Number 2 Ship Tank, Haslar Marine Technology Park (former Admiralty Experiment Works)

Official list entry

Heritage Category: **Listed Building**

Grade: **II**

List Entry Number: **1480177**

Date first listed: **26-Aug-2022**

Statutory Address 1: **Haslar Marine Technology Park, Haslar Road, Gosport, Hampshire, PO12 2AG**

This List entry helps identify the building designated at this address for its special architectural or historic interest.

Unless the List entry states otherwise, it includes both the structure itself and any object or structure fixed to it (whether inside or outside) as well as any object or structure within the curtilage of the building.

For these purposes, to be included within the curtilage of the building, the object or structure must have formed part of the land since before 1st July 1948.

Understanding list entries *(https://historicengland.org.uk/listing/the-list/understanding-list-entries/)*

Corrections and minor amendments *(https://historicengland.org.uk/listing/the-list/minor-amendments/)*

Location

Statutory Address: **Haslar Marine Technology Park, Haslar Road, Gosport, Hampshire, PO12 2AG**

The building or site itself may lie within the boundary of more than one authority.

County: **Hampshire**

District: Gosport (District Authority)
Parish: Non Civil Parish

National Grid Reference: SZ6151698755

Summary

A covered model ship testing tank, workshop and offices, constructed in 1927 to 1930 for the Admiralty.

Reasons for Designation

Number 2 Ship Tank, built in 1927 to 1930 at the former Admiralty Experiment Works (AEW) Haslar, is listed at Grade II for the following principal reasons:

Historic interest:

* as an exceptionally rare surviving example of an early-C20 ship model testing tank and research facility; * for its considerable influence in the field of international hydrodynamic research; * for its huge contribution to the development of the Royal Navy's surface and submarine fleets, as well as to boat testing for the water speed record, including most notably Sir Malcolm Campbell's Bluebird K3 and Bluebird K4 craft.

Architectural interest:

* as a ship model testing building that survives well, retaining its original external neo-Georgian appearance and most of the internal plan form, incorporating the testing tank, docks, workshops and offices for drawing and recording the models; * for its innovative and flexible design, allowing the Royal Navy to test models of larger vessels at greater speed and at varying depth; * as the largest tank of its type in the United Kingdom, and one of the largest in Europe.

Group value:

* with the Grade II-listed Number 2 Cavitation Tunnel, Number 1 Ship Tank and Manoeuvring Tank. In addition, with the adjacent Grade II*-listed watchtowers, gates and boundary walls of the Victorian gunboat yard, Grade I-listed gunboat sheds, Grade II-listed gunboat yard engine house, scheduled gunboat traverser system, and listed buildings of the Royal Hospital Haslar set within a Grade II-registered landscape.

History

The former Admiralty Experiment Works (AEW) Haslar is situated on the northern side of Haslar Peninsular, to the west of Portsmouth Harbour. Prior to its establishment in 1886 the site had been remote and relatively inaccessible. Since its construction and throughout its expansion in the C20, AEW Haslar has been a site of national and international significance for its scientific contributions to the empirical study and development of ship hulls and propulsion systems. This has had a profound impact on the development of many vessels in the Royal Navy surface and submarine fleets and on commercial high-performance craft used to set world water speed records. Experiments undertaken at AEW Haslar directly influenced the design of every class of warship operated by the Royal Navy in the late C19 and C20.

Sites devoted to the empirical study of ship hull performance and propulsion systems in England date from 1870, when pioneering engineer William Froude (1810-1879) constructed the first experimental tank for model ships adjacent to his home in Torquay. Having begun to conduct water resistance experiments on ships in the 1850s, Froude attracted the attention of the Admiralty by demonstrating that it was possible to obtain accurate ship hull

resistance data from model tests. In 1868 the Admiralty granted Froude £2000 for the construction of a test tank to undertake rolling and resistance tests at Torquay. The site became known as the Admiralty Experiment Works (Torquay) from 1872. William Froude's third son, Robert Edmund Froude, continued the programme of experimentation after his father's death in 1879, and in 1882 he was invited to design a new facility to replace the Torquay tank. After considering a number of potential sites in the 1880s, the AEW settled on Haslar due to the sufficient open space it provided for R E Froude's new ship tank design and its proximity to other naval facilities, including: a gunboat yard, Royal Hospital, and a Royal Naval cemetery. Following the closure of AEW Torquay, new facilities began to be established at Haslar from February 1886. The first experiments measuring the effects of water resistance on model ship hulls were conducted in the newly-constructed Number 1 Ship Tank in 1887, towing the models using an overhead wooden towing carriage.

The Naval Defence Act of 1889 saw a huge increase in the Royal Navy's shipbuilding programme, and the testing facilities at AEW Haslar had a huge impact on the hull designs of the expanding British surface fleet in the period leading up to the First World War. By 1918 more than 500 different warship models had been tested at Haslar. A 1917 plan shows a number of temporary huts built along the shoreline of Haslar Lake to provide accommodation for military personnel during the war. Most of these temporary structures remained on site until after the Second World War when they were gradually removed to make way for new test facilities.

The development of both the surface and submarine fleets in the First World War necessitated the expansion of test facilities at AEW Haslar. By 1927 plans for a second, larger ship tank had been drawn up; Number 2 Ship Tank was completed in 1930. In the 1930s AEW expanded into testing for the private sector, most notably for Sir Malcolm Campbell's Bluebird K3 and Bluebird K4 craft, in which he broke the world water speed records in 1936 and 1939 respectively. Both craft were extensively model tested in Number 2 Ship Tank. Plans to construct new facilities for propeller research began in 1937. The first of these new buildings, Number 1 Cavitation Tunnel, was completed in 1941. Cavitation is the sudden formation and collapse of bubbles, which can be caused by a propeller in water. This water-filled tunnel was therefore used for testing the efficiency of model propellers and hulls in relation to propulsion, wake, vibration and/or noise. A much larger cavitation tunnel was constructed by a German company in Hamburg during the Second World War. Following the end of the war, the Royal Navy shipped the German tunnel to Haslar and reassembled it between 1947 and 1949. Post-war financial restrictions prevented construction of the building to house the new Number 2 Cavitation Tunnel until 1952, and the tunnel was not fully operational until 1958. Number 2 Cavitation Tunnel was listed at Grade II in 2013.

The post-war period saw considerable expansion of the test facilities at Haslar, as the AEW realised that a far greater range of experimentation was required to improve the manoeuvrability of ships in response to the fast-paced naval warfare of the Second World War. Several ancillary facilities were constructed between 1945 and 1960 including a propeller laboratory and a photography laboratory, and Number 1 Ship Tank was extended in 1957. Steering and manoeuvring experiments began on nearby Horsea Lake in the 1950s and a large covered Manoeuvring Tank was completed at Haslar in 1959.

Operations at Haslar began to be streamlined in the 1990s. This followed the amalgamation of AEW into the Admiralty Marine Technology Establishment (AMTE, 1977-1984), the Admiralty Research Establishment (ARE, 1984-1991), and ultimately the newly-formed Defence Research Agency in 1991 (subsequently subsumed into the Defence Evaluation and Research Agency in 1995). The Number 1 Ship Tank building was converted to office use in 1993. Several post-war buildings and Number 1 Cavitation Tunnel were demolished between 1993 and 1995 to make way for new buildings and car parks. Experimental research has continued under the auspices of one of AEW's successor bodies, QinetiQ, since 2001.

Number 2 Ship Tank was the second testing facility constructed on the AEW Haslar site. The development of the Royal Navy's fleet during the First World War demonstrated that both the volume of investigations required and the range of vessels to be tested would far outstrip the capacity of a single tank. A second tank would have to be far larger to accommodate models that reflected the increased size and surface speed of the Navy's ships, as well as deeper in order to test submarine models. Completed in 1930, Number 2 Ship Tank, also known as the High Speed Tank, was orientated perpendicular to Number 1 Ship Tank parallel to Haslar Road. The tank was twice the width and depth of Number 1 Tank. In order to give greater scope for investigations in shallow water, a false bottom was incorporated

into the design of the tank allowing for adjustments in depth to be made. A large workshop was constructed to the west of the tank for the production of models and adjoined a series of offices for drawing and recording and the rooms housing the batteries and generators for powering the towing carriage. Since its construction, Number 2 Ship Tank has remained the largest tank of its type in the United Kingdom at 270m long. Among contemporary European examples only the Calm Water Towing Tank at the Canal de Experiencias Hidrodinamicas de El Pardo in Madrid, built to a length of 320m in 1934, could boast a longer waterway. In 1943, Admiral Sir Bruce Fraser initiated investigations into improving the efficiency of ship anchors and testing was carried out in the centre dock of Number 2 Ship Tank before a purpose built tank was constructed. Number 2 Ship Tank proved integral to boat testing for the water speed record in the mid-C20 and was used into the C21 for model testing of the reverse four-point hydroplane craft Quicksilver.

In 1970, the wheeled carriage used to move models along the waterway was updated with the Planar Motion Mechanism. The advent of high speed nuclear submarines required advances in the fields of submarine stability and control. The new mechanism measured the forces acting on a submarine model while running submerged at various attitudes, or when oscillated in a vertical plane. At the western end of the waterway was a beach built to suppress waves created during experiments, whilst at the eastern end a wavemaker allowed for a wider range of towing tests and simulated sea conditions. In 1995, a new wavemaker was installed and the beaches were also subsequently replaced. The slate roof covering and skylights to the building were renovated in the 2010s. The tank currently (2022) remains in use by QinetiQ for hydrodynamic model tests of surface ships, submarines, offshore structures and renewable energy devices.

Details

A covered model ship testing tank, workshop and offices, constructed in 1927 to 1930 for the Admiralty.

MATERIALS: red stock brick laid in English bond with red brick and concrete dressings, steel roof trusses and slate roof coverings.

PLAN: a linear plan comprising an extremely long single-storey gabled ship tank range at the north-east attached to a large square single-storey gabled workshop range at the south-west. The workshop range contains a facility area, offices, store rooms and plant rooms.

EXTERIOR: the building is orientated on a north-east to south-west axis parallel to Haslar Road. The south-east elevation of the workshop range forms the main entrance to the building fronting onto Haslar Road. This range is built in a neo-Georgian style with a brick and concrete plinth, brick pilasters, sash windows, a pitched slate roof and two projecting gables to the principal front. The south-east elevation is a largely symmetrical composition of 21 bays. The central bay contains panelled doors approached by steps beneath a semi-circular moulded porch canopy carried on huge corbels. On either side of the doorway are rusticated brick clasping buttresses, and above it is a 1930 date stone and parapet with a coping. There are three bays to the left of the entrance and four bays to the right, all containing pairs of six-over-six sash windows with red brick voussoirs and concrete cills separated by plain brick pilasters. Beyond these are the gabled bays; each with three sash windows beneath an oeil-de-beouf window and rusticated brick clasping buttresses. At the south-west end is an access ramp leading to a roller shutter for bringing models or machinery into the workshop. This range is lit from above by rows of skylights and two raised ridge lanterns. The south-west elevation has a tripartite round-headed window at its centre flanked by two further round-headed windows and two small square-headed windows at the north-west end. The north-west elevation is an irregular composition with a gable at its centre and ten flanking bays of casement or fixed windows separated by plain brick pilasters. The central gable has three doorways and two windows to the ground floor and a four-light window to the attic. Immediately to the north-east is a lean-to extension with timber double doors whilst immediately to the south-east is a single door raised above ground level and accessed via a short flight of steps to allow for a heating chamber below. Many of the doors and windows on this side of the workshop range appear to be late C20 replacements, some in uPVC.

The ship tank range is 64 bays long and has a concrete arcade of canted arches beneath the windows on each side

which support the walkways flanking the tank. Two earthen banks, probably the spoil from the excavation of the tank, obscure most of the arcades. The north-west and south-east walls have a large clerestory window to each bay separated by plain brick pilasters. The windows are of 30 panes with a central pivoted opening. At the 28th bay from the north-east end are projecting brick winch openings on each side raised on plinths beneath flat roofs. These were originally used for accessing the mid-point of the waterway, although the openings were infilled in the late C20 with uPVC doors and panels. There is also a two-storey gabled cross range to the south-east elevation at the 41st bay from the north-east end containing a plant room. The slate roof of this range has two rows of skylights and three raised ridge lanterns.

INTERIOR: the workshop range at the south-west of the building originally housed a workshop, machinery control room, dining room, drawing and recording offices, fitting room, and battery and generator rooms for the towing carriage before adaptation to modern use. The main entrance leads into a hallway and corridor with a terrazzo floor. Flanking the entrance are a series of offices, store rooms, meeting rooms and staff rooms, all largely with late C20 or early C21 fixtures and fittings*. Many of the doors have been replaced and there are some modern false ceilings* and partitions*. Opposite the main entrance is a doorway into the workshop or facility area; this area has a concrete floor and forms a large space open to the roof which is built of canted steel howe trusses. Attached to the roof structure are steel I-beams for a travelling crane*. This is used for lifting models up and through timber double doors at the north-east end of the facility area, into the ship dock beyond, including the Iris model used since 1895. On the north-west side of the range are further offices, plant rooms, store rooms and bathrooms.

The ship tank range is an exceptionally long structure with three docks at the south-west end; a pair of shallow concrete docks flanking a much deeper central steel and concrete dock facilitating the launching of models into the tank's waterway. There are modern steel railings*, buffers*, overhead bus bars*, light fixtures*, cabling* and piping* throughout much of this range. The concrete tank inside the main range is 12m wide and 5.4m deep with gently tapered sides. It is 270m long but extends up to 283m inclusive of its docks. Flanking it are two narrow walkways running along the length of the tank. The walls of the waterway support steel traveller rails* to carry the models* and recording equipment* mounted on a substantial trussed wheeled carriage (replaced in 1983)*. This includes the Planar Motion Mechanism*, which measures the forces acting on a model at various attitudes, or when oscillated in a vertical plane. The bays of the tank are numbered and the distance in metres from the wavemaker is marked at intervals along the waterway. The towing carriage interfaces with various towing rigs*. At the north-east end is a wavemaker* installed in 1995 whilst at the south-west end are beaches* also installed at that time. Behind the current modern wavemaker* is the original wavemaking equipment. The waterway is open to the steel roof, which is supported by canted howe trusses, 16m in span, seated on RSJ stanchions set within the brick pilasters of the side walls.

EXCLUSIONS * Pursuant to s1 (5A) of the Planning (Listed Buildings and Conservation Areas) Act 1990 ('the Act') it is declared that these aforementioned structures and/or features are not of special architectural or historic interest. However, any works to these structures and/or features which have the potential to affect the character of the listed building as a building of special architectural or historic interest may still require Listed Building Consent (LBC) and this is a matter for the Local Planning Authority (LPA) to determine.

Sources

Books and journals

Brown, D, The Way of a Ship in the Midst of the Sea: The Life and Work of William Froude, (2005)

Other

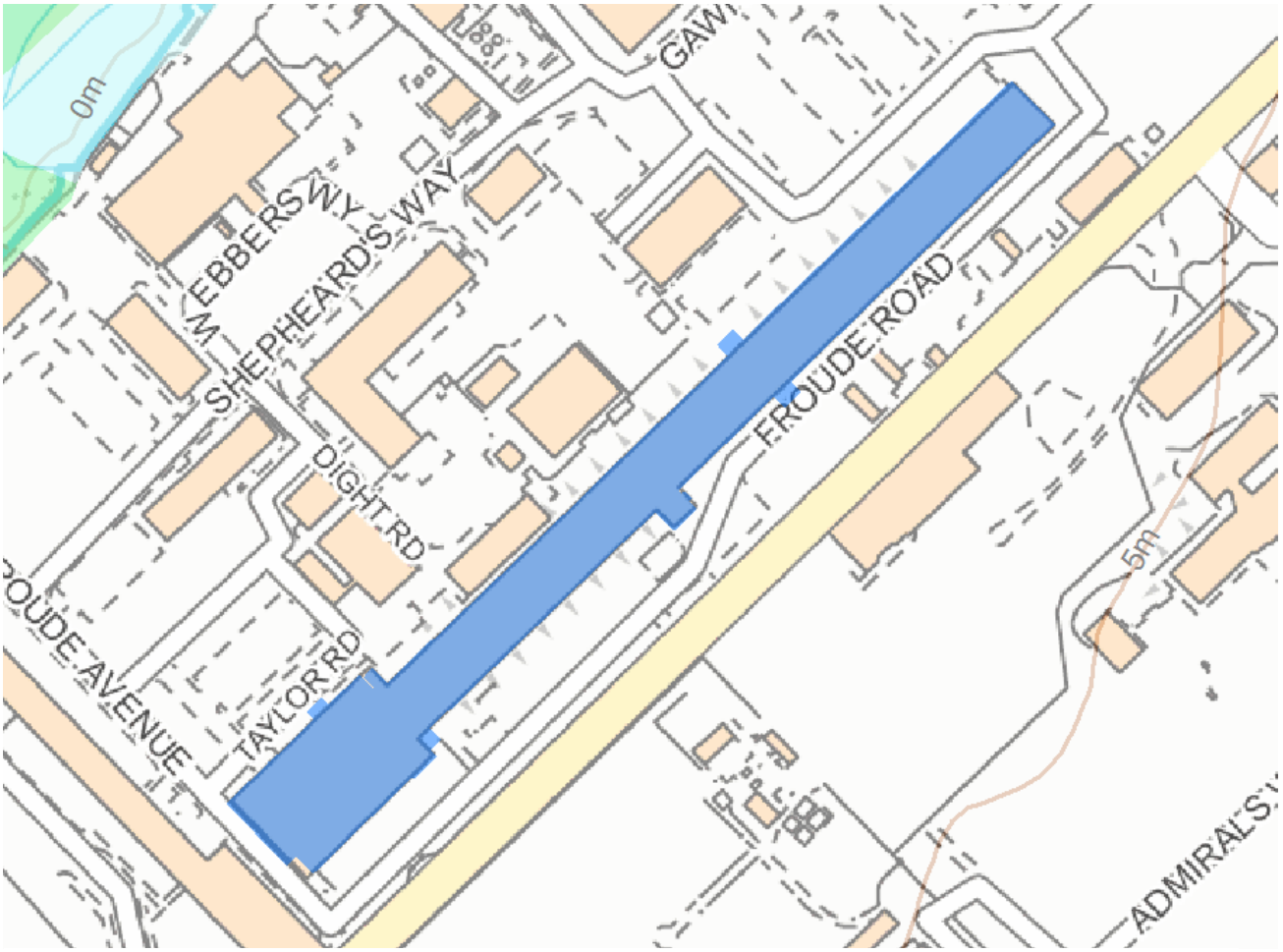
Bristow, M, The Admiralty Experiment Works, Haslar Road, Gosport, Historic England Research Report Series no. 11-2016, (2016) [Unpublished report]

OS Maps (1:2500): 1881, 1898, 1909, 1932, 1952, 1969

Legal

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.

The listed building(s) is/are shown coloured blue on the attached map. Pursuant to s1 (5A) of the Planning (Listed Buildings and Conservation Areas) Act 1990 ('the Act') structures attached to or within the curtilage of the listed building but not coloured blue on the map, are not to be treated as part of the listed building for the purposes of the Act. However, any works to these structures which have the potential to affect the character of the listed building as a building of special architectural or historic interest may still require Listed Building Consent (LBC) and this is a matter for the Local Planning Authority (LPA) to determine.



Map

This map is for quick reference purposes only and may not be to scale. This copy shows the entry on 11-Nov-2022 at 12:03:04.

End of official list entry

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