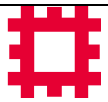

ENGLISH HERITAGE

THEMATIC SURVEY OF THE ORDNANCE YARDS AND MAGAZINE DEPOTS

SUMMARY REPORT
THEMATIC LISTING PROGRAMME

JEREMY LAKE

FINAL DRAFT
JANUARY 2003

Thematic Survey of the Ordnance Yards and Magazine Depots
Summary Report

1.0 Introduction

1.1 This summary report, compiled by Jeremy Lake of the Thematic Listing Programme (TLP) and David Evans, concerns the ordnance yards built for the navy and army from the 18th century to 1914. In particular, it focuses on those of the extensive naval sites whose complexity as industrial sites and potential interest had first been raised during TLP's work on naval dockyards (Lake and Douet, 1997): the listings published in August 1999 included the 18th century ordnance stores at Morice Yard in Plymouth and New Gun Wharf in Portsmouth. It was clear, for example, that very little was known concerning the development of ordnance storage at Chatham (which related to a dockyard now being considered for World Heritage Site status). Bull Point is still in active use by MOD, and will be subject to an extension of the Scheduled Ancient Monument (from the 1850s magazines to two late cordite and guncotton magazines) and some new listing recommendations. A lack of knowledge concerning the development of Priddy's Hard at Gosport – where key C19 developments have been afforded no protection - had also prevented discussions between Hampshire County Council, Gosport Borough and English Heritage concerning this important site to proceed on an informed basis: former listing proposals made in 1989 had been rejected by a minister due to inadequate evidence. Housing is now taking up much of the late 19th expansion outside the 18th century fortifications, within which a museum is being developed by Gosport Borough Council: TLP and the EH regional team have been involved in discussions over the relative significance of structures here over the last two years. This project has also cast much new light on the history of Upnor Castle (EH property). The entire complex at Weedon Bec was upgraded to II* in 1998, at the outset of this project: list descriptions will be revised to take account of detailed recording of the site.

1.2 Although Jonathan Coad's book on naval dockyards (*The Royal Dockyards, 1690-1850,* 1989) includes a chapter on ordnance yards it does not go further than 1855 (the abolition of the Ordnance Board). A very large number of building types, some extremely specialised, still survive in these establishments, many of which have been vacated by the Services for some time, while others are clearly approaching the end of their useful life. The purpose of many of these buildings is unintelligible without an elementary knowledge of the processes which went on in them. It follows that the importance of individual buildings cannot be judged without this knowledge and a realisation of the way in which they functioned together as part of a system which could vary from the simplicity of Weedon to the extreme complexity of Priddy's Hard. A documentary-based analysis of their functional and historical development was, therefore, commissioned from Dr David Evans as a vital first step in the assessment of their significance by TLP and the Monuments Protection Programme (MPP), in addition to forming an informed basis for more detailed future fieldwork and recording. They have been distributed with this report to relevant owners, local authorities and SMRs. The three reports, produced in connection with this document, on the Portsmouth Magazine System, Bull Point at Devonport, and the Medway Magazine System incorporate this information in texts describing each phase of construction, coming before the gazetteer entries. These will be referred to later on as PH, BP and MM respectively. Sources for the other

Depots are, for Marchwood, a 1997 report by Roger Bowdler of English Heritage of English Heritage's Historical Analysis and Research Team; for Purfleet, a 1994 report by Paul Pattison and Peter Guillery for RCHME, supplemented by the same authors' *The Powder Magazines at Purfleet,* in *Georgian Group Journal,* VI, 1996, pp.37-52; and for Weedon, an interim report of 1998 by Adam Menuge and Andrew Williams for RCHME. The development of new explosives - a subject explored in detail in the by Wayne Cocroft (*Dangerous Energy, English Heritage, 2001)* - had an important effect on the planning and design of new building types and the expansion of the Portsmouth and Medway facilities onto new sites at the end of the century, spurred on by the naval arms race with first France and then Germany – a story which continued with the Filling Factories of the First and Second World Wars.

1.3 A brief overview of the development of all the Depots under consideration forms **Part 2** of this review, in which individual buildings are not singled out for mention. **Part 3** contains a listing of the building types which evolved in these Depots, explaining their functions and arranged in chronological order, noting the examples which survive with any pertinent remarks. These are referred to, when they are from any of the PH, BP or MM sites, by the building number currently in use and the page reference to the report concerned. As a relatively small number of original buildings remain at Bedenham and Frater, and the base is in active use, a detailed investigation of individual buildings was not made, though a general historical account is given in PH pp.129-136. The reports will contain in many cases a photograph showing the current state of the building and also a reproduction of an original architectural drawing; other drawings which have been seen are referenced. The narrative portions of these three reports have not been referenced; the original sources on which all statements in the text have been made are reproduced, in part or in full, in another report which is available separately. **Part 4** contains a numerical breakdown of the buildings surviving in each Depot, with particular attention to Priddy's Hard, as that site is currently divided into three areas. The division is largely arbitrary and further confuses a complicated site.

2.0 A brief background to the Ordnance Yards

2.1 The major Ordnance Depots comprise Purfleet, Weedon, Bull Point (serving Devonport); the Medway complex of Upnor, Chattenden and Lodge Hill; and the Portsmouth complex of Priddy's Hard, Tipner, Bedenham, Frater and Marchwood. No site replaces the other, though there are considerable resemblances between the twentieth century locations of Bedenham and Lodge Hill. Each site has evolved in a different way in response to the same pressures caused by the development of ordnance and explosives. At Portsmouth an elaborate sequence developed around the magazine at Priddy's Hard (for the reception of powder undergoing refit, before restoving at Little Horsea and return for issue at Priddy's Hard) and Tipner (which stored powder being restored as well as dusted and mixed at Stamshaw).

There are two fundamentally different types of Ordnance Depot; that intended for the bulk storage of explosives and that in which the explosive is also manipulated in such processes as the filling of cartridges and shells. Until late in the eighteenth century magazines in Ordnance Depots were only used for bulk storage, and a specifically British bombproof design had been developed. All matters connected with guns, their ammunition and propellants were dealt with by the Board of Ordnance, whether for land or sea service, until the absorption of these functions into the War Office in 1855. As a consequence, deep-water wharfs close to dockyards were used to store everything from shot and cutlasses to guns and carriages, for use by both services: hence the warehouses and stores at New Gun Wharf (Portsmouth) and Morice Yard (Plymouth), now listed at grade II and II* as a result of the naval dockyards thematic review. Magazines in the principal Naval dockyards needed to have spare capacity, as when ships were paid off or docked all their ammunition had to be removed and stowed. During the late eighteenth century there were many reports of the powder issued to HM ships being of inferior quality, and even if it was originally up to standard there was always the possibility of dampness affecting the barrels. All returned powder therefore needed to be examined, and it was obviously inadvisable to open the powder barrels within a magazine. Special buildings – originally termed Shifting Houses – needed to be provided for this purpose. At Purfleet, the magazine where powder was received from the manufacturers, a Proof House had to be built for testing small samples from each batch. An appreciation of the need to wear clothing and footwear which contained no elements capable of striking sparks led to the provision of changing rooms for the staff, originally termed Shoe Rooms, and usually present as antechambers to the magazines themselves. Cooperages needed to be provided for the construction and maintenance of the powder barrels, and houses and office accommodation for the officers and the small permanent staff of labourers.

2.2 Until the later years of the 18th century, the storage facilities required for gunpowder were relatively straightforward. A bombproof structure was desirable, as were cavity walls to provide some limited degree of temperature control, and all metal fittings had to be made of copper. The powder itself was contained in 100lb barrels, stacked and arranged in the magazine in such a manner as to allow a free circulation of air. The maintenance of the barrels meant that a cooperage was a valuable ancillary building. However, there were few such purpose-built brick-vaulted structures in existence in England. Most powder was kept either within old fortifications, such as the Tower of London, or new ones, such as Fort St George.

Modern fortifications, designed in the age of artillery naturally contained bomb-proof magazines: older ones, such as Upnor Castle and the adapted Lady Chapel within the *enceinte* of Tynemouth Castle, could offer no such security. The naval bases which needed ready access to very large quantities of powder were very badly served , with Upnor providing the facilities for Chatham, the medieval Square Tower at Portsmouth (at the end of the High Street) and Plymouth depending on the distant supply of the Citadel and a small and dangerously located magazine at Morice Yard.[1]

2.3 Upnor with all its faults, was to remain in service until the 19th century. Plymouth was provided for from the mid-1740's by a new magazine at Morice Yard (described by Jonathan Coad), and at Portsmouth a new magazine was constructed at Gosport, well away from Portsmouth town. This site, Priddy's Hard, was to have the most remarkable history of continual enlargement and adaptation to meet the revolutionary developments in Naval ordnance. At Plymouth, the Morice Yard site was not suitable for a main storage magazine, which had to have a location dedicated to that function, and land was acquired for the purpose at Keyham Point in 1775. The greatest of the Storage magazines had been built at Purfleet, probably in the early 1770's though a chronology has not been determined. The five closely grouped magazines held 10,400 barrels each. Another class of ancillary building, a Proof House, was added in 1782-3. This function of testing powder was to ramify greatly and have a decisive effect on the development of ordnance yards.

2.4 The recent war with France and the invasion scare of 1779 led to concerns about the vulnerability of the arsenals, and had exposed an alarming situation concerning the state of the nation's gunpowder. The former was foremost in the mind of the new (appointed 1782) Master-General of the Board of Ordnance, George Lennox the Third Duke of Richmond. Although his plan to enhance the landward fortifications of Portsmouth and Plymouth was defeated in the House of Commons in 1786, [2] his other strategy – to divide and separate the magazines – was implemented at Portsmouth with the acquisition of land at Tipner Point between 1789 and 1791. Although the Board of Ordnance had purchased the Powder Mills at Faversham in 1760, the vast majority of powder was bought from private manufacturers. This monopoly was ended by the purchase of Waltham Abbey in 1787. Major William Congreve, the Comptroller of the Royal Laboratory at Woolwich Arsenal, had also devised an improved method of refining saltpetre, and new refining houses were built at Faversham and Waltham Abbey; after 1794 no saltpetre was used, even in the private firms, which had not been treble refined.

2.5 Equally important and crucial to the development of the magazines serving the naval dockyards, were the consequences of Congreve's experiments at the Royal Laboratory in the restoration of damaged gunpowder, such as being returned from ships in great quantities. The powder was restoved in kilns of a type developed by Congreve prior to 1790 and installed at Waltham Abbey in 1791, and then dusted

[1] The Square Tower in Portsmouth is listed grade I; the White Tower in the Tower of London (grade I) has an inserted brick vault of 1730-4. Other magazines within the enceints of post-medieval fortifications, such as at Yarmouth (Isle of Wight), Hugh Fort on St Mary's (Isles of Scilly) and Berwick-upon-Tweed have been listed or scheduled. The management regimes accorded to the latter will, in due course, be subject to re-evaluation by MPP and TLP.

[2] A series of detached redoubts at Maker Heights in Cornwall, opposite Devonport, survive as notable examples of forward fortifications of this type and period.

(rotating in cylinders which filtered out the powder dust) and mixed with a proportion of new powder. The financial savings as a result of Congreve's innovations were very great, quite apart form the improvement in the quality of the powder. Private firms now had a bench-mark set against the Government factories which they had to attain.

2.6 The Royal Laboratory, which was largely engaged in the production of pyrotechnics, had existed at Woolwich for many years, but its importance increased rapidly as Congreve's research progressed. Large numbers of filled cartridges were produced there, and the threat of disaffected persons sabotaging the establishment led Congreve in 1804 to propose the establishment of subsidiary Laboratories at Portsmouth and Plymouth. The Laboratories consisted of many small buildings within a compound, each building dedicated to some specific task involving the manipulation of explosives and the manufacture of, or braking up, of cartridges or pyrotechnic devices. Because of the potentially dangerous nature of the operations, they were located within the fortifications of the towns, at some distance away from the existing magazines at Priddy's Hard and Keyham Point. Following the example of Woolwich, the Portsmouth Laboratory was a symmetrical block of separated buildings on four sides of a quadrangle externally treated in Gothic style by Lewis Wyatt. The site at Plymouth was not so easily determined, being disturbingly close to Government House, but Mount Wise acted as a convenient traverse between the buildings.

2.7 Restoving establishments, for the repair of damaged powder returned from ships, were also to be provided. The potentially hazardous work of examining, restoving, dusting and remixing gunpowder could not be carried on in such proximity to the towns and advantage was taken of the local topography of the areas to provide dispersed locations to and from which the powder could be taken by water transport. At Plymouth all the powder processing facilities were concentrated at St Budeaux safely up the Hamoaze. Several plans survive of the establishment, whose buildings were of the same design as those at Stamshaw and Little Horsea in Portsmouth (where only below-ground remains can be traced). Earth traverses reinforced with masonry were used to minimise the effects of any explosion, and the boiler which supplied steam to the stoves was placed between two semicircular traverses. The Mixing House of 1804 (Building 124), is the only building surviving on the site, the footings of the other structures being clearly visible.

2.8 On the Medway plans were drawn up to replace Upnor Castle by a modern magazine by 1806, and in 1808 the construction of one 10,000 barrels capacity was decided upon. The site was quarried out of a rocky hillside to provide natural traverses. The CRE, Colonel D'Arcy settled on elliptical instead of rounded vaults, to give greater height within. The Castle was adapted, some laboratory facilities being provided in the south tower, while other portions were made to serve as cooperage and shifting house. 3,500 barrels continued to be stored in the castle, but this was proposed to be discontinued. Restoving on this site was out of the question and that operation was performed at Faversham. Communications between the Medway with Faversham and Purfleet involved long passages by sea or river, though this might have been partly mitigated by the Thames-Medway Canal, then in course of construction, and Board of Ordnance traffic was no doubt seen as

a steady source of income.

2.9 By 1807 the Board of Ordnance had realised the importance of the provision of separate buildings for examining powder and other functions at magazines; these were light wooden structures to minimise fallout damage after an explosion. The magazines at Keyham Point, Priddy's Hard and Purfleet were untraversed; the importance of these structures to prevent blast damage was realised at the same time and the later magazines, with the exception of Tipner and Upnor, were provided with traverses. Later events were to combine the Laboratories with the magazines at Bull Point and Priddy's Hard, and also at Chatham, and all these Depots' building types were multiplied greatly as a consequence. Only these three Depots, principally dedicated to serving the need of the Navy, had their evolution complicated in this way.

2.10 The Revolutionary and Napoleonic wars witnessed a peak of activity on all these sites. It also released the purse strings for three new Store Depots at Weedon, Marchwood and Tipner, together with a modern magazine for Upnor and a large number of small depots and magazines such as Hungerford, next to the Kennet and Avon canal and sold off in 1820. The latter were generally disposed of after the conflict, the consequence being that the small depot at Great Yarmouth is the most complete of a highly fragmentary class of site. [3] Canal communications were an important factor in the establishment of the major inland magazine and Horse Artillery barracks and storehouses at Weedon, where the Grand Junction Canal Company were informed in February 1804 of the Board's intention to open a short branch to serve the warehouses and magazines. The CRE, Colonel Pilkington, was ordered to begin work on the Artillery barracks on September 18 1805, and by October the Civil Officers' building was nearly finished and four storehouses were completed or well in hand, and the canal basin, with 200 yards of canal had been dug. He had never had a hand in building a magazine before, and expressed some mild concern, but the order to construct two magazines as a priority over the remaining four storehouses was given in February 1806. Despite – or because of – his inexperience, Pilkington provided his four magazines with traverses, the first to be developed on a major Magazine. They were not only strongly revetted, but contained rooms, with light roofs to give way in case of accident, at either end, for use as shifting rooms and stores, and by July 30 1810 the magazines were ready to receive powder. By 1827 the magazines were holding 10.500 barrels and 1,463,700 ball and 693,746 blank cartridges.

2.11 A further addition to the Portsmouth magazine system was also sited with canal communications in mind, and also featured an internal canal distribution system. This was Marchwood, conceived in 1811 as a store depot like Tipner. [4]

[3] In addition to Tipner, Upnor, Priddy's Hard and Hungerford, the Board of Ordnance in 1811 had magazines at Tilbury, Gravesend and Hyde Park. The latter, newly completed to the designs of Decimus Burton, survives (grade x). Two magazines in Shrewsbury's Armoury were built to the designs of James Wyatt in 1806. In 1817, 30 sites in Britain – mostly in existing barracks and forts - had magazines of sufficient size to warrant the appointment of a Board of Ordnance Storekeeper Parliamentary Papers (1817) IV, 131f, quoted in Bowdler, 1997 (note 4). The Board also had numerous depots (54 in 1796) dispersed around the United Kingdom: survival of these, which is highly fragmentary, awaits a detailed evaluation.

[4] For a detailed report on Marchwood see the report by Roger Bowdler, English Heritage (Historical Analysis and Research Team), 1997. The proposals for Marchwood were submitted in the Ordnance Estimates submitted

Potential canal communications from Southampton water were the Redbridge-Andover, Northampton-Winchester and Bursledon-Botley navigations. This was to be a 20,000 barrel magazine with two 10,000 barrel magazines the preferred disposition. In the event, 3 magazines with a 6,800 capacity were built, with a small internal L-shaped channel for moving barrels by barge.

2.12 After the war, Waltham Abbey and Faversham were maintained largely on a care and maintenance basis, maintaining the stock by 5,000 barrels a year at Waltham Abbey. The necessity of Laboratories at Portsmouth and Devonport were called into question. Their services had been invaluable during the war. Portsmouth Laboratory had chiefly made small arms ammunition, 52,953,970 round in all between August 30 1807 and April 7 1814, employing 353 people, of whom 294 were boys - the current staff numbered eight. Before their establishment Woolwich Laboratory had coped well, and in peacetime the Board could see no reason for maintaining both the additional Laboratories. Accordingly, it was decided to suppress the Devonport Laboratory but to retain Portsmouth for later consideration.

2.13 Restoving ceased at Stamshaw about 1833, and in 1849 the guard house at Little Horsea was converted to a caretaker's house, the establishment clearly being mothballed. At some unknown date the two islands of Little and Great Horsey were merged, being joined by a canal for testing torpedoes, the old buildings being destroyed. Stoving from 1833 was carried out only at St Budeaux and Faversham. By 1849 the former cycles of restoving powder were almost over, the Medway-Thames-Kent axis being the last survivor. By 1853 no extraction was done, this operation being performed entirely at Waltham Abbey, and because of the improved quality of powder very little stoving and dusting needed to be done.

2.14 At Weedon the water communications were fast going into disuse by 1845. It was thought that 'If Weedon is to be again made a Grand Depot' the rail link would be preferable; this did not happen, and the next year it was decided that except in very special cases all stores were to be moved there by canal. The floors of the Marchwood magazines had got into a poor state in the 1840's, and in September 1850 the Coast Guard (then a paramilitary organisation) were allotted much of the accommodation. The same decade, however, saw beginning of key developments at Bull Point, north of Devonport dockyard, and Priddy's Hard. The establishment of a new large magazine at Bull Point was forced on the Board because of the Admiralty's decision to build a Steam Yard, with basins and very extensive factory facilities at Keyham, and Keyham Point Magazine occupied much of the space required. The town of Devonport was rapidly encroaching on the magazines and in 1841 the inhabitants petitioned for its removal. The choice of the new location proved to be a prolonged business. Although March 1845 tenders for work at Bull Point were advertised, it was to be nearly seven years before Bull Point was ready for operations.

2.15 As completed, Bull Point housed 40,000 barrels in four magazines, and now formed an integrated complex with St Budeaux, now renamed a Royal Laboratory.

---

to Parliament in 1812-13, along with Dorchester, Carmarthen and North Hyde (close to Heston in North London). None of these survive.

St Budeaux itself had been altered, updated and added to, and the danger buildings of the whole site only performed one function each. In 1865 the design of the depot was highly praised and the designer commended - the prolonged gestation had in fact been worth while. The establishment worked in tandem with the floating magazine *Conquistador* moored half a mile away. When a ship was paid off, its ammunition was transferred to her, and thence to St Budeaux, where it was examined, stoved if necessary, and then sent to Bull Point, which consequently only ever handled powder which was in a perfect state.

2.16 While the preliminary designs for Bull Point were taking shape, Priddy's Hard was also being transformed into an integral site, though unwittingly. Like the other magazines, the years of peace had caused deterioration, particularly in the earthwork defences. This type of fortification needed a lot of attention – by 1809 they had been reported to be 'very ruinous' and in 1844 it was decided to restore and improve them, making the dry ditch a wet one and adding a drawbridge protected a couvre-port. At the same time the idea was initiated of removing the Laboratory from its unsuitable situation in Portsmouth to within the revamped fortifications of Priddy's Hard. Apart from the operational buildings, this involved the construction of a small Expense magazine to hold the explosives needed for the daily work in the Laboratory. The principal function of the Laboratories through the Revolutionary and Napoleonic Wars had been the production of small arms ammunition, but this situation was to change, and with it the role of Priddy's Hard. The development of artillery meant a great increase in the use of filled shells and the fuzes required to detonate them. The preparation of fuzes was a natural extension of the work of the Laboratories, and as the filling and emptying of the shells could not be carried out in a magazine, and required dedicated facilities, the Laboratories came more and more to deal with the projectiles and propellants for sea and land-service artillery. Forts were also equipped with Laboratories; these were defined as buildings in which all the operations of examining, filling or emptying of shells or cartridges were carried out, and which should be under magazine conditions. These have not been included in this preliminary survey. With the development of new propellants and projectiles the function of Priddy's Hard came to be more and more the preparation and inspection rather than the storage of explosives, and, as will be seen, it's original duties were transformed elsewhere. But the first stage of this steady evolution of the site was the establishment of the Laboratory in 1848, part of which have survived the redevelopment associated with the shell-filling complex of the 1880's.

2.17 The shortcomings revealed through the Crimean War brought about the decision to increase storage capability,[5] and additional magazines were built at Marchwood, Tipner and Upnor. In July 1853, for example, the CRE Portsmouth had been asked to prepare a report on the expense of making Marchwood serviceable again. The magazines were ordered in September to be made fit to receive powder from Dover, and in November the floor of No. 3 Magazine was ordered to be made good before the establishment was re-established as a Powder Station and Officers

[5] It was stated in Parliament that 32,000 of the 100,000 barrels used at Sebastapol had been imported from America and Belgium (Cocroft, *Dangerous Energy*, draft of 1998) . An 1856 Committee on Magazines earmarked Upnor, Weedon, Alderney, Gibraltar and Malta new Magazines: the Weedon Magazines were not built, Tipner, Upnor and Marchwood instead receiving new Magazines. The investment in the 3 related sites at Enfield (Royal Small Arms Factory), Waltham Abbey (Royal Gunpowder Factory) and the Woolwich Royal Arsenal were a further consequence of the conflict.

appointed. This, effectively the second foundation of Marchwood, was marked by a vast increase in its storage, four new magazines, three of 14,400 and one of 9,600 barrels capacity being built in 1856-7.

2.18 The Board of Ordnance was abolished in 1856, its last great project having been the creation of Bull Point. The War Office took over its responsibilities. Bull Point, as a state-of-the-art Ordnance Depot of the 1850's was provided with a suite of ancillary buildings which reflected the developments getting under way in Naval Ordnance. The layout of Priddy's Hard remained as it had been at the turn of the century, save for the addition of the Laboratory. By contrast, Bull Point was provided with a set of buildings dedicated to the various functions which were now coming into demand, stylistically coherent with the magazines themselves. Upnor, following the provision of additional magazine space, was also given new facilities in the shape of Shell Stores, while in 1877, space for expansion on the site for bulk Store Magazines being non-existent, a new site was acquired inland for five such magazines at Chattenden.

2.19 The further redevelopment of Priddy's Hard began in 1860 with a new magazine for the receipt of ammunition from ships; a large Store Magazine was added in 1878/9, and this phase was completed by 1879 with the installation of a sizeable shell-filling complex. This at once differentiated it from the other Depots. The Shell Filling Room was a large building, similar to the (subsequently lengthened) surviving Shell Store. After an explosion there in 1883 it seems to have been decided to move this activity to outside the historic boundaries of Priddy's Hard, and to distribute the activity among several small buildings. In 1886/7, therefore, a set of two Shell Filling Rooms and a Fuzing Room, with a Shell Filling Room for quick-firing shells, Expense Magazine and Unheading Room, were built without the ramparts along the edge of Forton Creek. Rolling ways to transport the powder barrels (which were never rolled, but moved in barrows or trollies) had always been required, but the new arrangements here introduced two gauges; the 1 ft. 6 inch powder line and the 2 ft 6 inch shell tramway. Priddy's Hard was to develop the most complex internal communications system of any of the Yards until the rails were all done away with and replaced by small self-propelled vehicles.

2.20 These developments took place against the background of the arms race of the second half of the 19th century, and related developments in ordnance. Thus the construction of an armour-clad and steam-powered fleet was accompanied by the development of ordnance which rendered the forts of the Palmerston government obsolete only 20 years after their construction. The smooth-bore 68-pounder had been the largest gun in service at the time of the Crimean War. Vast quantities of powder were needed to as propellant and explosive filling for shells of the 110-ton monster guns of the 1880s, a decade which saw the 12-inch gun emerging as the standard naval armament. The development of artillery, and the associated increase in the number of filled shells and fuzes required to fill them, had also made the daily work of the Laboratory concentrate more and more on the preparation and inspection of new types of propellants and projectiles.

2.21 Drastic changes in the administration of the Yards were made following the decision in 1890 to divide their control between the two Services. In the Portsmouth area, Priddy's Hard and Marchwood were handed over to the Navy,

while Tipner went to the Army. This meant that Tipner no longer had access to the Laboratory facilities of Priddy's Hard, and a set of buildings (now demolished) consequently had to be provided. Bull Point was divided, the Army retaining one magazine and the buildings around the Camber. Upnor went to the Navy and Chattenden to the Army, Purfleet being shared, but as will be seen these arrangements were soon altered. Weedon was given to the Army. The disparity between land and sea service Ordnance was now very great. Spurred on by the arms race with Germany, the Admiralty at once began a great expansion programme which affected Priddy's Hard, Bull Point, and Upnor. No significant alterations were ever to be made at the Store Magazine sites of Weedon, Purfleet, Marchwood, Chattenden and Tipner, with the slight exception mentioned above in the case of the last.

2.22 The range of building types was greatly expanded in this programme of works. Most important were the Cartridge Filling Rooms of 1897 sited in the new Laboratory at Priddy's Hard, which established the frangible wooden building surrounded by heavy earthen traverses – first appearing in the early 19th century - as the future norm for danger buildings. This range of buildings still remains, a unique survival. The preparation of shell cases by lacquering to prevent spontaneous chemical reactions and the development of the fuze from a rudimentary device to a complex piece of mechanism added other types of building. A great change in the construction of magazine buildings was also caused by the introduction of new explosives, which needed to be stored under different conditions from gunpowder. Guncotton, which had been introduced as early as 1870[6], was not suitable as a propellant or a shell filling, but found ready applications for filling torpedoes and mines and for underwater demolitions. Normally stored in its benign wet form, the buildings required were similar externally to any other storehouse, but in its far more potent dry form it required small heavily traversed buildings, sometimes with the additional protection of a wet moat, and the planting of shelter belts of trees. By contrast with the eighteenth century type of magazine, the roof was not a massive construction, but was intended rather to be blown off to vent any explosion. By the 1890's cordite (patented 1889, a guncotton/nitro-cellulose mixture which could be extruded as cord, hence the name) was being introduced, and after a few years the main application of gunpowder was in the initiatory systems required to detonate the new explosives. Cordite magazines tended to follow the pattern of dry guncotton magazines, though much larger, as the explosive was perceived to have relatively benign qualities. Nevertheless, the Plumstead-Erith complex of 1896-1900 near Woolwich Arsenal, the first to be designed, were built with substantial circular traverses – a pattern repeated at Priddy's Hard, plans for which were drawn up in 1898. The roofing, again intended to be frangible, varied between extremely shallow pitched copper clad structures and double pitched roofs. Gunpowder required merely to be kept well aired and protected against sparks, and the magazines up till now had been constructed with these requirements governing their construction. The presence of exposed metal was no longer considered as a liability in a cordite magazine, and metal trusses were introduced. Temperature control was now needed, however, and Boiler Houses were connected to the relevant buildings by a system of above-ground piping, a fragment of which survives at Priddy's Hard.

[6] A serious explosion of 1847 at Hall's Faversham works delayed its introduction. It was being manufactured on a small scale by the mid 1860s at Waltham Abbey.

Massive shell stores were added to store the finished articles, together with a Mine Store, though at that period the Naval use of mines was very limited. Larger Shifting Rooms were required to accommodate the expanded workforce. Picric acid (lyddite), which had become the standard propellant by the end of the 19th century, was so benign that no magazines were required. The navy continued to use it (it was their major shell filling material during the First World War) after the army had converted to TNT. [7]

2.23 Similar developments took place at Bull Point, though the nature of the site meant that the additional buildings did not affect the general layout of the establishment. The first important buildings, a set of three Shell Filling Rooms were added in 1893-4. The same process took place at Upnor, with the difference that filled shells were received at the Depot, and it was not until 1902 that the Admiralty decided to establish a shell filling facility on the Medway, which was to be further downstream, at Teapot Hard. That scheme was abandoned in January 1905 and a set of six Shell Filling Rooms was finally added to Upnor in 1906-7. The normal sequence of development was therefore reversed at Upnor.

2.24 The Upnor site was virtually completely occupied by the turn of the century, and was in any case quite unsuitably situated for a large magazine complex to be devoted to the storage of Cordite. A sizeable acreage was acquired at Lodge Hill, adjacent to the Army's Powder Magazines at Chattenden (which had early shown signs of structural problems caused by the underlying geology) and by 1899 the first cordite Cartridge Stores had been completed there. A set of five cordite magazines, a dry guncotton magazine, a Deposit Magazine and two examining rooms were added in 1900-1903, the whole design taking advantage of the large flat space available for development to lay out a new plan of Depot. The buildings - variants of the types established at Priddy's Hard and Bull Point - were arranged on either side of a railway line which formed the spine of the whole establishment. For the first time a standard gauge connection was provided for a Naval Ordnance Depot. In 1903 the Admiralty offered to take over the Chattenden magazines in exchange for their half share in Purfleet, and this arrangement was agreed to, though no further building work was undertaken at Chattenden by its new owners. A Laboratory was established at Lodge Hill for filling cordite cartridges at the same time as the Shell Filling Rooms were added to Upnor. Further magazines were to be added and the Laboratory extended, but otherwise (except for an anti-aircraft battery of 1913, now an exceptionally rare survival) Lodge Hill was set up for the First World War.

2.25 The development of Priddy's Hard after 1900 was affected by the traumatic event of an explosion in the New Shell Store in November 1902. It was decided that the site was far too close to the Dockyard for bulk storage of explosives, and that the magazines should be used only as ready use magazines to supply the shell and cartridge filling rooms. A new Magazine Establishment, to be laid out on the same lines as Lodge Hill, was proposed and after some false moves land was acquired at Bedenham. However, in 1905 it was decided to abandon the plan and build two additional cordite magazines at Priddy's Hard, a new central Ordnance depot being set up at a site to be procured somewhere in England. However, by 1908 this plan had been abandoned and work began at once at Bedenham. Drawings for the first

[7] Only earthworks have survived from the 1904 lyddite and cordite cartridge factories at Woolwich Arsenal.

magazines had been completed by February 1909 and negotiations for a standard gauge connection begun early the next year. Priddy's Hard was now largely turned over to shell and cartridge filling, and as new Store buildings were built at Bedenham the opportunity arose for turning many buildings on the old site to new uses, one consequence of which was the blurring of the history of the Depot.

2.26 The First World War brought about a great expansion of Priddy's Hard. This was partly because of the extension of the Laboratory to meet the increased need for filled cartridges and partly because of the introduction of new explosives and weapons systems. TNT, known in the Services as Trotyl, could be melted on a water bath and poured into shells, and a set of Trotyl Rooms were added in 1915. (A set was also provided at Upnor, probably at the same time.) Amatol was an explosive consisting of a mixture of ammonium nitrate with trotyl, and stores were required for this. A new Mine Store was built in close proximity to the Amatol Store, while buildings dedicated to fuze filling were required. New weapons requiring storage, filling and maintenance were depth charges, bombs for aerial use, and the anti-submarine device of the towed explosive paravane. Similar additions, but to a lesser degree, were made at Bull Point.

2.27 The years between the wars saw changes of function of existing buildings rather than any new construction campaigns, though Lodge Hill was provided with two large Shell Stores, while the advent of the second great conflict, though bringing about minor additions to Priddy's Hard and Bull Point, left its mark principally in the application of flat concrete roofs to many buildings, and the provision of passive defence structures such as air raid shelters (both surface and below ground), first aid and decontamination buildings, police posts (sometimes confused with pillboxes) and buildings to house additional firefighting equipment. After 1945 no significant additions were made at any of the older Depots, though the Bedenham / Frater site was developed to deal with state-of-the-art ordnance, a process which continues today.

3.0 The Building Types

Note that many buildings were adapted for other uses later. Only the initial use is recorded here. The full history of the buildings is given in the separate reports. As noted elsewhere, Bedenham and Frater have not been included in the detailed analysis.

Guide to Tables

Site name	Building	Date	Existing (bold) or proposed listing grade

3.1 Store Magazines

These were solely intended for the bulk storage of gunpowder in the standard 100 lb. barrels. Air vents were provided in the walls to prevent damp and all exposed metal surfaces were (or should have been) of copper. The classic British type was of two chambers with a massively thick bombproof vault, as opposed to the single chamber of the Vauban type Magazine (PH pp.10-11). The Keyham Point magazines, demolished in the early 1850's, were unique for their period in not being designed as bomb-proof (BP p.1); the next of this type (also demolished) was built in 1805 at Waltham Abbey. The Marchwood magazines followed this example, combined with the early use of traverses. The Upnor magazines took the form of a series of bombproof catenary arches.

Purfleet	No 5 Magazine	1763-5	**II***
Priddy's Hard PH, 9	'A' Magazine	1774-6.	**I**
Keyham Point, Plymouth		1775-83	Demolished
Tipner		1791-1802	**II**
Weedon		1805-10	**II***
Upnor MM, 1-2		1808-10	Demolished
Marchwood	'A' Magazine	1814-15	**II**
Bull Point BP, 19-21	Magazines 1 to 4	1851-4	**SAM** Or II*
Upnor MM, 10	Building LU 001	1856-7	II*
New Gun Wharf, Portsmouth	Magazine next to Grand Storehouse	c1855	
Marchwood	'C' Magazine	1856-7	**II**
Tipner		1856-7	II
Chattenden MM, 21-2	Buildings CH 307-11		Too altered to merit listing, but part of a planned landscape
Priddy's Hard PH, 41-2	E Magazine (Building 436)	1878/9	**II***

3.2 Receipt & Issue Magazines

These were intended to receive ammunition from ships coming in to refit or be paid off. Powder barrels which had been checked were held there for issue. The arrangements of Upnor and Tipner magazines, as a sequence of arches, meant that individual arches could be reserved for this purpose and a separate building was not required.

Keyham Point		1775-83	Demolished
Bull Point BP, 18-19	Building 13	1853-5	II*
Priddy's Hard PH, 40	C Magazine (Building 435)	1860/1	**II***

The Priddy's Hard example is of particular importance because of the role it played in the first (and best preserved) integrated shell filling facility within an Ordnance Yard. See PH pp.26-29.

3.3 Shoe Rooms

These were the first spaces dedicated to changing into specialised magazine equipment. See 18 for their later manifestation as **Shifting House**.

Priddy's Hard PH, 16, 23, 24	Buildings 419,422	1804, rebuilt later	**I**
Marchwood	Receiving room 130m N of Yacht Club premises	1814-16, enlarged 1899	**II**

3.4 Examining Rooms (before 1875 officially known as Shifting Houses)

These were for unheading barrels of powder and examining the contents.

Priddy's Hard PH pp.1-3, 7-9	Building 423	1775, rehandled at various dates till c. 1857	**I**
Weedon Bec	These, uniquely, are incorporated in the ends of the traverses of the magazines	1805-10	**II***
Marchwood	Examining Rooms 130m WNW of Yacht Club premises	1814-16	**II**
Priddy's Hard PH , 25	Building 431	1847/8	**II**
Bull Point BP, 59	Building 59	1856/7	II

3.5 Proof Houses

These were originally used for testing small quantities of gunpowder by igniting it with a hot iron on a glass, porcelain or copper plate. If satisfactory, it should produce few sparks and only leave smoke marks on the plate. By 1880 further tests carried out indoors included the measurement of its density to three decimal places and hygroscopic testing.

Purfleet	Purfleet Play Centre	c.1765	**SAM, list at II* and then deschedule**
Priddy's Hard PH, 32	Building 241	1879. Half the building was a Cook House	II
Priddy's Hard PH, 66	Building 335	c.1900, rebuilt 1921	
Bull Point BP, 73	Building 94	1934	

3.6 Buildings for the Repair of Gunpowder

As noted in the Reports, these were only built at St. Budeaux, (Devonport) and Stamshaw Point and Horsea Island (Portsmouth).

Mixing House

Bull Point BP, 2-8	Building 124	1804/5 reconstructed 1830	II

Dusting House

Bull Point BP, 2-5		1804/5 reconstructed 1830	Now visible as exposed foundations only

3.7 Original Laboratory Buildings

As noted elsewhere, Laboratories conceived in completely different building terms were built in the 1890's. Priddy's Hard preserves the unique remains of the 1847/8 Laboratory. Nothing remains of the Laboratory at Devonport, and nothing indicative remains at Upnor Castle.

Laboratory Buildings

Priddy's Hard PH, 12-19, 21-23	Buildings 204,413,416	1847/8	II

Laboratory Workers' Cottages

Priddy's Hard PH, 19-20	Buildings 216,217,404,806	1847	II

Laboratory Boat House

Priddy's Hard PH, 21	Building 314	1847 rebuilt later C19 at unknown date	II

3.8 Early Shell Stores

By the mid-nineteenth century shells were becoming more and more important in naval armaments, and for safety reasons filled shells could not be stored in the great Store Magazines.

Upnor MM, 11-12	Building LU 010	1861/2	Mostly demolished
Priddy's Hard PH, 26-9, 33-5	Building 303	1879	II
Upnor MM, 14-15	Building LU 012 No.3 Shell Store	1882-3	Demolished
Priddy's Hard PH, 79	Building 433	1889	II This was specifically for ammunition for 6 and 3 pdr. QF guns
Bull Point BP, 39	Building 8	1894/5	Built for the Army after the division of the Depot
Priddy's Hard PH, 63	Building 316	1896/7	II

3.9 Fuze and Tube Stores

In the 1850's fuzes were still very simple, but an essential part of the shell. They were normally stored separately, together with the firing tubes and percussion caps used to fire the guns.

Bull Point BP, 26-7	Building 55	1856/7	II

3.10 Empty Case Stores

Shells, and many other articles, were held packed individually in wooden boxes. As each ship had a regulation outfit of shells assigned to it, together with those held in reserve, a large space was required to house the store of empty cases which needed to be maintained.

Bull Point BP, 21	Building 43 Empty Barrel and Case Store	1856/7	II
Bull Point BP, 29-31	Building 63 Empty Barrel and Case Store	1856/7	II
Priddy's Hard PH, 38-39	Building 418 Shed for Empty Powder Cases and Barrels	1859	II
Priddy's Hard PH, 30	Building 218 Case Store	1865	II
Priddy's Hard PH, 39	Building 429 Case Store	1879	II
Priddy's Hard PH, 62-63	Building 312 Empty Powder Case Store	1891	II
Priddy's Hard PH, 78-79	Building 428 Empty Package Store	1896/7	II
Priddy's Hard PH, 60-61	Building 306 Case Store	1879	Much altered
Bull Point BP, 46	Building 39 New Building for Empty Powder Cases	1895/6	
Priddy's Hard PH, 61	Building 311 Case Store	1901	II

3.11 Early Cartridge and Shell Filling and Packing, and related Buildings

These are buildings of very different character and construction from those that were used for these purposes later in the century.

Bull Point BP, 25	Building 54 Hydraulic Press House for baling Cartridges	1856/7 No other example is known to have existed in the other Depots.	II
Bull Point BP, 31-32	Building 65 Filling and Packing House	1858	II
Bull Point BP, 32-33	Building 69 Breaking Up House	1858 -for dismantling defective ammunition	II

3.12 Store for planks, flannel cartridges, Foreman's Office and Printing Press Room

The mix of stores on this site is found nowhere else.

Bull Point BP, 22-3	Building 49	1856/7	II

3.13 Storekeeper's Office. Rooms for Storekeeper, Clerk, Messenger and Records

The administrative centre of Bull Point as completed.

Bull Point BP, 23-4	Building 50	1856/7, given flat roof 1940	

3.14 Pattern & Class Rooms

For instructing the staff in the construction and handling of ammunition, etc.

Bull Point BP, 28-9	Building 60	1862/3	II

3.15 Smithery

On a far humbler scale than the great Dockyard Smitheries.

Bull Point BP, 34	Building 100	1856/7	

3.16 Accommodation block for Messengers, Foremen and Police Sergeants, with Artificers' Shop

Possibly the most re-used and adapted building at Priddy's Hard, its multiple numbering reflects its subsequent uses.

Priddy's Hard PH, 42-3	Buildings 236,237,239,288,339	1877	

3.17 Painters' Shops

Identification marks and codes needed to be put on containers and the ammunition itself was colour coded.

Bull Point BP, 33	Building 71	1858	
Priddy's Hard PH, 69-71	Building 341	1900/01	II
Bull Point 62-3	Building 92	1901/5	

3.18 Shifting Rooms

The planning of these buildings became more elaborate than the old Shoe Rooms.

Bull Point BP, 64-66	Building 110	1856/7. Extensive rehandling at later dates	
Priddy's Hard PH, 78 UID 149784	Building 410 (Shifting Room)	After 1883.	II
Priddy's Hard PH, 58	Building 229 Unique in retaining its original fittings internally.	1897, extended WWI?	II
Priddy's Hard PH, 57	Building 223	1898/1899	II
Bull Point BP, 53-4	Building 61	1901/2	

3.19 Truck Shed

For the internal narrow gauge railway system.

Upnor MM, 15-16	Building LU 015	Early 1890's	

3.20 Shell Filling Rooms

The first set at Priddy's Hard set the pattern for repeats at Bull Point and Upnor.

Priddy's Hard PH, 44-46, 72-73	Buildings 346a, 346b, 346c	1886/7 1886/7. 346c was originally a Shell Fuzing Room.	II
Bull Point BP, 59-61	Buildings 84, 85, 86	1893/4	
Priddy's Hard PH, 74	Building 346d	1898. Differing fenestration from the 1886/7 set	II
Upnor MM, 19		1903-4. Only traverses remain.	

3.21 QF Shell Filling Rooms

Apparently not repeated at any other Depot.

Priddy's Hard PH, 45, 71-72	Building 342	1887/9	Surrounding archaeology included in revised schedule.

3.22 Expense Magazine for Shell Filling Rooms

Barrels of powder sufficient for one day's work were stored here for immediate use

Priddy's Hard PH, 81-82	Building 461	1886	II To be considered by MPP

3.23 Unheading Room

The barrels brought from the Expense Magazine were opened here before the powder was brought to the Shell Filling Rooms.

Priddy's Hard PH, 59	Building 242	1890s. This replaced the original Unheading Room of 1886.	II
Bull Point BP, 61-62	Building 87	1886. This Weighing Room performed the same function, and was built instead of the fourth Shell Filling Room. By 1913 it was termed an Unheading Room.	

3.24 Shell Emptying Rooms

For cleaning out condemned ammunition prior to re-use.

Priddy's Hard PH, 72	Building 345 New Shell Emptying Room	New Shell Emptying Room	II

3.25 Boiler House

These were required to heat all the new Shell Filling Establishments with a circuit of hot water pipes.

Priddy's Hard PH, 82	Building 462	1895 A replacement for the original building.	II

3.26 Detonator Stores

Upnor MM , 17-18	Building LU 010	1895/6	

3.27 Wet Guncotton Magazines

No special precautions were required for this safe explosive.

Upnor MM, 16, 18	Building LU 014	1895/6	
Bull Point BP, 50-51	Building 51	1897	II

3.28 Dry Guncotton Magazines

These resembled miniature versions of Cordite Magazines.

Bull Point BP, 41-3	Building 28	1900	Altered. Surrounding archaeology to be included in revised schedule.
Lodge Hill MM, 30-31	Building LH 152	1900/03	

3.29 Mine and Countermine Stores

The majority of mines in use before 1905 were held by the Royal Engineers at their Depots.

Bull Point BP, 52	Building 53	1897	
Priddy's Hard PH, 77-78	Building 409	1899/1900	II
Upnor MM, 17	Building LU 018	1903/4	

3.30 Mine Examining Rooms

At Priddy's Hard and Upnor these are built as annexes to the Mine Stores.

Bull Point BP, 51-52	Building 52	1902/3	

3.31 Filled Shell Stores (after the Admiralty takeover)

These were the largest buildings on ordnance yard sites.

Priddy's Hard PH,	Building 406 (Shell Store)	1896/7	II
Bull Point BP, 46-47	Building 41 (Covered Shell Base)	1897, rebuilt 1940	
Bull Point BP, 49-50	Building 47 (QF Ammunition Store)	1898/9	
Bull Point BP, 48-49	Building 45 (QF Ammunition Store)	1899	II
Priddy's Hard PH, 76-77	Building 407 (New Filled Shell Store)	1899, extended by 1903	II
Bull Point BP, 47-48	Building 44 (No.3 QF Magazine)	1901	
Upnor, MM, 17-18	Building LU 017	1903/4	
Bull Point BP, 54-55	Building 62	1906	
Lodge Hill, MM, 36-37	Building LH 123	1920s?	
Lodge Hill, MM, 36-37	Building 124	Early 1930s	

3.32 Cordite Magazines

These buildings needed to be temperature controlled, and were connected to the hot water pipe circuits.

Plumstead and Erith		1896-1900	Demolished
Priddy's Hard PH, 81	Building 454	1898/99	Surrounding archaeology included in revised schedule.
Bull Point BP, 40-41	Building 29	1899/1902	Surrounding archaeology to be included in revised schedule.
Lodge Hill MM, 30	Building LH 110, 111, 116	1900/03	
Lodge Hill MM, 31	Building LH 117	1900/03. Deposit Magazine for ammunition from ships	
Priddy's Hard PH, 75	Building 358	1905/6	
Lodge Hill MM, 34	Buildings LH 113, 114, 119	1910/11	

3.33 Cordite Examining Rooms

Lodge Hill MM, 32	Buildings LH 119, 121	1900/03	

3.34 Cordite Cartridge Stores

Lodge Hill MM, 28-29	Buildings LH 107, 108	1899	

3.35 Cordite Expense Magazine for Laboratory

Lodge Hill MM, 35	Building LH 120	1912	

3.36 New Laboratory Buildings

The frangible wooden buildings at Priddy's Hard set the pattern for all subsequent Laboratory buildings, and the general principles remain in use today. All of these buildings were altered in 1923 *for* work on shells rather than cartridges. See PH,p.106.

Priddy's Hard PH, 54-55	Buildings 127, 128, 129, 130, 131 (Rooms for testing filled powder cases)	1897	A representative sample to be assessed by MPP. Surrounding archaeology included in revised schedule.
Priddy's Hard PH, 68	Buildings 336, 336e, 336f (Rooms for filling cordite cartridges)	1897	
Priddy's Hard PH, 67	Buildings 336b, 336c (Rooms for filling cartridges)	1897	
Priddy's Hard PH, 67	Building 336d (Room for labelling & stencilling boxes)	1897	
Priddy's Hard PH, 66-67	Building 336a (Room for unheading powder barrels)	1897	
Priddy's Hard PH, 82	Building 464 (Room for securing, labelling & stencilling boxes & cases)	1897	

3.37 Drying Rooms

For drying cartridges.

Priddy's Hard PH, 59	Building 231	c1900	

3.38 Trotyl Melting Rooms

These were installed at the beginning of the First World War to deal with the new shell filling.

Priddy's Hard PH, 97-98	Building 344	1915	II

3.39 Trotyl and Shellite Shifting Rooms

Shellite was a high explosive consisting of a mixture of dinitrophenol and picric acid. Like Trotyl, it could be melted on a water bath. It was used as an intermediary to set off the main
explosive when an initiatory detonator was not used.

Bull Point BP, 64	Building 99	1915	

3.40 Articles in Use Store

For the Shell Area Laboratory.

Priddy's Hard PH, 121	Building 255	1939	

3.41 Munitions Store

It is not known what exactly was stored in this building.

Bull Point BP, 56	Building 72	1900	

3.42 Fire Engine Sheds

Priddy's Hard PH, 30-31	Building 224	Before 1880. Drastically modified subsequently.	
Priddy's Hard PH, 91	Building 213	Before 1920. Combined with a Pay Office.	

3.43 Tinsmiths' and Painters' Shop

Bull Point BP, 67-68	Building 129 (Tinmen's Shop and Cleaning Room)	1901/2	
Priddy's Hard PH, 92-93, 107-108	Building 309	1916, subsequently adapted to handle torpedoes.	
Bull Point BP, 75	Building 138 (Tinsmiths' Shop. Painters' Shop, Joiners' Shop)	1935	

3.44 Paravane Depot

The explosive paravane was not long in service and the buildings constructed to house and maintain them were soon put to other uses.

Bull Point BP, 74	Building 112	1917	

3.45 Transfer Sheds

These marked the connection of the Depots with the standard gauge railway network.

Bull Point BP, 76	Building 139	1916	
Priddy's Hard PH, 101	Building 408 (Shell Store Transfer Shed)	1917 (three Transfer Sheds eventually provided)	II

3.46 Naval Ordnance Inspector's Office

Priddy's Hard PH, 104-5	Building 211(2	1914?	

3.47 Electrical Power Stations

Bull Point BP, 63-64	Building 95	1904/6	
Priddy's Hard PH, 93-94	Building 319	1918	

3.48 Switchboard House

Priddy's Hard PH, 92	Building 302	1918?	

3.49 Charging Room for Electric Trolleys

This presumably dates the introduction of this motive power for the tramways at Bull Point.

Bull Point BP, 75	Building 137	1924	

3.50 Search Rooms

Priddy's Hard PH, 58	Building 227	1895?	
Priddy's Hard PH, 83-84	Building 227	1895?	
Priddy's Hard PH, 56-57	Building 202 (New Shelter Shed & Search House)	1902/3	
Priddy's Hard PH, 105	Building 228	1915 Possibly added at this time as a Women's Search Room.	

3.51 Carpenters' Shops

Bull Point BP, 43	Building 31 (Departmental Works Carpenters' Shop)	1890s	
Priddy's Hard PH, 61	Building 307 (New Carpenters' Shop)	1903. Probably built to serve the Departmental Works Department	

3.52 Departmental Workshops

This is a heterogeneous class of small buildings, at Priddy's Hard mostly adapted from earlier structures. As such these are the only buildings not listed here under their original functions, as these are no longer apparent at all. In both Depots concerned the buildings are grouped together.

Priddy's Hard PH, 5	Building 214	1780s?	
Bull Point BP, 44	Building 33 (Foreman's Office and Stores)	1892	
Bull Point BP, 43	Building 32 (Departmental Works Office)	1890s	
Priddy's Hard PH, 6-7	Building 305	1904/5	
Priddy's Hard PH, 7	Building 388	Late 1930's?	

3.53 Oils & Paints Stores

Priddy's Hard PH, 83	Building 466	1895	
Priddy's Hard PH,	Building 465	1895	

3.54 House for Crews of Steamers

To accommodate the men who delivered the seaborne stores.

Bull Point BP, 44	Building 34	1894/5	

3.55 Police Offices

Another, of slightly later date and quite different design, survives at Bedenham.

Bull Point BP, 45	Building 36	1894/5	

3.56 Examining Rooms

For inspection of stores on arrival or before dispatch by ship.

Priddy's Hard PH, 123-4	Building 321	1919	

3.57 Wash House

Priddy's Hard PH, 121-122	Building 270	1938	

3.58 Gas Decontamination Building

Priddy's Hard PH, 113	Building 97	1939	

3.59 First Aid Station

Bull Point BP, 74	Building 113	1939	
Bull Point BP, 71	Building 40	1939	

3.60 Trailer Pump House

Apparently the only one of these passive defence structures to survive in an Ordnance Yard.

Priddy's Hard PH, 120	Building 234	1939	

3.61 Police Post

Sometimes misdescribed as a pillbox.

Priddy's Hard PH, 111	Building 20	1940 One also exists on the roof of 436; see PH, p.42.	

3.62 Electrical sub-station

Priddy's Hard PH, 111-112	Building 45	1940s?	

3.63 Governor House

Priddy's Hard PH, 113	Building 89	1940s?	

3.64 Surface Air Raid Shelter

Apparently the only one to survive in an Ordnance Yard. Two underground, or partially underground, shelters also survive at Priddy's Hard, though these are not numbered buildings. Some may well exist at Bull Point and the Medway magazines.

Priddy's Hard PH, 114	Building 141	1940	

4.0 The survival of building types at the Naval Ordnance Yards

64 building types have been identified above (excluding latrines and bicycle sheds)

	Priddy's Hard	Bull Point	Upnor	Chattenden	Lodge Hill
Number of buildings present	84	53	8	5	14
Number of types represented	44	39	7	1	6

This may be further subdivided, as follows:

	Priddy's Hard	Bull Point	Upnor	Chattenden	Lodge Hill
Number of types represented	44	39	7	1	6
Number of nationally unique types	24	15	2	-	3

The greater importance of the Priddy's Hard and the Bull Point sites is evident. The extent to which they complement each other can be seen by the fact that between them they preserve examples of 39 out of the 64 types identified which can be found nowhere else. The Priddy's Hard site is further complicated by the fact that it is currently divided into three sections; the Heritage Area, an area sold off to Barratt Homes, an area owned by Gosport Council in limbo between the two. The boundary between this area and the Heritage Area is unclear, but the following figures will not be far out:

	Heritage Area	Gosport Council	Barratt Homes
Number of buildings	37	39	8
Number of types	21	21	4

The breakdown of unique structures within these sections is as follows. To simplify matters, all the different New Laboratory Buildings are regarded as one type here.

	Heritage Area	Gosport Council	Barratt Homes
Number of types	21	22	4
Number of nationally unique types	6	15	2

Nor is this all. Of the two types not strictly unique on the Barratt estate, one is a cordite magazine of the type first developed at Erith to house the explosive, and now the sole example of that design, while the four Shell Filling Rooms include the three original 1886/7

buildings, the first to be built and far more complete as a group than other remaining examples at Bull Point. The unique structures in the Council's territory contain not only the buildings which worked in conjunction with these Shell Filling Rooms, preserving virtually the whole of the complex, but also the New Laboratory of 1897. Though they have been treated here as one building type, reference back will show that the latter actually comprise five buildings for testing filled powder cases, three rooms for filling cordite cartridges, a room for unheading powder barrels which worked in conjunction with two rooms for filling cartridges, and two rooms for labelling and stencilling boxes. Some of the Second World War structures, though unique, are not of comparable importance at all (such as buildings dealing with the internal electrical systems) but others, such as the Gas Decontamination building, more dramatically illustrate through their form the site's relationship to the military and historical context of the period. It is true that some of the Second World War structures are nationally unique only within the context of Ordnance Yards, but this only applies to five of the least important buildings on the Council site, which still leaves nearly half the building types.

It is clear from the above that 17 out of the 39 nationally unique building types are in areas of Priddy's Hard where their future is uncertain. Matters are made worse by the split in the site, which cuts completely across the functional layout of the shell and cartridge filling systems, as made evident in the plans reproduced in PH pp.45, 48 and 50. The buildings concerned may be set out in more detail:

Barratt Homes	Date	Building	Description	Historic status
	1886/7	346a	Shell Filling Room	The first and best preserved Shell Filling Rooms to be built in Ordnance yards. The presence of nearly all the original ancillary buildings makes them of particular importance.
	1886/7	346b	Shell Filling Room	
	1886/7	346c	Shell Filling Room	
	1898	346d	Shell Filling Room	
	1898/99	454	Cordite Magazine	The oldest surviving Cordite Magazine
	1903	345	Shell Emptying Rooms	Unique
	1905/6	358	Cordite Magazine	Built as an expense Magazine for Shell and Cartridge Filling, rather than as a Store Magazine like the above.
	1915	344	Trotyl Melting Rooms	Sole remaining building built for one of the principal explosives of World War 1.

These buildings worked in conjunction with:

Gosport Council	Date	Building	Description	Historic Status
	1886	461	Expense Magazine for Shell Filling Rooms	Unique.
	1887/9	342	QF Shell Filling Rooms	Unique.
	1895	462	Boiler House	Replaced original building of 1886.
	1890's?	242	Unheading Room	Replaced original building of 1886
	1900/01	341	Shell Painting Shop	Examples exist at Bull Point, but this is stylistically related to the Shell Stores which the complex supplied.
	1895	466	Oils and Paint Store	Probably worked in conjunction with the above building.
	1895?	465	Oils and Paint Store?	As above.

The cartridge Filling Complex also survives as a self-contained, remarkably well-preserved set of buildings, all on Gosport Council land:

Gosport Council	Date	Building	Description	Historic Status
	1878/9	436	E Magazine	By 1897 bulk powder was stored here to be supplied by the barrel to the Unheading Room of the New Laboratory.
	1897	336a	Unheading Room	Unique.
	1897	336b	Room for filling cartridges	Supplied by the above.
	1897	336c	Room for filling cartridges	Unique.
	1897	127	Room for testing filled powder cases	Unique.
	1897	128	Room for testing filled powder cases	
	1897	129	Room for testing filled powder cases	
	1897	130	Room for testing filled powder cases	
	1897	131	Room for testing filled powder cases	
	1897	336	Room for filling cordite cartridges	

	1897	336e	Room for filling cordite cartridges	Supplied from the Cordite Magazines. Unique.
	1897	336f	Room for filling cordite cartridges	
	1897	336d	Room for labelling and stencilling boxes	Unique.
	1897	464	Room for securing, labelling and stencilling boxes.	Unique.
	1897	229	Shifting Room	The only Shifting Room to retain internal fittings.
	c.1900?	231	Cartridge Drying Room	On site of 1889 Proof House. Consequently probably contemporary with the building below.
	1897?	335	Proof House	Rebuilt 1921, but completes the set of buildings.

The additional structures comprise:

Gosport Council	Date	Building	Description	Historic Status
	1895	466	Oils & Paints Stores	Worked in conjunction with the Shell Painting Room. Unique.
	1895?	465	Oils & Paints Stores	
	1895?	227	Search Room	The Search Rooms at Priddy's Hard appear to be only ones to survive in Ordnance Yards.
	Late 1890's	437/322	Search Room	
	1902/3	202	Search Room and Shelter Shed	
	1914?	41	Naval Ordnance Inspectors Office	Unique.
	1915?	228	Search Room	
	1918?	302	Switchboard House	Unique.
	1919	321	Examining rooms	Unique.
	1938	270	Wash House	Unique.
	1939	255	Laboratory Articles in Use Store	Unique.
	1939	97	Gas Decontamination Building	Unique.
	1940	20	Police Post	
	1940	141	Surface Air Raid Shelter	Unique.
	1940's?	89	Governor House	Unique.

5.0 LIST OF SITES AND RECOMMENDATIONS FOR PROTECTION

5.1 GUIDE TO TABLES

Building Number and Name Cross-reference to reports (PH, MM and BP) Unique Identifier Number, relating to the Listing Management System database at WHS	Historical information and, where relevant, cross-reference to Building Types analysis (Part 3 of this report)	Recommended listing grade

The Depots at the three principal dockyards each evolved in a quite distinct way, because of the peculiarities of each individual site. At Priddy's Hard, the buildings accumulated within their own fortifications until the late nineteenth century, when the site was greatly extended outside the ramparts. Development continued within the original area, to provide a close mix of buildings of all periods there, while the new site presented largely twentieth century layout. The developments at Devonport were dictated by the demands of the Navy, who required Keyham Point for their expansion of the Dockyard to meet the needs of steamships. Bull Point was selected as the new site; this occupied a narrow coastal strip to the north of the restoving establishment, several hundred yards away. This became transformed into the Laboratory wing of the new Depot, and unlike the jumble of Priddy's Hard, the buildings developed around a clear marked axis. At the Medway, where the Elizabethan Upnor Castle had been adapted as an unsatisfactory magazine and laboratory, nineteenth century developments marginalised the role of the old building and developed in a linear fashion along a riverside site more cramped than that of Bull Point. Further expansion for Store Magazines was enabled by the purchase of separate inland sites firstly at Chattenden and later at Lodge Hill. In a similar way, when it was decided that Priddy's Hard magazines should only be used for explosives used for shell filling, a completely separate development was undertaken at Bedenham. No such proceeding took place at Bull Point, which remained a self-contained Depot.

6.0 BEDENHAM
Gosport Borough Council
Hampshire
149172

There are no recommendations for protection on this site. by 1908 this plan had been abandoned and work began at once at Bedenham. Drawings for the first magazines had been completed by February 1909 and negotiations for a standard gauge connection begun early the next year.
The administrative group survives largely intact, but the buildings are well below the mark on architectural grounds (compared, for example, to the First World War cordite factory at Holton Heath in Dorset) and in view of the fact that they relate to an extensive site where there has been much demolition. The site remains in use by the navy, and most of the surviving magazine buildings have been reclad. The shell stores have all been demolished. The site is described in the Priddys' Hard report.

(David Evans, *Priddys' Hard,* (report for Listing Team, English Heritage), 2000)

7.0 RNAD BULL POINT
Plymouth City Council
Devon

Bull Point, located just to the north of the Royal Navy's new Steam Yard at Keyham, was the last great project of the Board of Ordnance, which was abolished in 1856. It provided storage for 40,000 barrels of powder in an integrated complex including a floating magazine where powder was unloaded and the 1805 St Budeax laboratory where it was checked and processed, before being taken to the Bull Point magazines (SAM). In contrast to other yards, Bull Point was from the outset provided with a set of buildings planned and dedicated to the various functions for the processing as well as the storage of the new types of ordnance which had a revolutionary impact on the design of naval ships and fortifications. All the buildings – mostly in ashlar with rock-faced dressings and fronting an avenue to the S of the magazines - are stylistically coherent with the magazines themselves, and comprise both the finest ensemble in any of the Ordnance Yards and a remarkable example of integrated factory planning of the period.

The magazines for Devonport dockyard had been moved from Morice Yard – developed from the 1720s – to Keyham Point in 1775. Sir William Congreve, Deputy Comptroller of the Royal Laboratory in Woolwich, proposed in 1804 the establishment of subsidiary Laboratories (now demolished) at Portsmouth and Plymouth. Restoving establishments, for the repair of damaged powder returned from ships, were also to be provided. The potentially hazardous work of examining, restoving, dusting and remixing gunpowder could not be carried on in such proximity to the towns and advantage was taken of the local topography of the areas to provide dispersed locations to and from which the powder could be taken by water transport. At Plymouth all the powder processing facilities were concentrated at St Budeaux safely up the Hamoaze. Several plans survive of the establishment, whose buildings were of the same design as those at Stamshaw and Little Horsea in Portsmouth (where only below-ground remains can be traced). Earth traverses reinforced with masonry were used to minimise the effects of any explosion, and the boiler which supplied steam to the stoves was placed between two semi-circular traverses. The Mixing House of 1804 (Building 124), is the only building surviving on the site, the footings of the other structures being clearly visible.

The establishment of a new large magazine at Bull Point was forced on the Ordnance Board because of the Admiralty's decision to build a Steam Yard, with basins and very extensive factory facilities at Keyham. The town of Devonport was rapidly encroaching on the Keyham Point magazines and in 1841 the inhabitants petitioned for its removal. The CRE at Devonport (Colonel Oldfield) was asked to find a new site, although its proved to be a prolonged business. Although March 1845 tenders for work at Bull Point were advertised (Baker and Son being given the tender), it was to be nearly seven years before Bull Point was ready for operations. Work on the magazines and associated traverses and enclosures commenced in October 1851 and was completed by June 1854: Oldfield's plans for the magazines were only slightly modified by his successor, Colonel Holloway. Drawings for other buildings are dated 1855-8.

As completed, Bull Point housed 40,000 barrels in four magazines, and now formed an integrated complex with St Budeaux, now renamed a Royal Laboratory. St Budeaux itself had been altered, updated and added to, and the danger buildings of the whole site only performed one function each. In 1865 the design of the depot was highly praised and the

designer commended - the prolonged gestation had in fact been worth while. The establishment worked in tandem with the floating magazine *Conquistador* moored half a mile away. When a ship was paid off, its ammunition was transferred to her, and thence to St Budeaux, where it was examined, stoved if necessary, and then sent to Bull Point, which consequently only ever handled powder which was in a perfect state. Tramroads connected all the buildings where materials were handled, the Receipt and Issue Magazine being sited close to the basin: the inadequate size of the latter necessitated the construction of a new powder pier opposite the main magazines.

In contrast to other yards, Bull Point was from the outset provided with a set of buildings planned and dedicated to the various functions which were now coming into demand. The development of artillery meant a great increase in the use of filled shells and the fuzes required to detonate them. Storage room was thus required for the wooden boxes in which shells were loaded onto ships (Buildings 43 and 63), for fuzes and the percussion caps and friction tubes for firing the guns (Building 55). Cartridge and shell filling and packing (Building 65) required buildings of a very different character and construction from those introduced later in the century. Gunpowder was fitted into the shell in flannel cartridges, which needed to be compressed in order to reduce their stowage space on board ship (Building 54). Examining rooms, for unheading barrels and examining contents, were also supplied (Building 59) with instructional rooms (Building 60, soon converted into a school for the children of the staff). All the buildings – mostly in ashlar with rock-faced dressings and fronting an avenue to the S of the magazines - are stylistically coherent with the magazines themselves, and provide the finest ensemble in any of the Ordnance Yards and a remarkable example of integrated factory planning of the period. Also part of the planning of the site, and relating to the fortification of the Plymouth area, were the defensible barracks sited to its north-east, above the altered and demolished managers' houses.

A further building campaign of 1893-1906 left Bull Point prepared for the First World War. The Cordite Store (Building 28), Dry Guncotton Magazine (Building 29) and Wet Guncotton Store (Building 28) are now – with the loss of similar structures at Priddy's Hard – the best surviving group representative of the development of new explosives, and Building 45 provides the finest example – maintaining the high standards established in the 1850s – of a store for the ammunition of the quick-firing guns being increasingly fitted onto warships.

(David Evans, *Bull Point* (report for Listing Team, English Heritage), 2000)

7.1 Buildings recommended for listing

Bull Point Training Centre 3 items: Perimeter wall and attached guard house, magazine, stables, garage and canteen **151729** Block One (former soldiers' quarters) **151730** Block Two (former officers' quarters) **151731** BP, 17	Built in 1855-8 for the garrison guarding Bull Point, and the finest defensible barracks of the period outside Pembroke in Wales. Also part of the nationally-important fortifications of the Plymouth area. The complex is surrounded by a tall defensible wall, projecting at the corners to form bastions covering alternate sides, with rifle slits. The entrance has a wide pediment containing a shield over a semi-circular arched doorway with rusticated dressings.	II
Buildings 17 (Magazine 4), 25 (Magazine 3), 26 (Magazine 2) and 27 (Magazine 1) and associated traverses BP, 19-21	Retain as Scheduled Ancient Monument, which is being revised to include traverses surrounding Buildings 28 and 29: it may also, subject to consultation, include the latter.	SAM
Building 13 BP, 18-19 **142790**	Intended to receive ammunition from ships coming in to refit or be paid off. Powder barrels which had been checked were held there for issue. The most architecturally elaborate of any C18 or C19 magazines. Decorative treatment extends to even the ventilation holes, recalling the late C17 work of the great French engineer Vauban.	II*
The Camber **142797**	Basin walls enclosing wet dock, with entrance to NW	II
Entrance gates and wall to east side of RNAD Bull Point **151732**	Extends approx. 750 m from NW to SE, reflecting the secure nature of the site.	II
Enclosure walls and piers to SW of Buildings 17, 25, 26 and 27 (2 items)	Define western boundary of magazine enclosure, with return to N end and piers to south end. The arched entrance to the south inscribed B(oard) O(rdnance)	II

151733		
Building 43 BP, 21 **151736**	Empty Barrel and Case Store, sited to the W of Magazine 1. With 63, the most architecturally-distinguished example of this key building type (3.10).	II
Building 49 **151737**	Flannel cartridge store, printers and office. Buildings 49, 50, 54, 55, 59, 63, 65 and 69 all face onto the avenue which extends northwards from the dockyard to the Magazine enclosure.	II
Building 55 26-7 **151738**	Tube and Fuze Store (3.9). A unique example representative of the state-of-the-art technology of the 1850s.	II
Building 59 BP, 59 **151740**	Examining Room, for unheading barrels and examining contents. The least altered individual example of a building type (3.4) characteristic of the period up to 1860.	II
Building 63 BP, 29-31 **151741**	Empty Barrel and Case Store. With 43, the most architecturally-distinguished example of this key building type (3.10).	II
Building 54 BP, 25 **151742**	Hydraulic Press House. With 65 and 69, part of a unique ensemble representative of the ordnance technology of this period, before the extensive shell-filling complexes needed for the 12-inch breech-loaders of the 1880s onwards (3.11).	II
Building 65 BP, 31-32 **151743**	Shell-filling and packing workshop.	II
Building 69 BP, 32-33 **151744**	Breaking-up House, for dismantling defective ammunition.	II
Building 60 BP, 28-9 **151745**	Pattern and Class Room, for instructing staff in the construction and handling of ammunition and later converted into a school. A unique example (3.14), unusual in any C19 industry and in its later manifestation broadly comparable to the classrooms built on barracks from the 1850s and by some enlightened industrialists on factory sites. Sited uphill to the E of the main avenue.	II
Building 28 BP, 40-41 **142798**	Cordite Store, 1899-1905, surrounded by earth traverses. Two cordite stores have survived at Priddy's Hard, in the area outside the ramparts under development. This	Altered. Surrounding archaeology included in

	example is the only one to relate to an important core group, and thus the introduction of this important new explosive (3.32). Cordite stores were built soon after the new smoke-less propellant replaced gunpowder in the 1890s, and its more stable character is reflected in the much lighter construction of this early example. Surrounded by an earth traverse. The original design had a raised roof and front parapet, and a pair of traveller cranes.	revised schedule.
Building 29 BP, 41-43 **151746**	Dry guncotton magazine, 1900, surrounded by earth traverses. The best surviving example, relating to a key site and the introduction of this important new explosive (3.28).	Altered. Surrounding archaeology included in revised schedule.
Building 57 BP, 50-51 **151747**	Wet guncotton store, 1896-7. The least-altered and most significant surviving example (3.27), relating to a key site. Guncotton magazines were built for the new smoke-less explosives which replaced gunpowder from the 1890s. It could be stored wet or dry, the latter needing precautions against explosion, hence the earth traverses. In its dry state it was more stable, as is reflected in the much lighter construction of this complete and early example of a store.	II
Building 36 BP, 45 **151748**	Police Station, 1896. A unique example relating to a key site (3.55)	II
Building 45 BP, 48-49 **151749**	QF Ammunition Store, 1899-1905. The most architecturally elaborate example in the ordnance yards (3.31), relating to a key period in naval ordnance and prominently sited close to magazine enclosure on this key site.	II
Building 124 BP, 2-8 **151750**	Mixing House of 1804, the only survival from the St Budeaux Restoving Establishment	II

7.2 Buildings not recommended for listing, but of particular importance within the group One UID for the following: 151895

Building 61 BP, 53	Shifting room, 1901-2. The largest example in the ordnance yards, reflecting the needs to accommodate a larger workforce on this expanded site (3.18)
Building 34 BP, 44	House for crews of steamers, 1899: given flat roof 1940 but prominently sited opposite Police Station
Building 39	Empty Packing Case Store, 1895-6
Building 50 BP, 23-4	Clerk's Office, 1856-7, given flat roof 1940
Building 71 BP, 33	Painters' Shop, 1858. Refenestrated
Building 110 BP, 65-6	1866 Shifting House remodelled as Shell Filling Room: positioned well to south of main group
Building 8 BP, 39	Filled shell store, 1894-5. The only building on the site built by the War Office after the division of the site between the army and navy.
Building 52 BP, 51	New Mine Shop, 1902-3
Building 53 BP, 52	Mines and Countermines Store, 1897-1905

7.3 Not listable

Building 31	Carpenters' store, 1896-7
Building 33	Store, 1896-7
Building 39	Store for empty powder cases, 1895-6
Buildings 52 and 53	New mine shops of 1902-3
Building 62	Shell store, 1906. Much more altered than Priddy's Hard example.
Buildings 41, 44 and 47	1890s ammunition stores, altered mid C20
Building 92	Shell painting room, 1901
Building 95	Electricity generating station
All buildings in Phases 4 and 5	Mostly sited to south of principal group. Priddy's Hard has more significant groups of buildings belonging to these periods, the incomplete shell filling group (Buildings 84, 85, 86 and 87), for example, having a much more complete - both intrinsically and contextually - match at Priddy's Hard. The Bull Point report – outlining these phases from p.56 – can now be used as a basis for future recording prior to any clearance works

8.0 CHATHAM
Medway District Council
Kent

A late 19th century store and carriage house, together with the early 18th century storekeepers' house (now the Public House, grade II) is all that remains of the ordnance wharf on this site.

9.0 CHATTENDEN
Frindsbury Extra
Medway District Council
Kent

149173

Chattenden was developed as a Bulk Storage depot to supply Upnor by rail. Land was purchased on this inland valley-slope site in 1872, and work commenced in December of the same year. The five magazines – built for a capacity of 4,000 barrels each – were smaller versions of the 1850s group at Bull Point. They have all been adapted as a consequence of the subsidence that became apparent as early as the 1880s: buttresses were first built between the external walls and the revetted walls of the traverses. Although the buildings are too altered to merit listing as a group, Chattenden's sole and continuing function as a magazine with no later encroachments has served to conserve its character as a landscape within its wooded valley setting. Its continued use is sympathetic to its conservation as a planned landscape: should this use finish, some consideration should be given to its future management in this respect.

(David Evans, *The Medway Magazines* (report for Listing Team, English Heritage), 2000)

10.0 GREAT YARMOUTH
Great Yarmouth Borough Council
Norfolk

The Lodges, Barrack Block, Armoury and Workshop survive from the original Board of Ordnance store of 1806-c1815, built to serve the fleet anchored in Yarmouth Roads during the war with France from 1793 to 1815. This was originally planned with parallel ranges of storehouses extending westwards from a quay on the River Yare to enclose a working area which included a small magazine. The probable designer was James Wyatt (1746-1813), Architect to the Board of Ordnance from 1782. One of two barrack blocks survive from its conversion into Militia Barracks in the 1850s, and further alterations to the site were made after its purchase by Coleman's (the food manufacturers) in the 1890s. Some of the Napoleonic buildings, including the storehouses and magazine, were destroyed by bombing during the Second World War. There are no proposed additions or upgradings on this site, but the list descriptions need revision.

(Adam Menuge and Andrew Williams, *The Royal Ordnance Store, Great Yarmouth,* RCHME, 1999 (NBR No. 44260))

No. 244 Southtown Road Southtown 149235	South Lodge, shown as Storekeeper's House in 1810 and a typical Wyatt design.	Listed grade II (item 235)
No. 244A Southtown Road Southtown 149234	Barrack block. A single-storey building heated from a single stack.	Listed grade II (item 236)
Workshop range N of No. 244A Southtown Road Southtown 149314	The surviving militia barracks building of 1853-5.	Listed grade II (item 238)
Utility block immediately E of No. 244A Southtown Road Southtown 149236	A single-storey building, shown as a smithy and carpenters' shop in 1810.	Listed grade II (item 237)
No. 244B Southtown Road Southtown 149315	The Armoury, a characteristic Wyatt design which is externally well preserved.	Listed grade II (item 239)
No. 245 Southtown Road Southtown 149316	North Lodge, shown as 'Clerk of the Cheques' House' in 1810 and built in a matching style to No. 244. Extended in 1891.	Listed grade II (item 240)

11.0 LODGE HILL
Frindsbury Extra
Medway District Council
Kent

149317

There has been much demolition on this extensive site, which was developed after 1898 as a consequence of the Admiralty's decision to abandon Woolwich Arsenal as a storage depot and locate a further site for cordite. None of the remaining structures are recommended for listing, there being superior examples of the type at Bull Point and Priddy's Hard. Two out of three Cordite Cartridge Stores remain, their entrance elevations having been altered through the insertion of large doorways.

A sizeable acreage was acquired at Lodge Hill, adjacent to the Army's Powder Magazines at Chattenden, and by 1899 the first cordite Cartridge Stores had been completed there. A set of five cordite Magazines, a dry guncotton Magazine, a Deposit Magazine and two Examining Rooms were added in 1900-1903, the whole design taking advantage of the large flat space available for development to lay out a new plan of Depot. The buildings - variants of the types established at Priddy's Hard and Bull Point - were arranged in sequence on either side of a railway line which formed the spine of the whole establishment: in many respects, the plan anticipated the extensive flow-line layouts of First World War filling factories. For the first time a standard gauge connection was provided for a Naval Ordnance Depot. In 1903 the Admiralty offered to take over the Chattenden Magazines in exchange for their half share in Purfleet, and this arrangement was agreed to, though no further building work was undertaken at Chattenden by its new owners. A Laboratory was established at Lodge Hill for filling cordite cartridges at the same time as the Shell Filling Rooms were added to Upnor. Further magazines were to be added and the Laboratory extended, but otherwise (except for an anti-aircraft battery of 1913, now an exceptionally rare survival to be assessed by MPP) Lodge Hill was set up for the First World War. The Royal Engineers, based across the Medway at Brompton Barracks, experimented early in the Second World War with different types of pillbox: some of these structures remain, and they will be assessed by MPP as part of the evaluation of 20th century fortifications.

(David Evans, *The Medway Magazines* (report for Listing Team, English Heritage), 2000)

12.0 MARCHWOOD

Former Royal Naval Armaments Depot
Magazine Lane
Marchwood
New Forest District Council
Hampshire

Marchwood was conceived in 1811 as a store depot like Tipner (Porstmouth). Potential canal communications from Southampton water were the Redbridge-Andover, Northampton-Winchester and Bursledon-Botley navigations. This was to be a 20,000 barrel magazine with two 10,000 barrel magazines the preferred disposition. In the event, and after deliberation resulting the adoption of submitted in 1811 by Sir William Congreve over those by General Fisher (commanding officer of the Portsmouth Royal Engineers' Department), 3 magazines each with a 6,800 capacity were built, with a small internal L-shaped channel for moving barrels by barge and a centrally-placed Shifting House. The shortcomings revealed through the Crimean War brought about the decision to increase storage capability, and additional magazines were built at Marchwood, Tipner and Upnor. In July 1853, the CRE Portsmouth had been asked to prepare a report on the expense of making Marchwood serviceable again. The magazines were ordered in September to be made fit to receive powder from Dover, and in November the floor of No. 3 Magazine was ordered to be made good before the establishment was re-established as a Powder Station and Officers appointed. This, effectively the second foundation of Marchwood, was marked by a vast increase in its storage, four new magazines, three of 14,400 and one of 9,600 barrels capacity being built in 1856-7. A *Times* article of 1864 noted that Marchwood was 'the largest magazine in the Kingdom', with a capacity of 76,000 barrels of powder. The establishment began to be wound down soon afterwards, there being 45 employees in 1898. B, E, F and G magazines were destroyed by the Luftwaffe in June 1940, and the Admiralty's use of the depot declined steeply after 1945: it was closed in 1961.

(Roger Bowdler, *Former Board of Ordnance Gunpowder Magazines, Magazine Lane, Marchwood, Hampshire*, Historical Analysis and Research Team, English Heritage, 1997)

12.1 Currently listed

Frobisher Court **149126**	Former barracks and flanking officers' quarters. 1816.	Listed grade II
Marchwood Yacht Club offices and attached wall and gates **149127**	Former depot office and guard house, linked by west forecourt wall and iron gates. 1814.	Listed grade II
Former A (No. 1) magazine and enclosure walls, 100m N of Marchwood Yacht Club offices **149129**	Built 1814, the brick cavity walls for prevention of damp and temperature control were built according to a system patented in 1809 by John Groves. Other 2 magazines destroyed 1940.	Listed grade II
Former receiving room 130m N of Marchwood Yacht Club offices **149128**	Built 1814-16, originally as a Shoe Room for changing into specialised magazine clothing. Extended in 1899 for cordite storage.	Listed grade II
Former examining room and enclosure walls 130m WNW of Marchwood Yacht Club offices **149130**	Built 1814, for unheading barrels and examining contents	Listed grade II
Former C magazine and enclosure walls 200m WNW of Marchwood Yacht Club offices **149131**	1856-7, for 14,400 barrels. Partial survival of barrel racks.	Listed grade II
Blast wall around site of former D magazine 250m W of Marchwood Yacht Club offices **149132**	1814. D magazine destroyed 1940. Subject to some alteration in 1990s when Hawkins Court built.	Listed grade II

12.2 Not listable, but protected within the conservation area (designated 1997)

One UID for following: 151896

Wall to Magazine Lane	Mid C19 dwarf wall with piers and iron railings
E and F Magazine walls	1854-6, adjoin the western perimeter of the site. The magazines have been demolished, and the walls – now within an area developed for housing in the 1990s – do not relate to the core group on this site. The E magazine walls have substantial later losses.
Sea wall	Dwarf wall of stone rubble and reused ashlar, mostly mid C19
West perimeter wall	Wall on approximate line, closing landward entrance to site, shown on early C19 plan. Bowdler, however, has concluded that it dates from the 1854-6 phase, when the adjacent E and F magazines were built.
Walls to B magazine	1854-6. Magazine demolished.
Canal	1814-15, only the N arm of the L-shaped canal has survived, with sloping sides descending to a narrow trench
Former labourers' cottages	1891, with later alterations.

13.0 MORICE YARD
Devonport
Plymouth City Council
Devon

- described in the summary report by Listing Team on Royal Naval Dockyards (Lake and Douet, 1997)

14.0 NEW AND OLD GUNWHARF SITES
Portsmouth
Hampshire

- described in the summary report by Listing Team on Royal Naval Dockyards (Lake and Douet, 1997)

15.0 PRIDDY'S HARD
Gosport Borough Council
Hampshire

Priddy's Hard's magazines and related structures date from the late 18th century. The site's expansion from the mid 19th century was closely related to the development of land and sea artillery and the navy's transition from the age of sail, powder and solid shot to the Dreadnought class of the early 1900s. Priddy's Hard retains the best-preserved range of structures that relate to this remarkable history of continual enlargement and adaptation, one that encompasses that of Britain's dominance as a sea power on a global scale.

The first phase of the site is bounded by the northern end of the Gosport Lines, defences for the protection of the naval dockyard that date back to the late 17th century and were extended around Priddy's Hard from 1757. The first plans were drafted in 1769, and the first phase of the complex was finished by the end of September 1777. This comprised a basin for powder vessels, a powder magazine, a cooperage for the repair of powder barrels, a rolling way (for moving powder in barrows or trollies), officers' houses and a shifting house (for the examination of powder). Two additional magazines were projected (and designed) in 1776, and, though never built, had a permanent effect on the shape of the site, as the Commanding Royal Engineer of the Portsmouth district, Captain Archer, was ordered to strengthen the line of fortifications – which until 1779 comprised temporary pallisades and fascines - to allow for them. The earthwork defences (Scheduled Ancient Monument) comprise a rampart with demi-bastions. The space so provided was to prove invaluable during the site's expansion in the next century.

Like the other magazines around Portsmouth, Chatham and Plymouth, the years of peace after the Napoleonic Wars had caused deterioration, particularly in the earthwork defences. This type of fortification needed a lot of attention – by 1809 they had been reported to be 'very ruinous' - and in 1844 it was decided to restore and improve them, making the dry ditch a wet one and adding a drawbridge which protected the main entrance. In 1847/8 a Laboratory complex was built at Priddy's Hard, following a decision to move it out of Portsmouth onto a more secure site. Apart from the operational buildings, this involved the construction of a small Expense Magazine (demolished) to hold the explosives needed for the daily work in the Laboratory and the introduction of a transit system from the Magazine to the Expense Magazine. The principal function of the Laboratories through the Revolutionary and Napoleonic Wars had been the production of small arms ammunition, but this situation was to change, and with it the role of Priddy's Hard. The development of artillery meant a great increase in the use of filled shells and the fuzes required to detonate them, the preparation of fuzes being a natural extension of the work of the Laboratories. From 1845 shells were being introduced into naval service on an unprecedented scale (a shell store at Gunwharf in Portsmouth was begun in 1853), and in the Crimean War preparations were made for shell filling at Priddy's Hard. As the filling and emptying of the shells could not be carried out in a magazine, and required dedicated facilities, the Laboratories came more and more to deal with the projectiles and propellants for sea and land-service artillery.

The development of new propellants and projectiles from the mid 19th century took place against the background of the arms race of the second half of the 19th century. Thus the construction of an armour-clad and steam-powered fleet, followed by the introduction of

steel guns and rotating turrets, was accompanied by the development of ordnance which rendered the forts of the Palmerston government, initiated in 1859 in reaction to a perceived threat from the French, obsolete only 20 years after their construction. Thus the smooth-bore 68-pounder had been the largest gun in service at the time of the Crimean War. Vast quantities of powder were needed as propellant and explosive filling for shells of the 110-ton monster guns of the 1880s, a decade which saw the development of more effective breech-loading systems and the emergence of the 12-inch gun as the standard naval armament.

The development of complex shell-filling systems at once differentiated Priddy's Hard from the other Depots, and the survival of such a complete complex is unique in a national context. The covered rolling way and buildings around the Camber (all wooden) were rebuilt in brick in the 1860s. An increasing amount of buildings (sited around the Camber) were required to house the store of empty cases in which shells were individually packed and supplied to the ships: there are seven of these stores, ranging from 1859 to the 1890s. The vital job of repairing these boxes was carried out in the carpenters' shop (Building 413). The further redevelopment of Priddy's Hard began in 1860 with the construction of 'C' Magazine (Building 435). This was originally intended for the receipt of ammunition from ships, and formed the terminus of a transport system, linked to the Laboratory, that was to play a key role in the development in the 1860s of a shell-filling complex. This eventually necessitated the demolition of the east ranges of the Laboratory, converted for shell-filling purposes in the 1860s but without the capacity to meet the demand as shells replaced solid shot as the standard naval ordnance. Tramways connected the Powder Pier and new E Magazine (436, built in 1878/9 as a replacement for 'A' Magazine) to the Shell Filling Room (demolished) and finally Shell Store of 1879 (303) and Pier. After an explosion at the Shell Filling Room in 1883 it was decided to move this activity to outside the historic fortified boundaries of Priddy's Hard, and to distribute the activity among several small buildings. In 1886/7, therefore, a set of Shell Filling Rooms and a Fuzing Room (346a-d), later joined by a Shell Filling Room for quick-firing shells (342, not included), an Expense Magazine (461) and Unheading Room (242), were built without the ramparts along the edge of Forton Creek. All the filling rooms were heated by hot water pipe supplied from a boiler house (462, not included). Priddy's Hard was to develop the most complex internal communications system of any of the Yards until the rails for the powder line (1 ft. 6 inch gauge) and the shell tramway (2 ft 6 inch gauge) were replaced by small self-propelled vehicles. The site had 240 employees in 1895, and larger Shifting Rooms were required to accommodate the expanded workforce.

Drastic changes in the administration of the Yards were made following the decision in 1890 to divide their control between the two Services. Spurred on by the arms race with Germany, the Admiralty at once began a great expansion programme which affected Priddy's Hard, Bull Point, and Upnor. A great change in the construction of magazine buildings was also caused by the introduction in the 1890s of the new explosives cordite and guncotton, which were stored - under different conditions from gunpowder – to the N and NW of the ramparts. This part of the site has lost its former layout and most of its buildings, Bull Point (Plymouth) now having the best-retained buildings representative of the new technology. 1896 saw the construction of a new Laboratory for filling cartridges (mainly with cordite), comprising frangible wooden buildings protected by massive traverses, within the southern section of the 18th century defences. Although temporary buildings whose plan forms are not clearly related to their intended and differing functions, their

imprint on the landscape is marked by the dividing traverse walls (within the Scheduled Ancient Monument constraint area). The preparation of shell cases by lacquering to prevent spontaneous chemical reactions and the development of the fuze from a rudimentary device to a complex piece of mechanism added other types of building. Massive shell stores (406, 407) were added to store the finished articles, together with a Mine Store (409), though at that period the Naval use of mines was very limited.

The development of Priddy's Hard after 1900 was affected by the traumatic event of an explosion in the New Shell Store (407) in November 1902. It was decided that the site was far too close to the naval dockyard for bulk storage of explosives, and that the magazines should be used only as ready use magazines to supply the shell and cartridge filling rooms. A new magazine establishment, to be laid out on the same lines as Lodge Hill (opposite Chatham dockyard), was proposed and after some false moves work began in 1908 at Bedenham. Priddy's Hard was now largely turned over to shell and cartridge filling. The First World War brought about a great expansion of Priddy's Hard. This was partly because of the extension of the Laboratory to meet the increased need for filled cartridges and partly because of the introduction of new explosives and weapons systems. TNT, known in the Services as Trotyl, could be melted on a water bath and poured into shells, and a set of Trotyl Rooms were added in 1915. Amatol was an explosive consisting of a mixture of ammonium nitrate with trotyl, and stores were required for this. A new Mine Store was built in close proximity to the Amatol Store, while buildings dedicated to fuze filling were required. New weapons requiring storage, filling and maintenance were depth charges, bombs for aerial use, and the anti-submarine device of the towed explosive paravane. Similar additions, but to a lesser degree, were made at Bull Point.

(David Evans, *Priddy's Hard* (report for Listing Team, English Heritage), 2000)

15.1 Buildings recommended for listing

'A' Magazine, now Museum Building PH, 9 **149781**	'A' Magazine of 1770-6 is a magnificent C18 example of the classic British magazine type with two parallel bombproof vaults (see 3.1). It was designed by Captain Archer, Commanding Royal Engineer of the Portsmouth District. From c1880 – with the completion of E Magazine (436) – it was used for storing small arms ammunition and filled rockets and shells.	**Listed grade I** (item 130) 19.01.90
'B' Magazine and attached Passage and Boundary Wall, and Main Rolling Way and attached Foreman's Office, Shifting Room and Shoe Houses, Museum Buildings PH 7 (423), 9 (425), 23-4 (419, 421, 422) **149782**	*A multi-phased complex, the phasing relating to that in the Priddy's Hard report.* *Phase 1.* 1774-6. Building 423 was built as two detached rooms (originally a cooperage and a Shifting Room for the examination of powder: 3.4), within the magazine enclosure and separated by the uncovered rolling way from the Camber, joined by a central link building and then rebuilt as two storeys. Adjoins E wall of the enclosure walls to the magazine. *Phase 2.* The whole was refronted c1847, and by 1856 the wooden rolling way (Building 421, and link to 423 and 425) and flanking shoe rooms and offices (Buildings 419 and 422) had been rebuilt in brick. Together with Marchwood, the shoe rooms (3.3) provide the earliest known examples of this key building type. Building 423 was heightened soon afterwards.	**Listed grade I** (item 130) 19.01.90
Empty Powder Case Store (Building 312), Museum Buildings PH 62 **149785**	Building 312 (immediately to W of 418) was built in 1891 as an Empty Powder Case Store (3.10). These stores are associated with the introduction of shells into naval service, each shell being individually packed into its own wooden box.	II
Quick Fire Shell Store (Building 433) approx. 12m N of 'A' Magazine, Museum Buildings PH 79 **149783**	Building 433, comprising a wing to the N of the magazine, was built in c1889 as an ammunition store for the quick-firing guns being increasingly used on naval vessels: after 303, it is the best surviving example of an ordnance yard shell store (3.8). It incorporates part of the original magazine enclosure wall and retains its original	**Listed grade I** (item 130) **19.01.90** Propose to list at grade II*

	traveller crane.	
Building 209 (Main Office Building) **149167**	1811. Despite its extension in 1920, in matching style, this is a fine Late Georgian building that both visually and through its historical role related to the original Magazine group on this uniquely important site.	**Listed grade II** (item 135) 19.01.90
The Camber Basin, retaining walls and two cranes and railings **149168**	1774-6 with later repairs, recent archaeological work having demonstrated successive phases of rebuilding. This was a vital component of the first phase of this site, its later strengthening and adaptation providing testament to its continuing importance.	**Listed grade II** (item 134) 19.01.90 Upgrade to II*
Empty Package Store (Building 428), Museum Buildings PH, 78 **149169**	Built 1896/7, and prominently sited between the main magazine group and the Camber. These stores are associated with the introduction of shells into naval service, each shell being individually packed into its own wooden box.	II
Shifting Room (Building 223), to SW of 'C' Magazine PH, 57 **149170**	Built 1898/9 for changing into magazine clothing (3.18), and prominently sited to the N of the main magazine group.	II
Laboratory Boat House (Building 314) PH, 21 **149171**	Built in 1847 for the new Laboratory complex, prominently located next to the Camber and later rebuilt in brick. Despite the importance of water communications in the naval ordnance yards, this is the only example of this building type to have survived.	II
Building 431 (Shifting House) to NW side of Camber PH, 25 **149174**	1843, rebuilt in brick at a later (1877-83) date. The first building for the examination of powder brought in from naval vessels to be built outside the magazine enclosure.	**Listed grade II** (item 133) 19.01.90
Building 418 (Shed for Empty Powder Cases and Barrels, Museum Buildings) PH, 26, 38 **149786** **149175**	Building 418 (to the SE of 421), a weatherboarded Shed for Empty Powder Cases and Barrels of 1859, was converted into a magazine – with its own rolling way link – when it had its walls rebuilt in brick in 1865. The rolling way from the Laboratory magazine and associated shell-filling rooms (demolished) passed through this building to the new 'C' Magazine (Building 435), as part of the transit	**Listed grade II** (item 131) 19.01.90

	sequence established for the shell-filling system in the 1860s.	
Case Store (Building 311and 306) and Rolling Way (Building 218) PH, 30, 61 **149176**	1865 Case Store, rebuilt 1877-83 in brick, the roof being reused (311). The later extension to the south is part of the same structure, and included in the proposed listing These stores are associated with the introduction of shells into naval service, each shell being individually packed into its own wooden box. The Rolling Way formed part of the tramway system that from the 1860s was devised in order to link 'C' Magazine to the Laboratory and its associated shell-filling complex.	II
Case Store (Building 429) to W side of the Camber, Museum Buildings PH, 39 **149177**	Building 429, to the N of 421, was built as a store (probably for packing cases again) in c1879 – probably as part of the new shell filling system. These stores are associated with the introduction of shells into naval service, each shell being individually packed into its own wooden box.	**Listed grade II** (item 132) 19.01.90
'C' Magazine (Building 435) PH, 40 **149178**	An earth-traversed and casemated structure of 1860/1, originally intended to receive ammunition from ships coming in to refit or be paid off and of particular importance because of the role it played in the first (and best preserved) integrated shell filling facility established within an Ordnance Yard (see PH pp.26-29). It comprised the northern terminus of the site's first tramway system, and supplied the Laboratory magazine and associated shell-filling rooms (demolished). It had become an Expense Magazine for gunpowder and cordite by the 1890s.	II*
'E' Magazine (Building 436) PH, 41-2 **149179**	1878/9, located within one of Archer's demi-bastions and built for the bulk storage of gunpowder following the 1875 Magazine Committee's recommendations that it be stored away from the old core of the site, 'C' Magazine being too small for the purpose. This building was connected to the New Powder Pier (designed in 1876) by a tramroad. The entrance was altered in 1886. Built on the same principles as the original 'A'	**Listed grade II*** (item 145) 19.01.90

	Magazine of 1770-76 – which it replaced as the Depot's Deposit Magazine - and converted into a cordite magazine by 1913. Surmounted by a police post to view over the establishment in 1939/1940.	
Laboratory North Range (Building 204) and Laboratory Building to NE of Laboratory Complex (Building 206) PH, 12-19 **149180**	This was built in 1847/8 to the designs of Colonel Lewis, the Commanding Royal Engineer of the Portsmouth District. The first stage of this steady evolution of the site was the selection of this site for the Laboratory in June 1846, part of which has survived the redevelopment associated with the shell-filling complex of the 1880's. Planned as a virtually exact reproduction of Congreve's planned Laboratories of 1804, only with flat rather than pitched roofs, all that now remains is the NW range (Buildings 204 and 206), which comprises a row of Laboratory buildings and connecting walls, remodelled and enlarged at various dates, and Building 413 (qv). These have survived as the most complete ranges from any of the 19th century Laboratories, with the exception of Wyatt's Royal Laboratory at Woolwich Arsenal (grade II, only the façade remaining). Nothing remains of the Laboratory at Devonport, and nothing indicative remains at Upnor Castle.	II
Laboratory Building, E Range (Building 413) and attached Rolling Way (Building 412) PH, 21-23, 35-6 **149191**	413 is the only surviving building - a carpenters' shop converted into an Examining Room by 1880 - from the east range of the Laboratory. The Rolling Way formed part of the tramway system that from the 1860s was devised in order to link 'C' Magazine to the Laboratory and its associated shell-filling complex. It extends both to the front and rear of this building, the latter section being joined to Buildings 306 and 311.	II
Laboratory Cottages (Buildings 216,217,404,806) PH, 19-20 **149192**	1847 Laboratory Workers' Cottages by Colonel Lewis, the only range of workers' cottages to have survived in any of the ordnance yards. Despite the loss of its original stacks and flat roof, its later conversion (1877) into a tube and rocket store and subsequent enlargement (1892) relates to another key aspect of 19th	II

	century ordnance and the evolved historical importance of this site.	
Proof House and Cook House (Building 241) PH, 32 **149193**	After the 18th century example at Purfleet on the Essex coast and an early 19th century example at the Marsh Works in Faversham, this is the best surviving example of a Proof House (see 3.5) for the testing of explosives. Half the building was a Cook House, and it was converted into a non-danger building in 1897. It originated, like the much-altered range of buildings to the north, as a Small Arms Cartridge Factory in 1859. This followed the decision by the Secretary of State for War, Sidney Herbert, to lessen the dependency on the great arsenals of the Thames.	II
Shell Store approx. 5m SE of Shell Stores and Transfer Shed (Building 303) PH, 2609, 33-5 **151858**	1879, enlarged to N in 1892. The most significant surviving example of this key building type in any of the ordnance yards (3.8).	II
Shell Filling Rooms, Fuzing Rooms and associated traverse walls, approx. 60m SW of southern demi-bastion to Priddy's Hard Ramparts (Buildings 346a, 346b, 346c, 346d) PH, 44-46, 72-73 **151859**	These were built in 1886/7 to the designs of Lieut. Col. Ovey, the Gosport Commanding Royal Engineer, and Lieut. Col. Pridham, the Assistant Commissary of Priddy's Hard. They comprise the first and – despite the loss of one unit - most complete suite of purpose-built rooms for filling and fuzing shells (3.20) in an ordnance yard, all separated by substantial brick traverse walls for protection against blast. They directly relate to contemporary developments in naval ordnance and the changing character of the Royal Navy's ships, and formed a model for later developments on other sites. 346c was originally a Shell Fuzing Room. 346d was built in 1898 as an additional shell fuzing room.	II
Expense Magazine for Shell Filling Rooms (Building 461) PH, 81-82 **152044**	1886. A unique surviving example of an expense magazine (3.22) for holding small quantities of powder for use in the nearby Shell Filling Rooms. *The surrounding earthworks are sited within the Scheduled Ancient Monument constraint area.*	**Listed grade II with traverse walls** (item 140) 19.01.90
Shell Painting Room (Building 341)	1900/01.The best-preserved of three painters' shops (3.17), where ammunition	II

PH, 69-71 **151861**	and containers were colour-coded and shell interiors varnished to prevent the formation of salts. Positioned on the transit system that linked the shell-filling complex (see 346) to the remainder of the site.	
Shell Stores and Transfer Shed (Building 406, 407 and 408) PH, 75-76, 101 **151862**	1896-1899. With 409, this is the finest and best-preserved group of buildings representative of a characteristically Admiralty style of architecture after they took over from the War Office in 1890. Located close to the Shell Pier, the shell stores (the largest building type associated with the ordnance yards: 3.31) also mark the culmination of operations at Priddy's Hard prior to the completed ordnance being loaded onto warships. The attached Transfer Shed marked the connection of the Depots with the standard gauge railway network (3.45). The scale of this building, with 409 (below), is also testament to the *materiel* needed to serve the greatly expanded and modernised navy of the period preceding the First World War.	II
Mines and Countermines Store (Building 409) PH, 77 **151866**	1899/1900. Harbour defence mines had been the responsibility of the Royal Engineers until 1905, the Royal Navy only being concerned with offensive minelaying in enemy waters and the destruction of his devices by means of countermines.	II
Quick Fire Shell Store, approx 19m W of 'A' Magazine (Building 316) **151867**	An imposing range (3.8) of 1896/7 close to the main site entrance and 'A' Magazine. The windows were deepened when it was converted into a carpenters' machine shop in 1916.	II

15.2 Not recommended for listing as a result of consultation process

Unheading Room (Building 242) PH, 59 **151860**	1890s. This replaced the original Unheading Room (3.23) of 1886 – where barrels were opened before the powder was brought to the nearby Shell Filling Rooms. An integral part of a unique and historically-important complex.	Not listable, but surrounding archaeology included in revised schedule.

Building 342 PH, 45, 71-72 **143408**	A unique example of a shell-filling room for Quick Firing shells (3.21). 1887/9, but given flat roof in 1940 and not an integral part of the shell-filling complex. It was served by the powder line, not the shell line, and sent its smaller shells to 3 buildings to the north of 'A' magazine. Surrounding archaeology included in revised schedule.
Building 345 (New Shell Emptying Room) PH, 72 **143393**	1903. For cleaning out condemned ammunition prior to re-use (3.24). Surrounding archaeology included in revised schedule.
Building 462 (Boiler House) PH, 82 **151897**	1895, for heating the new Shell Filling Establishments with a circuit of hot water pipes (3.25). A replacement for the original building, which was attached to the Cook House (qv). Surrounding archaeology included in revised schedule.
Building 344 PH, 97-98 **143416**	Trotyl Melting Room , enlarged as Amatol Mixing Room. The only First World War building recommended in any of the ordnance yards (1915), and prominently sited close to 346 above. However, it is much later than the main group and lacks sufficient intrinsic merit for individual listing.
Building 229 (Shifting Room) PH, 58 **143399**	1897, sited close to the New Laboratory site and uniquely retaining its interior fittings (3.18). Surrounding archaeology included in revised schedule.

16.0 PURFLEET
Thurrock District Council
Essex

Purfleet became the Ordnance Board's centre of gunpowder storage as a result of an Act of Parliament passed in 1760, surpassing in size both the Tower of London and Upnor Castle on the Medway. It stored powder, transported after 1787 from the Royal Gunpowder Factory at Waltham Abbey, and supplied both the Army and the Navy, and comprised a group of five magazines (each with a capacity of 5000 barrels) built in 1763-5 by James Gabriel Montresor of the Royal Engineers for the Board of Ordnance. The depot also included barracks for officers and men, a proof house for the testing of powder and a clock tower over the entrance archway to the compound, attached to the boundary wall. These were the most substantial magazines in existence, although all but No. 5 were demolished soon after 1973. The site relates to a critical period in Britain's growth as a naval power in the decades after the Seven Years War.

(Report by Paul Pattison and Peter Guillery for RCHME, 1994, NMR, Swindon (NBR Index No. 93577); Paul Pattison and Peter Guillery, 'The Powder Magazines at Purfleet', in *Georgian Group Journal,* VI, 1996, pp.37-52)

Purfleet Play Centre and attached wall to S Centurion Way **151868**	Proof house of the mid 1760s, to the designs of James Gabriel Montresor, Royal Engineer, and completed to a similar design as the main magazines. These were originally used for testing small quantities of gunpowder by igniting it with a hot iron on a glass, porcelain or copper plate (3.5): the (altered) interior was originally provided with a gallery. This function of testing powder took place against the background of scientific development in eighteenth century France and Britain and Britain's attempts to standardise and improve the quality of powder available to the army and navy. Later shifting house in front of original entrance to S, with open pediment to gable end of W-facing range. 2m high brick blast wall faces onto Centurion Way. Used as a Copper Hoop Store in the C19.	SAM Propose to list at II*
No. 5 Magazine Centurion Way **151992**	A classic example of the British type of magazine (3.1), with twin barrel vaults and for the supply of both services and the largest group built in Britain. The magazine is the only survivor of a group of 5 magazines (each for 10,000 barrels) by Montresor built 1763-5 (the other 4 demolished 1973). This still remains, with	Listed grade II (item 8/1) SAM Upgrade to I. 10.11.1981

	the 1770s magazine at Priddy's Hard opposite Portsmouth dockyard, the most outstanding example of a typically British type of magazine, with twin barrel vaults, that relates to a critical period in Britain's growth as a naval power in the decades after the Seven Years War. The wooden overhead crane is a uniquely early example of a type of structure that had a great impact on the development of industrial buildings, anticipating their introduction into factory and warehouse spaces in the nineteenth century. Their survival in such a complete building, one built for the British military-industrial complex, is thus of great significance in the context of the Industrial Revolution. There is evidence for similar cranes at Priddy's Hard and at Morice Yard, Devonport, of the 1740s.	
Clock Tower and Gateway with flanking walls Centurion Way **151995**	Entrance gateway with Portland stone dressings to semi-circular arches to lower stage, surmounted by pedimented clock tower and finally a louvred lead cupola. Only about 2m of the c2m high wall has survived to the E, and approx. to the W.	Listed grade II (item 9/8) 10.11.1981
Boundary wall with Ordnance Board marker at TQ 5518 7856 **151869**	Mid C18 brick wall, an important part of the group.	II

(Report by Paul Pattison and Peter Guillery for RCHME, 1994, NMR, Swindon; Paul Pattison and Peter Guillery, 'The Powder Magazines at Purfleet', in *Georgian Group Journal,* VI, 1996, pp.37-52)

17.0 TIPNER POINT
TIPNER
Portsmouth City Council
Hampshire

The recent war with France, and the invasion scare of 1779 led to concerns about the vulnerability of the arsenals and had exposed an alarming situation concerning the state of the nation's gunpowder. The former was foremost in the mind of the new (appointed 1782) Master-General of the Board of Ordnance, George Lennox the Third Duke of Richmond. Although his plan to enhance the landward fortifications of Portsmouth and Plymouth was defeated in the House of Commons in 1786, his other strategy – to divide and separate the magazines – was implemented at Portsmouth with the acquisition of land at Tipner Point between 1789 and 1791. The original design for a pair of circular vaulted magazines was superceded by the present one for a magazine with groined arches and a copper-clad wooden roof. From 1805 until the mid 1820s Tipner acted as deposit magazine for the restoving of old gunpowder at Stamshaw nearby (demolished). The magazine accommodation at Tipner, Marchwood and Upnor was increased following appraisal by Lord Panmure, the Secretary of State for War, of the Committeee on Magazines report of March 1856. The southern extension to the magazine was built with parabolic arches, as used at Weedon Bec and Upnor. On the division of the ordnance depots between the two services in 1890, the site passed to the Army, and on conversion of the magazines into general ordnance storage the present iron doors were inserted.

All the descriptions will need revision. Four buildings survive from the third phase of 1891-1910, but they do not comprise a sufficiently important group of ordnance stores to merit listing.

Two former powder magazines at Tipner Magazine **151955**	Structurally complete by 1798 (for 5,000 barrels). Part of the original groined vault survives internally; the majority of the vaulting to the extension of 1856-7 (for 10,000 barrels) having also been removed.	**Listed grade II** (item 463) 22.11.1979
Building immediately north of former powder magazines at Tipner Magazine **151956**	Former shifting house, completed 1800.	**Listed grade II** (item 464) 22.11.1979
Building immediately south of former powder magazines at Tipner Magazine **151957**	Former cooperage, completed 1800.	**Listed grade II** (item 465) 22.11.1979
South-west section of boundary wall to Tipner Magazine **151958**	c1800. Amendment not necessary.	**Listed grade II** (item 466) 22.11.1979

(David Evans, *Priddy's Hard* (report for Listing Team, English Heritage), 2000, pp. 141-150)

18.0 UPNOR
Frindsbury Extra
Medway Borough Council
Kent

The castle at Upnor on the Medway, built between 1559 and 1567 to the designs of the military engineer Sir Richard Lee, has after the Tower of London a longer history of association with the storage of explosives than any other site. Built in order to protect naval shipping anchored in the Medway, its importance as a fort declined after the Dutch raid of 1667 and the recasting of the nation's defences. In the following year it was ordered to be converted into 'a Place of Stores and Magazine'[8], a function which continued until 1913. The Castle was adapted for this role, some laboratory facilities being provided in the south tower, while other portions were made to serve as cooperage and shifting house. After 1827 buildings in the water bastion were lowered to form a new Laboratory building, the Magazine in the castle being converted into a Laboratory storehouse.

Plans were drawn up to replace Upnor Castle by a modern magazine by 1806, and in 1808 the construction of one 10,000 barrels capacity was decided upon. The site was quarried out of a rocky hillside to provide natural traverses. The CRE, Colonel D'Arcy settled on catenary instead of rounded vaults, to give greater height within: these had already been used within the casemates at Dover Castle. 3,500 barrels continued to be stored in the castle, but this was proposed to be discontinued. Restoving on this site was out of the question and that operation was performed at Faversham. The Crimean War brought the inadequacies of storage provision on the site to a head, a situation compounded by the fact that filled shells could not be kept in the same magazine as gunpowder: shells were carried through the Laboratory, where gunpowder was being examined and filled into cartridges, and then hoisted 20 feet into an adjacent chamber. In 1856 the decision was made to build a new shell store and magazine, the latter with a capacity of 23,000 barrels. These were completed in 1857. An additional shell store was built in 1860-1. In 1877, space for expansion on the site for bulk Store Magazines being non-existent, a new site was acquired inland for five such magazines at Chattenden: this served as a Deposit Magazine to serve Upnor, to which it was linked by railway. The Upnor site, however, continued to expand eastwards along the Medway in the late 19th century, with storage for wet and dry guncotton in 1895-6 – the main explosive in mines and torpedo warheads - and shell filling facilities in 1906-7: the latter (demolished, only the traverses remaining) were built much later than at Priddy's Hard and Bull Point, this function having been previously carried out at Woolwich.

(David Evans, *The Medway Magazines* (report for Listing Team, English Heritage), 2000)

[8] Andrew Saunders, Upnor Castle, English Heritage guide, 1967, p. 15. New material uncovered in the course of this project (see the Medway Magazines report) should be integrated into a future edition.

Building LU001 MM, 10 **151870**	The former B Magazine of 1856-7 (matching shell store of 1856-7 demolished) to the same design as D'Arcy's of 1810. Designed by Lt Col Savage, CRE at Chatham, and the work contracted out to Joseph Diggle of Dover: handed over to the Upnor Storekeeper in June 1857. Internally distinguished by its catenary arches, previously employed by the Royal Engineers in the Drop Redoubt and Napoleonic Tunnels at Dover. The gabled facades and use of Tudor Gothic detail has resulted in a strongly 'architectural' 19th century magazine, possibly in response to its prominent location on the Medway and close to the Castle.	II*
Wall extending E from Upnor Castle **151871**	Brick wall of early 19th century date, pierced by four blocked openings for the former powder piers which stretched into the Medway. A prominent feature relating to both the castle (SAM) and B Magazine.	II

Other buildings on the site are detailed in the Medway Magazines report. They do not comprise a sufficiently complete group, compared to Priddy's Hard, of Guncotton Stores (also well represented at Bull Point) and associated buildings to merit listing. The Filled Shell Store of 1903-4 has been much altered, the adjacent Filled Mine Store (Building LU 018) being a notably complete example but not surviving in relationship to a sufficiently outstanding group to merit listing.

19.0 FORMER ROYAL ORDANCE DEPOT, WEEDON BEC
Bridge Street
Weston and Weedon
South Northamptonshire
Northamptonshire

Canal communications were an important factor in the establishment of the major inland magazine and Horse Artillery barracks and storehouses at Weedon, where the Grand Junction Canal Company were informed in February 1804 of the Ordnance Board's intention to open a short branch to serve the warehouses and magazines. Its location made it the ideal choice for a central ammunition depot, being close to the small arms factories and workshops of Birmingham and also far away from the more vulnerable defended coastal areas and the other ordnance yards that were mainly sited close to the royal naval dockyards. The Commanding Officer of the Royal Engineers, Colonel Pilkington, was ordered to begin work on the Artillery barracks on September 18 1805, and by October the Civil Officers' building was nearly finished and four storehouses were completed or well in hand, and the canal basin, with 200 yards of canal, had been dug. He had never had a hand in building a magazine before, and expressed some mild concern, but the order to construct two magazines as a priority over the remaining four storehouses was given in February 1806. Despite – or because of – his inexperience, Pilkington provided his four magazines with blast houses (known as traverses), the first to be developed on a major magazine. These brick and slate buildings were infilled with earth, and at either end contained shifting rooms (for changing into specialist magazine clothing) and offices. By July 30 1810 the magazines were ready to receive powder and ammunition. By 1827 the magazines were holding 10,500 barrels and 1,463,700 ball and 693,746 blank cartridges. Some defensive works, including the loopholing of the perimeter walls, was undertaken in 1831: this was for defence against internal insurrection rather than any foreign army. From 1837 the storehouses were used as barracks and as a prison (Nos 5 and 7 being converted for this purpose), and from 1855 as a clothing store. In the 1870s it was converted into one of the Depots created under the army reforms of Edward Cardwell, the Secretary of State for War, and from 1885 as a weapons and equipment store. It was closed by 1965 and sold by the MOD in 1984.

Four functionally separate sites marked the planning of Weedon Bec. These were the Storehouse Enclosure, the Magazine Compound, the Barracks (demolished) and housing for the Depot's principal officials (demolished), such as the Storekeeper and the Clerk of Cheque. The latter groups were built on high ground to the north, close to the Daventry-London road, and were clearly designed to both complement and enhance the effect of the storehouse and magazine groups set on lower ground to the south, especially as viewed from Weedon Bec. The first two groups are still surrounded by defensible perimeter walls and comprised the Depot's operational arm, and were positioned along the Ordnance Canal. The canal widens into a large central basin, flanked by pedestrian bridges, in the centre of the Storehouse Enclosure. The gatehouses at its west and east ends were provided with winding gear for operating portcullis gates that provided further defensive measures. The Magazine Compound was separated by an open area of approx. 220m, as protection against the effects possible explosion, and was extended westwards by an additional magazine and earthen traverse in c1857. The storehouses (drawings of 1804-6 in Public Record Office MPH 763, Sheets 7 and 10) bear a stronger relationship through their consistently high treatment as a planned group to those found in late 18th century naval

dockyards, most notably at Portsmouth and Chatham. They are also comparable in terms of their scale and architectural ambition to the finest set-pieces of early 19th century civil dock warehousing, such as John Foster's Goree Warehouses of 1810 in Liverpool's George's Dock and Telford and Hardwick's work for the St Katherine Docks Company. This quality treatment, especially marked on the south elevations with their rusticated basements, is repeated internally, where even the heavy axial beams have had their supporting posts chamfered with scrolled stops. The reasons for this choice of architectural quality over purely functional needs are unclear, although parallels can be found in contemporary barracks architecture – including those commissioned by the Ordnance Board - as well as the great naval dockyards. Although the magazines (drawings of 1816 in Royal Engineers Library, W140 (D38), and later plans and drawings also archived there) are smaller in terms of their individual scale than the late 18th century example at Priddy's Hard opposite the naval dock at Portsmouth (listed grade I and like the Weedon examples built to the distinctive British double-vaulted plan), as a group they had no rival until the suite of traversed magazines were built at Bull Point, Plymouth, in the 1850s (Scheduled Ancient Monument). Catenary arches were first used at Tipner in the 1790s and then Colonel D'Arcy's magazine at Upnor. The use of traverses makes the group highly innovatory in terms of its planning, blast walls of earth (sometimes faced in brick) being henceforth a characteristic features of magazine complexes. These traverses have also uniquely assumed an architectural form. These traverses have also uniquely assumed an architectural form.

As a unique planned military-industrial complex, complete with its own defensible transport system and surrounding walls, the national importance of the Storehouse and Magazine group at Weedon Bec is also enhanced by their intended role within the context of the Revolutionary and Napoleonic Wars.

(Adam Menuge and Andrew Williams, *Royal Ordnance Depot, Weedon Bec*, RCHME Report, National Monuments Record No. 97080).

Former Weedon Barracks, East Lodge **152002**	Gatehouse. 1811-14. Rear elevation to east has semi-circular arch spanning canal, with portcullis. Cupola contains striking clock signed 'Jno Thwaites and Co. Clerkenwell London 1814'. The central unheated room has a winding mechanism for raising and lowering the portcullis, all concealed by panelled boxing and supported by a trussed timber trestle.	**Listed grade II*** (item 171)
Former Weedon Barracks, Outer Wall and North West Bastion **152003**	Enclosure walls, gates and gatepiers, for perimeter security of the site. 1804-10. Red brick in Flemish bond, with stone coping to NE bastion. Ten casemates built in groups of four and six along each side of the angle formed by the corner of the perimeter wall, these including a casemate at each end (probably for storage of artillery pieces) that flank a wall that spans the angle and is pierced by a central segmental-arched entrance. Semi-circular vaults to casemates, which are surmounted by bomb-proof layer of sand and gravel capped by	**Listed grade II*** (item 172)

	a layer of bricks and finally a stone-flag walkway, which is accessed by ramps with stone-paved stairs and runways for the deployment of small artillery pieces (referred to in 1830 Ordnance Return).	
Former Weedon Barracks, Outer Walls and North East Bastion **152017**	As above.	**Listed grade II*** (item 173)
Former Weedon Barracks, South East and South West Bastions, southern section of perimeter wall and Gate Piers to South East **152016**	As above. This item includes the whole southern half of the perimeter wall, extending northwards to meet the lodges at each end.	**Listed grade II*** (item 174)
Former Weedon Barracks, West Lodge **152028**	Gatehouse. 1811-14. Rear elevation to east has semi-circular arch spanning canal, with portcullis. The central unheated room has a winding mechanism for raising and lowering the portcullis, all concealed by panelled boxing and supported by a trussed timber trestle.	**Listed grade II*** (item 175)
Former Weedon Barracks, Canal Enclosure Wall to North **152004**	Wall with turning arm for barges to centre.	**Listed grade II*** (item 176)
Former Weedon Barracks, Canal Enclosure Wall to South **152018**	As above.	**Listed grade II*** (item 177)
Former Weedon Barracks, Storehouse No. 1 **152015**	Warehouse. 1804-10, and one of an odd-numbered group to the north of the canal. Treated in a classical manner with Doric entablatures to the doorcases. The steel roof dates from 1938, when the roof profiles were remodelled.	**Listed grade II*** (item 178)
Former Weedon Barracks, Storehouse No. 3	As above.	**Listed grade II*** (item 179)

152009		
Former Weedon Barracks, Storehouse No 5 **152027**	As above.	**Listed grade II*** (item 180)
Former Weedon Barracks, Storehouse No. 7 **152026**	As above. Converted into military prison in 1844/5, when wing to west end added, and with later additions.	**Listed grade II*** (item 181)
Former Weedon Barracks, Storehouse No. 2 **152005**	Warehouse. 1804-10, and one of an even-numbered group to the south side of the canal. Internally remodelled 1889 (drawings in Royal Engineers Library W6-8, 802), after fire. The south elevation is similar to the odd-numbered warehouses but makes use of the fall of the land to accommodate a basement storey; this is treated in a robust classical manner, with grey sandstone vermiculated rustication and semi-circular arches over original nail-studded plank doors beneath louvred tympanae.	**Listed grade II*** (item 182)
Former Weedon Barracks, Storehouse No 4 **152014**	As above.	**Listed grade II*** (item 183)
Former Weedon Barracks, Storehouse No. 6 **152010**	As above.	**Listed grade II*** (item 184)
Former Weedon Barracks, Storehouse No. 8 **152029**	As above.	**Listed grade II*** (item 185)
Former Weedon Barracks, Storehouse No 17 **152022152009**	This is the most impressive structure that remains from the additions to the Storehouse Enclosure after the 1870s. It was built in 1902 as a clothing store, the result of the reviews of army logistics after the Boer War which placed importance on the provision of adequate supplies for volunteer forces.	**Listed grade II*** (item 186)
Former Weedon Barracks, Walls to Magazine Enclosure	Bastion-like projections originally stood at each corner of the Compound. Lean-to structures, from which portcullis gates could	**Listed grade II*** (item 187)

152013	be operated, at east and west ends of enclosure, lit by 3 segmental-headed openings and accessed by round-headed doorway and external brick steps to stone-coped balustrade. The portcullis gates to the east rise in a sandstone slot against the perimeter wall, the winding drum being set between pulleys on either side of its supporting trussed timber trestle. The structure at the west end has been modified by the infilling of the entrance and partial collapse.	
Former Weedon Barracks, Large Magazine to W of the series of four magazines in Magazine Enclosure **152012**	Added to the main group c1857.	**Listed grade II*** (item 188)
Former Weedon Barracks, West Magazine of the series of four magazines in Magazine Enclosure **152006**	1807-11. Although the magazines (drawings of 1816 in Royal Engineers Library, W140 (D38), and later plans and drawings also archived there) are smaller in terms of their individual scale than the late 18th century example at Priddy's Hard opposite the naval dock at Portsmouth (listed grade I and like the Weedon examples built to the distinctive British double-vaulted plan), as a group they had no rival until the suite of traversed magazines were built at Bull Point, Plymouth, in the 1850s (Scheduled Ancient Monument). Catenary arches were first used at Tipner in the 1790s and then Colonel D'Arcy's magazine at Upnor. The use of traverses makes the group highly innovatory in terms of its planning, blast walls of earth (sometimes faced in brick) being henceforth a characteristic features of magazine complexes. These traverses have also uniquely assumed an architectural form. These traverses have also uniquely assumed an architectural form.	**Listed grade II*** (item 189)
Former Weedon Barracks, Inner West of the series of four magazines in Magazine Enclosure **152030**	See above.	**Listed grade II*** (item 190)
Former Weedon	See above.	**Listed grade II***

Barracks, Inner East of the series of four magazines in Magazine Enclosure **152031**		(item 191)
Former Weedon Barracks, East Magazine of the series of four magazines in Magazine Enclosure **152011**	See above.	**Listed grade II*** (item 192)
Former Weedon Barracks, West Blast House of the series of four blast houses in Magazine Enclosure **152025**	See above.	**Listed grade II*** (item 193)
Former Weedon Barracks, Inner West of the series of four blast houses in Magazine Enclosure **152008**	See above.	**Listed grade II*** (item 194)
Former Weedon Barracks, Inner East of the series of four blast houses in Magazine Enclosure **152023**	See above.	**Listed grade II*** (item 195)
Former Weedon Barracks, East Blast House of the series of four blast houses in Magazine Enclosure **152024**	See above.	**Listed grade II*** (item 196)