

## THE CHALLENGE OF CRUMLIN VIADUCT

The demolition of Crumlin Viaduct 27 years ago was one of the great losses of British industrial heritage, comparable perhaps with the destruction of the Euston Arch. Yet whereas the latter proved a powerful stimulus to the industrial conservation movement, the loss of Crumlin Viaduct went relatively unnoticed nationally at the time. Even today, the case raises important questions about our approach to major conservation challenges.

The viaduct, which crossed the Ebbw Valley ten miles north-west of Newport, Gwent, was one of the most significant examples of technological achievement in the industrial revolution. It was the most forthright of the world's earliest lattice girder structures, occupying a place in the development of lattice girder bridges similar to that of Pontcysyllte Aqueduct in the history of cast iron.

Crumlin was also one of the most spectacular monuments ever produced by the British railway age, and an important landmark in south Wales. Jack Simmons wrote of it in 1961, 'Though it is a perfectly plain structure, with no ornament at all, its height and the open latticework of the piers on which it rests give it an exceptional grace...' Of Crumlin together with Stephenson's Britannia Bridge, he said, 'Any one who wishes to see the use of iron in bridges at its best, and in the strongest possible variety, will still find it worth while to visit these two great works, built within ten years of each other, at opposite ends of Wales.' (*The Railways of Britain*, pp. 77-8.)

South Wales saw a massive increase in coal and iron production during the nineteenth century, and railways were vital in permitting this expansion to take place. Most traffic went down the valleys to the ports, but in 1847 the Newport, Abergavenny and Hereford Railway obtained an Act to build a new link, the Taff Vale Extension, from their line at Pontypool to the Taff Vale Railway at Quaker's Yard. In the words of the Company, this was to provide 'a direct line from the mineral districts to Liverpool and the commercial marts of the Midland and Northern Counties'. The route crossed the grain of the valleys by a series of embankments, bridges and tunnels. The viaduct over the Ebbw at Crumlin was the most notable engineering feature of the line, and evoked

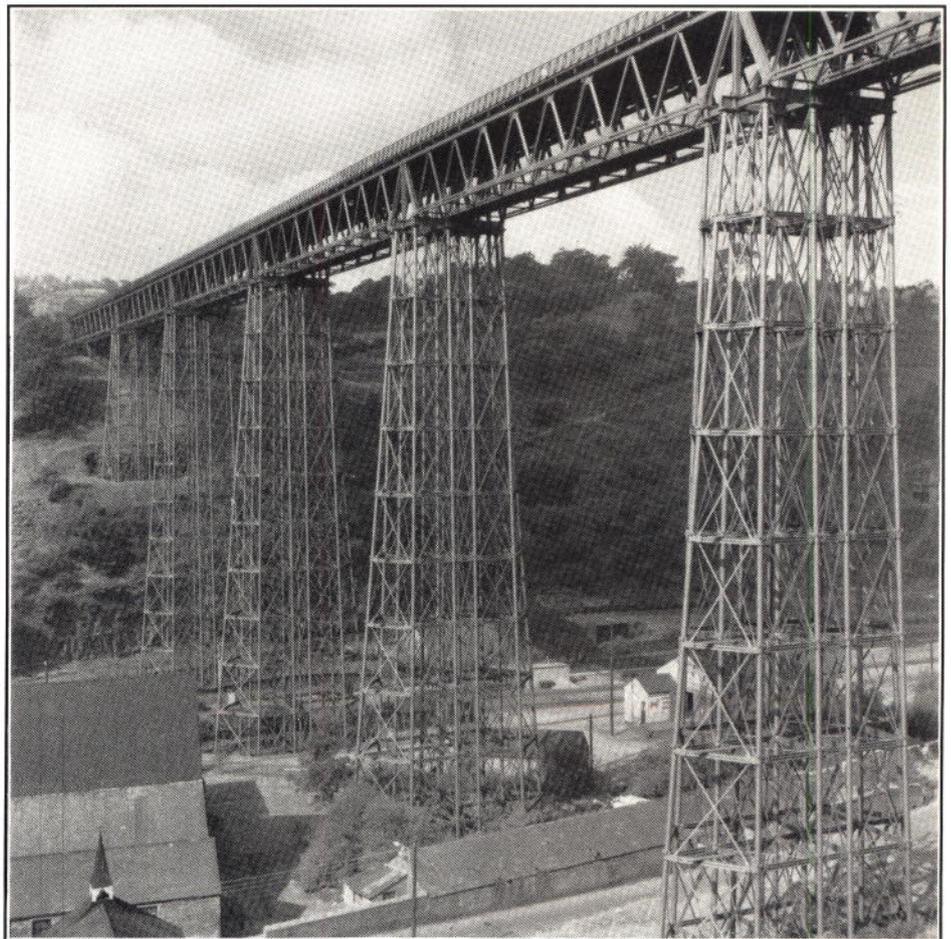
international acclaim. When it opened in 1857, the *Illustrated London News* commented, 'The man of science must regard this structure as one of the finer specimens of engineering construction which has been produced in this age of mechanical triumphs.'

The route as laid out by the company engineers Messrs Liddall and Gordon necessitated crossing the Ebbw at a height of over 200 feet. Since the valley was intersected by the smaller Kendon Valley at this point, in essence two bridges would be required linked by a rock knoll. The total length of the bridge would be 1,650 feet, the main valley requiring a section of 1,050 feet and the smaller valley 450 feet. The company invited tenders for a wrought iron bridge in August 1852, and considered two in October, for a lattice design submitted by Messrs Doynes and a 'Warren' configuration submitted by Messrs Kennard. The Kennard

tender was recommended on the grounds of strength and economy by Liddell, the Company Engineer, and the contract was awarded.

Messrs Kennard's design was based on the invention patented in 1848 by James Warren and Willoughby Menzoni: a triangulated truss of sloping members between horizontal top and bottom beams, commonly known as the Warren Girder. The bridge was of ten spans, seven of which were over the Ebbw valley. Each pier was made of 12 cast iron columns of one foot diameter, and the deck consisted of four lines of Warren truss girders, each of 150 feet span and 15 feet deep.

The significance of Kennard's viaduct lay in the design of the girders, which represented a stride forward in structural practice. T W Kennard applied a more detailed analysis of the stress distribution in the span, thus allowing design improvements to the top and bottom



The Crumlin Viaduct: would we treat it better today?  
Photo: Howarth-Loomes Collection c/o RCAHM Wales

beams of the girders. This allowed economy in the use of iron by varying the cross-sectional area of beam without adversely affecting strength. Kennard patented his invention in 1853.

The fabrication of the wrought iron components was carried out using bar iron from Blaenavon Ironworks in a substantial permanent engineering works built on site by Messrs Kennard. The viaduct opened in 1857 to world-wide admiration, with Kennard's innovative design receiving much acclaim from the many eminent bridge engineers of the period. Crumlin proved to be the first of a series of viaducts based on Warren's triangular girder. Messrs Kennard continued to design and manufacture bridges at their engineering works at Crumlin for world-wide projects for a number of years.

The new railway was a strategic success initially, with its various spurs providing access to over 18 ironworks with a total of 117 furnaces. The take-over by the Great Western in 1863 coincided with the explosion in the coal trade and the extension of the line into the Aberdare and Neath valleys. Despite the decline of the inland iron trade, this ensured that coal traffic would maintain the viability of the line for the next one hundred years. However, as the coal

industry, too, gradually declined after the First World War, rail traffic reduced, and in 1964 the line closed.

British Rail immediately declared its intention to demolish the viaduct, owing to its need for regular maintenance, unlike most masonry structures. The viaduct had been listed in 1960, but permission for its demolition was granted once the costs of maintenance had been looked into. Little consideration was given to whether preservation was justified or how it might be achieved, as it was felt by the government departments involved that expenditure on maintenance could not be justified and the life of the structure would be limited in any case. The response of the local authorities was muted and no real effort was made to establish the historical significance of the viaduct or its likely future value to the nation's heritage. The Royal Commission on Ancient and Historic Monuments in Wales was asked to make a photographic record. However, demolition went ahead in July 1966.

Today, only the stone abutments survive, towering high on the hillsides above the village of Crumlin (SO 213986). As Bryan Morgan wrote in *Railway Relics* (1961), for a paltry sum in annual upkeep, Britain had lost for ever a monument of great technical importance.

This demolition seems almost inconceivable today. Crumlin was one of the most technologically important bridges ever to have been built, and was a truly impressive landmark; but the minds of people at the time were largely set against its retention. Many local authorities in South Wales in particular appear to have been determined to obliterate all traces of the detested ironmasters and coal owners, though many of the same authorities are now striving to promote their areas through the lesser industrial heritage they did not manage to destroy.

Energetic attempts are being made by the Bennerley Viaduct Preservation Trust to keep the similar bridge of 1879 in Derbyshire, but even today such fights are long and difficult. One hopes that with our experience from cases like Crumlin and better understanding of industrial heritage, we will be able to regard future challenges of conservation with greater insight, and think ahead while there is time. But would we? Many similar future challenges may exist. The present Severn Bridge, for example, completed in the same year that Crumlin was demolished, might yet be considered for demolition. How will we react to such prodigious conservation problems, and how will we be judged in years to come? **Michael Tutton**

## NOTHING LASTS FOR EVER

*Literary and artistic criticism is not something we are often treated to in the Bulletin. The following article by Francis Haveron is an individualistic critique of one recent film. Readers are invited to respond to this, or to send in articles about other works relevant to industrial archaeology.*

In AIA *Bulletin* 19.1 last year, Stephen Hughes recommended that British local societies should borrow an English language film about industrial archaeology from the Netherlands. Having tracked down this film, called *Nothing Lasts For Ever*, I borrowed it from the Dutch producing company and showed it to the Surrey Industrial History Group. It is on 16mm format in colour and obtainable from the producer Rene Scholten at Studio NIEUWE GRONDEN, Van Hallstraat 52, 1051 HH Amsterdam, The Netherlands, Fax 020 682 43 67 or ☎ 020 686 78 37.

Unusually, this is a film about industrial history and its relics that was made by a woman, Digna Sinke. On the evidence of this one film, a woman's and a film-maker's viewpoint of industrial archaeology can be very different from that of most industrial archaeologists. A common approach is one of precision: setting a place, a building or an object in its time and its situation; exploring relationships of time, place and significance; mapping out its world with the accuracy of a geographical survey. Digna Sinke's film gives some dates and historical perspective, but avoids the traps of dullness or at least a sense of talking to a small, narrowly interested minority. Instead, she approaches the task with a poetic eye and a sense of pessimism aptly conveyed by her film title. Her first sequence, for example, wanders in leisurely fashion through a deserted porcelain factory which nature is rapidly engulfing with foliage. The film's climax is a sequence of shots (mostly archival newsreels) of demolition by dynamite of elderly factory buildings and unwanted chimneys—a sequence which appeals

to the destructive small boy who lurks beneath our skin. The coda is a series of shots zooming back or travelling back down the corridors of melancholy buildings awaiting demolition or of deserted railway tracks in a factory area.

The problem is that of an audience. Who is the film aimed at? Any film about industrial archaeology is welcome but this one does talk down to its viewers at the beginning like a Schools TV broadcast to ten year olds. Is it intended as a tribute to the past history of Dutch industrialisation? Is it intended to pay a tribute to the sterling efforts of industrial archaeology enthusiasts? Is it intended to excite our enthusiasm for visiting industrial archaeology sites in Holland? None of these really fits this film. The best interpretation might be that it is a philosophical musing on the impermanence of man's endeavours. It is not likely therefore to please the industrial archaeology movement whose members may not be given to thinking about the brevity of life and of work. On the positive side, it does convey usefully some idea of the progress of Dutch industry, yet it pays no attention at all to windmills and canals, those essential of Dutch industrial archaeology and history. Several industrial archaeologists are shown but, with respect, their preservation work is not adequately displayed. One problem could be that the film's length has been cut heavily, from 74 to 56 minutes. The result is that it appears disjointed. An example is the treatment of a wind pump dealt with in five shots, two of which show an enthusiast walking across a field, but no information as to what it is, its date, its importance, where it is nor what it is doing in the film are given to us. There is no complete shot of it, no explanation, no development.

The sound track, though, is particularly interesting as it mingles, amongst many other sounds, bird song and the quiet cough of a steam-powered pumping engine, plus some delightfully cool Mozart and even a snatch of a tango. Alas, the editor has left in an embarrassing excerpt of a singer extolling the praises of

the HAKA chain of co-operative stores, one of which—the headquarters? it is never made clear—we are soon shown being demolished to make an ironic comment and perhaps to bear out the film's pessimistic title.

Summing up, an interesting film but ultimately one which leaves its audience feeling sad and dissatisfied. It promises much but provides little. The industrial archaeology movement has tried, in many cases successfully, to arrest Time's winged chariot. In Britain we are perhaps too self-satisfied with what has been achieved but I find it difficult to believe that there are reasons for our Dutch colleagues and those in other European countries to be so downcast. There is a satisfying kind of tragic melancholy in contemplating decay and ruins but the industrial archaeology movement as a whole is realistic, positive and determined, and is not likely to sympathise with the mood evoked by this film.

**Francis Haveron**

## NOTICEBOARD

### ANOTHER ROUNDHOUSE

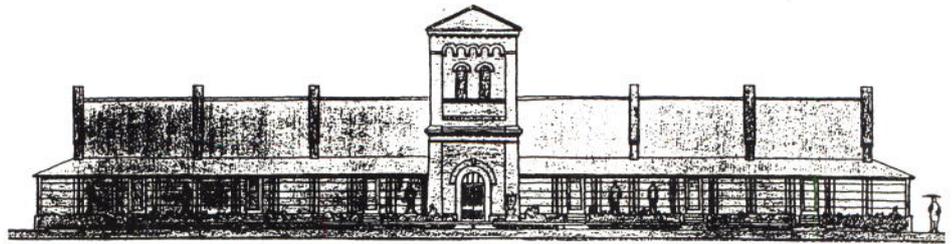
The Barrow Hill Engine Shed Action Group was formed to save the last operational ex-Midland Railway steam roundhouse, at Chesterfield. The roundhouse was built in 1870 and housed up to 80 locomotives until it ceased operation in 1991. As a result of their efforts, the buildings and turntable have been listed and attempts are being made to negotiate purchase of the property for a working museum. The Group would welcome support from all quarters. Contact Mervyn Allcock, 266 Williamthorpe Road, North Wingfield, Chesterfield, S42 5NS ☎ 0246 854921.

## FUTURE OF THE ROYAL GUNPOWDER MILLS AT WALTHAM ABBEY, ESSEX

In 1991 the Ministry of Defence (MoD) closed the Royal Armament Research and Development Establishment (RARDE) at Waltham Abbey. This is the site of gunpowder mills which were probably first established in 1665 and became the second government gunpowder factory (after Faversham) in 1787. In the nineteenth century the site was at the forefront of research into the development and manufacture of modern explosives and propellants. This continued into the twentieth century and after World War II the establishment took on a series of new titles until in 1984 it became RARDE.

The site occupies some 190 acres, much of which is a Site of Special Scientific Interest (SSSI) with, for example, the largest heronry in Essex. There are also many historic industrial buildings, including several terraces of steam powered gunpowder incorporating mills, the earliest dating from 1857. Much of the site is contaminated with waste products from explosives research, development and testing.

The MoD appointed CIVIX, a group of urban design, development and planning consultants, to advise them on the sale of the site. CIVIX in



turn consulted many interested parties, including Waltham Abbey Town Council, Epping Forest District Council, Lee Valley Regional Parks Authority, Essex Wildlife Trust, Gunpowder Mills Study Group (GMSG), English Nature, English Heritage, and the Royal Commission on the Historical Monuments of England (RCHME). The industrial archaeology interests have been largely represented by the GMSG, with the support of the Greater London IA Society. CIVIX and the local community have been very supportive of our proposals which include the creation of a national gunpowder museum in one of the ranges of steam-powered mills. In addition the RCHME, with the support of English Heritage, have carried out a major survey of the site and its buildings and have discovered many unexpected artefacts, including powder punts on the network of canals which served the site. The Commission has also undertaken a detailed study of the extensive archive of documentary information on the mills, much of which was deposited recently at the Public Record Office. It is anticipated that many features of the site will be listed or scheduled as a result of this activity, which is also linked to a national survey

of the gunpowder industry currently being undertaken by English Heritage.

On 22 March CIVIX presented their proposals to the MoD at a briefing meeting held at Waltham Abbey Town Hall. These involved the use of some parts of the site for housing and commercial developments, including an hotel, other parts for leisure, recreation and education, including the proposed museum, and also the retention of the SSSI. KPMG Peat Marwick, who had been commissioned to examine the feasibility of creating a Trust to develop the site also reported. They envisaged development over a period of five years of a Visitor Centre, the Gunpowder Museum, a Nature Centre, and 'people mover' systems using the existing canals and perhaps a re-created tramway. We now await the reports from the RCHME and English Heritage during the summer and the response from the MoD, which is under an obligation to the Public Accounts Committee to achieve a market value for the site. However, whatever else materialises, an enormous amount of information is becoming available on the history of the explosives and propellant industries.

*Alan Crocker, Chairman GMSG*

### ROSEDALE

A £300,000 project jointly funded by English Heritage and the North York Moors National Park will protect the ironstone kilns at Rosedale from further damage and preserve the best parts to give an impression of the original layout. Ore was mined in this remote valley from the 1850s to the 1920s for the Teesside ironworks, and the area forms one of the most impressive industrial landscapes left in Britain.

### NEW MEMBERS

The Association welcomes the following new members, who have joined since January:

Michael Tutton, Abergavenny  
Richard J Butterfield, West Yorkshire  
Eric V Cooper, Alloa

Dr Tim Smith, West Sussex  
Victoria A Perry, Bury St Edmunds  
E L Golberg and M D Hamilton,  
Washington DC

Jonathan Clarke, Telford  
Alan Jervis, North Yorkshire  
T E Evans, Haywards Heath  
Jill Halpin, Surrey  
M J Wagrel, Totnes  
Lorraine R Wilde, Burton-on-Trent  
Spencer Cooper, Birmingham  
Peter Wildman, Rugeley  
John L Irwin, Farnham  
B C Taylor, Norwich  
Philip C Parker, Perth  
John H Rapley, Honiton  
W D Cocroft, Newcastle-under-Lyme  
J C Taylor, Sheffield  
Martin Frisby-Boor, Farnborough  
Dr S Peters and Ms C J Mills, Leicester  
Roy Powell, Wiltshire

In addition, the following organisations have affiliated to the Association or become institutional subscribers:

Museu Paulista, USP Biblioteca, Brazil  
Nottingham Trent University

### AFFILIATED SOCIETIES

By the time members receive this, the 1993 Ironbridge Weekend will be over, and plans in hand for next year's event. If anyone has any suggestions, either about the general arrangements, or topics and/or speakers, please let me know.

I am pleased to report that I have received a

'Society Profile', from the Westonzoyland Engine Trust. Keith Hooper, their publicity officer, provided the piece below.

May I remind groups that further 'Profiles' would be most welcome—send these, or any comments about the AIA's service to local societies, to me at 20 Stourvale Gardens, Chandler's Ford, Hampshire, SO5 3NE.

*Pam Moore*

### SOCIETY PROFILE WESTONZOYLAND ENGINE TRUST

The Westonzoyland Engine Trust is a small (but enthusiastic!) group of volunteers who aim to restore the first steam pumping station on the Somerset Levels, and establish a museum of steam and land drainage. The Trust was founded in 1977 when a group from the Somerset IA Society was invited by the then Wessex Water Authority to survey the 1830 built station and its later secondary pumping engine built by Easton and Amos of London in 1861. The pumping engine consists of a two cylinder vertical steam engine, one cylinder being either side of a well and connected by an overhead crankshaft geared to an Appold centrifugal pump in the well. The original group became a charitable Trust in 1980 and steamed the engine for the first time since 1951 on 7 May 1983, after having installed a small vertical boiler and constructed a new boilerhouse. Lack of skilled bricklayers ensured the new work was suitably wobbly to match the old!

After having leased the site for some years the Trust was offered the freehold of the majority of the site for a small sum and was able to purchase this from the then newly-

formed National Rivers Authority. The Trust has been able to re-build the sixty-foot high brick chimney and restore a large part of the roof, but much attention is needed to the inside of the buildings. We have been fortunate in obtaining various other steam engines, a blacksmith's forge, a two-foot gauge railway and a 50 hp Crossley diesel engine, as well as many smaller items. A new exhibition hall is largely complete and just awaits internal finishing and cosmetic exterior work.

At present the Trust has some seventy members, with a 'hard core' of ten working on Thursday evenings and Sunday afternoons. The Station is open to the public on the first Sunday in the month from April to October from 2pm to 5pm, when the engines are run under steam. We are also open on any Sunday afternoon and on Thursday afternoons in June, July and August, not in steam. The Station is 1.5 miles from Westonzoyland Village on the Burrowbridge road (ST 340328).

For further information please contact: Mrs M Miles, Hon Secretary, WET, Rose Cottage, Lower Durston, Taunton, Somerset, TA3 5AH  
☎ Taunton (0823) 412713.