Archaeological Field Survey Report

CLIFFE FORT BRENNAN TORPEDO SLIPWAYS MEDWAY, KENT

by Paul Pattison

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

CLIFFE FORT
BRENNAN TORPEDO STATION
MEDWAY, KENT

NMR NUMBER TQ 77 NW 25

REQUEST SURVEY

APRIL 1993

RCHM
ENGLAND

RCHME (CAMBRIDGE)
Brooklands
24 Brooklands Avenue,
CAMBRIDGE, CB2 2BU

CLIFFE FORT BRENNAN TORPEDO LAUNCHING BAYS (KENT)

A SURVEY BY THE RCHME, APRIL 1993

INTRODUCTION

An archaeological survey was undertaken by the RCHME at Cliffe Fort, on the River Thames in Kent, following a request from John Williams, County Archaeologist for Kent County Council. The survey was designed to record two launching bays of a Brennan Torpedo Station which were threatened by repairs to the river bank. The launching bays are built into the ditch and counterscarp bank on the eastern side of an 1860's coastal fort and were originally connected to storage and operations rooms inside the fort itself. The latter were not included in the survey but a partial photographic record was made. In order to record fully each launching bay, survey took place at an exceptionally low spring tide.

TOPOGRAPHY

Cliffe Fort faces north-west, occupying low lying, flat ground on the right bank of the River Thames. Cliffe, together with two other forts; Shornemead Fort further upriver on the right bank and Coalhouse fort at East Tilbury on the left bank, formed the first line of the Thames defences established following recommendations in a Royal Commission report of 1860. They protected the southern end of that stretch of the river known as the Lower Hope, where there is a pronounced westward bend toward London. Inland from Cliffe fort there is a large expanse of low lying, marshy ground.

THE DEVELOPMENT OF THE BRENNAN TORPEDO

Several articles have previously been published and are currently being researched on the development of the Brennan Torpedo and installations in Britain and abroad. The

following is a short summary.

The torpedo was invented by an Irish Australian, Louis Brennan, in Melbourne, 1874, and patented in the following year. By 1877, the Brennan Torpedo Company had built a 9ft, half-scale working model which was demonstrated to two military advisors, both Royal Engineer Officers, who were in Australia at the time. This trial revealed the potential of the weapon and by August of 1878 further development had resulted in an improved 15ft long torpedo which was tested successfully during February and March of 1879. Soon afterwards, it became clear that further financial backing and the necessary materials and facilities for continued improvement could not be found in Australia. Accordingly, following contacts with the Admiralty in England, a new company was established and funds raised to send Brennan to England with his partner, John Temperley, in the December of 1880, with the intention of selling the torpedo to the Admiralty. In 1881 an Admiralty Committee decided they had no use for the torpedo as a ship-board weapon but suggested that further trials might be made from coastal forts. Brennan and Temperley had, however, already been in touch with the War Office, and they were referred, via the Royal Engineers' Committee, to the Inspector General of Fortifications. Subsequently in 1883, with government backing, a workshop was provided in the school of Military Engineering at Brompton barracks, Chatham, and trials were made from an experimental station in the River Medway, at Garrison Point Fort, Sheerness. These met with a favourable response and development continued until 1886 when Brennan reported that the weapon was ready. All rights to the torpedo were purchased by the British Government in 1887, for the then substantial sum of £110,000 (Kitson 1993).

The torpedoes were manufactured in a small factory in Brompton Barracks between 1887 and 1896 when production moved to a larger establishment in the Submarine Mining Enclosure near Gillingham Pier. Production ceased in 1906 although

torpedoes remained in use for short time afterwards (Gillingham Library 1973, 8).

THE TORPEDO

The unique nature of this weapon was the ability to launch and steer it from the shore. The methods of propulsion and steering were constantly improved but the later models worked as follows: a steam engine, located securely in the fort, both propelled and steered the torpedo by means of two steel wires contained, tightly coiled, in drums inside the torpedo itself. The steam engine pulled the wires from the torpedo drums, winding them onto a sub-divided drum on the engine. This action span the torpedo drums which were connected, by a series of linkages, to two contra-rotating propellers, thus allowing the torpedo to run. Immediately the engine was running, the torpedo was released and ran on small wheels down an inclined modified rail track of 7" gauge, into the water (Beanse 1993a).

A steering wheel on the engine altered the relative positions of two sliding pulleys moving on either side of a horizontal steering girder, mounted over the engine. The steel wires moved over these pulleys. By turning the steering wheel the pulleys moved together or apart, the distance moved being equal to half the difference in the length of wire taken off each torpedo drum, and, via linkages to the rudder, proportional to the rudder movement. Rudders were located at both bow and stern of the torpedo (Beanse 1993a).

The torpedo also contained a mechanism which enabled it to run at a constant depth. A collapsible mast on the dorsal surface enabled tracking from the shore, and a rear-facing light facilitated night observation. The torpedo run was watched through mounted binoculars by an observer, located in an elevated position on the fort, who transmitted engine and steering information electrically to dials located next to the steering wheel in the engine room. Information could also be transmitted audibly

through a speaking tube (Beanse 1993a). It is a remarkable fact that the engineer controlling the torpedo never saw the torpedo on its run.

Continual improvements were made to the torpedo and by the 1890's it could run up to 2000yds (1829m) at depths up to 12ft (3.66m) at speeds between 22 and 30 knots, carrying a charge of 220lbs of wet gun cotton (Kitson 1993 ,72). The surviving torpedo at Chatham, built at Gillingham probably between 1887 and 1891 (Kitson 1993, 72) is 22ft (6.7m) long, 2ft 9in (0.84m) deep and 2ft (0.61m) wide and would have weighed 3.5 tons when armed (Gillingham Library 1973, 9). An account of 1885 describes a torpedo with wire drums holding 2,000yds of wire, which could run at a speed of 27 knots for 1,000 yds (914m). In another account of the same date a torpedo, 21ft (6.4m) long and weighing 1 ton, carried a charge of about 200lbs of wet gun cotton. By 1887, the performance of the weapon carrying 200lbs of compressed gun cotton was stated at 22 knots speed for short ranges, 19 knots over 1,000yds and 17 knots over 1,600yds (1463m) (Beanse 1993b, 2-3).

By 1894 trials were under way with a thicker wire, allowing more power to be transmitted to the torpedo. This involved considerable redesign, producing a two-to-three knot gain on speed. This change also required a heavier launch rail which can be seen in the two different launching bays at Cliffe Fort (see below and plan 4).

THE CLIFFE FORT TORPEDO STATION

It is not known precisely when the Brennan Torpedo Station was first established at Cliffe Fort. Assuming that Sheerness was the only experimental station, then Cliffe should post-date the British Government's purchase of the weapon in 1877. Ordnance Survey maps are of some assistance: the southern launching bay was built by 1895 and is depicted as an indentation to the river defence with a twin rail 60m long running out over the mud (OS 2nd edition 25" 1897, surveyed 1895).

By 1907 both launching bays were mapped; the newer northern bay a wedge-shaped interruption to the river defence. A single line represents the rails of both launching bays running out 60m and 73m respectively into the river over mud flats (OS 3rd edition 25" 1908, surveyed 1907). The northern launching bay was built sometime after 1894 to accommodate the re-designed torpedo. It is not known whether both launching bays functioned together: the fact that a northern bay was built at all, instead of adapting the existing southern bay, might suggest that the earlier bay continued to function. However, the considerable differences in the form of the later torpedoes, winding engines and other ancillary equipment suggests that the southern bay remained in use only until the northern bay was fully operational.

Cliffe has the dubious distinction of being the only known Brennan Torpedo Station to sink a ship, albeit in error: in August 1901 a Ketch, WS Flower, was struck by a torpedo on trials. The torpedo, containing a full charge but no detonator, made a large hole below the ship's waterline and it sank quickly. Fortunately, no one was injured and the vessel was recovered (R E Museum).

Between 1904 and 1906, four of the established Brennan Torpedo Stations in Britain competed annually for a challenge cup and the results were printed in the Royal Engineer magazine, "The Sapper". Cliffe won on three consecutive occasions between those dates, in 1906 scoring 4 hits out of 9 by day and 2 out of 3 by night. The target was a 50 yd gap between two buoys which were towed past the torpedo stations at a range of 1000 yds and a speed of 30 knots. Cliffe was manned by an officer and twelve men ("The Sapper" 1906, 50, 57).

There are no known references to the Cliffe Brennan installation after 1906.

THE SURVEY

It was not possible to survey all of the southern launching bay, which had been partially

infilled and new gabbions installed for coastal defence. The remaining portions comprised a small section at the extreme eastern end and the western half, which is visible at low tide. The northern launching bay surives in its entirety, although there has been considerable riverine erosion at its western end.

The launching bays are constructed predominantly of concrete and timber, laid in deep cuts made through the riverbank leading just into the counterscarp bank and outer slope of the fort ditch, at a level to secure successful launching at all conditions of tide. The riverbank here is of grey clay, reinforced with a thick layer of stone sets which were probably carefully laid but which are now largely displaced by tidal action. Leading north from the northern launching bay the additional protection of a sloping concrete apron, 0.35m thick, is also badly broken by the tides.

At their lower, river ends the launching bays were protected from erosion by a continuous revetment of butted upright timbers, each timber c. 0.3m wide and 0.1m thick, extending between and to the north and south of both bays. One hundred years of tidal action has broken this revetment, with many timbers displaced or leaning, allowing the stone bank behind to spill into the river.

The southern launching bay is directly in line with the torpedo room inside Cliffe Fort but the northern bay, built later, is offset to the north. This would have necessitated several adaptations to get the torpedoes from their earlier path onto the newer launching rails. A thorough search of the area between the launching bays and the fort, where several rails are still visible, is clearly needed to solve this problem. At the time of survey this area was hopelessly overgrown.

The northern launching bay (the letters in the text refer to plans 1 and 3)

This comprises a concrete chute 34m long, widening gradually towards the river and sloping at an angle of c. 5 degrees. Its smooth, steep side walls are set at an angle of

c. 30 degrees from vertical and stand between 1.35m and 2m above the floor. The floor is built of contiguous slabs varying in width between 1m and 4.3m and c. 0.35m thick. At the lower end of the launching bay the river has undermined the floor, causing it to buckle and collapse; its broken slabs now slope at various angles.

At the river end of the launching bay are a line of six upright timber posts, each 0.22m square, standing to a uniform height of 1.75m, well above the collapsed concrete floor. The top of each post is morticed to landward, probably to take a horizontal rail across the end of the launching bay to which the continuous revetment of upright planks was attached. On each side at the mouth of the bay are two upright planks, **a**, which have rectangular holes, 0.35m deep and 0.15m wide, cut through near their tops. Their function is unknown.

At **b** the side walls slope down towards the river and abandon their angled sides, continuing to the timber revetment with much lower, vertical faces only 0.4m high. At the landward end the side walls turn inwards to end in opposing, sloping faces. Paired grooves in these faces formerly held horizontal timbers forming two vertical partitions which closed off the launching bay from the river when the torpedos were not being launched (several timbers in place today are probably not original). These partitions divide a raised platform, **c**: on the river side the platform is raised 0.6m above the main floor of the bay which is reached by a flight of four steps, formerly used by personnel to perform routine maintenance and to clear flotsam and jetsam; on the landward side are opposing flights of six steps providing access down to the platform and also the partitions, which would have been removed to launch torpedoes. These steps also provided access along the counterscarp bank of Cliffe Fort.

Laid across the axis at the landward side of platform **c** is a timber sleeper 1.4m long, 0.32m wide and 0.23m deep, to which is bolted a large brass plate 0.61m long, 0.255m wide and 0.02m thick, in a central position. Additional brass bolts on this plate

formerly anchored the ends of the launch rails. Platform **c** is effectively an abutment, with the rails presumably supported across the fort ditch by a small timber bridge structure: undergrowth prevented the identification of any associated remains. On platform **c** the launch rails are built into a recess in the concrete so that their upper surfaces project just enough to carry the torpedo wheels, while the centre of the recess is concave to allow for the depth of the ventral surface of the torpedo (plan 4; profile 10). The gauge is c. 0.18m (7"). The rails leave the platform to run down the central axis of the launching bay on eleven of an original twelve steel supports (plan 3; profile 9 and plan 4; profile 14). Beyond the river end of the launching bay, at low water, the stumps of four circular pillars are visible, three in situ, the other collapsed, which carried the rails further out into the river. The pillars are 0.39m to 0.44m in diameter. As in the southern bay, they are probably embedded deeply into the river bed. Set in the upper surface of the fallen pillar is an identical rail support to those used in the launching bay.

Three complete pairs of launch rails remain in situ, each rail 4.5m (14.75ft) long; another single rail of the same length, its partner sawn off short, also survives and a fourth pair on platform **c** have a shorter length of 3.4m (11.15ft). If one more pillar was anchored in the river, four more pairs of rails could be accommodated, although the OS map depiction suggests that there may have been even more (OS 3rd edition 25" 1908, surveyed 1907).

The southern launching bay (letters in the text refer to plans 1 and 2)

This comprises a concrete and stone chute 40m long, widening slightly towards the river, its floor sloping to the water at an angle of 7 degrees. The surviving 19m length of the floor, 5.4m to 8.5m wide, is built in several rectangular sections laid across the main axis of the bay. Most of these are obscured by debris, but those visible are 1.95m and 1.95m

to 3.65m wide respectively. This launching bay has steeply-angled sides and is deepest to landward, where it is 1.95m, gradually losing height towards the river end where it is only 0.5m. The concrete sides are built in layers running outward and downward, with reductions in steepness between each layer. Above the concrete the profile is carried on by a revetment of stone setts, now in a fragmentary condition.

The mouth of the launching bay is intact, suffering hardly any erosion. Its timber revetment comprises six vertical posts, each 0.22m square, driven into the river bed, to which on the landward side is attached a continuous horizontal timber rail. Nailed to the landward side of this rail is the main revetment of upright planks set edge to edge, driven into the river bed and continuing both north and south of the launching bay. The top surfaces of the posts, the rail and the plank revetment are all level with each other (for clarity they are shown detached on plan 1). The top of the revetment stands 0.5m above the end of the concrete bay floor and 1m above the river mud.

Running down the centre of the main axis are a series of eight wooden post stumps each 0.22m square and between 0.1 and 1.15m high. Although most are broken, one survives to its full height of 1.15m. At low tide, beyond the timber revetment at the river end, another six posts are visible, presumably driven deep into the mud at the bottom of the river. All fourteen posts, spaced at 1.85m (6ft) centres, form a straight line and formerly supported the metal launching rails. A previous, unfinished survey recorded four more stumps and gaps for a further three, making twenty one in all (Smith ms survey). The twin launching rails seem to have been deliberately removed in c. 1970 by sawing through the timber supports (Beanse, pers.comm.). Several broken and twisted examples lie among debris in the launching bay.

Fragments at the upper end of the launching bay reveal a similar design to the northern bay. Opposing flights of steps descend to a platform, **d** - at 1.9m considerably wider than its northern partner - which was originally closed off from the river by a

timber partition similar to that in the northern bay; the grooves for them in the concrete are now barely visible. A single pair of rails remain in situ, anchored to a timber sleeper at the end of the platform via an iron plate, 0.61m long, 0.23m wide and 0.02m thick. Platform **d** also functioned as an abutment for a bridge arrangement carrying the rails over the fort ditch; the opposing abutment is visible built into the fort glacis (not surveyed)(see plan 4, profile 11).

METHOD

The survey was carried out by Paul Pattison and Jane Kenney of RCHME using a Wild TC1610 Electronic Theodolite with integral EDM, the data captured electronically on a Wild GRM 10 Rec Module. This data was subsequently transferred to a PC and a plot obtained on a Calcomp 3024 plotter. A full photographic survey was undertaken by Sid Barker of RCHME, comprising extensive cover of the launching bays with additional photographs of the storage and operations rooms inside the fort. The work was greatly assisted by 24 Field Squadron of Royal Engineers, Chattenden Barracks, who carried out extensive clearance, especially in the northern launching bay, removing rubble and sea debris so that the photography and survey could proceed.

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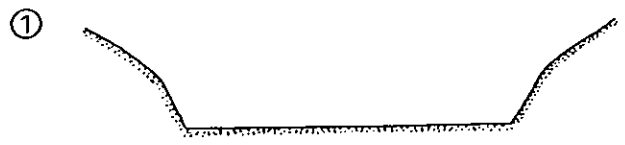
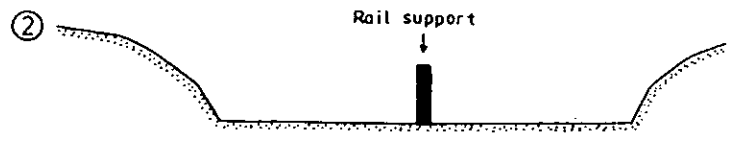
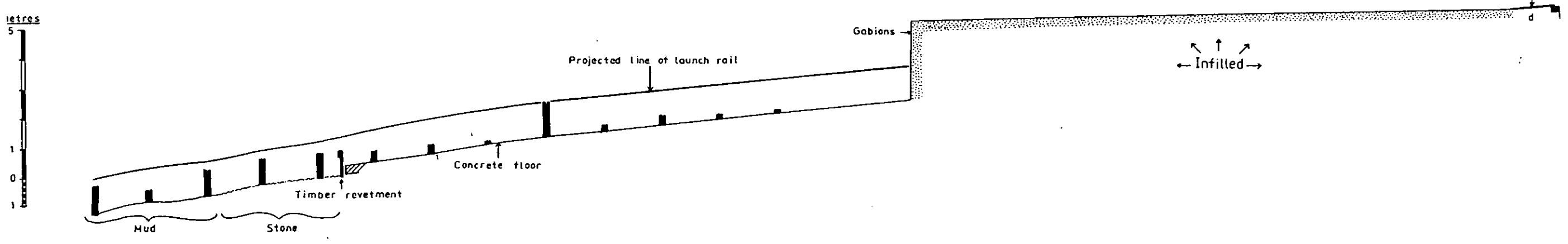
The Sapper October 1906 50, 57.

Cliffe Fort Brennan Torpedo Station
South Launching Bay

Profiles







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Metres

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

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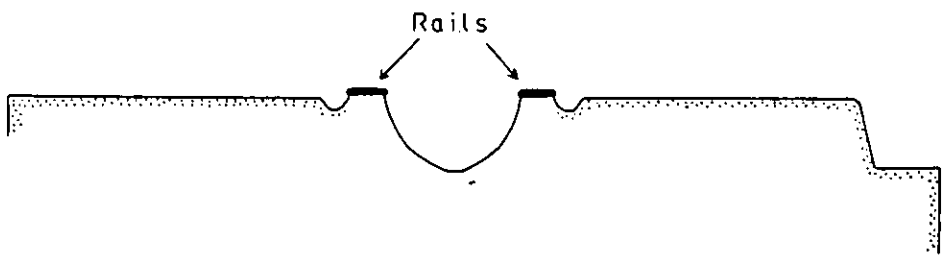
Cliffe Fort Brennan Torpedo Station

PROFILES



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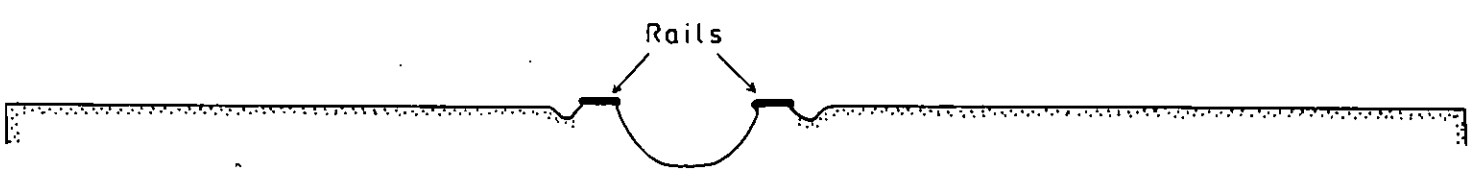

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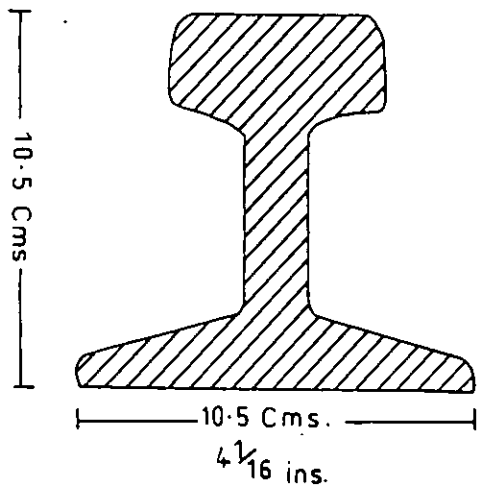

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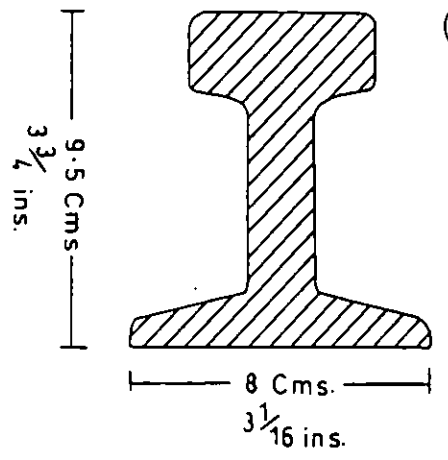

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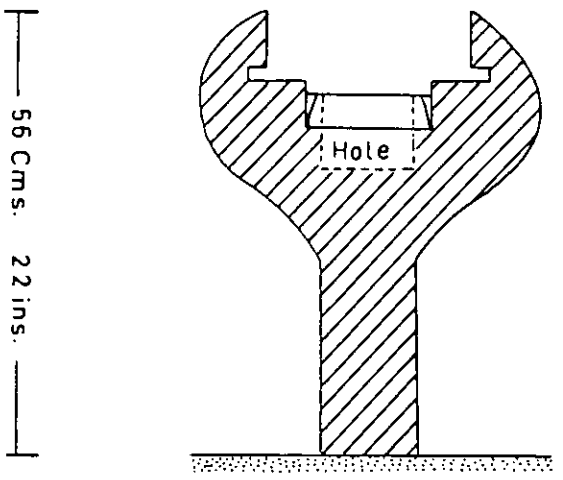

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North Launching Bay Rail support

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Cliffe Fort Brennan Torpedo Station
Launching Bays

GN

Cliffe Fort

Fence

KEY

- Timber uprights
- Stone sett paving
- Steel upright
- Concrete sea wall
- Infilled area

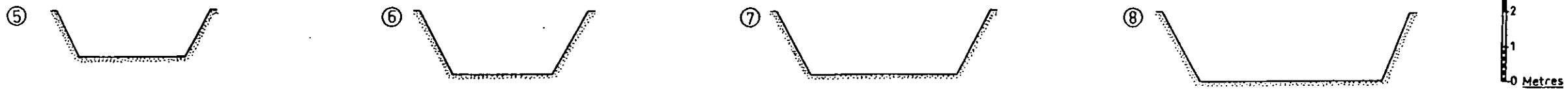
Fire Brigade store

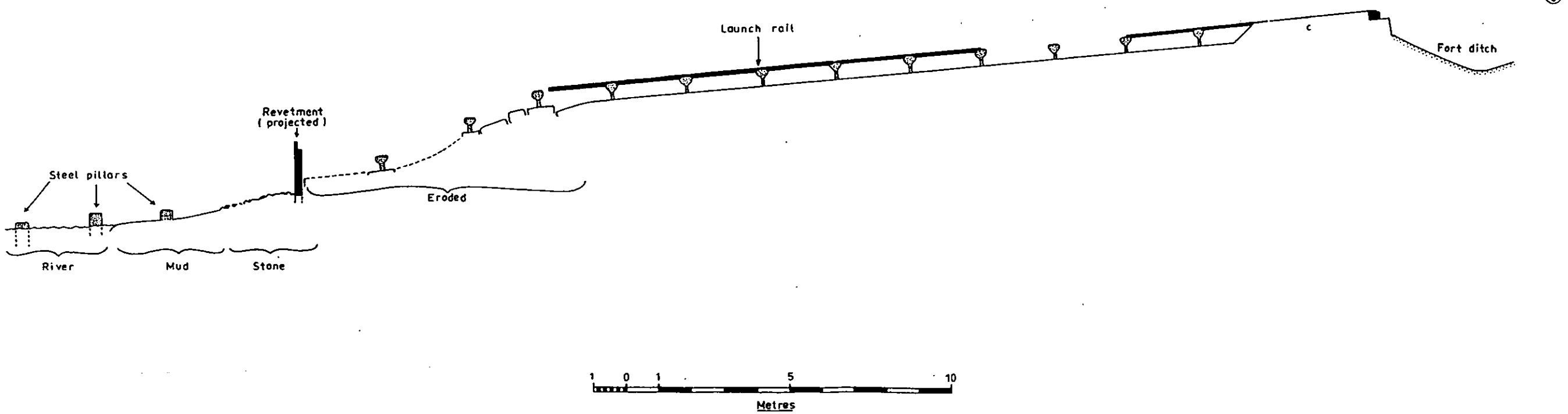
1 0 1 5 10 15 20

Metres

Cliffe Fort Brennan Torpedo Station
North Launching Bay

Profiles





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