' The origins of Newcastle and Gateshead* (Newcastle-upon-Tyne: Tyne Bridge Publishing)

Falconer, K, 2011 'From Icons to Landscapes, a celebration of LTC Rolt and 'industrial' World Heritage Sites' in Buchanan R A (ed) *Landscapes with Technology: Essays in honour of LTC Rolt*, (Bath: Millstream Books)

Gearey, B G, Chapman, H P, Howard, A J, Krawiec, K, Bamforth, M, Fletcher, W G, Hill, T C B, Marshall, P, Tetlow, E, and Tyers, I, 2011 'The Beccles triple post-alignment, Beccles Marshes, Suffolk: excavation and palaeoenvironmental analyses of an Iron Age wetland site', *Proc Prehist Soc,* **77**, 231–250

Griffiths, S, Bayliss, A, Ford, B M, Hounslow, M, Karlouskovski, V, Bronk Ramsey, C, Cook, G, and Marshall, P, 2011 'Chapter 6: Overview of the scientific dating evidence', in Ford, B M and Teague, S, *Winchester: a city in the making, archaeological excavations between 2002 and 2007 on the sites of Northgate House, Staple Gardens and the former Winchester Library, Jewry St*, Oxford Archaeol Monogr, **12**, 225–36

Hammon, A. (2011) 'Understanding the Romano-British – Early Medieval Transition: A Zooarchaeological Perspective from Wroxeter (Viroconium Cornoviorum)'. *Britannia*, **42**, 275-305

Harwood, E, 2011 *Chamberlin, Powell and Bon*, (RIBA Publishing with English Heritage and the Twentieth Century Society)

Harwood, E, 2011'The Barbican, City of London' in *Delft Architectural Studies on Housing, 5, The Urban Enclave*, (Delft: NAi Uitgevers), 22-33

Harwood, E, 2011'Stirling and the North', *Architecture and the Built Environment*, **14**, 9-12

Haynes, I and Wilmott, T 2011 'Jupiter: best and greatest?', *Current Archaeology*, **259**, 20-25

Hook, R. 'Medieval Roofs in the North of England', in Walker, J (ed), *The English Medieval Roof: Crownpost to Kingpost*, Report of the Essex Historic Buildings Group Day School 2008, **6**, 115-124

Horsfall Turner, O 2011 '"The Windows of this Church are of several Fashions": Architectural Form and Historical Method in John Aubrey's 'Chronologia Architectonica'', *Architectural Hist*, **54**, 171-193

Lake J, Berry E and Herring P, 2011 'Chapels and Landscape in Cornwall', in King, C and Sayer D (eds), *The Archaeology of Post-Medieval Religion*, Soc Post-Medieval Archaeol Monogr Ser.

Leary, J, 2011, 'It's official – the Marlborough Mound is prehistoric', *PAST* **68**

Leary, J, 2011 Prehistoric Southwark: Neolithic, Bronze Age and Iron Age activity on Horselydown Eyot, *London Archaeol,* **13(2),** 31-5

Leary, J and Field, D, 2011 Great Monuments, Great Rivers. *British Archaeology,* **120**

Continued on page 43