

THE HIGH DOWN TEST SITE, ISLE OF WIGHT ROCKET TEST SITE

SURVEY REPORT

Wayne Cocroft



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**HIGH DOWN TEST SITE,
THE NEEDLES, ISLE OF WIGHT
Rocket Test Site**

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Gantry 1 looking up the efflux channel towards the gantry foundations

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1 Introduction

The remains of the High Down Test Site are a rare example of a 1950s British rocket test facility, built at a time when the country was amongst a handful of nations at the forefront of rocket and missile technology. Internationally, large rocket testing facilities of this date are uncommon, restricted to the two Superpowers, the United States and the Soviet Union, and possibly France. It is also a visible reminder of the Isle of Wight's aviation heritage, in such specialised fields as flying boats, rocket powered interceptor fighter and hovercraft, and in particular its contribution to space technology.

Most of the site's ancillary buildings have been demolished and the metal work of the test stands removed, nevertheless, its plan form and remaining features may be used to illustrate the operation of a post-war rocket test facility. The site and surrounding down land is owned by the National Trust and is publicly accessible. More detailed records of the site's individual features are presented on record forms and may be found in the appendix.

2 Topography and landuse



Figure 1 The Needles viewed from the west with the High Down and Tennyson Down to the right. In the foreground is James Walker's 1859 Goose Rock lighthouse. To its right is Scratchell's Bay and above it New Battery and the High Down Test Site. (c) English Heritage NMR18515/30

The southwest coast of the Isle of Wight is formed of a whale-backed chalk ridge orientated roughly west to east known as Tennyson Down and West High Down (Figure 1). At its western end the ridge narrows to form a peninsular with steep cliffs to either side, to the south is the English Channel and to the north the White Cliffs overlook the western entrance to the Solent. At the western most point of the peninsular are the chalk sea stacks, known as The Needles and at their end the mid-19th century Goose Rock lighthouse. This replaced an earlier 18th century lighthouse by Richard Jupp that stood on the hilltop (Hague and Christie 1975, 220). To the south is Scratchell's Bay and above the headland Sun Corner the cliff side forms a natural amphitheatre. The Needles are regarded as one of the most picturesque features on the Isle of Wight and with the adjacent coloured sands are some of the island's most popular tourist destinations. However, offshore the gently shelving chalk has been treacherous to shipping, there are many documented wrecks and archaeological finds suggest some may be of Roman date. From the construction of New Battery in the late 19th century, the downland between it and Coastguard Cottages was intensively used for military encampments. Some may be traced as footings or earthworks, less obvious are the many buried service trenches that connected the buildings. Removal of many of these buildings, chiefly during the 1970s, involved considerable ground disturbance and re-profiling of many slopes in the area. Today the downs are open grassland and the Needles Old Battery a feature part of the island's coastal path.

3 History

From at least the Roman period Southampton Water has been an important trading route with the continent (Cotton and Gathercole 1958) and from the Tudor period Portsmouth developed into one of the country's main naval bases. Control of the movement of shipping into the Solent was therefore of vital national strategic interest.

The Needles Battery

From the cliffs above The Needles there are commanding views of the western approaches to the Solent and eastwards towards Southampton Water. Prior to the construction of the first permanent battery between 1861 and 1863 historic Ordnance Survey maps show that the headland was deserted except for a track along West High Down, which is followed by the modern footpath and terminated somewhere above Sun Corner. To assist in the construction of the fort and the transport of its heavy guns a new road was terraced into the north side of the headland along the top of the White Cliffs.



Figure 2 The Needles Battery.
(c) English Heritage
NMR.21952/15

The Needles Battery (SZ 29556 84882) was one of 76 batteries and forts constructed or remodelled in the late 1850s and 1860s under Lord Palmerston against the threat of hostile French intentions (Saunders 1989, 182; Coad 2007, 51-5). On the north shore of the Solent, Hurst Castle was modernised in the 1850s and dominated the 1.25 km (3/4 mile) channel between itself and Fort Albert and other batteries on the island. So vital was this stretch of water that by the end of the 19th century it was guarded by ten batteries and forts. The Needles Battery (Figure 2) was designed by Major James Edwards, Royal Engineers, and constructed by George Smith of Pimlico, and was originally equipped with six Armstrong 7-inch breech-loading guns (Savage c.2000, op.1: Coad 2007, 51). In 1873, these were replaced by six more powerful 12 ton 9-inch rifled muzzle-loading guns, these were arranged in two groups, Group A with four guns and a position finder and Group B with two guns and

a position finder (The National Archives (TNA): Public Record Office (PRO) WO192/134). In addition to the gun emplacements the new battery included a ditch and defences on the landward side, a barracks, officers' quarters, a Royal Engineers' office, shell and powder stores and a laboratory for shell assembly and inspection.

The end of the century brought new threats, in particular small motor torpedo boats, and in the late 1880s trials were undertaken with searchlights and quick firing guns. In 1908 a Fire Command Post was added to co-ordinate all the guns defending the Needles Passage and later in 1913 one of the country's first fixed anti-aircraft guns was tested on the fort's parade ground (Savage c.2000, 7; Coad 2007, 53).



Figure 3 The Needles Battery, 1870s rifled 9-inch muzzle loading guns placed on replica carriages. (c) English Heritage

After New Battery (see below) received its guns the metal fittings were removed from Old Battery's guns in February 1902 and in the following year the guns were tipped over the cliff edge. Their carriages were broken up for scrap in 1905 (TNA: PRO WO192/134). Two of the guns have subsequently been recovered by the National Trust and placed on replica carriages (Figure 3). The Needles Battery is a Scheduled Monument 22017.

The New Needles Battery

In the early 1890s fears that the vibrations from the discharge of the guns might hasten further cliff falls, and thereby undermine the 1860s fort, led to the construction of a new battery about 350m to the south east just below the crest line of the hill (see Figure 9) The construction of this battery also necessitated the creation of a new road and to the west of the Needles Battery a terraced track was dug into the cliff side to the site of the new battery. This comprised three emplacements at 120m (394 feet) above sea level, which dominated the northwest approaches to the Solent and the passage to the north (Figure 4). Construction begun in October 1893 of the new battery was completed by May 1895. The main contractor for the work was Mr Hill, Bungworth, Gosport, and the total cost of the work was £9821 (TNA: PRO WO 78/3949 Drwg No.2). In common with practice elsewhere it was not until



Figure 4 *The New Needles Battery, looking eastwards towards Hurst Castle and the Solent.*
(c) English Heritage

1900 that it was equipped with two 9.2-inch Mark IX breech-loading guns, the third was in place by 1904. The delay in arming the new battery may in part be accounted for in contemporary perceptions about threats to the country and the competing demands on both the Treasury and gun-makers to re-equip the Royal Navy with modern battleships. At the east end of the emplacements was a position finding post with a telephone room beneath. Around 1900 a new battery command post was built on the crest of the hill. For practice use two quick firing 3-pounder guns were placed between the centre and northern emplacement, but by 1907 these had been removed. Between 1911 and 1914 the emplacements were adapted for Vavasseur Barbette (VB) mountings, which used an inclined ramp to help to absorb the recoil forces. In 1913, one 9.2 inch Mark IX breech loading gun (M1) was installed and a year later a similar gun (M2) was erected, leaving the central emplacement dismounted (TNA: PRO WO192/134). During the First World War a 6-pounder quick firing gun was emplaced to the south of the westerly emplacement for examination service use, whose role was to confirm the identities of ships entering the Solent.

Also at the end of the 19th century a row of four Coast Guard cottages were built on the northern side of High Down, partly terraced into the slope to provide some protection from the elements. The main access to these cottages was from the road along the top of the White Cliffs and up a steep iron staircase set into a concrete channel.

After the armistice in November 1918 the fort was placed on care and maintenance, but in 1926 it was reactivated for Territorial Army use with two 9.2-inch breech-loading guns. During the Second World War it once again played a vital role in protecting the Solent's western approaches. It guarded against the long range bombardment of Portsmouth, attempts to scuttle block ships in the channel or efforts by small motor boats to enter the channel and in 1943 the guns of New Battery engaged a number of German torpedo boats. In the event

of an attempted invasion it might also be used to deter landings on the north shore of the Solent. At the beginning of the war its main armament was replaced by two 9.2 inch Mark X guns, designated F1 and F2, both of which were nearly 40 years old and were erected on the VB mountings. During the war they were replaced and in February 1944 it was noted that the guns were on Mark V mountings (TNA: PRO WO192/281). At the eastern end of the battery in the command post a Mark II**B rangefinder was installed. Anti-aircraft defence was provided by two elderly Lewis machine guns (TNA: PRO WO 192/134). During the war one minor improvement to the battery was the installation of electric lighting to replace oil lamps and candles. In 1941, a Chain Home Low radar station, staffed by the RAF, was set up to detect low flying aircraft (Gough 1993, 27). In the following year two 40mm Bofors guns were emplaced, although one was soon removed. The guns were manned by around 50 local troops from the 530 (Princess Beatrice's) Coastal Artillery Regiment, a further 40 infantry soldiers protected the guns, with local defences comprising barbed-wire entanglements, machine gun and spigot mortar posts, and a minefield (West Wight Beacon 2001, 22-23).

At the end of the war the battery was mothballed and as part of the general rundown of Britain's coastal defences the fort was put up for disposal in 1952 (Moore 1995). Its guns were scrapped in 1954. Beyond this date the Admiralty Surface Weapons Establishment (ASWE) retained an interest in the site, but it is unclear whether or not they maintained any dedicated infrastructure.

High Down Test Site

As the old fears of a seaborne assault on the Solent receded the Cold War brought new threats and in particular the dread of attack with nuclear weapons. Western policy during the 1950s believed that the most effective and economic way to deter Soviet communist aggression was to threaten overwhelming nuclear retaliation. For this policy to be convincing the means of delivering the nuclear deterrent needed to be one step ahead of any Soviet countermeasures. As Soviet air defences improved, even before the first generation of nuclear armed V-bombers were in service it was recognised that they would soon be obsolete. The solution to this problem was seen to be an unstoppable missile. This would be invulnerable to Soviet air defences and have sufficient range to threaten Moscow and elsewhere a large percentage of the Soviet Union's urban population.

In 1954, the Air Ministry issued Operational Requirement 1139 for a missile with a range of around 1,500 miles (2413km). The air frame and engines for this missile, which was later named Blue Streak, were primarily developed by De Havilland and Rolls-Royce, who established a large test range at Spadeadam, Cumbria (Tuck and Cocroft 2004). Responsibility for the design of the warhead and the construction of its re-entry head principally lay with the Atomic Weapons Research Establishment, Aldermaston, and the Royal Aircraft Establishment (RAE), Farnborough. Two of the crucial challenges that needed to be addressed were the shape of the re-entry head and the type of material that might be used for the fabrication of its outer shield. To answer these questions scientists from the RAE needed access to a relatively cheap rocket capable of launching scale models of different shaped re-entry heads, whose re-entry through the earth's atmosphere could be accurately monitored.

From this requirement emerged the Black Knight project. A characteristic of many post-war aerospace and defence projects was the necessity of combining cutting edge technology with complex administrative structures that needed to accommodate the working cultures of numerous public and private sector organisations. Also typical of the period were the bewildering sequence of company names as the multitude of aerospace firms were rapidly amalgamated into a few large concerns. The Black Knight project required the co-operation of five major partners, the Guided Weapons Department of the RAE, who were the design authority for the project. Saunders Roe (which in 1960 became a Division of Westland Aircraft) were responsible for the detailed design, construction, assembly and static testing, their team led by the company's chief designer Maurice Brennan. Bristol Siddeley Engines Ltd (subsequently part of Armstrong Siddeley Motors) was responsible for the propulsion system. In order to gain experience for the later Blue Streak firings De Havilland Propellers Ltd (later Hawker Siddeley Dynamics) the prime contractor for the Blue Streak missile programme, provided most of the trials team at the Australian test site at Woomera. There, staff from the Weapons Research Establishment also provided range equipment (Bristol Siddeley 1965, 26-8). In addition there were many sub-contractors who supplied both sub-assemblies for the rocket and components for the test site (Scragg 1990, 297). Saunders Roe's headquarters for the project was in parts of the former naval college at Osborne House and the main factory was close by at East Cowes, now GKN Westland. Previously the company had designed Britain's only rocket-powered interceptor aircraft, the SR-53, which used a Spectre rocket engine fuelled by kerosene and high test peroxide. The lineage of the high test peroxide/kerosene engine may be traced back to wartime German designs, which were developed by the Rocket Propulsion Establishment, Westcott, Buckinghamshire. The Saunders Roe company was also accustomed to working with personnel from the RAE, and if meetings were required the Isle of Wight was relatively close to Farnborough (Scragg 1990, 297-300). Around 240 people were employed by the testing programme, although it is unlikely that they were all at High Down at any one time (West Wight Beacon 2001, 22-3).

The High Down test site had a number of functions, in the early stages of the project it was used to aid the development of the rocket. Initially the rocket's engines, structures, electronic control and measuring systems, guidance units and other equipment needed to be brought together for testing as a single system. The ground facilities at High Down were almost identical to those at Woomera and allowed modifications to be made to equipment before it was shipped to Australia; testing, launching techniques and procedures were also perfected. However, due to the development work undertaken at High Down some of its systems were more complex than those at the Woomera launch site. Once the rockets moved into their production phase the stands were used for proof firing before they were shipped to Woomera.

The recently vacated upper battery at the Needles was chosen as the site for the test stands. The site was close to Saunder Roe's main works at East Cowes, yet it was sufficiently remote from habitation to prevent a noise nuisance or hazard in the event of an accident. The site selected for the test stands was at the top of the steeply sloping cliff side between Sun Corner, at the western end of High Down cliffs, and the recently abandoned



Figure 5 The High Down Test Site , in the foreground is the headland of Sun Corner and to its left Scratchell's Bay .
(c) English Heritage
NMR15574/09

New Battery. The cliffs and hillslope above Sun Corner formed a natural amphitheatre with the test stands at the top and their exhaust, or efflux, channels facing out to Scratchells Bay (Figure 5). The tests stands were placed below the top of the cliff along the 113m (370 ft) contour at either end of a curving concrete service road. This position both gave the buildings in the preparation area some acoustic shielding and also gave them a measure of protection from flying debris should there be an accidental explosion. To the north the Needles headland provided similar protection as well as preventing observation of the site from the mainland.

The design of the road network and buildings for the test site was carried out by John A Strubbe, FRIBA, whose practice was based at Ham in Surrey. This commission perhaps won after his earlier work for another leading engineering firm, English Electric, when he redesigned the interior of their headquarters Marconi House, London, 1953-4. Consulting engineers Dash and Partner, Hay and Barry, and Herbert Lapworth Partners also advised on the project. While the more detailed technical design work was completed by Saunders Roe's works engineer (Scragg 1990, 298). Strubbe was also responsible for the design of a new drawing office and dining room, which was erected on the site of the former Royal Naval College, Osborne House (TNA: PRO WORK 15/157). No attempt was made to conceal the activities at The Needles the majority of the structures were clad in vertically fluted aluminium sheeting. In their heyday the gleaming silver buildings above the chalk White Cliffs stood as a vision of the space age and Britain's post-war technological revolution.

The Black Knight and Black Arrow Rockets

A detailed discussion of post-war British space policy, the specifications and performance of the Black Knight and Black Arrow rockets are beyond the scope of this report. Three recent publications provide up-to-date summaries of these projects and the design of the rockets (Hill 2001, Millard 2001 and Hill 2007). The National Archives, Kew, also holds many original files relating to the role of Black Knight in the Blue Streak missile programme, post-war space policy, as well as technical reports detailing the results of the experiments carried out using these vehicles.

Nevertheless, to understand the layout and operation of the High Downs Test Site it is necessary to appreciate the basic design of the rockets tested at this site. Black Knight



Figure 6 Black Knight rocket. W D Cocroft collection

(Figure 6) was constructed from aluminium and measured 10.5 m (32 ft) in length and 0.9m (3 ft) in diameter. At first it was powered by an Armstrong Siddeley Motors Gamma 201 rocket engine; this used a fuel combination of kerosene and high test peroxide, with a silver-plated nickel gauze as the catalyst to decompose it to oxygen and superheated steam to power the rocket and its fuel pumps (Bristol Siddeley 1962, 31-2). Within the rocket the propellants were held in aluminium tanks carried at a ratio of eight parts high test peroxide to one part kerosene. The kerosene tank was about 1.22m (4ft) in length and was mounted over the 5.2m (17ft 4ins) long high test peroxide tank (TNA: PRO AVIA 53/535). Initially, the Black Knight rocket was designed to launch experimental re-entry heads on a steep trajectory, at around 80

miles (129 km) the head separated reaching an apogee of around 500-600 miles (804-965 km) before beginning its ballistic descent (Tharratt 1963a, 248; Millard 2001, 9). Although high test peroxide is an unstable compound and many precautions need to take place during handling, at normal temperatures it is easier to control than other oxidants, such as liquid oxygen. In 1961, the Gamma 201 was superseded by the more powerful Gamma 301 series engine with four swivelling combustion chambers providing a 25% increase in thrust (Scragg 1990, 299; Millard 2001, 36-7). Later, a two-stage rocket was employed with downward facing solid Cuckoo rocket motor to increase the velocity of the re-entry head. The re-entry head was in turn mounted on a sabot ring with four or more Imp motors to disconnect it from the second stage, the sabot was connected to the second stage by a lanyard that pulled it away from the re-entry head allowing it to fall freely to earth (Bristol Siddeley 1965, 27). In this configuration Black Knight was involved in two series of tests

codenamed Gaslight and Dazzle to investigate the phenomena surrounding warhead re-entry heads. At a time when the Soviet Union was developing the Galosh anti-ballistic missiles system, this research was of great significance in designing decoys to accompany British warheads. These investigations were also of great interest to the United States and probably formed an important component of the exchange of nuclear data between the two countries at this date.

By the early 1960s the frantic activity to develop a whole series of indigenous British nuclear warheads was coming to an end and in future the country's needs would be met by a relatively small number of devices. With the reduction of research in this area Black Knight's role was drawing to a close.

At this time, beyond the two superpowers, Britain, through the Blue Streak missile programme was the only country with the technical expertise to consider developing a satellite programme. One option was for an all British satellite launcher named Black Prince that would use Blue Streak for the first stage, a modified Black Knight for the second stage and an un-named third stage. In parallel discussions were taking place with possible European partners to establish the European Launcher Development Organisation (ELDO). This would use Blue Streak as the first stage, with other countries contributing the upper stages. The RAE's Space Department was also investigating two satellite launcher concepts, one founded on Black Knight and the second on a new rocket based on its technology. In autumn 1964 it was decided to go ahead with the second option with a rocket that would eventually be known as Black Arrow (Millard 2001, 1-13). Westland Aircraft Ltd at Cowes was responsible for the rocket's design and manufacture in facilities previously used for Black Knight, including the High Down Test facilities. This design used the next generation of Gamma high test peroxide engines. The first launch of a Black Arrow rocket took place on 28 June 1968 and on 28 October 1971 the British satellite Prospero was placed into orbit. Despite this success a couple of months earlier on 29 July 1971 the Minister of Aerospace, Frederick Corfield, had announced the end of the Black Arrow programme (Millard 2001, 27-50).

Later history of the test site

The late 1960s saw further amalgamations within the British aerospace industry and in December 1966, Saunders-Roe's and Vickers Supermarine's hovercraft interests merged to form the British Hovercraft Corporation (BHC), in 1970 it became a wholly owned part of the Westland Group. With the cessation of rocket work the Needles site passed to the British Hovercraft Corporation, they were left with a specialised facility with no obvious future use. They attempted to market the site as the High Down Industrial Test Facilities for testing hazardous or noisy products, or perhaps radio aerials (British Hovercraft Corporation 1971). This campaign failed and in 1974 the site closed and the following year it was sold to the National Trust. Soon after the test gantries and associated posts were demolished along with 1950s structures in the preparation area. It was probably also around this time that the surviving military structures to the south of Coastguard cottages were cleared. After the end of rocket testing a coastguard look out tower within a fenced compound was built in New Battery's western emplacement.

4 Description

The New Needles Battery

The New Needles Battery (SZ 29918 84806) sits at the western end of West High Down, just beneath its crest (see Figure 9). As described above a new road was constructed to link



Figure 7 The New Battery, rear side from the east.
(c) English Heritage

the Old Needles Battery to the new site. To the rear of the battery an upper road led to the **Battery Command Post** and on towards the **Coastguard Cottages**. The eastern extent of the battery roughly coincided with the present north to south fence to the south of **Coastguard Cottages**, where two War Department boundary marker stones remain. The New Battery comprised three open, mass-concrete emplacements with a **Position Finding Post** at its eastern end (Figure 7). During the 1950s the emplacements were partly subsumed within Saunders Roe **Preparation Area** and a number of modifications were made to them. In the early 1970s the 1950s structures were removed re-exposing the battery.



Figure 8 Position Finding Post.
(c) English Heritage

At the eastern end of the emplacement a concrete stair case provides access to the open **Position Finding Post** with a central concrete column on which was mounted an instrument (Figure 8). In front of this column the position is curved to allow for easy access around the instrument. To the west of the column is a concrete locker, which was probably used for chart storage (TNA: PRO WO78/3949, drwg No.3). Below this position a flight of stairs gives access to an underground room that formerly housed a **Telephone Exchange** and was latterly used as a **Store** (Figure 13).

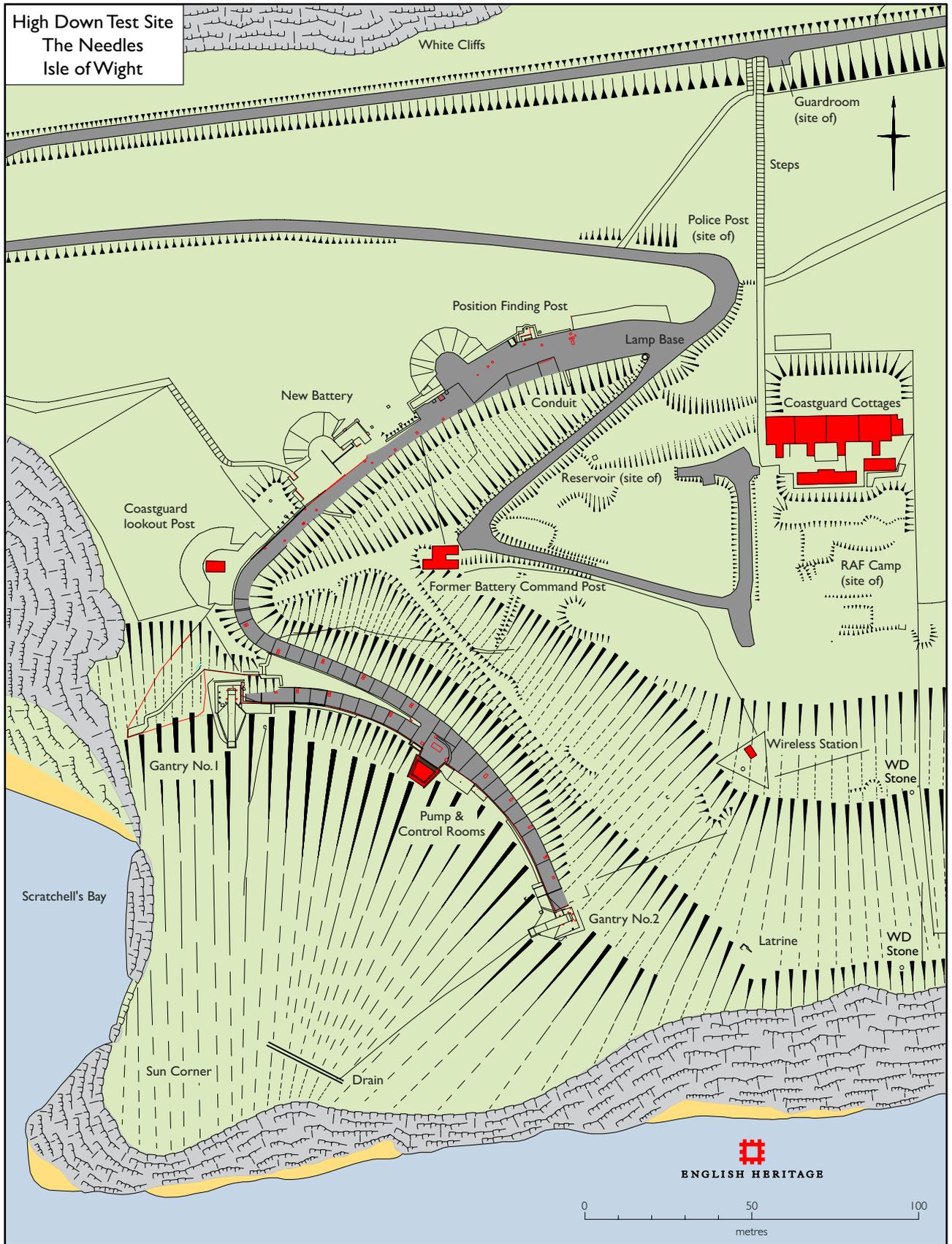


Figure 9 Plan of the High Down Test Facility (c) English Heritage



Figure 10 The central emplacement, to either side are entrances to the underground magazines.
(c) English Heritage

The three emplacements are semi-circular in shape with an outer curving concrete parapet (Figure 10). From the seaward side they presented a low profile with only their shielded guns appearing above the parapet. To the rear the gun pits were open with the guns set on a central mounting that elevated the barrels to the height of the parapet. Surrounding the gun was a raised metal platform for the gun crews. Set into the walls of the emplacements are lockers, formerly closed with steel doors, which were used to house ready-use ammunition. The eastern most emplacement (F1) has been stripped of most of its fittings, and was left as an open area when the battery was incorporated into the test site's **Preparation Area**. At this time its base was covered by tarmac thereby obscuring any surviving features of the gun mounting and supports for the surrounding deck.

In between this emplacement and the central position is an underground **Magazine**. From each of the emplacements concrete ramps lead down into the **Magazine**. On its northern side were a **Shifting Room** to the west and two **Cartridge Stores** to the east, which were used to hold ready assembled cordite charge bags. On the opposite side of the **Magazine**, to the southeast, of the access passage were three smaller rooms, one was used as a **Shell Store**, one as a small items store, the function of the small central room is unknown (TNA: PRO WO78/3949, drwg No.3). The western emplacement had its own dedicated **Magazine**, although smaller it was organised in a similar manner. Due to later alterations its access ramp to the west is no longer visible, although a concrete staircase at its east end remains open.

Cut into the hillslope to the rear of the emplacements were a number of ancillary structures, moving from east to west an **Artillery Store**, **Guardhouse**, **Store**, **Canteen**, **Cookhouse** and **Shelter**. These buildings all appear to have been demolished in the 1950s and their sites re-occupied by buildings for the rocket **Preparation Area** (see below), the later buildings have also been cleared and chalk rubble dumped over the area to re-instate the slope's profile. On the level ground to the east of the emplacements was a **Barrack Hut** for 30 men, it too was cleared by the late 1950s and its site used as a **Vehicle Park**. Around the turn of the 20th century, on the crest of the hill to the south of the emplacements a

Figure 11 Battery Command Post, later used as a transformer house, looking west wards to the Solent's approaches.
(c) English Heritage



Battery Command Post was built with clear views of the Solent's western approaches (Figure 11). In the triangular-shaped piece of ground between it and the **Coastguard Cottages**, was another hut for 30 men, an unidentified building, and a temporary officers' mess formed from old railway carriages. Immediately to the south of the **Coastguard Cottages** was a **Semaphore** and **Watch House** (TNA: PRO WO78/4892, drwg.5). No surface traces of these features are visible.

Upper Area

Returning to the upper road heading towards the **Battery Command Post**, on the hillslope to its southeast are the sites of various huts used as **Barracks**, a **NAAFI** and **Lecture Room**, which were in use until the end of the Second World War. Due to considerable later landscaping no traces of the platforms for these buildings survive. On the south side of the track and terraced into the hill slope was the 60, 000 Gallon (272760 litre) **Reservoir** and adjacent to it the **Fire Station** (TNA: PRO WO192/281). It is uncertain whether or not the wartime structures were retained by the rocket test site, although it was noted that an upper section was added to the **Reservoir** in 1960/61 (Strubbe 99/70R). Both these structures have been demolished and it appears that chalk rubble, or perhaps material from higher on the slope, was used to cover their platforms and to reinstate the slope's profile. At the top of the track is the former **Battery Command Post**, this was built at the beginning of the 20th century and probably extended during the late 1930s, when it was known as the **Battery Observation Post**. In the late 1950s it was enlarged and converted into a **Sub-Station and Transformer**. Close to it during the Second World War there were two light anti-aircraft positions and to its southeast a Bren gun position, of which no trace remains. To its east was a Bofors gun, which lay close to a low platform defined by a horse-shoe shaped scarp. This, however, marks the position of a rectangular concrete platform, which was probably constructed during the 1960s (OS 68103, 29 March 1968, frame 295). This may be equated with the Test Site's **R.F.** (radio frequency) **site** (British Hovercraft 1971, 4).

From the **Battery Observation Post** the track continues eastwards before turning sharply towards **Coastguard Cottages**. Beyond the outer corner of the turn is the site of the early 20th century **Watch House**, which survived into the post-war period as a roofless ruin. Its site is level and free of earthworks, however, to its rear are a series of low earthworks that mark the position of the wartime RAF compound. Its personnel were tasked with maintaining and operating the headland's radars. An earthwork mound on the fence line may mark the position of a **Spigot Mortar** (TNA: PRO WO192/281). On the cliff slope were a number of small buildings probably associated with the **Radar Station**. The building housing the radar stood just to the south of the surviving **Radio Frequency Laboratory**, now the **Wireless Station**, its site is marked by disturbed ground and low scarps on the hillslope. Air photographs (OS 68103, 29 March 1968, frame 295) show that it was standard modulator building, comprising two small square building connected by a short corridor, a hole in the roof of the southeastern building indicates that the radar head was positioned over this structure. To its east was a small building, possibly sunken, it too has been cleared and has left no surface trace. Just above the cliff edge are the foundations of another small building. Its isolated position and the presence of large quantities of cinders suggest it might be the remains of a **Latrine**. A break of slope running north-west wards towards the **Battery Commander's Post** marks the line of the path. Just to the east of the present fence, and outside of the survey area, was another small building, which has also been demolished.

High Down Test Site

The High Down Test Site was established on the site of New Battery in 1956 and occupied 35 acres (14.16 hectares) of the downland and cliffs (Figure 12). Access to the site was



Figure 12 The High Down Test Site viewed from the east, to the bottom right are the Coastguard Cottages and to their right are the White Cliffs. (c) English Heritage

from Alum Bay along the original fort road terraced into the hillslope above the White Cliffs. The test site's outer boundary fence ran from this road and to west of steps to **Coastguard**

Cottages, past the cottages and to the cliff edge. On the road above the White Cliffs, at the foot of the steps to the **Coastguard Cottages**, was the **Main Gate**. This has been removed, but is marked on either side of the road by sawn-off I-girders. Outside of the gate are the remains of an earlier **Guard Room**. Just inside the main gate was the **Inner Gate House**, this comprised a single basement room with an observation post on its roof. This structure has been demolished; its foundation slab remains partly covered by slumping. Adjacent to the **Inner Gate House** a set of concrete stairs with 33 steps leads towards the site of the upper **Police Post**. At the base of the stairs the cement is marked with a small piece of graffiti, comprising the initials 'CEL' and a broad government issue-style arrowhead. On the opposite side of the road to the **Inner Gate House** are the remains of a wartime **Spigot Mortar** position. All that is visible of this feature is a concrete block with a steel spigot at its centre. Positions such as these were built to a standard pattern with a central concrete column surrounded by a pit with ammunition lockers in its sides. From the **Inner Gate House** vehicles followed the road and made a sharp turn above the Old Needles Fort at the top of this road was the upper **Police Post**, where there was another gate. This building was also used as a **RF (radio frequency) Laboratory**, which probably occupied a cabin on the roof of the **Police Post**. This building has also been demolished, although its eastern end is marked by an earthen mound. From this gate the security fence ran about 30m (98ft) to the north of the emplacements to the cliff edge.

Beyond the inner gate vehicles made another sharp turn into the **Preparation Area**. On the southwest corner of the bend was a **Store**, whose site has been lost by later landscaping. Beyond here the road split into two, at its junction is a circular brick **Lamp Base**. The lower road leads into the rear of the emplacements which was used as the **Preparation Area** and the upper road towards the former **Battery Command Post**.

Preparation Area

The **Preparation Area** as its name implies was used to receive and make the rockets ready for test firing, the control and monitoring rooms were also located in this area. Prior to a trial a rocket, or flight vehicle, was brought from Saunders Roe's East Cowes factory to the test site on a purpose-built trailer. At the entrance to the site was a 5 ton lifting gantry with a 9.1m (30ft) head room to allow rockets to be lifted on to a handling trolley. Although the rocket was checked before leaving the factory it was rechecked on its arrival in case it had suffered any damage during transport. Some of the more fragile components were also only fitted at this stage.

The **Preparation Area** was laid out over the rear of **New Battery** and also made use of some of its underground **Magazine** rooms. As described above, the **Barrack Hut** at the eastern end of the emplacements was demolished and its site occupied by a **Vehicle Park**. Also at the eastern end of the emplacement the telephone room beneath the **Position Finding Post** was reused as a **Store** (Figure 13). The easterly emplacement was cleared and its surface covered in tarmac.



Figure 13 The telephone room beneath the former Position Finding Post was later used as a store.
(c) English Heritage

In the underground **Magazine** serving this emplacement and the central emplacement the rooms were stripped and adapted for new uses and the area was known as the **Equipment Centre**. The former **Shell Store** and **Store for Small Items** were converted into the **General Battery Room** and the **Flight Battery Room**. The **General Battery Room** is now used by the National Trust as a **Café**. To the north the large **Cartridge Room** was transformed into the **Control Room** to the west and the **Guidance Room** to the east. At the east end the small **Shifting Room** was used as the **Recording Room** (Strubbe drwg 99/11R; British Hovercraft Corporation 1971, 7-8).

The central area of the emplacements was transformed by the construction of a large structure known as the **Main Building** (Figure 14). The **Preparation or Main Building** was equipped with a wide variety of test equipment to check its electronic, pneumatic and hydraulic systems. Other smaller shops within the building checked guidance gyros, aligned



Figure 14 The Main Building lay to the right, this view shows the line of its front wall.
(c) English Heritage

monitoring transponders to the correct frequencies, and charged vehicle batteries. It was a steel-framed structure spanned by five trusses and two half-trusses at either end, all set perpendicular to the roadway. It was clad in vertical aluminium sheeting that rose to gable height to hide the roof. Traces of brick-cavity walls foundations might indicate that the outer walls had low brick wall bases and cladding above. The building stretched from the steps leading down into the western **Magazine** to above the central **Magazine**. On the north side is stretch of red brick wall that formed the

outer wall of the building and a sawn-off I-girder columns that carried the roof. The main north wall was carried over the curving pit of the emplacement which was roofed over; traces of roofing felt may be seen around the parapet lip. Internally the floor of the gun pit was covered by a new concrete floor providing a working area of 44ft (13.4m) x 32ft (9.8m). Within this area there was a working height of 14ft (4.3m) and a 1 ton overhead travelling hoist. Adjacent to the roadway the east and west ends of the building were of red brick cavity wall construction, the foundations of which may be traced. At its centre was a long loading bay with sliding doors, whose metal runner remains. A covered way over the road linked it to the **Laboratory** building to the south; above the covered way was a 2-ton travelling hoist, whose footings remain. At the eastern end of the building a ramp led down into the central **Magazine** and adjacent to it a flight of concrete stairs gave access to a series of gallery rooms above the **Magazine** housing offices, a records and conference room. These upper rooms are represented by a concrete floor slab, to the south it has been partly cut away. Around its eastern and northern edges are traces of a brick cavity wall and sawn-off I-girders.

To its west the underground **Magazine** was also adapted to new uses. The former **Shell Store** and **Store for Small Items** were converted into the **Instrument Laboratory** and the **Photographic Room**. To the north the large **Cartridge Room** was used as **Stores** while the central corridor was used as a **Camera Range**. In the western emplacement was the **High Test Peroxide Cleansing Department**. This was housed in the old emplacement with a wall along the roadway and a roof covering the open pit of the emplacement. This has subsequently been removed and the present **Coastguard Lookout Post** constructed. At the eastern end of this emplacement the rectangular compartment marks the position of the **High Test Peroxide Store** tank. From here high test peroxide was moved down to the **Firing Sites** by underground pipes.

To the rear of the emplacements the battery's ancillary buildings were demolished and their platforms reused for a series of support buildings. These have in turn been demolished and their rubble, or material from the hillslope, used to cover their platforms and restore the slope's profile. Opposite to the former battery's **Position Finding Post** was the **Artillery Store** and **Guardroom**. These buildings were replaced by a **Workshop**, the northern side of this building may be traced as brick footings, a section of internal floor surface and a metal runner for a sliding door. Immediately to its east is a concrete conduit that originally carried a 2-inch water pipe from the battery's reservoir. From the circular brick **Lamp Post** a track led to the upper storey of the **Preliminary Preparation Building**, its line is partly marked by a break in scarp. The ground floor of this building was occupied by a workshop. To its west was another two-storey structure, its upper storey occupied by **Laboratories** and **Lavatories** and on its ground floor a **First Aid Room**. Sections of the **Laboratories** included specialist features, such as a room with filtered air and a vibration free area for checking gyroscopes. At the western end of this group of buildings was the **Canteen**, this was a double storey structure built on the site of the battery's **Canteen and Cookhouse**. On the lower floor was the kitchen and general canteen and on the upper floor the senior staff canteen, a conference room and other offices. On the crest of the hill the former

Battery Commander's Post was extended and converted into an electrical **Transformer** building, it remains in use as an electrical sub-station.

Services

To operate the test site needed to be supplied with a variety of services, including propellants, hydraulics, pneumatic services, electricity and fire-fighting. The propellants, kerosene and high test peroxide, were supplied from the mainland by tanker, at the test site the kerosene was stored in two 600 gallon (2728 litres) tanks. The high test peroxide was held in 4000 gallon (18184 litre) tanks, which were equipped with water sprinklers, and emergency draining and dumping facilities. Before firing the high test peroxide was piped to a 1000 gallon (4546 litre) ready-use tank on each of the gantries. Hydraulic pressure was supplied to the vehicle during testing by a portable trolley and in the absence of vehicle hydraulics was used to swivel the combustion chambers. High pressure air was required for pressurising the high test peroxide tank, the reservoir and accumulator of the hydraulic system, and for purging and starting the rocket motor. At Woomera, prior to launch pneumatic pressure was also used to operate the release jack. A bulk store for compressed air and nitrogen was located between the gantries. A Williams and James compressor unit was used to recharge the air cylinders and nitrogen was brought to the site in cylinders. These supplies were piped to regulator panels in the gantries for distribution.

For its main electrical supplies the site relied on local mains supplies with its own 500 kVA transformer, within the site power lines distributed three-phase and single-phase power. Large supplies of water were also required for safety reasons. The main water supply to the site was from the Isle of Wight Water Works pumping station, about 2km (1¼ miles) to the east. Close to the Alum Bay entrance to the site was another pumping station and 6,000 gallon (27,276 litre) **Reservoir**, additional water also available from well and pump in the Old Needles Fort. Water from both sources was pumped up to the 60,000 gallon (272760 litre) site **Reservoir**, which was connected to the test stands by a 12-inch (30cm) main. During firings, the flames, or efflux, from the engines was directed into a steel deflector bucket that effectively turned them through 90 degrees. In operation the bucket was cooled by a torrent of water delivered at 1500 gallons (6819 litres) per minute. In the event of a leak or spillage of high test peroxide water is very effective in diluting this substance and the gantries were equipped with sprinkler systems, in the event of fire provision was also made to flood the engine bay with water. As a further safety precaution adjacent to each **Test Post** was a personnel tank 6 ft x 3ft 6ins x 3 ft (1.83m x 1.06m x 0.91m), into which staff could dive if there was a HTP spillage.

Systems

A rocket is made up of a number of inter-related systems, the most important of which, include propulsion, guidance, control, and telemetry. Before a static firing or launch these units need to be tested and in some instances parameters set and synchronised. These tasks were usually carried out from consoles or racks, with leads running back to the rocket. For ease of operation most of the initial checking was undertaken from the **Test Posts** adjacent to the gantries. For firing or launch these consoles and racks were duplicated

in the **Equipment Centre**. In this building, which was sited away from gantries, each of the consoles was manned by a specialist systems engineer, who was able to initiate and check his part of the operation and if necessary shut down the firing. Most of the firing or launch sequence was, however, controlled by an automatic Sequence Console operated by the Sequence Officer. The timing of the firing sequence was crucial and the consoles were all linked to crystal controlled pulses from the Central Timing Unit, which could also be linked to the cameras and other recorders. During firing over one hundred different measurements were recorded, collecting data on, for example, pressure, voltages, and the electrical currents in components. Most of the data was collected by a 600 foot (182m) landline than ran between the rocket stands and the recording facility. The readings were recorded either on magnetic tape or photographically (Tharratt 1963a, 260). The firings were also photographically recorded, and the site was equipped with developing facilities with automatic processing machines for its oscillograph papers, and for 16mm and 35mm film.

Firing Area

To prevent transport damage to the vehicle the **Preparation Area** is generally as close as possible to the firing or launch area (Figure 15). After the test vehicle had been checked it



Figure 15 The Firing Area showing the Firing Sites and the central Control Room.
(c) English Heritage
NMR 18516/3

was hauled the short distance to one of the test gantries. Here the rocket was hoisted to a vertical position before it was lowered on to the launcher. The steel-framed gantries housed hoists for raising and lowering the rockets, servicing platforms and a variety of services, including high pressure air and nitrogen, fuel lines, and water for dowsing the efflux bucket and fire fighting. On this exposed headland they also had the vital function of providing a weather shelter from salt air, high winds, rain, ice and snow. At High Down the gantries

were fixed, whereas the ones at Woomera were designed to be rolled back in preparation for a launch (Tharratt 1963a, 252). Once it was secured to the launcher the final checks were made, including the mechanical and electrical stage connections, internal systems, vehicle and ground firing systems, and tests on radio links between the rocket and ground facilities. To assist in checking and testing the rocket's systems adjacent to each of the **Gantries** was a **Test Post**. These small buildings housed consoles for controlling the electrical supplies to the rocket and for monitoring tests.

The test stands (SZ 29943 84707) were approached from the **Preparation Area** along a concrete road that turns steeply at the westerly emplacement, now occupied by the **Coastguard Station**. Steel covers along this section of track mark to the rear the line of the control and monitoring cables leading back to the **Preparation Area** and to the front the high test peroxide pipe. This track gives access to the gently curving access platform, the curve in part defined by the track following a level contour across the hillslope. At the



Figure 16 The Control Room, the Pump House lies to the left beneath the access causeway.
(c) English Heritage

centre, and seaward side of the platform is the reinforced concrete **Pump House** and **Control Room** and to either end the **Firing Sites**, No.1 to the west and No.2 to the east.

The **Pump House** and **Control Room** (Figure 16) are accessed from the platform from a flight of stairs to their west. A door, immediately opposite to the foot of the stairs, gives access to the **Pump Room**, another opening on its south side was probably for ventilation. This building is entirely beneath the access platform, although its presence is marked by a number of Elkington Gatic (Gas and Air Tight Inspection Covers) covers on the surface of the platform. Within in the room are a number concrete machinery mounting plinths that variously held at the centre a large pump driven by an adjacent electric motor and various pipe valves. In operation water was supplied from the site's 60, 000 gallon (272760 litres) **Reservoir** along a 12 inch (0.3m) main to the **Pump House**. From here cooling water was piped to the **Firing Sites** along a 12 inch (30cm) main and fire fighting water along 3-inch

(7.6cm) pipes. In an emergency the pumps could deliver 3,000 gallons (13,638 litres) of water per minute (British Hovercraft Corporation 1971, 9).

To the south of the **Pump House** is a narrow passage way between it and the freestanding trapezium-shaped **Control Room**. This passage way gives access to the **Control Room** through an outward opening armoured door in its rear wall. To either side of the **Control Room** concrete wing walls retain the hillslope and give access to its front. It is built on a concrete 'floating base' and is separate from the main causeway and in the event of an accidental explosion it was designed to withstand pressures of up to 10lb/in². Internally are various plinths and mounting bolts for the safety officer's console that was positioned in the centre of the room and in the northeast corner controls to engage the fire fighting system. In its eastern and western walls are armoured observation windows facing the two **Firing**



Figure 17 Facilities
Storage area.
(c) English Heritage

Sites and single windows in its front and rear walls. At platform level the passage way is covered by wooden boarding to give access onto the **Control Room's** roof.

At platform height, immediately to the east of the **Control Room** are a pair of concrete slabs abutting against the platform (Figure 17). The westerly one is supported on brick foundation and on its surface are five pairs of mounting bolts. Impressions on the western side of the easterly slab show that it was shuttered using corrugated-iron sheeting, and on its surface are four sawn-off steel channels. These slabs are absent from the original design drawings, but are later shown as the site of the **Facilities Storage**, for demineralised water, kerosene, high pressure air and nitrogen (British Hovercraft Corporation 1971, 4) .

Running beneath the platform were the services for the two firing sites, including the 12-inch (0.3m) water main, to the rear the high test peroxide pipe and to the front cable ducts. The latter two marked by lines of metal covers. At either end of the platform were the **Firing Sites**, No.1 to the west and No.2 to the east. Adjacent to each of stands was a **Test Post**



Figure 18 Site of the Test Post adjacent to the Firing Site No. 1 (west).
(c) English Heritage

(Figure 18) before firing these were used for the initial checking of the rockets' systems and for routing cables back to the **Preparation Area**. Adjacent to each of the **Test Posts** was a bath into which the personnel could jump if they were contaminated with high test peroxide. The sites of both these baths are now obscured by tipping. At **Firing Site No.1** a set of concrete stairs provided access from the **Preparation Area** to the rear of the **Test Post**. Its site is infilled with chalk rubble, a contemporary photograph (British Hovercraft Corporation 1971, 2) shows it was a single storey brick structure, with two upper storeys clad in aluminium sheets. From the top storey a gangway gave access to the adjacent servicing **Gantry**. At



Figure 19 Gantry 2 detail showing the fixing plate for the gantry and efflux duct beneath.
(c) English Heritage

the opposite end of the platform the **Test Post** adjacent to **Firing Site No.2** was a single storey structure. Its site is marked by a section of breeze block wall, chalk and building rubble interspersed with lengths of co-axial cable.

The **Firing Sites'** foundations were cast as separate structures indicated by a vertical joint on the front face of the platform. During operation the **Firing Sites** were covered by **Gantries** (Figure 19). These fulfilled a number of functions, they were used to raise the rockets over the firing position, provided weather protection for the rockets and personnel, and carried the service pipes and cables. They were steel-framed and clad in Noral aluminium sheeting. In contrast to the gantries at Woomera these ones were fixed. The superstructures of each **Gantry** were 62ft 7ins (19m) tall and internally there were six working decks, at the apex of the structure was a running beam and 'Felco' hoist which was used to raise the rocket off its transporter and position it over the firing pit. Externally the gantries measured approximately



Figure 20 Gantry 1 showing the blocked High Test Peroxide bay and the vertical joint separating the gantry foundations from the causeway. (c) English Heritage

20ft (6m) x 16ft (4.9m). During firing the hot efflux gases from the rocket were turned through 90 degrees by a metal bucket that was constantly dowsed with water. The hot gases, or efflux, were directed down the concrete-lined efflux channel flame at the bottom of which was a sump to collect any unburnt fuel. Effluent from these sumps then appears to have been carried down earthenware pipes to a breeze-block channel 25.4m (83ft 4 ins) in length situated close to the cliff top. Most of the pipes have been removed, but there lines may be traced by gullies leading down from the stands. Adjacent to each of the **Gantries**, and beneath the platform, was an open bay that was used to house the **High Test**

Peroxide Dispensing Tanks, these bays have subsequently been blocked in brick; each tank could hold 1000 gallons (4546 litres) (Figure 20). The **Gantries** were removed and scrapped in the early 1970s and all that remains are the metal plates by which they were attached to the concrete footings.

Conclusion

The remains of the High Down Test site reflect essentially a single phase of activity between 1956 and 1971. Any modifications that were made to facilities to accommodate the switch from testing Black Knight to Black Arrow are imperceptible to the archaeological record. The operation of most rocket test sites follow a fairly standard routine and the procedures used at High Down were typical of practices used elsewhere. In England, they represent the only publicly accessible remains of a rocket test site and therefore have high educational value in explaining the significance of this technology against its local, national and international historical background.

5 Methodology

A detailed RCHME Level 3 (RCHME 1999, 4) survey was undertaken of the late 19th century New Battery and the area of the rocket test stands. The survey was carried out using a Leica TC805L Total Station Theodolite, data collected was processed using Key–Terra Firma software and transferred to an AutoCAD electronic environment. The report was prepared in Adobe Pagemaker 7.0.

Data record sheets were compiled in Adobe Pagemaker 7.0 for all the site's main components. Professional ground photography of the site was undertaken by the Royal Commission on the Historical Monuments of England (RCHME) in 1994, job number 94/1973. Specially commissioned low level oblique air photographs of the site have also been taken and are held by the National Monuments Record.

All readily accessible secondary historical sources were consulted, including contemporary journal articles and more recent historical accounts of the Black Knight and Black Arrow projects. Relevant primary files at the National Archives, Kew, were also consulted, in particular those that shed light on the history of New Battery and the infrastructure of the rocket test site. The National Archives has many other technical files relating to rockets' technology and test programmes, which were outside the scope of this report. The National Trust also holds copies of the original design drawings for the rocket test site and these were consulted to confirm the identification of a number of buildings.

The site report and copies of this report along with all professional ground and air photographs taken during this and previous investigations have been deposited with the archive of English Heritage at the National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon, SN2 2GZ, to where application to view this material or to further copies of this report should be made.

6 Chronology

- 1787 Lighthouse built on the headland
- 1857 Construction of Needles Point Light begins
- 1859 22 May Needles Point Light is lit
- 1861 September construction of the battery begins
- 1863 Six 12 ton, 9-inch rifle muzzle loading guns installed
- 1893 Construction of the New Battery begins
- 1895 New Battery complete
- 1902 Metal fittings removed from guns on the Old Needles Battery
- 1903 March, guns of Old Needles battery dismantled and thrown over cliff
- 1905 Old Needles battery, carriages broken up for scrap
- 1913 Old pattern guns removed from New Battery
- Breech loading 9.2-inch 'C' Mark IX gun erected in emplacement M1
- 1914 August outbreak of the First World War
- Breech loading 9.2-inch 'C' Mark IX gun erected in emplacement M1
- 1917 Two Hotchkiss Mark 2 quick-firing 6-pounders installed and Maxim machine guns
- 1918 November, armistice, the batteries are put on 'Care and Maintenance'
- 1926 Guns put back into Practice and Training
- 1928 Middle Mark IX gun at the New Battery is removed and scrapped
- 1936 New Needles Battery, Battery Observation Post reconditioned
- 1938 Light anti-aircraft pits dug
- 1939 3 September, outbreak of Second World War
- December, Battery Observation Post extended to include Section Commander's Post
- 20 & 21 December, replacement Mark IX guns delivered
- 1940 January, replacement Mark IX guns in position

- 1941 24 February, CD/CHL radar equipment arrives
29 July, radar equipment in use and manned by army
- 1942 20 February, RAF take over radar
5 October, K set delivered to RAF
- 1945 May, end of the war in Europe, the batteries are put into Reserve
- 1954 The New Needles Battery guns are scrapped
- 1955 July main industrial contract for the *Black Knight* rocket awarded to Saunders Roe Limited
Saunders Roe leases the New Needles battery site
- 1956 April, work begins on the test stands
- 1957 January the test site opens
April, testing of the first *Black Knight* rocket
- 1958 7 September launch of the first *Black Knight* rocket at Woomera, Australia
- 1960 Saunders Roe Limited became part of Westland Aircraft
- 1965 25 November launch of the 20th and last *Black Knight* rocket
Testing of the *Black Arrow* rocket begins
- 1966 Saunders-Roe and Vickers Supermarine hovercraft interests form to create the British Hovercraft Corporation
- 1968 Launch of the first *Black Arrow* rocket at Woomera, Australia
- 1970 4 March, successful launch of Black Arrow R1 into sub-orbital flight
- 1971 The government ends the *Black Arrow* project
28 October launch of the last *Black Arrow* rocket with the British *Prospero* satellite
- 1974 High Down Test Site closed
- 1975 The National Trust buys the headland

7 Acknowledgements

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8 Bibliography and sources

Primary sources

The National Archives, Kew

AVIA 48/57 Black Knight: re-entry test vehicle 1955-1957

AVIA 53/535 Saunter Roe Ltd: design and development of project 'Black Knight' 1960-1964

WO78/3949 Isle of Wight Defences New Needles Battery block plan of site, etc

WO78/4892 Portsmouth Defences, Isle of Wight, Needles New Battery, 17 plans 1902-1916

WO192/134 Fort Record Book Needles Fire Command Isle of Wight 1863-1943

WO192/281 Fort Record Book Needles Isle of Wight: New Needles Battery (1863-1954)

WORK 15/157 Royal Naval College site: use of accommodation in old stable; lease to Saunders Roe Ltd 1951-1960

The National Trust

High Down Rocket Testing Site, design drawings by John A Strubbe and Partners FRIBA

Pump Room and Control Room, Record Drawing 24/52

Preparation Area, Record Drawing 99/11R

Gantries, Record Drawing 99/26

Preliminary Preparation, Record Drawing 99/71

Trinity House nd. (c.1960) The Needles - Isle of Wight drwg. No. 45/234A

Air photographs consulted, National Monuments Record, Swindon

OS 68103, 29 March 1968, frame 295

Secondary sources

British Hovercraft Corporation 1971 *The High Down Industrial Test Facilities* British Hovercraft Corporation: East Cowes

Bristol Siddeley 1962 'Rocket engine development' *Bristol Siddeley Journal* **3** (2) 31-35

- Bristol Siddeley 1965 'Black Knight' *Bristol Siddeley Journal* **6** (1) 26-8
- Coad, J 2006 'The Needles batteries' in Gardiner, M and Tomalin, D (eds) *The Isle of Wight: report and proceedings of the 152nd summer meeting of the Royal Archaeological Institute in 2006* 51-5 supplement to *Archaeological Journal* **163**
- Cotton, M A and Gathercole, P W 1958 *Excavations at Clausentum, Southampton 1951-1954* London: HMSO
- Gough, J 1993 *Watching the Skies A History of Ground Radar for the Air Defence of the United Kingdom by the Royal Air Force from 1946-1975* London: HMSO
- Hague, D B and Christie, R 1975 *Lighthouses their architecture, history and archaeology* Gomer Press: Llandysul
- Hill, C N 2001 *A Vertical Empire The history of the UK Rocket and Space programme 1950-1971* Imperial College Press: London
- Hill, C N 2007 *Black Knight Britain's first ballistic rocket* British Rocketry Oral History Project
- Millard, D 2001 *The Black Arrow Rocket A history of a satellite launch vehicle and its engines* Science Museum: London
- Moore, D 1995 *New Needles Battery* Fortlog 31: Palmerston Forts Society
- RCHME 1999 *Recording archaeological field monuments A descriptive specification* RCHME: Swindon
- Robinson, H G R 1963 A review of range support requirements *Journal of the British Interplanetary Society* **19** 174-178
- Saunders, A 1989 *Fortress Britain artillery fortifications in the British Isles and Ireland* Beaufort: Liphook
- Savage, J E M c.2000 *The Needles battery* The National Trust
- Scragg, J 1990 A contractor's view of the Black Knight programme *Journal of the British Interplanetary Society* **43** 297-300
- Tharratt, C E 1963 Black Knight support facilities *Journal of the British Interplanetary Society* **19** 178-84
- Tharratt, C E 1963a Black Knight *Journal of the British Interplanetary Society* **19** 248-262
- Tuck, C and Cocroft, W D 2004 *Spadeadam Rocket Establishment, Cumbria* English Heritage: Archaeological Investigation Series 20/2004

West Wight Beacon 2001 'More memorabilia needed for new Needles museum' *West Wight Beacon* August **91** 22-23

Appendix 1 The Gazetteer

The gazetteer provides detailed descriptions of the main visible features of the New Battery and the High Down Test Site. The component sheets are arranged roughly the order which the structures are approached from the lower road above the White Cliffs. Most of the identifications have been made from the original 1950s site drawings by John Strubbe and Partners, which are held by the National Trust. A Trinity House plan of the site, also held by the National Trust, allocates numbers to some of the buildings. Where these are legible they have been noted on the sheets.

Guard Room

AREA/LOCATION: Lower Road

STRUCTURE No.

DATE: ?Late 19th century

NGR: SZ 30225 84951



ORIGINAL FUNCTION: Guard Room

LATEST FUNCTION: Ruin

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS: 6.64m x 2.9m height 3.2m

DOCUMENTARY REFERENCE: NA: PRO 192/281 Guard room plan 1 May 1944

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

The remains of the Guard Room comprises three mass concrete walls, the fourth and northern side was of timber. In its floor is a slot 1.78m x 0.08m and 0.01m in depth. The building had a mono-pitch roof and there are brackets on the rear wall that supported the roof plate.

Main Gate

AREA/LOCATION: Lower road above White Cliffs

STRUCTURE No.

DATE: 1956

NGR: SZ 30026 84930



ORIGINAL FUNCTION: Gate

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Steel RSJs

DIMENSIONS:

DOCUMENTARY REFERENCE:

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Inner Gate House

DESCRIPTION:

The entrance to the test site was originally marked by a set of gates, sawn-off I-girders (15.2 cm x 13 cm) on either side of the road indicate their position. On the northern side of the road is a 6cm diameter gate pivot and to the east of the gate is a concrete block 53 cm x 46 cm with an 8 cm square hole at its centre, which probably held a sign.

Inner Gate House

AREA/LOCATION: Lower road

STRUCTURE No.

DATE: 1956

NGR: SZ30210 84950



ORIGINAL FUNCTION: Inner Gate House

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: J Strubbe 99/70R: British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Remains of main entrance gates

DESCRIPTION:

The Lower Gate House controlled access to the rocket test site. It has been demolished and its concrete floor slab is partly covered by soil slippage from the south. To the rear of the Inner Gate House a set of concrete steps led to the Police Post, on the sides of the steps traced into tehwet concrete are the initials 'CEL' and a broad government arrow '^'.

Spigot mortar

AREA/LOCATION: Lower road above White Cliffs

STRUCTURE No.

DATE: 1939-45

NGR: SZ 30211 84953



ORIGINAL FUNCTION: Spigot mortar

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NMR SZ 38 SW 18

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

Remains of a wartime spigot mortar position. The mortar position was probably constructed in the early years of the Second World War as part of the Isle of Wight's anti-invasion defences. It covered the approach road to the headland and the Needles Fort, on the opposite side of the road are the remains of an earlier guard post. Spigot mortar positions were of a standard design and there is likely to be back-filled pit surrounding the central pillar. The pit might be concrete or earth lined.

The Needles Battery

AREA/LOCATION: The Needles Battery

STRUCTURE No.

DATE: 1861-1954

NGR: SZ 29561 84884



ORIGINAL FUNCTION: Gun battery

LATEST FUNCTION: National Trust site

CONSTRUCTIONAL TYPE: Concrete, brick

DIMENSIONS:

DOCUMENTARY REFERENCE: National Archives: Public Record Office WO78/3949 Isle of Wight Defences New Needles Battery block plan of site, etc; WO78/4892 Portsmouth Defences, Isle of Wight, Needles New Battery, 17 plans 1902-1916; WO192/134 Fort Record Book Needles Fire Command Isle of Wight 1863-1943; WO192/281 Fort Record Book Needles Isle of Wight: New Needles Battery (1863-1954); Coad, J 2006 'The Needles batteries' in Gardiner, M and Tomalin, D (eds) *The Isle of Wight: report and proceedings of the 152nd summer meeting of the Royal Archaeological Institute in 2006* 51-5 supplement to *Archaeological Journal* **163**; Savage, J E M c.2000 *The Needles Battery* The National Trust

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

This site lay outside of the survey area.

Police Post

AREA/LOCATION: Access road

STRUCTURE No.

DATE: 1956

NGR: SZ 30006 84872



ORIGINAL FUNCTION: Police Post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: NA: PRO WO192/281 Plan 1 May 1944; AVIA 48/57 Hospital Block; Strubbe 99/70R; Tinity House 45/234A (1); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

Police Post and Radio Frequency Laboratory. The building has been demolished, a mound to the east marks its extent.

Store

AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: TQ 30025 84842



ORIGINAL FUNCTION: Store

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Trinity House 45/234A (3); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

The Store has been demolished and there is no discernible trace of the feature on the surface.

Lamp Base

AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: SZ 30001 84837



ORIGINAL FUNCTION: Lamp base

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: diameter 1.82m (6 ft)

DOCUMENTARY REFERENCE:

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

Circular, lamp base, 11 courses of single bricks with the remains of a rolled steel lamp post in the centre.

New Battery

AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1893-1954

NGR: SZ 29902 84808



ORIGINAL FUNCTION: Battery

LATEST FUNCTION:

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NMR SZ 28 SE 117, National Archives WO78/3949 Isle of Wight Defences New Needles Battery block plan of site, etc Drwg No.3; WO78/4892 Portsmouth Defences, Isle of Wight, Needles New Battery, 17 plans 1902-1916, Drwg No.5; WO192/134 Fort Record Book Needles Fire Command Isle of Wight 1863-1943; WO192/281 Fort Record Book Needles Isle of Wight: New Needles Battery (1863-1954); Coad, J 2006 'The Needles Batteries' in Gardiner, M and Tomalin, D (eds) *The Isle of Wight: report and proceedings of the 152nd summer meeting of the Royal Archaeological Institute in 2006* 51-5 supplement to *Archaeological Journal* **163**; Moore, D 1995 *New Needles Battery* Fortlog 31: Palmerston Forts Society; Savage, J E M c.2000 *The Needles battery* The National Trust

PHOTOGRAPHS: BB94/16337; BB94/16350

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

The New Needles Battery is located at the western end of West High Down, just beneath its crest. The New Battery comprised three open, mass-concrete emplacements with a Position Finder Post at its eastern end. During the 1950s the emplacements were partly subsumed within the Saunders Roe rocket test site preparation area and a number of modifications were made to them. In the early 1970s the 1950s structures were removed re-exposing the battery.

At the eastern end of the emplacement a concrete stair case provides access to the open Position Finding Post with a central concrete column on which was mounted an instrument. In front of this column the position is curved to allow for easy access around the instrument. To the west of the column is a concrete locker, which was probably used for chart storage. Below this position a flight of stairs gives access to an underground room that formerly housed a Telephone Exchange and was latterly used as a Store.

The three emplacements are semi-circular in shape with an outer curving concrete parapet. From the seaward side they presented a low profile with only their shielded guns appearing above the parapet. To the rear the gun pits were open with the guns set on a central mounting that elevated the barrels to the height of the parapet. Surrounding the gun was a raised metal platform for the gun

crews. Set into the walls of the emplacements are lockers, formerly closed with steel doors, which were used to house ready-use ammunition. The eastern most emplacement (F1) has been stripped of most of its fittings, and was left as an open area when the battery was incorporated into the test site's Preparation Area. At this time its base was covered by tarmac thereby obscuring any surviving features of the gun mounting and supports for the surrounding deck.

In between this emplacement and the central position is an underground Magazine. From each of the emplacements concrete ramps lead down into the Magazine. On its northern side were a Shifting Room to the west and two Cartridge Stores to the east, which were used to hold ready assembled cordite charge bags. On the opposite side of the Magazine, to the southeast, of the access passage were three smaller rooms, one was used as a Shell Store, one as a small items store, the function of the small central room is unknown. The western emplacement had its own dedicated Magazine, although smaller it was organised in a similar manner. Due to later alterations its access ramp to the west is no longer visible, although a concrete staircase at its east end remains open.

Cut into the hillslope to the rear of the emplacements were a number of ancillary structures, moving from east to west an Artillery Store, Guardhouse, Store, Canteen, Cookhouse and Shelter. These buildings all appear to have been demolished in the 1950s and their sites re-occupied by buildings for the rocket Preparation Area, the later buildings have also been cleared and chalk rubble dumped over the area to re-instate the slope's profile. On the level ground to the east of the emplacements was a Barrack Hut for 30 men, it too was cleared by the late 1950s and its site used as a vehicle park. Around the turn of the 20th century, on the crest of the hill to the south of the emplacements a Battery Command Post was built with clear views of the Solent's western approaches.

Equipment Centre

AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1895

NGR: SZ 29911 84813



ORIGINAL FUNCTION: Magazine and Shell Room

LATEST FUNCTION: Equipment Centre

CONSTRUCTIONAL TYPE: Mass Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: NA:PRO WO78/3949 Drwg.3; Strubbe 99/11R; Trinity House 45/234A (13); British Hovercraft Corporation 1971, 7-8

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

In between the eastern and central emplacements was an underground Magazine. From each of the emplacements concrete ramps lead down into the Magazine. To rear was probably a Shifting Room to the west and two Cartridge Stores to the east, which were used to hold ready assembled cordite charge bags. On the opposite side, to the southeast, of the access passage were three smaller rooms, one was used as a Shell Store, one as a small items store, it is not know what the small central room was used for.

During the 1950s the underground Magazine was stripped and adapted for new uses and was known as the Equipment Centre. The former Shell Store and Store for Small Items were converted into the General Battery Room and the Flight Battery Room. The General Battery Room is now used by the National Trust as a Café. To the north the large Cartridge Room was transformed into the Control Room to the west and the Guidance Room to the east. At the east end the small Shifting Room was used as the Recording Room.

Main Building

AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1956

NGR: SZ 29904 84803



ORIGINAL FUNCTION: Workshop

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Steel and aluminium sheet

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/7, Trinity House 54/234A (14): British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies and cuts New Battery emplacement

DESCRIPTION:

The main building in part used the central gun emplacement for its foundations, it was steel-framed structure with brick clad external walls which rose up to conceal its roof, which comprised mono-pitches against the northeast and southwest end walls and in-between these five gabled roofs. The main line of the building's northern wall was carried over the gun-emplacement, which was covered by a semi-circular roof. In this building the main workshop measured 13.4m (44 ft) 9.7m x (32ft); it had a clear headroom of 4.2m (14ft) and was equipped with a travelling 1 ton hoist. The second gable-roof from the western end was carried over the approach road and joined onto the laboratory and office building. The covered area had headroom of 5.5m (18ft) head room west housing a 2 ton travelling hoist.

This building was demolished during the 1970s to re-expose the 19th century gun emplacement, although some of its walls are covered in traces of white paint from its internal walls. The position of the main building may be traced by rows of cut-off 'I' section girders that mark the position of its uprights, in places sections of brick cavity-wall foundations may also be followed. At the western end of the building was the workshop described above, this was entered from the south through metal concertina doors, whose metal running rail remains set into concrete. As might be expected the floor surface of workshop in the former emplacement shows no evidence features on its floor, although at the eastside a gully in the floor may indicate the apposition of partition. To the east a flight of con-

crete steps led to an upper room, whose concrete floor slab remains. Next to this a set of steps descends into the former magazine area parts of which were used as a battery room and the Equipment Centre, the latter was sealed and unavailable for investigation.

Oxidant Laboratory

AREA/LOCATION: Preparation Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29868 84774



ORIGINAL FUNCTION: Oxidant Laboratory

LATEST FUNCTION: Coast Guard Lookout

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R HTP Cleasing Department; : British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 1895 emplacement

DESCRIPTION:

The Oxidant Laboratory has been demolished and its site is occupied by a Coast Guard lookout tower.

Maintenance Building

AREA/LOCATION: Preparation area

STRUCTURE No.

DATE: 1956

NGR: SZ29976 84833



ORIGINAL FUNCTION: Maintenance building

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: 15.15m (49ft 9 ins) x
4.9m (16ft 1 ins)

DOCUMENTARY REFERENCE: Strubbe 99/11R; Trinity House 45/234A (4)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 19th century guard room

DESCRIPTION:

The remains of this rectangular building comprise brick footings 35cm wide and the remains of a concrete floor slab, to the southwest the floor slab is partly buried by spoil. At its eastern end is a concrete surface 4.9m (15ft 6 ins)x 4.58m 15ft 1 ins)and on the north side of this slab is the metal rail of a sliding door.

To the east of this building is concrete tunnel 0.81m wide and 1.39m high that leads into the hillslope, at its entrance is a slot for wooden door frame. This dates from the 1890s and carried the battery's water pipes.

Laboratories

AREA/LOCATION: New Battery

STRUCTURE No.

DATE:

NGR: SZ29949 84819



ORIGINAL FUNCTION: Laboratory

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/71; British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overlies 19th century Store

DESCRIPTION:

Laboratories and mechanical workshop

Offices

AREA/LOCATION: New Battery

STRUCTURE No.

DATE: 1956

NGR: SZ 29894 84774



ORIGINAL FUNCTION: Offices

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 99/11R and 99/71; Trinity House 45/234A (10); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Overleis 19th century shelter and cookhouse

DESCRIPTION:

Offices, conference rooms, first aid and canteen

Fire Station

AREA/LOCATION: Preparation Area/Upper Are

STRUCTURE No.

DATE: 1956

NGR: SZ 29963 84792



ORIGINAL FUNCTION: Fire Station

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: Trinity House 45/234A (24)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Adjacent to 60,000 gallon Reservoir

DESCRIPTION:

The Fire Station has been demolished and its site covered by chalk rubble.

60 000 Gallon Reservoir

AREA/LOCATION: Preparation area/upper area

STRUCTURE No.

DATE: 1956

NGR: SZ 29980 84803



ORIGINAL FUNCTION: Reservoir

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS:

DOCUMENTARY REFERENCE: NA: PRO AVIA 48/57 Static water tank 30,000 Gal's (underground); Strubbe 99/70R; Trinity House 45/234A (25)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Fire Station

DESCRIPTION:

The reservoir originally held 60 000 gallons (272,760 litres) of water, it has been demolished and its site covered by chalk rubble.

Transformer & RF Laboratory

AREA/LOCATION: High Down

STRUCTURE No.

DATE: 1901-2

NGR: SZ 29939 84775



ORIGINAL FUNCTION: Battery Commander's Post; Transformer, Sub-Station and Radio Frequency Laboratory

LATEST FUNCTION: Electricity sub-station

CONSTRUCTIONAL TYPE: Brick

DIMENSIONS: see text

DOCUMENTARY REFERENCE: NA: PRO WO78/4892 Drg 5 Needles New battery c.1908; WO 192/281 BOP plan 1 May 1944; AVIA 48/57 Central Control Room and Offices; Strubbe 99/70R; Trinity House 45/234A (8); British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

This structure has been enlarged on number of occasions and used for different purposes. It was originally constructed about 1900-02 as the Battery Commander's Post a role it retained until after the Second World War. During the 1950s the building was modified and used as a transformer, sub-station and radio frequency laboratory. It remains in use as an electricity sub station.

The building comprises two parallel blocks oriented roughly east to west with a central linking passage. It is brick built, but cement rendered that makes deciphering its phasing difficult. The south range {10.42m (34ft 2ins) x 2.80m (9ft 2ins)} comprises two lower bays with a higher central section. In its south wall is a blocked opening 62m wide, possibly a former door, and to its east a window opening 85cm x 62cm. The rear range measures {7.7m (25ft 3ins) x 3.61m (11ft 10ins)} with a low roof to the west and a higher and perhaps later roof to the east, in the rear north wall is a blocked window. From the east a passage leads to present entrance to the building, on its north wall is a blocked window. Immediately to the east of the building are two sawn-off rolled steel channels (30cm x 10cm, height 116cm).

Coast Guard Cottages

AREA/LOCATION:

STRUCTURE No.

DATE: Late 19th century

NGR: SZ 30054 84815



ORIGINAL FUNCTION: Coast guard cottages

LATEST FUNCTION: Holiday flats

CONSTRUCTIONAL TYPE: brick, slate roof

DIMENSIONS: Not measured

DOCUMENTARY REFERENCE: NA: PRO 78/4892 OS Hamp Sheet XCIII.3 1908; NA: PRO WO192/281 1 May 1944 plan Sgt, officers, NAAFI staff; Trinity House 45/234A Cottages 27-32,

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

Late 19th century coast guard cottages, now let by the National Trust as holiday cottages.

Gantry No.1 Test Post

AREA/LOCATION: Firing Area Gantry No.1

STRUCTURE No.

DATE: 1956

NGR: SZ 29880 84739



ORIGINAL FUNCTION: Test post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: -

DOCUMENTARY REFERENCE: Strubbe 99/26; Trinity House 45/234A (17)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Adjacent to Gantry No.1

DESCRIPTION:

The Test Post has been demolished and its site is covered by chalk rubble amongst which is a pipe with a control valve and brick rubble. To its east was a safety bath for the worker sloading the high test peroxide. To the rear are concrete steps that gave access to Gantry No.1 and back towards the Preparation Area.

Gantry No.2 Test Post

AREA/LOCATION: Firing Area Gantry No.2

STRUCTURE No.

DATE: 1956

NGR: SZ 29977 84674



ORIGINAL FUNCTION: Test post

LATEST FUNCTION: Demolished

CONSTRUCTIONAL TYPE:

DIMENSIONS: -

DOCUMENTARY REFERENCE: Trinity House 45/234A (20)

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES: Gantry No.2

DESCRIPTION:

The Test Post has been demolished, to its rear is the remains of a breeze block wall and a concrete surface, its site is strewn with rubble in which are pieces of concrete and co-axial cable. Four concrete steps to the south gave access to Gantry No.2.

Pump Room & Control Room

AREA/LOCATION: Firing Area

STRUCTURE No.

DATE: 1956

NGR: SZ 29932 84711



ORIGINAL FUNCTION: Pump Room & Control Room

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete

DIMENSIONS:

DOCUMENTARY REFERENCE: Strubbe 24/52; Trinity House 45/234A(19)

PHOTOGRAPHS: NMR94/16338; BB94/16340; BB94/16343; BB94/16344

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

The Pump Room and Control Room are accessed from the platform by a flight of stairs to their west. A door, immediately opposite to the foot of the stairs, gives access to the Pump Room, another opening on its south side was probably for ventilation. This building is entirely beneath the access platform, although its presence is marked by a number of Elkington Gatic (Gas and Air Tight Inspection Covers) covers on the surface of the platform. Within in the room are a number concrete machinery mounting plinths that variously held at the centre a large pump driven by an adjacent electric motor and various pipe valves. In operation water was supplied from the site's 60, 000 gallon (272760 litres) Reservoir along a 12 inch (0.3m) main to the Pump House. From here cooling water was piped to the Firing Sites along a 12 inch (30cm) main and fire fighting water along 3-inch (7.6cm) pipes. In an emergency the pumps could deliver 3,000 gallons (13,638 litres) of water per minute.

To the south of the Pump House is a narrow passage way between it and the freestanding trapezium-shaped Control Room. This passage way gives access to the Control Room through an outward opening armoured door in its rear wall. To either side of the Control Room concrete wing walls retain the hillslope and give access to its front. It is built on a concrete 'floating base' and is separate from the main causeway and in the event of an accidental explosion it was designed to withstand pressures of up to 10lb/in². Internally are various plinths and mounting bolts for the safety officer's console that was positioned in the centre of the room and in the northeast corner controls to engage the fire fighting system. In its eastern and western walls are armoured observation windows facing the two Firing Sites and single windows in its front and rear walls. At platform level the passage way is covered by wooden boarding to give access onto the Control Room's roof.

Facilities storage

AREA/LOCATION: Firing Area

STRUCTURE No.

DATE: 1960s

NGR: SZ 29944 84708



ORIGINAL FUNCTION: Facilities Storage

LATEST FUNCTION: Derelict

CONSTRUCTIONAL TYPE: Concrete base

DIMENSIONS: 7.65m (25ft)x 3.9m (12ft)

DOCUMENTARY REFERENCE: Trinity House Strubbe 45/234 not shown; British Hovercraft Corporation 1971

PHOTOGRAPHS:

RELATIONSHIPS WITH OTHER FEATURES:

DESCRIPTION:

The main concrete slab sits on a brick foundation, in its centre is a ceramic drain 18cm square, along its longitudinal sides are five pairs of sawn off bolt fixings and one at each end. These were for square fixing plates approximately 21cm x 21cm, which were probably used to support fencing.

To its south is another slab 5.25m (17ft 3ins) x 1.9m (6ft 3ins) supported on a breeze block wall, at the corners of this slab are four sawn off steels channels 17.5cm x 8cm and in its north side a slot 39cm x 30cm.

This area was described as Facilities Storage for demineralised water, kerosene, high pressure air and nitrogen.

The slab does not appear on the late 1950s design drawings and was probably added during the 1960s.



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