



ENGLISH HERITAGE

Maritime and Naval Buildings Selection Guide

Heritage Protection Department

March 2007

Selection Guide

Maritime and Naval Buildings

I INTRODUCTION AND DEFINITIONS

England has the longest coastline in relation to its land mass in Europe: nowhere is very far from the sea. Its long coastline has been a highly significant factor in the defence of the nation. The country's Merchant and Royal Navies were key to the development of the British Empire from the sixteenth century onwards. Historically, its fishing industry provided a significant proportion of the nation's food. Coastal trade and transport was especially important during the long period when road communications remained poorly developed. Just how important shipping was for the economy in the nineteenth century can be told through statistics: by the early nineteenth century Royal Navy Dockyards were by far the largest industrial complexes in the country, if not the world: mid nineteenth-century British ports handled over 25 per cent of total world trade, and in 1890 Britain owned half of the world's tonnage of merchant ships. Our maritime heritage is thus of great importance.

This selection guide covers buildings and structures on land that are associated with the sea. There is some crossover with other categories and guides: canals are dealt with in **Transport**; warehouses fall under **Industrial Buildings**; seaside buildings like piers are discussed in **Buildings for Culture and Entertainment**. For coastal defence see the selection guide on **Military Buildings**. Historic ships are included in the National Register of Historic Ships administered by the National Maritime Museum, Greenwich and generally are not covered by listing. Historic wreck sites are separately designated.

2 SPECIAL CONSIDERATIONS WHEN CONSIDERING NAVAL AND MARITIME BUILDINGS FOR DESIGNATION

Because the development of maritime and naval complexes is inter-connected with the Industrial Revolution, the special considerations relating to industrial buildings apply, and reference should be made to the **Industrial Buildings** selection guide, section 2, where these are presented in detail. (These concern the importance of setting and of integrated sites; the relationship of industrial process to architectural form; the significance of machinery and technological innovation; and the importance of recognising significant change.) In addition, because many specialised maritime buildings (such as navigational aids) are subject to exceptionally high levels of weathering, or are modest and vernacular in character (e.g., fishermen's huts), it is important to establish authenticity of fabric: extensive or total replacement of fabric can be an issue. Historical associations can be significant, but need to be reflected in built form: the connection between buildings and ephemeral activities such as smuggling, for instance, need to be securely documented.

3 HISTORY AND SPECIAL INTEREST

Trade and Transport

History

Docks and harbours The earliest surviving structures to facilitate mooring and protect boats against the elements are quays and breakwaters: some survive from before c.1700 but will have been substantially renewed. Dry docks existed in the medieval period although none survives. The first wet docks -where lock gates enclosed and maintained artificial expanses of water - were constructed for repairs by the Royal Navy at Portsmouth and Devonport (Plymouth) in the late seventeenth century. The first successful commercial docks to facilitate loading were constructed at Liverpool from 1715. There was a rapid expansion of docks from the 1770s: in 1775 the only commercial docks were in Liverpool enclosing under 6ha of water, but by 1830 there was 160ha nationally (all but 10 ha in England), around 40 per cent of which was in London. In 1830, Liverpool was the leading port in terms of tonnage, handling 2.5 million tons, but even after further dock building by 1841, over half of tonnage nationally was handled without using docks, often employing boats known as lighters to ferry goods between ships anchored in deep water and the quayside. For shipbuilding purposes, slipways were normally used being cheaper than dry docks to construct and maintain. The industrial revolution led to the creation of some entirely new ports such as Seaham, Co. Durham (1828, to handle coal), Charlestown in Cornwall (1801 to handle china clay), and Goole in the East Riding of Yorkshire (1826, a transhipment port between inland traffic on the Aire and Calder Navigation and seagoing vessels on the Humber).

The ever-expanding volume of trade in the nineteenth century (2.77 million net tons in 1840; 11.56 in 1910) was made possible by increases in the numbers and sizes of vessels. The British merchant fleet numbered over 18,000 ships in 1803 (average 110 tons). By 1863 there were over 26,000 merchant sailing ships (average 180 tons) with 850 steamships (average 110 tons). This led to a major expansion of port facilities including alterations to allow for larger ships and the different shape of steamship hulls compared to those of sailing vessels, as well as new developments in warehousing and goods handling. Consequently very few dock entrances remain unaltered. From the mid nineteenth century, investment by the railway companies became increasingly significant and this led to greater integration of facilities especially relating to the handling and dispatch of goods.

Warehousing. The history and selection criteria for warehouses may be found in the **Industrial Buildings** selection guide but a number of additional points specific to ports is provided here.

Pre-industrial warehousing was often provided within or to the rear of merchants' houses and may not be adjacent to the waterfront. When identified, such warehousing can be of great historical interest by showing the early commercial development of the port. Warehouses in the dock area tended to be set back from the quayside so goods had to be moved twice, from ship to quay, then quay to warehouse, sometimes via transit warehouses to aid sorting. Rapid development was

made in the nineteenth century towards fully integrated docks, especially in London and Liverpool. St Katharine Dock, London (late 1828-29; Thomas Telford, engineer, and Philip Hardwick, architect) enabled large numbers of ships to be unloaded at the same time with direct transfer between the ships and the warehouses, which were built right up to the waterfront. Perimeter walls secured docks against theft and the 1823 Warehouse Act introduced the concept of bonded warehouses where goods could be stored safely and free of customs duty. The dock's security perimeter thus acted as a customs wall too.

Integration reached its peak in the second half of the nineteenth century when goods were moved from ship to rail, either direct or towards the end of the century, via single storey transit sheds that lack extensive warehousing, to be transported to smaller warehouses and markets spread across the country. *Cargo handling* became increasingly mechanised and specialised from the late nineteenth century. Suction was used to unload grain from 1904; and overhead rail systems and conveyors were developed from the 1920s for goods such as animal carcasses, coal and bananas. Specialised oil facilities were also developed, often with oil tankers discharging their cargos at jetties extending out into deep water rather than using docks.

Cranes and Hydraulic Power Systems pre-dating the late nineteenth century are rare. Wharf-side cranes were wooden, sometimes strengthened with iron tension framing, and powered by treadmill; iron and later steel cranes were introduced from the 1840s. Overhead traveller cranes were developed in the eighteenth century and were in wide use by the mid nineteenth century in civil dock workshops where heavy materials such as boiler and engine parts needed to be moved about. However, goods in ships were typically placed in containers small enough to be manhandled and there was little use of cranes until powered cranes were developed from the 1840s onwards. These were typically jib cranes (i.e., cranes with a movable arm) rather than beam cranes more commonly found in engineering works. Cranes were either steam or hydraulically powered with a number of specialist crane manufactures being established by the 1860s. Hydraulic cranes, patented by Armstrong of Newcastle upon Tyne in 1847, were of particular significance for ports, many of which developed centralised hydraulic systems powering dock gates, swing bridges, conveyor belts as well as cranes. The earliest hydraulically powered docks were developed in the 1850s. The first electric dockside cranes in England were installed at Southampton in 1893, a portent of the widespread shift away from steam power then underway

Normally, passengers did not require specialised handling facilities until the late nineteenth century when the size of ships increased to such an extent that they needed deeper water. By around 1900, passenger liners were in excess of 10,000 tons and might carry nearly 3,000 passengers at a time. Southampton, with its double high water at each tide, became the principal port of the Cunard line, and challenged Liverpool for its position as the premier Atlantic port. Passenger liners continued to expand in size through the early twentieth century with increasing numbers of American tourists making up for the declining numbers of European emigrants, with services only declining following the first transatlantic jet airliner flights from 1957.

Special Interest

Docks and harbour walls pre-dating 1840 generally form the most impressive engineering structures of their date and even where they have received alteration, as nearly all have, will normally merit designation, with those displaying technical innovation or association with major developments in shipbuilding, warranting a high grade. Examples would be key developments in modern dock construction such as those pioneered by Smeaton and Rennie, including the use of hydraulic cement, which sets underwater and inverted brick arches used to form dock floors to resist pressure from upwelling mud or Samuel Bentham's development in c.1800 of caisson gates and then free floating caissons - hollow structures that are filled with water to sink them into position to create a seal and are then pumped out to float them out of the way. For major sites, consideration should also be given to associated structures such as warehousing, dock offices and boundary walls.

Because of the greater survival of dock and port facilities from the mid nineteenth century onwards, greater selection should be exercised. The selection criteria are similar to those for industrial buildings. These include buildings that were innovative in design; are well preserved; or display alterations that illustrate the technology of accommodating larger ships. A holistic approach should be taken where several original or near contemporary associated structures survive together or where a group of structures displays the evolution of port facilities in one significant place. Even where the dock itself is not well preserved, auxiliary structures such as lifting or swing bridges, locks and loading facilities may merit designation in their own right for technological interest.

Wood was widely used for *slipways* until in the late nineteenth century, but examples even of this late date are believed to be rare. Slipways used for building purposes are normally distinguished by having a centre line of keel blocks, and more rarely post settings for scaffolding. Slips with rails are known as patent slips. These were developed for ship maintenance with the rails guiding a wheeled support cradle, allowing boats to be winched out of the water for hull repairs without the need for a dry dock. Early examples, even without a surviving cradle, may merit consideration.

Dock company warehouses were often built to a high standard with money invested in architectural design and quality materials to attract business. These are impressive and most are already protected, e.g., Albert Dock, Liverpool (1842-7, Jesse Hartley). In contrast, warehouses owned by companies for their own stock were normally designed to cut costs to the bone unless they were used as salerooms as well. Some selection is necessary: they should be considered when substantially intact (for example, retaining external fittings and internal fittings such as stairs, boarded partitions, walls etc.), or where they form part of well-preserved ensemble such as those along the banks of the River Lune at Lancaster.

Cranes, especially large examples, embody the act of cargo handling and are frequently viewed as iconic structures in the same way as mining pithead wheels. As with other loading facilities they were often designed for a relatively short lifespan and have been subject to modernisation and replacement. All survivors from before c.1840 will be rare and significant. Some, such as treadmill-powered cranes, are of international importance. Pre-First World War cranes that retain their association with listed docks or other structures and any surviving hydraulic or steam powered cranes that have not been

converted to other power sources are very rare and may merit listing at high grade. Although electric powered cranes became the commonest form in the twentieth century, early examples pre-dating the First World War are now rare and may merit protection as will remains of hydraulic power systems at docks.

Control and Rescue

History

Customs The control of seafaring activities and the collection of customs dues have left hardly any physical remains prior to the seventeenth century. The Navigation Acts (not generally repealed until the mid nineteenth century) sought to protect national commerce and (after 1651) required imports to be carried by English owned ships or ships owned by the nation of origin of the cargo. Much of the regulation was enforced at sea by naval ships or, from the late eighteenth century, by ships operated by the Customs Service, but a number of building types emerged where business was conducted on land. Most striking is the *customs house*, from where Revenue Officers collected customs duties, impounded illegal goods and combated smuggling. These were mainly situated in the principal ports and had wide jurisdiction. Some lesser ports and havens were sometimes provided with simple customs posts. Earlier customs houses are architecturally imposing (Exeter, 1680-1; Kings Lynn, 1683) but those built in the nineteenth century are normally more modest, not least because the growth of free trade led to the abandonment of many customs duties. From the eighteenth century onwards, administration at certain ports and harbours by commissioners or trustees, often employing officials such as harbour masters, led to the erection of purpose built administrative offices for the supervision of harbour activities and the collection of harbour dues.

Smuggling was widespread well into the nineteenth century. Between 1710 and 1745 it is estimated that only a quarter of the tea drunk nationally was legally imported. But the activity has left few upstanding remains. While smuggling was mainly combated via interception at sea, some lookouts and coastguard posts were established at points around the coast, mainly from the late eighteenth century. The *Coastguard* was established to combat smuggling but developed a role in lifesaving. While the Coastguard operated some lifeboats, it was mainly issued with shore-based life saving apparatus and rockets that could carry ropes to ships beached just off the coast. From 1831 the Coastguard formed a reserve for the Royal Navy until the 1925 Coastguard Act prioritised the service as a coast watch and a life saving communication organisation. The most numerous Coastguard-related structures are cottages, which were specially built throughout the nineteenth century, often as terraces with a view of the coast. *Lifeboat services* were provided on a voluntary basis. Liverpool is thought to have been the first place to provide a dedicated lifeboat - the earliest purpose built vessel was the 1790 *Original* at South Shields - and the Royal National Lifeboat Institution (RNLI) was established in 1824. Always reliant on donations and volunteers, purpose-built lifeboat stations were slow to appear and were frequently quite simple structures.

Special interest

Customs houses and other buildings connected with the administration of ports that pre-date the repeal of the Navigation Acts will be of considerable historic interest and some, particularly those dating from the seventeenth and eighteenth centuries, may have elaborate interiors containing plasterwork and high-class joinery. These will normally be listed.

Many buildings in this category are modest and sometimes easily overlooked. Physical evidence of the illegal side of the maritime economy is rare: buildings with firmly documented smuggling connections where there are surviving features, such as hides, may be of sufficient historic interest to be listed and could tip the balance in otherwise marginal cases. Eighteenth - or early nineteenth - century lookouts and coastguard posts will normally merit designation for historical interest where there is solid evidence to support the connection, even where they are little more than simple huts. Complete terraces of Coastguard cottages may be eligible where they make a striking contribution to the landscape or survive in association with coastal defences. Similar considerations apply for Coastguard stations, lookout towers, visual signalling posts, rocket stores and other equipment sheds. Lifeboat stations are among the most evocative reminders of early charitable and altruistic activity and any surviving nineteenth-century examples should be considered, their historical significance outweighing their often utilitarian design. As fundraising was such a key factor with the lifeboat service, nineteenth-century collecting boxes may also merit designation. Reused sea mines, being typically post First World War, are more numerous but may sometimes warrant careful consideration.

Aids to Navigation

History

From the earliest times, mariners have made reference to features ashore, both natural and manmade, as aids to navigation. Amongst the earliest bespoke structures are those that support a light to mark the position of a hazard at night. An exceptional survivor is the Roman lighthouse or *pharos* at Dover, which is both listed and scheduled. It owes its survival to its use as a church tower in the Middle Ages and there are medieval records suggesting that church towers in coastal situations were adapted to show lights visible from offshore. Most surviving aids to navigation are sixteenth century and later, and the range of such structures is enormous, extending from the simple metal post surmounted by a triangle marking a reef close to a harbour mouth to the soaring lighthouse towers of the great engineers of the late eighteenth and nineteenth centuries.

Seamarks may be divided into three broad groups: buoys, beacons and leading marks. Buoys, being floating devices simply tethered to the seabed, are not listable. *Beacons* are relatively simple structures of wood, metal, brick or stone designed to mark a hazard or, when erected in pairs, to provide a transit by which a vessel may fix its position, examples of the latter use being shown on sixteenth-century charts of the south coast and the approaches to King's Lynn. *Leading marks* are similar to beacons, but are specifically designed to indicate, when aligned, the direction of a safe passage between hazards. Usually they are erected at different elevations and are distinctively marked.

Some consist of no more than a wooden post or metal pole bearing a top mark and/or a light, while others may be substantial structures very similar to lighthouses.

Lighthouses Prior to the early nineteenth century, responsibility for ensuring the safety of mariners was shouldered by quasi-ecclesiastical or charitable bodies such as the various Trinity Houses (of which Deptford, Kingston-upon-Hull and Newcastle upon Tyne are the best known). However, with a few exceptions, the construction of purpose-built lighthouses, from the late seventeenth century, was undertaken by private individuals such as Sir John Clayton who built primitive lighthouse towers on the Farne Islands (Northumb.), Flamborough Head (Yorks. E. Riding) and elsewhere and who sought to meet his costs and make a profit by charging dues from passing shipping. The first lighthouse to be built to mark an offshore hazard was Henry Winstanley's Eddystone lighthouse, the first of four to be erected on that reef to the south of Plymouth. Although not a commercial success, the value of such structures in saving life and protecting commerce was immediately apparent. The following two-and-half centuries saw the construction of numerous lighthouses around the shores of mainland Britain and on many offshore reefs. An Act of Parliament in 1836 abolished the private ownership of lighthouses and vested control throughout England and Wales in the hands of Trinity House.

Most lighthouse towers were built of stone. The great figures of the 'heroic' age of lighthouse building (from the mid eighteenth century down to the end of the nineteenth) were innovators in the field of construction. John Smeaton (1724-92) experimented with the use of hydraulic cement in the construction of his tower on the Eddystone reef, where he also developed the system of dovetail jointing for the stonework. Other materials were also employed in some cases, including brick and cast-iron and (after 1853) concrete. In the twentieth century reinforced concrete was employed in the construction of the lighthouse built at Dungeness, Kent, in 1959-60 (Ronald Ward & Partners).

Early towers burned coal in an open brazier and a variety of oil lamps were used throughout the eighteenth century. Kerosene became standard after 1845. The use of gas was rare. The lighthouse at Souter Point (1871), north of Sunderland, was the first to use electricity from the outset. Reflectors are first documented at Liverpool in 1767 and a combination of reflection and refraction via lenses and prisms became normal following the breakthrough in optics pioneered by Augustin Fresnel. Revolving lights appeared first in France in the 1790s. In many cases, these arrangements have in turn been replaced by modern optics based. In recent years, there has been an increasing use of electricity generated by solar power.

Special interest

The growth of maritime commerce in the sixteenth and seventeenth centuries provided the initial stimulus for setting up navigational aids but the widespread provision of seamarks and lighthouses in turn greatly facilitated the expansion of trade as a concomitant of the Industrial Revolution: their national importance in this context should be recognized, as should their architectural and technical interest. Some lighthouses and many seamarks functioned as part of a group and should be considered together; so too should lighthouse keepers' accommodation (as at the North Foreland lighthouse, Kent).

The exposed situations occupied by some of the smaller features such as beacons and leading marks together with their often relatively insubstantial nature has led, over the years, to a need for constant repair and replacement. Some needed to be moved from time to time owing to the movement of the sandbanks they marked. Consequently, few early examples survive but those that do are worthy of consideration. Special care is necessary to confirm authenticity.

Shipbuilding and Maintenance

History

Civil shipbuilding and maintenance yards were widespread around the coast until the mid nineteenth century. In the early seventeenth century the leading area of activity was the Thames and East Anglia, shifting to the north-east during the eighteenth, where it came to be concentrated at Newcastle and Sunderland. The shift away from the south-east to the northern industries accelerated from the early nineteenth century with the increasing but slow adoption of iron in ship construction. Initially iron was used to replace structural timbers. In 1853, Brunel's SS Great Britain showed that iron could be used on a much more extensive scale. The Thames shipbuilding industry played a key role in the development of steam-powered and iron ships (such as the Royal Navy's first ironclad, HMS Warrior, 1859), but it was not until the 1870s that shipbuilding had largely switched from timber to iron. New shipbuilding yards opened on more extensive sites with space for engineering workshops and better access to raw materials. This switch - from wood to iron and from south to north - forms a distinct watershed in the commercial shipbuilding industry. Some southern yards survived for repair and maintenance, but few could compete with the well-capitalised and skilled yards on the Tyne, Wear, and Clyde.

Commercial shipyards were rarely sited within harbours, being squeezed out by competition for space: instead they normally developed on the margins of ports, either utilising a beach or an estuary waterfront, sometimes even up-river or on a canal side. Central to most commercial shipyards would be slipways upon which hulls were constructed to be launched stern first (see docks above). Yards on canals or narrow rivers typically used broad slipways, launching sideways. A yard would normally have at least two slips to allow for continuity in workflow and for timber frames to season before being planked. Slipways were built of timber long after stone was being used for dry docks and stone was probably adopted only at the time of the switch to metal shipbuilding.

Although the commercial shipbuilding industry maintained overall economic dominance nationally, individual civilian yards were dwarfed by the *Royal Navy Dockyards*, especially in the eighteenth and early nineteenth century –and these were concentrated in the south. In 1804, the Royal Dockyards employed a third of Britain's 5,100 shipwrights, mainly at Chatham, Portsmouth and Devonport at a time when the very biggest civilian yard employed only 119 shipwrights. The Royal Dockyards were largely self-contained, forming complex integrated manufacturing units that were by far the largest industrial establishments in Europe until at least the mid nineteenth century. The dockyards were designed as both shipbuilding and maintenance facilities to keep as much of the navy available for active service as possible. The Royal Dockyards constructed the navy's largest warships until the advent of the ironclad in the 1860s

when commercial yards played an increasingly major role. Naval dockyards led the way in the development of shipbuilding facilities, with the construction of a wide range of specialised buildings and structures. For none of the Great Powers of continental Europe was the strategic benefit weighted so heavily toward naval as against military strength as it was in Britain. The close working relationship between the Royal Yards and civilian manufacturers and engineers – reflected in the layout and engineering of the steam factories developed at Portsmouth and Devonport from the 1830's – underpinned Britain's lead in so many aspects of industrial technology and the effectiveness of the British battle fleet as a deterrent.

Special interest

The Royal Naval Dockyards have been the subject of intensive reviews for purposes of designation and it is not possible here to provide detailed guidance for listing; some key structures have been scheduled as Ancient Monuments too. Certain of the specialised buildings present in the Royal Naval Yards – e.g., slipways, dry docks, mould and sail lofts, mast ponds, saw mills, rope works, forges, smithies, lead mills, paint works as well as various workshops for producing all the items used on ships together with a wide range of storage facilities - may survive in commercial contexts. Where these are encountered, they are likely to be rare and may be good candidates for designation. There are two reasons for this. Many commercial yards would buy in components from elsewhere so they often had limited facilities of their own on site with a lot of fabrication conducted in the open or within non-specific buildings. Also, survival at civil yards tends to be fragmentary at best. Given their general historical importance as part of the nation's maritime heritage, some allowance should be made for the fact that no commercial docks will compare with the better-preserved Royal Naval Dockyards and individual buildings need to be assessed in the context of the survival rate within the commercial sector. By the mid twentieth century shipyard buildings tended to be standardised steel framed structures as used throughout manufacturing industry and are unlikely to be of special interest.

Fishing and Whaling

History

Small-scale off-coast fishing made use of local harbours; alternatively, boats were hauled on to beaches: in either case fish were processed without the need for elaborate specialised buildings. Larger-scale commercial fishing operations were constrained by unhelpful government measures such as the high duty on salt that restricted fish curing. Where fishing prospered, specialised buildings developed and some survive. The Cornish pilchard industry that exploited large summer catches required processing complexes known as fish cellars. However this trade declined in the nineteenth century, as a result either of over-fishing or changes in the migration patterns of the fish. From the late eighteenth century, the east coast herring fishing industry became increasingly dominant in national economic terms, exploiting the regular migration of large herring shoals that moved southwards from Northumberland in mid summer to East Anglia by early autumn. Physical remains on land of this industry also survive.

In the second half of the nineteenth century, increasing industrialisation and large-scale investment in both port facilities and fishing vessels, particularly by railway companies,

changed the face of the industry. Investment by railway companies was concentrated at a handful of ports such as Fleetwood, Grimsby and Hull and this encouraged the expansion of deep sea trawling for cod and other white fish, especially after the introduction of the steam trawler in the 1880s. The success of these fishing ports rested on the development of wholesale markets linked by rail to the rest of the country, with rail transporting 1,514 tons of Grimsby fish in 1856, increasing to 44,376 tons in 1877. From the last quarter of the nineteenth century to the First World War, there was continued growth in the fishing industry supported by the expansion of the home market for fish both at home (such as the rise of the fish and chip shop from the 1870s) and abroad. Underpinning change in the industry was the development of refrigeration, used commercially from the 1850s, then on a massive scale after the invention of the ammonia compression machine in 1876, which paved the way for the frozen food industry established by Clarence Birdseye in the early 1920s.

Special interest

Very few fishing-related buildings (other than markets) pre-date the eighteenth century. Prior to the nineteenth century, local conditions determined their shape and scale. Examples include Cornish pilchard fishing, which required look-out posts to locate shoals, and fish cellars where fish was cured by salting and then pressed to extract the oil (for use in oil lamps) before being packed for export, mainly to Spain and Italy; and the herring yards on the east coast - open fronted utilitarian sheds where fish were gutted, cured with salt and packed into wooden barrels - mainly for export to northern Europe. Both are sometimes associated with cooperage workshops. Herring was smoked either whole (as bloaters) or split, (the kipper being invented in the 1850s) and many smoke houses of varying design survive around the coast. Well-preserved early examples – the chronology of local fishing industries differs markedly - may merit designation.

New forms of structure developed with long-haul industrial-scale fishing towards the end of the nineteenth century: ice making plants after 1876, larger scale smoke houses such as those developed from the 1890s in Grimsby and Hull, and coaling stations serving steam-powered vessels and sailing boats with steam-powered capstans used for hauling nets. The First World War seriously disrupted the industry and forms a distinct watershed: after this time the scale of fishing activity fluctuated but did not result in any significant innovations in terms of building type.

Structural relics of the whaling industry in England are rare, despite the fact that it was economically important to several ports. Most whales were processed at whaling stations overseas with the oil, bone and other products being shipped back as trade goods. One oddity is the use of whale jawbones as ornamental arches: by the mid 1990s only around 80 of the many hundreds erected, mainly of nineteenth-century date, were thought still to be standing, and they are suitable candidates for listing.

Miscellaneous Maritime Items

As well as the whalebones mentioned above, miscellaneous items such as figureheads and other maritime relics may occasionally warrant consideration for designation. For instance, there are a considerable number of commemorative maritime monuments,

e.g., the Memorial to the Heroes of the Marine Engine Room of 1916 on the Liverpool Pier Head.

As mentioned at the outset, ships are not normally designated by English Heritage through listing. Some historic wrecks have, in the past, been scheduled, and reforms are currently under way to consider future approaches to known marine sites.

4 SELECT BIBLIOGRAPHY

- Adamson, S.H., *Seaside Piers* (1977)
Coad, J.G., *Historic Architecture of the Royal Navy: An Introduction* (1983)
Coad, J.G., *The Royal Dockyards 1690-1850: Architecture and Engineering Works of the Sailing Navy* (1989)
Douglas, A., 'Excavations at Rainbow Quay, an 18th-Century Whale Rendering Plant, Rotherhithe, London' *Post-Medieval Archaeology* 33 (2000), 179–193
Evans, D., *Arming the Fleet: The Royal Ordnance Yards, 1790-1945* (2006)
Evans, D., *Building the Steam Navy: The Royal Dockyards and the Victorian Battle Fleet* (2004)
Greeves, I., *London Docks 1800-1980: A Civil Engineering History* (1980)
Jackson, G., *The British Whaling Trade* (1978)
Kemp, P. (ed.), *The Oxford Companion to Ships and the Sea* (1988; nb. 2005 edition is not as comprehensive)
Lake, J. and Douet, J., *The Naval Dockyards: A Thematic Survey* (1998 English Heritage, unpublished report)
Pounds, N., 'Cornish Fish Cellars' *Antiquity* 18 (1944), 36-41
Ritchie-Noakes, N., *Liverpool's Historic Waterfront: The World's First Mercantile Dock System* (1984)
Stammers, M., 'Slipways and Steamchests : the Archaeology of 18th- and 19th-Century Wooden Merchant Shipyards in the United Kingdom' *International Journal of Nautical Archaeology*, 28(3) (1999), 253–264
Swann, D., 'The Engineers of English Port Improvements 1660-1830' *Transport History* 1 (1968)
Trinder, B. (ed.), *Blackwell Encyclopedia of Industrial Archaeology* (1992)

Web sites

- www.mcga.gov.uk pages covering the history of the Coastguard
www.portcities.org.uk/ covering ports of Bristol, Hartlepool, Liverpool, London, Southampton
www.nmm.ac.uk/memorials/ Database of maritime related memorials.

Lighthouses

- Bathurst, B., *The Lighthouse Stevensons* (1999)
Hague, D.B. and Christie, R., *Lighthouses Their Architecture, History and Archaeology* (1997)
Hart-Davis, A. and Troscianko, E., *Henry Winstanley and the Eddystone Lighthouse* (2002)
Jackson, D., *Lighthouses of England and Wales* (1975)
Naish, J., *Seamarks Their History and Development* (1985)
Woodman, R. and Wilson, J., *The Lighthouses of Trinity House* (2002)

