

SUSTAINING ENGLAND'S INDUSTRIAL HERITAGE

A Future for Preserved Industrial Sites in England

A Study for English Heritage

by

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This is the online synopsis of the report carried out in 2008 for
English Heritage by Neil Cossons

England's preserved industrial heritage is one of its most important cultural assets. It reflects Britain's emergence and subsequent growth as the world's first industrial nation. It forms a vital but fragile record, early evidence of economic and social changes that are still transforming the world today. These preserved sites afford an insight into an age that had global consequences. What survives represents a minute fraction of a rapidly vanishing industrial landscape that was once commonplace.

Many of these sites are vulnerable and some are in peril. But their future can be secured. English Heritage should take the lead in seeking a way forward, with others, so that a sound future can be guaranteed, based on improved standards of scholarship, research, conservation, management and access.

1 INTRODUCTION

1.1 This study examines the current state of preserved industrial archaeological sites in England and makes recommendations on how their future may be secured.

1.2 It considers issues of conservation, access and interpretation, governance and management, funding and volunteers, and how these compare with currently accepted standards and practices. It examines issues concerning the relative importance of sites, in terms of their evidential, historical and communal significance, identifies those of outstanding national and international importance, and proposes some scale of priorities. The extent to which the present portfolio of sites is representative of the industrial revolution period, and what might be done to present a more comprehensive picture, is also addressed.

1.3 The study has been carried out by Neil Cossons; this report reflects his findings and contains his recommendations. The opinions expressed are entirely his and the recommendations reflect observations based on his experience and of sites visited, and the views of those consulted.

1.4 Crucial to the research and compilation has been the contribution of Keith Falconer, Head of Industrial Archaeology at English Heritage (especially for Section 7), and Sarah Butler, Research Assistant for the project.

1.5 The study is based on *Industrial Archaeology: A Policy Statement by English Heritage*¹(1995), on previous work commissioned by English Heritage, notably the PLB Consulting Report of 1998, *Public Access to England's Preserved Industrial Heritage*,² and the summary,³ and on subsequent studies (referred to where appropriate in the text), discussions with trustees, managers, volunteers and others with knowledge and experience in the field, and visits to sites. Most of the recommendations in this report coincide with or reinforce the seven key points of the English Heritage 1995 policy statement. These are set out in Appendix 3.

1.6 The study concerns sites [in England] preserved as examples of Britain's industrialisation, and dating in the main from the eighteenth and nineteenth centuries. Publicly accessible and designated industrial field monuments and designated buildings that are not generally accessible to the public have not been considered in any depth, other than to note that some are of exceptional importance and should be preserved as such.

1.7 Excluded – with notable exceptions - are inland waterways; railway sites, including preserved railway lines, their equipment, locomotives and rolling stock; and rural wind- and water- mills. This is not to imply that such sites are not an important and integral component of the industrial heritage or landscape, on the contrary. But, in all three of these areas there are mechanisms that underpin and support the management of preserved sites.

1.8 British Waterways Board (BWB), the Inland Waterways Association, the Waterways Trust and numerous canal restoration societies provide a network embracing inland navigations. BWB, with some 3,000 designated structures in its care,⁴ is increasingly aware of its heritage assets and the responsibilities attaching to them, of the need to reconcile access and operation with the imperatives of conservation, and has an evolving conservation policy with a nucleus of staff responsible for implementing it.⁵ Most inland waterways sites are by definition openly accessible to the public. Examples of related sites that do merit inclusion are Crofton and Claverton pumping stations on the Kennet & Avon Canal and the Anderton Boat Lift, linking the Trent & Mersey Canal and the Weaver Navigation, in Cheshire.

1.9 Network Rail, other authorities with responsibilities for the railway estate, the Railway Heritage Trust⁶, the National Railway Museum, the Heritage Railways Association, and – to an extent – individual railway preservation societies, provide a network of knowledge, experience and support, as well as funding and management, for conservation of significant structures and buildings relating to the railway heritage. There is a large number of designated sites,⁷ over 2,000 in all, most of which, as with the historic railway estate in general, are in use and accessible – or at least visible – to the public. Inevitably, the operational requirements of the railway make some of this heritage only partly accessible.

1.10 The Mills Section of the Society for the Protection of Ancient Buildings (SPAB) has its origins in the Wind and Watermills Section of SPAB, founded in 1929. It is an autonomous section of SPAB and campaigns for the preservation of wind- and water- mills of which there are some 450 [in the United Kingdom] open to the public. It publishes the directory *Mills Open*, the quarterly *Mill News*, and runs National Mills Weekend.

1.11 For the remainder, their heterogeneous nature means there are no such networks. It is these sites with which this study is primarily concerned. Many are of prime or outstanding evidential value – in a global context - and almost all have in varying degrees important qualities of historical, aesthetic and communal meaning.

1.12 It is accepted that there is no hard line to be drawn between sites actively preserved and accessible to the public and equally important sites that are designated but not publicly accessible. Similarly, there are blurred lines between the preservation of machinery *in-situ*, machinery removed for museum preservation and machinery moved from a museum collection to a preserved site, invariably not the one from which it originated. Thus at a number of sites machinery has been installed to replace previous examples that have been scrapped. This is not always clear – and to most visitors will almost certainly not be understood. Moving items of machinery from museums into sites where the original has already been lost is quite widespread.⁸

1.13 Further, the gravitational pull of a site with potential space, if only for storage, attracts those who have collected items of machinery without anywhere to put them. It is then one short step to create a museum. This can happen without any obvious policy decisions. Generally, introduced machinery is of less significance than the sites at which it is deposited. In some cases these moves are endorsed by major museums as a means of putting items dismantled and in store on public display. Examples of this can be seen at, for example, Kew Bridge, Crofton and Papplewick pumping stations, Astley Green Winder, and Ellenroad Ring Mill. In the case of Kew Bridge, the site is now marketed as *Kew Bridge Steam Museum*, 'the world's largest collection of steam pumping engines'. With thoughtful conservation planning and management – and assuming space is available - this approach need not threaten the intrinsic historical and archaeological qualities of sites but it can also put a premium on the importance of those that remain pristine in their originality. There are also dangers that the original monument becomes neglected at the expense of new additions. Thus the trustees of Ryhope Pumping Station have determined, as a matter of policy, to eschew the introduction of alien items in order to protect the authenticity of the site. These issues need to be taken into account when determining value, managing scheduled monument and listed building legislation, and in encouraging strategic approaches to conservation policy.

2 THE QUESTION OF VALUE

2.1 The criteria for assessing significance, as set out in *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment* (English Heritage, 2008) have been adopted, where possible and appropriate, throughout this report. The categories are Evidential Value, Historic Value, Aesthetic Value and Communal Value.

2.2 However, such is the unique nature of England's industrial heritage - and especially its early industrial heritage - representing as it does the origins of the industrial age worldwide, that it has been necessary to develop a more refined mechanism for defining value, in order to demonstrate relative importance within those categories of high value, nationally and internationally.

2.3 Accordingly, in view of the seminal (including global) importance of some of these preserved industrial sites, Evidential Value has been sub-divided into three sub-groups:

- Prime Evidential Value (PEV);
- Outstanding Evidential Value (OEV);
- Evidential Value (EV)

The categories of Historical Value (HV), Aesthetic Value (AV) and Community Value (CV) broadly equate with those in *Conservation Principles*. Headline

definitions from *Conservation Principles* (2008) are set out below in parenthesis.

2.4 Within these last three criteria no order of precedence or relative importance is implied; only in the category of Evidential Value has there been an attempt to sub-divide by Prime Evidential, Outstanding Evidential and Evidential value in order to demonstrate relative importance. It is also *generally* assumed that the three categories of Evidential Value are of a higher order of importance than those of Historic, Aesthetic or Community value even though sites in these three Evidential sub-categories may well score highly in one or more of the others. In other words, being identified as having value in one or more of the four categories is not mutually exclusive.

2.5 The value criteria are thus:

[Evidential Value “Evidential value derives from the potential of a place to yield evidence about past human activity”.]

In order to stress the extreme importance of some of the sites addressed by this report three categories of evidential value are proposed:

- (PEV) Prime Evidential Value: An example acknowledged as the first of its kind in the world, or the oldest surviving example, representing an innovative and seminal technology/typology, from which subsequent or related examples evolved or which illuminate by example subsequent developments.
- (OEV) Outstanding Evidential Value: A rare example of an innovative and seminal technology/typology.
- (EV) Evidential Value: An internationally, nationally or regionally important example or rare survivor of an important or once typical or common typology.

[Historical Value “Historical value derives from the ways in which past people, events and aspects of life can be connected through a place to the present. It tends to be *illustrative* or *associative*”.]

In this report historical value might be further defined as:

- (HV) Historical value: An example representative or illustrative of a once-typical typology of which there may be other examples, or with important associations with a once-common or typical typology.

[Aesthetic Value “Aesthetic value derives from the ways in which people draw sensory and intellectual stimulation from a place”.]

- (AV) Aesthetic value.

[Communal Value “Communal value derives from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. Communal values are closely bound up with historical (particularly associative) and aesthetic values, but tend to have additional and specific aspects”.]

- (CV) Communal value.

Some sites meet some, most or all of these criteria. These definitions are used – indicatively and where appropriate - throughout this report. (They should not be construed as definitive classifications).

2.6 This methodology will need further testing in order to prove its applicability in all circumstances, eg primordial industrial landscapes such as those identified in the early eighteenth century in and around Manchester and the South-western Pennine Uplands⁹ or in twentieth century industrial environments where prime or outstanding examples may be difficult to identify in a potentially large international population of sites and landscapes. Issues of technology transfer or transmission of social or economic models from one industrial environment to another will need to be fully understood when making these assessments.

2.7 In debates in support of Guardianship or an equivalent form of protection, it is suggested that these relative tests of evidential value will be helpful. It is equally expected that there will be relatively fewer in other areas of the historic environment, a reflection of the seminal significance of the early industrial revolution in Britain.

2.8 Some illustrative examples of sites within each of the evidential categories are:

PEV Prime Evidential Value:

The Old Furnace, Coalbrookdale, Shropshire, where in 1709 iron was first smelted using coked coal as a fuel;

The 1779 Iron Bridge, Shropshire; the world’s first civil engineering work entirely of iron;

Elsecar Newcomen-type beam engine, 1795, Barnsley; the oldest surviving steam engine *in-situ*;

Longdon on Tern Aqueduct, 1796; the world’s first iron aqueduct;

Ditherington Flax Mill, 1797, Shrewsbury; the world’s first iron-framed building;

The 1812 Boulton & Watt beam engine, Crofton, Wiltshire; the oldest working steam engine *in-situ*;

Liverpool Road Station and Warehouse, Manchester, 1830; the earliest surviving railway passenger terminus;

Brunel terminus of the Great Western Railway, Bristol, c1840; the earliest surviving trainshed terminus;

The Ironbridge Gorge World Heritage Site, Shropshire;

The Derwent Valley World Heritage Site, Derbyshire;

Chatham Historic Dockyard (on the 1999 WHS Tentative List and the 2011 draft list)

The ss *Great Britain* (1845) preserved in the Great Western Drydock, Bristol, where she was built; the world's first large iron [and screw-propelled] ship.

OEV Outstanding Evidential Value:

Abbeyleigh Furnace and Forge, Sheffield; an early crucible steel-making site;

Derwentcote Cementation Furnace, County Durham, and Hoyle Street Cementation Furnace, Sheffield, early steel cementation furnaces;

Saltford Brass Mill, Avon; best surviving example of a brass battery mill;

Annealing furnaces at Kelston, Avon; best surviving examples of furnaces for annealing brass;

Evans' Silver Works, Birmingham; best surviving example of craft-based silverware manufacture;

Fakenham Gasworks, Norfolk; the last surviving gasworks in England;

Queen Street Mill, Burnley; the last steam powered weaving shed in Britain.

EV Evidential Value:

Ruddington Framework Knitters' Shops (and museum), Nottinghamshire; best example of East Midlands frameshops with knitting frames (non-original);

The glass cones at Catcliffe, Sheffield, Stourbridge, West Midlands, and Lemington, Newcastle upon Tyne; surviving examples of the once-common form of the *verrière Anglaise*;

Stott Park Bobbin Mill; the only surviving example of over eighty bobbin mills that served the Lancashire textile industry;

Over Bridge, Gloucestershire, Telford's single stone span of 1829, (based on Jean-Rodolfe Perronet's 1768 bridge at Neuilly);

Birmingham back-to-backs; preserved examples of a now rare housing type.

(These designations are indicative and should not be regarded as definitive without further analysis)

2.9 There are also qualitative issues affecting value (eg see para 1.13 above) that come into play when determining the significance of a site. Authenticity and originality are slippery terms reasonably well understood in the context of, for example, historic buildings that have been through a succession of uses. What we have today represents the apostolic succession of connected events over time that are readily susceptible to archaeological and historical analysis. More complex is the effect of events that have taken place *since* the site went into preservation where lack of clear policy – almost always stemming from a failure to understand intrinsic value - can introduce illogical changes that defy the normal rules of adaptation during a site's working life. These are particularly relevant to industrial sites and relate as much to what has happened since it was in use and, in particular, to the current management regime when in preservation, as to any underlying policies deriving from intrinsic qualities.

2.10 The study also – again with a few notable exceptions – excludes industrial buildings that have been adapted for new uses. Some of these are of exceptional importance and their preservation is crucial. So too is public access.

Reference is made to these. Examples include the 1797 Ditherington flax mill in Shrewsbury, the world's first iron-framed building (PEV), the Portsmouth Block Mills (PEV); or Green's boatshed at Sheerness (OEV). All are of singular importance and should be preserved, with public access.

2.11 The report notes at a number of points that priorities for preservation of the industrial heritage, and of the need to secure a sound future, are not peculiar to England. This is a United Kingdom-wide matter that deserves to be addressed in that context.

3 BACKGROUND TO THE STUDY

3.1 The need to secure the preservation of historic industrial sites and provide public access to them sprang from the growth of industrial archaeology in the 1950s and '60s. Industrial archaeology itself derived from the threat – real and perceived – to the material evidence of the primal age of industrialisation. Many of the buildings and machines of the early industrial age had survived into the post-war years, the life of those still in use prolonged by the exigencies of war. Others had been simply overlooked. In the 1950s and '60s post-war industrial and urban renewal for the first time put strategic pressure

on industrial areas, resulting in large scale demolition and redevelopment. In this climate of change and renewal industrial archaeology was born. The need to preserve the most important examples of what remained was highlighted, partly as the result of celebrated losses, although at the time there were few means of saving sites of significance. At a national level the destruction of the Euston Arch in the early 1960s brought together many of the nascent but uncoordinated conservation interests around a common cause. But at a regional level the loss in the late 1960s of the world's first shot tower in Bristol or the great Cornish pumping engines at Sudbrook on the Severn Tunnel went virtually unnoticed. These were sites of real complexity or great size, for which at that time no adequate preservation mechanisms existed. It is a moot point as to whether they are more effective now.

3.2 Losses continue. The 1802 Rennie warehouses in London's Docklands (Listed), and the Hardwick warehouses at St Katherine Dock (Listed), London; Elemore 'Isabella' Colliery Winding Engine (1820s), County Durham (Scheduled); Dee Mill Engine, Lancashire (Scheduled, vandalised, de-scheduled and demolished); Murton Colliery Winder (1920s) (Listed Grade II and recommended for II* in 1993, but demolished in 1995); Old Mill, Congleton (1753) 'the oldest standing remains of a textile mill in Britain' (but de-Listed and demolished in 2003), are some examples of the continued attrition of designated sites. At a more general level the last Bessemer converters in Britain (in Workington) were moved to Sheffield for museum preservation after initiatives to secure on-site preservation failed; the Middlesbrough blast furnaces (the last chance for preservation) were demolished; there are now no crucible steel furnaces apart from the small early example at Abbeydale; and the workshops of the craftsmen Sheffield cutlers and edge-tool makers, the 'little mesters', numbered in hundreds as recently as the 1960s and '70s have now gone.

3.3 Sites of the pre-industrial periods were already well recognised as the responsibility of the then Ministry of Public Building and Works (MoPBW; from 1970, the Department of the Environment (DoE)), of the National Trust, local authorities and, in a few cases, locally-based preservation trusts and societies. With the advent of the growing interest in industrial archaeology, sites of industrial importance were increasingly designated – by Scheduling and Listing – but, partly in recognition that there was a burgeoning voluntary sector, the MoPBW/DoE chose to stand back from taking the most important of these sites into its direct care. Similarly, at this time the National Trust, did not have extensive involvement in preserving industrial sites.

3.4 It was a policy in marked contrast to that applying to pre-industrial landscapes where, during the same period, sites were taken into Guardianship at a rate unprecedented in the previous half century or since. For both organisations the years from 1950 to 1975 were the most active period of acquisition in their histories. Today, their respective rates of acquisition, of all types of sites and properties, are much reduced.¹⁰

3.5 In the case of industrial sites, Government policy endorsed and encouraged designation by Scheduling and Listing but – implicitly or explicitly

– favoured management and operational responsibility resting with locally-based organisations, notably voluntary bodies (many set up as companies limited by guarantee and registered as charities), local authorities or combinations of the two.

3.6 This study stems from a recognition that preserved industrial sites are both an important element of the nation's cultural heritage and that in the main they lie outside the wider frameworks of conservation and preservation of the historic environment. In this context the establishment of recognised conservation principles and practices is becoming generally accepted. The recent (2008) publication by English Heritage of *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment* is evidence of this. The industrial heritage is often rich in sites that contain prime or outstanding evidential value in their fabric and contents. In some cases these are acknowledged 'world firsts', reflecting Britain's primary role in the origins of industrialisation. Many combine historical value, in an illustrative or associative sense, with the communal values they enjoyed at the heart of working communities. In every sense, the historic industrial environment is reflective of wider qualities now commonly accepted across the historic environment in general.

3.7 Similarly, qualities of site access and interpretation have seen major progress and improvement in recent years. In the case of the preserved industrial heritage however those who care for sites – with notable exceptions – work in relative isolation from the wider world of conservation, preservation and heritage management and the values attaching to it.

3.8 The achievements of the - largely voluntary - bodies who pioneered industrial heritage preservation over the last forty years have been prodigious and outstanding. Today, with ageing volunteers, often in diminishing numbers, and with preservation standards and public expectations rising, the condition of many of these important sites is problematic and their future prospects often fragile.

3.9 In view of the primal importance of the evidence, the nature and relative complexity of much of the material, the singular circumstances under which it is preserved and the fragility and vulnerability of the present arrangements, this study has been commissioned by English Heritage in order to seek strategic solutions that will secure a sustainable future for the nation's preserved industrial heritage.

4 CONTEXT

4.1 The impact of the Industrial Revolution on Britain's economy, on society and on the landscape is well documented although less well understood. So too is the ambivalence that derives from it. The widespread recognition that industrialisation was transformational in the most fundamental of ways and that the events that took place in Britain were to have a wider, global impact

has also become better understood in recent years as has a new and emerging understanding of the nature of that influence.

Origins

4.2 That aspects of the physical evidence of industrialisation – or, more particularly, of the engineering innovations that accompanied it - deserved preservation, has been recognised since the 1850s. The first examples to be systematically collected – as a result of the pioneering work of Bennet Woodcroft - formed the basis for the Patent Museum. These were absorbed into the collections of the Science Museum, London in the 1880s.¹¹ They reflected contemporary views on what were then seen as significant and symbolic technologies that had formed the heart of Britain's development as the world's first industrial nation – for example, in the development of the steam engine (for mine drainage and as a prime mover for factory-based manufacturing), the wider application of steam power (notably in the development of the steam railway locomotive and for marine propulsion); the transport revolution that steam locomotion made possible (the railway after 1825 and trans-oceanic steam shipping after 1840); mechanisation of spinning and weaving and the development of factory production; and the innovations in engineering that were a necessary component of all these developments (for example, machine tool improvements, standardisation of screw threads, and development of precision measurement).

4.3 These technologies were captured by the collecting of seminal machines and their preservation in museums which appealed in particular to those working in manufacturing industry and especially in the engineering field. Woodcroft's work set the policy for several generations of curators in the Science Museum. The Museum itself provided the inspiration for others with similar, although largely regional, policies, notably the Newcastle Museum of Science & Industry (opened 1934, rehoused, and renamed *Discovery* in 1993), the Birmingham Museum of Science & Industry (opened 1951, closed 1997, and with some collections on display in *Thinktank*) and the Manchester Museum of Science & Industry (opened 1983). (Other collections of important industrial material preserved in museums out of the direct context of their original settings include those of the Port of London in the Museum of Docklands, and the Hawley Collection of Sheffield edge tools and cutlery, preserved by the Sheffield Industrial Museums Trust at Kelham Island Museum.

4.4 From the mid-nineteenth to the mid-twentieth century these museums reflected the predominant economic culture of the nation. Their collections were comprehensive – within contemporary parameters of conventional museum buildings and display techniques – and concerned largely with the mechanical equipment of engineering and manufacturing. Their relevance and appeal was to a substantial population then engaged in industry. Today these collections represent an outstanding and unique scholarly resource of material that exists nowhere else. They complement the more recent moves towards the preservation *in-situ* of industrial buildings and – where these exist - their contents. Today, in a changed world, most of these collections are off

display and are no longer seen as central to the mainstream of preservation, presentation or education of the museums that own them. Further, with rare exceptions, there is virtually no curatorial research or publication being carried out on them.

4.5 Other key technologies were less well represented. This was not because they were deemed unimportant, more because their tangible remains were seen as beyond the scope and capability of museum preservation. In the absence of alternative arrangements this material was lost. Similarly, immovable objects might be recognised as important but their preservation was viewed as impractical or the responsibility of someone else. [For example, discussions at an advanced stage between the DoE and the Science Museum whereby the latter would preserve Fakenham Gasworks came to nothing.]

4.6 The acquisition of prime movers (and especially of the stationary steam engine in its multiplicity of forms), but less commonly of the equipment they were designed to power, became widespread, the result largely of curatorial predilection and enthusiast interest. This imbalance continues today; the obsession with the steam engine has itself a history going back over 150 years. The preponderance of stationary steam engines preserved, in museums, *in-situ* and in the ownership of volunteer groups and individuals, skews strongly the picture of preservation and the balance of volunteer activity nationally. [Numbers are impossible to quantify but it is thought that there are more volunteers involved in steam preservation than in all other aspects of industrial preservation put together]. For the time being, the future of sites where the operation of steam machinery is the primary activity is not seen as a critical issue, although there are unanswered questions about conservation standards and the longer term implications of using historically significant boilers and equipment. At worst, this represents a collision of interest between the principles of conservation, encapsulated in statutory designation, and the hobby interests of enthusiasts whose desire for operation takes precedence over evidential or historical considerations. There are, generally speaking, plenty of volunteers in this field and their support, albeit delivered on their own terms and with little relationship to wider historical, contextual or public interest, is if anything growing rather than declining.

Industrial archaeology

4.7 From the 1960s, with a new and growing interest in industrial archaeology, it was appreciated that buildings and structures of the industrial revolution period deserved protection in the same manner as those of a pre-industrial date. This recognition came quickly, in response to growing public interest. At the same time new – largely locally-based – organisations grew up to meet the need. The early success of the Ironbridge Gorge Museum Trust demonstrated that monuments could be preserved *in-situ* and – properly presented – would have a significant public following. New museums too broke out of traditional constraints and moved buildings and equipment that

could not be preserved *in-situ* for preservation in open air museums. Beamish and the Black Country Museum are the outstanding examples.

4.8 Industrial buildings and monuments – and, where extant, their contents - were recognised as sufficiently important to warrant designation.¹² From 1962, significant monuments began to be identified and between 1963 and 1980 support was given to the Industrial Monuments Survey. As a result there are today some 1,800 Scheduled industrial monuments and 38,000 Listed industrial buildings in England representing, respectively, around 9 per cent and 10 per cent of the totals.

4.9 There are however significant bodies of contextual evidence that are little understood and have not to any extent been studied or designated. These require urgent attention. Workers' housing and associated industrial communities are the most important; they have been largely neglected. These buildings and landscapes are particularly vulnerable to degradation by ill-considered change. Only a tiny proportion has been designated. Their evidential, illustrative, associative and communal value is inestimable. Although outside the terms of reference of this study, research into industrial housing and the establishment of priorities for preservation are urgent requirements. Within the context of English Heritage's wider strategy for designation, industrial workers' housing represents the most significant gap in our understanding of the historic environment. In addition to the evidence and information derived, a strategic study of housing, would also expose priorities for preservation.

4.10 There is also an abundance of industrial buildings, mainly mills, factories and warehouses, – some designated but most not - that have been adapted for new, non-industrial, uses. Many of these have now lost their contexts as a result of widespread demolition and redevelopment of their environs. Despite the almost universal absence of the contents of these mills and factories, among them are buildings that in their own right are of outstanding importance, of prime or outstanding evidential value. The best possible conservation standards need to be applied in these cases and proper arrangements made for public access. The 1796/7 Ditherington Flax Mill, Shrewsbury, now in the ownership of English Heritage, the world's first iron-framed building, is the most significant of these. Completed conservation schemes include, for example, the Navigation Warehouse, Wakefield; the Holbeck Round Foundry and Urban Village, Granary Warehouse and 32 The Calls, Leeds; and Murray's Mills, Ancoats. There are many more; these lie largely outside the scope of this study.

Government policy

4.11 The preference for grant-aiding locally-based preservation bodies, rather than taking industrial sites into Guardianship, provides the context for the subsequent history of preserved industrial sites in England. Although never declared as a formal policy this practice emerged in the 1960s. As a *de facto* practice it was well-established by the mid-1970s and further confirmed at the first meeting of English Heritage's AMAC/HBAC Industrial Archaeology Sub-

Committee, in 1985,¹³ at which the then Secretary (Peter White) stated that 'when there was a choice grant aid was preferred; Commission [HBMCE] acceptance of the ongoing responsibilities for maintenance and management entailed by Guardianship or acquisition was reserved for cases where there was no option but to take the monument into Guardianship or acquire it if it were to be preserved, and where preservation was essential'. At that date there were seven industrial monuments either owned by the Secretary of State or in Guardianship.¹⁴ In response to a question about the 'rapidly deteriorating' condition of the Elsecar beam engine it was stated that 'the Commission was aware of the problem ... [and] negotiations were taking place over ownership. When they were complete, the Commission would consider grant-aiding or taking the monument into guardianship'. (This site was not taken into Guardianship and, despite being Scheduled, is still in a less than satisfactory condition with public access by appointment only.¹⁵)¹⁶

An international dimension

4.12 Britain's industrial primacy is to an extent better acknowledged and understood overseas than it is here. Equally, many of the processes pioneered here assisted other nations in their transition to industrial economies. The export of British industrial technologies, expertise and goods has meant that a significant part of Britain's industrial legacy is to be found overseas. In some cases these are the best or only surviving examples. In Spanish Town, Jamaica, is the first iron bridge in the New World, cast in Walker's Foundry, Rotherham in 1800 and preserved as a national monument. In Dunedin, New Zealand, is the best preserved example of the hundreds of British gasworks that were once commonplace and exported throughout the world. It is being preserved by a local voluntary group supported by Dunedin City Council. In Japan a range of industrial sites in Kyushu and the Yamaguchi prefecture are being nominated for World Heritage inscription; included are significant sites of United Kingdom origin. There are many more examples, often proudly seen as intrinsic parts of historic environments overseas. Those charged with the conservation of these overseas industrial heritage assets look to Britain for information, leadership and endorsement.

4.13 There is also a wider and increasing interest overseas in the preservation of the industrial heritage. To a significant extent it is as a result of initiatives begun in the United Kingdom over the last fifty years that this interest and activity stems. Britain is widely recognised throughout the world as the first industrial nation. This is readily, frequently – and almost touchingly – acknowledged. Amazement is often expressed that we make so little of our own internationally important industrial heritage. Industrial archaeology had its origins in Britain too – from the mid-1950s – as did the First International Congress on the Conservation of Industrial Monuments, held in Ironbridge in 1973, and from which TICCIH,¹⁷ the present international conservation organisation, has evolved. This needs to be taken into account when establishing the international context of Britain's industrial heritage and in determining priorities for its preservation.

4.14 Much of the early industrial conservation work pioneered in Britain also provided inspiration for similar enterprises overseas. But, in contrast to the situation in Britain, the initiative for industrial archaeological conservation has generally been driven by state or regional government conservation agencies. Often this stems from different assessments of value and, in particular, of a heightened awareness of communal and associative value, not just of sites but – importantly – of industrial landscapes. As a result there are many large industrial conservation projects in Continental Europe that greatly exceed in scale, ambition and funding anything to be found in Britain. In terms of size there is no equivalent here of the huge integrated iron and steel works at Völklingen in the Saar, inscribed on the World Heritage list in 1995, nor of the great coal mining landscape conservation scheme in the Nord-Pas de Calais which embraces pits, spoil heaps and whole mining communities. These large scale industrial conservation projects are relatively numerous across Europe; they are almost non-existent in Britain.

5 ISSUES

5.1 The industrial heritage is a heritage that is to a great extent misunderstood. Much is unacknowledged. By its nature the industrial landscape, and especially the urban industrial landscape, was characterised by the humble, the repetitive and the commonplace; indeed, the purpose of many of the new industrial technologies of the eighteenth and nineteenth centuries meant that for the first time in human history large numbers of identical things could be manufactured or built. These industrial landscapes are some of the most vulnerable in the country.

5.2 Conservation favours the distinctive and the different; understandably, for here are captured the inspirational events of human endeavour and creativity. Much of the preserved industrial heritage reflects this view, protecting exceptional examples of innovative new technologies. But the issue of what to do about the typical still needs to be addressed. The opportunity of choice is still open, to identify, designate and protect these often fragile and vulnerable landscapes. In some instances once commonplace features like colliery spoil heaps are now rare and such as survive need designation. In the case of industrial housing the number surviving is huge but the level of understanding is low, and few are designated. It is perhaps only in this area that there is still the opportunity of choice, from a big population of exemplars. The question of how to protect those worth saving, in the face of inevitable loss through degradation, has still to be answered.

5.3 The current situation has arisen from a number of issues with their roots in the 1960s and '70s, notably:

- Loss of historically important sites was taking place before there was a groundswell of support for their preservation. This was especially critical in relationship to large sites, notably of the iron and steel industry (eg Workington) of coal mining (where the preservation of

- Although on the one hand these threats and losses gave rise to industrial archaeology, from the early sixties there was not then widespread public policy or political opinion in support of a national preservation strategy;
- Government was enthusiastic about designation but – with a small number of exceptions (see Appendix 1) - set its face against taking sites into its own care, preferring to leave this to the voluntary sector;
- There was a widely held view in Government, often but mistakenly supported by such outside advice as then existed, that a ‘no more than one of each’ preservation policy would be adequate;
- But, there was no mechanism for determining which sites should be earmarked for preservation nor any means of encouraging or activating preservation efforts on the ground;¹⁸
- Such sites as were taken on by the voluntary preservation movement reflect the interests and predilections of the volunteers rather than a response to a wider strategy;
- Most sites tend to be of small physical scale, within the scope of volunteer ambitions and capabilities. Nevertheless, many were beyond the then capacity of statutory agencies;
- Such interest as was shown by local authorities was constrained – both in policy and funding - by existing museum priorities. Volunteer groups could achieve what in most instances was too daunting for local authority museums services;
- The de-industrialisation of the 1970s and ‘80s proceeded at such a pace (and in economic and political circumstances that militated against a strategic approach by Government) that little was done to ensure the preservation of representative examples of industrial sites;
- Although redundant buildings survived in profusion their contents, in the form of manufacturing machinery, generally disappeared thus rendering preservation less relevant;
- Such has been the availability of redundant industrial buildings (mainly mills and factories) that retention by re-use has become a prolific movement.

5.4 As a result, the build up of the nation’s portfolio of preserved sites has been largely serendipitous. Most sites are of relatively small scale, most are in the hands of locally-based volunteer groups or local authorities or

combinations of the two. But much has gone and with it the opportunity of choice. There have been outstanding exceptions: for example, the success of the Ironbridge Gorge Museum Trust from the early 1970s; the return to Bristol and restoration of the ss *Great Britain*, and more recently, the restoration to use of the Anderton Boat Lift in Cheshire.

Management and operation

5.5 Many of the voluntary industrial preservation groups are outside the mainstream of wider conservation philosophy and practice and to an extent unaware of the now widely accepted strategies, management principles, policies and doctrines that apply elsewhere. As a result, standards of preservation and interpretation fall short – often well short - of currently accepted practice and public expectations. Many sites are poorly cared for, badly presented, and have inadequate opening hours. Few have strategic plans based on vision, clear conservation policies and sound financial management. Those that do are, almost without exception, free from the worst of the problems afflicting the others. (For example, the Ruddington Framework Knitters' Museum in Nottinghamshire, despite the loss of an annual local authority grant, achieves high standards based on strategic planning and good professional advice.) Most live a hand-to-mouth existence, victims of circumstances that they believe to be beyond their control. In many cases, trustees are of advanced age and out of touch with contemporary practices, for the management of sites or the running of voluntary bodies. (At Fakenham Gasworks, for example, a site considered in the early 1970s as being so important that it should be taken into the care of the Science Museum,¹⁹ a trust structure made up of nominees from other local bodies and very low volunteer numbers means that the site lacks adequate care and opening hours are minimal). Similarly, in many cases volunteer numbers have declined and those who do support preservation societies are of advancing years. Often, trustees and volunteers lack leadership, are inexperienced and unaware of wider initiatives that they could be taking in order to improve their situations. (By contrast, Dogdyke Pumping Station, Lincolnshire, engages in formal trustee training and development. In this case and that of Ruddington (see above) the presence of a senior (retired) museum professional on the trustee body has clearly helped to raise standards and awareness). There is a widespread feeling that these are unloved and misunderstood monuments and the people who care for them are marginal to the focus and work of those national bodies engaged in caring for the nation's heritage.

5.5 This situation is not peculiar to voluntary preservation organisations. Some of the worst examples of neglect, decay, poor interpretation and inadequate opening hours can be seen at sites in the care of local authorities or in the hands of preservation trusts that are substantially dependent on local authority funding for their continued operation. Lack of commitment and often declining financial support from local authorities leaves sites especially vulnerable, eg Coldharbour Mill, Uffculme. Few sites enjoy consistent and reliable local authority support and cite this as a major problem, although at Papplewick Pumping Station in Nottinghamshire the city parks department continues to maintain the grounds. Even the most basic security measures

are beyond the resources of some preservation bodies. For example, the Bowes Railway, a site run by a trust on behalf of two local authorities, is suffering from vandalism of such severity that application for Scheduled Monument consent for demolition of one of the winding engine houses may be proposed. It is important too that within English Heritage itself pressures on funding do not prejudice conservation standards, or operational quality, eg the admirable levels of operation and demonstration at Stott Park Bobbin Mill.

5.6 Generally, there is little knowledge or understanding of the conservation principles and practices that are commonplace and widely accepted in other spheres of historic environment management. Similarly, documentation is often non-existent so there is no record of work carried out. As a result, original fabric is being lost. Indeed, in the case of some of the voluntary groups, make do and mend is seen as a virtue when a little thought, a well-defined conservation policy and a strategic approach to funding and management would not only produce better and more responsible results but deliver the resources to achieve them. Few bodies have the knowledge or experience to achieve this level or quality of approach.

5.7 There is a hazy view of when and how Listed Building or Ancient Monument consents should be sought and, on occasion, a relaxed response on the part of local authority or English Heritage officers for whom the industrial heritage is outside their area of understanding. On occasions there is an unconscious complicity between applicant and authority, the former seeking permission within limited resources to get on with work of sub-optimal standard, the latter willing to accept that anything is better than nothing. As a result, standards generally are lower than in other areas of historic environment conservation.

5.8 That many industrial sites involve the preservation and on occasion operation of machinery – often of great significance – represents another issue and point of contention. Few voluntary bodies have clear conservation policies for machinery in their care. This is in part because there is little developed conservation philosophy for historic machinery, few established practices, no teaching institution or training courses, and virtually no literature. This is a critical issue when machinery is being run, where operational imperatives often take precedence over conservation policies, even supposing such exist. There is also evidence here and there that satisfying enthusiast inclinations – sometimes badly thought through – takes precedence over conservation of the heritage asset. In this context there are few sources of authoritative advice, and knowledge on the part of conservation authorities is insufficient to give guidance or help improve standards. As a result, conservation agencies are themselves dependent on the views of clients who on occasion have little or no understanding of what needs to be done.

Degradation

5.9 Many industrial sites contain substantially original fabric and content and their settings can be equally significant. Loss of fabric and detail represents a

real and continuing threat to evidential, historical and aesthetic value, and thus to authenticity and integrity. A prime cause is the insidious threat of degradation which erodes setting and context, sites and buildings, as well as contents, including machinery. Degradation results primarily from ignorance and expediency. Failure to understand the intrinsic qualities of the site, its archaeology and history, means that losses can take place through a failure to value what is there. Expedient and unimaginative responses to perceived visitor circulation requirements, to health and safety directives, or the access needs of the less able can in the worst instances irreversibly destroy quality, atmosphere and integrity. Inappropriate interpretive techniques may have similar effects although this is more often reversible. Again, an explicit conservation plan, clearly defining those intrinsic qualities that are of value and importance, could help to ensure a more responsible approach.

5.10 There is tension between preservation and operation. Operation often takes a high priority, attracts visitors and represents the primary incentive for volunteers to commit time and energy to supporting an historic site. For many of the volunteers engaged in the running of sites it is the operation of machinery that attracts them. Voluntary commitment to operation can be very specific to certain types of machinery.

5.11 At present many of those in charge of preserved industrial sites are unaware of conservation principles and practices that would be taken for granted in other circumstances and situations, and where the need for professional knowledge and advice is accepted. In the most perverse instances volunteer machismo is fuelled by delight at subverting authority, especially when this is seen as unwarranted interference by a local authority or English Heritage. There may also be an all too ready willingness – albeit reluctantly - to sacrifice authenticity and integrity in the interests of the threat to operation posed by Health & Safety requirements. Intrusive welded mesh screens (installed to allow self-guiding visits and thus save on operating costs) destroy much of the ambience and attractiveness of Coldharbour Mill's textile machinery. But at Whitchurch Silk Mill, where visitors are also self-guided, protection is effective but discreet. In short, for an historic site to be working, in a manner that conveys to visitors in an authentic manner something of its real purpose and meaning, poses one of the most challenging of conservation situations.

5.12 Finding a solution requires knowledge and understanding, great clarity of purpose, and a strategic approach to management. Familiarity with English Heritage advice and guidelines is crucial. These are set out in *Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment* (2008). The adoption of a Conservation Plan is critical. Of the sites questioned few had a conservation plan and of these some had prepared it in order to gain access to Heritage Lottery Fund capital. There was less evidence that the plan was then used as an operational tool.

5.13 There are issues too for the statutory bodies administering conservation legislation and especially the Scheduled Monument and Listed Building consent procedures. (This is most notable where local authority conservation

officers are involved.) Prime among these is lack of knowledge or understanding of historic processes and machinery and the issues associated with operation. In essence, the principles that apply to buildings and sites will read across to form at least a starting point for understanding the issues but there is plenty of evidence that a more relaxed approach is taken to consents where machinery is involved, or a lack of appreciation by both applicant and authority that machinery is as precious a part of the site's history as the built fabric. Generally, machinery – and especially working machinery – is more susceptible to degradation through lack of understanding and operational imperatives than are buildings.

Visitors and operating costs

5.14 Given the often-limited opening times, often the result of insufficient numbers of volunteers, visitor numbers are surprisingly good. Statistics are inadequate and comparisons difficult, as data is collected and collated in a variety of ways, but most sites have numbers broadly comparable with middle range/lower quartile English Heritage properties. Direct operating costs per visitor are comparable with the EH average of £4.92 (2008 figures). For operating sites costs would appear to be generally lower than the £16.95 per paying visitor at Stott Park. Visitor numbers, year on year, appear to be steady although there are wide variations between one site and another. Sites where machinery and processes are operated or demonstrated have great attraction, although energy costs are in danger of becoming prohibitive²⁰ The issue here for some site operators is whether the additional costs of operation are recouped from more visitor income. For example, this is an issue for EH at Stott Park Bobbin Mill (6,440 total visitors in 2007/8) which, without its operation and excellent guiding, would be a largely meaningless site. Whitchurch Silk Mill and Kew Bridge Pumping Station, with good and well publicised opening hours, and regular operation, achieve between 10,000 and 11,000 a year with some consistency, although at Coldharbour Mill numbers have dropped progressively from 25,000 (1980s) to 13,000 (2005) and 11,700 (2006). (This drop led to the reduction of paid staff from three full-time and two part-time to one full-time and one part-time.) But, at Fakenham, with minimal opening hours, free admission (a donation is invited) and no operation, numbers average about 1,500 per year (An experiment involving extended opening hours during August 2007 resulted in numbers of over 500 for that month alone but this could not be sustained for want of volunteers.) Many sites with operational capacity limit working to a number of weekends per year in which most of their visitors are concentrated; these events also stimulate engagement by volunteers.

5.15 Guides feature prominently at sites where free-range access is difficult or impossible, and at some sites as an additional asset, eg Higher Mill, Helmshore, and – at a premium price - Anderton Boat Lift. Their quality is less to do with money, or lack of it, more issues of understanding and training and recognition of visitors' interests and levels of intrinsic knowledge. The veracity of a good guide who once worked in the industry or on the site itself is difficult to beat. At Geevor tin streaming mill and Higher Mill, Helmshore inspirational guides transform what would otherwise be a good but poorer

quality experience; similarly, at Elsecar engine (on the heritage open weekend in September 2008).

5.16 Operating costs for sites are low, from below £10,000 per year, in the case of Fakenham Gasworks, – often insufficient to offer a really good experience – and interpretive standards often fall short of what today’s public increasingly expects. But there is a reasonable balance between direct operating costs (excluding maintenance of the fabric) and income from visitors and other sources, largely reflecting the real contribution that volunteer operation represents. Marketing expenditure is well below average and few sites exercise much ingenuity in gaining worthwhile publicity or generating better numbers. Fakenham, with annual operating costs (excluding support in kind) of less than £9,000, is largely dependent on publicity in the free local newspaper and church magazines. By contrast, sites that have been set up more recently and have generally younger, more active and influential trustees and volunteers – eg the Brunel Museum based on the Brunels’ Rotherhithe Tunnel and Crossness Pumping Station, Abbey Wood, have ambitious strategic plans, well articulated, and productive relationships with the media.

5.17 Generally, many sites look tired and unkempt, often with poor housekeeping. They appear to be victims of a spiral of decline with insufficient and often ageing volunteers to carry out the work needed – especially of maintenance – and with income falling short of day-to-day needs. With little effective marketing visitor numbers tend not to reflect the true potential of the sites. Surprisingly little is made of the outstanding national and international importance of sites. At Ironbridge, for example, which in the 1970s was marketed under the not-uncontentious banner ‘The Birthplace of the Industrial Revolution’, no mention of this is made today (2011). Its appeal to visitors is based on the Victorian village and the interactive exhibit *Enginuity*, neither of which derive from the intrinsic historical or archaeological credentials of the Gorge. All this may sound like a counsel of despair. In fact, the situation is not only recoverable but offers significant opportunities for long term improvement and a sustainable future. There are practical and deliverable opportunities for capitalising on the best that a mixed economy of voluntary commitment, public funding, professional advice, and training can offer.

5.18 The priority is to secure the future of these sites, improve the quality of their conservation and interpretation and ensure that they enjoy a wider audience. All these are achievable. But the means of developing and sustaining solutions to the range of problems confronting the long term preservation of these sites is complex and will require understanding, ingenuity, diligence and sensitivity.

5.19 What is needed is a comprehensive strategy implemented with great care. English Heritage has clear fiduciary responsibilities to ensure the future of these sites. As an agent of last resort it makes good sense for English Heritage to show leadership. It should seek a strategic solution that avoids further decline leading to eventual collapse of the preservation bodies and the crisis that would result from this. English Heritage should adopt a policy aimed

at effecting a steady and systematic improvement in the conservation and interpretation of these sites. There are good opportunities to engage others as partners in seeking appropriate solutions. Proposals for achieving this are set out below.

6 SUMMARY AND RECOMMENDATIONS

6.1 This report is concerned in the main with those sites that are preserved and accessible to the public. The majority of these are in the care of locally-based preservation trusts, most of which were formed in the 1960s and '70s. The next largest group are in the hands of local authorities. Less than three per cent are in the care of statutory or nationally-funded agencies. Some additional observations and recommendations on wider issues thrown up in the preparation of this report are set out below; see para 6.46.

6.2 Government at this time favoured grant-aiding voluntary bodies, and to an extent local authorities, rather than taking industrial sites into Guardianship. This was in part recognition of the burgeoning interest in industrial archaeology and the willingness, and ability, of local voluntary groups to tackle often-daunting rescue and preservation tasks. There was also a belief that industrial sites would be too complicated to take into Guardianship, difficult and expensive to manage, and required skills not then available in the Department of Ancient Monuments and Historic Buildings or its successor, English Heritage.

6.3 It was a policy in marked contrast to that applying to pre-industrial landscapes where, during the same period, sites were taken into Guardianship at a rate unprecedented in the previous half century, or since.

6.4 Subsequent attempts at addressing these issues have come to nothing. The 1998 PLB Report, commissioned by the Industrial Archaeology Panel, produced some sound - but not prescriptive - recommendations. None of these were acted upon. The issue was seen as too difficult and no one had specific responsibility for prosecuting it. Accordingly, this report attempts to offer solutions or means towards achieving solutions and the recommendations have been made in this light.

6.5 That these industrial sites have been saved from destruction and decay, and opened to the public, represents an extraordinary achievement on the part of those voluntary bodies involved. Their endeavours have achieved spectacular results, often against the odds, and relieved the public purse of what would have been huge capital costs, as well as running costs – even supposing that such moneys had been available. The investment of grant-aid by Government, and more recently of Lottery funds, in support of this work has represented extremely good value for money.

6.6 Today, the situation is much less rosy. There are profound weaknesses and shortcomings in the current arrangements. Now is the time to review our approach, take a strategic view, and secure a sound future for the preserved industrial heritage.

6.7 This report advocates the adoption of a carefully planned strategic approach to secure the future of England's preserved industrial heritage.

6.8 It identifies a key role for English Heritage, as the historic environment lead body, in driving for solutions to issues of risk and sustainability in the historic industrial environment.

6.9 But, others should be involved too. The Heritage Lottery Fund (HLF) already has a major capital investment in the field. It should be engaged in the strategic process of protecting that investment over the long term. So too, the National Trust with a small existing portfolio of industrial sites in its care, should consider options for adding others or taking them under its wing in some form of Associate status.

6.10 The issue of museum collections, their preservation, re-housing and display, needs the attention of the Museums, Libraries and Archives Council (now under the auspices of the Arts Council of England). In particular, Museum Development Officers, one of the most successful outcomes of the *Renaissance in the Regions* initiative, could play an important part in providing advice to industrial preservation organisations. The Association of Independent Museums (AIM) has already indicated its willingness to support the recent STIR (Saving the Industrial Revolution) initiative, which it is hoped will develop into a self-help body for preserved industrial sites.

6.11 In the case of the majority of preserved industrial sites there are six main areas of concern:

- the nature and complexity of the material evidence, especially where this includes machinery (operating or stationary);
- low levels of understanding of the value of that evidence and the absence of widely accepted conservation principles, planning or practice;
- lack of widespread appreciation of contemporary best-practice management standards, on the part of operators and statutory agencies;
- the fragility and vulnerability – in terms of governance, funding and longer term volunteer involvement - of many of the current site management arrangements;

- lack of nationally coherent marketing of the industrial heritage to the public;
- absence of an academic infrastructure promoting the study of the industrial heritage and, in particular, its preservation and conservation.

This study has recommendations that address all these issues.

6.12 The nature and circumstances of the preserved industrial heritage are such that it needs specific measures tailored to secure its future. No other area of the preserved heritage is in this situation. In that Government or its agents were complicit in creating and encouraging the development of the present arrangements there needs to be a recognition on the part of English Heritage that it has fiduciary responsibilities in this field and that specific measures are needed.

6.13 Some sites are in crisis and others are likely to be in the near to medium term future. Unless a clear and explicit national policy is developed the most vulnerable will deteriorate to a point where continued preservation will be impossible, as a result of degradation, decay, vandalism or inappropriate and expedient policies. In other cases, sites will become victims of the collapse of the bodies currently responsible for their preservation, largely as a result of an ageing and diminishing trustee and volunteer base, leaving English Heritage to pick up the pieces or broker – and no doubt fund – solutions with other agencies.

6.14 Adoption of a strategic approach is therefore essential. It has numerous advantages. First, the reinforcement and improvement of the management of these sites will ensure a continuity of care, the protection of vulnerable fabric, avoidance of the dangers of vandalism and the opportunity to rebuild such arrangements as do exist around sound principles and practices. A non-strategic or laissez-faire approach will inevitably leave many of these sites vulnerable to terminal decline or catastrophe and to the consequences of failure of existing governance and management arrangements. Second, for English Heritage, as the agency of last resort, a strategic approach provides the opportunity to anticipate, plan and budget for a sound and programmed regime of appropriately tailored solutions with all the benefits of protection of the assets and consequent long term cost savings that these imply.

6.15 But, in order for such a strategic policy to succeed, there needs to be a sound under-pinning of accepted and understood conservation principles and practice – not least on the part of EH itself - of research, teaching and training, and of a means of spreading the word. This report aims to both outline a policy and set out some options and proposals for implementing it.

6.16 An agreed policy, developed by English Heritage in consultation with the preservation bodies, and endorsed by Government through the forthcoming 2010-2015 Corporate Plan, with a programme and mechanism for its implementation, is an urgent priority. English Heritage (with the support of the Heritage Lottery Fund) should lead on this.

Recommendation 1 *English Heritage should recognise that the preserved industrial heritage represents a unique cultural asset of international significance and that to secure a sustainable future requires special measures.*

6.17 This situation is not peculiar to England; it is a United Kingdom issue. Although outside the scope of this study, similar conditions apply to a greater or lesser extent in the other home countries.

Recommendation 2 *English Heritage should open discussions with the equivalent conservation bodies in Scotland, Wales, Northern Ireland and the Isle of Man in order to develop a United Kingdom-wide approach to securing the future of the preserved industrial heritage.*

Recommendation 3 *English Heritage (preferably with the support and involvement of the other home country agencies) should declare the unique nature and international importance of the nation's industrial legacy, assert a recognition that its future must be secured and that it intends to make this a priority for the forthcoming strategic plan.*

6.18 In order to develop policy and provide a mechanism for its implementation English Heritage will need to do a number of things. As there is the nucleus of a management infrastructure in place it is proposed to adapt this in order to meet these strategic requirements.

Recommendation 4 *English Heritage should reconstitute the Industrial Archaeology Panel (which advises staff) as a full Committee (Industrial Archaeology Committee (IAC)) to advise the English Heritage Advisory Committee (EHAC,) and widen its terms of reference to embrace the strategic oversight, conservation and management of preserved industrial sites. This will require additional members with experience in these fields. Some could be drawn from the voluntary preservation sector. (But, see Footnote 1 below)*

6.19 These issues have wider implications, not least for the Heritage Lottery Fund. HLF has a major capital investment in many of these sites. It is important that this investment is protected and that sound governance, management and conservation principles are adopted in order to avoid catastrophic failure or loss through degradation, decay or vandalism.

Recommendation 5 *English Heritage should establish a strategic relationship with the Heritage Lottery Fund (perhaps through the mechanism of the Industrial Archaeology Committee or a specially constituted joint committee) to keep under review the state of health of preserved industrial sites in England and of those bodies responsible for their preservation and interpretation.*

6.20 English Heritage currently lacks the staff or management capacity to implement a responsible policy of oversight and care. Current arrangements

have enabled a comprehensive Monuments Protection Programme (MPP) programme to be pursued. This has evolved into the present Strategy for the Historic Industrial Environment Reports (SHIERS) initiative. Less satisfactory has been the ability to carry this work through into designation or to ensure responsible levels of care of the most important and vulnerable sites. Entirely absent is any capacity to monitor or support the preservation of industrial sites in terms of standards, management or operation. As a consequence many important preserved industrial sites have reached crisis or impending crisis without English Heritage either knowing or being able to do anything about it.

Recommendation 6 *English Heritage should establish an Industrial Archaeology Unit (IAU) with resources of knowledge and management experience, and a budget, sufficient to implement a policy of securing a sustainable future for preserved industrial sites. The new IAU should be responsible to the IAC act as its programme board. The IAU need not be large (three or four people). (But, see Footnote 1 below)*

6.21 The IAC and IAU would form a nucleus of specialist knowledge and expertise in support of the industrial heritage in general and preserved sites in particular. It would oversee the present programme of SHIERS work, review designation, undertake training (both for EH staff and for voluntary groups), promote improved standards of conservation and interpretation, be watchdog, early-warning system and if necessary safety net. The IAP should present an annual statement to EH Commissioners.

6.22 It is accepted that this will be a challenging prospect for English Heritage at a time of reform and financial constraint but such is the nature and urgency of the need and the danger of doing nothing that this matter has to be addressed in the most positive and constructive manner. Alternative mechanisms may exist and should be analysed; what is without question is that EH needs to address this issue as a matter of urgency, take action, and put in place practical means of securing the future of these important sites. Action now will bring dividends in the longer term. (See Footnote 1 below)

6.23 (An example, albeit on a smaller scale, of special needs requiring special solutions is in English Heritage's approach to the conservation of the maritime heritage.)

Recommendation 7 *As part of its Priority Designation Programme, English Heritage should review the categories of designation of the 250 key preserved industrial sites, and others that are at risk, and where necessary, undertake regrading.*

Recommendation 8 *English Heritage should identify and document a core portfolio of all types of key historic industrial sites, based on their historical and archaeological importance, review the range of current uses (preserved, operational, re-used, etc), in order to ensure that current preservation arrangements meet appropriate standards of care and management.*

6.24 Of the 250 preserved industrial sites in England at least fifty are of prime or outstanding evidential importance and almost without exception of significance on an international scale. Some are at acute risk and should be considered immediately for Guardianship.

6.25 Examples are:

- The 1795 Elsecar Beam Engine, Barnsley, a Newcomen-type engine and the earliest steam engine in the world still *in-situ* (PEV). (Scheduled Ancient Monument in the care of Barnsley Metropolitan Borough Council);
- Longdon-on-Tern Aqueduct, Shropshire (1796) (PEV), also of great importance but perhaps at less risk,

6.26 Wholesale Guardianship of significant numbers of sites is not seen as a financially or politically viable option, nor is it necessary or desirable. Where existing arrangements are satisfactory or repairable, they should be supported and reinforced. A more interventionist approach would be expensive and counter-productive. A practical and affordable way forward, which could have the benefit of supporting, mobilising and capitalising on local community and voluntary efforts, would be to enter into supportive arrangements with existing preservation bodies.

6.27 Two mechanisms are proposed. For large or complex sites of high significance and preferably where there is the nucleus of local support (either from a voluntary body, local authority, or combination of these) a new governance model should be created (usually as a charitable trust registered as a company limited by guarantee) in the form of an **Industrial Preservation Foundation** (IPF). This would bring together voluntary, community, local authority, English Heritage, HLF and possibly National Trust and museum interests.

6.28 English Heritage should anticipate being a core funder of these IPFs, with a strategic role in nominating some trustees, in monitoring management (but not directly managing sites itself), and ensuring standards of care and interpretation. An IPF would have full executive responsibility for the conservation, interpretation and management of the site or a group of related sites. These Foundations and the sites in their care should enjoy a special relationship with English Heritage and be accessible free or at a discount to English Heritage (and National Trust?) members.

6.29 Examples of sites where this model could be applied are:

- The Bowes Railway, Sunderland/Gateshead (OEV) (Scheduled Ancient Monument in the care of the Bowes Railway Trust) and Causey Arch (OEV) (The Bowes Railway is in a critical state of decay, with an inappropriate management structure);
- Queen Street Mill, Burnley (OEV);

- Evans' Silver works, Birmingham, (OEV) as an alternative to straightforward Guardianship;
- Foundation management might provide a suitable model for, for example, EH Guardianship sites such as Stott Park Bobbin Mill or World Heritage Sites like the Derwent Valley or Saltaire. [A partial step in this direction has been made with the unified management being applied at Hadrian's Wall]

Examples of potential Foundation sites are listed in Appendix 2

6.29 The second model involves leaving the present governance arrangements in place but proposes a level of regular support sufficient to encourage improved standards and generate self-help.

6.30 (The recent experiment of the Associated Properties Scheme is a near analogy. In the case of Coldharbour Mill, Uffculme, Devon, for example, this was regarded by the trustees as a most successful approach).

6.31 English Heritage should establish a series of **Associated Properties** (APs), by negotiation with such bodies. Eventually, there might be as many as fifty such AP relationships. These need not be specific to English Heritage; other bodies, notably the National Trust, could set up similar arrangements. Examples of preserved industrial sites where this model might apply are listed in Appendix 2

6.32 APs should be of exceptional quality and usually of evidential value, in the hands of competent or potentially competent local management, and prepared to commit to agreed standards of conservation and interpretation.

6.33 An AP would receive an annual grant from English Heritage. This could be a negotiated sum, agreed for, say, five years. The site would appear in the EH Handbook and website, EH members would have free or discounted access, and opening hours would be agreed in advance. EH would offer support, through the IAU. The operational relationship with EH should be through regional offices, (But see Footnote 1 below). In each region there should be a designated member of staff responsible for the operation of the AP system, within a framework determined by the IAU.

6.34 As far as is practicable AP relationships should match a standard format but EH should recognise the need for flexibility and be prepared to tailor AP contracts to suit the needs of individual sites and their operators. This is not an area for one-size-fits-all solutions. The AP system should be reviewed regularly by the IAP in association with site operators.

6.35 Operators should be encouraged to form a national association or self-help body (possibly based on the emerging STIR initiative or within AIM) and EH should anticipate providing some start-up funding for this. (HLF might be a willing partner). (The nearest equivalent body is the *ad hoc* group established

by HLF that embraces the industrial, maritime and transport heritage, itself a recognition that these areas require specific measures to ensure their sustainability).

6.36 The development of a network of APs will require care and sensitivity. The process should be implemented progressively over, say, five years beginning with say ten sites in year one, new sites being added at about the same rate each year. This programme should be set out in advance so that the wider sector understands from the outset the nature of the intention and the means of implementing it. The annual grant should be seen as a means of helping sites to help themselves, and should be reviewed regularly. If HLF could be a partner, in the case of those sites that it has supported, this would help spread the load. The objective should be to improve standards and make sites more self-sufficient.

6.37 Criteria for AP support should be:

- importance of site (it should generally be of evidential value);
- degree of risk (early AP relationships should be established where improved conservation and interpretation is vital and beyond the current capabilities of the operators, or where day-to-day management is breaking down through other factors);
- willingness of current management to engage in a programme of improvement (AP support should be in return for compliance with agreed standards and, where necessary, a willingness to embrace new methodologies as a route to better performance)

6.38 It would be important to emphasise that AP relationships should not threaten the independence of preservation bodies. Rather, the relationship should be to assist in meeting designated standards and engender a more secure and fruitful policy of self-help. A direct parallel might be the supportive arrangements currently being devised for places of worship.

Recommendation 9 English Heritage should explore the opportunities for the establishment of Industrial Preservation Foundations and a network of Associated Properties (where possible and appropriate with the participation of other national agencies, eg HLF, NT)

6.39 One of the obstacles to wider public understanding of and participation in the preserved industrial heritage stems from its diverse and excluded nature. There are no national bodies representing the wider interests of the preserved industrial heritage, no easily accessible website that gives details of sites and their opening arrangements, no annual publication that describes and lists them. Such arrangements have so far been beyond the financial and managerial capacity of the site operators themselves. Very few sites appear in Hudson, many do not feature in local tourism outlets. Lack of money is usually cited as the problem. Given that their marketing budgets are small or non-

existent, any measures to achieve wider publicity for these preserved sites should encourage increased public involvement and enhanced income.

6.40 There are a number of moves that could improve this. Enlargement of the European Route of Industrial Heritage (ERIH) website initiative and/or the development of a dedicated United Kingdom industrial heritage website, and the production of an annual publication on the industrial heritage with particular reference to preserved industrial sites could transform public awareness, promote a larger visiting public and provide a platform for improving standards.

Recommendation 10 *English Heritage (in collaboration with HLF?) should take the lead in offering start up funding for three initiatives to widen access to the preserved industrial heritage:*

- Encourage the widening of the ERIH website initiative to embrace all key preserved industrial sites in England;
- Sponsor a purpose-designed industrial heritage website providing comprehensive information on sites, their importance, access arrangements, and programmes (this might best be handled through a private contractor with the ultimate objective of passing back a proportion of the costs to those sites listed);
- Publish – or sponsor – an annual publication, *England's Industrial Heritage: Conservation and Access* (again, perhaps best handled through a private publisher/distributor). This would include substantial editorial content on conservation principles and practice, commissioned articles on recent programmes of research, conservation, excavation, operation of machinery, or demonstration of processes, and new interpretive or access initiatives, as well as a comprehensive and well illustrated directory of sites. The objective would be for this to become self-funding or substantially so, with any annual deficit to be picked up by those participating sites that take space, supported if necessary by EH.

For EH, these initiatives should be seen as five-year start-up commitments.

6.41 Again, all these initiatives would be better carried out on a UK-wide basis, negotiated with the other home country agencies. If this proves to be slow or impossible, English Heritage should take the lead and encourage others to join later.

6.42 In comparison with other areas of the historic environment, research, opportunities for study and training, development of conservation standards, planning and management are either small or non-existent. Bearing in mind the importance, size and relative scale of the historic industrial environment and the high level of risk attaching to much of it, this represents both a major deficiency and a real brake on future progress. The problem is exacerbated by the high proportion of volunteers at the heart of the preservation activities

who do not have access to training. Training should be made available to them.

6.43 English Heritage should become a contributor to developing research, teaching and expertise in these fields. This might take the form of, for example, pump-priming (with others) the establishment of the research and teaching infrastructure necessary to ensure a sound future for the historic industrial environment, of sponsoring research and/or teaching positions in critical areas where knowledge is low and standards unsatisfactory.

Recommendation 11 *English Heritage should support provision of research and teaching in those specialist areas of preservation, conservation and management that relate to the historic industrial environment.*

6.44 This will require a pro-active approach by English Heritage. Funding or part-funding of relevant courses (including if necessary the (time-limited) part-funding of a post or posts, and of scholarships to give candidates access to those courses, will be necessary. This funding could be in the form of start-up grants over, say, five years tailing off as provision becomes self-sustaining.

6.45 There are areas of the industrial heritage that are critically neglected but generally fall outside the scope of this report. The most significant of these is industrial workers' housing, still the most prolific surviving evidence of industrialisation. Industrial housing is little understood, and hardly any are designated. They are peculiarly vulnerable as a result of ill-considered alteration. This degradation is likely to increase as a result of further alterations stemming from the energy conservation implications of climate change. Amongst these houses there are still a few survivors of early typologies although most of the court- and back-to-back housing of the early nineteenth century has now gone. **A major study of surviving industrial housing is an urgent requirement.**

6.46 ***These recommendations reflect the peculiar needs of a preservation sector that lies largely outside the conventions and frameworks that guide and govern the care of the wider historic environment. At almost every level, from the absence of an academic base and opportunities for formal training to the nature of the funding and governance arrangements of the bodies that care for most of the industrial heritage, the needs are unconventional and require specially tailored solutions. On the plus side, there is the commitment and willingness of voluntary bodies to take on preservation responsibilities that would be daunting for public sector organisations and the major national asset that this represents. There is a universal desire to do better but a lack of understanding of what that constitutes.***

6.47 ***Crucially, the objective is to achieve a fruitful outcome: better and more sustainable care of the nation's key historic industrial sites; improved access and standards of conservation and interpretation; the revival of the fortunes of voluntary organisations who will be better***

equipped to carry out their work into the future; and, a modest but effective investment of public money in an outstanding heritage of national and international significance.

Footnote 1 Investigating the management options. To invest time, expertise and money in helping to improve and sustain the performance of these organisations will itself require perceptive and sensitive handling on the part of English Heritage. This will be more crucial than money, and will need leadership that both understands the sector and has the skills to offer real support and guidance. Responding to these challenges will also require extraordinary determination and focus on the part of English Heritage. For example there are issues about how, as a subject-specific matter that requires cross-cutting solutions, this sits in the EH management structure.

EH will need to explore the most imaginative of options in order to meet this challenge. Freedom to operate flexibly and responsively suggests an outsourced solution run by a free-standing unit in the manner of an archaeological unit enjoying a contractual relationship with EH might offer a productive way forward. (An analogy is the outsourcing of underwater archaeology to Wessex Archaeology. In the case of industrial sites the Ironbridge Institute might be an appropriate godparent for the IAU)

Another might be to give the IAC management board status and to operate the IAU entirely offshore. The relationship with EH would thus offer direct accountability to Commissioners on the part of the board but a contractual relationship with the IAU whose staff would be on independently determined conditions of service and pay scales. Bearing in mind that much of the day-to-day work would be in co-operation and liaison with voluntary bodies, this could be a particularly attractive model; see Footnote 2 below.

Footnote 2 Implementation. Ideally, EH and HLF should work in concert to implement these recommendations. Where possible, engagement of other agencies should be sought. There are a number of potential pitfalls. Some of the voluntary preservation bodies may resent intervention, especially if there is an implication that their policies or the quality of their work is in question. The carrot must be more obvious than the stick. If one of the primary messages from this report is that sites are in peril – which is the case – then devising means of affording assistance will need great care, in terms of arguments to justify involvement, wording, and mechanisms for implementation. A Panel reformed as the IAC and a new IAU will require people of stature, knowledge and maturity to give authority to the implementation of these proposals. On the ground, sensitive and practical support, encouragement and a non-bureaucratic approach - for which neither EH or HLF are wildly applauded – will be the key to success.

7 A PORTFOLIO OF SIGNIFICANT SITES

7.1 This section of the report comprises a high-level audit of nationally significant historic industrial sites of the key industries that were to characterise the country's industrialisation post-1700. Utilising the thematic reports already produced under the Monuments Protection Programme (MPP), the Thematic Lists and the SHIERs initiative, and the thematic surveys undertaken by EH and its predecessor bodies, it gives a broad picture of the 'national portfolio' of preserved industrial sites. No attempt has been made to equate these sites with the value definitions expressed in *Conservation Principles* (except where this is especially helpful to emphasise a high level of importance (eg generally PEV or OEV). The most significant sites are identified in **bold**, those in *italics* are usually more contextual in their significance.

7.2 The key sites, identified for EH consideration, meet at least one of the criteria, with adaptations, defined in *Conservation Principles*. Most meet the criteria of the sub-groups set out in section 2 above.

7.3 An important and unaddressed issue concerns the preservation of typical aspects of the industrial landscape, almost invariably undesignated, which are now rare (eg colliery spoil heaps) and disappearing, or prolific but largely unstudied and subject to degradation through modernization and alteration (eg workers' housing). Although not the subject of this study these are important and need urgently to be addressed.

7.4 The industries examined are:

- **Coal**
- **Textiles**
- **Metal Industries (including Engineering)**
- **Transport & Communications**
- **Organic based industries**
- **Chemicals & Ceramics**
- **Public Utilities**
- **Military Industrial sites**

COAL

7.5 Britain's was the world's first coal-fuel economy. Coal was fundamental to Britain's pre-eminent role in global industrialisation for a period of two centuries, but the landscape evidence for the very existence of the coal mining industry has now almost disappeared. And what has survived is skewed in chronological range, content and geographical distribution. It is also very vulnerable.

7.6 Britain by the beginning of the eighteenth century was unique in Europe for its large consumption of coal – some 3 million tons per year, and its Industrial Revolution was to be based on coal. By 1800 consumption had risen to 10 million tons, to 50 million tons by 1850 and to a peak of 287 million tons in 1913 when 1,118,000 workers were employed in the industry, in 3,100

collieries. At Nationalisation in 1947 some 1,000 pits came into public ownership but by 1992 only 50 were still working, employing 43,800 men. Today, after a bitter period of industrial strife in the 1980s and 90s most coal production is won by open-cast mining and there is only a handful of deep coal mines left and a workforce of some 6,500.

7.7 The Coal MPP was conducted during a period of such extreme change in the industry in the 1990s that it was split into two surveys – pre-twentieth century remains and the then current industry. The survey of early remains encompassed numerous field monuments such as *Stublick Pithead* in Northumberland, the cluster of impressive structures in Whitehaven (*Candlestick Chimney Wellington Pit, Duke Pit Guibal fan case and Saltom Pit*), the *Jane Pit Engine House, Workington*, and several other engine houses and associated structures such as coke ovens in the North East, Yorkshire, the Midlands, the Forest of Dean and the Somerset coalfields. Almost all are Scheduled as Ancient Monuments and while some are cared for by local authorities and/or industrial preservation trusts generally they do not meet the SHIPS criteria. A few of the engine houses such as **Bestwood** and **Washington F** still contain their steam engines and have limited public access. By far the most outstanding site of this group is the **Elsecar Engine (PEV)** - with its Newcomen-type engine of 1795 - the earliest *in situ* steam engine in the world.

7.8 The remains of the twentieth century coal industry, while more complete, are by no means representative of the later industry. The NCB period of modernised collieries and new super-pits is particularly poorly represented and there is almost no underground preservation. **Caphouse (with Hope) Colliery, (OEV)** Wakefield, is the outstanding exception. As the National Coal Mining Museum for England it combines typical early twentieth century pithead structures with access to underground galleries. It is the only preserved industrial site in England that receives direct government funding, with an annual grant from DCMS in 2006/07 of £2,659,000, channelled through the Science Museum, London. In 2006/07 the museum received 128,960 visitors, free of charge. This well exceeds the total public funding (excluding capital) for all other preserved industrial sites in England.

7.9 The experience of preserving a site such as **Chatterley Whitfield (EV)** – the first mine in Britain to produce more than a million tons of coal in a year – has been problematic and unsatisfactory. Scheduled, and in the ownership of Stoke-on-Trent City Council, the site is the subject of a regeneration programme to which English Heritage is a major contributor while the preserved pithead complexes at **Woodhorn, Snibston** and **Haig Collieries** are only partial and the twentieth century steam winding engines at **Pleasley** and **Astley Green** are isolated and out of context. The 1861 horizontal steam winding engine, by Evans of Paulton, removed by Bristol City Museum from Old Mills Colliery, Somerset in the 1960s (and possibly the oldest horizontal winder in the world) is still in storage with no immediate prospect of presentation.

TEXTILES

7.10 The textile industry was in the vanguard of the Industrial Revolution in Britain and no other industry has left architectural remains as impressive, diverse and widespread, both chronologically and geographically. Most of these buildings are peculiarly British in form, owing little to other cultures, and each innovatory stage has left some record in the landscape. Many of these stages were already obsolete when the industry's contemporary technology was adopted overseas. Thus Britain is the country where the widest spectrum of development can be studied from surviving remains. The remarkable survival of some of these most historic mills was one of the principal reasons for the inscription of the Mills of the Derwent Valley, New Lanark and Saltaire as World Heritage Sites and for the inclusion of several mills in Ancoats in the 1999 UK WHS Tentative List proposal for Manchester.

7.11 The textile industry in Britain, as elsewhere, was a necessary part of civilised life and, from the Middle Ages onwards, an important element in its international trade. It was originally very much based on wool, and, to a lesser extent, flax. It was also relatively ubiquitous. Wool and later wool cloth formed the primary commercial export from England for over four centuries and was symbolic of the nation's primary source of wealth. The evidence for the early phases of the industry must be sought in the expressions of the prosperity it created – the Woolsack in the House of Lords, the magnificent churches, clothiers' houses and merchants' houses in East Anglia, the southern counties and the West of England and in the wool-warehouses in ports such as Southampton and Poole, and in long-converted workshops in East Anglia. It was the development of factory production in spinning, weaving and knitting, over the last three centuries, of specialised branches and their concentration organisationally and geographically, that was to give the industry its present character.

7.12 The first branch to undergo significant mechanisation was the hosiery industry which, from the late seventeenth century onwards, witnessed significant expansion with the development of hand-powered workshops, especially in the English Midlands. It was not, however, until the first quarter of the eighteenth century, when the economic circumstances were ripe, that any venture was to provide a lasting model for greater changes in the industry. Paradoxically, it was a luxury branch of the industry – silk - that was to pioneer the concentration of production and the application of water-powered mechanisation. And, it was a second imported raw material – cotton – that was to give the industrialisation of textile manufacture real impetus.

7.13 Little survives, other than the ornamental gates and the foundation platform with its watercourse arches, of Lombe's pioneer Italian Silk Mill of 1721 in Derby but Congleton, Leek and Macclesfield all contain significant evidence of the expansion of the silk industry from the mid-eighteenth century onwards. The industry thereafter progressed steadily, if unspectacularly, until a flourish in the later nineteenth century with some large mills built in Staffordshire as at *Big Mill* Leek and in Yorkshire, Lister's massive *Manningham Mills* in Bradford, which catered for the velvet trade. Amongst

the surviving sites in the industry's early heartland are Chester Roads Mills, **Paradise Mill** and *Paradise Street workshops* in Macclesfield and *London Mill* and *Wellington Mill* in Leek while **Whitchurch Silk Mill** (Hampshire) is of particular note as it still produces silk and retains its waterwheel. It is run by a preservation trust, continues manufacture, and is open to the public; a model of a well run and presented preserved historic industrial property.

7.14 It was again the Midlands and in particular the valley of the River Derwent in Derbyshire that witnessed the next great step forward in the textile industry. Richard Arkwright's harnessing of water power at Cromford to spin cotton in 1771 was to revolutionise the industry. The mills and settlements he and his associates built along the Derwent valley and in its tributary valleys over the next half-century has left perhaps the finest legacy of early textile industry landscapes in the world. Many of Arkwright's own mills have survived, including **Cromford** (PEV), **Masson** (PEV) and *Haarlem*. The Strutt family empire is represented by mill structures at Belper (of which **North Mill** (PEV) is outstanding) and Milford surrounded by their settlements and company farms, while at Darley Abbey the Evans family's enterprise is witnessed by the remarkably complete complex of *Boars Head Mills* with its associated settlement.

7.15 The cotton manufacturing technology developed in the Derwent Valley, rapidly spread throughout northern England and most spectacularly on the western flanks of the Pennines whose the valley sides were lined with textile mills and their settlements such as **Quarry Bank Mill** (PEV) at Styal. By the end of the eighteenth century the industry freed from reliance on waterwheels by the introduction of steam power, spread to the lowlands west of their earlier Pennine heartland. Manchester was an early centre of this movement and Ancoats, which developed from the 1790s with the first large concentration of steam-power, retains one of the most significant groups of early steam mills to be found anywhere in Europe - **Murrays Mill** (1798 onwards), McConnell & Kennedy's *Sedgwick Mill* (1818) and *Beehive Mill* (1820). It was from Ancoats that Manchester was to become known as the first industrial city.

7.16 Cotton spinning mills had led this early building boom, but the second quarter of the nineteenth century saw great advances in the development of mechanised weaving which profoundly changed the cotton industry and the design of its factories. In addition to spinning in multi-storeyed mills, many firms began to integrate other manufacturing processes and housed power looms in single-storey sheds with their distinctive saw-tooth roof profiles. By 1850 the English cotton industry was dominated by the concentrations in south-east Lancashire and the adjacent areas of Cheshire and Derbyshire, and increasing specialisation began to occur. The integrated firm, which peaked in the cotton industry around 1850, was gradually replaced by newer firms concentrating on either spinning, which was centred on Manchester in the south of the area, or weaving, centred on Burnley in the north. By the end of the century over 80% of all spindles were in the spinning district while over 65% of all looms were in the northern area with **Queen Street Mill** Burnley (OEV) (with its steam-driven loomshed) the outstanding and unique survival of this generation. In the second half of the nineteenth century Manchester

developed from being primarily a manufacturing city to being the centre of the world trade in cotton. This pre-eminence was expressed in a remarkable series of commercial warehouses that visually are still such a feature of the central city area.

7.17 In the woollen cloth industry the earliest significant buildings are late seventeenth- and eighteenth- century clothiers' houses with integrated or adjacent workshops. Examples are to be found in the West Country around Trowbridge and Bradford on Avon in Wiltshire, and in the Nailsworth and Stroud valleys in Gloucestershire where *Egypt Mill* and the *Wool Loft* at Nailsworth illustrate the continuum between the seventeenth and eighteenth centuries. The region also contains early examples of specialised buildings including loomshops and wool stoves such as the distinctive round towers at Woodchester and Frome. In Yorkshire the finest expression of this period is the **Piece Hall** (OEV) at Halifax, a magnificent galleried courtyard of 1779 providing an exchange between merchants and manufacturers. Numerous workshops survive in the rural uplands reflecting the domestic phase of the industry which continued long into the nineteenth century as at the weavers cottages at **Golcar** where a terrace of c1840 has been preserved as a museum. **Higher Mill, Helmshore**, with its restored fulling stocks, is a fine example of the early phase of Pennine Woollen mills.

7.18 Increasingly, throughout the nineteenth century the buildings of the wool and worsted industries were to dominate the landscape of West Yorkshire. Benjamin Gott's *Armley Mills* in Leeds, though largely rebuilt after a fire in 1805, is a classic example of a large water-powered scribbling, carding and fulling mill of this period. Towns such as Halifax and Huddersfield and their surrounding areas were transformed by mills and specialised branches of the industry developed in a host of smaller towns such as Batley, Osset and Dewsbury. Bradford was the supreme example. It was ringed by huge complexes of mills in surrounding settlements, such as Ilingworth's Mill, Buttershaw, Black Dyke Mills, Queensberry and Moorside Mills, The great complex of **Saltaire Mill** and settlement (PEV) is the ultimate example. A similar expansion in the West of England is represented by a cluster of fine mills in the Stroud Valleys, including the magnificent **Stanley Mill** which is an 1813 fire-proof rebuild of an earlier complex, *Ebley Mill*, a classic long narrow mill of 1814, and *Dunkirk Mills* with its long range of four early nineteenth century blocks. To the south west of the region, the huge complex of *Tonedale Mills* (1800 onwards) at Wellington and the late eighteenth century **Coldharbour Mill** at Uffculme (OEV) (now a textile museum) are noteworthy. The carpet branch of the industry in Yorkshire is well represented by the magnificent *Dean Clough* complex in Halifax, but elsewhere, as at Kidderminster in the West Midlands, most of the outstanding buildings have gone.

7.19 The flax industry has a long history in Britain but due to the nature of its cultivation and preparatory processes the industry was originally rurally based. Some relic survivals, such as sailcloth and twine making, are to be found in Somerset and Dorset as at West Coker twine-works and the mills and workshops in and around Bridport. By the end of the eighteenth century,

however, the industry had moved into towns and indeed many of the pioneer fire-proof mills were built to accommodate the dry spinning of flax, which was particularly hazardous. Thus **Ditherington Mill** (1797) (PEV) in Shrewsbury, recognised as the earliest fully fire-proof mill in the world, was built originally for flax, as was Salford Twist Mill (1802), Marshall's complex of mills (from 1808 onwards) in Leeds, and *Barracks Mill* (1809) in Whitehaven. Marshall's mills in Leeds culminated in the magnificent Egyptian style **Temple Mills** (1840) (OEV), which were both technologically very advanced as well as being architecturally distinctive. The horse-hair works at *Lower Flax Mill*, Castle Cary, retains its nineteenth-century machinery in use and is the only such works left in the country. The existence of working machinery in its original building is today so rare that this should be considered as a candidate for survey and possibly preservation for public access. In Wilton, where until recently the carpet mills admitted visitors, public access has now ceased and the mill complex is entirely devoted to factory outlet retailing.

7.20 Although the hosiery industry was the first branch to successfully mechanise, production generally remained small-scale and in the premises of master framework knitters, typified by the preserved examples at **Ruddington**, Nottinghamshire and **Wigston**, Leicester. Lace factories, however, successfully grew in scale with the introduction of the bobbin-net lace machine perfected and patented by John Heathcoat. Though in 1816, Heathcoat moved to Devon and a machine lace industry also developed in Somerset the main development of the lace industry remained in the East Midlands with huge complexes of mills, such as Anglo-Scotian Mills (Beeston), Victoria Mill (Draycott), Leopold Street Lace Factories (Long Eaton), and Springfield Mills (Sandiacre). The focus of the trade was the Nottingham Lace Market precinct with its magnificent commercial warehouses such as that of Thomas Adam (c1855).

7.21 The huge demands of the textile industry for mechanised plant called into being networks of supply industries producing bobbins, spindles, shuttles etc. **Stott Park Bobbin Mill** in Cumbria (a Guardianship site where the process is demonstrated) is the last of more than eighty such mills and a fine example of the type of woodland industry that developed to meet that demand.

METAL MINING, PRODUCTION AND WORKING (INCLUDING ENGINEERING)

7.22 Over a period of fifteen years various MPP reports on ferrous and non-ferrous metals and metal working have considered thousands of sites and recommended hundreds for new (or affirmation of) designation (the iron and steel industry alone has attracted over 300 such recommendations). However, a great many of these sites are field monuments and relatively few fall into the categories relevant to this review. Thus of the hundreds of mine engine houses (there are over a hundred in the various Cornish WHS areas) only a few which are in complexes with public access, and notably those which contain their steam engines, are included. Similarly of the many

hundred metal production and working sites only a few outstanding examples, mainly furnaces, are assessed.

Metal extraction

7.23 The south west of England contains the richest variety of metal bearing ores and has one of the longest records of metal ore mining in Britain. This has been recognized by the inscription of the Cornwall and West Devon WHS which preserves and celebrates the distinctively Cornish contribution to hard rock mining globally. Mining sites with remains of peculiarly Cornish style can be found in Spain, Mexico, South Africa and South Australia. Some of the sites within the nine areas of the Cornwall and West Devon WHS, such as **Levant Mine**, the **East Pool Engine houses**, **Geevor Dressing Mill**, **Tolgus Tin Mill** and **Morwelham Quay** are preserved sites interpreted to the public. Some are in National Trust ownership, while the Geevor site is run by a community preservation trust. The Pennines were also important for non-ferrous mining, most notably lead, and in the Peak District **Magpie Mine** is one of the best preserved while at **Nenthead Mine** in Cumbria the designated area covers some 200 acres of mining landscape and the dressing floors at **Kilhope Lead mine** which are open to the public. Iron mining has left a less tangible legacy but the early open cast mining remains such as *Puzzlewood Scowles* in the Forest of Dean are important while calcining kilns such as those at *Rosedale* in north Yorkshire are equally impressive.

Production, primary and secondary

7.24 The refining of non-ferrous metals has left a legacy of field monuments such as the lead smelt mills and flues of the Pennines as at *Grassington*, *Greenhow*, *Healeyfield*, *Nenthead*, *Grinton* and the arsenic calcining kilns and flues at *Bottalack* and *Bere Alston*. Iron production on the other hand has left a rich legacy of furnace sites and forges including the fine cluster of charcoal fired furnaces in Cumbria of which **Duddon Bridge**, is the finest (and also publicly accessible) but *Backbarrow*, *Newland*, and *Nibthwaite* are also of importance. In Yorkshire there are fine furnaces at *Low Mill* and *Rockley* and in the Midlands at *Morley Park*, *Moira*, *Bedlam*, *Blists Hill* and *Charlecote* but it is the **Coalbrookdale Furnace (PEV)** in Shropshire that is of prime significance as the first site where coke was successfully used to smelt iron. There are also early iron furnaces in the Weald (Ashburnham) and the Forest of Dean – *Gunns Mills* and *Whitecliffe* - but these are difficult of access for the public. There are fewer sites where the conversion of iron into steel is preserved, making **Derwentcote Cementation Furnace (PEV)** in Durham and *Hoyle Street cementation furnace* in Sheffield of particular significance. Derwentcote is in English Heritage Guardianship. In Sheffield several sites have remains of crucible steel making and of these **Abbeydale Furnace and Forge (PEV)** and **Darnall Steelworks** are outstanding. Very little survives of the later developments in steel making – there are no Bessemer convertors left *in situ* nor open hearth furnaces, but the Magna Centre in the former **Templeborough Steel Works** preserves one of the electric arc furnaces in its huge hall. The brass industry greatly expanded around Bristol in the eighteenth century with the pioneer technological improvements by William

Champion, amongst others. This has left a rich legacy of sites including the **Saltford Brass Mill**, (P/OEV?) the Champion buildings at *Warmley* and the annealing kilns at *Kelston*.

Metal Working

7.25 The significance of Boulton & Watt's Soho Foundry, Smethwick and Mathew Murray's Round Foundry, Leeds are discussed below in the section on engineering works but other foundries and forges which did not develop into more sophisticated works have survived such as at *Wortley* near Sheffield and at *Perran* and *Sticklepath* in the south west. The water driven **Finch Foundry** at *Sticklepath* is owned by the National Trust and is a representative illustration of a typical small rural scythe forge while the *Forge Needle Mill* at *Reddich* preserves the specialised processes for manufacturing needles. Mathew Boulton's Soho Manufactory initially produced the small metal wares for which the Birmingham area was to become so famous and the Birmingham Jewellery Quarter still retains some notable sites representing these industries. The **Jewellery Quarter Museum** is located in a former family-scale jewellery works while the outstanding **Evans' Silverworks** (OEV) representing the other branch of the Quarter's industry, has recently been acquired by English Heritage. Unfortunately, there is no such representative site of the Sheffield cutlery trade.

Engineering Works and Factories

7.26 In the nineteenth century Britain could justifiably claim to be the 'workshop of the world'. Thousands of engineering works and factories across the country supplied the tools, locomotives, plant and machinery that enabled global industrialisation. Today the classic engineering works is a thing of the past. The rise of the industry was spectacular in its speed and extent and its contraction was equally rapid and traumatic. Its heritage is both unrepresentative and fragmentary and what does survive is problematic and vulnerable.

7.27 The engineering works in its most recognisable expression was effectively a creation of the last two decades of the eighteenth century and the first half of the nineteenth. Prior to that machinery was the province of the millwright, mechanic, blacksmith and carpenter - they would come together to erect machinery on site - a waterwheel, steam engine or textile mill. The increasing technical sophistication of the steam engine developed under the inventive genius of a few manufacturers such as James Watt and Mathew Murray (and the demand for mass produced textile machines) was to change all that. These engines were much more demanding in terms of design and precision and by the end of the century were being wholly constructed within an engineering works environment. The industry rapidly developed in the first decades of the nineteenth century with notable concentrations in London, Manchester, Leeds, Tyneside, the Black Country and Cornwall. Indications of specialist emphasis soon became apparent – machine tools in London and Manchester, textile machinery in Lancashire, Manchester and Leeds. Before long, locomotive manufacture in Tyneside and Leeds and agricultural

machinery in an arc across the east of England from Leeds to Bedfordshire were to produce further growth in scale and mass production. By the second half of the century the main railway companies were manufacturing their own locomotives and carriages in huge integrated works at sites like Derby, Crewe and Swindon while even greater numbers of locomotives were being constructed, largely for export, by private companies in Leeds, Manchester and Tyneside. There were outliers of all these industries in other locations and further specialisms such as crane building in Leeds, Carlisle and Bath and oil engines in Keighley and Dursley.

7.28 With the exceptions of some railway and agricultural engineering works and car factories, the buildings of the industry have not attracted much scholarly attention and the rapid contraction of the industry in the latter half of the twentieth century largely wrong-footed the preservation movement. Consequently, most of the sites have gone without adequate assessment or recording as they typically occupied urban locations which were ripe for regeneration. The English Heritage SHIER has shown that of the thousands of works that existed the majority have gone and only a handful are adequately preserved or sympathetically re-used. Amongst those preserved in their own right are **Garretts Long Shop, Leiston**, *Burrells Museum, Ingenuity* at Coalbrookdale and the **Stephenson Works** in Newcastle. Of those converted the Great Western Railway Works at Swindon is perhaps the best example of a multi-use site with the railway museum occupying an 1846 Brunel machine shop and its 1865 extension, English Heritage occupies the General Office (1842-1926) and the workshops of 1846 and the 1870s, have been converted into a vast outlet centre. There is a similar development based on railway workshops at Ashford in Kent. The early *Workshops* and *Roundhouse* at Derby Railway Works have also been sympathetically converted but elsewhere railway sites such as Crewe have not fared so well.

THE ORGANIC-BASED INDUSTRIES

7.29 There are some 450 preserved wind- or water-powered corn mills and open to the public [in the UK]. Although most date from the industrial revolution period they generally reflect a longstanding rural tradition although a very few include advanced high-technology waterwheels. They represent the largest single group of preserved workplaces in England. Very few meet above average evidential criteria but many accord with wider perceptions of aesthetic and communal value as symbols of the pre-industrial rural landscape. Most are not under threat and there are reasonably effective networks ensuring standards and promoting access. There are four such mills in Guardianship and nearly twenty in the ownership of the National Trust. No further assessment is being made here. The focus is therefore on other organic-based industries such as brewing, papermaking and leather production.

Brewing

7.30 The making of beer is an ancient and ubiquitous art which has been refined over the centuries and is currently being re-organised into ever-larger

units. The eighteenth century witnessed a revolution in brewing - large commercial breweries emerged in centres such as London and the state itself built breweries in the Naval victualling yards. Surprisingly little survives of the grand London breweries of this period apart from some heavily restored parts of Whitbread's Chiswell Street brewery. There are the remains of Naval breweries at the victualling yards near Portsmouth and Plymouth. The steep rise in population and therefore consumption in the nineteenth century encouraged the construction of steam powered breweries throughout the country and by 1870 there were no less than 16,798 in the United Kingdom. By the middle of the century tower breweries had been developed to take advantage of gravity as well as steam to move ingredients around the building and there are some archetypal tower breweries surviving such the functioning **Hook Norton Brewery** (OEV) and *Arkells Brewery* which both retain their steam engines and the **Stamford Steam Brewery** (OEV) which is now a museum. Today five multinational companies supply over 80 per cent of the beer sold in pubs and shops from some 20 large modern breweries while 40 or so regional historic breweries supply 'real ale' to pubs and have a vibrant sale of bottled 'live-beers'. The **Bass Brewing Museum** in Burton-on-Trent (where some brewing is carried out on a demonstration basis)) has recently been closed by Coors of Denver, the new owners.

7.31 The heritage of the basic ingredients of beer – malted barley and hops - is even more vulnerable. Floor malting and other historic processes have virtually disappeared in the last twenty years. The SHIER in 2004 found that of some 600 maltings that have been designated, most have already been converted to other uses and only six traditional floor maltings were operating. Now, [2008], there are only two, one of which, **Tuckers** in Devon, operates privately as a preserved exhibit and is open to the public. Similarly, of the 500 Listed oasthouses in SE England, most have now been converted into residences and only a few, such as that at **Scotney Castle Farm**, which is owned by the National Trust, still provide hops for locally brewed beer.

Other food stuffs

7.32 The manufacture of luxury foods such as chocolate resulted in large-scale and often innovative factories, including as Cadbury's at *Bournville*, Fry's at Keynsham and Terry's and Rowntrees in York. The latter two have just closed and the Somerdale Factory at Keynsham is soon to close leaving Cadbury as the main British-based producer. New food types, such as breakfast cereals, required large factories, e.g., the Shredded Wheat works at Welwyn Garden City (1926). Even the production of craft-food, such as marmalade, assumed an industrial scale (e.g., Frank Cooper's factory at Oxford, 1903).

Leather and Papermaking

7.33 The tanning industry which was originally to be found throughout the country has left a surprisingly slight heritage. The *Walsall Leather Centre Museum* located in a former leather works in the town that latterly became the main centre for the production of leather goods provides a good introduction

to the industry but operating traditional tanneries have all but disappeared and Grampound Tannery is a rare survival. Similarly papermaking is now concentrated in a few huge modern works and the traditional mills are mostly closed and converted to other uses. The preserved sites of the **Paper Trail** in Hertfordshire and **Wookey Hole Papermill** in Somerset which operates in the midst of a tourist attraction are therefore of considerable significance

TRANSPORT, MARITIME & COMMUNICATIONS

7.34 As this review is concerned primarily with preserved industrial sites to which the public has access on a visitor basis most of the country's transport heritage is not considered here. Much of it is still operational for its original purpose or, in the case of inland waterways for new leisure purposes which recognise and largely respect the value of surviving heritage assets. Accordingly, only the few nationally significant transport sites that lie outside the responsibility of the main operating agencies and their dedicated advisers are included. Inland waterways and railways have effective umbrella bodies that champion their cases (see paras 1.8 and 1.9) and the National Register of Historic Ships, a DCMS-funded agency, is establishing national priorities for historic ship preservation. Some may be designated under the proposed new Heritage Protection legislation.

Inland Waterways

7.35 British Waterways, and the Waterways Trust, share responsibility with the Environment Agency for the maintenance and operation of the inland waterways system together with a large number of canal preservation societies broadly co-ordinated under the umbrella of the Inland Waterways Association. As most of that system is viewed and designated as a heritage amenity, and British Waterways have dedicated regional teams of historic advisers, its historic structures have attracted considerable funding from the HLF are generally well looked after. Exceptional structures such as the **Anderton Lift** (P/OEV?) and the **Foxton Incline** have involved other national agencies in detailed discussions over their conservation while the boat and waterways museums at *Ellesmere Port*, *Stoke Bruerne* and *Gloucester* – all in historically important buildings - are national assets meriting national support. There are a few very significant canal structures such as the **Longdon-on-Tern Aqueduct** (PEV) that are no longer on the navigable system and hence outside British Waterways care. This is an outstanding candidate for preservation, possibly through Guardianship. The *Hay Incline* is within the Blists Hill site of the Ironbridge Gorge Museum.

Maritime

7.36 The outstanding global significance of Britain's maritime heritage has been recognised by the inscription of Liverpool's dock systems and associated commercial and institutional buildings as a WHS. This review does not attempt to comprehensively cover the many outstanding dock structures and warehouses in the historic ports around the country but rather points to some of the historic features that may fall outside normal operational

remits or re-use possibilities. Thus at Goole the **Tom Pudding Hoists**, at Bristol the *Fairbairn Steam Crane* and *Underfall Yard*, at Hull the *Alexandra Dock Steam Crane* and at Grimsby the *Grimsby Dock Hydraulic Tower* are all of significance. There are also numerous lighthouses around the coast which no longer fulfil their original function and are now preserved as historic sites. Some such as **Souter** near Sunderland are owned by the National Trust and are open to the public while others are managed by voluntary bodies on behalf of or in co-operation with Trinity House. Historic ships are of course an essential component of the maritime heritage but pose particular preservation issues. One in England, **Cutty Sark** (PEV), is Listed. Some vessels, such as the **ss Great Britain** (PEV), and HMS *Victory* are preserved in their land-locked dry-docks and can be treated as conventional historic sites although they demand their own conservation technologies. In the case of the *Great Britain*, she is preserved in Bristol in the Great Western Dock, the dock in which she was built.

Railways

7.37 A significant part of the primary network of the nineteenth century railway system is still in use as are many of its engineering structures, stations and related buildings. For the operational railway estate, and for preserved lines, there is a network of support embracing the historic environment of the railway with greater understanding, sympathy skill and care than has been the case in recent history. The widespread recognition that the often outstanding architectural and engineering heritage of the railway is one of its greatest assets, can be modernised to fulfil its original function, and as such animate the experience of rail travel in a manner otherwise impossible is transforming long-neglected structures for long term future use. Network Rail and the Railway Heritage Trust in particular share a commitment to reviving the fortunes of railway buildings and structures second to none. Others organisations appear in para 1.9. Accordingly, only those railway related sites that are no longer part of the Network Rail operational system, such as the Brunel section of **Temple Meads Station** (PEV), or fall outside the conventional preserved railway ambit, or are structures isolated from the operational system such as redundant viaducts in charitable trust ownership, are considered. Notable amongst these latter types of sites is the **Bowes Railway** (PEV) and the nearby **Causey Arch** (PEV) both of which are of international significance and should receive appropriate treatment, as should the **Middleton Top Engine House** (OEV) on the Cromford & High Peak Railway. Other nationally significant structures such as the *Kings Cross Coal Drops*, and the *Blyth* and **Dunston Coal Staithes** also require national attention.

Roads

7.38 Before the advent of railways the road network, largely under the aegis of the turnpike trusts, called into being many of the most significant engineering structures of the period designed by some of the most eminent engineers of the day. Of these the **Iron Bridge** (1779) (PEV) is a Guardianship monument as is Telford's masonry arch, **Over Bridge** (1820s)

(OEV). But many are still in use including Telford's Mythe (1826) and Holt (1826) cast iron bridges. Similarly, Samuel Brown's **Union Suspension Bridge** of 1820 and Brunel's **Clifton Suspension Bridge** (1864) still carry traffic but Sir John Rennie's *Horkstow Bridge* of 1835 and James Dredge's *Victoria Bridge*, Bath of 1836 are by-passed. The Brunels – Marc and Isambard – were responsible for one of the most remarkable engineering feats of the pre-railway era – the Thames Tunnel and though this is now part of the London Underground system its pedestrian access structure is preserved at **Rotherhithe**. Later road engineering structures of note which while still operational have very significant historic preservation elements are **Newcastle Swing Bridge** of 1876 **Tower Bridge London** of 1894 and the **Transporter Bridge** Middlesborough of 1911. The **Brooklands Museum** in Surrey preserves a key element of the motor industry – the surviving sections of the banked racing circuit, scene of early twentieth century motor racing.

Aviation

7.39 The twentieth century expansion of the aviation industry has demanded constantly changing and often novel structures, some of which, such as the *Cardington Airship Hangars*, are now recognised as important historic structures. The remainder of the built heritage of the industry and especially of aircraft manufacture and development has yet to receive the scholarly assessment that it deserves. Significant sites include early airport buildings at Speke, Brighton and Croydon, all now largely isolated from their original functions; hangars, including examples of Belfast truss roofs and large-span structures like the Brabazon hangar at Filton and the Owen Williams hangar at Heathrow and the research establishment structures at Farnborough.

Communications

7.40 A state-run postal system had evolved in the seventeenth century but it was Sir Rowland Hill's reforms of 1837 that created the modern postal system, with the penny post being introduced in 1840. By then a sophisticated network of mail and stage coaches covered the country supported by a huge industry of coaching houses, coach building and wagon building, and the breeding, stabling and provision of horses. So complete has been the extinction of this major transport industry, largely as a result of the arrival of the railway after 1840, that its remains are largely unknown and unstudied. Only tollhouses and milestones afford significant evidence, together with an unknown number of complete and largely unaltered coaching inns. Other services included telegraphs, savings banks and money orders. Prior to the 1830s, telegraphic messages were conveyed by visual means. A series of hilltop telegraph stations, built by the Admiralty in the 1790s to connect naval dockyards with Whitehall, passed information quickly along a line of observation towers. The electric telegraph was introduced in the 1830s and was also adapted for railway signalling purposes. Samuel Morse's dot-dash code evolved from 1835, and the technology of long-distance telegraph communication developed rapidly thereafter, with underground and submarine cables being developed from the 1850s. The submarine telegraph cable station at **Porthcurno** (OEV) is now a museum with wartime galleries built

into the hillside. Following the invention of the electric telephone by Alexander Graham Bell in 1876, the first telephone exchange was established by a private company in London in 1879 and others quickly followed, developing a countrywide network. In 1912 the Post Office took over the network created by the National Telephone Company and the first automatic exchange was opened at Epsom (Surrey). During the 1930s a singular neo-Georgian style became standardised for telephone exchanges.

7.41 Communication by radio is one of the most significant advances of the twentieth century. Guglielmo Marconi developed ship to shore communications and opened the world's first permanent wireless station in an Isle of Wight hotel in 1897; the wireless station at **Poldhu**, Cornwall, of 1900 was the first purpose-built radio building and is now preserved and a museum. Public broadcasting by wireless in England began in 1922. Television was first demonstrated by John Logie Baird in 1926, and the world's first television transmitter was erected at Alexandra Palace in North London in 1936. International communication improved markedly after the First World War. Aeroplanes made air mail possible, which extended the utility of the post, and radio technology developed rapidly. The Post Office radio station at Hilmorton opened in 1926, equipped with the world's most powerful transmitter: in that year the first two-way conversation by radio telephone took place between Hilmorton and the United States. Artificial earth satellites were soon recognised as the long-term solution for the rapidly expanding worldwide telecommunications network. The first active telecommunications satellite (Telstar) was launched in 1962, and one of its three international reception and transmission dishes was at **Goonhilly** in Cornwall. **Jodrell Bank** in Cheshire of 1952-57 has become the most celebrated example of a dish, based on wartime radar models.

THE CHEMICAL & CERAMIC INDUSTRIES

7.42 Salt has been produced since prehistoric times and there is archaeological evidence of its production in the Bronze and Iron ages and during the Roman period it was to become a major coastal industry. Later, the use of coal to heat salt pans maintained the coastal industry but by the nineteenth century the industry had shifted its focus. Coastal salt-making became relatively less important as firstly inland brine reserves were exploited and than somewhat later rock salt. Both these required fuel to raise and/or process favouring those reserves close to coalfields or good transport the salt reserves around Northwich became the main focus of the industry. The Salt Museum in Northwich and the nearby **Lion Salt Works** (OEV) are key sites.

7.43 The first appearance of a chemical industry in England, other than salt, can be dated to the sixteenth century but the industry was small scale and had only slight impact on the landscape until the industrial revolution when the acid-alkali-bleach industry developed at an industrial scale primarily to serve the burgeoning textile industry. At the same time the copperas and alum industry which had worked at a small scale around the south coast turned to

the huge deposits in North Yorkshire while the gunpowder industry expanded hugely to supply both military and commercial demands. The state production of gunpowder for the military is covered below but there were significant commercial producers in Kent around Faversham and in Surrey supplying London, in Somerset, Devon and Cornwall supplying Bristol and the Cornish mining industry and in Cumbria supplying Liverpool. Of these the Oare and *Chart Gunpowder Mills* at Faversham and the *Chilworth Works* near Guildford are of note. However the majority of chemical industry sites, because of their nature do not lend themselves to preservation or public display. *Catalyst* an interpretation centre at Spike Island, Widnes on the Mersey presents something of the industry's heritage in an historic chemical industry setting.

Glass and ceramics

7.44 The English glass industry is unique in Europe having undergone a sudden and radical change to the use of mineral fuel in the decade before 1620. This brought about a shift in location and the industry was to remain closely connected to the coalfields until recent years. In the seventeenth century as well as a change in fuel allowing much greater scale of production the English glass industry witnessed a much increased market with the demand for window glass, wine bottles, drinking and storage vessels all greatly expanding. This demand was met by the introduction of new products such as lead-crystal and by improved techniques including the introduction of the distinctive glass cones as covers for reverberatory and annealing furnaces early in the eighteenth century. These cones were recognised as a distinctively English form and were to become prominent features of the skyline in Bristol and Bridgewater, in the West Midlands, on Merseyside and around Sheffield and Newcastle. Notable examples survive at the *Stuart Crystal Works*, Stourbridge, at *Catcliffe* near Sheffield and at *Lemington* outside Newcastle while the *Hotties Centre* at St Helens celebrates that town's glass heritage.

7.45 As with the glass industry in the seventeenth century the pottery industries underwent a similar revolution in technology and scale in the eighteenth. At the beginning of the century most English pottery production was of relatively coarse earthenware but the introduction of improved salt glazing had encouraged a much finer creamware to develop by mid century. Further developments by the Wedgwood family, and then Cookworthy's discovery of china clay, led to the production of porcelain for which the Staffordshire industry especially become world renowned though other centres developed in London, Worcester, Derbyshire, Liverpool and at Coalport. The pottery industry now became the largest supplier of ceramics in the world. Much of the industry was concentrated around Stoke-on-Trent which became famous for its distinctive landscape of pot-works with thousands of bottle kilns but there were also major centres in the North East, in Yorkshire and in Lancashire. **Wheal Martyn China Clay Works** (OEV) in Cornwall is preserved as a site and museum of the china clay industry and other associated raw material sites are to be found at **Cheddleton Flint Mill** (OEV) and at the *Etruscan Bone Works* in Hanley while there are preserved potworks at **Gladstone Pottery** at Stoke, at **Coalport**, Shropshire, and at

Worcester. The industry has declined greatly in recent years and any opportunity to preserve further works as representative heritage sites should be taken (*The important site of Middleport Pottery of Burgess & Leigh in the Potteries is currently under consideration by English Heritage and should receive the most serious consideration*).

Clay, Brick and Lime

7.46 Despite the ubiquity and scale of the brick and clay tile industries and the survival of numerous kilns of many shapes and sizes as field monuments there are relatively few sites preserving its heritage. The relatively complete **Bursledon Brickworks**, preserved by the Hampshire Buildings Preservation Trust, is therefore of considerable significance. The Hoffman continuous kilns, which revolutionised the industry in the late nineteenth century, have been superseded by continuous tunnel kilns and the former with their tall chimneys became a prominent feature of some landscapes as around Stewartby. Limekilns were equally widespread and a great many survive as field monuments with some such as **Beadnell** in Northumberland being owned by the National Trust. Later types of kiln are to be found at the *Amberley Chalk Pits Museum*.

PUBLIC UTILITIES

7.47 The provision of public water, gas and electricity supplies and the removal of waste and sewage are known collectively as the 'public utilities' and by the mid nineteenth century were coming to be seen as the responsibility of central and local government, although ventures were often set up with joint private/public capital. They helped create a safer and healthier environment and some municipalities and corporations saw such improvements as being one of the principal justifications for their existence. Consequently many of the buildings were monumental in scale, and set in carefully designed landscapes.

Water Supply

7.48 The provision of clean water has been seen as a public responsibility and by the nineteenth century was being supplied by new largely iron water mains from large reservoirs and by pumping from boreholes. One especially significant development was the construction in the early seventeenth century of the New River from Hertfordshire to London, a 40-mile long canal built between 1609 and 1613 to bring spring water to the rapidly growing metropolis. By and large, such early structures gradually fell into disuse during the nineteenth century, though the tradition of providing public drinking fountains and drinking troughs for animals underwent a dramatic revival in the Victorian period.

7.49 *Waterworks* is the generic term to describe buildings associated with the process of filtering abstracted water (a legal requirement after the mid-1850s) and pumping it to the consumer. None of the first generation of pumping engines has survived, although the engine house at New River Head in

Clerkenwell that John Smeaton designed in 1766 for an improved Newcomen engine still stands, embedded in later additions. The result was the creation of modern water supply systems, which include reservoirs, pumping stations and filtration plants. Structures range from the monumental waterworks to the isolated hydrant.

7.50 But the idea of universal access to water is primarily a phenomenon of the mid to late nineteenth century based on public health requirements. A number of Acts authorised water authorities to extract water from rivers or construct reservoirs. Covered reservoirs survive from the early Victorian period onwards while the construction of clay-core earth dams was an important British contribution to the history of dam building. The early English examples were built for reservoirs to supply northern towns around the Pennines and some corporations drew their supplies from far afield, e.g., Liverpool (1892, 52 miles from Lake Vyrnwy) and Birmingham (1890, 68 miles from the Elan Valley). Mass-concrete arch dams were built from 1905; and the Lake District's Haweswater Dam (1941) was the first buttress dam in Britain.

7.51 England's oldest extant water-pumping beam engines (of 1820 onwards) are those at **Kew Bridge Pumping Station** (OEV). Because of their rarity almost all surviving pumping houses (or stations) from before 1860 are listed: there are some half dozen from before 1850, and twenty plus from the 1850s. The decades between 1860 and 1930 were the most active years of waterworks' construction. They saw the widespread use of steam pumping and most undertakings, both private and municipal, built impressive pumping stations and engines, many of which survive in preservation. All are already Listed (many at II*) or Scheduled as AMs including Eastney, Twyford (Hants), **Ryhope**, Broomy Hill Hereford, Springhead Hull, Abbey Park Leicester, Blagdon Somerset, Bestwood and Brindley Park, Rugeley, and Mill Meece – several should be considered as possible Associated Properties. **Papplewick** (OEV) and **Kempton Park** (OEV) pumping stations should be singled out for special treatment as being arguably the supreme examples of their respective generations of pumping station.

7.52 The operation of the canal system was dependent on impounded water between locks and this was sometimes supplied by pumping. Two of the most significant pumping installations have been preserved on the Kennet & Avon Canal – the steam engines at **Crofton** (PEV) and the waterwheel pump at **Claverton** and these should receive special attention as should **Leewood Pumping Station** on the Cromford Canal.

Drainage

7.53 The low lying areas of East Anglia and Somerset were reclaimed and kept dry by a network of pumping installations. Initially these pumps were wind driven and Stacey Arms, Berney Arms and Horsey Mere Windmills survive in Norfolk and in Suffolk the Herringfleet and Priory Windmills. Early steam pumps survive at Spalding Marsh and *Dog Dyke* in Lincolnshire and at **Stretham** (PEV) in Cambridgeshire, the latter driving a huge scoop wheel.

Sewage Disposal

7.54 Early sewers removed rain and waste water and simply discharged into rivers. Notable advances were made in sanitary science and engineering during the mid nineteenth century. The main changes were from dumping (where waste was allowed to drain on 'sewage farms' before being used as fertiliser) to treatment by filtration, and the increasingly powerful methods of pumping effluent away from centres of population. The first steam pumping disposal station was built in 1852 at Southampton and the first sewage treatment works was established at Leicester in 1853. England's two outstanding historic sewer systems are the main drainage schemes of Brighton and Hove, and London, where Joseph Bazalgette masterminded major engineering works in the 1860s that included the construction of the Thames Embankment with a tunnel for the Underground, an extensive system of cross-metropolitan drains and a series of pumping stations, designed to high architectural and technical standards. Of the latter, **Crossness** (Grade 1 and on the buildings at risk register) is of national significance while Abbey Mills London, Clay Mills, Burton-on-Trent, Cheddars Lane Cambridge, New Mills Norwich, Eastney Portsmouth, Coleham Shrewsbury and Abbey Lane Leicester, of regional significance.

Gas Supply

7.55 Gas lighting derived from coal was invented by William Murdoch in the 1790s and pioneered at Boulton & Watt's Soho manufactory in Birmingham. The earliest gasworks were associated with factories but gas came increasingly to be used, primarily for domestic and street lighting, from the 1820s. Although the individual components of gasworks underwent modification during the nineteenth century the basic layout remained relatively unchanged: gas was produced in retorts, scrubbed and filtered, and transferred to gasholders before being distributed to customers. The earliest known surviving horizontal retort house at Birmingham dates from 1822 and major efficiencies were secured with the vertical retort in 1903, which made control carbonization more effective: this transformed the physical appearance of gasworks buildings. As a safety precaution gas was first stored underground, then gasholders were enclosed within brick-built gasholder houses, which were an obvious opportunity for architectural embellishment as in Warwick. As the danger of explosion came to be seen as minimal, so the casing was abandoned and the traditional gasholder emerged in the form of a large bell of wrought- or cast-iron, sealed in a tank of water. The world's earliest surviving gasholder is reputedly No 3 at Fulham. The telescopic gasholder with guide-towers (that varied capacity on a fixed site) was invented in 1824 and had reached great scale and sophistication by the 1890s.

7.56 The only survival in England of a small town gasworks is to be found at **Fakenham**, Norfolk (OEV). It dates from 1846 and is now a museum. Not until after the 1850s did gas begin to be commonly used for heating: the gas ring, invented 1867, made domestic gas cooking feasible. The challenge of electricity in the early 1880s was countered in 1885 by the invention of the incandescent gas mantle but, by the 1900s, the traditional stronghold of gas –

lighting in streets and buildings – was under irreversible decline. Gas lighting of streets and railway stations nonetheless survived intermittently into the mid twentieth century and there are still examples in London parks and elsewhere, adapted to use natural gas.

Electricity Supply

7.57 The practical harnessing of electricity for lighting and power was a later nineteenth century development. The invention of the electric arc light and the incandescent electric filament lamp attained commercial success between 1879 and 1884. Although generators were used to illuminate large buildings from the 1870s, most power stations were small and isolated, providing limited supply to country-house estates, industrial sites, lighthouses or hospitals. Their relative importance diminished from the 1890s as large central stations were built to generate power for transmission over wide areas, for a range of customers and uses. Sebastian de Ferranti's partly-surviving Deptford Power Station in south-east London of 1887-89 was the first high tension power station to convey electricity over a substantial distance. In the early decades of the electricity industry multiple undertakings overlapped and competed in a haphazard scramble for territory, resulting in regulation under the 1919 Electricity (Supply) Act. The scale of generating stations was influenced by the type of operator (private, municipal or government) and the use for which the electricity was supplied, such as lighting, traction for transport, or power for industry. The pioneer, R E B Crompton's Arc Works in Chelmsford (Essex), established in 1878, still stands in part, and an early electricity station of 1888 built in London by his company to supply a state-of-the-art housing development, Kensington Court, still survives. The huge architect-designed 20th century municipal power stations such as Bankside and Battersea have survived in other uses. The world's first full-scale nuclear power station was opened at **Calder Hall** in 1956, five years after the opening of the plutonium processing plant at Seascale nearby. The Sellafield Interpretation Centre celebrates these innovative sites. The 1989 Electricity Act privatised the network.

MILITARY INDUSTRIAL SITES

7.58 For the last three centuries the British armed forces have required a supply and support infrastructure that, at times, has constituted collectively one of the largest and most sophisticated industrial concerns in the world. In the seventeenth century the Royal Navy was supported by the largest administrative and industrial enterprise in the world, to supply and provision ships, their armaments, rope, cordage and sails. Throughout the eighteenth century and for much of the nineteenth the naval dockyards and the state armament and munitions works were the largest employers in the country. They pioneered some of the most important technological advances in industrial processes and systems, in building construction and in the manufacture of weapons and explosives. Storage and supply became a vast industrial exercise and the resultant victualling and ordnance yards are prime sites. In the twentieth century new forms of warfare demanded new types of technologies and thus sites, with emphasis on aviation, nuclear weaponry,

intelligence and communications. Despite constant alteration as the nature of warfare changed many key sites survive and much of this industrial heritage is of both national and international significance. There is a wealth of historic industrial sites contained within the defence estate and as much of that estate is now in private ownership this industrial heritage must be considered at some risk. A summary review below identifies key sites in this distinctive sector of the historic industrial environment.

The Royal Naval Dockyards

7.59 **Chatham** The eighteenth and early nineteenth century areas of the Chatham Royal Naval Dockyard with the associated defences are included in the 1999 UK WHS Tentative List. The eighteenth century rope-walk at the heart of a complex of early industrial buildings, of exceptional importance, is still operating as a working museum while the white lead mills and associated fire-proof sail-hanging building are of considerable technological and constructional significance. The group of covered slips is the finest in the country.

7.60 **Portsmouth Dockyard** Portsmouth Block Mills (PEV) have long been recognised as one of the seminal sites of the Industrial Revolution. The modest complex of Georgian buildings saw the first use of steam power in the Royal Dockyards, the introduction of Samuel Bentham's innovative powered sawmills, the triumphant realisation of Marc Brunel's revolutionary block making machines and a new order of working practices in the dockyards. The Block Mills heralded the age of mass production, using semi-automatic machines, and, accordingly, have received huge attention both in the contemporary technical literature and in modern histories of technology and labour studies. The future of the Block Mills is once again under consideration, and considerable sums have been spent on the consolidation and repair of the buildings, which still retain some of Brunel's block making machines, (others are in the Science Museum and the National Maritime Museum) but a sympathetic use has still to be found. The associated **Royal Clarence Victualling Yard** is being redeveloped for housing and contains some of the earliest remains of industrial breweries and bakeries and storehouses.

7.61 **Devonport** The naval dockyard at Devonport dates from the 1690s, and alongside its docks and slips it retains a range of structures associated with the sail navy of the eighteenth and early nineteenth centuries (including storehouses, smitheries, and ropewalks). It also retains structures associated with the maintenance of the early steam-powered fleet including the massive Quadrangle complex of the 1850s-60s, built as a set of interlinked machine shops. The nearby **Royal William Victualling Yard** of the 1830s-40s remains as an iconic military-industrial complex, treated in a broad classical style and with a remarkable range of iron roofs. It is being developed by Urban Splash as a landmark housing complex.

7.62 **Sheerness** Now operated as a commercial port, Sheerness retains several significant industrial buildings dating from its early nineteenth century rebuilding by John Rennie. Of international significance is the later **Boatstore** (PEV) designed by Col G T Greene and constructed in 1858-60 as a multi-storeyed iron framed building with light curtain walls. As such it is regarded as an important antecedent of modern metal frame-construction curtain wall buildings

Weapons and Explosives

7.63 **The Royal Arsenal, Woolwich** The Royal Laboratories (1696), the Royal Brass Foundry (1715-17) with the Dial Arch Block constitute one of the earliest groupings of historic industrial buildings in the country. They owe their survival to later unsympathetic re-use and in the current regeneration should be accorded a very high priority for constructive conservation.

7.64 **Royal Gunpowder Factory, Waltham Abbey** The Royal Gunpowder works constitute a unique survival of the historic production of explosives by the state. The site contains a range of explosive manufacturing buildings dating from the late eighteenth century to the mid twentieth including magazines, steam driven black powder incorporating mills and later explosive structures all linked by a water power and transport canal system. The *Royal Small Arms Factory, Enfield* built from the mid nineteenth century onwards was one of the first in England to use the American system of standardization and inter-changeability of components for small arms. Home of the Enfield rifle that equipped British forces in both world wars some of its buildings are Listed but out of use. Similarly, the *National Machine Gun Factory, Burton-on-Trent* exemplifies state-built munitions factories with architecturally impressive frontages and large open shops designed for flexibility and piecework.

7.65 The **Royal Naval Cordite Factory, Holton Heath** is of twentieth century construction which, with its remains of the fermentation plant used to produce industrial solvents, is arguably the world's first industrial scale bio-technology plant. The missile programme developed during the Cold War period has some sites with significant test structures which are now of historic interest. Prominent amongst these is the **Rocket Establishment, Spadeadam**, Cumbria which was built and managed by Rolls Royce and de Havilland and may be the only early 1950s big liquid propellant rocket engine test site still surviving in the West. The *High Down Test Site, Isle of Wight* is associated with the Blue Streak and Black Arrow rocket programmes and was the site from which the British Prospero satellite was launched in 1971. It is now owned by the National Trust. The *Rocket Propulsion Establishment, Westcott, Buckinghamshire* was the government research centre where Blue Streak was developed and fragments of the mock-up silo survive. *Porton Down, Wiltshire* the British bio-chemical warfare research centre contains vast post war buildings that have not been assessed. The sites associated with the development of Britain's military nuclear capacity such as Fort Halstead, Aldermaston, Orfordness, Foulness and Burghfield are currently under review in the SHIER on the nuclear industry and are not considered here.

Ordnance Yards

7.66 **RNAD Bull Point, Plymouth, Devon** Bull Point, with the 1805 St Budeaux laboratory where powder was first checked and processed, comprises a remarkable set-piece example of integrated factory planning of the mid-nineteenth century. It provided storage for 40,000 barrels of powder and with Weedon Bec (below) comprised the most coherent architectural ensemble in any of the Ordnance Yards. **Priddy's Hard, Gosport**, Priddy's Hard's magazines and related structures date from the late eighteenth century to the early twentieth and the site retains the best-preserved range of structures that relate to this long history of continual enlargement and adaptation, encompassing much of the age of Britain's dominance as a global sea power. The first gunpowder magazine and its surrounding buildings now houses *Explosion!*, the Museum of Naval Firepower which combines the history of the Priddy's Hard Armaments Depot with the history of Naval weaponry. **Weedon Bec, Weedon, Northamptonshire** This site, with warehouses and magazines set along a canal, is a unique example of a planned military-industrial complex, dating from the early nineteenth century, complete with its own defensible transport system and surrounding walls. Its location made it the ideal choice for a central ammunition depot, being close to the small arms factories and workshops of Birmingham and also far from vulnerable coastal areas.

Aviation and Intelligence

7.67 **Bletchley Park** is renowned for a series of remarkable achievements – the decryption and dissemination of the Enigma, Lorenz and other codes (codenamed ULTRA), developments in rapid analytical machines and a whole range of subjects from mathematics to linguistics. All stages of the attitudes and advances made in cryptographic, computing and intelligence processes are visible in the developing scale of surviving fabric within the park; from the mansion, stable yard and associated park, to the timber huts and the later brick, steel and concrete structures. **Farnborough**, is one of the key sites in Europe relating to the development of aviation technology and aeronautical research. Originating as the base for the Royal Engineers' School of Ballooning in 1906 and the Royal Engineers' Air Battalion from 1911, the site was later occupied by the Royal Aircraft Establishment. It closed as a military research establishment in 1999. Although much altered, the site retains a small number of historically significant buildings including two important *wind tunnels* of 1934-5 and 1939-42, the latter relating to the birth of jet-powered flight and delta-wing technology

Appendix 1

Industrial Sites currently in Guardianship or National Trust ownership:

English Heritage Guardianship

Stott Park Bobbin Mill
Derwentcote Furnace
Mortimers Cross Watermill
Berney Arms Windmill
Iron Bridge
Over Bridge
Cantlop Bridge
Saxstead Green Post Mill
Sibsey Trader Tower Mill

National Trust Ownership

Quarry Bank Mill
Levant Mine
Cornish Mining Engines
Branscombe bakery and Forge
Finch Foundry
Cotehele Quay
New Battery, The Needles
River Wey, Godalming Navigation and Dapdune Wharf
South Foreland Lighthouse
Horsey Windpump
Lavenham Guildhall
Orfordness Test Site
The Workhouse, Southwell
Birmingham Back-to-backs
Shugborough Estate Brewery
Force Crag Mine
Gondola steam launch
Souter Lighthouse
Beadnell Limekilns

Corn Mills:

Water: Dunster, Cotehele, Branscombe, Clyston, Killerton, Shalford,
Winchester City, Houghton, Stainsby, Lode and Acorn Bank.

Wind: Stembridge Tower Mill, Bembridge Tower Windmill, Pitstone
Post Windmill

Appendix 2 Proposals for preservation, under three categories

Sites Proposed for Guardianship

Elsecar Newcomen-type Beam Engine (this might be a candidate for
Foundation management)
Longdon-on-Tern Aqueduct

(Ditherington flax mill, if not taken into Guardianship, could be in Foundation management with public access to the key buildings)

Possible Foundation Sites

Bowes Railway and Causey Arch (inc Dunston and Blythe Staithes?)
Chatterley Whitfield Colliery
Evans' Silverworks
Lion Salt Works
Middleport Pottery (?)
Portsmouth Block Mills (but preferably incorporated into one of the existing management bodies in the Dockyard)
Queen Street Mill, Burnley

Possible Associated Properties

Year 1, eg:

Fakenham Gasworks
Coldharbour Mill
Tuckers Maltings
Papplewick Pumping Station
Geevor tin dressing mill (unless taken into a West Cornwall IPF)
Ruddington Framework Knitters Museum
Morwelham Quay
Nenthead Mine
Saltford Brass Mill
Bletchley Park

Future years, eg:

Crofton pumping station
Claverton pumping station
Pleasley Winder
Washington F Winder
Astley Green Winder
Bestwood Winder
Stanley Mill, Gloucestershire. (In multiple use.)
Backbarrow Furnace
Wortley Forges
Sissinghurst Hop Kilns
Grampound Tannery
Abbey Mills
(Fulham Gasholders)
(Calder Hall – Windscale - Sellafield)
(Jodrell Bank)
Bass Brewing Museum
Hook Norton Brewery
(Sheerness Small Boatstore)

(Devonport: storehouses, smitheries, ropewalks,)
(Royal William Victualling Yard)
(Woolwich Arsenal: Brass Foundry)
Clifton Suspension Bridge
Temple Meads Brunel Station
Nenthead mining area
Blyth Staithes – with the Bowes Railway Foundation?
Dunston Staithes – with the Bowes Railway Foundation?
Goole Tom Pudding Hoists
Snailbeach
Northern Viaducts Trust sites and footpaths
Trencherfield mill engine, Wigan
Ellenroad mill engine
Middleton Top engine house
Brunel Tunnel, Rotherhithe
Porthcurno telegraph station (unless taken into a West Cornwall IPF)
Brunel block mills
Royal Gunpowder Factory, Waltham Abbey
Faversham gunpowder mills

Appendix 3 Industrial Archaeology: A Policy Statement

The seven key points from *Industrial Archaeology: A Policy Statement* by *English Heritage* published in September 1995:

1 English Heritage recognises the unique international significance of the country's industrial heritage and will complete theme studies of industrial buildings and monuments under the Monuments Protection Programme and List Review in order to identify important sites and structures which deserve to be retained and recorded. We will encourage government to provide appropriate statutory protection for the industrial heritage and will offer planning guidance where necessary for the management of significant sites in their landscape context; we will also seek urgent action where needed to safeguard important threatened industrial sites which are suitable for long-term preservation.

2 Encouragement will be given to the identification and repair of industrial buildings and monuments which are at risk, through commissioning example feasibility studies, targeting repair grants in accordance with financial need, and promoting the suitable and flexible reuse of former industrial buildings.

3 Responding to a period of rapid economic and technological change, English Heritage will work with RCHME, local authorities, and the Science Museum to encourage the timely identification and recording of significant industrial landscapes, sites, buildings, structures, machines, and processes, and to help with their effective management. Where the option of retention cannot be realistically achieved, a record of last resort is essential.

4 Public appreciation of the industrial heritage will continue to be promoted through education and publication and through access to, and the interpretation of, our historic properties.

5 English Heritage will explore with the national agencies – particularly the Museums and Galleries Commission and the Science Museum – the suitability of existing arrangements for management of the country's most important preserved industrial sites and monuments.

6 We will review the adequacy of existing resources to sustain the special needs of display and demonstration for industrial archaeology where appropriate and will cooperate with government agencies and others, including the National Trust, to preserve important industrial sites.

7 Our commitment to education and training in industrial archaeology and conservation of the industrial heritage will be maintained through relevant publications and lectures by English Heritage staff.

Notes and references

¹ English Heritage, 1995. *Industrial Archaeology: A Policy Statement by English Heritage*

² PLB Consulting, with Ian Ayris, Ian Dormer and Swift Research Ltd, 1998 *Public Access to England's Preserved Industrial Heritage* (prepared for English Heritage), hereafter referred as PLB Report 1998. The *Research Digest* of the same report is referred as PLB Research Digest 1998. The fourteen recommendations of the report, whilst sound, were not targeted enough to have any real effect. In retrospect they appear as exhortations to the sector rather than specific recommendations for action by English Heritage. This has in part informed the present study.

³ A review of the results can be found in Anthony D Streeten 2007 'Public access to England's preserved industrial heritage' in Györgyi Németh (ed) *Growth, Decline and Recovery: Heavy Industrial Regions in Transition*, Miskolc, Hungary, 181-88.

⁴ There are 2,739 Listed buildings and structures and 42 Scheduled Ancient Monuments in the care of British Waterways Board (the third highest volume of ownership after the Church of England and the National Trust). [This total is for England, Scotland and Wales]. The cost of maintaining the inland waterway network (2006/7) is £56,363 per mile per year. See oral evidence to the Environment, Food and Rural Affairs Committee (British Waterways Sub-Committee) 26 February 2007. A canal landscape centred on Pontcysyllte and Chirk aqueducts has been put forward to UNESCO as the United Kingdom Government's 2009 nomination for World Heritage inscription

⁵ BWB Policy Statement on conservation, published annually.

⁶ See Anon 2007. *Twenty-one Years of the Railway Heritage Trust*, London.

⁷ See Gordon Biddle 2003. *Britain's Historic Railway Buildings*, Oxford

⁸ The Lilleshall vertical blowing engine, saved from destruction in the late 1960s and re-erected in the blowing engine house beside the Blists Hill blast furnaces of the Ironbridge Gorge Museum exemplifies the issue. There are numerous others of a more compromising nature. There is no obvious archaeological or conservation philosophy behind these moves although ready acknowledgment that in their working careers engines were not infrequently moved is cited as a justification.

⁹ See for example Michael Nevell 2008. 'The Archaeology of Industrialisation and the Textile Industry: the Example of Manchester and the South-western Pennine Uplands During the 18th Century (Part 1)' *Industrial Archaeology Review*, **30**, 32-48.

¹⁰ Neil Cossons 2007 'Industrial Archaeology: the challenge of the evidence' *Antiquaries Journal*, **87**, 1-52 and especially the histograms on pps 23 and 24.

¹¹ See Anon 1957. *The Science Museum: The First Hundred Years*, HMSO London and David Follett 1978. *The Rise of the Science Museum under Henry Lyons*, Science Museum, London

¹² See Neil Cossons (ed) 2000. *Perspectives on Industrial Archaeology* (Science Museum, London) and especially Keith Falconer 'Not a bad record? Changing perspectives on recording', 57-85, and Anthony D F Streeten 'Policy and practice for conservation of the industrial heritage', 86-114.

¹³ See Minutes of the [English Heritage] AMAC/HBAC Industrial Archaeology Sub-Committee, first meeting, 16 September 1985.

¹⁴ Sites in the ownership of the Secretary of State or in Guardianship (May 1985) were - with in parenthesis date of being taken into the Secretary of State's responsibility: Berney Arms Windmill, Norfolk (1951); Saxted Green Windmill, Suffolk (1951); Mortimers Cross Watermill, Herefordshire (1953); The Iron Bridge, Shropshire (1975); Sibsey Trader Windmill, Lincolnshire (1975); Cantlop Bridge, Shropshire (1977). (Derwentcote Steel Furnace, County Durham, was on the point of being acquired by the Secretary of State.)

¹⁵ The Elsecar engine is also open to guided parties on Heritage Open Days. Over the weekend 13/14 October 2008 some 120 people visited. Excellent guides provided tours of the engine. The overall state of maintenance was poor and dense bramble overgrowth had been cleared in the days before in order to permit public access.

¹⁶ See A K Clayton 1964 'The Newcomen-Type Engine at Elsecar, West Riding' *Transactions of the Newcomen Society*, **35**, 97-108

¹⁷ TICCIH, The International Committee on the Conservation of the Industrial Heritage, meets every three years and publishes the Transactions of its congresses. It advises ICOMOS and UNESCO on industrial archaeological conservation and World Heritage Sites.

¹⁸ The identification by the National Coal Board of Chatterley Whitfield pit in Stoke on Trent as an outstandingly important and suitable example of a large colliery that could be retained after closure was a rare example of an industry-based strategic approach to preservation. The effects of the mass pit closures of the 1980s led to flooding and the initiative, as originally conceived, failed.

¹⁹ See G B L Wilson 1976 'The Small Country Gasworks' *Transactions of the Newcomen Society*, **46**, 33-43, in which feature Norfolk gasworks in general and Fakenham in particular. In the discussion after presentation of the paper Sir David Follett, then Director of the Science Museum and a member of the

Ancient Monuments Board, said that ‘when he died the word “Fakenham” would be engraved on his heart’.

²⁰ An increase of 35 per cent at Kew Bridge is anticipated (letter from Oliver Pearcey, Chairman of the Kew Bridge Engines Trust, 23.9.2008)

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