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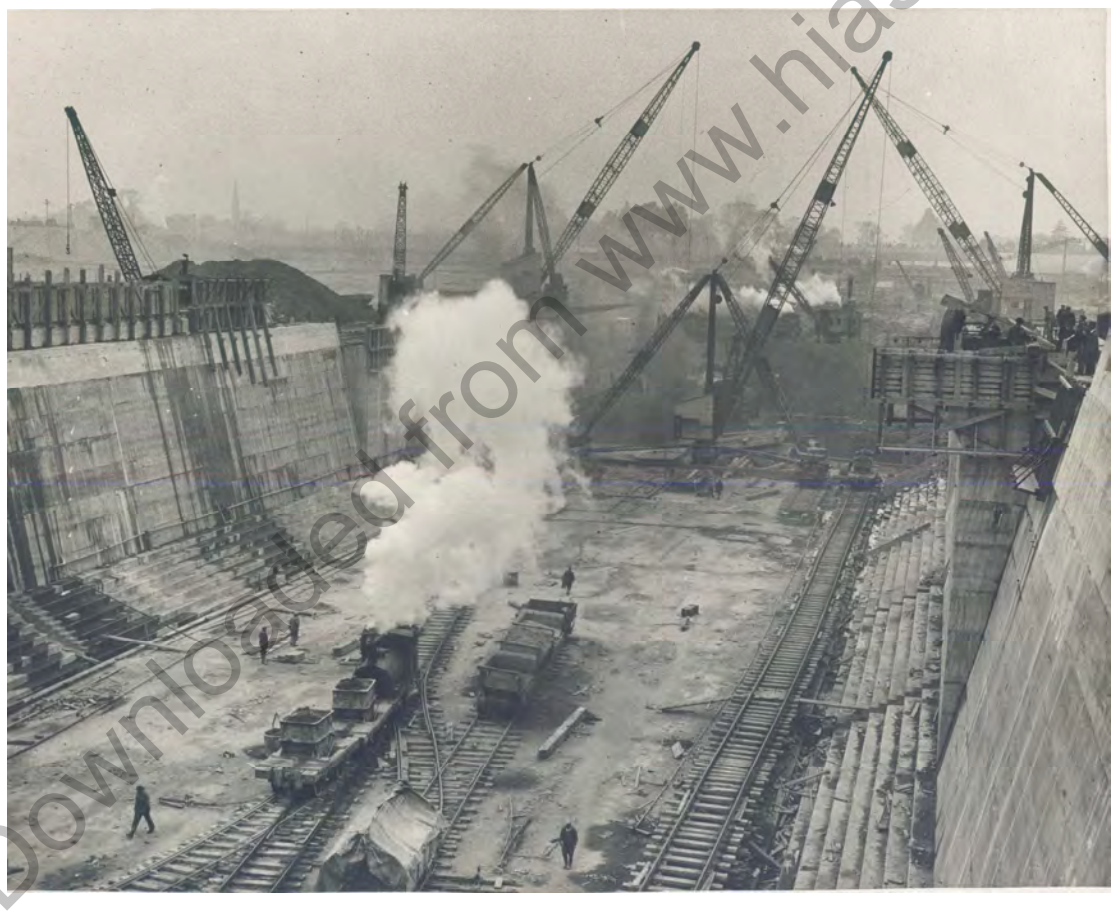
Hampshire Industrial Archaeology Society

Journal



No. 15

2007

Cover photo:
Construction of the *King George V* Dry Dock, Southampton. Progress on the Dock floor is nearing completion with work on the head of the Dock still under way. (ABP Coll SCM)

Hampshire Industrial Archaeology Society

(formerly Southampton University Industrial Archaeology Group)

Journal No. 15, 2007

Contents

Editorial and Acknowledgements

Welcome to Issue 15 of our *Journal*. Once again the *Journal* has articles on a wide variety of subjects, showing the wide interests of members of the Society.

Armfields of Ringwood was a successful country foundry which made a national contribution to the development of water turbines as power sources in rivers. Celia Clark's article looks to the future, briefing us on the bid being assembled by Portsmouth for recognition as a World Heritage Site. The closure of the King George V dry dock in 2005 signalled the end of major ship repair facilities in Southampton at a time when large cruise ships were beginning to use the port regularly. The gestation and building of the first electricity power station in Winchester is followed by an article on gas lighting in Lymington where gas succeeded electricity for a time.

My thanks are due to all who have contributed to this edition of the *Journal*. Acknowledgements and thanks for the provision of illustrations are made as follows:
Associated British Ports [ABP], (Fig. 32); C. Clark, (Figs.12-17); J. M. Gregory, (Figs. 5, 34, 36-7); Hampshire Record Office, (Figs. 33, 35); J. B. Horne, (Figs. 44-49); J. Pain, (Figs. 18-20, 22, 26-31); Southampton City Museum Service [ABP Collection], (cover, Figs. 21, 23-5); Winchester City, (Figs. 42, 43); Winchester Library, Local Studies Collection, (Figs. 38-41); A. Yoward, (Figs, 1-4, 6-11).
The authors and HIAS have made every effort to trace copyright holders of illustrations, but if we have inadvertently overlooked any, we apologise.

Martin Gregory
May 2007

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The Contributors

Celia Clark
Living in Portsmouth since 1970 gave Celia Clark a home town - after a military childhood in different parts of the world. Her MSc dissertation compared the history and different futures of Portsmouth, Chatham, Plymouth and Venice Arsenale. Her PhD on public participation in new uses for military heritage sites examined the reshaping of Portsmouth's Gunwharf, Mount Wise and Stonehouse in Plymouth, and the Royal Gunpowder Works at Waltham Abbey, Essex. In 2000 she wrote a report about the future of historic dockyards across Europe (pub: Univ. of the West of England) which she is currently expanding into a book with a world focus. She was instrumental in setting up an EU project linking walled cities in Portsmouth, Obidos in Portugal and Xingcheng in Liaoning province in China, which gave her experience in preparing for a World Heritage Site inscription.

Martin Gregory
Martin Gregory is a retired schoolmaster. His interest in the history of technology goes back over 45 years. He has researched and built model steam and Stirling engines for many years and also works on the history of the sewing machine. He has been a member of HIAS and its predecessor for over 35 years, has served as Secretary and Chairman and is the present editor of the Journal.

John Horne
John Horne is an engineer, now retired, who has lived near Southampton since 1969, though originally from Liverpool. He served several terms as Secretary and then Chairman of the former SUIAG. Interested in most aspects of industrial and business history, he concentrates on transport and Public Utility matters. Current projects include a 'Virtual Archive' for the Gas Industry and the listing of material donated by Vosper-Thornycroft when they left their Woolston shipyard.

Jeff Pain
Jeff Pain has been a member of the IA group since its early days in the 1960s. He was born in Southampton and, apart from wartime, has always lived and worked in the area. Educated at Taunton's School, he followed his father into the shipping world, being employed in freight, passenger and ship agency work. After the reorganisation of shipping, he spent twenty years or so with Pirelli, first at Southampton and, when that closed, at Eastleigh. His main interest has always been in transport covering ships, railways and aircraft, with road interest limited to trams and buses.

Tony Yoward
Tony Yoward grew up in Swindon and moved to Emsworth in 1952 to manage, and later own, the Pharmacy. He is now retired. He always had an interest in Industrial Archaeology, especially canals, and has served on the AIA committee and organised the national conference in Hampshire. In 1970, he moved into the converted Slipper Mill building and the interest in mills took off. He has published a 'Glossary of 3500 mill terms' and is the Archivist for the Hampshire Mills Group. He has been a member of the SPAB Mills Committee, Chairman of SUIAG and was one of the founding trustees for the Mills Archive, a website for British Mills.

Armfields of Ringwood

Tony Yoward

Joseph John Armfield (1852 - 1935) was a successful millwright, engineer, inventor, entrepreneur and a dedicated Quaker. But the story of Armfields of Ringwood realy begins before he was born.

About 1835, Stephen Tunks' brewery in Christchurch Road, Ringwood closed. Tunks, also the owner of a bank in the town, had suffered rather heavy financial losses and both his bank and brewery closed down. In 1836, blacksmith William Munden's business, which had originally been established in Poole in the early 1800s, was transferred to Ringwood when he purchased part of Tunks' brewery buildings. He soon built up a flourishing little business repairing waggon wheels and farm machinery, making and repairing millstones and milling machinery. In 1859, Munden was described as "a miller, engineer, iron and brass founder".

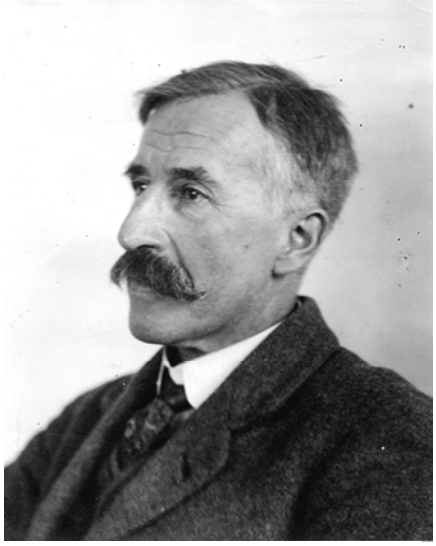

Figure 1. Joseph John Armfield

Joseph J Armfield was born in Jewin Crescent, St Giles, London (now the site of the Barbican) on 15th May 1852. He was the son of Quaker parents and was brought up in the Society of Friends, being educated at a Friends' school. He was always interested in science and engineering and, after his school days, he served a demanding engineering apprenticeship at John Smith's Grove Iron Works, Carshalton, Surrey, where he obtained a good grounding in mechanical knowledge.

Joseph Armfield came to Ringwood in 1875, aged 23. He visited Munden's little foundry and workshops and was so taken with the possibilities of the business that the following year, 1876, he entered into partnership with William Munden and the business was run as 'Munden, Armfield & Co'. A couple of years later, Joseph Armfield bought the entire business and it was carried on as 'Joseph J Armfield & Co.' until it was incorporated as a Private Limited Company about 1924. The mill wheel at Alderholt has "W Munden of Ringwood" cast on it and another at Blashenwell, Kingston has "Munden and Armfield".

When Munden retired, he lived with his wife Mary in Fordingbridge until he died in the late 1890s, leaving effects valued at £2,435 17s 8d - not a small amount in those days.

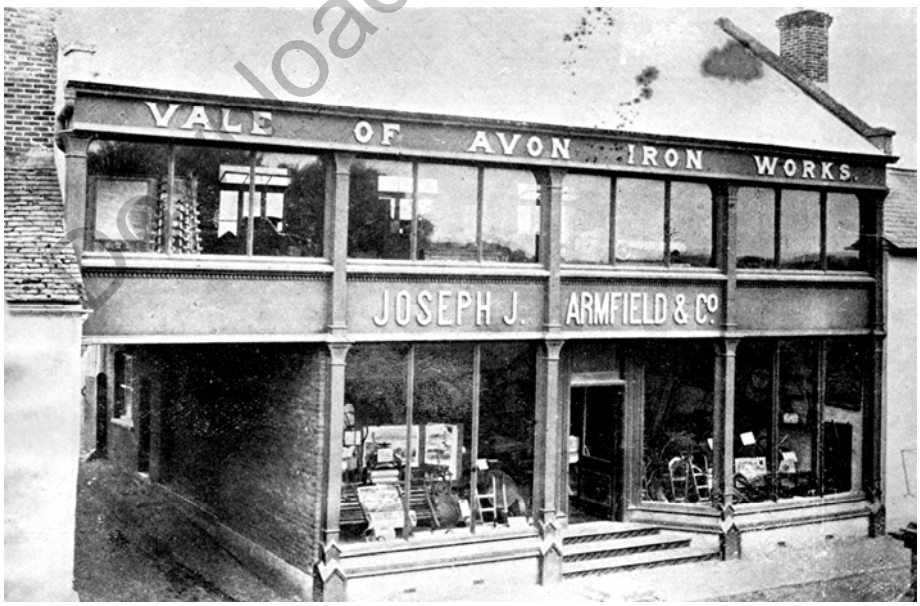

Figure 2. The showroom and offices of the 'Vale of Avon Iron Works', Ringwood

When Armfield became the proprietor, about 30 men were employed but, as the business developed, a new and extensive site opposite the old one was secured and about 200 men were employed in the works at one time. Joseph Armfield's works produced a vast quantity of cast and manufactured products.

Most of the cast-iron lamp-posts for Ringwood's street lighting were made at his works and railings, road signposts, inspection covers and road bollards can be found in many Hampshire

villages bearing the cast inscription "Armfield, Ringwood". No kind of engineering work was declined, from major mill works, sluices and weirs, to the repair and manufacture of small parts for local farmer's ploughs and waggons. The leading lines were water turbines, flour milling machinery and disintegrating (pulverising) machines.

In the late nineteenth century, turbines began to replace the once familiar water wheel, just as the old mill stones for grinding wheat were being superceded by the roller milling machines. Armfield commenced his turbine work in 1887 and his 70 inch (1.8 m) turbine was said to be the heaviest wheel in England. Such was the excellence of the engineering products turned out by this small family firm tucked away in a quiet corner of Hampshire that, in the Melbourne Exhibition of 1888, its entries won a first prize. As business increased, London offices were opened at 20 Mark Lane, E.C.

Roller-mill plants were being introduced into the milling industry in the late 1800s and Joseph Armfield, a pioneer in this development, designed, built and installed roller-mill plants at Sopley, Bickton, Ringwood Town Mill, Christchurch and elsewhere in England. Thus, millstone dressing and millwright engineering became a slowly-declining part of the business.

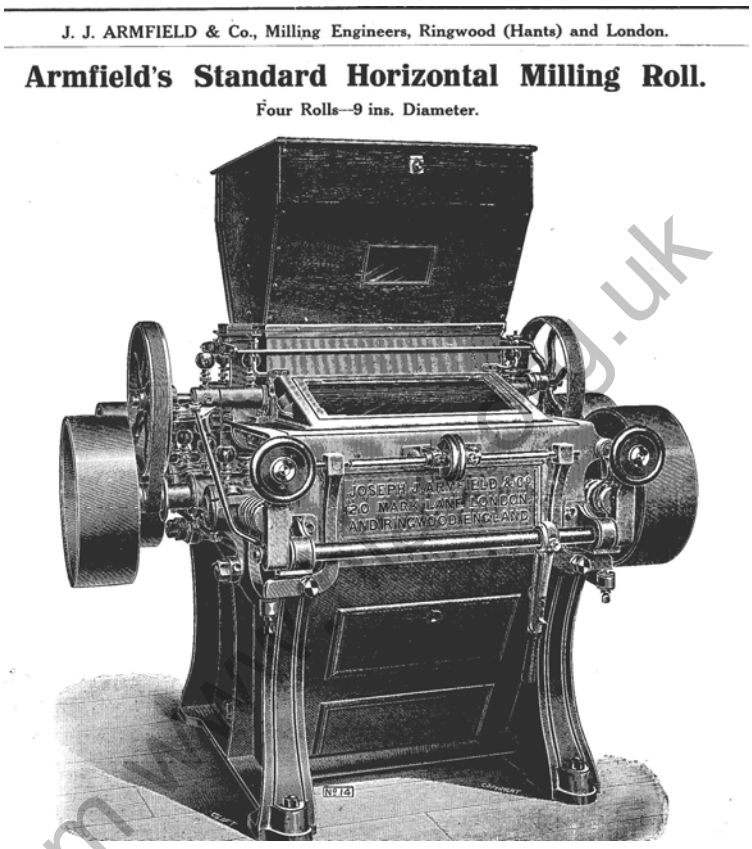

Figure 3. Armfield's roller mill machine showing both London and Ringwood addresses

The Ringwood show rooms displayed a large assortment of implements of all kinds, agricultural and horticultural and, behind, on the ground floor were the offices. The show rooms stood on the site of the Old Kings Arms, a hostelry dating back to the times of James I. There were an iron foundry, a brass foundry and five forges. Castings were made from one or two ounces (50 g) up to four tons and thousands of plough shares were cast in the foundry every year.

About 1890, most of the iron foundry, turbine and general engineering works were transferred from the small workshops in Christchurch Road to land on the opposite side. Later a branch works was established at Stuckton, near Fordingbridge, five miles north of Ringwood.

Figure 4. Armfield's later diagonal roller mill machine

On April 9, 1935, Joseph John Armfield died at Ringwood, aged 83, after a short and severe illness. He left a widow, two sons and one daughter. His remains were laid to rest in the Society of Friend's Burial Ground, at Isleworth, on April 13th 1935.

Engineer, designer, inventor, experimenter, photographer and businessman, he was also involved in various public works. He was a J.P. for the County of Hampshire, and served on the Ringwood R.D.C. and the Board of Guardians for 20 years. He was also Chairman of the Council School governors and of the New Forest Liberal Association. As a Quaker and a pacifist, his work for peace took many forms; he founded a local Branch of the League of Nations Union, and lectured to the Young People's Association on peace and war.

His sixty years in business had an effect not only on mills in this country but, with many clients in other countries around the World, also in South Africa, India, Ceylon, Natal, Australia, South America, Portugal, Kenya, Uganda, Persia and Mauritius, to name a few.

STUCKTON IRONWORKS

Figure 5. Lamp post by Sheppard and Ingram in Fordingbridge

In the late 1700s, Thomas Sheppard, a member of a Dorset family with generations of flour millers, moved to Bickton mill on the River Avon. His father, also Thomas Sheppard, worked as a millwright at Milton Abbas. Thomas (junior) was a clever engineer and invented several improvements to the mill machinery, so much so that other millers came to see these and thought so highly of them that he was advised to start a business in this line. He took over the mill at Stuckton for this purpose in 1790.

He died in 1804 and his son, William, became the proprietor when he was about 20 years old. He built the iron foundry in 1807 which provided castings for agricultural implements, mill machinery and hatch gear. The plant was driven by a Cornish steam engine, providing power for the works, forge and pattern shop. A tall brick chimney graced the boiler house. The old Cornish engine was finally dismantled in 1920, but the original chimney still remained as a local landmark for many years. In 1830 it is said that the mill had been attacked by Luddite, anti-machinery, rioters.

The business was continued by William until his death in 1844, then by his widow Maria Sheppard for a further ten years until her son George took it over. Machinery is in existence marked "Sheppard and Ingram" so it is presumed a partnership was formed about this time. This subsequently became Ingram and Phillips.

Figure 6. Mr. George S. Wort

Sheppard sold the Stuckton works to J J Armfield in 1872, thus providing the Ringwood firm with a larger and well-equipped foundry. The Stuckton foundry closed down in 1908, some years after the new foundry had been established at Ringwood. The agricultural machinery side of the business, however, continued to be centred at Stuckton.

In 1915 Mr. George Wort was appointed manager. The works was purchased by the Wort family in 1953, who continued the business as Armfield Agricultural Engineering Co. Most of the agricultural machinery was made at Stuckton from castings made at Ringwood. Stuckton Iron Works had always been mainly an Agricultural works.

In 1953, Hartley Wort sold the Stuckton side of the old firm. The

agricultural engineering side and the new firm retained the name of Armfield in its title and continued to provide the farming community of the Avon Valley and nearby Dorset and New Forest areas with a specialist service.

Figure 7. Armfield Agricultural Engineering Co stand at the New Forest Show giving the Fordingbridge (Stuckton) address

WATER TURBINES

In the early 1880s, J J Armfield began to study the replacement of the old-fashioned waterwheels by water turbines imported from America. Turbines were able to extract more of the available power for use in the mill. Several of these were imported and installed, but soon, Armfield decided to cast and manufacture his own.

The first Armfield-made turbines (called "British Empire" turbines) were installed at Corfe Mullen Mill on the Dorset Stour in 1884. By 1900, a total of 98 turbines had been manufactured averaging about 30 bhp (22 kW) each. They are found not only mainly in Hampshire, Dorset and the adjoining counties, but as far away as Yorkshire, Kent and Cornwall. The size of the turbines ranged from 6 to 70 inches (0.15 to 1.8 m), but most of the trade was in the range 40 to 60 inches.

Figure 8 shows a “British Empire” turbine with double rotor and a single control gate (type 2). The flow is radially inwards for both rotors and upwards out of the top rotor, downwards out of the bottom rotor.

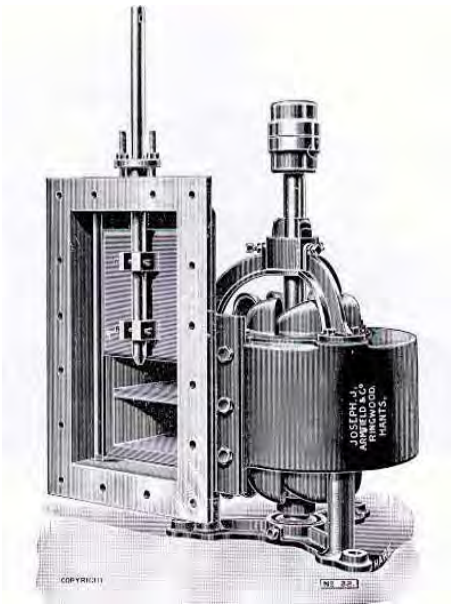

Figure 8. “British Empire” turbine

A new turbine was patented in 1910, the "River Patent Turbine", largely as a result of work by Armfield’s son, J Harold Armfield, who had now entered his father's business. It was designed to deal with large volumes of water, to run at a high speed and to be used to

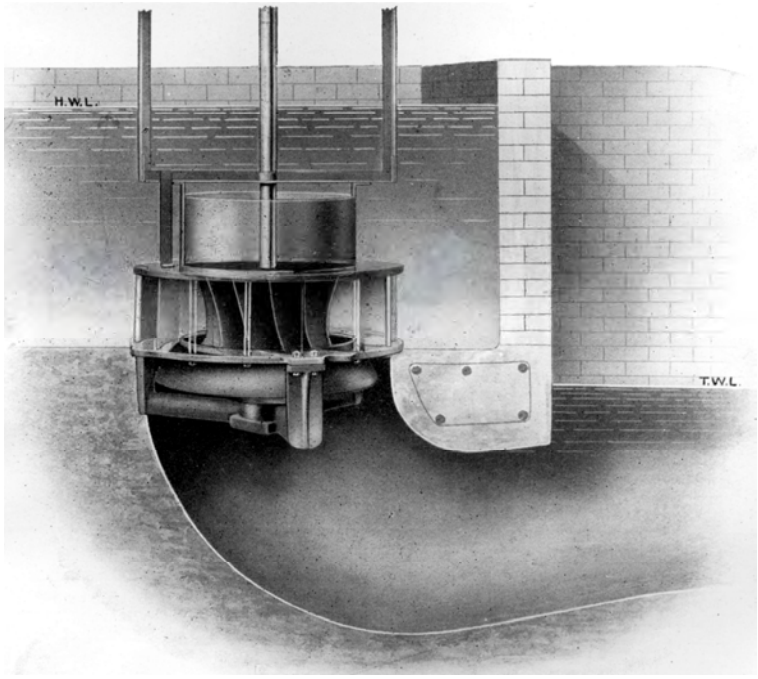

Figure 9. Armfield "River Patent Turbine" (type 1) with single rotor

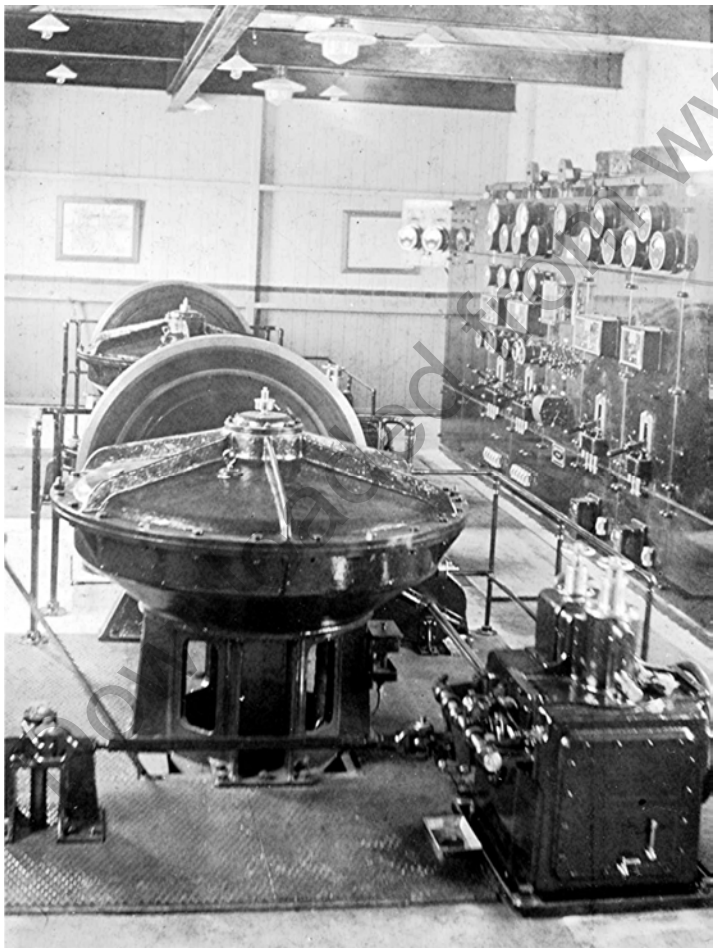

Figure 10. The Ringwood hydroelectric power station on the river Avon. The turbines had vertical shafts and drove horizontal axis alternators through bevel gearboxes. Two gearboxes and alternators are shown in the photograph. One set is now in the Electricity Museum in Christchurch.

produce electricity. The first one was installed in Lake House, Wiltshire in 1911.

This new Armfield turbine incorporated an Austrian design and was especially suitable for low heads of water, as occurred on the rivers of lowland areas, and could be arranged to produce, by water power, the "new" electricity, then being widely introduced for lighting. At Canford Castle, on the River Stour, he installed three 45-inch (1.1 m) "British Empire" turbines which drove two dynamos to produce electricity for the estate.

During the 1914-19 war, part of the works were taken over for munitions but, being a Quaker and pacifist, he continued his engineering business in the other part. In 1920, a new foundry was built over the old one at the Vale of Avon Ironworks and the old workshops opposite were used only for milling work, a rapidly-declining branch of the firm's activity as the big port millers' combines took more and more control of milling.

In 1930, arrangements were made with the newly-formed (1924) Lymington garage firm of Wellworthy's to produce parts at the foundry, for car engines. Special adaptions and improvements had to be made for precision casting and the careful grading of alloys that was needed for this type of work. In 1943 the Vale of Avon Ironworks, the foundry and workshops, were sold to Wellworthy's (Lymington) Ltd., where they developed a large, complex precision-engineering factory.

In 1949, the original workshops and yard of the Munden-Armfield business opposite were rented to a group of engineers who bought the goodwill of the water turbine side of the firm and trading under the name of The Armfield Hydraulic Engineering Company. Biwater purchased Armfield Hydraulic Engineering in 1982 and moved the business to Birmingham in 1990. Then, ATE (Armfield Technical Education) occupied the site at Ringwood and Gilbert Gilkes & Gordon (Kendal) purchased the remains of the business about 1995, retaining many of the recent contracts and drawings. At the same time, a number of drawings and day-books were deposited and indexed at the Hampshire Record Office.

THE MARCONI CONNECTION

In 1907, the Armfield firm at Ringwood was associated with the manufacture of special rotary disc spark dischargers for the famous Italian wireless pioneer, Guglielmo Marconi. The apparatus was for use with the new trans-Atlantic wireless service from Clifden, Ireland.

Marconi had despaired of getting the necessary parts made in England and was on his way to Poole to take a boat for France when, passing through Ringwood, he happened to notice Armfield's Vale of Avon Ironworks. He discussed his problem with Joseph Armfield who, true to character, agreed to attempt the making of the high-speed steel disc required as an essential part of the apparatus which no other firm would attempt.

The disc was to be run at a extemely high speed and, coupled by belting to a stationary steam engine, the apparatus was placed in a deep pit covered with heavy timbering as a safety precaution should the disc disintegrate. The test was entirely successful, and Armfield built the whole apparatus required by Marconi.

A regular trans-Atlantic radiotelegraph service was announced in 1907, but consistent transatlantic signalling turned out to be very difficult to establish and it was many years before reliable communication was provided.

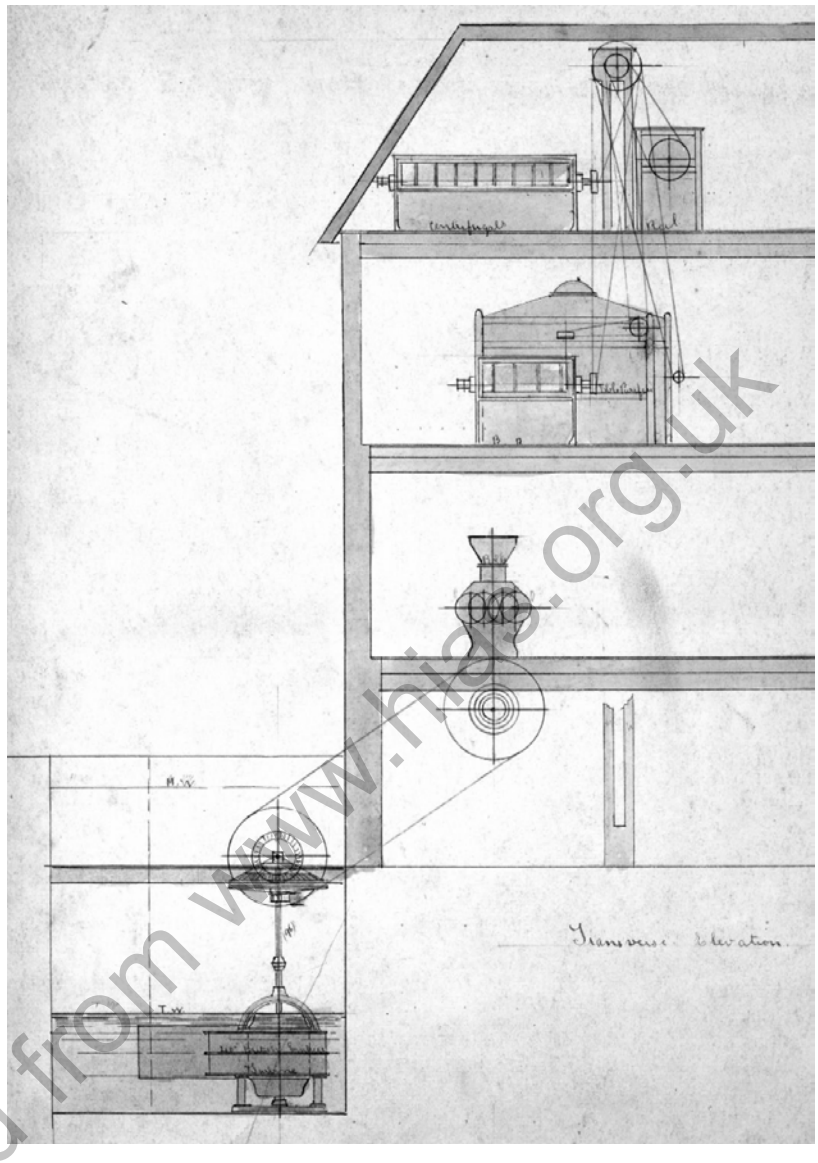

Figure 11. Armfield drawing of Chesapeake Mill, Wickham, showing turbine and drive to mill, but not in the final place as built.

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Chatham and Portsmouth: World Heritage Sites?

Celia Clark

Two very different English historic dockyards are at different stages in the process of applying to be inscribed onto the list of World Heritage sites. At present the List includes 830 properties forming part of the cultural and natural heritage which the World Heritage Committee, part of ICOMOS (International Council on Monuments and Sites) which advises UNESCO on the list, considers as having **outstanding universal value.** 644 of these are cultural, 162 natural and 24 mixed properties in 138 different countries. Each year the 'state party' – in our case the Department for Culture, Media and Sport (DCMS) – puts forward one site from its Tentative List. Chatham and Gibraltar are both on this list.

Figure 12. Portsmouth Dockyard's Industrial Heritage

Chatham's land-based Site was nominated by the DCMS in 1999, while the Portsmouth proposal, currently led by a steering group of five local authorities and civic societies and naval and heritage interests is based on the water of Portsmouth Harbour and Spithead - with appropriate land inclusions. Only one other harbour is currently on the World Heritage list: the colonial town of Willemstad in Curaçao in the Netherlands Antilles in central America. There are three other naval dockyards currently inscribed: Karlskrona in Sweden, Venice in Italy (as part of a wider inscription) and Suomenlinna in Finland. Chatham's nomination begins:

> "Chatham Dockyard is the supreme example of a Royal dockyard largely unaltered from the age of sail, at a period when the Royal Navy was instrumental in Britain's global influence and when, before the full impact of the Industrial Revolution, dockyards were the largest industrial centres in Europe. The dockyard contained all the facilities necessary to build, repair, maintain and equip ships of the fleet, and was supplemented by facilities for the Ordnance Board, responsible for the supply of guns, ammunition and powder to the navy and army. Nearby were barracks for the army and marines, and around these and

the dockyard grew up the village of Brompton, serving this major concentration of military personnel. Installations such as dockyards were considered vulnerable to attack by land or sea. Hence at various periods Chatham was provided with permanent fortifications. On the high ground east of the dockyard continuous artillery fortifications were provided in the mid 18th century, called the Brompton Lines, with a concentration of guns and troops at Fort Amherst, overlooking the town of Chatham and controlling access to the military zone of the dockyard, barracks and ordnance wharf."

"The proposed World Heritage Site focuses on the 18th and early 19th century dockyard and excludes the later 19th century extension for the steam navy. It includes the site of the Ordnance Board wharf, of which some buildings remain, and, as an outlier, Upnor Castle, built in 1559-67 to defend the dockyard and used in the 18th century as the main powder magazine at Chatham. It also includes the site of the Infantry Barracks (now known as Kitchener Barracks) of c1750-80 and the site of the Royal Marines Barracks of c1780. The most significant surviving barracks at Chatham are, however, those built by the Ordnance Board as the Brompton Artillery Barracks, completed on a grand scale by 1806, and now forming the Royal Engineers HQ as the School of Military Engineering. The village of Brompton served the barracks and is included in the proposed World Heritage Site for its fine 18th century houses and other historic buildings serving a social function for the large number of military personnel."

"All these sites, with the exception of Upnor, were defended by the Brompton Lines, construction of which was commenced c1756 by the Royal Engineers, first as earth fortifications and later revetted in brick. These continued to develop into the 19th century until the 1870s when a perimeter ring of forts was built to replace them. The proposed World Heritage Site includes not just the Lines themselves but also the former open fields of fire to the east, known as the Great Lines. The northern end of the Lines has been eroded by the construction of the 19th century extension to the dockyard but they are continuous through Brompton Barracks and extend south to rejoin the river Medway at the site of the former ordnance wharf. This southern end is collectively known as Fort Amherst, a major complex of gun positions, magazines, barracks and tunnels that controlled access into the military zone by means of guarded gates at bridges over a deep barrier ditch."

The nomination goes on to define fully the boundaries and buffer zone for the World Heritage Site, preserving key views and using existing statutory designations (listings, schedulings and conservation areas) to ensure high quality, appropriate development.

Joanne Cable, World Heritage Site and Great Lines City Park Project Manager, has recently taken up her post at the helm of bid development for Portsmouth, acting as a lynchpin for the stakeholders activated by earlier Feasibility Studies and partnership work, and guiding the creation of a universally-agreed Nomination Dossier, securing the long-term future of the Site. Financial contributions of £240 000 over three years, from the South East England Development Agency (SEEDA) and English Heritage, underpin nomination work. Much work has also been done since the DCMS first focused World Heritage attention on Chatham dockyard and its defences, including, for example, Medway Council's development of a Tall Buildings Policy to guide future development in sensitive areas, and the council's commitment to establishing the Great Lines (former Field of Fire) as a world-class City Park.

The Portsmouth proposal is at the first stage: the bid is being put together by the conservation officers and civic societies in Portsmouth, Gosport, Fareham, Winchester (for the Palmerston forts - a detached core zone) and the Isle of Wight, together with representatives of Portsmouth Naval Base Property Trust, Defence Estates, the Mary Rose Trust, Royal Naval Museum and Hampshire & Wight Trust for Maritime Archaeology, with advice from Chris Dobbs and David Michelmore, key members of ICOMOS. The core area is framed by the skylines of Ryde and Portsdown Hill.

Since we began work, the Ministry of Defence review of the status of Britain's three main surface fleet naval bases: Portsmouth, Devonport and Clyde/Faslane has sharpened our focus. Portsmouth University's Centre for Local and Regional Economic Analysis examined three main options for their likely socio-economic impact locally: the closure or minimisation of either Portsmouth or Devonport Naval Base – or the introduction of 'local initiatives' at each base in order to minimise costs. Portsmouth Naval Base and associated activities support a total of just under 35 000 jobs within South Hampshire: 13 300 service jobs and 21 600 civilian jobs, 8% of all work in the sub-region and employment for 6.2% of the people living

Figure 13. Last steel casting at Portsmouth Dockyard, 1982.

within the area. This employment and spending of defence firms which form a significant cluster in South Hampshire generate an income of £680m for the local economy (Grainger et al 2007), but the MOD's presence continues to contract. In March 2007 military, naval and airforce nurses, soldiers and sailors marched ceremonially out of the Royal Naval Hospital to receive the Freedom of Gosport Borough, as they left for ever. This, Britain's first purpose built naval hospital (1746 to 1754) by Theodore Jacobsen, designer of the Foundling Hospital in London, was handed over short term to the NHS, but faces an uncertain future thereafter.

According to sources responsible for government buildings in English Heritage, Portsmouth has the weakest case for continued naval use; Plymouth has long-term contracts tied up to maintain nuclear submarines; land in Portsmouth is more valuable than that in Plymouth; and private concerns - VT, BAE, Fleet Support Limited as well as the defence heritage attractions which are the subject of the bid - already operate in Portsmouth. VT's huge ship assembly shed where sections of warships are constructed – the return of shipbuilding to Portsmouth after 39 years – now dominates many views in the harbour. The Government Defence Industrial Strategy aims for a consolidated naval ship and submarine building strategy in Britain that can cut its costs (Davies 2007). Consolidation is already under way among Britain's leading defence contractors: BAE own Barrow shipyard where submarines are built, and BAE Systems and VT Group have a joint venture in support services and are working on a similar proposal within the shipbuilding and naval support sector. Rosyth is already privatised: Babcock owns the dockyard and also runs the Faslane submarine base for the MOD. Babcock and BAE are among the bidders for control of Devonport Management Limited (DML) in Plymouth (Milner 2007).

Figure 14. Haslar Hospital, Gosport.

Communities around Portsmouth Harbour and Spithead may need to recognise that they have to develop new ways of continuing the area's global role - looking over the horizon, sharing experience with other former naval ports, beginning to plan for possible different futures. Tourism is already well established in Portsmouth Harbour and the Isle of Wight, but there is no coordination in key policies important to what we all experience as one place: in tourism, planning or conservation. Commercial, political, tourist, marine and business interests, the local communities and the MOD all need to be convinced that future development will not be inhibited or constrained before they support the bid. If all five local authorities sign up, costs of the

bid, and dossier - and if accepted onto the DCMS Tentative List, which is currently being revised and shortened - the management plan - would be shared.

Portsmouth Harbour might fit three categories for nomination: for technology and architecture, as well as being a cultural landscape:

- an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;
- an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;
- an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.

Figure 15. Insertion of new structure and part dismantling of No. 6 boathouse as a result of conversion to tourism uses.

There is also a category for moveable objects e.g. historic ships. Only one category is necessary. Portsmouth Harbour would be the first to include objects. Authenticity is important: the Nara document refers to authenticity of materials, design and setting, which had to be of worldwide significance. Portsmouth Harbour's theme is Defence of the Realm. The draft bid – with the theme 'Defence of the Realm' reads:

"The great natural harbour of Portsmouth on the south coast of England has significant pre-historic remains from the last ice age when it was shaped by the Solent River. Spithead, the area of the Solent between Portsmouth and the Isle of Wight, and Portsmouth Harbour are framed to the north by Portsdown Hill, a chalk outcrop, and to the south by the hill on which Ryde in the Isle of Wight stands."

"Portsmouth Harbour was a key base in two world empires: the Roman and the British Empire. In the third century AD the Romans built their largest fortress in northwest Europe, Portchester Castle, at the back of the harbour. A Romanesque keep and church were added in the 11th century. From the seventeenth century Fort Cumberland defended the approach to Langston Harbour, gaining its star fortress form in the eighteenth century. The historic towns of Fareham and Gosport on the western and north western shores of the harbour have significant social and economic links with the development of national defence."

"Over the last four centuries, Portsmouth Dockyard has developed into a modern naval base with the full complement of supporting facilities around the harbour, many of them supplied by water: gunwharf, victualling, hospitals, ammunition stores and magazines. In the nineteenth century a ring fortress was constructed: massive land forts encircling the harbour along Portsdown Hill and in Fareham and Gosport, and four sea forts between Southsea, Ryde and Bembridge Isle of Wight. In Haslar, Gosport, there is a gunboat yard associated with the great Victorian engineer Isambard Kingdom Brunel, who was born in Portsmouth in 1806. These establishments and the historic towns around the harbour and Spithead contain a significant architectural and engineering legacy."

"'The English royal dockyards, victualling yards and hospitals formed what are arguably the largest industrial centres in Britain before the Industrial Revolution, while their economic impact was out of all proportion to their size' (Coad 1989). By the middle of the eighteenth century the royal dockyards and the navy had become 'by a large margin the largest industrial organisation in the western world' (Rodger 1986)."

"There are several technological world firsts associated with the harbour. The most important is Block Mills, where the world's first steam-powered mass-production factory using metal machine tools was developed by Marc Brunel, Henry Maudslay, Simon Goodrich and others. Also in Portsmouth dockyard Samuel Bentham devised the first caissons to close dry docks, and the first use of circular saws occurred there."

"The ship-testing tanks in Haslar, Gosport, were built by William Froude and his son in the 1880s - a facility which is still in operation. James Lind (1716-1794) Chief Physician at Haslar Royal Naval Hospital from 1762-1772 published 'A treatise of the scurvy' in 1753 based on comparative clinical trials; he also proposed distilling fresh water from sea water. Haslar Hospital was designed by Theodore Jacobsen – and was at the time the largest brick building in Europe."

"During WWII degaussing of ships was developed at HMS Vernon, and ship-borne radar to detect aircraft in Eastney Fort East. In the mid-twentieth century the invention of freeze-drying took place in Royal Clarence Victualling Yard."

"Portsmouth's green seafront Southsea Common was for centuries the assembly point for armies and naval forces departing for war, preserving it - as a field of fire - from development until 1922, when it was purchased by Portsmouth Corporation. It is now listed as a historic landscape. D-Day in June 1944, the world's greatest seaborne invasion was co-ordinated at Southwick House just to the north of Portsdown Hill; a large part of the invasion forces assembled in the area and left from Portsmouth dockyard – as did the Falklands Task Force in 1982."

"Three preserved ships: *Mary Rose*, HMS *Victory* and HMS *Warrior* represent key developments in warship design. *Mary Rose* was raised from the Solent seabed in 1984; significant historic wrecks including *Invincible*, *Edgar* and *Royal Sovereign* and other important underwater heritage are identified in Spithead."

"Ryde, Alverstoke and Southsea have significant Regency and early Victorian areas, including Owen's Southsea, an early garden suburb developed by Thomas Ellis Owen from 1830-60. His Alverstoke Crescent and communal garden in Gosport have been restored by the local community - as has Nelson Square in Ryde."

This draft is continually revised: further research is needed, particularly to identify technological firsts – with which help would be appreciated. However, much documentation already exists – on listed buildings, ancient monuments, conservation areas, as well as the many policies designed to protect the maritime and underwater environment. The abolition of the Crown Exemption dating from 1913, in June 2006, means that the Ministry of Defence is now subject to civilian planning laws and regulations. After protracted negotiations between English Heritage and the MOD, which would rather spend their money on missiles, protective work is now taking place on the Grade I Block Mills to make the building weather-tight. However, the building needs a long term use.

Likely gains in the bidding process include the prestige of integrated worldwide publicity to boost the local tourist industry – worth £300m – to the local economy. Despite attempts to form a Portsmouth Harbour Tourism Forum two years ago, the area still misses the opportunity for combining messages from the different attractions. Joint, co-ordinated promotion and marketing of the harbour attractions – to a worldwide audience would be possible if Inscription takes place. World Heritage status helps to preserve and sustain the heritage – built, underwater, archaeological, cultural, natural – by emphasising its importance to local people and to the local economy and for future generations. The steering group hopes to nurture enhanced inter-local authority cooperation in planning and conservation policies, and cooperation between the enormous number of stakeholders around the harbour and Spithead. However, there is considerable concern that the new responsibilities imposed on local authorities for ancient monuments and listed buildings and other aspects of the historic environment proposed in the Heritage Protection Reform White Paper will not be adequately met - when so many councils are cutting their specialist conservation, archaeologist and planning staffs. World Heritage status would help to reverse this trend in this area. Planning authorities would be strengthened in insisting on higher quality new developments and urban design. They are being

encouraged by English Heritage to develop tall buildings policies. Other gains include sustainable development; rediscovery of the key importance of water transport, reducing traffic congestion and pollution and the protection and enhancement of public access to the water.

Disbenfits might be more tourists putting pressure on local infrastructure – though more visitors are needed in winter; employment of specialist staff to operate enhanced planning controls over design and location of new buildings affecting the core and buffer zones; and the fact that sites are monitored by ICOMOS – and can be placed on the World Heritage in Danger list if proposed changes are perceived as damaging, as is happening in Liverpool and London near the Tower of London.

However, the steering group believes that there are substantial gains from the process whether application is made for World Heritage status or whether it succeeds or not. Those involved in the project believe strongly that the preparation process, which has brought together an unusual but cohesive group of people is justified in its own right whether or not the bid succeeds, particularly if it leads to greater co-ordination of stakeholders around the harbour.

Comments welcome!

Figure 16. Portsmouth Block Mills at the launch of Jonathan Coad's book, 2006.

Figure17. Tourists outside John Winter's Ticketing Office, Portsmouth

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www.hants.gov.uk@navaldockyard

The King George V Dry Dock, Southampton

Jeff Pain

This was the official title of the dock, although it was also known by its numerical sequence as "No 7 Dry Dock" or affectionately as "KGV (Dry Dock)". However, let us to the story.

After the First World War there was an urgent need for additional and indeed larger dry dock facilities, so the London & South Western Railway Co which owned the docks, ordered a floating dry dock as a temporary measure whilst decisions were made on a more permanent installation. Prior to the 1914-18 War a large area of land was obtained on the Weston shore of the River Itchen but when, under the 1923 amalgamation, the Southern Railway became owners of the docks, an alternative was investigated.

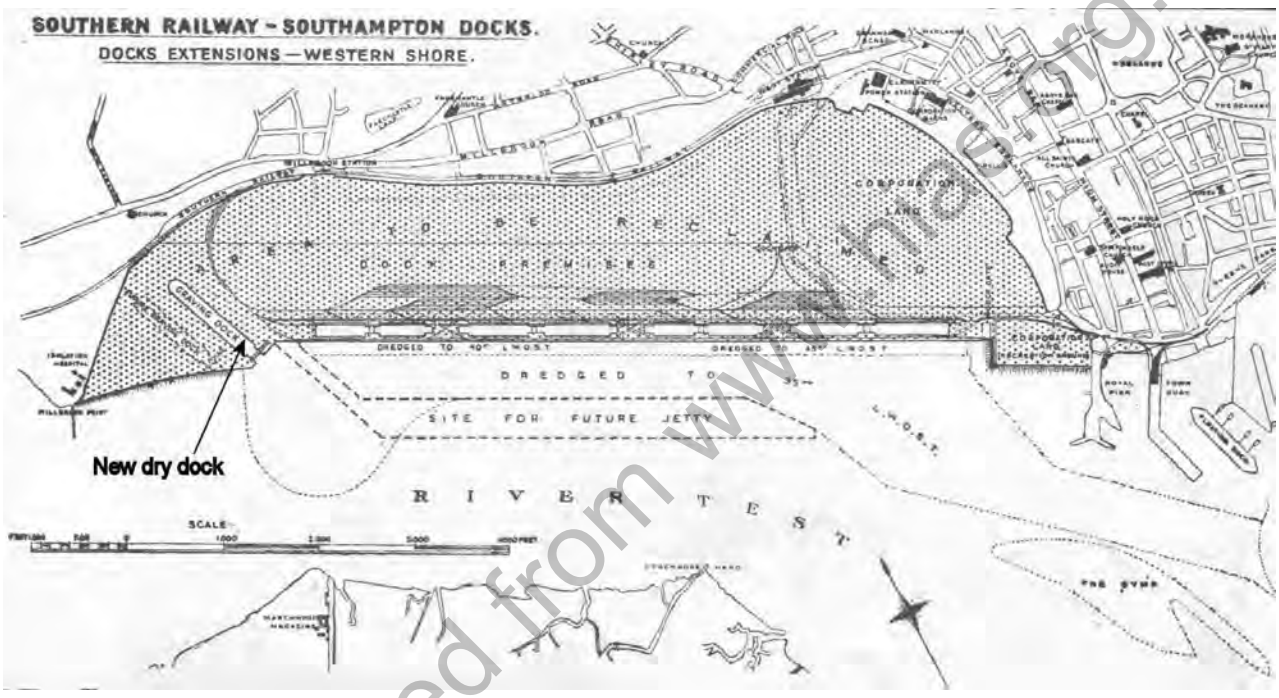


Figure 18. Plan showing the area of the reclamation with the new dry dock on the far left. Space was allowed for a second dock if required. The 'future jetty' was never built. (Southern Railway booklet, November 1932)

Possibly influenced by the 1916 proposal of the Ford Motor Co to establish their works at Millbrook, a scheme which fell through in 1922 with Dagenham being the lucky recipient, the possibility of reclaiming the bay which became a mud flat at low tide, between the Royal Pier and the Millbrook foreshore, was considered. Powers were applied for in 1924 which included a dry dock at the western end of the proposed new docks.

The company's own engineer, Mr F E Wentworth Sheilds, OBE, MICE, was responsible for the overall work and, though some consideration was given to an echelon layout, consultation with Sir Frederick Palmer, sometime engineer for the Port of London Authority, resulted in a linear plan with a single quay wall some 7000 feet (2.1 km) long. Work started in 1927 and took 7 years to complete, the work being carried out by Messrs Sir Robert McAlpine & Sons (London) Ltd.

Figure 19. At an early stage of construction with the concrete structure for the caisson gate in the centre. At the right is the start of 107 berth with the gap to allow water to exit from the lagoon as material is tipped in.

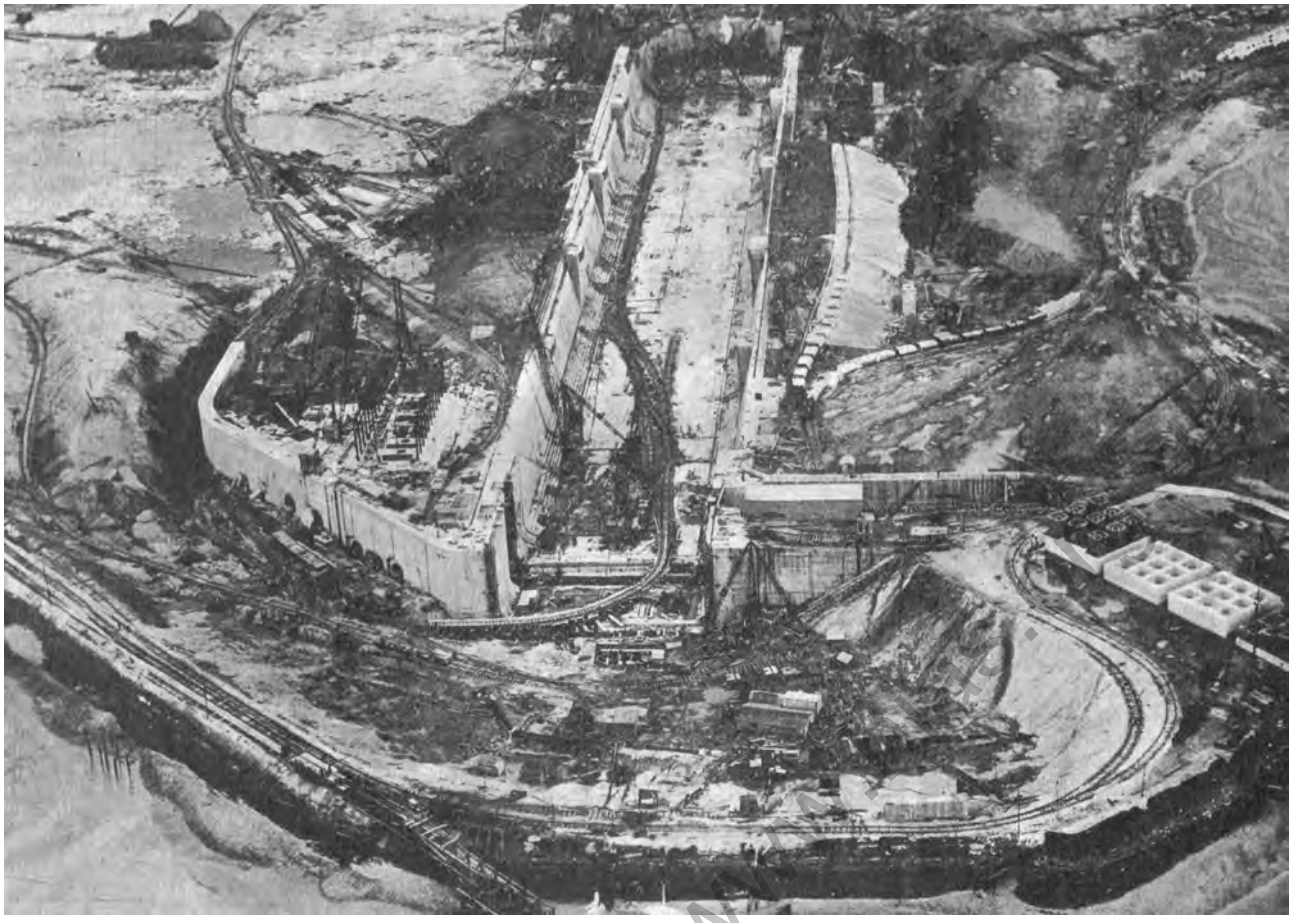


Figure 20. Work on the dock is now well advanced. On the left can be seen the frame of the pump house and the inlet and outlet orifices. Everywhere is temporary track work for moving materials. (Docks Souvenir Supplement)

About this time details were being finalised for the new dry dock that had to be long enough to accommodate the proposed new Cunard liner (*Queen Mary*). A contemporary account (1933) refers to 'the new 72 000 ton liner' and that the 'dock is large enough to take vessels up to 100 000 tons if ships of such a size should ever be brought into commission'.

The main dimensions of the dock were:
Length …….. 1200 feet (366 m)
Width at entrance… . 135 feet (41 m)
Depth over keel blocks at HWNT
……..……45 feet (14 m)
Depth over keel blocks at HWST
……..……48.5 feet (15 m)
Depth over sill at HWNT
……..……47 feet (14.3 m)

The contractors were Messrs John Mowlem & Co Ltd of London and Edmund Nuttall, Sons & Co Ltd of Manchester.

The first stage, before building the dock could commence, was to enclose and drain the site. This required an embankment of gravel dredged from the channel, supplemented by chalk

Figure 21. Inlet (right) and outlet (left) orifices for the pumps with pump house above. Once the dock was flooded these were always below water. (ABP Coll SCM)

Figure 22. Closer to completion, the pumping house is taking shape on the right.. The western extension dock wall is complete but the lagoon still requires final draining.

and made watertight with interlocking steel sheet piling. Within this protection, excavation by steam navvy and dragline excavators removed material which was taken away by rail to be sorted. Any gravel was retained for use later in concrete manufacture at two mixing plants on site.

A bed of gravel containing artesian water under considerable pressure, was found to underlie the site. This was overlaid by layers of clay. However, as it was felt this could cause problems with stability of the dock floor, tube wells equipped with pumps working within filters were sunk into the gravel to relieve the pressure and lower the ground water level below that of the work.

The dock when full held 260 000 tons (260 000 m^3) of water and the pumping plant installed could pump it dry in four hours. The main pumps consisted of four 54 inch (1.4 m) diameter centrifugal units with double inlets, these were directly coupled to 1250 bhp (930 kW) synchronous motors with vertical spindles, the motors running at 272.3 rpm when working on a 6600 volt 3 phase 50 cycle supply. The supply was obtained by a direct cable link from Southampton Corporation electricity generating station alongside Southampton Central railway station, the cost of 3275 yards (3 km) of power cable and 3,400 yards (3.1 km) of pilot cable plus switch gear and metering equipment at the power station being shared equally.

Figure 23. The main electric pumps in the pump house in 1937. The control panel is on the gallery at the right. (ABP Coll SCM)

For dealing with drainage and storm water there were three 16 inch (0.40 m) centrifugal vertical spindle pumps each driven by 220 bhp (164 kW) motors running at 585 rpm. In addition there was equipment to provide circulating water for the auxiliary condensers of any ship in the dry dock, and also to supply water from the river for fire fighting hydrant mains at a pressure of 120 psig (8 bar).

The main pumps were installed some 40 ft (12 m) below ground, these and the auxiliary equipment being in a chamber 100 ft 930 m) long by 25 ft (7.6 m) wide near the entrance on the west side of the dock with, as far as possible, all the electrical equipment being housed above ground in case of flooding. The main suction and discharge culverts were 10 ft (3 m) in diameter and the main drainage culverts 6 ft 6 in (2 m) diameter. The flow to and from the main pumps were controlled by eleven 10 ft (3 m) diameter wedge type sluice valves, in cast iron casings attached to the concrete culverts. There were also six 6 ft 6 in (2 m) sluice valves for the drainage culvert control, all of these being in concrete pits about 70 ft (21 m) below ground level.

Special attention was given to the control of this equipment so that operation was possible by one man using push button controls and an illuminated control panel with coloured lights to indicate the operational status of the plant.

The main equipment was supplied by the following:

Pumps – Gwynnes Pumps Ltd, London & Lincoln
Motors – General Electric Co Ltd, Birmingham
Control Equipment – Electric Control Ltd, Brighton
Control Indicating – Evershed & Vignoles Ltd,London
Sluice Valves – Glenfield & Kennedy Ltd
Electrical Equipment – Metropolitan-Vickers Electrical Co Ltd
Standby Generators – Crossley Bros Ltd.

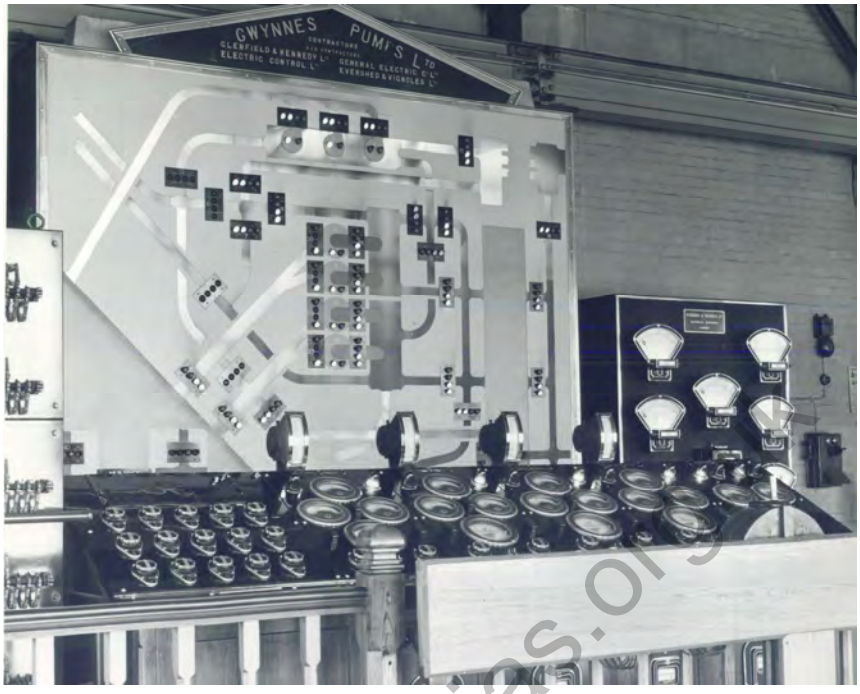


Figure 24. The control panel and console. By repute, this could have serviced the second dry dock (never built) using the same pumps. (ABP Coll SCM)

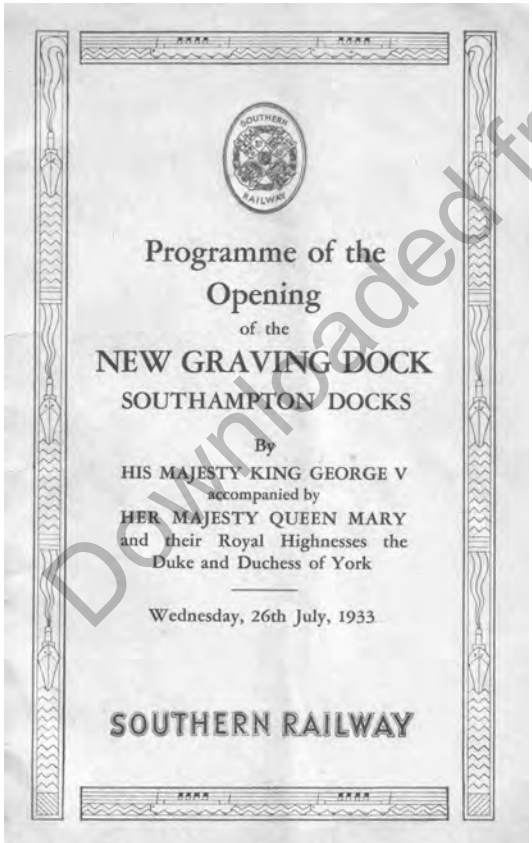
The entrance caisson gate deserves a paragraph on it own. It was built by The Furness Shipbuilding Company at Haverton Hill on Tees. Launched by Mrs Wentworth-Sheilds in early 1933 it was subsequently towed to Southampton arriving on the 11th June 1933. It had to receive some fine-tuning in No 6 dry dock before it could eventually be installed on 28th August. It measured 141 ft 9 in (43 m) long, 58 ft 6 in (18 m) deep with a width of 29 ft 6 in (9 m) and the dry weight was some 2000 tons. It also had its own pumping system to flood the internal tanks. The caisson displaced about 4500 tons of water and with the dock empty it had to withstand a pressure of 6300 tons. Provision was made for the gate to work in three positions; in any of which timber-facing on the caisson will form a water tight joint when in contact with dressed granite stops on the dock. The normal position is against the inner stop with water excluded from the dock. Alternatively, it could be placed against the outer stop to maintain water level in the dock at low tide. In the third, or emergency position, it could be placed on the outside of the dock entrance to allow repair to the granite facings or steel slide paths. This caisson was to be the Achilles heel as it was the cost of necessary repairs that in the end brought about the dry dock's closure.

Figure 25. In August 1933 the caisson gate is floated into its recess. Note the south side is set back after the entrance to allow for an angled entry. (ABP Coll SCM)

The cost of the dry dock was some £1.63 million, this being part of the total cost of £13 million for all of the authorised work covering the reclamation, quays and transit sheds.

Figure 26. The royal yacht is coming alongside the eastern wall of the dock for their Majesties to disembark. Note the covered stand at the head of the dock and the open terraces at each side. This particular postcard is printed on the back as a New Year card from Mr & Mrs Wentworth-Sheilds.

On Wednesday July 26th 1933, the dry dock (although not ready for use) was officially opened by their Majesties King George V and Queen Mary accompanied by the Duke and Duchess of York. The royal party arrived from Cowes on the royal yacht *Victoria and Albert* breaking a red and white tape across the entrance and, berthing on the east side of the dock at 12 o'clock. Disembarking, they made their way to a tented dais at the head of the dock. After a welcoming speech by Mr Gerald W E Loder, Chairman of the Southern Railway, the King, in his speech, said '*I have much pleasure in declaring the dock open for use and in naming it " The King George V Graving Dock" and I pray that by God's blessing it may serve to foster the commerce of Southampton'.* Following which, Queen Mary used a silver goblet inscribed *'The Southern Railway had me wrought for Her Majesty to use when christening the King George V Graving Dock, Southampton, July 26th, 1933'* to pour Empire Wine into the water. The Bishop of Winchester delivered the benediction and after presentation of local and company bigwigs had been made, their Majesties boarded their yacht which was towed out to return to Cowes. Meanwhile, 500 guests adjourned to the *Berengaria* for a celebratory lunch. A newspaper account records that they boarded railway carriages at a nearby platform for conveyance to 44 berth in the 'old docks'.



Programme of the Opening of the NEW GRAVING DOCK SOUTHAMPTON DOCKS By HIS MAJESTY KING GEORGE V accompanied by HER MAJESTY QUEEN MARY and their Royal Highnesses the Duke and Duchess of York

Wednesday, 26th July, 1933

SOUTHERN RAILWAY

Figure 27. The cover of the official programme for the day giving information of transport, seating and proceedings.

Whilst the foregoing is based on reports after the event, some reference should be made to the logistics involved and the following details are taken from the official programme. The spectators were seated in five stands, No.1 (covered) at the head of the dock, for holders of red and blue badges, east side No.2 yellow tickets and No.3 green tickets, west side No.4 orange tickets and No.5 white tickets.

Getting there and leaving.

RED. A special train will leave Waterloo at 9.25 am arriving at the Graving Dock at 11.05 am. Guests arriving by road should park at 44 berth (next to *Berengaria*), from where another special train will depart at 10.30 am. After the ceremony a train will leave the Graving Dock at 1.15 pm for 44 berth. After lunch a train will leave for Waterloo at 4.20 pm.

BLUE. Badge holders were offered the 9.25 am from Waterloo, or if arriving from other points they should detrain at Southampton West Station and go by taxi or tram to Millbrook to access the site via Church Lane and the footbridge. Guests arriving by car could park in Millbrook Station Goods Yard. Afterwards all these guests were to leave via the footbridge and make their way home independently.

YELLOW & GREEN All to enter and leave via the footbridge, car parking if required in Millbrook Goods Yard.

ORANGE & WHITE All guests to go to 102 berth (parking available) then on foot to 103 berth for transfer by a Southern Railway Boat leaving at 10 am for the Graving Dock. Afterwards they would be returned by boat to 103 berth, or if they so wished exit could be made by the footbridge.

Figure 28. The dock ready for action with keel blocks in place along the centre line. There are stabilising blocks which were adjusted to suit the incoming ship on either side.

Some guests were obviously expected to arrive quite early as musical entertainment was to be provided from 9.30 am by the Docks and Marine Sports Club Band, and the Royal Air Force Band. Also included was community singing and ten minutes of massed choirs who included 'John Peel' and 'Rule Britannia' in their repertoire.

Regarding the special trains, it would appear that as the rail connection at Millbrook had not been made at this stage, they were required to run past the Town Quay and the Royal Pier and then along the length of the 'New Docks' which at the Graving Dock end, was still very much a building site.

As a matter of interest no commemorative record was made at the time, however in 1953 a suitably inscribed black granite stone was placed in the coping at the head of the Dock.

The first vessel to use the dock was the White Star liner *Majestic* on the 19th January 1934, billed at the time as 'the world's largest liner in the world's largest dry dock'. And so "No 7" took over from the floating dry dock servicing all the largest ships using Southampton. The *Queen Mary* did not make use of it until 27th March 1936, going straight into the dock after her shake-down voyage from the builders John Brown on the Clyde (her completion having been delayed because of the depression).

Figure 29. The first vessel to use the dock was the White Star Line *Majestic* shown entering the dock. The lagoon on the left was not reclaimed until the 1960s when container berths were constructed.

In September 1939, war was declared and although freight traffic continued, most passenger liners were requisitioned for military use and, along with a few still on commercial service, were transferred to ports such as Liverpool or Glasgow. However the dock was kept busy repairing vessels damaged by torpedoes, bombs or mines until some time in 1943 when along with other dry docks No 7 was involved in the construction of units for the Mulberry harbours used in the D-Day invasion, with such wonderful code names as Bombardons, Phoenixes, Rhinos, Gooseberries and Spuds for Whales, all of which contributed to the success of the landings on 4th June 1944.

After the war there was a busy time with refurbishment for civilian use of all those liners that had survived the hostilities and trade was good for some twenty years, for example the Cunard flagships *Queen Mary* and *Queen Elizabeth* both had two visits per year, a main overhaul in the winter followed by a mid-summer check up, indeed in the 1950s they had some ten other vessels (not all at the same time) operating from Southampton.

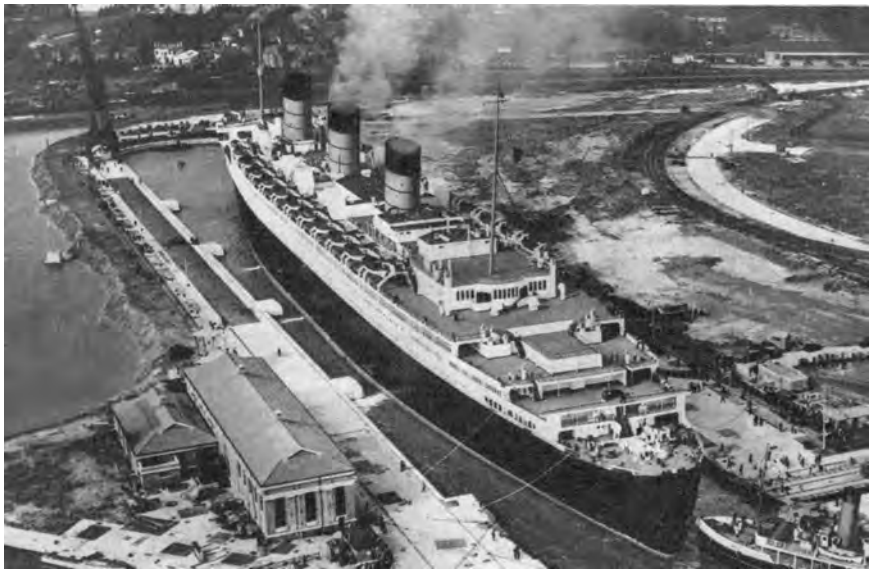


Figure 30. The *Queen Mary* entering the dock, probably for the first time on 27th March 1936. The land on the right hand side is now fully reclaimed and roads have been laid. On the left of the pump house is the emergency generator building.

By 1970 passenger ships were well in decline and Cunard's *Queen Elizabeth 2* was close to being their sole representative. The next few years would see the end of the Union Castle Line's long established service to South Africa. At this stage the loss of revenue was such that British Transport Docks Board, by then the owners, decided to offer the facilities for direct operation. So, in 1981 Vosper Ship Repairers Ltd took it over along with No 6 dry dock and the adjacent workshops previously owned by Harland & Wolff Ltd. Their tenancy did not last as in April 1987, Thew Engineering had the lease but this time for No 7 only, as No 6 and the Harland & Wolff workshops closed about this time.

However, Thew Engineering went into liquidation and, in April 1990, A & P Shiprepairers of Falmouth leased the dry dock, along with sheds and space alongside the dock, which were the subject of separate agreements. By 2005, the dry dock was becoming a liability and with the caisson gate needing urgent repair or replacement the end was in sight. As Associated British Ports (the current owners) had decided to use the area as extra quayside space, A & P's last job was to dismantle the gate before relinquishing their tenancy in December 2005.

Figure 31. Photographed in 1991, the *Shieldhall* and the Red Funnel *Netley Castle* share the dock to save costs. (Solent Photo Library postcard)

The last ships to use the No 7 dry dock were the Naval vessel *Fort George* of 28 821 grt from 15th August 2005 to 12th September 2005, and the car carrier *Grand Benelux* of 37 237 grt from 14th September to 18th September 2005. The first use as a 'wet berth' was by the *Joker* of 1559 grt in February 2007.

When it became known that the dock was closing, efforts were made through the City Council to preserve the site as a significant structure in the heritage of the docks. An application for listing was submitted to the Department for Culture, Media and Sport. After examination by one of their inspectors in January 2006 separate Grade II orders were made on the 5th June 2006 for the dock structure and also the original pumping house building, though it was recognised that the below ground chamber might in due course be flooded and so be inaccessible.

Figure 32. The Dock in its final days with on-site buildings for workshops and stores. Note the current docks trade, with imported cars on the left, containers on the right and, in the right foreground, handling of bulk materials, for which the late Dry Dock will be used. (ABP)

Unfortunately the caisson gate and the two large cranes had been dismantled before the inspectors' visit and were not able to be included. However, the City Council had served a Buildings Preservation Notice in December 2005 to halt demolition of the remaining 6-ton crane and this, at present, remains alongside the dock. Also, the builders' plates from the large cranes were rescued by Southampton Heritage Services who retained one and presented the other to the builders Stothert & Pitt of Bath.

So Southampton has lost all of its major ship repairing facilities even though, of the current passenger vessels using the port, only the *Queen Mary 2* at some 140 ft (43 m) width would not fit. However, modern liners do not require dry docking so often and, in any case, the builders tend to give extended guarantees.

As an historical note, in the early thirties Southampton had six normal dry docks plus a floating dry dock. In use, although not exclusively, Nos 1-4 handled the Southern Railway's vessels, No 5 was advertised by J Samuel White, No 6 had Harland & Wolff whilst J I Thornycroft advertisements showed the floating dry dock.

Sources:

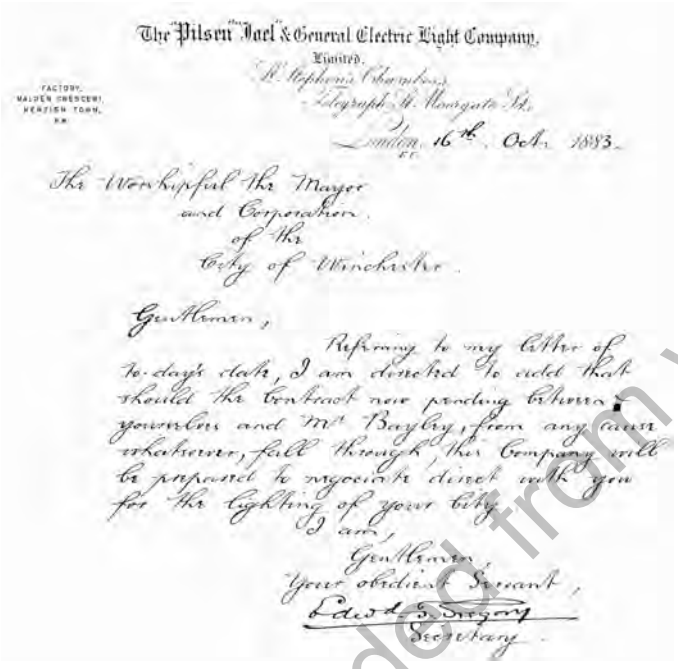
Mr. B, Moody
Mrs. A. Smith
Associated British Ports (ABP)
Southampton City Museum Services (SCM)
Southampton Central Library, Local History Section

Electricity comes to Winchester

Martin Gregory

The first commercial use of electricity was for electric lighting in the form of arc lamps for lighting public places. The Metropolitan Board of Works contracted with a French company to place 20 arc lamps on the Victoria Embankment on 13th December 1878. The first commercial electrical supply to provide power for both public and private consumers was in Godalming, Surrey in 1881. Unfortunately, the scheme failed to attract sufficient private demand to ensure commercial success and the company failed in 1884.

Parliament passed the *Electric Lighting Act (1882)* enabling the Board of Trade by licence, or by Provisional Order, to authorise any local authority or company to set up a public electricity supply. From 1882 onwards, many private companies and local authorities obtained Provisional Orders to commence the supply of electricity although the infrastructure of the industry was still in an embryo state. Along the south coast, Brighton, Eastbourne and Hastings had all started electric lighting in 1882.



The Pilsen Joel & General Electric Light Company,
Limited.
St. Stephen's Chambers,
Telegraph St. Moorgate St.
E.C.
London 16th Oct. 1883.

The Worshipful the Mayor
and Corporation
of the
City of Winchester.

Gentlemen,

Referring to my letter of to-day's date, I am directed to add that should the contract now pending between yourselves and Mr Bayley, from any cause whatever, fall through, the Company will be prepared to negociate direct with you for the lighting of your city.

I am,
Gentlemen,
Your obedient Servant,
Edwd S. Gregory
Secretary.

Figure 33. Letter from Pilsen Company to the Mayor and Corporation of Winchester, 16th October 1883. (HRO ref: W/C1/5/53.

Winchester had the reputation of being an ultra-conservative town. The public gas supply dated from 1834, thirteen years after Southampton had gas lighting. A decent water supply only started in the 1850s and the city waited until the last moment to build a sewerage system, starting in 1878. It is thus slightly surprising to find the City Councillors entering into negotiations for electric lighting as early as 1883, five years before Southampton obtained its first supply. This may, in part, be because a dispute with the Winchester Water and Gas Company had led to the gas lighting of the town centre being converted to oil lighting which was dirty and dim.

In 1883, the City Council was approached by Robert Bayley of Poole with a scheme for electric lighting [1]. Using equipment he had on loan from the "Pilsen" "Joel" & General Electric Light Company Ltd of London, he offered to "undertake to light the streets in an efficient manner by means of two hundred 20 candle power (cp) incandescent lamps and seven 2000 cp arc lamps (Figure 34) in the Broadway and High Street." He would provide plant, lamps, labour and maintain the system for three years at a cost of £3-18-0 (£3.90) per 20 cp lamp lit from "one hour after sunset to one hour before sunrise". The arc lamps would cost £23 per lamp lit from one hour after sunset till 11 pm He also offered to take over the remaining oil lamps at £2-12-6 (£2.63) per lamp and had made his calculations assuming he could adapt the existing lamp columns. A draft contract was issued on 6th September 1883. A month later, the "Pilsen" company wrote to the Mayor and Corporation on 16th October (Figure 33) pointing out that they remained the owners of all the lamps, dynamos etc. loaned to Mr Bayley, and offering to take over the contract from Mr Bayley. The Town Clerk, Walter Bailey, queried Robert Bayley's ability to complete the contract and by the end of the month Bayley had withdrawn. Once bitten, twice shy, Winchester kept its oil lighting, renewed negotiations with the gas company, and put off the arrival of electricity for a decade.

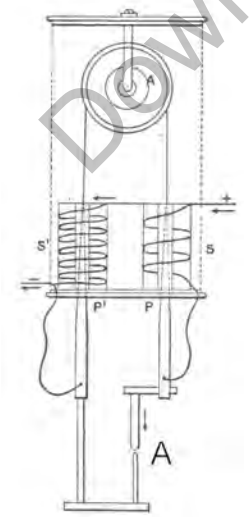
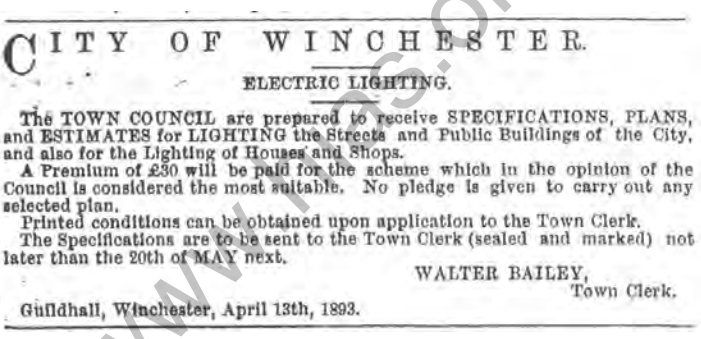


Figure 34. The mechanism of the Pilsen arc lamp. The arc was struck at A and series + parallel coils fed the carbon rods to maintain a stable arc.

The City Council finally got round to a second attempt to introduce an electricity supply and appointed an Electricity Committee in 1893. Mr H N Warburton was appointed to carry out a canvas of the city [2]. A questionnaire was distributed and householders were asked to post their completed forms to the Guildhall. In March 1893 Mr Warburton produced his report. Only eight unfavourable returns were received out of 112, and a further 226 persons had given a favourable reply but had not signed for any lamps. The College wished to install the electric light and would require 400 lamps. The London and South Western Railway station had 170 large three-jet gas lanterns which they would convert to electricity. Colonel Whiting, commanding the barracks, was personally in favour of it but pointed out that it was useless making any recommendation to the War Office unless it could be proved that the cost was no more than that of gas. (The barracks burnt down a year later on 18th December 1894.) The Dean and Chapter of the Cathedral had come to no definite decision! In all, over two thousand five hundred 16 cp lamps were signed for and Mr Warburton ended his report: "To sum up the results of my canvas, ….. it is my opinion that there is a decided preponderance of public opinion in favour of the electric light, while an important minority, partly from private interests, and partly from dislike of all change, and partly from prejudice, are unfavourable to its adoption." Reasons for not wishing to change included the expense householders had already incurred in buying improved gas burners, and that others were shareholders in the Winchester Water and Gas Company.

In April 1893, the Council placed advertisements in the technical press asking for Specifications, Plans and Estimates for a system to provide both public and private lighting [3]. Figure 35 shows the advertisement in *The Electrical Engineer* where it appeared alongside similar advertisements put in by Bedford, Aberdeen and Liege (Belgium). The offer of a £30 premium raised eyebrows as witnessed by a note two pages after the advertisement in another journal, *Lighting, The Popular and Business Review of Electricity.* "I am glad to see so ancient and conservative a city as Winchester going in for electric lighting, but who suggested their method of inviting schemes? It is open to many objections. To begin with, there is a certain shabbiness in trying to get plans and specifications from the contractor for nothing. These things cost money and ought to be paid for. Whether the offer of a £30 prize……. will encourage a rush into the field remains to be seen. The idea is strikingly suggestive of a shilling prize competition, and is correspondingly undignified. The only point that I can see wherein it differs from an illegal lottery is that no entrance fee is demanded……"



CITY OF WINCHESTER.

ELECTRIC LIGHTING.

The TOWN COUNCIL are prepared to receive SPECIFICATIONS, PLANS, and ESTIMATES for LIGHTING the Streets and Public Buildings of the City, and also for the Lighting of Houses and Shops.

A Premium of £30 will be paid for the scheme which in the opinion of the Council is considered the most suitable. No pledge is given to carry out any selected plan.

Printed conditions can be obtained upon application to the Town Clerk.

The Specifications are to be sent to the Town Clerk (sealed and marked) not later than the 20th of MAY next.

WALTER BAILEY,
Town Clerk.

Guildhall, Winchester, April 13th, 1893.

Figure 35. Advertisement in the *Electrical Engineer*, April 1893. (HRO ref: W/C1/5.57)

Eight competitors entered for the prize and Mr Morgan Williams, a consulting engineer from Morgan Williams and King, was commissioned to adjudicate [4]. A late entry was received from no less than C A Parsons, but was disqualified as it was twelve days late and "considered informal in nature". Water power was considered alongside dynamos driven by steam engines. Williams commented on the range of estimates of the power available from the river Itchen, from 20 to 94 hp (15 – 70 kW). He, Williams, thought the water power available was much too small. Two sites were considered for the central power station: the City Mill area and alongside the sewage pumping plant in Garnier Road. He supported the Garnier Road site arguing that, not using water power, the

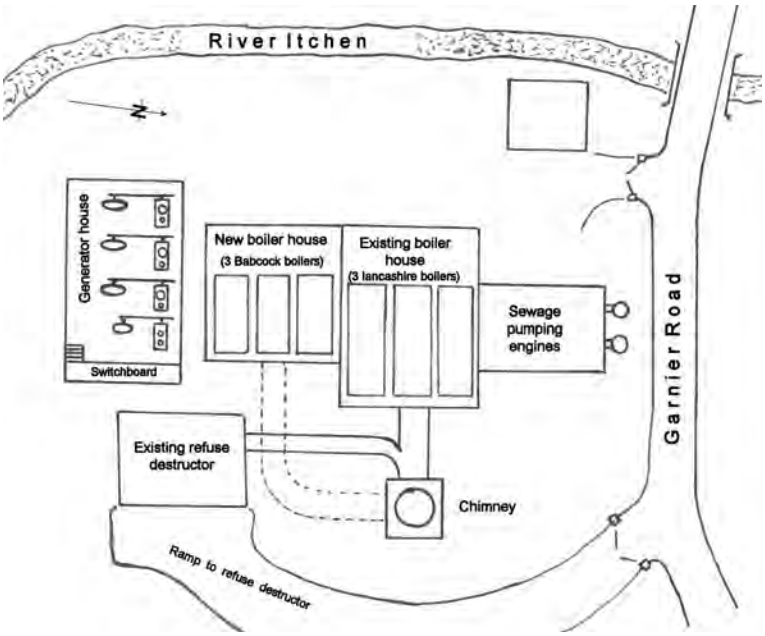


Figure 36. Site plan for a power station in Garnier Road. Redrawn from the Brush Electrical Company tender of 1893.

City Mill site would create an eyesore and be much more expensive. He awarded the prize to the entry of the Brush Electrical Engineering Company of Loughborough, a subsidiary of the American Brush company. He did, however, comment that the Brush estimates took too favourable a view of the revenue from private consumers.

The Brush tender is a very comprehensive document [5]. In May 1894, Mr Raworth, the general manager of the Brush Electrical Engineering Company, spoke to members of the Corporation and the citizens in the Guildhall. He complimented the Corporation on being the first, in his experience, to show a desire to pay for the information they obtained. "The directors of his company were so thunderstruck when they heard of a Corporation so honest as to pay for what they got that they divided the thirty guineas between the gentlemen of their staff who had prepared the specifications and drawings."

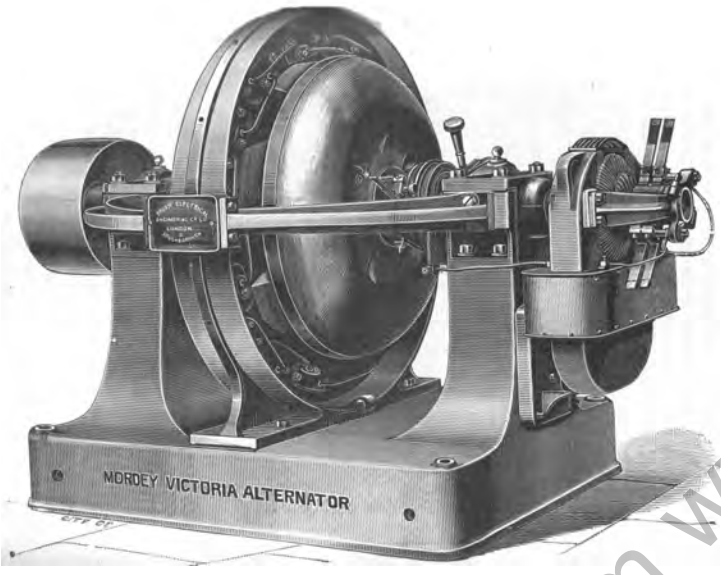


Figure 37. The Mordey-Victoria alternator manufactured by the Brush Electrical Engineering Company

The Brush Company prefaced their detailed specification with some generalities. Street lighting would only be economic when combined with a private lighting and power system with a central (power) station. Water power on the 'City Mills' site could only supply about 60 hp (45 kW) in total, and that at the considerable cost of creating new and larger waterways. (Presumably the necessary head to get 45 kW was to be got by demolishing Durngate, City and Wharf Mills and embanking the river to get all the drop at one place.) A supply limited to only 45 KW would be totally inadequate.

These considerations led them to propose a central station in Garnier Road alongside the sewage pumping works [6](Figure 36). This would make it easy for the City to manage the two together. The supply would be on the Alternate-current (sic) system using several Mordey-Victoria alternators operated in parallel to provide a 1000 V supply at 100 Hz. The 1000 V feeders would supply four cast iron transformer substations at strategic locations, where the supply would be transformed down to 100 V for the consumer. Being an AC system, no accumulator was required. Experience had shown that accumulators (batteries) were expensive, both in first cost and to maintain, and required 25% more energy to charge them than was stored.

The central power station would have three Babcock and Wilcox twin drum WIF water tube boilers and use the same chimney as the sewage pumping plant and destructor. Steam at 120 psig (800 kPa) would be supplied to three 75 kW sets and one 30 kW set. The steam engines were inverted vertical open-framed compound engines of Brush's own design driving the Mordey-Victoria alternators (Figure 37) at 600 rpm by eight cotton ropes. The total installed capacity would be 255 kW and the maximum initial load 180 kW. The tender for building the central station and infrastructure was £15 480. The street lighting used the existing columns and fitted the lanterns with two 25 cp lamps; an ingenious electromagnetic relay energised the second lamp if the first lamp failed. The annual maintenance contract for the street lighting part was estimated at £800 pa. For private consumers the estimated cost of the supply was 4½d [7] per unit (kWh).

The City Council took a long time to make up its mind. Finally, in 1895, it decided to apply for a Provisional Order to set up an electricity supply itself. This provoked an outcry from the traditional Winchester Ratepayers who organised a petition [8]:

> We, the undersigned Ratepayers, …… see neither advantage nor necessity to light by electricity. Electricity is more costly and less reliable than other forms of lighting. We respectfully urge that at the present time it is undesirable to add to the financial burden of the Ratepayers by so large an increase to the City loan account.

Although the petition has several hundred signatures, the City Council went ahead and obtained the Winchester (Corporation) Electric Lighting Provisional Order from the Board of Trade on 21st December

1895. They did not, however, implement it as negotiations with the gas company led to the replacement of oil lamps with gas.

In the autumn of 1896 the Corporation was approached by Messrs Edmundson's Electricity Corporation with an offer to transfer the Provisional Order, giving the Corporation the option to purchase the undertaking later. Edmundson's Electricity Corporation was a company building and operating local electricity supply systems all over the country. One attraction of transferring the Provisional Order to them was that it saved Winchester City the capital cost of setting up what was clearly going to become a necessary part of the infrastructure of every town whilst still giving them the option to purchase later. Discussions dragged on and it was not until late 1897 that a start could be made on building the power station and laying cables. From that point on, progress was rapid. A company, the Winchester Electric Light and Power Company Ltd was set up with a capital of £25 000 in £5 shares. Mr H N Warburton was the resident engineer and secretary, and the registered office of the company was in Westgate Chambers.

A new site was chosen for the power station on the north side of Winchester on part of the site of Hyde Abbey [9]. The site was owned by the Chairman of the gas company. The entrance was from Hyde Abbey Road and it was suggested that the stream, part of the river Itchen, through the site could be utilised for cooling the condenser. The architect of the buildings was Thomas Stopher, a well-known Winchester architect and surveyor. The site was quite extensive and allowed plenty of room for expansion (Figures 38 & 39).

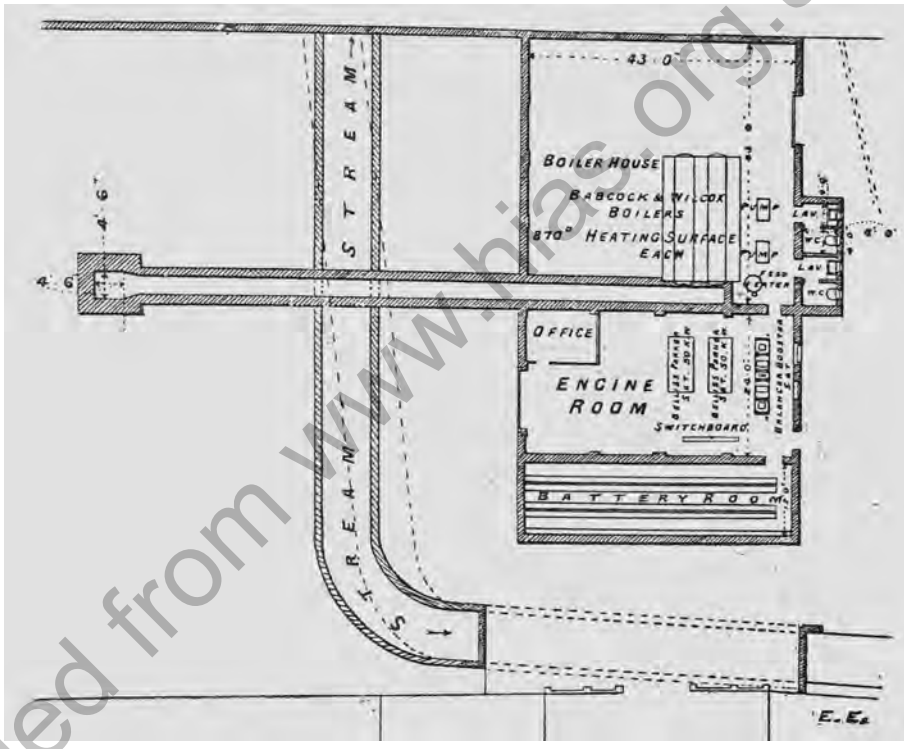


Figure 38. Plan of the power station of 1898 as built by Edmundsons. North is at the top of the plan.

The system constructed by Edmundson's was a simple low voltage DC system using a three-wire layout to give a 230 V supply, dropping to 210 V at the end of the feeder cable to the consumer. When commissioned, there were two Babcock and Wilcox water tube boilers, with space for two more, supplying steam at 120 psig (800 kPa) to two 53 kW sets each consisting of an enclosed compound engine by G E Bellis, Birmiingham, directly coupled to a shunt wound dynamo by Parker of Wolverhampton. The sets ran at 450 rpm and gave an electrical output of 115 A at 460 V (Figure 40). The engine room also contained two booster sets for battery charging, and two rotary transformers to balance the three-wire system (i.e. to keep the 460 V output of the dynamo at -230 V to 0 to +230 V). Being a DC system, an accumulator was

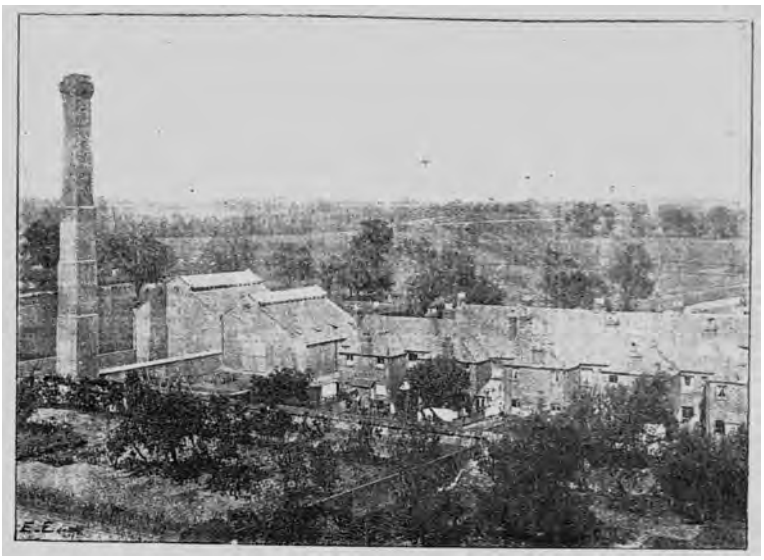


Figure 39. The power station in 1898. The houses on the right are in Hyde Abbey Road.

provided made up of 230 cells, each of emf 2 V, and designed to provide a current of 65 A for 9 h, enough to light eight hundred 8 cp lamps for 9 h. This was to enable the boiler fires to be banked up and the engines to be turned off during the night.

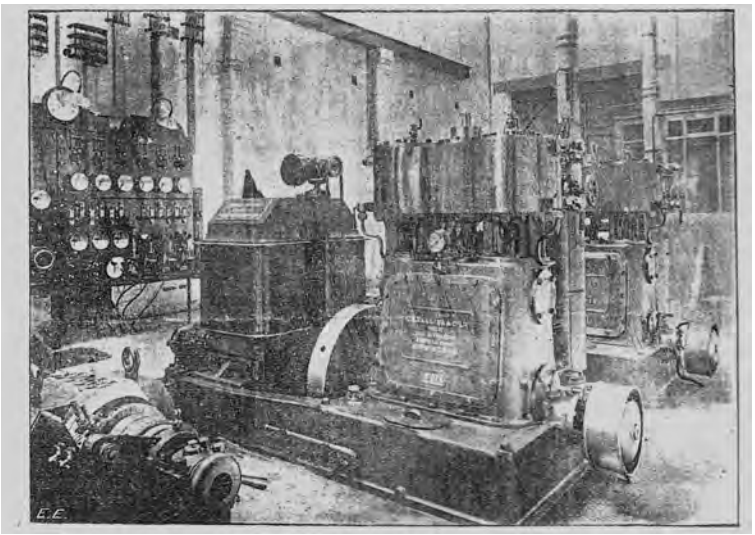


Figure 40. The two Bellis engines and Parker dynamos in the engine room of the power station, 1898.

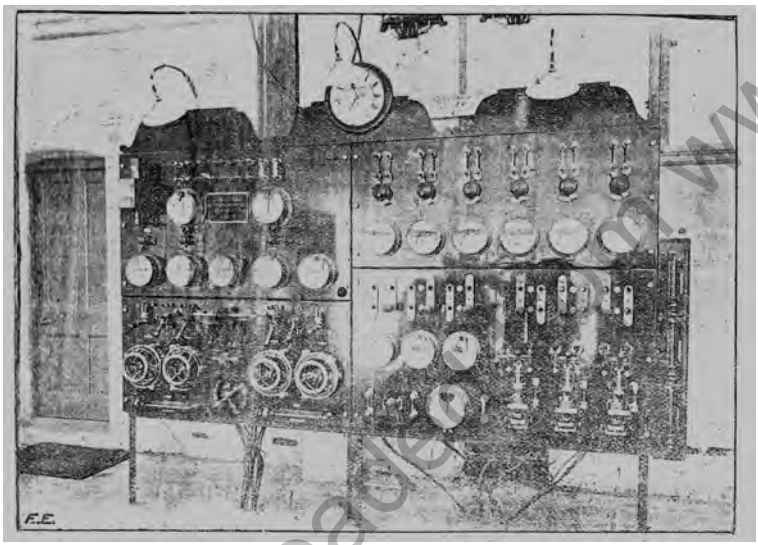


Figure 41. The power station switchboard at the opening in 1898.

The formal opening of the works was on 30th June 1898 when the Lady Mayoress, Miss Bowker, turned on the lights above the switchboard (Figure 41). She was later presented with the switch she had operated. Reporting the event, the *Hampshire Chronicle* wrote [10], "In the records of this city Thursday 30th June, 1898 will always be a prominent date …… The question of electric light is no new one, for it has been a much debated question for many years past, and that it should ever have been brought within reach of the citizens …… was no doubt looked upon as improbable by many, if not most, residents." At launch the company had only a dozen customers and no street lighting load, so was significantly over capacity. Ever optimistic, our journalist [11] continues; "…. there are many excellent shops and good houses, ….. the celebrated public school and the houses connected are sure to become good customers. The military barracks (burnt down a few years ago and about to be rebuilt on an extensive scale), the infirmary, the diocesan training college [now the University of Winchester], several breweries (one of which is already lighted), municipal and county public buildings are certain in the ordinary course of things to become customers."

At the start, the supply was expensive. It was charged on the 'maximum demand system' at 7d per unit (kWh), dropping if the consumer used the supply for longer periods. With a worker earning around £2 per week in 1900, one unit was over 1% or weekly earnings, or, in real terms, 25 times the price of electricity today. The Company was prepared to wire your house 'free' for a rental of 2/- per lamp, per year for the wiring. The power station cost just over £14 000 and the laying of feeder and service cables another £6300. Thus the delay by Winchester Corporation increased the cost to the Ratepayers by 25% and gave them a more limited DC system of just over half the capacity.

With the supply up and running the optimism of the 1898 article was beginning to be justified. In 1899 the Company bought a third boiler and another engine-dynamo set and spent £4049 extending their cable network. The purchase of only 27 meters suggests that the clamour for electricity was not overwhelming initially. 1900 saw no new machinery in the power station, but the first evidence for real growth with the ordering of 167 'ordinary' meters and 109 pre-payment meters for some private customers.

The period 1901-04 saw more rapid growth [12]. There were extensions to the buildings every year and further boilers and engine-dynamo sets were purchased. The issued share capital was doubled to £50 000. Further evidence of progress was the installation of chain grate stokers to feed coal to the boilers mechanically, of a Green's Economiser to heat the feed water to the boilers, and of an enlarged accumulator system. In the

accounts, the 'free' wiring of consumer's property was costed at an average of nearly £4000 per annum with a typical charge for the provision of a domestic supply of around £20. The public lighting contract which had been lost to gas in 1895 came up for renewal in 1905 and parts of the city were converted to electric lighting from then on.

In 1910 the registered office was at the power station, but customers had a town office to pay bills at 64 Parchment Street. The City Council then decided to exercise its right to purchase the undertaking [13] and promulgated a bill through Parliament in 1911 to take over the Winchester Electric Light and Power Company. One objector was the Winchester Water and Gas Company who wrote to the Town Clerk in February 1911 asking for permission to inspect the power station. On 22nd February the Town Clerk refused consent for the visit. In a memo to the manager of the power station he wrote: "In no circumstances is a representative of the gas company to be allowed to receive information or interrogate your staff." The firm of Merz and McLellan were appointed to arbitrate between the Company and the Council over the value of the undertaking. They arrived at a purchase price of £91 827 for the assets of the private company. The City Council took out a loan of £100 000 repayable over 40 years to cover the purchase. Raising this loan caused a lot of correspondence as the City Council stuck out for a rate of 3½% which was below the prevailing rate.

In 1911 the City became the proud owner of one utility; although water and gas remained in private hands. Mr Warburton retired and Reginald Ayton became the City electrical engineer, a post he held until 1947, one year before nationalisation. The customers' office was moved to Gordon Road which became the main entrance to the power station site. The electricity system continued to grow and extensions to both buildings and plant were made [14]. In the period up to 1914, oil firing was considered for the stand-by boiler and further street lights were converted to electricity. A map of 1914 shows about half the city streets lighted by electricity and half by gas. Quarry Road even had electric lighting up one side and gas up the other! Most of the city centre was electrically lighted save for those gas lamps needed for ventilating the sewers. One of these Webb pattern gas lamps for sewer ventilation, remains in The Square to this day!

1913 saw the connection of nearly eight hundred 8 cp lamps in new customers' premises (a rise of 45% on 1912) although 40 others were disconnected. The energy supplied by the power station rose from 26 MWh in the month of July to 99 MWh in December 1913 and 112 MWh in January 1914. Electricity was also becoming slightly cheaper. For private customers the tariff was either: a flat rate of 5¾d per unit, or: a standing charge of 15% of the rateable value of the property plus 1d per unit. A typical commercial tariff was that offered to the new Picture Theatre replacing the Market Hotel in 1914 [now the Theatre Royal], of 3d per unit for a minimum of 10 000 units per year for 5 years.

Figure 42. An aerial view of the site in the 1980s when in use as a substation and car workshop. (PWCM 35771)
A is the old battery room, E is the old engine house,
B is the old boiler house, C is the site of the chimney,
H is the terrace of houses in Hyde Abbey Road seen in Figure 39.
The white dotted line shows the path of the stream round the site.

During and after the 1914-18 war there was a steady growth in the load for uses other than lighting. Domestic consumers bought electric irons, cookers, kettles, heaters and small motors to drive sewing machines, fans, vacuum cleaners etc. In 1924, there were four Babcock and Wilcox boilers to supply the one remaining Bellis-Parker generator set and two geared steam turbine sets by Parsons-GEC and Fraser & Chalmers-GEC. The total nominal capacity of the station had risen to 1.25 MW and the output for that year

was 2552 MWh. The company had nearly 1500 consumers and supplied 252 public lamp standards. Although Winchester could compliment itself on a growing electricity service, all was not well with repayment of the loan. By 1924, only £20 000 of the loan had been repaid and annual loan interest was around twice the annual rate at which the principal was being repaid.

As the demand increased, small local low voltage DC systems became increasingly uneconomic relative to large AC power stations linked by a high voltage grid using transformers. At the end of 1926 the Electricity (Supply) Bill became law and a start was made on connecting up major power stations to form a national supply (the Central Electricity Board or CEB) interconnected by the National Grid. As the Grid came into commercial operation, small power stations under 5 MW installed capacity found their days numbered; particularly when they were DC. Winchester was just such an undertaking. In 1935, the power station in Gordon Road still produced 2319 MWh, but 1681 MWh had to be bought in from the CEB and 144 MWh from Southampton Corporation. Electricity consumption over the previous ten years had doubled as Compton, Twyford and Colden Common were now supplied and Winchester itself had grown significantly. The system became an AC one to make use of the National Grid when it became fully operational. Winchester power station closed down in December 1935. After this, electricity was bought in from the Grid. The buildings and site remained as a transformer station and maintenance depot for the electricity supply until demolished in 1999 (Figures 42 and 43).

Figure 43. The offices in Gordon Road just prior to demolition in 1999. (PWCM 35709)

Winchester City remained in charge of the sale of electricity to consumers. In the decade 1925 to 1935 the number of consumers had more than doubled to 3871 and the number of street lights had risen to 450. The domestic electricity rates were either: lighting at 6¼d per kWh, heating and cooking at 1d per kWh in the summer and 1¾d in the winter, 2¾d for motor power, or: 3/- per room in the summer, 6/- per room in the Winter, per quarter, plus ¾d per kWh in the summer, 1d per kWh in the winter. Meter rent was 2/- per quarter and, presumably, on the 'either' tariff each consumer required three meters. With the nationalisation of the electricity supply industry in 1948 the responsibility of the City Council for electricity supply ceased.

References

1. Hampshire Record Office (HRO) reference W/C1/5/53, (1883)
2. HRO reference W/C1/5/62, (1893)
3. HRO reference W/C1/5/57, (1893)
4. HRO reference W/C1/5/61, (1893)
5. HRO reference W/C1/5/58, (1893)
6. HRO reference W/C1/5/59/4, (1893)
7. All electricity prices are given in shillings (/-) and old pence (d). One shilling = 5 p, one new penny = 2.4 d
8. HRO reference W/C1/5/64, (1895)
9. *The Electrical Engineer*, Vol: **43**, Number 1076, July 8th 1898
10. *The Hampshire Chronicle*, July 2nd 1898
11. *The Electrical Engineer* op cit
12. HRO reference W/C1/5/82, (1898-1905)
13. HRO reference W/C1/5/96, (1911)
14. HRO reference W/B5/7/1, (Minute book from 1911)

Gas Lighting in Lymington

John Horne

The Lighting Contract

In 1932, after 32 years of electric street lighting in Lymington, the Electricity Company probably considered their street lighting monopoly to be secure and it was certainly difficult for the Gas Company to convince Lymington Corporation that they had anything new to offer. The opportunity for change came when the Borough of Lymington was extended to embrace Pennington District and tenders were called for to erect, light and maintain 22 new street lamps in the absorbed area. Both the Gas and Electricity Companies were allowed to bid and although the Gas Company did not attempt any price cutting to secure the contract, they were successful.

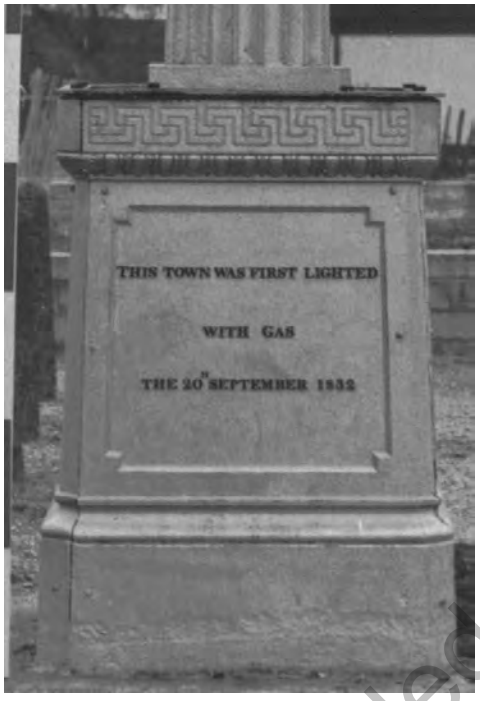


Figure 44. 'This town was first lighted with gas the 20th September, 1832'

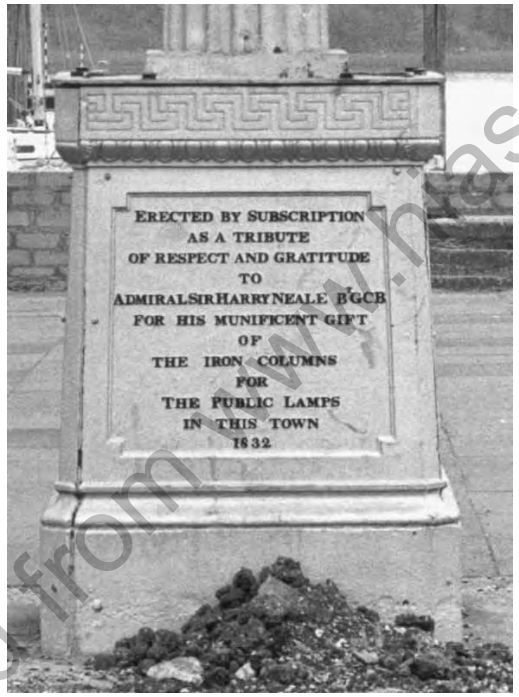


Figure 45. Plaque commemorating the generosity of Admiral Sir Harry Neale

In submitting their unsuccessful tender for this new district the Electricity Company also quoted for the lighting of the original Borough of Lymington, their contract for which was about to expire. By a little propaganda it was pointed out to the Council that perhaps the Gas Company should have the opportunity of bidding for this work also and the tenders for the old Borough were referred back to the Lighting Committee with instructions they should look to the Gas Company for an alternative tender.

This was the signal for feverish activity at the Gas Company office; J W Gibson, the Engineer, Manager and Secretary of the Company was advised by Phillip Moon, the Engineer and Manager of the Bournemouth Gas & Water Company. By courtesy of the (London) Gas Light & Coke Company, the local press was paid to carry an advertisement similar to those adopted by the GLCC when successfully fighting for next 15 years' contract to light Westminster. A copy of the newspaper which carried the advertisement was sent to each Councillor with a letter stating the case for gas. The work of erecting the 22 new lamps in Pennington had begun during September 1932 and since the major decision was imminent the Company took particular care with them. To make sure there was an adequate of gas in the new district, which was growing rapidly, 1740 yards of new main were laid within a single month. A special point was made of employing local labour so as to ease Lymington's unemployment problems. All this doubtless helped to burnish the Gas Company's image at this crucial time. The result was that in October 1932 Lymington Corporation decided to award to the Gas Company the contract for street lighting within the Borough, for seven years starting 1st April 1933.

The work of converting 196 electric street lamps to gas ready for 1st April proved difficult because the Electricity Company showed all the signs of being a poor loser. They would not allow access to the lighting columns until pressure was brought to bear by the Corporation on behalf of the Gas Company. Naturally, the

very first lamp to be reconverted to gas on 1st March 1933 was the Burrard Gas Column. In the words of J W Gibson, the Gas Manager, "this had been considered a desecration, and the electric lamp was therefore removed at the earliest possible moment and a 6-light 'Rochester' gas lamp erected in its place".

The Local Authority was also responsible for the harbour at Lymington and the street lighting contract included navigation lights at the mouth of the river. Careful attention was necessary to give correct focusing to these lights which, in normal circumstances, had to be visible 15 miles distant. The problem was solved by using the lenses of navigation lights taken from the disused steam yacht *Fortuna* and adapting them in conjunction with 2-light 'Rochester' lamps. By arranging the mantles to come in line exactly with the centre of the lenses the lights could be seen from the Isle of Wight.

Another conversion that presented some difficulty was the lighting of the face of the public clock, because the Churchwardens feared that gas would be a danger to the woodwork. In this case the solution was floodlighting from the outside.

Unfortunately, the wartime 'black-out' came into force before this hard-won lighting contract had run its full course. After the war, there was encouragement from central government to replace gas lighting by electric. Higher labour costs also tended to discourage further technical development in gas street lighting, although up to that date it equalled anything electricity could offer, provided it was properly maintained. Lymington's street lights reverted to electricity, therefore, the date having proved difficult to pin-point.

Figure 46. The gas column under restoration, showing the cast iron base and column, and the wrought iron tracery top.

The Lymington Gas Column

To commemorate the introduction of gas lighting to Lymington in 1832, the residents raised a subscription to install a column in the centre of the town. The faces of the base of the column record the date (Figure 44) and the donors of the iron columns, Admiral Sir Harry Neale B^{T} GCB (Figure 45), and of the lamps, George Burrard Esquire.

The Lymington Gas Column was removed from the town centre to a position beside the Lymington Yacht Club, probably sometime in the 1950s, where it was apparently gas lit for a while before becoming derelict. The column remained out of use for 15 or 20 years, the original lanterns having been replaced by 'Windsor' pattern lanterns. To commemorate the 150th anniversary of the monument the New Forest District Council agreed to restore it to gas lighting and thanks to a considerable joint effort by the Council and Southern Gas the restored column was ceremonially relit on the evening of Tuesday, 20th December 1983. Heavy rain and

high winds did not prevent a modest crowd gathering at 5.00 p.m. to see the Chairman of the Council perform the brief ceremony.

Each Lantern was replaced by a new 'Windsor' to the same pattern as the old, each with a 2-light incandescent burner. The lighting mechanism was now a combination of time-switch and light-sensitive cell, but apart from this and the pattern of lanterns the column is probably unchanged from 1832, a remarkable link the earliest days of gas in Lymington.

Figures 48 and 49 show the restored column illuminated at night.

Figure 47. Fixing the new lanterns

Figure 48.

Figure 49.

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No. 6 (1997); *No.7* (1998); *No. 8* (1999); *No. 9* (2000/2001)
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To join, contact the Membership Secretary:
Keith Andrews, 13 Ashley Close, Harestock, Winchester, Hampshire, SO22 6LR.

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