

NORTH HEAD TUNNELS INVESTIGATION REPORT

December 1998



Department of Conservation
Te Papa Atawhai

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Cover illustration
Aircraft of The New Zealand Flying School over North Head. 1921
Photo Auckland Public Library.

North Head Tunnels Investigation Report

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ABSTRACT

Since at least the 1950s stories have been told that the fort at North Head contains a complex of hidden tunnels. According to some of these stories the tunnels may have contained either the first aircraft built by aviation giant Boeing, or unexploded ammunition. During 1991-92 there was a flurry of public and media interest in these stories, with a particular focus on the possibility that unexploded ammunition was present. In early 1992 the local residents association approached the Ministers of Conservation and Defence as well as the Prime Minister for some assurances that these stories were not true. North Head is an Historic Reserve administered by the Department of Conservation and it was to this department that the government turned to determine the truth or otherwise of the stories. The result was a two year investigation divided into a number of stages. These involved research, witness interviews, remote sensing, and archaeological excavation. The outcome of the project was that there was no evidence of any hidden tunnels or ammunition on the Reserve at North Head.

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1. Introduction

1.1 THE SITE

The Historic Reserve at North Head on Auckland's North Shore consists of a volcanic cone with an area of 8.6 ha. (Fig. 1). The volcano is made up of the original tuff cone which has been almost completely smothered by a steep sided scoria cone, 65m high. Much of the reserve is bordered by coast and on the north and eastern sides the tuff has been severely eroded by wave action, mostly from the time before the emergence of Rangitoto when the coast was more exposed. The western and south western sides of the reserve are bounded by residential properties. The area of the cone is mostly covered in grass with some native species especially on the coastal margins. The reserve is intensively used attracting 350,000 visitors a year (CMS 1994:161).

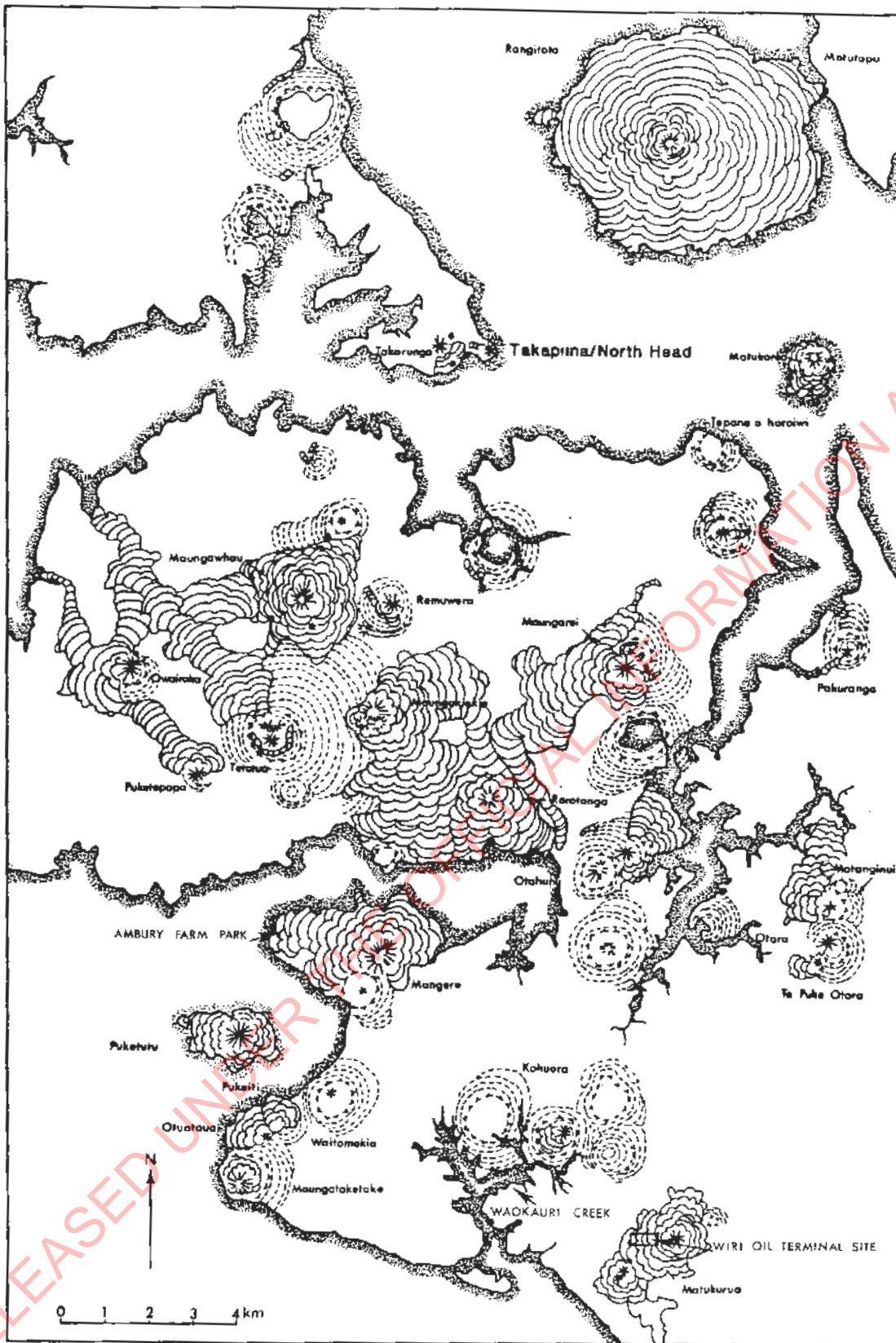
1.2 THE HISTORY OF NORTH HEAD

A short history of North Head (Maungauika/Takapuna) can be found in 'North Head: the Development of a Fort' (Veart 1990) and a more detailed examination in a PhD thesis, 'The Disappearing Guns of Auckland' (Mitchell 1995). Another report summarising the archival material was also prepared as part of this project, 'North Head Investigation 1992. Interim Research Report' (Treadwell 1992). This will be discussed in more detail in a later chapter.

The volcanic part of Devonport was once an area of intensive Maori settlement. Early photographs clearly show Maori garden walls in the area between Mt Victoria, Mt Cambria and North Head. These extended up the western slopes of North Head. Mt Victoria (Takarunga) was a major pa site and terracing and food storage pits are still clearly visible on its slopes. On North Head, however, the signs of Maori occupation were not as apparent. Early photographs show no signs of terracing or fortification. There is, however, strong traditional evidence for the presence of a pa at North Head. Fortification is recorded by Ngati Paoa in the late 18th century when the pa was besieged by Ngapuhi (Graham 1924: 10). In another account Ngati Paoa are described as engaging Ngati-tai at the pa at Takapuna (North Head) (Graham 1918: 89).

European earthworks have destroyed all traces of Maori occupation on the upper slopes so it is impossible to see what the Maori defences may have looked like. It seems probable that these consisted of a refuge pa of small size on the eastern side, not visible in the early photographs.

The European fortification of North Head has created the most modified ground surface of any surviving volcanic cone in Auckland. There is virtually none of the pre-1885 ground surface left intact anywhere on the upper slopes of North Head.



(After: Figure 4.4, E. J. Searls, "City of Volcanoes" 1981) j. Roberts NZHPT : 1986

- | | | | |
|--|------------------|--|---------------|
| | Lava Flow | | Tuff ring rim |
| | Tuff and lapilli | | Shore line |
| | Cone with crater | | Scoria cone |

Figure 1: Auckland showing location of Takapuna/North Head

European fortification started originally in 1870 with the emplacement of two 40 pounder field guns above Cheltenham Beach. The main work, however, started in 1885 in response to the Russian war scare of that year.

In March of 1885 three temporary batteries were built at North Head on the summit and at North Battery, and South Battery (Fig. 2). Then in the period 1886-89 these were replaced by more permanent works emplacing 8 inch disappearing guns. At the end of this period there were three main batteries:

- the Summit Battery with two 7 inch rifled muzzle loader (RML) guns, an 8 inch BL-HP (breech-loading, on a hydro-pneumatic mounting) gun, and two 6 pounder quick firing guns;
- South Battery with an 8 inch BL-HP gun and a 64 pounder RML gun;
- North Battery with an 8 inch BL-HP gun replacing a 7 inch RML which had been part of the temporary works of 1885.

In the 1890s work was still going on with the rebuilding of the summit area and the construction of an engine room connected to South Battery, search lights at the water line and a new 6 pounder emplacement to cover the minefield which was to be laid between North Head and Bastion Point. Much of this work was carried out by prisoners who were housed in the barracks building on the summit.

In 1900 two 12 pounder guns were emplaced overlooking the inner entrance to the harbour. In 1904 work started on the construction of a twin 6 inch MK VII emplacement on the upper northern side of the Head. This was completed in 1911. To store ammunition for these guns a Main Magazine was built c.1907.

After the First World War the fort was allowed to run down. The RML guns had been declared obsolete in 1904, in 1924 the 6 pounder and 8 inch disappearing guns were abandoned. The fort had only the 6 inch MK VII's and 12 pounder guns. Also during this period the Navy used the old disappearing gun magazines and searchlight tunnels to store reserve ammunition.

In the 1930s the moribund coastal defences of New Zealand were revitalised. After the First World War defence had a low priority for both government and the people of New Zealand. One of the main items of expenditure was the money paid to the Imperial government in London towards the construction of the naval base at Singapore. It became apparent, however, that this would not be enough in the event of Britain facing a war in both Europe and the Pacific. It was realised that some form of local defence would also be required. At North Head this took the form of three new searchlight emplacements and new diesels to repower the generators. With the increased range of the guns on warships of this period North Head was much too close to the port to be of much use as front line defence. Therefore throughout this period the fort was to act in more of an administrative role.

During the Second World War a number of other changes took place at the fort (Fig. 3). A large number of new buildings were constructed to provide accommodation for the expanded establishment. The route of the summit road was altered to make room for these. In 1940-41 four 6 pounder Hotchkiss guns were emplaced to cover

both the anti submarine boom which stretched to Bastion Point, and the approaches to Cheltenham Beach on the north side of the Head. In 1941 the 6 inch MK VII guns were moved to Whangaparaoa for the duration of the war and were replaced by two 4 inch naval guns. These were emplaced in front of the old North Battery which had its old 8 inch BL-HP removed and the gun pit roofed to provide storage space.

After the war the 6 inch MK VII's were returned and remained as the main armament until the disbanding of the coastal defences in 1958-59. Also during this time the old tunnels were used to store equipment from all the other coastal defence establishments in the northern part of the country. The area of the fort was then passed to the Devonport Borough Council as a reserve. It was in turn handed on to the Hauraki Gulf Maritime Park Board, which was later incorporated into the Department of Conservation (Veart 1990; Treadwell 1992; Mitchell 1995). The Navy continued to occupy the summit until August 1996.

1.3 THE STORIES, ANOTHER HISTORY

The outline above is the 'official history'. It can be authenticated from archives, government reports and from the memories of a large number of men and women who had served at the fort. There is, however, another history - oral and quite detailed - describing another fort. This one is much larger, much deeper with tunnels filled with all manner of objects ranging from filing cabinets, ammunition, and whole aircraft either in crates or complete and parked in underground caverns. A number of the people who tell these stories are eye witnesses. They are not all telling stories second hand, the classic 'friend of a friend' of urban myth (Brunvand 1993). They maintain that they have seen these things themselves. The majority do not claim to have seen aircraft or other treasures, but rather much more extensive tunnel systems than are visible today.

Much of this evidence has been gathered by Mr John Earnshaw, a film maker with a long standing interest in the tunnel stories and the Boeing aircraft. He has been the major driving force behind getting the stories investigated.

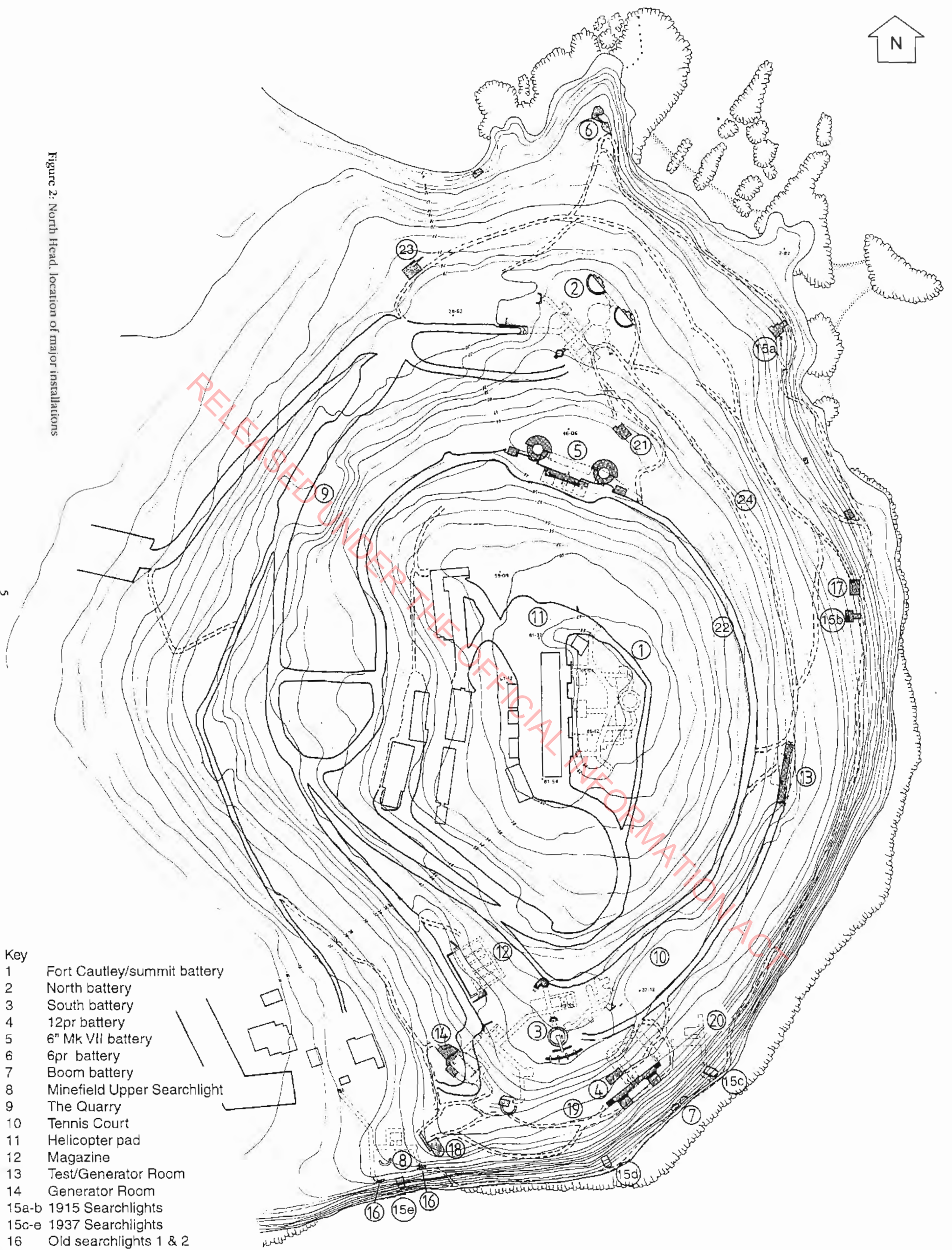
Details of some of these eye witness accounts are contained in a record of a meeting held in the electorate office of the Deputy Prime Minister, the Hon. D. McKinnon on the 15th April 1991. The record of this was supplied to the Department of Conservation in a letter dated the 8th May 1992 (DOC 013-10). It consists of the accounts of a deputation assembled by Mr John Earnshaw. This list, while not complete, does give the flavour of these accounts.

The witnesses are named in the original document but here will be referred to by numbers.

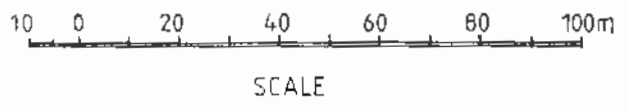
Witness 1. Once owned a map given to him by a colleague which showed North Head with many tunnels, shafts and levels in a cutaway form. He lost the map when moving house.



Figure 2: North Head, location of major installations



- Key
- 1 Fort Cautley/summit battery
 - 2 North battery
 - 3 South battery
 - 4 12pr battery
 - 5 6" Mk VII battery
 - 6 6pr battery
 - 7 Boom battery
 - 8 Minefield Upper Searchlight
 - 9 The Quarry
 - 10 Tennis Court
 - 11 Helicopter pad
 - 12 Magazine
 - 13 Test/Generator Room
 - 14 Generator Room
 - 15a-b 1915 Searchlights
 - 15c-e 1937 Searchlights
 - 16 Old searchlights 1 & 2
 - 17 Generator room foundation
 - 18 Minefield defence control
 - 19 Gunnery training area
 - 20 Annie's Cave
 - 21 4" Battery Observation Post
 - 22 Tramway Pulley
 - 23 6" Gun
 - 24 Covered Way



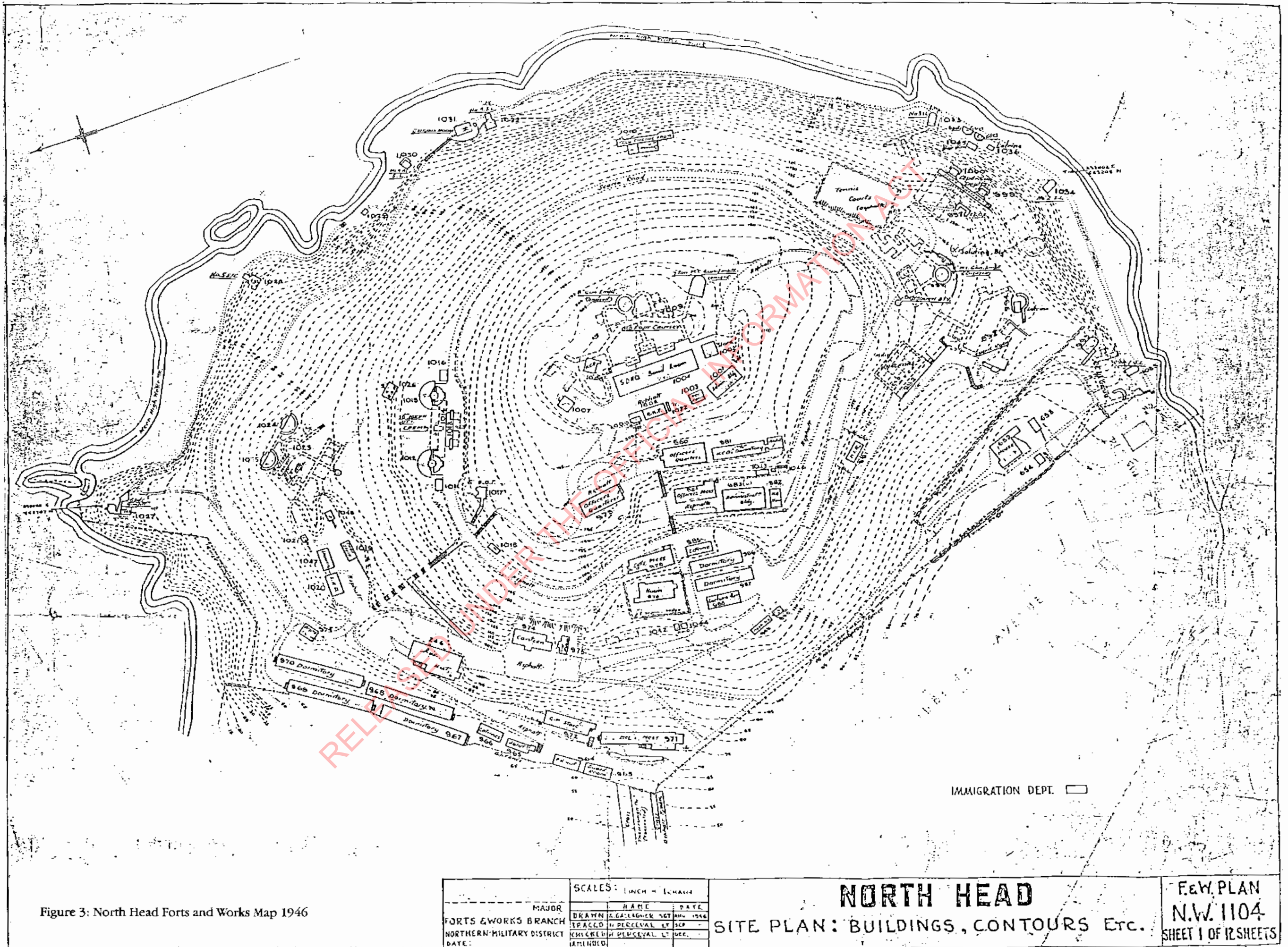


Figure 3: North Head Forts and Works Map 1946

MAJOR FORTS & WORKS BRANCH NORTHERN MILITARY DISTRICT DATE:	SCALES: 1 INCH = 1 CHAIN	
	DRAWN TRACED CHECKED AMENDED	NAME DATE DATE DATE
	S. G. LAGHER SGT H. PERCEVAL LT H. PERCEVAL LT H. PERCEVAL LT	APR 1946 SEP DEC.

NORTH HEAD

SITE PLAN: BUILDINGS, CONTOURS Etc.

F&W PLAN
 N.W. 1104
 SHEET 1 OF 12 SHEETS

Witness 2. Went to North Head by sea in the 1960s. He landed on North Head and explored tunnels and saw large crates, bombs with fins and large underground rooms.

Witness 3. This man worked at the yard at Torpedo Bay at the base of North Head and reports seeing a large underground magazine on the 'Left hand side' of North Head.

Witness 4. Stationed at North Head during the 1950s and explored tunnels which he says contained ammunition, machinery and crates.

Witness 5. An army member who had been stationed at North Head at weekends in 1951 and who had monitored ammunition during his time there.

Witness 6. A security guard who had worked at North Head in the 1970s and who had been shown a map by an officer with a number of levels which he says were more than were visible at the time.

Witness 7. This witness said that as a 12 year old he had crawled into tunnels and had souvenired a number of military items. He also said that he had seen crates containing aircraft.

I have met a number of these witnesses and found them to be pleasant and reasonable people. I do not think any of them to be consciously making things up. I do, however, in most cases believe them to be mistaken in their recollections. I will explain the reasons for this conclusion later in the report.

As well as the witnesses recorded above there were a number of other people telling similar stories. Many of these were recorded by Mr John Earnshaw and their evidence provided to the Department, unfortunately with the proviso that they not be published. The most important, in that his account triggered the interest of *The North Shore Times Advertiser*, and subsequently John Earnshaw, is the witness known as 'sailor number 1'. His account was reported in the *NSTA* and described an underground exploration of a large tunnel complex on the summit that extended through a number of levels and included very large underground spaces. It was this account that seems to have brought the hidden tunnel stories out publicly. Before this they seem to have been more in the nature of local Devonport folklore. The issue of the *NSTA* could not be found, however the author of the article was interviewed and the record of Earnshaw's subsequent interview with the witness read (see also *Sunday Star* 12/7/92 and Chapple: in press).

A number of other people were interviewed during the investigation, with varying degrees of success. The most crucial issue was whether anyone had witnessed the presence of ammunition at the fort *after* the time that the area was handed over to the Devonport Borough Council. As can be seen from the witnesses reported above, most of the stories of ammunition dated from the period when North Head was still an active fort, a time when it would be expected that ammunition would be present. Only one witness came forward to report seeing ammunition after this time, and as he refused to give his name it was felt that his evidence could not be given the weight of that of others who were willing to be identified. When he was interviewed

his stories lacked the detail needed to clearly identify the area recalled (DOC 013-10).

The large number of unnamed interviews submitted by Mr Earnshaw, while they cannot be quoted, were quantified. The areas the witnesses were talking about had all been located using a gridded map sheet. It was therefore possible to count up the numbers of accounts for each map square. The most frequently identified areas were those where there was an existing underground installation of some kind. Most people described extensive extra tunnels in the summit area, inside the naval security fence. Most of these stories centred on an old 8 inch gun pit which had been converted into a water tank in the 1960s. A concrete floor and liner had been constructed inside the gun pit, effectively blocking access to any tunnels which may have led off it.

It should be noted that there was another group of witnesses telling a completely different story. These were mostly the soldiers who had either been stationed at North Head during the war or had been responsible for cleaning up and closing the fort prior to the public handover in the late 1950s. These people were adamant that they had left no ammunition behind, either hidden or otherwise. It would seem in the normal course of events that these would be the people to whom most attention should be paid. However, the fact that the people most involved with the fort contradicted the other witnesses was attributed by some to an elaborate conspiracy. All the evidence available argues that this conspiracy theory has little basis in fact.

The situation therefore was that a substantial body of people believed that there was a possibility that North Head held a number of secrets: the hidden tunnels, the planes and the ammunition. These of course were inter-related. People said that there were old aircraft at North Head in tunnels that had been blocked off, but why seal aircraft in tunnels? The answer given was that the tunnels were sealed not to hide aircraft but to hide decaying ammunition.

1.4 THE AIRCRAFT

One of the most persistent of the stories associated with North Head is that there are old aircraft walled up in hidden tunnels. Most of these suggest that among these aircraft are either one or both of the first two aircraft built by the giant American company Boeing.

The material relating to the stories of the aircraft was originally assembled by the Navy's historian, Lt Cdr P. Dennerly, as an adjunct to one of the earlier investigations described below (ODF 7735/2). To this information has been added some further material on the fate of the aero engines once fitted to the Boeings.

The first controlled flight in New Zealand was made by the Walsh Brothers, Leo and Vivian, in a locally assembled Howard Wright biplane 'Manurewa 1' (Harvie 1974: 14,18)

The Walsh brothers continued with their pioneering aviation work and between 1917 and 1923 operated a flying school at Kohimarama on the southern side of the Waitemata harbour. They used a number of flying boats and sea planes in their business, including craft they built themselves as well as imported models. Among the imports were Curtiss and Supermarine flying boats and the two B&W Boeing seaplanes. The New Zealand Flying School initially trained pilots for action in the First World War. After the war work continued under a government subsidy to foster civil aviation and to provide refresher training for reserve pilots. This subsidy was discontinued in 1923 and the flying school work stopped (ODF 7735/2 1386).

The government and the Walsh brothers then started negotiations over the purchase of the assets of the school by the government (ODF 7735/2 1375). At this time the flying school had twelve aircraft, two disused Curtiss flying boat hulls and a large amount of ancillary equipment. Six of the aircraft were on loan to the flying school from the government and six others plus the Curtiss hulls were owned by the Walsh brothers.

Government assessors were employed to provide detailed documentation on all the equipment on offer. Their report on the eight Flying School aircraft is most revealing (ODF 7735/2 1369). The aircraft were listed as follows:

Supermarine Flying Boat (Channel type). A good training machine in good condition...and suitable for service work.

Walsh Boat - Hull...experimental, no wings empennage etc., designed for the hull.

Walsh Boat 'D', the Walsh boats have been designed & constructed by Mr Walsh and the 'D' boat has been flown. They do not conform to any Air Ministry standard with regard either to general design or structural strength. Owing to this I cannot recommend their further use.

Curtiss Boat Hulls (2) Of obsolete type, hulls without wings, centre section empennage etc..... useless for service work.

Boeing Seaplanes (2) Both of obsolete type, stripped of fabric. Fuselages wings etc., in very bad condition and not worth repairing. Useless for service work.

D.H.6 Airplanes. A training machine stored at Trentham... useful for service work.

The aircraft the assessors recommended purchasing were obvious choices. In their report they say:

With the exception of the Supermarine Flying Boat and the D.H.6 Aeroplanes which are in good condition and of serviceable types, the machines are obsolete and are in poor condition.

The Supermarine and the D.H.6 are the only machines taken, no value being placed on the other machines. (ODF 7735/2 1370).

This statement is supported by another document in the same file giving a detailed summary of the Flying Schools assets. This document states the respective values placed on the Flying School's assets by both Mr Walsh and the government's assessors. The Supermarine and DH6 were accepted at the Walshs' valuation. The two Walsh aircraft, the Curtiss and the two Boeings were rejected. All were described as unsuitable or obsolete, and no value was placed on them by the assessors (ODF 7735/2 1363).

Having decided what should be purchased the government officials then had to find a place to store the aircraft and all the other equipment purchased. In April 1925 two officers, Captains Wilkes and Ivory, inspected Torpedo Yard and decided that by using the old mine store and nine waterproofed aircraft cases all the gear could be accommodated there at the foot of North Head (ODF 7735/2 1354).

The equipment was moved from Kohimaramara to Torpedo Bay over the Easter period of 1925 (ODF 7735/2 1351). For June 1925 there is on file a requisition order for the purchase of the water proofing material 'malthoid for 5 aeroplanes cases at Devonport' (ODF 7735/2 1350). By February 1926 there were complaints arising over the aeroplane cases 'congesting' the parade ground at Torpedo Yard (ODF 7735/2 1348). A memorandum was then sent to ask advice on what was in the cases what was to be done with them (ODF 7735/2 1347).

The reply stated that the cases contained three Avro aircraft and all the parts of three DH aircraft apart from the fuselages. These were the aircraft already owned by the government. They had been transported from the Walsh Flying School where they had been on loan.

It was suggested that as the machines were unserviceable a Board of Survey be held rather than go to the expense of moving the crates to the airforce's new base at Hobsonville (ODF 7735/1340). The Board of Survey was held on 22 April 1926 to assess the value of the aircraft cases and their contents. The Board listed the equipment stored at Torpedo Yard and assessed the value of the material. The only aircraft listed at this stage were the three Avros, the three DH 9s and the Supermarine Channel - the Supermarine being the only one of the Walsh aircraft actually bought by the government and stored at North Head. The other Walsh aeroplane purchased, a DH 6, was stored at the base at Trentham.

The Board recommended that all seven aircraft be destroyed, while most of the other equipment was to be disposed of. None of the aircraft are recorded as being retained (ODF 7735/2 1341). The Avros and the DH9s were confirmed as destroyed in September 1926 (ODF 7735/2 1337). The Supermarine hull remained and was finally disposed of in 1932, when it was sold for £1 (ODF 7735/2 1334 1336).

The documentation therefore strongly supports the argument that the two Boeings, the subject of most interest, were not purchased from the Walsh brothers, and were never taken to be stored at North Head. For the aircraft that were taken to North Head there is clear documentation describing both what was there and what happened after their arrival.

The only contradiction in the archival evidence is over the number of aircraft crates involved. The two officers, Wilkes and Ivory, who carried out the inspection of the storage facilities at North Head suggested that nine crates would be needed to store the aircraft. In the event only five are recorded at Torpedo Yard and malthoid for only five crates was ordered. It has been suggested that the discrepancy is because the extra four crates were stored in tunnels and therefore did not need the waterproofing supplied by the malthoid. The use of tunnels, however, was not mentioned by the inspection team. The only storage places that they mention were the cases and the old mine store. It seems a more likely conclusion that the space needed was overestimated rather than that four cases are missing.

It seems that while today the first two aircraft built by Boeing would have enormous value, to the assessors at the time they were seen as two obsolete and partially dismantled liabilities. It is not clear what happened to them but it seems certain that they are not still hidden at North Head.

While it seems certain that the Boeings were not purchased by the government, documents that were found during the project indicate that their engines were (Fig. 4).

The two Boeings ordered by the Walsh brothers arrived in New Zealand in October 1918. Both were fitted with 6 cylinder 125 hp water cooled Hall-Scott A-5 aero engines (Fig. 5). As well as the two engines fitted to the aircraft there was a third, spare engine (Harvie 1974: 70).

The spare engine was fitted for a time to the Walsh built flying boat 'D'. Subsequently the engine in Boeing 'F' broke a crankshaft. This reportedly led to the front part of the engine breaking through the radiator and falling into the sea with the propeller still attached (Harvie 1974: 70). After this incident the spare Hall-Scott engine was taken from the Walsh flying boat and fitted to Boeing 'F' (Harvie 1974: 80,81).

At the time of the government assessment of the flying school assets, the engines were examined and valued and a detailed report was made. In this report the three 125 hp Hall-Scott 6 cylinder water cooled engines are listed. They are described as in good order although rather old (ODF 7735/1 1368). In another part of the report the relative values of the engines are discussed by the assessors suggesting that the three engines were worth £300, £250 and £200 respectively (ODF 7735/1 1362). Presumably the £200 engine is the one damaged in the earlier accident with the £300 engine possibly from Boeing 'G', Mallard, the least used of the aircraft.

The three engines, originally from the Boeings, were purchased and are listed in a report on the aero engines held by the Defence Department in March 1926. At this time the engines are listed as '2 unserviceable awaiting overhaul, 1 incomplete' (ODF 7735/1 1329). Presumably the incomplete engine was the one damaged in the earlier accident.

By the 4th August 1926 the engines were sold. The New Zealand Defence Forces document found during the research associated with the project, lists the purchasers of the three Hall-Scott engines. They were Mr W.C. Mills of Devonport who purchased two, and Hoyes Motors Ltd, which bought the remaining engine (Fig. 4).

While the Defence Department may have viewed the engines as old and obsolete,

NORTHERN COMMAND.

In your reply
46/101/1/9
please quote this number.



HEADQUARTERS,

DEFENCE OFFICE,
AUCKLAND,

4th August 1926. 192

Headquarters,
N.Z. Military Forces,
WELLINGTON.

RE : AERO EQUIPMENT - AUCKLAND.

Reference your 35/43/5/AIR of 19th ultimo, all the stores enumerated therein have been sold with the exception of Spares for Roberts Engine of which there are none in store. The monies collected have been paid into the Public Account and are accounted for in Captain W. Ivory's Sub-Receiver's Account for the months of July and August 1926.

The particulars are as under:-

Name of Purchaser.	Description of Article.	Amount.	No. of Sub. Rec. Receipt.
<u>G. B. WARMAN:</u>	1 Beardmore Engine No. 2012.	£35/-/-	239738.
<u>W. C. MILLS :</u>	1 Beardmore Engine No. 2213.	} £67/10/-	239739.
	1 Hall Scott Engine No. 161		
	1 Hall Scott Engine No. 117		
<u>GILLETT MOTORS LTD.:</u>	1 Roberts Engine.	£10/-/-	239740.
<u>C. T. GILLESPIE</u>	: 1 Aero Case	2/1/-	239741.
<u>C. L. CLIFTON</u>	: 1 Aero Case.	2/-/-	239742.
<u>T. M. ROBERTS</u>	: 1 Beardmore Engine No. 9710	£25/-/-	239743.
<u>C. G. HERBERT</u>	: 1 Curtiss Engine No. 1819	£35/-/-	239744.
<u>HOYES MOTORS LIMITED</u>	All Curtiss spares.	£17/10/-	239745
	2 Sunbeam Engines.	} £152/10/-	239746
	1 Curtiss Engine		
	1 Hall Scott		
<u>T. J. HOLLIDAY</u>	: 1 Aero Case	2/5/-	239752
<u>J. H. SHARP</u>	: 2 Aero Cases	4/-/-	239754.

Major,
Financial Services

W.C. Mills

W.P.S. noted.

19/8/26

D.F.S.

Forwarded for your information

T.M. Wedderburn
Director of Air Services

W. J. Kelly

COLONEL-COMMANDANT,
NORTHERN COMMAND.

FILING

R. T. Munn

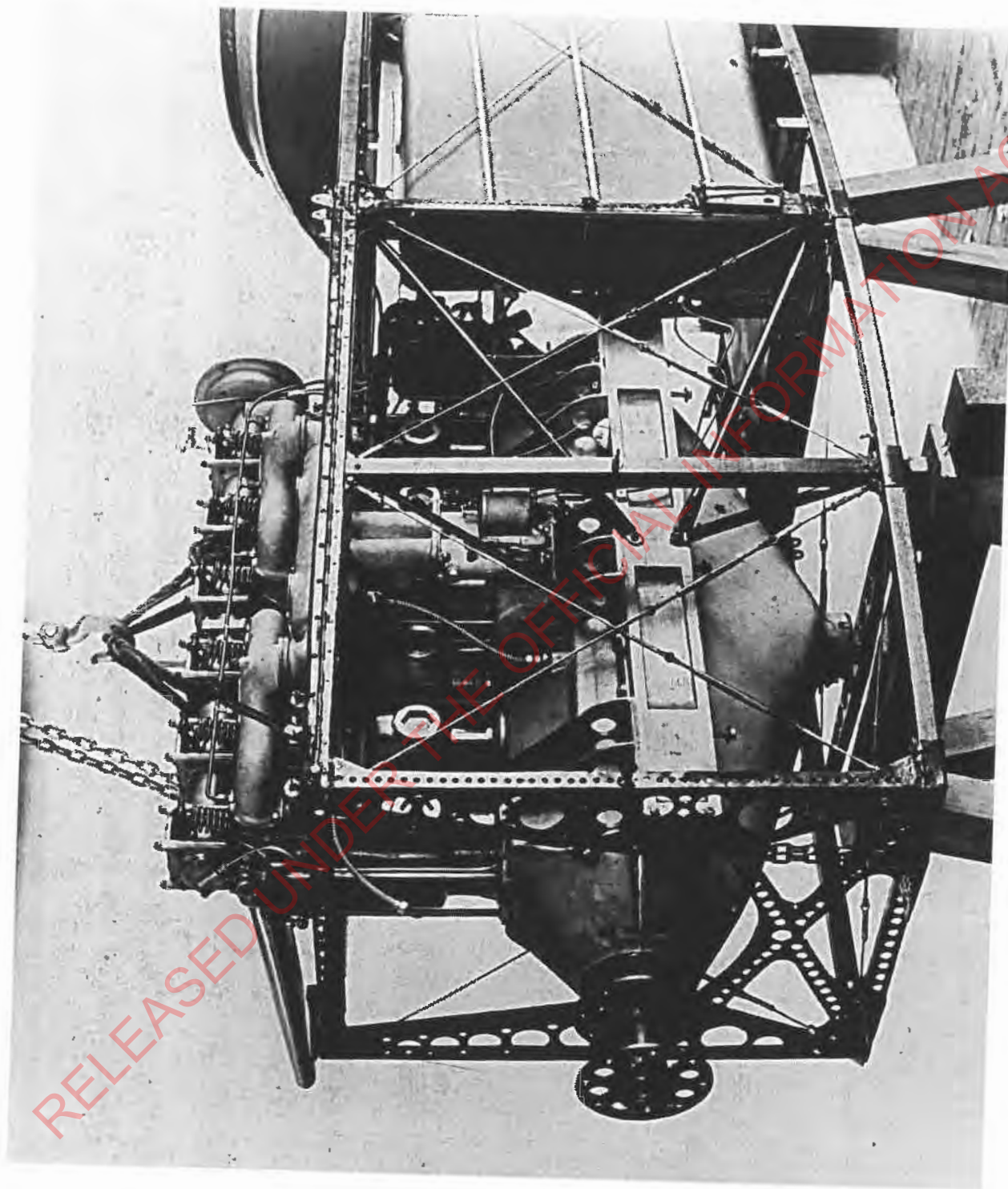


Figure 5: The 125 hp Hall-Scott aero engine



WELL-KNOWN AUCKLAND SPEED BOAT BURNED TO WATER'S EDGE AT ORAKEL.
A recent photograph of the Miss X, owned by Mr. R. M. Hoyes, which was totally destroyed
by fire yesterday afternoon.

Figure 6: The Racing Powerboat "Miss X" (New Zealand Herald 20th June 1927)

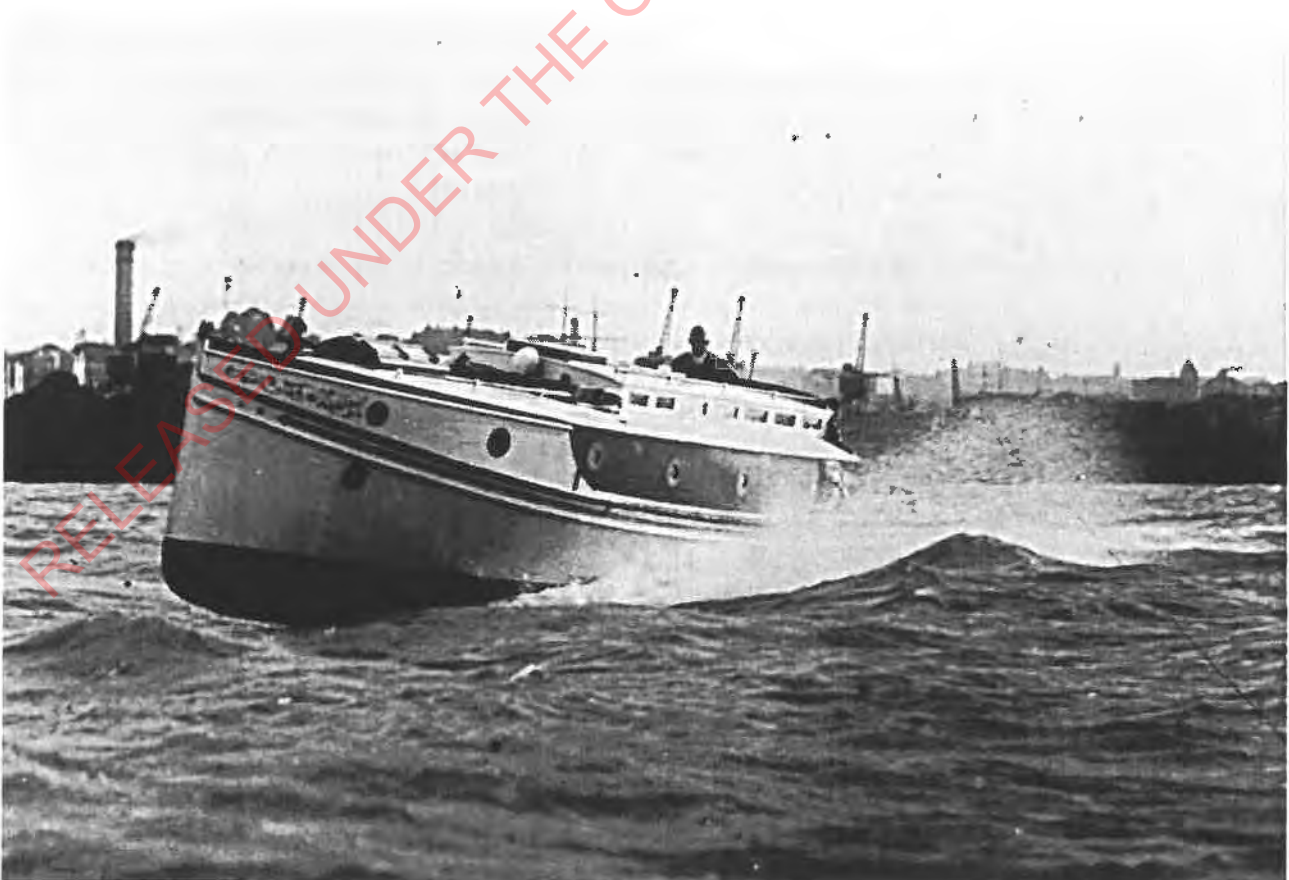
the local power boat racing enthusiasts did not. The magazine *New Zealand Aquatic* for 28th July 1926 was very enthusiastic. 'The sale by the Defence Department of over a dozen aeroplanes motors of between 75 and 275 hp is likely to give a much needed stimulus to speed boat racing in Auckland where all the motors have been placed' (*NZ Aquatic* 28 July 1926: 5).

The managing director of Hoyes Motors, Mr Rex Hoyes and Mr W.C. Mills, the purchasers of the Hall-Scott engines, were both involved in the Auckland power boat racing scene. By March 1927 Mr Hoyes had repowered his 22 foot stepless runabout 'Miss X' with 'a six cylinder Hall-Scott aero engine ...of 125 hp' (*NZ Aquatic* 23 March 1927: 7). The chequered history of this boat and its old Boeing motor is well documented in the press of the day.

In April 1927 'Miss X' broke a prop shaft and in May suffered a minor fire (*NZ Aquatic* 25 May 1927: 17). However in June 1927 she caught fire off Orakei Wharf and was totally destroyed. The burnt out remains were towed ashore by a fishing boat (*NZ Herald* 20 June 1927) (Fig. 6). The *New Zealand Aquatic* suggested that there may have been a slight possibility of salvaging the motor, although this was believed to be so extensively damaged 'as to be not worth the trouble' (22 June 1927: 3).

The fate of the two engines purchased by Mr Mills is not as clearly recorded. Mills raced a boat named 'Romance II', which is still in existence although now powered by something less exotic than an old Flying School aero engine. (A Packington - Hall local historian pers comm 1992). There is, however, a picture of the boat at speed dating from this era suggesting an engine of some horse power (Fig. 7).

Figure 7: The launch
Romance II
Auckland
Public Library



with the correct identifying numbers was purchased by Mr John Earnshaw in 1994 (*Rodney and Waitemata Times* 15 March 1994). The current owner is to restore the engine and is reported to be attempting to locate the carburettor and the magnetos (*NZ Classic Car*, September 1994: 5).

As well as the engines associated with the Boeings the research also identified the fate of some of the other flying school engines sold at the same time. This information is contained in Appendix 2.

The fact that the engines were removed from the Boeings and sold separately reinforces the argument that the aircraft were not retained. One thing that is clear is that the Boeings and their engines were not in tunnels at North Head.

PREVIOUS INVESTIGATIONS

1.5

Prior to the work undertaken by the Department of Conservation there had been four other investigations carried out as a result either of public concern over hidden ammunition, or interest in the aeroplanes. Three of these were done by the armed forces and one as part of a student research project.

Army Investigation Number 1

In a document entitled 'Reconnaissance Report, Tunnels HMNZS 'Tamaki Boatyard' a Major Stevenson sets out the results of the first serious search for hidden tunnels at North Head. This is dated 5th March 1980 (Stevenson 1980, in ODF 7735/2). This investigation was carried out as the result of information supplied by local historian and later mayor of North Shore City, Mr Paul Titchener. The information suggested that two old aircraft, a Boeing B&W seaplane and an Avro 504L lay crated up in a sealed tunnel at North Head. As a result of this information Stevenson was instructed to search the area of HMNZS Tamaki boatyard, the old mine depot and torpedo store at Torpedo Bay at the foot of North Head.

The three areas examined were the old mine store, the carpenters shop and the old primer test pits. This was because these structures were all built up against or dug into the cliff face, allowing the possibility of a tunnel being hidden behind them. A number of holes were drilled in the walls of the old mine store indicating that the structure was built directly against the cliff face with no signs of tunnels. In the carpenters shop, originally the minefield test room, areas of the timber lining were removed from the walls to allow inspection of the cliff behind them. No tunnels or signs of tunnels were found. Similarly the backs of the then unidentified primer test pits were drilled with no tunnels being found. There are in fact on file good drawings of these structures and it is quite clear that there are no tunnels associated with them (Drawing 1564/16, dated 16/7/1895. Copies held at the conservancy office, DOC Auckland; see Fig. 8).

Major Stevenson's report also includes the outline of an interview with Major A.G. Salt who had served at the old 'Artillery Yard' at Torpedo Bay. In this interview he states that there were no more tunnels and that the aircraft had been either burned on the adjacent beach or in one case sold.

SUBMARINE MINING

PIT FOR TESTING PRIMERS.

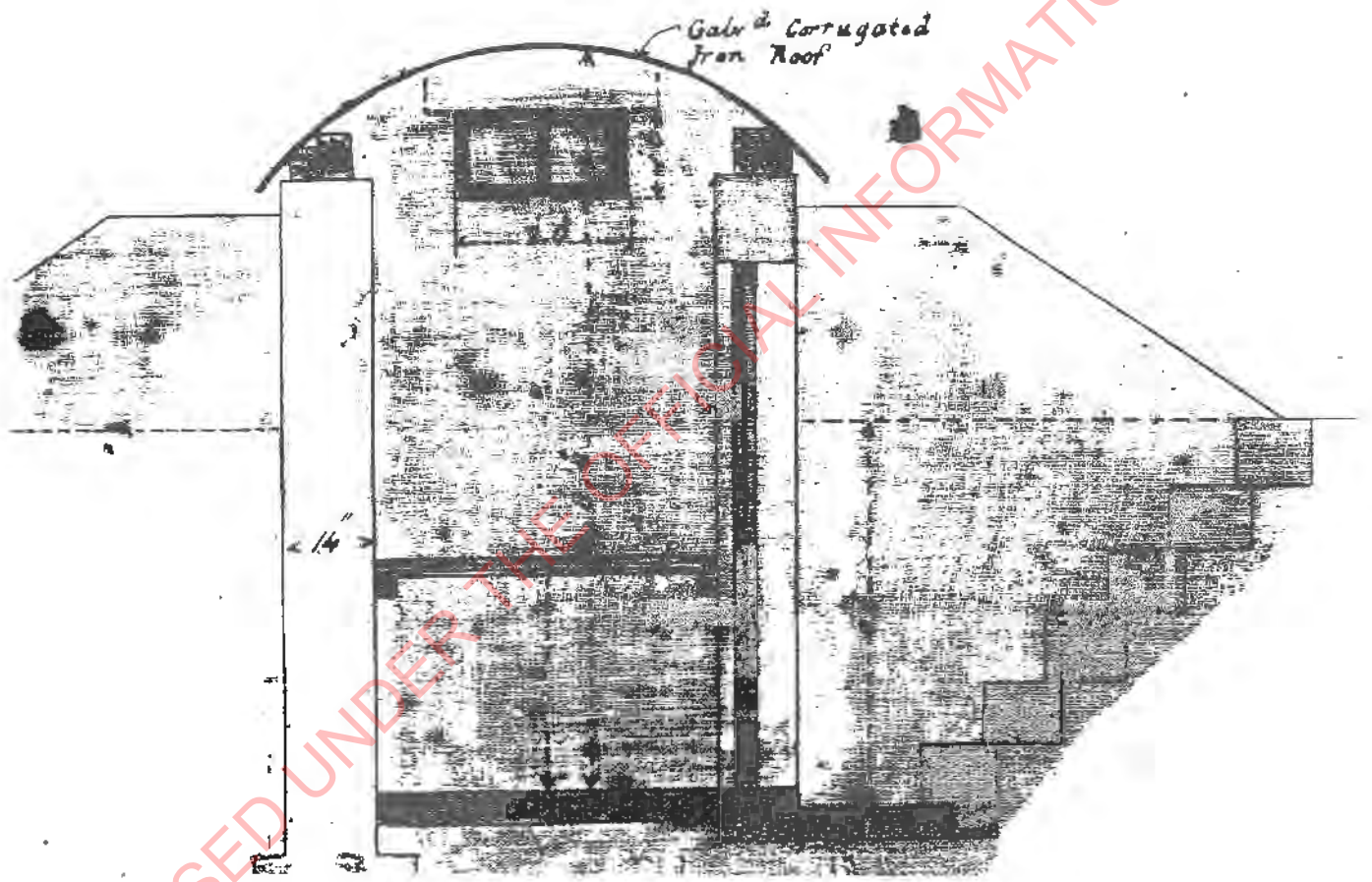


Figure 8: The Primer Test Pits, 1895 (detail)

The conclusion of this investigation was that there was no evidence of tunnels ever existing at the naval boatyard at Torpedo Bay.

Army Investigation Number 2

The origins and outcomes of this investigation are not clear as the only report on it consists of a hand written 'sitrep' (Barratt 1984). This investigation seems to have involved a Ministry of Works drilling team, John Earnshaw and a private contractor using ground radar, or 'echo sounder' as it is referred to in the report. The sitrep was prepared by Lt Barratt and covers work carried out between May and September 1984.

On 9th June the Ministry of Works were reported as having drilled 20 holes on the eastern side of the old 8inch gun pit (the 'water tank') in an attempt to locate the tunnels described by Mr Earnshaw's witnesses. The report says that this work was unsuccessful in locating any tunnels in the area drilled. On the 18th June the radar was used in the area of the water tank and a possible tunnel site was drilled with no success. On 20th September another attempt was made to use the instrument in the area of the water tank, which in the opinion of Lt Barratt indicated that no tunnels existed in this area as the machine did indicate known tunnels but showed nothing in the other areas where witnesses remembered seeing tunnels.

The equipment was then moved to the area of the 'boat yard', Torpedo Bay. Here the radar was used in the area of the old primer test pits. These had been filled in a long time ago and not surprisingly this was shown on the radar. The author of the report did not seem to know what these structures were. The report goes on to say that the longer scans of the cliff face did indicate the possibility of spaces existing behind the cliff face near the old mine store and the 'chippies shop', the old test room for the 19th century mine field. The author of the report said that he felt these could not be associated with the aeroplanes as the tunnels were too narrow (these are in fact the primer test pits) or the buildings that blocked the possible tunnels predated period the aircraft were stored at Torpedo Bay.

The report ends with a statement that the owner of the equipment was going to 'feed all his information into a computer and produce composites in a cleaned up version'. This apparently was never done as the machine had malfunctioned in some way (Earnshaw pers. comm.).

Army Investigation Number 3

This was an investigation undertaken by the army in 1988-9 (Maindonald 1988, in DOC 013-01, vol. I). It was the inconclusive results and conflict that came from this work that led to the Department of Conservation investigation that is the subject of this report.

The work was planned to investigate a number of sites specified by Mr Earnshaw, and to this were added areas suggested by the army team. The work planned by the army team was set out in a document prepared by 2nd Lt S.R. Maindonald. He

listed the proposed areas in a priority order. These were:

- the concreted entrances at Torpedo Bay (in fact the primer test pits);
- an area on the western side of the Head where an unidentified structure appeared in an old photograph;
- what he called the 'vertical shaft in earth cave', a location that no one else, including Mr Earnshaw (pers. comm.), has been able to identify. It is possible that he was referring to the shaft in the old searchlight tunnels, the existence and history of which are well known;
- the ammunition hoists at the 6 inch battery;
- a site referred to as the 'drive in entrance';
- a site visible in aerial photos on the eastern side of the Head;
- the 'water tank' (the 8 inch gun pit on the summit).

The results of this work were patchy with some of the sites listed above being investigated, others listed but not examined, and areas not mentioned at all examined on an ad hoc basis. There were, it seems, a number of reasons for this - insufficient equipment, the depth of the sites, and what were alleged to be disagreements with Mr Earnshaw and his team.

A number of things were, however, discovered. An old sealed entrance was located in South Battery. This was excavated and found to consist of a short length of tunnel connecting to the tennis court area. A bulldozer was used to move earth on the western side of the Head in the area indicated by the photograph. No tunnels were found. As well a number of holes were drilled in existing installations, the main result of this being the release of a naphtha like smell inside the tunnels at the summit battery.

The main outcome, however, came later and did much to fuel public speculation when the information was released. The information consisted of a telex recording drill testing in the water tank on the summit to confirm the existence of a tunnel located by 'an electronic survey'. An almost full copy of this report was obtained by the Department of Conservation from the Government Communications Security Bureau, the organisation responsible for the work (DOC 013-10, vol. I). Some information had been removed 'as likely to prejudice the security or defence of New Zealand'. The information removed consisted of the type of apparatus used in the radar survey. The radar results had suggested the possibility of a tunnel in the area where the army had previously drilled. This location was redrilled and it was reported that 'at 8 feet resistance to drilling stopped and compressed air blow back around the drill ceased, indicating the presence of a large air space'.

The missing tunnel perhaps?

Investigation Number 4

In late 1991 a doctoral student, John Mitchell, was working on an archaeological thesis on the 'Russian scare' forts of Auckland and offered to try to investigate some of the mysteries while undertaking other excavation work on North Head. This led to a furious public response in an unsigned pamphlet delivered to Devonport

WARNINGS UNHEEDED

DIG AT NORTH HEAD AMMO DUMP THREAT TO PUBLIC SAFETY

DECEMBER 20TH. 1991

Despite the warnings of the former Minister of Defence that the North Head Historic Reserve contains "weeping" obsolete ammunition, the Department of Conservation is rushing ahead with plans to dig the place up in early January with no provisions for public safety.

Former Defence Minister, Bob Tizard, has stated that decaying ammunition had been "encountered" at North Head and that it could be set off by people trying to break into the sealed tunnels. Yet Conservation have not been in touch with Defence about this and no special safety provisions are planned.

H.P.T. NOT TOLD OF EXPLOSIVES DANGER.

The Historic Places Trust (Wellington), who issued a permit for the 'dig' on December the 18th, say that they were not told about the decaying ammunition danger.

Four years ago safety precautions were considered essential for investigations at North Head. As far back as mid 1987 Conservation Regional Manager, Gerry Rowan, was writing to the Secretary of Defence expressing concern about the possibility of decaying ammunition at North Head. "Clearly this material, if it does exist, is likely to become more unstable as time passes" said DoC Manager, Gerry Rowan.

DOUBLE STANDARDS.

The Army sponsored Mallard Productions attempt to open the sealed tunnels in 1988 was only allowed to proceed with a fully equipped team of military explosives experts in attendance. Four years later the former Defence Minister has confirmed a mounting body of evidence that the decaying ammunition does exist. Yet in January excavations are going ahead with none of the precautions thought necessary in 1988. Why?

Conservation has not publicized proposal for the excavation. Nobody outside of Conservation has been given the chance to view, comment on or object to the proposal. The 1988 investigation was advertised in public notices and stood down for a month to allow public submissions. Double standards?

SECRECY AND CONTRADICTIONS.

Despite Official Information Act requests, Conservation has refused to release details of the contract they have with the post grad student archaeologist conducting the excavation on their behalf. Student archaeologist, John Mitchell, has publicly stated that he does not believe the tunnels exist. But in a letter to Conservation in October last year he wrote:- "Of some concern - is the theme common to more than 50 witnesses that there is a large amount of ammunition walled up in North Head in disused magazines. There are documentary references to many magazines in and on North Head; three of these cannot be accounted for in the extant features."

CONSIDERABLE DANGER TO RESIDENTS.

Significantly, Mitchell continued:- "If the accounts of these witnesses are correct, then a not inconsiderable danger to the citizens of Auckland exists in the heart of a populous residential area."

Last week a former Minister of Defence confirmed these same witness accounts! None of this information was contained in Mitchell's proposal seeking the Historic Places Trust permit to excavate.

DIFFERENT STORIES TO H.P.T. AND NAVY?

The Historic Places Trust say that, in seeking his permit, Mitchell indicated that he was interested in 1800s 'Russian Scare' fortifications. The permit was granted for this purpose. Contrary to this a Navy source in Auckland said that Mitchell wants to dig where he [Mitchell] has evidence of an entrance to the sealed tunnel complex.

'SAFE INVESTIGATION' VETOED

Evidence of such an entrance was shown to Mitchell in 1990 by veteran North Head sealed tunnels researcher, John Earnshaw of Mallard Productions Ltd. Earnshaw's evidence was confirmed by a military survey two years ago. Although the Army and their explosives experts were still available to proceed with a safe and well planned excavation at that time, Conservation would not grant Earnshaw the permission to proceed. No cogent reasons were given for this obstruction.

The current excavation, set to take place in the middle of the holiday season when there is little time or avenue for objection, is an apparent headlong rush to be the first past the post - at the expense of common sense and public safety.

NO CONSULTATION ON POTENTIAL DANGER.

Despite the clear warnings given by former Defence Minister, Tizard, Conservation have not bothered to follow up the information and they have not bothered to inform Civil Defence, the North Shore City Environmental Health Dept. or the Dangerous Goods Inspectors of their plan to excavate on the abandoned munitions dump at North Head.

RESEARCH AND SAFETY PUSHED ASIDE.

There are legitimate researchers with up to 12 years invested in careful and well planned investigation of North Head involving the appropriate authorities, expertise, safety measures and public awareness. These have been pushed to one side in this seemingly gratuitous quest for archaeological one-up-man-ship. The excavation should be delayed until appropriate public safety measures considered by the relevant authorities full public awareness is provided for.

The double standards are glaringly obvious as is the cavalier attitude with which Conservation is treating the issue of public safety.

1 09-12-91 2253 1

Figure 9: Anonymous leaflet delivered to North Head residents

residents (Fig. 9). This investigation was carried out between the 14th and 31st January 1992. The objectives and outcomes of this work were as follows (DOC 013-11):

1. To relocate the southern summit 7 inch RML gunpit. This structure had been filled in during the 1960s and, while partially visible in early aerial photographs, was largely unrecorded as no original drawings of it survived.

The outline of this structure was excavated and the presence of a loading gallery established. In muzzle loading guns this is the passage into which the gun is swung to load it covered from hostile fire.

2. To locate if possible the northern 7 inch RML gunpit on the summit and to assess how much remained after its recorded destruction in 1904 as part of an aborted plan to build a 6 inch Mk VII emplacement here.

The site was located and excavated. This showed that the entire structure had been destroyed as far as the existing tunnel entrance.

3. To establish how much of the 6 inch Mk VII emplacement had been built prior to being abandoned. This emplacement had originally been planned for the summit area but this idea had been aborted and the installation rebuilt at a lower level (see Fig. 2).

It was established that most of the earthwork had been dug to a depth of approximately 3.5m but no concrete had been poured.

4. To excavate down the edge of the 8 inch gunpit to see if there were any tunnels leading from the eastern side. This was one of the areas identified by the witnesses. This was the gun pit that had been converted into a water tank, meaning that it was impossible to see entrances under the concrete water tank liner.

It was found that the walls of the gunpit were over 2m thick, enough to enable an entrance to be located in the wall under the liner and be invisible to any outside examination. This, together with the fact that the area that would have to be excavated was located under the security fence, meant that this objective was abandoned.

5. To locate if possible the unidentified structure, possibly a tunnel entrance, visible in old photographs. This was the structure on the western slopes that the army team had attempted to find in 1988.

When this area was located it was found that a bulldozer used in the 1988 army investigation had so disturbed the ground surface that hand excavation was an impractical means of investigation.

2. Initial investigations by the Department of Conservation

2.1 BACKGROUND

The Department of Conservation may seem to be an unusual organisation to undertake a search for old ammunition. There were, however, two good reasons for this. Firstly the old fort at North Head is part of a Historic Reserve administered by the Department and secondly the area of the fort is an archaeological site, the disturbance of which during the earlier investigations was worrying. It was felt that the Department had the necessary expertise to undertake both the research and the physical investigations without excessive damage to the site and in such a manner that information would be recorded and published.

The investigation was carried out by the Department at the request of the Minister of Conservation. This was in response to escalating public unease over claims that ammunition was still present in hidden tunnels at the reserve. The responsibility of the Department of Conservation had been established at a meeting held in Wellington attended by officials from Defence, Conservation and MPs from the area who had been contacted by concerned constituents. It had been agreed that the Department of Conservation was the organisation most responsible for the Historic Reserve, as well as having the necessary staff to carry out the work with the least damage.

The work commenced in 1992.

2.2 ARCHIVAL RESEARCH

One of the ongoing claims about North Head was that the archival record had been falsified and purged of any material relating to the hidden tunnels. There were also parts of old files circulating in the community that seemed to relate to installations that were not immediately identifiable. For this reason the obvious place to start was the archival record. A researcher was employed to start this process and the results of his work were made available through the Auckland public libraries (Treadwell 1992). This report consists of a referenced chronology starting in 1885 and ending in 1975. A large number of sources were consulted. Among these was the material at National Archives, Wellington, including the Army files, Forts and Works files, the Fort Record Books, Army drawings, and Navy files. At National Archives, Auckland, the Public Works files for the period 1911-1957 were read. The main Defence Records Registry was made available and this archive was searched. Other institutional records examined were those at the Naval Museum at Devonport, the old Devonport Borough Council records, Whites Aviation photographs, some dating from the 1930s, the Walsh Memorial Library at the Museum of Transport and Technology, Works Consultancy (the successors to the Ministry of Works and the Public Works Department), and finally the Army Museum at Waiouru.

The conclusions reached from this work were that good records existed of the two main periods of construction at the fort. These were the early period from the 1880s until the start of the 6 inch Mk VII battery in the early 1900s and the later period stretching from 1935 until the end of 1944. There was nothing to suggest that there were gaps in the record for these periods. The only major work done outside these phases was the building of the two searchlight emplacements in 1915-16 and these were well accounted for (Treadwell 1992: 14). The times between the two major construction phases seem to be periods of routine maintenance or, in the depression era of the early 1930s, of neglect.

Even after all this work material continued to appear. Some records, like a copy of the Fort Record Book from the 6 inch Mk VII battery, were in private hands but others were in National Archives, filed in such a way that they had been missed in the first search. In this we were much helped by the continued work of John Mitchell, the student who had carried out the excavations on the summit of North Head in 1992.

One of the most useful files discovered at this time were the Weekly Reports of Mr Walter Frankham, the Inspector of Defence Works who had supervised the construction of the Fort between 1889 and 1893 (Nat Archives AD/33/3,4,5). These files contain an extraordinary amount of detail. They were prepared each week by Frankham to let his boss in Wellington, a Mr A.D. Bell, know how construction was progressing. He is the model of the conscientious Victorian public servant, and seems to record everything - the number of prisoners working for him, their warders, their health, the state of the wheelbarrows, the amounts of earth dug, the height of the walls, and quantities of cement and other supplies ordered. It is possible to reconstruct the sequence of the construction of the fort from his records (Fig. 10).

Later we were to find a complete specification for all the 19th century disappearing gun forts filed as 'The Contents of an Artillery Officers Drawer'. This, however, comes later in the story.

The discovery of Frankham's reports allowed us a much fuller understanding of the early period of the Fort. The structure of the defences at North Head for most of its history are based upon the three batteries built by Frankham and his prison labourers. A large number of the tunnel stories were centred on the three 19th century batteries and there were a number of erroneous suppositions about them. Frankham explained a number of these. For example there is in South Battery a small rectangular space in the middle of the tunnel leading to the 64 pounder battery (17 in Fig. 11). There is no obvious reason for this and there had been speculation that it may have been the result of alterations to conceal a tunnel entrance. All is explained by Frankham. Originally it seems the 64 pounder gunpit was sited at this point and it was one of Frankham's jobs to move it closer to the cliff. Rather than completely demolishing the old pit Frankham had modified it to provide a covered area to mix concrete while the rest of the emplacement was built (National Archives AD/33).

Other documents found provided a way of checking the layout of the installations during the 1920s. These came in the form of a series of reports prepared by the Navy at a time when they were looking for expanded magazine storage. During this period changes in the numbers and types of vessels in the New Zealand Squadron

Report of progress of work: Fort Caubley
for week ending January 3rd 1941

NEW ZEALAND
6/1/41

Four Warders, two Instructing Warders, & 40 prisoners have been employed on work at the Summit Battery during the past week as under.

The rear wall of passage from No 7th to 8th gun pit, has been concreted to ceiling height, throughout its whole length from 7th gun pit to its finish opposite end of Parade. & the seaward wall of passage has been concreted to within 2' of ceiling height, from 7th gun pit to doorway at end of passage C. The tunnel being cut through concrete wall at rear of 8th gun pit for passage into present main magazine has been driven about 2' 6" during the week, & is now on about 8' 6" from face of wall. Men were also employed tracing up old concrete & wheeling alongside skidding board, & part of the day unloading cutter load of cement at jetty.

- Carpenter one (Civilian) Laying 1 1/2" piping from syphon (supplying water to Electric Lt. Bldg) to steam pump shed at foot of hill, also driving steam pump part of 2 days.
- Carter one (Civilian) Carting usual coal supply & timber etc & working with Carpenter.

Drill Shed

Carpenter & 3 Labourers (Civilians) employed 6 days of the past week getting out foundation for, & relaying & concreting original Racer & pivot of 64 feet gun from North Head

W. Frankham
Inspector

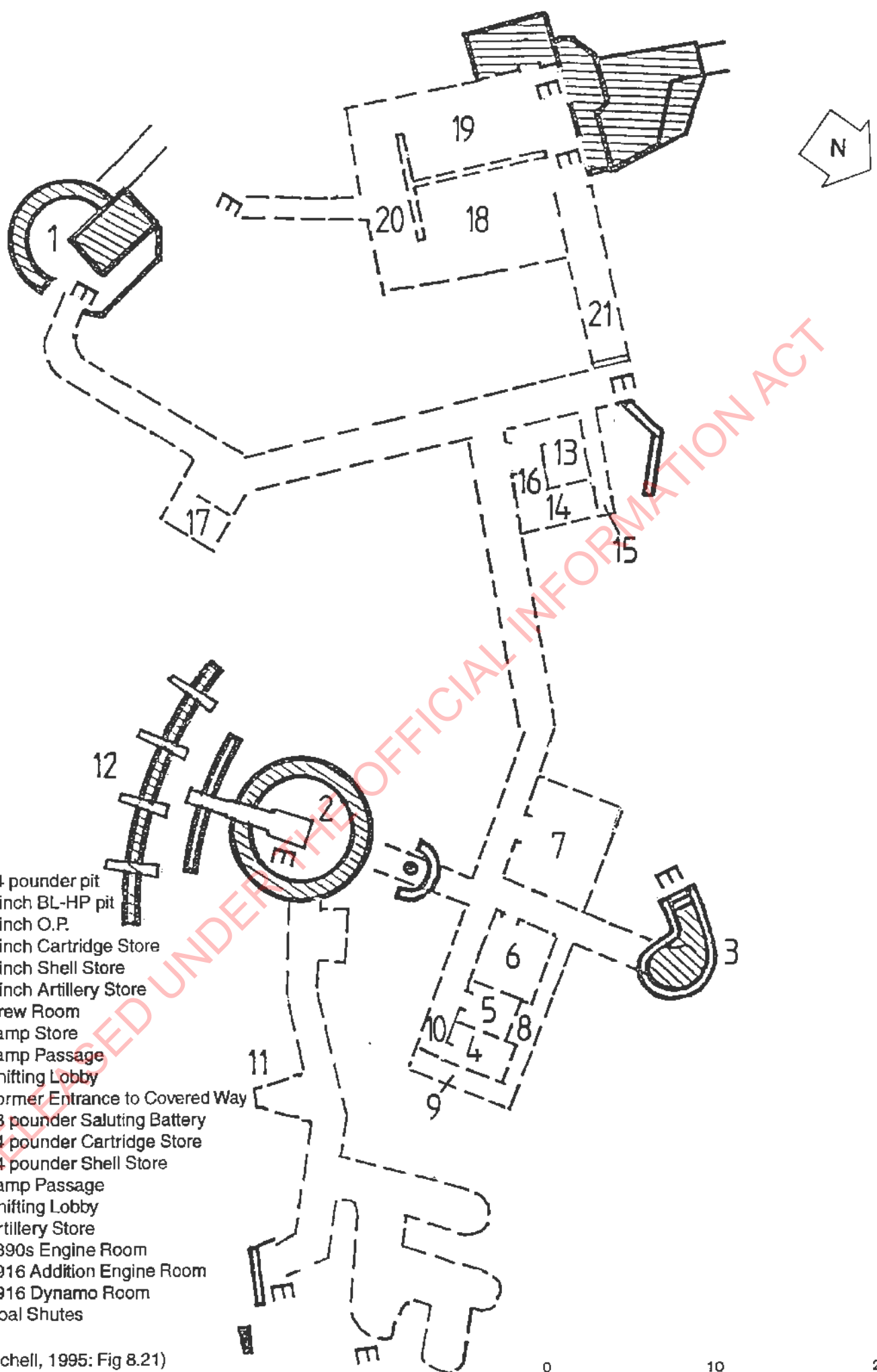
Figure 10: A page of Frankham's Reports

KEY

- 1 64 pounder pit
- 2 8 inch BL-HP pit
- 3 8 inch O.P.
- 4 8 inch Cartridge Store
- 5 8 inch Shell Store
- 6 8 inch Artillery Store
- 7 Crew Room
- 8 Lamp Store
- 9 Lamp Passage
- 10 Shifting Lobby
- 11 Former Entrance to Covered Way
- 12 18 pounder Saluting Battery
- 13 64 pounder Cartridge Store
- 14 64 pounder Shell Store
- 15 Lamp Passage
- 16 Shifting Lobby
- 17 Artillery Store
- 18 1890s Engine Room
- 19 1916 Addition Engine Room
- 20 1916 Dynamo Room
- 21 Coal Shutes

(See Mitchell, 1995: Fig 8.21)

Figure 11: Plan of South Battery and Engine Room



of the Royal Navy meant that existing magazine space was inadequate (McIntyre 1988). Initial inspections were carried out in May 1923 and the volume of magazine space at North Head and nearby Fort Victoria was described. The total for both Forts was given as 10,000 cubic feet with Fort Victoria having 5000 cubic feet 'roughly'. Fort Victoria consisted of a single 8 inch disappearing gun battery. The fact that only approximately 5000 cubic feet were available at North Head with three batteries does not suggest that huge underground spaces were available at this time. In a letter dated 26th March 1925 the areas used for naval storage were described as consisting of 'North Battery: the whole magazine. South Battery: One long passage and one large magazine. Fort Cautley (the summit): Three small magazines. Sub-Mining Tunnel:(the old searchlight tunnel) One long passage.' There is nothing in this description that suggests any large, now unknown underground storage area or that the existing Batteries were larger or contain any unknown features. To emphasise this point another letter dated the 17th June 1925 describes the volume of magazine space in use by the navy at North Head as being 6000 cubic feet. This figure equates with the volumes of these spaces today (these documents are reproduced in Treadwell 1992). In 1930 the Devonport Borough Council approached the Prime Minister of the day, Forbes, to ask that ammunition be stored at North Head rather than at Fort Takapuna, to which it had been moved. It was felt by the council that North Head was a safer option. Forbes replied 'The idea that North Head has ample ammunition storage facility is farcical...the naval department abandoned North Head as unsuitable' (North Head Defence Reserve 203/8/vI, National Archives Wellington). Again this hardly suggests large underground spaces. Therefore it seemed clear that for most of the early period of the fort's history we had a good record of what was built and in the Naval records of the 1920s we had a check on the extent of the installations at this time also. This left only the later period of construction in the 1930s and 1940s during which any extra underground feature could have been built. The documentation for the early 1930s shows that coastal defences were a low priority for government spending in this time of depression and financial hardship. A report to parliament in 1932 tells the story. In talking about the coastal defences it says 'Generally in fair condition..only urgent repairs have been carried out during the year. This means that normal maintenance work is accumulating' (AJHR 1932: H-19-5). This is not suggestive of a government in the process of building extensive underground installations.

To a large degree in this period New Zealand's defences were still run from London. Auckland was included in the Imperial Defence Scheme prepared by the War Office in London. It is described as a 'defended port' needing one 6 inch battery, at this time provided by the 6 inch Mk VII guns at North Head. With the increase in the numbers of cruisers being built at this time the War Office in 1934 decided that Auckland now needed two 6 inch batteries. After some indecision this battery was built on Motutapu Island in 1938 and later during the war another 6 inch battery was built at Castor Bay on Auckland's North Shore (AD 11 11/14, Coastal Defences-Modernising).

In 1938 in another report, the effectiveness of the 6 inch batteries was questioned and two 9.2 inch batteries were planned (AD 11 11/14). These, however, were not completed until after the war had ended. The interesting point in the planning and construction of these installations is that they were given the highest level of secrecy, with code numbers not names, restricted access to files and limited distribution of

material relating to their existence. Despite these restrictions it is now possible to have unrestricted access to the records of their planning and construction (see Corbett 1996).

There were of course other military installations built at this time that were not gun emplacements. For example the air raid shelters in Albert Park and, with the arrival of the American troops in 1942, camps, hospitals and the vast magazine complex on Motutapu Island were built. All this work too is well recorded and remembered (Grattan 1948: 460-516).

There are therefore plans and records for works constructed before and during the Second World War. These consist of overall regional planning from both London and Wellington and also the specific plans for each installation. None of these contain the slightest hint of any major work on North Head. Even where there were major works of the highest secrecy, some record remains.

Perhaps the strongest argument against work on major excavations on North Head during this period is that it is in the middle of a closely settled suburb. In work we have done on other coastal defence sites built at this time, some in remote locations, we have always been able to find people who had helped build them or had seen them being built. At North Head not a single witness to any such work has come forward.

From the evidence collected, therefore, we were able to put together a detailed chronology which allowed us to see what areas both in time and space were unaccounted for. These were then put together with the witness evidence to see if there were any areas where gaps in the archive and the witnesses stories overlapped.

There were very few gaps, but there were some. The later period seemed well accounted for as did the time when the dedicated Inspector of Defence Works, Mr Frankham, was keeping the records. There was a minor gap in the very early period, in 1885-6, at the height of the Russian war scare when the defences were constructed at speed and few records were kept. Most of these works, which only consisted of open trenches, had been demolished later when Frankham was rebuilding the fort in the period 1889-93, but there were some exceptions.

Firstly we had found a photograph taken in c.1885 that showed what may have been a tunnel on the western side of the Head, today a piece of featureless hillside (Fig. 12). There was no record of what this was. Secondly there were the 8 inch and 7 inch gunpits on the summit, the very area in which the witnesses, the army drillers and the Government Communication Security Bureau all thought a tunnel might exist. Both these structures had been built before the arrival of Frankham and so there was not any detailed record relating to them. This therefore seemed the obvious place to start. We would strip out the water tank, expose the old 1885 gunpit and be able to see if any entrances existed. This however proved to be a little more difficult than we had anticipated.

RELEASED UNDER THE OFFICIAL INFORMATION ACT



Figure 12: Unidentified structure 1885 Photo R. Cornelius

2.3 THE GAS TESTING

After the army drilling in 1988 there had been a strong smell of naphtha (moth balls) in the tunnels of the Summit Battery. We were informed that Naphthalene was a constituent of explosives and that it was possible that the smell was coming from decaying ammunition (Theyers 1992). For this reason we put off any plans to excavate until we had more information. After consultation with Army explosives experts and a firm of consulting engineers (Riley Consultants) we engaged firm of industrial chemists to identify and map the concentrations of naphtha and any other volatile hydrocarbons that may have been coming from decaying ammunition. These people then started drilling the walls of the Summit Battery and analysed the air that was extracted using a Photovac Model 10S50 gas chromatograph. There was at this stage an unexpected result. When the walls were drilled we found a sticky black substance that smelled strongly of naphtha (Groundsearch 1993).

What was this?

At this point we were rescued by Mr Frankham. John Mitchell was continuing his research into the building of the 19th century forts and found a volume of Frankham's Monthly Reports, the summaries of the more detailed Weekly Reports that we already had. In this volume was some new material: the goods purchased in the course of building the fort. Among these were orders for approximately 2000 gallons of coal tar from the Auckland Gas Co. We managed to contact the last chemist employed by the gas company in the days of coal gas production and we were told that one of the major components of coal tar is naphthalene (D. Peace, pers. comm. 1993). In fact the local Devonport gas works had manufactured 'naphthalene flakes', a product once used to preserve animal hides for shipment through the tropics. We later found the whole 19th century specification for the fort and this gave the procedure for preparing the coal tar for use as a water proofing agent for the tunnel roofs and walls (Fig. 13). The conclusion reached was that the naphtha smells came from the tar and not from ammunition. While somewhat reassured we did, however, conduct tests in other areas where we thought it possible that explosives may have been present. In none of these was any trace of explosive found (Pegman 1993).

Work on the water tank/gunpit could start.

GENERAL SPECIFICATION FOR ASPHALTE.

General.	The position and extent, &c., of the asphaltic work, and any special notes thereupon, will be given on the general plans and in the general specification for each work.
(1) Asphaltic only. Composition.	The asphaltic is to be composed of five parts of thoroughly dry sand, dried and heated over a brisk fire immediately before use; five parts of coal tar; and six parts slack lime, sifted and dry; well boiled together in proper boiler over a clear fire, and laid, spread, or poured hot; a little pitch added when the mixture is nearly ready will harden it. If too brittle from over boiling add more tar.
Special workman.	A regular asphalter, or some one having good acquaintance with asphaltic work, is to be employed to superintend the preparation and laying of the asphaltic, and the modification, if necessary, of the above composition, to give a stiff-setting plastic-paste which will not harden to brittleness.
Laying the asphaltic	The asphaltic to be laid 1in. thick. (1.) Spread as a damp course under all brick walls, extending at least 3in. on each side beyond the width of such walls. (2.) Poured as a vertical damp course in brick walls, where so shown; before pouring in, special care to be taken that the asphaltic space is thoroughly clean of all mortar and chips from the brickwork. (3.) As a coating to bond bricks (refer to the General Specification for Brick Walls). (4.) As a roof covering over the top of all roofs; it is to be very carefully run and packed round all pipes coming through the roof; the roof must be dry when the asphaltic is put on. (5.) Wherever else shown, specified, or implied.
Finishing.	The whole asphaltic work to be done in a thorough and workmanlike manner, and to be rubbed smooth and finished on top.
Asphaltic pavement.	Asphaltic pavement is to be laid on floors of galleries, or elsewhere, where so specially directed by the Engineer for Defences. A general specification for such asphaltic pavement will be provided.

Figure 13:
Specification for
tunnel waterproofing
(from General
Specifications, 1886)

2270]

3. Stage 1 excavations

The locations of excavated sites are shown on Fig. 14. These excavations were carried out under Historic Places Trust Permit No.1992/18.

3.1 SITE 1. THE WATER TANK/GUNPIT (Figs. 15 and 16)

This gunpit had been built in the early period of construction at the time of the 'Russian scare'. This was before the arrival of Frankham and any orderly system of file keeping. We did have a generic plan for gunpits of this type but each example appears to have been altered to suit the peculiarities of the local situation. The water tank completely obscured the walls of the gun pit. There were three entrances into the pit which we knew existed because it was possible to see them from inside the tunnels behind the gunpit. It was the eastern side which interested us. This side was completely obscured by the water tank. It was here that the drilling and the radar scans had suggested that an entrance might exist. It was also the area



Figure 14: North Head, Location of Excavated Sites

31

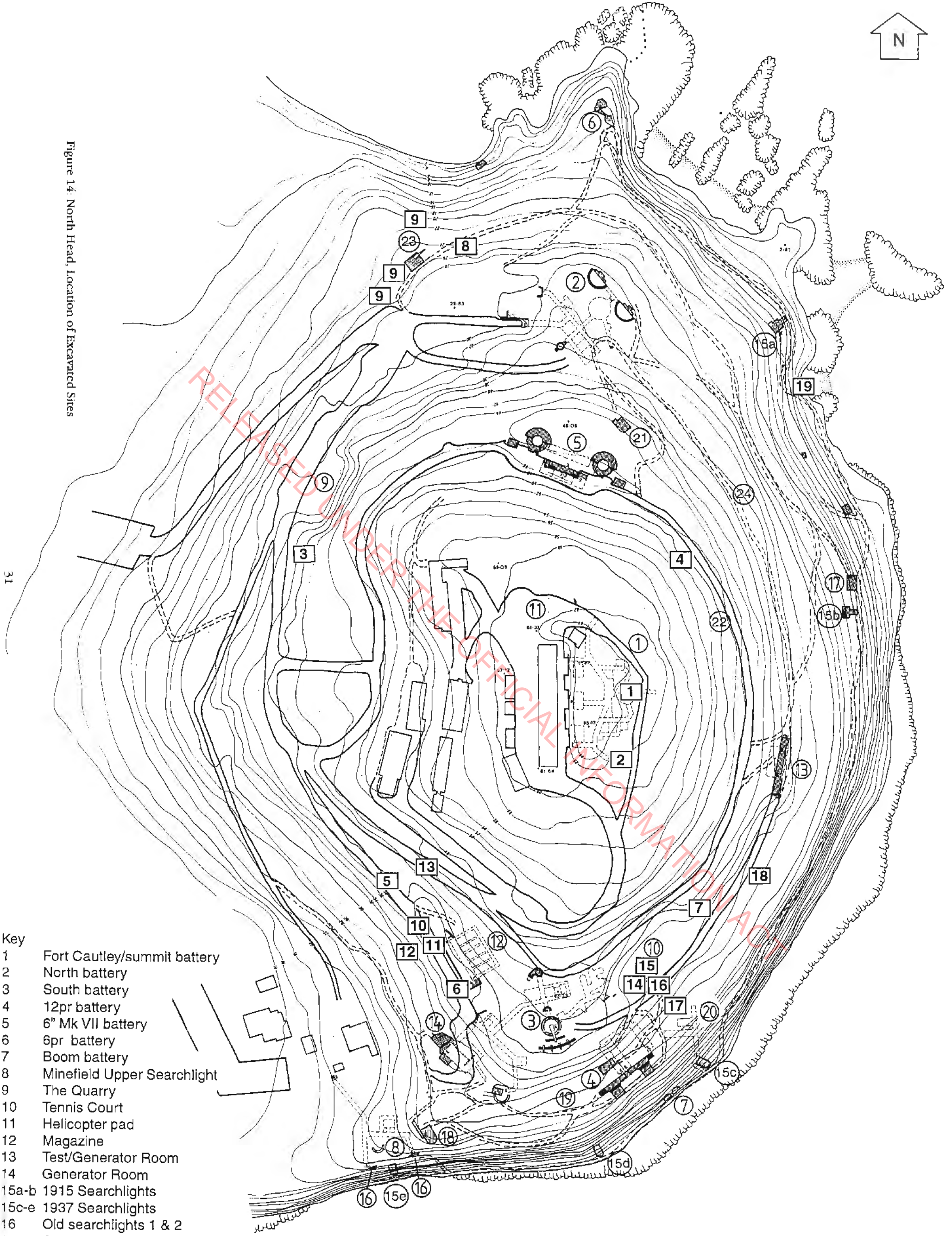
RELEASED UNDER THE OFFICIAL INFORMATION ACT

- Key
- 1 Fort Cautley/summit battery
 - 2 North battery
 - 3 South battery
 - 4 12pr battery
 - 5 6" Mk VII battery
 - 6 6pr battery
 - 7 Boom battery
 - 8 Minefield Upper Searchlight
 - 9 The Quarry
 - 10 Tennis Court
 - 11 Helicopter pad
 - 12 Magazine
 - 13 Test/Generator Room
 - 14 Generator Room
 - 15a-b 1915 Searchlights
 - 15c-e 1937 Searchlights
 - 16 Old searchlights 1 & 2
 - 17 Generator room foundation
 - 18 Minefield defence control
 - 19 Gunnery training area
 - 20 Annies Cave
 - 21 4" Battery Observation Post
 - 22 Tramway Pulley
 - 23 6" Gun
 - 24 Covered Way

1 Location of excavated sites

10 0 20 40 60 80 100m

SCALE



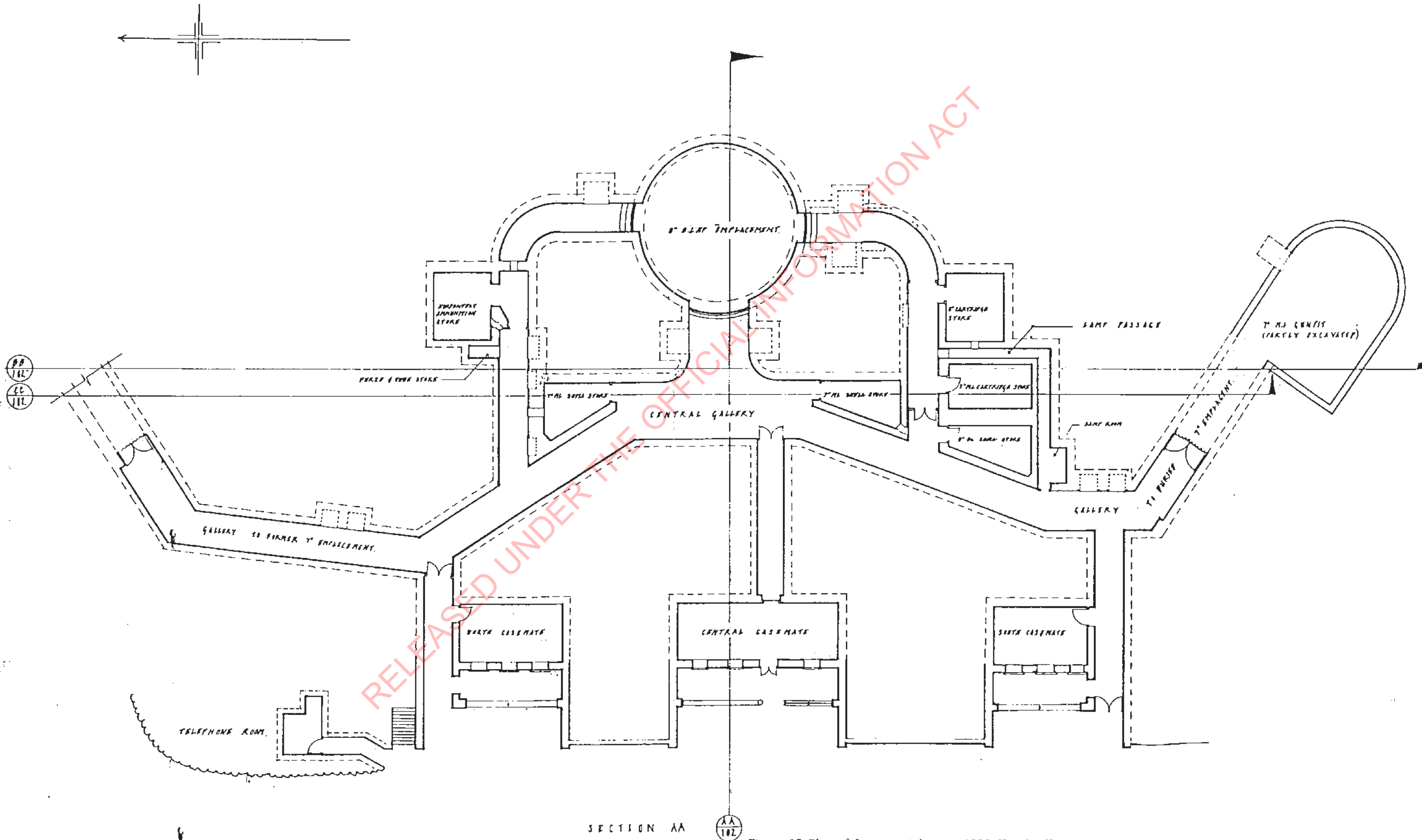
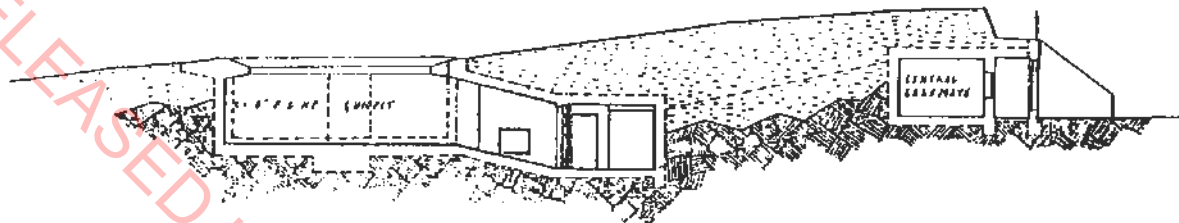
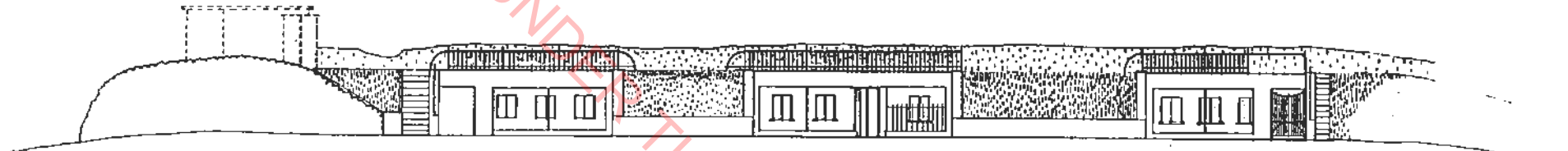


Figure 15: Plan of the summit battery, 1992. Treadwell.

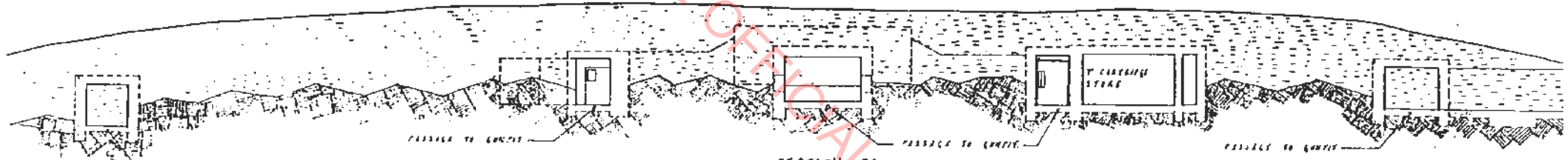
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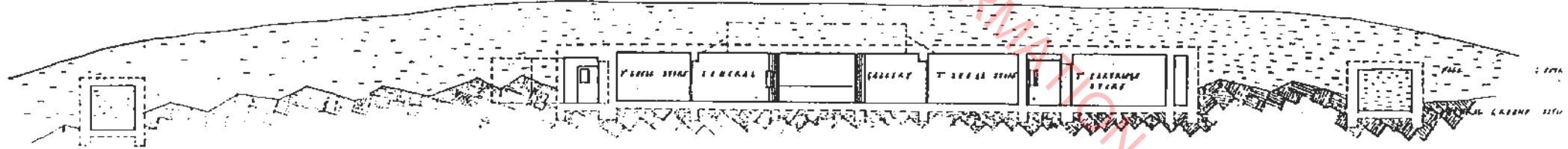
SECTION AA



WEST ELEVATION



SECTION BB



SECTION CC

NOTE: WALL THICKNESS IN
SECTION AA, BB, AND
CC ONLY.

Figure 16: Cross sections of the summit battery, 1992. Treadwell

NORTH HEAD :	SECTIONS &	SCALE 1:100
SUMMIT BATTERY	ELEVATION	J TREADWELL

where we had been told that witnesses had said they had entered a large tunnel complex.

There was one witness who we managed to talk to. This was one of the Ministry of Works people who had built the water tank. He had been contacted by Mr Earnshaw because he had left his name scratched in the concrete base of the water tank. We had been led to believe that he had described a tunnel leading off the eastern side of the gunpit. When he was taken to the site he then said that his information had been misinterpreted. What he had described had been reversed. The entrances were on the western side, i.e. the ones we were already aware of.

On June 22 1993 the contractors, Allied Concrete Cutters, using a 250 mm core drill, cut into the water tank wall at the point where the radar scan and the patched 1988 drill hole indicated that an entrance might exist. The army drill team in December 1988 reported that they found:

- (a) a layer of reinforced concrete approximately 1 foot thick with reinforcing rod 3/16 inch diameter.
- (b) a layer of loose dry clay merging into fine mortar possibly mixed with dirt.
- (c) at 8 feet resistance to drilling stopped... indicating the presence of a large air space.

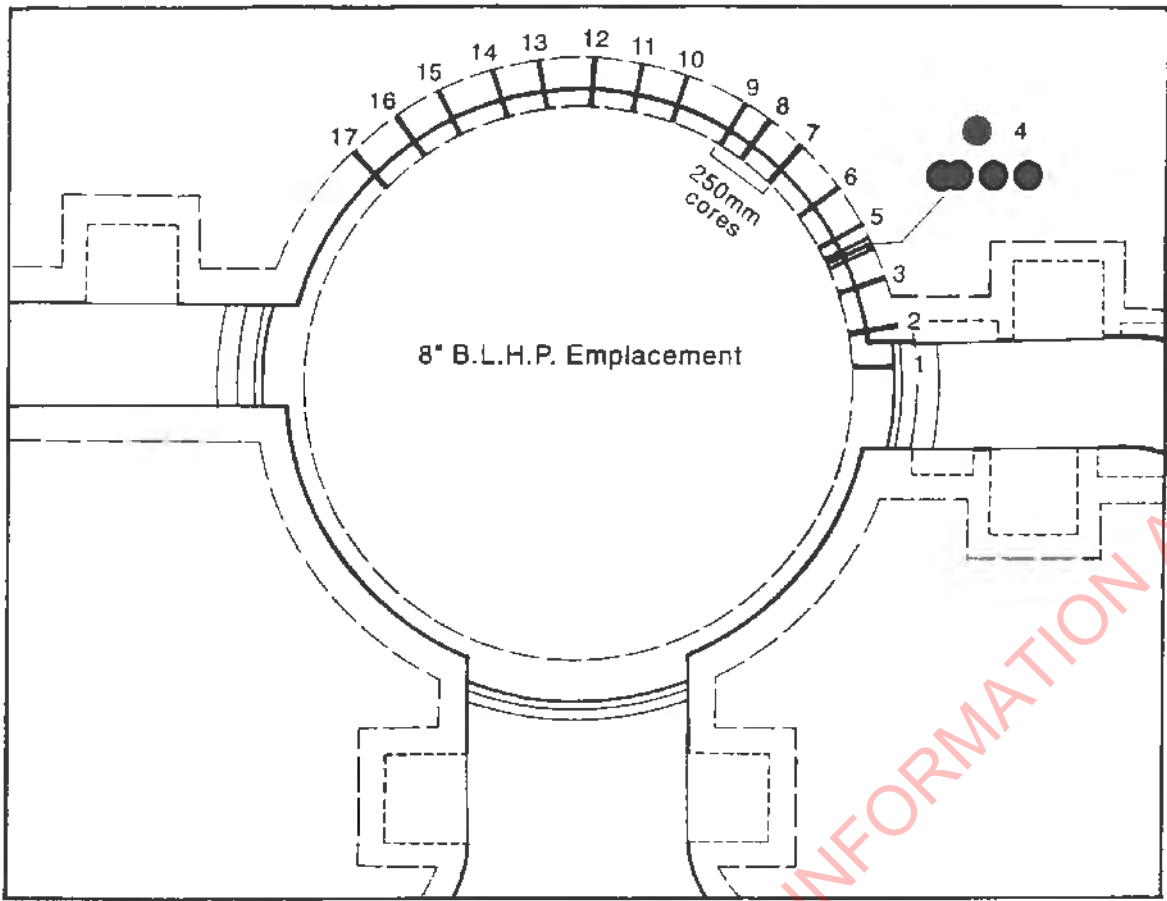
(SIR Survey Task, 7/12/88, in DOC 013/10, vol. III)

The machine was bolted to the water tank wall and core drilling commenced. The core drill, unlike the pneumatic drill used by the army team, allowed examination of the material removed and much greater control. The core removed by the drill at this point (8 in Fig. 17) indicated that the water tank liner was 165 mm thick. The liner was easily removed from the surface of the old gun pit wall which was still whitewashed. The drill was then used to remove a 530 mm deep core from the wall of the gun pit. This core indicated that the material was the original 19th century concrete used to build the gun pit.

The material consisted of plaster approximately 60 mm thick and then a very loose mixture of aggregate and cement which became progressively looser the deeper it got. At approximately 310 mm the concrete was so loose that the core fell apart. The material used to build the gun pit wall consisted of a sharp red chip, similar to 'McCallums Chip', a material from a quarry on McCallums Island and still used today - water rolled red pebbles, crushed shell, scoria and basalt.

Two other cores were taken approximately 1 m apart (7 and 9 in Fig. 17). These revealed the same white painted surface beneath the water tank wall. The concrete beneath this was also consistent with the 19th century concrete.

At this point we decided that continued work with the 250 mm drill would damage the structure of the gun pit too much and that a 100 mm core drill would give the same information with less damage. A series of 100 mm cores were taken from the tank liner at 600 mm intervals, 700 mm above the floor of the tank (Fig. 17). At one point the tank liner appeared to be thicker and in another area there was a rubber strip embedded in the concrete. These anomalies led in turn to the decision to strip out the water tank wall, but even at this time we drew some conclusions.



Holes drilled in gunpit wall

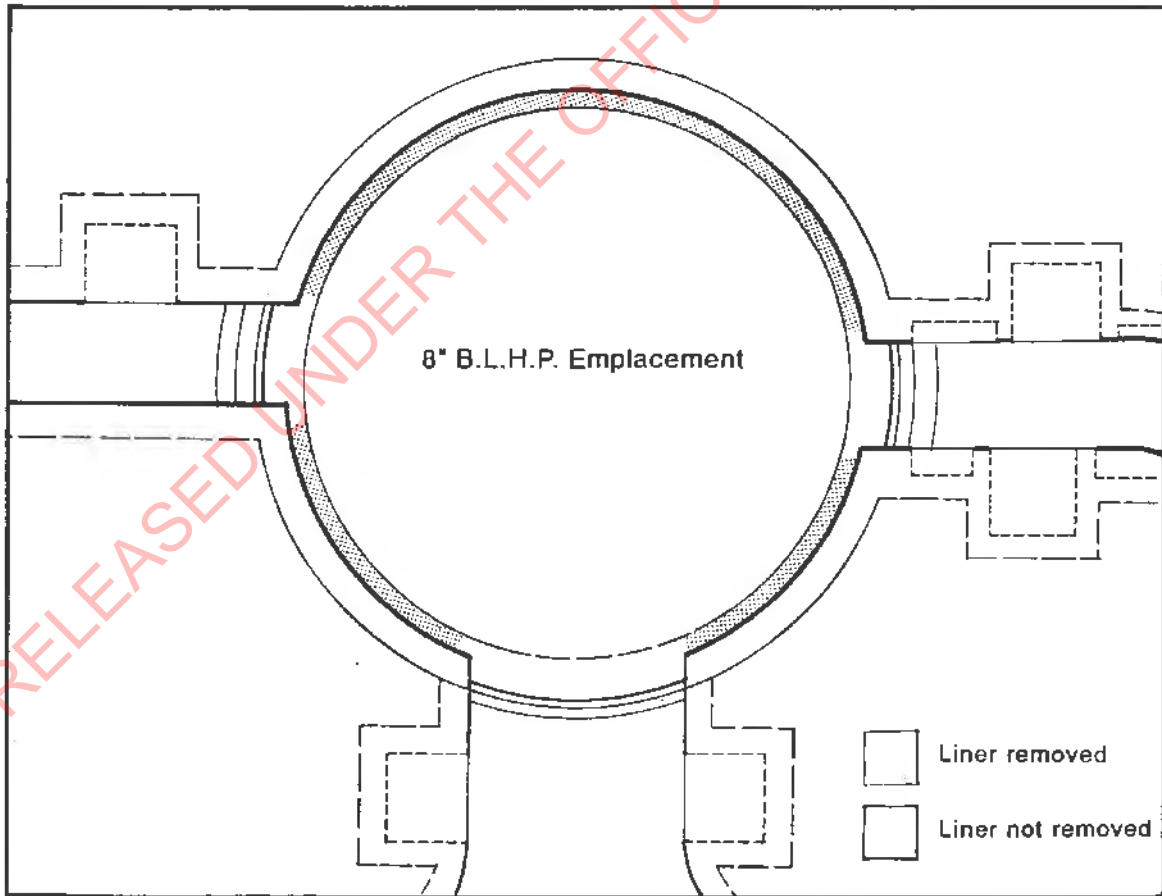


Figure 17: Work completed at summit 8 inch gunpit

These were that the loose material reported by the army drilling team was in fact 19th century concrete which the cores showed became very loose, little more than rubble fill, at approximately 300 mm into the old wall. The use of a pneumatic drill by the army would have loosened the old concrete even more. This damage had been compounded because the army drill had become jammed and another drill had been used to free the original machine. This appears in turn to have disturbed the loose concrete and helped create the air space detected by the radar. The reason that the army drilling team reported that 'at 8 feet resistance to drilling stopped', was that they had gone right through the gun pit wall and out the other side. A generic drawing for these gunpits still exists. '1570-1, Emplacement for eight-inch thirteen-ton BLR gun' (copy held DOC Auckland). This shows the gun pit wall as being 6 ft thick, with the apron as 2 ft thick. It appears that the drillers went right through the main wall of the pit and then through the apron and then into the loose fill outside.

The '1 foot' thickness of 'reinforced concrete' recorded in the army report was in fact the watertank wall together with the small thickness of the 19th century concrete. The use of a core drill allowed us to distinguish these differences whereas the pneumatic drill used by the army had simply broken them up.

The next stage was to remove the walls of the water tank. This, we felt, would tell us definitively whether there were any hidden tunnel entrances behind the tank. The work was done in two stages. On the 30th of June 1993 the eastern side of the tank was removed. This was done with a diamond tipped concrete saw set to the depth of the liner determined by the core drilling. The walls of the tank were removed in 600 mm wide slabs with minimal damage to the gun pit.

Beneath the water tank was a continuous 19th century gunpit wall. This was very well preserved. The gunpit was whitewashed and still had the degrees of traverse painted around the circumference. These were to enable the gun crew to visually check the information sent to them from the observation post before the gun was fired. Also on the wall were areas painted red indicating where the gun was not to fire. These were labelled 'Minefield' and 'Bean Rock Light', places that did not need an 8 inch shell dropped on them.

On 13th July the western side of the water tank was removed. The three known entrances were left blocked at the request of the Navy for security reasons (Fig. 17). The removal of the wall on this side was more difficult as it was found that the 'rammer tubes' had not been blocked off prior to the pouring of the water tank wall. Rammer tubes are the ceramic pipes set into the wall of the gunpit into which the gunners could insert the long handled rammers and swabs used to load the gun. Without the rammer tubes there would not be enough space to manipulate these unwieldy tools.

What had happened was that the concrete had flowed into the tubes bonding the watertank to the gunpit. This problem was solved by the skilful work of the contractors, Allied Concrete Cutters. The watertank was removed with little damage to the gunpit or the rammer tubes.

The final job to complete work on the water tank was to remove the floor. This was done by B & K Demolition between the 14th and 16th September 1993. The watertank floor was cut into slabs and the central part lifted out. The perimeter was more difficult, as the iron tracks once used to run the ammunition trollies on had bonded to the water tank concrete. In this area the floor was broken up with a rock breaker, again with little damage to the floor of the old gunpit. As a bonus we found that the drains in the gun pit floor still worked.

At the end of all this we had an almost intact 1880s gunpit. There was no sign anywhere of any other tunnel entrances, blocked or otherwise. The old whitewash covered the walls, and the old signage appeared intact. The concrete cutting contractor was also of the opinion that there was no sign of any blocking of entrances. He said that based on many years experience it would be impossible to do this in such a way that it would be undetectable (Withy, pers. comm. 1993). In the North Battery, where the rammer tube holes were blocked and plastered during the Second World War, the imperfections on the curving wall can still be seen.

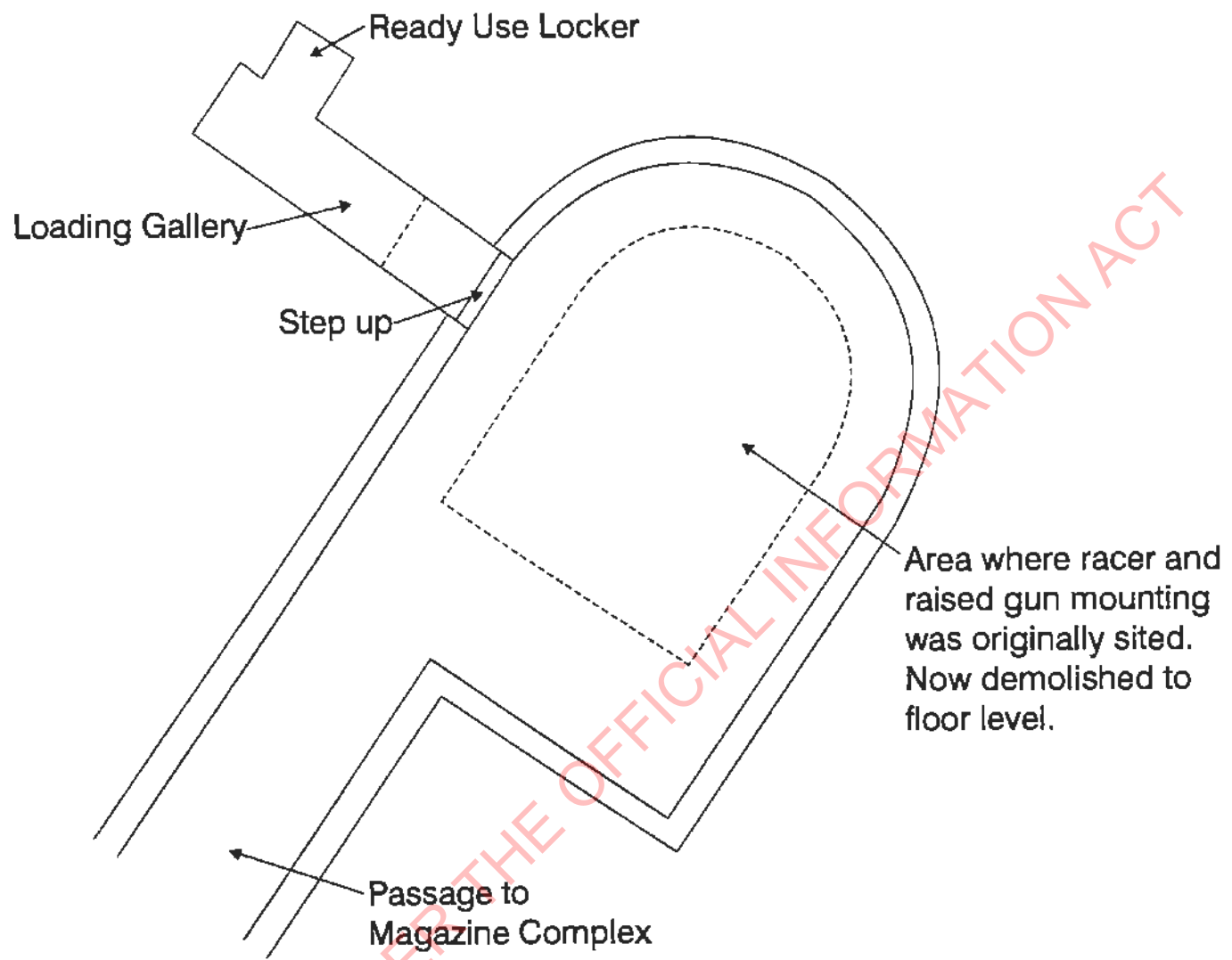
At the end of this work it was obvious that there had never been any other entrances to the gunpit. There was, however, a second gunpit some metres to the south. This had originally housed a 7 inch Rifled Muzzle Loader gun. The gun had been declared obsolete in 1904 and is now set up in Albert Park in central Auckland. The gunpit had been filled in progressively during the 1950s and 1960s. The outline of the pit had been exposed during the Mitchell excavation.

In conversation with a number of people it was apparent that the existence of this gunpit had been forgotten. It was possible that the witnesses were describing this gunpit and not the water tank. Also this was another area that had been built before the arrival of Frankham and therefore there was no good record of its construction. For this reason we decided to excavate the second gunpit too.

3.2 SITE 2. THE 7 INCH RML GUNPIT

This work was also carried out by B & K Demolition using machines both inside and outside the pit with detail work such as recesses and drains being excavated by hand. The work was completed successfully and a number of interesting things discovered. These included some features described by witnesses as being in the watertank gunpit. Some people had described the 8 inch pit as having 'man sized alcoves'. These were present in the 7 inch gunpit. Others talked of the roof of a tunnel being broken up and stacked on the tunnel floor and then blocked off. What we found was that the roof of the 'loading gallery' had its roof demolished and the resulting rubble was stacked on the floor and in the 'ready use locker', the cupboard at the end of the gallery. A loading gallery is a feature specific to muzzle loading guns. Because the gun was loaded from the front the gun had to be rotated so that the gun crew could load it under cover. On these guns the cover was provided by a short blind tunnel 'the loading gallery'. It was the roof of this structure that had been broken up and piled on the tunnel floor (Fig. 18).

N ←



Scale

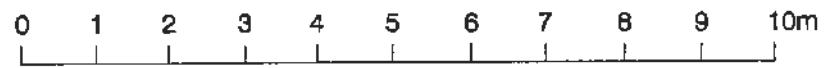


Figure 18: The 7 inch Rifled Muzzle Loader Gunpit

Another feature restored was the tunnel leading back to the rest of the installation. This was cleared and the existing gate freed and then padlocked. The whole gunpit was fenced as a safety measure.

We also found that the floor of the gunpit had been altered at some time with the concrete pedestal on which the gun sat being demolished. The large holding down bolts that fastened the gun mounting are, however, still clearly visible, indicating that the floor has not been rebuilt to conceal an entrance. The wall on the south side of the pit had a hole visible near the floor. This when examined was found to contain large pieces of rotting wood, presumably parts of the old wooden structure that formed the original gunpit built during the panic of the 1885 Russian scare (Fort Record Book 1885-1910: Chapter II).

This gunpit shows no sign that it has been altered in any way to conceal an entrance.

3.3 SITE 3. THE STRUCTURE ON THE WESTERN SLOPE

This structure was visible in old photographs (Fig. 19), although its function was unknown. Nor was there any clear connection between the witnesses' stories and the structure. Even the people who had served on North Head in the 1950s seemed to have no memory of it. The Army team in 1988 had attempted to find traces of it with a bulldozer with no success.

For this reason the machine used for excavating the 7 inch gunpit was used to dig a number of trenches across the slope in the area where the photographs indicated the structure once existed (Fig. 20). The trenches covered a much wider area than that shown on the photographs in order to find any tunnel that may have led from the structure. All the trenches were dug down to the subsoil.

There was no indication of any structure or tunnels in any of the trenches. A number of intercutting rubbish pits were found in the trenches dug, probably from a barracks once located to the south. The material found consisted of bottles, old cans and from the lowest level a black and white pot lid from a tooth-paste container. Production of these ended in about 1914 (Dale 1977: 18), a date which fits the earlier period in which the barracks was in use. Also found was a slab of concrete approximately 1.5 x 0.5 x 0.3 m. It was not clear if this had come from the structure visible in the photographs.

Whatever the structure had once been, the work done in this area clearly showed that it no longer existed and that there had never been any tunnels associated with it.

3.4 SITE 4. THE TRAMWAY

One of the sites in which Mr Earnshaw was interested was visible in a photograph included in the unpublished war history of the Public Works Department (Grattan 1948). This photograph was used to show the anti submarine boom that was built



Figure 19: The structure on the western slope.



Figure 20: Area excavated on western slope

across the harbour during the Second World War. Also shown in this photograph is a cut out section of the hillside on the north eastern side of North Head. I was familiar with this site and had always interpreted it as the cutting associated with the tramway that had been used to drag guns and other material to the top of the hill during the 19th century (Veart 1990: 15). The documentation described how in 1893 the need to remove the damaged 8 inch gun from North Battery had entailed the rebuilding of the previously dismantled tramway. As part of this rebuild the tramway was cut off at a lower level and no longer reached the summit (Mitchell 1995: ch. 8, 50). However to preclude future argument we decided to excavate the site. Prior to excavation the location was pinpointed by a surveyor (Photosurvey 1993).

The excavation was done with the same machine used to excavate the western slope. The result was not an entrance, but not simply a partly destroyed tramway either. After the machine removed a deposit of approximately 2 m of loose soil, a large iron pulley wheel was exposed. This was firmly set in concrete (Fig. 21). This was the top of the tramway from the 1893 period described in the documents. The depression in the hillside from the earlier tramway continued above the pulley wheel indicating the original extent of the feature. The area had been used as a rubbish dump and wedged in the pulley itself was a celluloid 1914 calendar issued by Tudehope's Ltd 'The Busy Drapers and Milliners' of Symonds St, Auckland (Fig. 22). Immediately above the wheel in the fill was a stoneware Grey & Menzies bottle manufactured by Govancroft of Scotland, a pottery started in 1913 (Godden 1988: 282). This bottle has a top for fitting a crown cap, a feature of these bottles from about 1920 (Tasker 1989: 68). In association with this was an 'Alva' Codd aerated water bottle manufactured by A. Alexander of London. This has a 'spun lip', a feature common on Codd bottles in the period 1915 to 1920 (Tasker 1989: 31). At the top of the deposit was a brown glass ABC beer bottle dated 1939. This suggests a progressive filling of the cut in the hill from about the time of the First World War until the beginning of the Second.

We later discovered a drawing of the incline wheel showing how it was used (National Archives AD 35/5; see Fig. 23).

There was no indication of an entrance in this area either in the drawing or the excavation. The cut in the hillside visible in the Grattan photograph was nothing more than the site of the incline wheel.

4. The photosurvey map and magnetometer survey

The work described above brought to a conclusion the first stage of the project. We had examined all the areas where we could pinpoint a location for which there was clear information, either from witnesses or photographs. To continue any further we needed another way to examine the evidence. One idea that had been suggested was the use of ground radar, similar to the system used on the water tank by the



Figure 21: The incline wheel set into the rear of the upper road on the line of the tramway

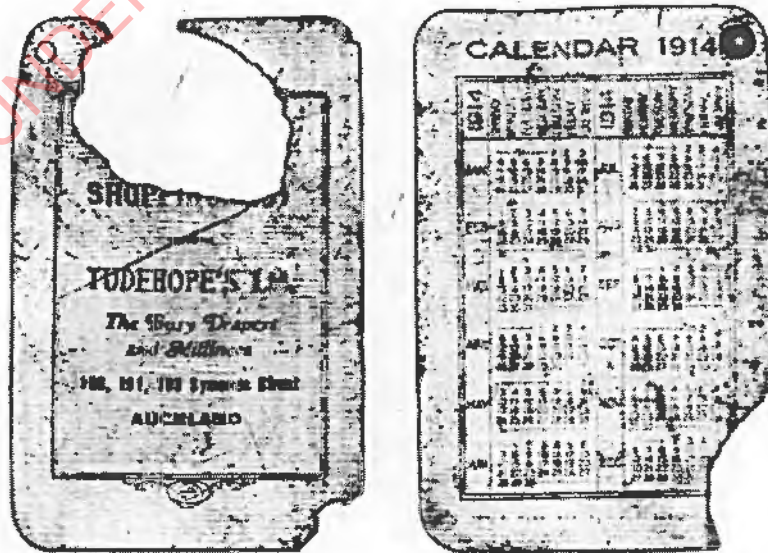


Figure 22: The 1914 calendar

Government Communications Security Bureau. To do this for the whole of North Head would have been too expensive, and we would therefore have to narrow down the areas to be examined by some other means. Two methods were chosen: magnetometer survey and detailed mapping using aerial photography. The mapping system proved to be so successful that in the end the use of the radar was not required. Once the areas for potential radar survey were identified with the mapping system it was easier and cheaper to excavate them immediately and leave out the radar altogether.

We had used the firm Photosurvey for previous archaeological work and therefore approached them to prepare a map using sets of stereo pair aerial photographs to identify changes to the buildings and ground surface of North Head. These photographs were available for the years, 1940, 1950, 1960 and 1970. On their advice the photographs for 1940 and 1950 were chosen for further analysis. This was because they were the clearest in that the amount of vegetation on the Head was minimal at these periods, allowing a clearer view of the ground surface, and also that they fitted into the time period described by most of the witnesses.

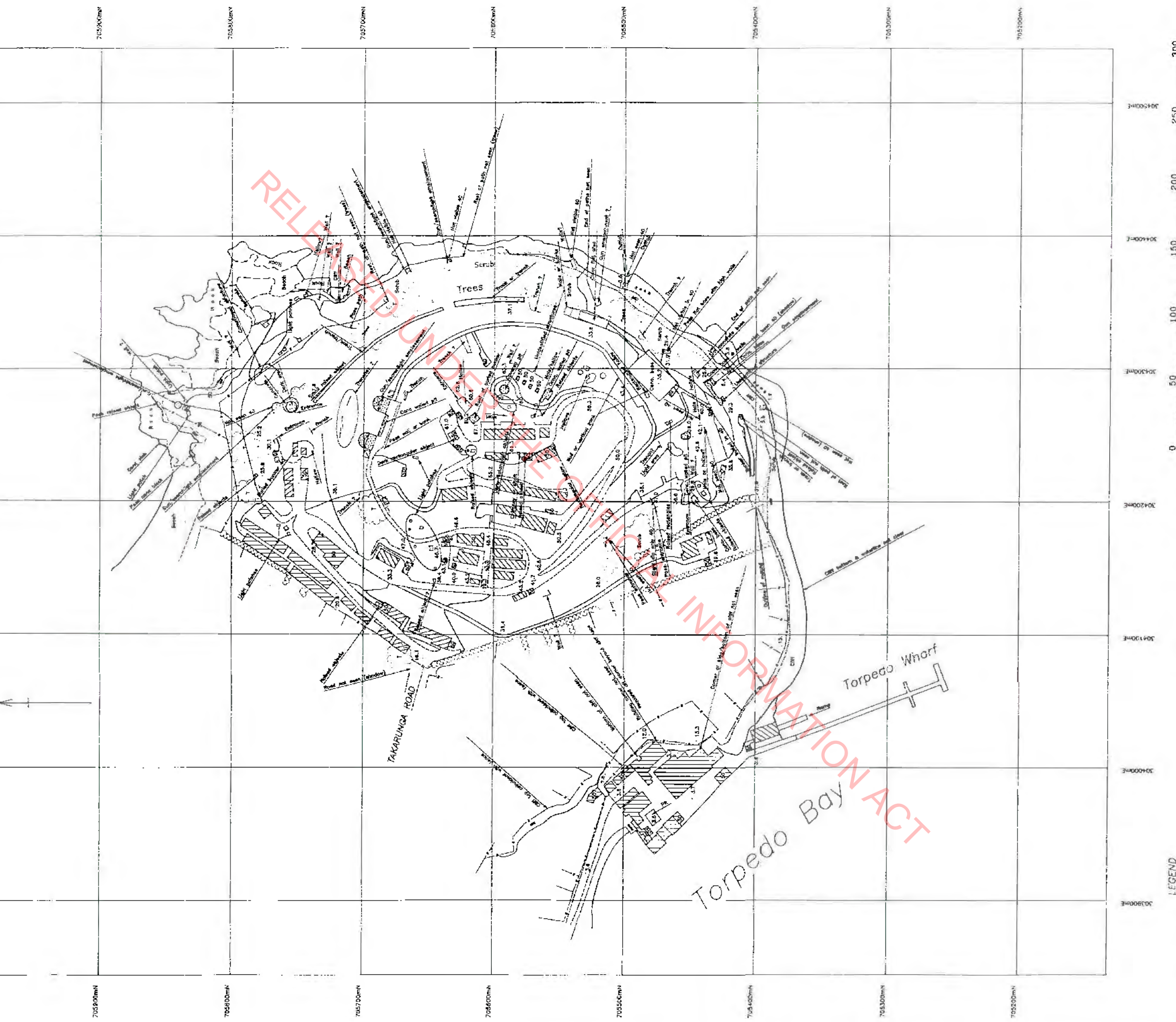
A map was prepared locating all the structures present on North Head in 1940 and in 1950 (Fig. 24). Also noted were any changes during this period. On the original map these were colour coded. Both Mr Earnshaw and myself worked with Photosurvey staff in identifying areas of interest. Five sites of unidentified structures or changes in the ground surface were located from this map. Photosurvey then surveyed and pegged these sites on the ground.

Added to this data was a plan dating from the 19th century owned by Mr Earnshaw which showed another engine room and associated tunnels in the area of North Battery. We had no record of an engine room being built here although there were stories of people entering a tunnel system in the North Battery area. This information was also transferred onto the map.

The other technique used was a magnetometer survey. This was undertaken by Paul Vidanovich, a geological surveyor who had been originally contacted by Mr Earnshaw. A Magnetometer functions in much the same way as a metal detector but in a much more sophisticated fashion. At North Head most tunnels were constructed by a method known as 'cut and cover' or 'cut and fill'. This meant that the tunnels were originally dug as a trench, a tunnel built in the trench and then the whole thing was backfilled. The roofs of the tunnels were reinforced with old railway line, a material which could be located by the magnetometer.

The survey was undertaken in November 1993 using an EG & G Geometrics G856 Proton Precession Memory Magnetometer. Three areas suggested by Mr Earnshaw were surveyed: the terrace in front of the old main magazine and toilet block, the old parade ground/tennis court area, and the site of the engine room shown in the old plan.

Thirteen areas with magnetic anomalies were located using the magnetometer at all three locations (Vidanovich 1993). These could have been either cultural or natural in origin.



The sites identified from the Photosurvey map and the magnetometer survey were then investigated. The investigation used three techniques. Where sites were identified as possible entrances a machine was used to dig the area. Where sites were deep and localised a drilling rig was used and in two areas inaccessible by machine, hand excavation was used.

5. Stage 2 excavations

The locations of sites excavated are shown on Fig. 14

5.1 SITE 5. THE BANK BY THE TOILET BLOCK

This site was located using the Photosurvey map. This indicated a structure that may have been a tunnel entrance in 1950. It was also in the area where the 1885 photograph showed a large trench in the hillside (Fig. 12). The area was probed and had an area of looser fill associated with it. The magnetometer also showed an anomaly in the same area.

The site was identified and pegged by a surveyor.

The machine dug in this area to a depth of 3 m, exposing a layer of fill 2 m deep, with the original ground surface and natural soil layers below this (Fig. 25). A large iron sash weight was excavated at approximately 1.5 metres depth. It was probably this object that had been detected by the magnetometer. There was no sign of any structures in this area and no concrete or broken brick to suggest the demolition of any structure.

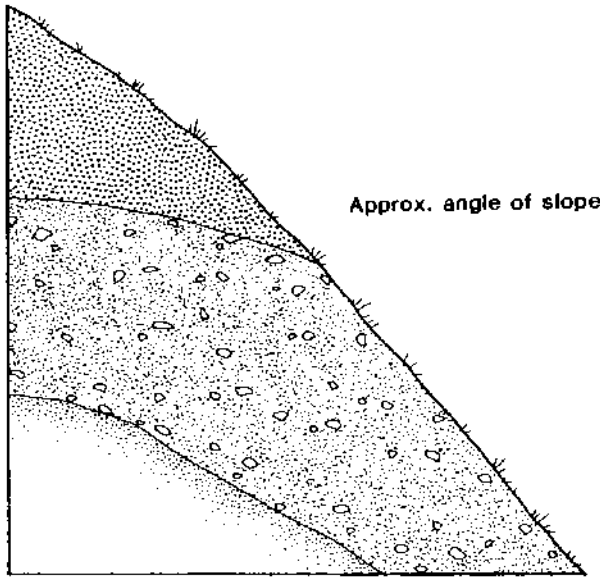
The loose fill seemed to be the product of infilling with material excavated, probably from the nearby South Battery tunnels. The fill shown in Fig. 25 was in places made up of a number of lenses each about the size of a wheelbarrow load. One can imagine the prisoners wheeling out the barrows and tipping them over the side of the bank to create the terrace on which the road was later built. Later work with a drilling rig identified large areas of fill all over this terrace.

5.2 SITE 6. THE SLOPE BELOW THE MAIN MAGAZINE AND TOILET BLOCK

This site was identified during the magnetometer survey. It also was in the general area of the excavation shown in the old 1885 photograph (Fig. 12).

The site was excavated by machine to a depth of 3 m. The cross section was similar to that seen at site 5. There were a number of fill layers, again with signs of the individual lenses possibly created by the dumping of loads of soil from the nearby tunnelling. A buried topsoil layer was excavated at a depth of 2.1 m with the

South baulk



North baulk

East baulk

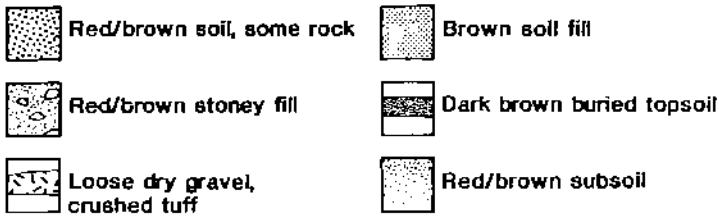
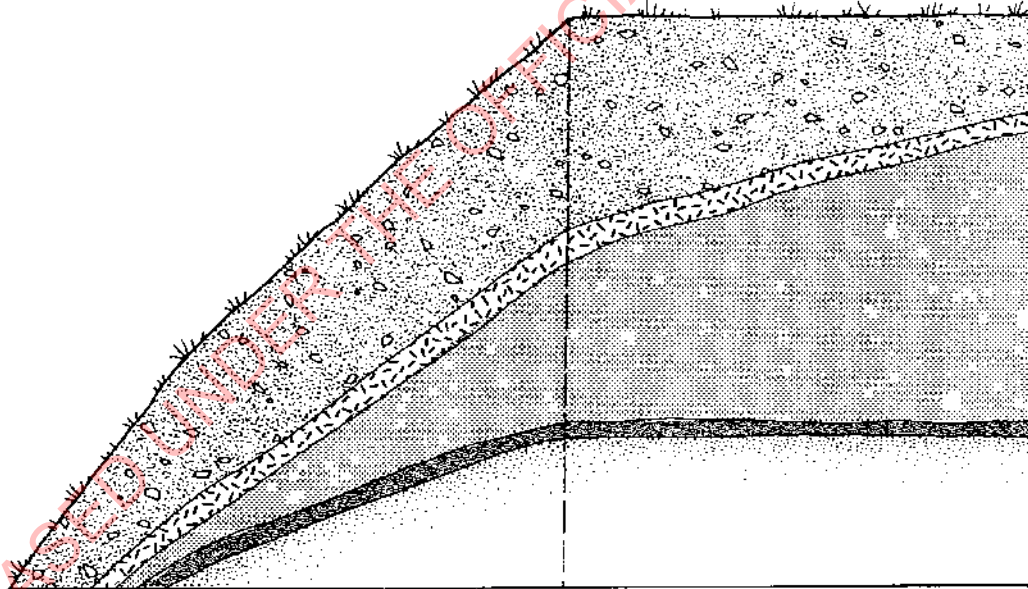


Figure 25: Cross sections of Site 5

undisturbed natural soil layers below it. A 40 cm length of railway iron, presumably an offcut from the tunnel roof reinforcing, was found. This was probably the material found by the magnetometer. There was no sign of any structure having ever existed in this area.

Sites 5 and 6 were the only possible locations for a structure associated with the trench seen in the 1885 photograph or the structure visible in 1950. The fact that nothing was found at either of the sites argues strongly that the later structures visible in 1950 were nothing to do with the 19th century trench. It is probable that the huge amount of later fill in this area had obliterated any sign of the old trench. It is clear that the structures seen in the 1950 photograph were superficial and not tunnel entrances.

5.3 SITE 7. THE SALUTING GUN BASES ON THE OLD TENNIS COURT

Archival information indicated that there had been a battery of 6 saluting guns mounted on concrete slabs located here during the 1930s (Fig. 26). The magnetometer survey had shown some anomalies in this area and it was not clear whether the concrete slabs were the cause of this. For this reason the site was excavated and it was found that the reinforced concrete slabs were built directly on top of the undisturbed rock and soil. The conclusion reached was that the concrete bases of the old saluting battery were the cause of the magnetometer anomalies and that there were no other subsurface structures in the area examined.

5.4 SITE 8. THE BANK BELOW NORTH BATTERY

This site had been identified in the Photosurvey map in both the 1940 and 1950 aerial photographs. Through the stereoscope it looked to be a raised rectangular object, possibly a ventilator or chimney. There was a similar structure visible (under strong magnification) in the same area in an oblique aerial photograph we had obtained from Whites Aviation which dated from 1939. The site was located by the surveyor and then excavated.

What we found was a rubbish pit containing a series of fires. There was also a large amount of refuse, with bones, bottles, tins and other items. The fires in the pits were stratified, with the material found dating from about the time of the First World War until the 1960s (see Appendix 3). There was no sign of tunnels, tunnel entrances, or any other structure. It seems probable that the raised objects seen in the aerial photographs were incinerators or rubbish bins.

5.5 SITE 9. THE ENGINE ROOM IN THE OLD PLAN

This site was excavated on the basis of two pieces of evidence. Firstly a 19th century plan (Fig. 27) and secondly the magnetometer survey.



Figure 26: The 4 inch naval gun saluting battery on the tennis court by South Battery, during Territorial training in 1937. Photograph W. Ruffell collection.

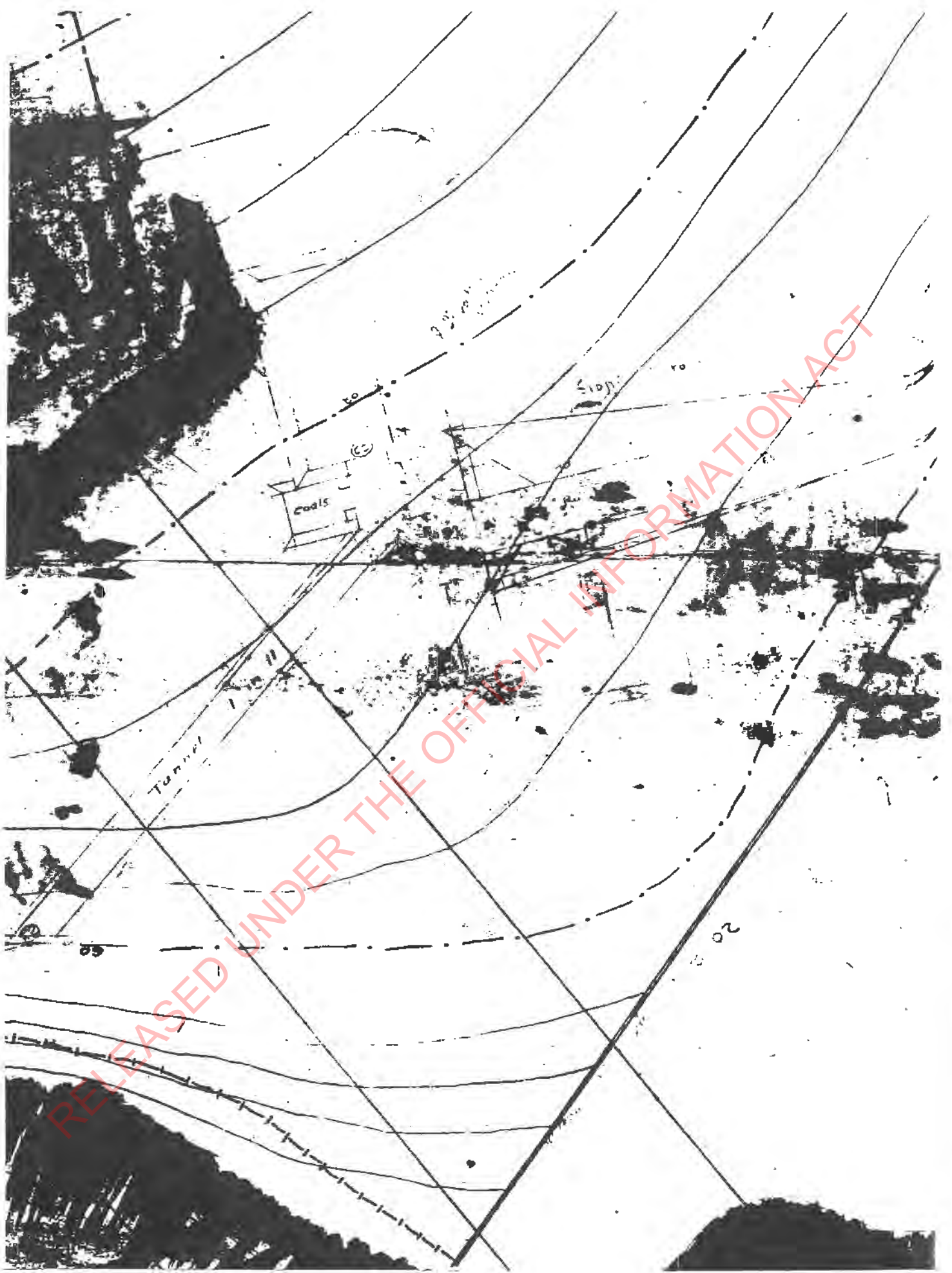


Figure 27: The North Engine Room. 1880's Dwg 1573-2

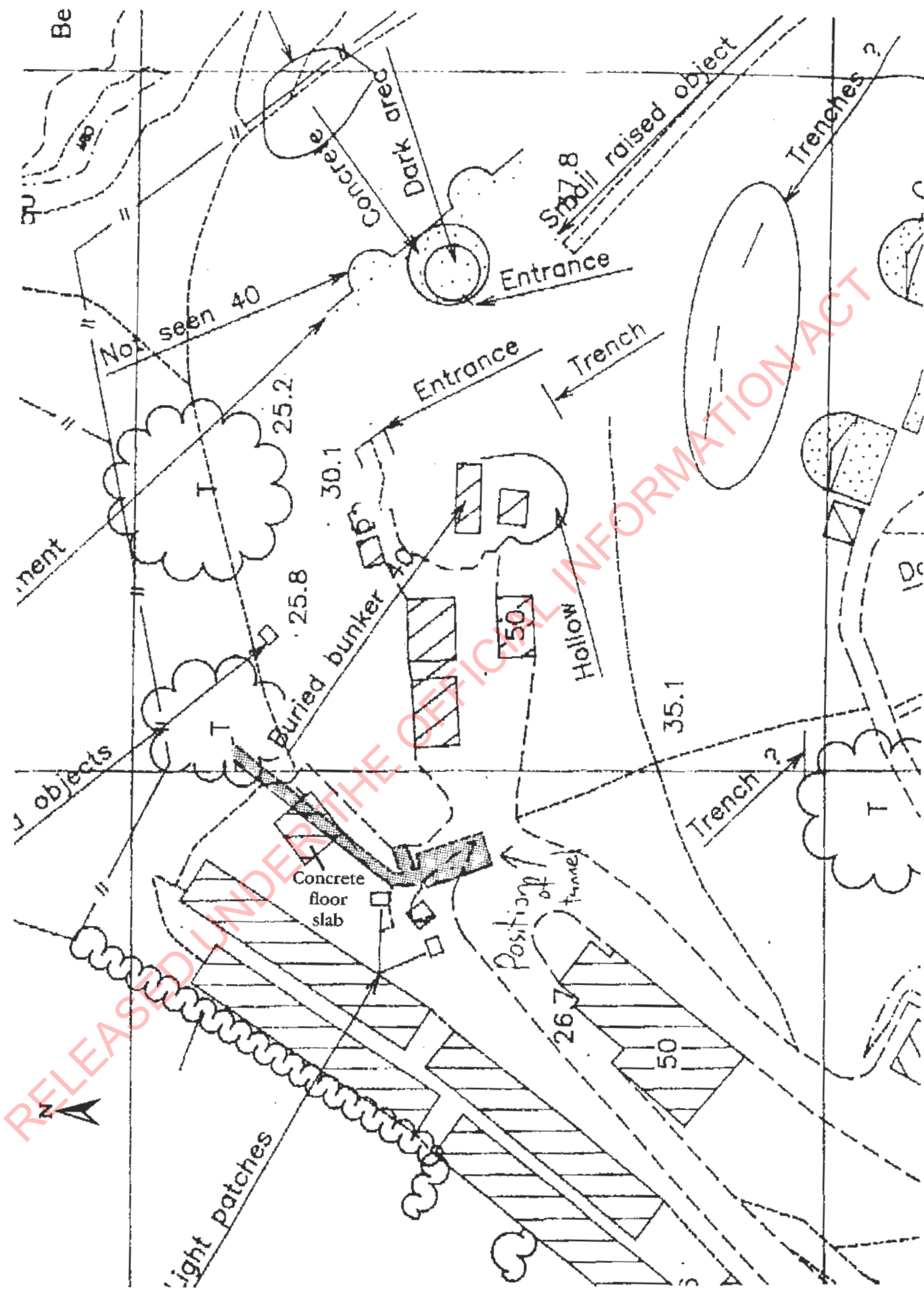


Figure 28: The North Engine Room Location as plotted onto the photosurvey map

The plan shows the outline of an underground engine room to the west of North Battery. This was probably designed at the time a minefield was planned to run from North Head to Rangitoto Island. At this date these were 'electric minefields' requiring a power supply. The minefield to Rangitoto was never taken up, rather the decision was made to lay it to Bastion Point (National Archives AD 57/25 A. Bell Oct. 1892).

We thought, however, that the engine room might have been built and abandoned and that this might have been the source of the stories of the tunnel complex in this area. The site was investigated in two ways, by machine trenching and by drilling.

A 12.5 m long trench was excavated across the area where the drawing indicated a tunnel might have existed to the north-east of the old concrete floor slab currently occupying part of the site. The trench was excavated to the depth of 2 m. The drawing indicated a soil cover above the tunnel roof of 4 ft, 1.22 m. Given that it was possible that the soil depths had altered over time the trench was dug to the level of the subsoil. In one area a band of tuff (consolidated volcanic ash) was encountered. There was, however, no evidence of tunnels, concrete, brick or any other cultural material. There was no indication in the excavation of what had caused the magnetometer anomaly. Sometimes magnetometer readings are affected by natural features.

At this time the old drawing was plotted onto the Photosurvey map (Fig. 28) and a drilling rig used to drill two holes, one where the tunnel was shown and one in the area of the engine room itself.

The hole at the tunnel site was drilled to a depth of 6.25 m through soil and scoria. The second at the engine room site was drilled to 7 m, again through soil and scoria. No traces of concrete, brick or any other cultural material were found at this site either.

The conclusion reached was that the engine room shown on the old plan had never been built.

5.6 THE DRILLING RIG SITES

Where sites were shown as being of some depth in the magnetometer survey we decided that the most effective and least destructive method to use was a mobile drilling rig. This was supplied by Drillwell Exploration Ltd together with the staff to operate the machine. The rig had the capability to take core samples and this was used on occasion, although it was found that by simply sieving the water coming off the drill it was possible to see what material was being drilled through. Also the operators of the rig could tell the relative densities of the material being penetrated.

5.7 SITE 10. THE TERRACE BY THE TOILET BLOCK AND MAIN MAGAZINE

This was an area identified by the magnetometer survey as having a series of anomalies. Two holes were drilled to test these.

Hole 1 Drilled to 8.75 m. The site was cored and this showed the hole passed through a mixture of loose scoria and soil.

Hole 2 Drilled to 8.75 m, soil and scoria.

No indications of tunnels were found.

5.8 SITE 11. THE TERRACE BY THE MAIN MAGAZINE

The magnetometer had shown a linear pattern of anomalies here and two holes were drilled to test this.

Hole 1 Drilled to 9.25 m, soil and small pebbles.

Hole 2 Drilled to 7.5 m through a tuff layer, 0.5 m thick at 3 m depth with soil beneath this.

Nothing cultural was found.

5.9 SITE 12. THE PHOTOSURVEY SITE ON THE SLOPE BELOW THE MAIN MAGAZINE

A possible structure was indicated in the Photosurvey map in an area below the terrace on which the toilets and main magazine are located. This was not easily reached by the digger we had been using, while the machine work in this area had created more damage than had been anticipated. For these reasons we decided to use the drilling rig to drill a hole directly above the point indicated by the photosurvey map.

We drilled to 7.5 m, the material extracted indicating a fill of soil and small pebbles. No signs of a tunnel or any other structure were found.

5.10 SITE 13. THE ROAD ABOVE THE TOILET BLOCK

The public toilets at North Head are built in a cut out in the hillside where the fort's laboratory building had once been located. It had been alleged that there was a tunnelled magazine behind the toilet block and that this had been blocked off by the construction of the toilets in the 1970s. Mr Earnshaw reported that he had contacted the contractors who had built the toilets and they had told him that they had no recollection of there being a tunnel entrance here. Mr Earnshaw speculated that if it did exist then it may have been blocked off before the contractors had arrived.

A hole was drilled on the edge of the road behind the toilet block to a depth of 7.25 m through scoria boulders and soil. There was no airspace, concrete or anything else to indicate that a underground structure had ever existed here.

5.11 SITE 14. THE TENNIS COURT (A)

This is a flat area to the north of South Battery, used as a parade ground and later as tennis court. The magnetometer survey had located some very strong anomalies in this area.

The site was drilled to 7 m and at 1.2 m some metal filings were brought up by the drill. We then used hand tools to enlarge the hole and excavate further. The rock was broken up using a mattock. A very dense layer of the natural tuff, consolidated volcanic ash, was encountered at approximately 1.2 m depth. It was suggested by the consulting engineer used on the project that it was possible that the drill had struck this layer of denser material and the resulting vibration had brought down the metal from a higher level (P. Riley pers. comm.).

What was certain was that the material we had dug through was undisturbed natural tuff. There was no indication of where the metal had come from.

5.12 SITE 15. THE TENNIS COURT (B)

This was another anomaly located during the magnetometer survey. It was drilled to 5.25 m through undisturbed tuff.

5.13 SITE 16. TENNIS COURT (C)

Throughout our time on North Head we had been often approached by a member of the public who had suggested that we use divining rods to locate subsurface

structures. One area where he said there was a strong response from the rods he was using was on the Tennis Court. Finally I agreed to test his ideas. He indicated the area where he said the divining rods gave the clearest response and we drilled a hole to 7.5 m through undisturbed tuff.

5.14 HAND EXCAVATED SITES

Hand excavation was used on three sites where it would have been difficult or too expensive to use machines.

5.15 SITE 17. THE SOUTHERN BANK OF THE TENNIS COURT

This site had been tentatively identified in the Photosurvey map as a structure. We had no record of any building in this area. The site was located on the ground and pegged. At the time of excavation it consisted of a featureless grassy bank. We excavated a test trench using an auger and spades.

In the trench we found a layer of redeposited fill between 1.3 and 1.5 m deep containing broken brown glass beer bottles, pieces of concrete and sheets of some non-ferrous metal. The trench was dug to the level of the original ground surface without evidence of any structure being apparent.

5.16 SITE 18. THE NORTHERN BANK OF THE TENNIS COURT

This was another possible site that had been located using the aerial photographs. In the photographs it appeared as some sort of raised structure. Again we excavated the area using an auger and spades. Here the original ground surface was covered with a 1.5 m thick layer of redeposited fill. No cultural material was found.

5.17 SITE 19. THE CAVE

This site was identified by a member of the public who described crawling down under one of the low overhangs on the coast of North Head and seeing what appeared to be a concrete slab set into the wall of the cave.

We cleared the sand out of the cave and noted that the floor of the cave was only 0.4 to 0.5 m below the roof. The reported concrete appeared to be a whitish natural concretion forming on the tuff.

6. Discussion

6.1 THE EXCAVATIONS

The sites we had excavated had been identified in a number of ways. The two gunpits were known structures where eye witnesses had described the existence of hidden tunnels. Both had been altered in such a way as to make it impossible to check the veracity of the stories without returning the gunpits to their original form. This was therefore done. While we found a number of features we did not have records of, for example the signage on the 8 inch gunpit and the full extent of the loading gallery on the 7 inch emplacement, we found no evidence at all of hidden tunnels or entrances. In all major ways the excavated evidence from the two gunpits agreed with the documentation and similar structures elsewhere.

The work at the western slope and on the tramway was the result of the identification of clearly visible but unknown structures in aerial photographs. The structure on the western slope had been removed sometime after 1962, the last time it was recorded in photographs. We tested the theory that a tunnel might have led from it by deep trenching across the hillside. With the exception of rubbish pits there was no evidence of any subsurface structures.

The site of the tramway had been predicted and the work done confirmed our initial ideas. The area of the pulley wheel was completely excavated as far as the undisturbed subsoil at the back of the cut in the hillside in which the wheel sits. This means that there can be no tunnel behind the wheel.

The sites for investigation identified in the Photosurvey map were all structures of which we had little or no record. These structures appear to have been removed at some time after the war, probably during the clean up prior to the abandoning of the fort in the late 1950s. There was little evidence of these structures when excavated suggesting that their construction was quite insubstantial, probably little more than sheds, or in one case rubbish tins or an incinerator. At Site 17 some rubbish was found but no structural evidence. All these sites were excavated to the original ground surface, that is to the level where the ground was undisturbed by human activity. This was done to ensure that any signs of tunnelling would be found if they existed.

The old engine room plan had been public knowledge for some time and a number of people had attempted to find the engine room itself. The work done in this area conclusively proves that this structure was never built. The site indicated on the plan was professionally located and the main features excavated by machine and then double checked with the drilling rig. Nothing was found.

Some of the sites identified by the magnetometer were in areas where the aerial photographs also showed some evidence. In others we had to rely on magnetometer readings alone. In three of the sites located by the magnetometer, metal was found. These were all sites where excavation rather than just drilling had taken place. At none of these sites was any evidence of tunnels or underground structures found.

The Photosurvey map had recorded all surface features visible in 1940 and 1950. We especially examined areas where people had described tunnel entrances or unknown structures. In only one of these areas was anything visible on the photographs. This was the area of Sites 17 and 18. In no other part of North Head indicated by witnesses was anything to be seen. The refuse found at Site 17 suggests that the informant, who did not claim to have entered a tunnel, had seen something here, but that it was perhaps not as substantial as he had remembered.

There was one other site where a number of witnesses claimed to have seen a tunnel entrance. This was in the area of Torpedo Bay. The site of this tunnel was most popularly in the area between the 'chippies shop', the old minefield test room, and the 'connecting up shed'. This area was closely inspected and found to be a completely unaltered cliff formed of banded tuff. The only other areas were those behind the 19th century minefield buildings. These had all been examined by Major Stevenson in 1980, to the extent of dismantling the internal walls. This work was well recorded with photographs (Stevenson 1980). Also as correctly observed by Lt Barratt in his investigation in 1984 (Barratt 1984), the structures blocking off these supposed tunnels date from the 19th century, precluding the possibility of witnesses seeing them in the 20th. The archival material made no mention of any other tunnels in this area, and there was no sign of them in any of the photographs examined. For these reasons it was decided that any further work in this area was a waste of time.

6.2 THE WITNESSES

The origin of the stories of North Head is not in documents or files, but in people's memories. Of the large number of people interviewed about their memories of North Head very few appeared to be making things up. Most were trying to recollect structures and underground spaces seen up to 50 years previously. My appreciation of this process was clarified when I accompanied a group of men who had helped build and fit out the large 9.2 inch gun emplacements at Stony Batter on Waiheke Island. Most of these people had last seen these structures in the 1940s. These were men who had not just visited the place but who were actively involved in its construction. Most of them were totally lost when first confronted with the site, and later took some time to orientate themselves when inside the tunnels. I realised that the things that they had originally used to orientate themselves were no longer there. They remembered, for example, engine rooms with engines, not dark empty spaces. Also the outside area had changed, trees had grown up and buildings had been demolished. In the end however they reconciled their memories with what they could see today. At no time do I recollect them claiming that the tunnels had changed. They assumed rightly that their memories were at fault. This assumption is generally not made at North Head, where there is another 'history' for people to fit their memories into. If things are not as remembered, then reality and memory do not have to be reconciled, but it can simply be claimed that the structures have been altered or hidden.

There have been a great many changes at North Head over the years. The most convincing witness stories date from the 1950s and 1960s when the fort was in a period of transition after the war and before the handing over of the site to the

Devonport Council. Most of the fort's defences were still in place together with much of the equipment from the coastal defence sites in the northern region. This included equipment from Motutapu, Bastion Point, Takapuna, Castor Bay, Whangaparaoa, the Bay of Islands, Waitata point, Waiheke, Tiritiri Matangi and the Whangarei Heads (Coastal Defences AD W 1449). The place appears to have been filled with gear. Many of the witnesses describe the tunnels as filled with crates and boxes. Parts of the fort were also used to store dangerous war souvenirs handed in by members of the public. These were stored in the old 7 inch magazine in North Battery and included a number of odd items that may be the explanation for some of the stories of the strange weapons alleged to be stored at the fort (Major R. Nutsford, the last commanding officer at North Head, now deceased, pers. comm. 1992).

Some of the old Flying School equipment seems to have remained for years after the official disposal. People have described seeing items during the Second World War and a wing strut from one of the aircraft was found in the old searchlight tunnels as late as the 1960s (Tony Packington-Hall, local historian, pers. comm. 1992). One gentleman whose father was stationed on North Head during the 1920s described how his father had built him a canoe out of one of the wing floats that remained there. These items may also have been part of the origin of the aircraft stories.

Today the fort is stripped of equipment and none of the stout wooden doors that once sealed the tunnels are still in place in any of the public areas. Trees and shrubs have been cleared and there are no longer guards to avoid, all powerful aspects of many early memories.

Another factor that I have noticed is that people have difficulty determining direction and space underground, especially in the dark. Over the last few years I have taken hundreds of people on tours of the tunnels on North Head and elsewhere in the coastal fortifications managed by the Department of Conservation. Many of these people, when asked, cannot tell which direction they are facing and frequently have a sense that spaces seem smaller than on their first visit. This experience is most apparent when visiting the large Second World War batteries at Stony Batter (Waiheke Island) and at Whangaparaoa. The Stony Batter emplacements are abandoned and in darkness and give an impression of great size when first visited. The Whangaparaoa battery is still in use as a naval armaments depot, is well lit and seems quite domestic by comparison. I suspect that something similar affects memories of North Head. Most of the batteries at North Head have never been illuminated with anything more than candle lamps, a situation commented on by the naval assessors in the 1920s during their quest for more storage space. Witnesses from the earlier periods describe using candles, matches and even following balls of string to find their way around. These memories are often competing with their freer, better lit experiences of today. Again the absence of doors may affect today's memories in this area also. Where the large wooden doors still exist on the summit it can be seen that they exclude almost all light. When they were fitted all over the fort it must have been dark in many places now flooded with sunlight.

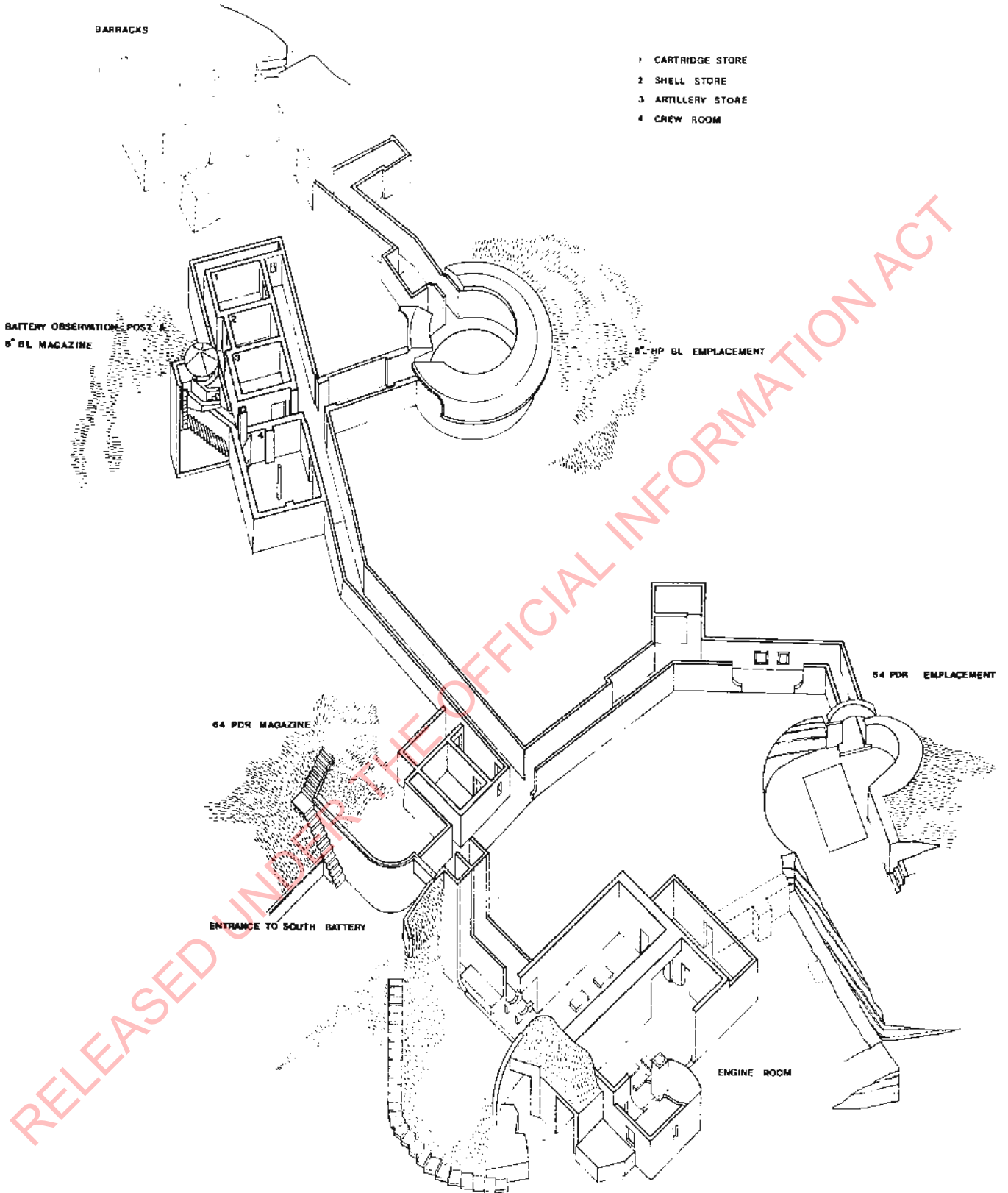


Figure 29: North Head: South Battery and Engine Room

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Most eye witness accounts focus on the three main batteries. The difference is that people seem to enlarge the spaces in their memories. Two examples can be used here. One refrain in a number of stories is that of there being a number of interlinking levels in the Fort. People describe how they climbed down ladders and shafts that they say are no longer present. They are of course correct, and if you know where to look you can still see where ladders and shafts were. One major example is in the old searchlight tunnels on the southern coast. Here up until the 1970s there was a '40 foot' shaft with a ladder to the surface. During some periods in the 1950s and 1960s the shaft seems to have been the only unblocked access to the surface in this tunnel complex. The top of this shaft was blocked off and the ladder removed by the Hauraki Gulf Park Board in the early 1970s as a safety measure.

The other area where different levels used to exist was in South Battery (Fig. 29). Until the 1970s it was possible to find four levels in this battery. People could start at the observation post, descend a ladder to the top of the stairs, go down the stairs to the magazines, walk down the tunnel to the 64 pounder magazine, then down another ladder to the engine room. The access shaft to the engine room was also blocked off as a safety measure. The presence of this shaft is now almost totally obscured. Again while exploring the South Battery in the 1950s and 60s the doors would have been in place and there would have been no lighting.

The third example is at the Summit Battery, the source of a number of stories (*Sunday Star* 12/7/1992). Here the witnesses describe entering a series of tunnels from the 8 inch gunpit and entering a large 'amphitheatre'. The excavation work of course disproved this story, so how then could the stories be explained? I think that by taking the witness stories and 'shrinking' them, it is possible to reconcile the stories with what truly exists. Firstly people describe going down from the gunpit and entering a large space known as the 'amphitheatre'. In reality you do have to go down from the gunpit to get to the magazine passages (see Figs. 15 and 16). This gunpit, unlike the others on North Head, does have steps, but unlike the stories there are not enough of them to get you below the gunpit. After passing through the magazine passage you reach the central gallery behind the gunpit. This is the largest underground space in any of the batteries on North Head, not an amphitheatre but a larger room than is usual. This space had six doors leading off it which may have added to the impression of size and mystery. Another common factor in the Summit Battery stories is an exit facing Rangitoto. At its most extreme this exit is said to be on the waterline. There was an exit up until the late 1960s that faced Rangitoto at the end of the northern 7 inch RML passage (Fig 15). This entrance was reopened for a short time during the 1992 Mitchell excavation. The passage was blocked off as a security measure because it opened outside the fence around the naval training area on the summit.

The stories at North Head are not unique. There seem to be similar stories from many parts of the world. I have not made any special effort to gather these, but as I worked on the project people have passed them on to me. There are stories of Spitfire aircraft in caves in Queensland Australia; jeeps and trucks in tunnels on Motutapu Island; copies of the American Declaration of Independence in church crypts; a network of tunnels beneath Los Angeles (Stanley 1994: 59-61); and a whole secret underground city beneath London - the explanation, I was told, for the massive cost overruns in the construction of the Jubilee tube line.

It is my belief, therefore, that while the witnesses are not making anything up, they are enlarging and confusing what they saw. It has got to the stage now where the story has had so much publicity that the accounts are cross-fertilising each other and becoming codified into a single account. It is a good story but that is all it is.

6.3 THE ARCHIVAL EVIDENCE

As a result of this project and the Mitchell (1995) thesis, North Head is now one of the most thoroughly researched pieces of real estate of its size in New Zealand. We have become intimately familiar with the history of its construction and the government policies involved. The work on this project has spawned other ongoing research on coastal defence in New Zealand and this has furthered our understanding of the later World War 2 period, and the way North Head fitted into the overall defences (Corbett 1996). We have read hundreds of documents from many sources and in none of this material is there any suggestion of major work at North Head that we cannot identify.

As well as the written archive all available photographs were examined. The major use of this resource was the production of the Photosurvey map. Use of their very powerful stereoscope assisted in allowing the close examination of the aerial photographs. Using this piece of equipment was like being able to fly over the site in the years 1940 and 1950.

As well as the stereo pairs we examined a large number of oblique photographs. In both cases all structures that could not be explained by what could be seen today were excavated or drilled with no other underground structures being found.

7. Conclusion

Proving that something does not exist is very difficult. No matter how much work is done there always someone who says 'but what about ...'

In this situation it was especially difficult in that some of the people involved believe in the existence of the tunnels very strongly, at times in the face of contradictory evidence. The tunnels are to some of them a central part of their life experience. To them therefore the outcome is disappointing. However another group of people can feel rightly vindicated. These are the military personnel who have steadfastly maintained that the Fort was safe and that they had left nothing dangerous behind.

It seems therefore that all the available evidence leads to only one conclusion: that there are no tunnels, no aeroplanes and no ammunition hidden at North Head.

Acknowledgements

A large number of people have helped in this investigation, too many to thank all individually. My special thanks go to Peter Riley and Leigh Dooley of Riley Consultants who seemed to have an answer to all our obscure requests, Dave Knight of B&K Demolition and Bill Withy of Allied Concrete for their careful work and advice. Bill McLeod for his patience, the staff of Photosurvey Ltd for their imaginative solutions to our mapping problems, the members of the New Zealand armed forces, both army and navy for their assistance, to Jeremy Treadwell for his research and drawings, to John Mitchell for sharing his research without reservation, Belinda Maingay for her illustrations, and to all the staff of the Auckland Conservancy for their patience. I am also grateful for the information supplied by John Earnshaw, without which none of this would have got off the ground.

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This report comes at the end of a lengthy process of research both as part of the project and by other individuals. Readers are invited to read 'North Head Investigation, 1992. Interim Research Report', by J. Treadwell, which contains a substantial amount of the available material in the form of a referenced chronology. Other material not in Treadwell is included here, and mention is also made of 'Mitchell 1995', a doctoral thesis which contains the most complete bibliography on the early period of coastal defences yet available. Work is under way on the preparation of publications on the later period of coastal defence in Auckland, parts of which should be available in 1998. This is being prepared by Peter Corbett, whose 1996 publication on the Stony Batter and Whangaparaoa defences also provides an excellent background to the history of Auckland's coastal defences during WW2.

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Appendix 1. Glossary of terms used

Anti-Submarine Boom: In Auckland this consisted of piles driven into the sea bed between North Head and Bastion Point with nets suspended from them to control the entrance of the harbour from sneak attacks.

Battery: A place where guns are emplaced or stored.

BL-HP: Breech loading - hydro pneumatic. This indicates that the gun is loaded via the breech and is mounted on a hydro pneumatic disappearing carriage.

Board of Survey: Committee set up to assess a situation, in this example to find the worth of the equipment stored at Torpedo Yard.

Disappearing gun: These were a 19th century development allowing the gun to be concealed between shots. The energy generated by the recoil of the gun when fired was stored using a pump and storage cylinder arrangement. This was then used to push the gun back to the surface in time to fire the next shot.

Empennage: An aeroplane's tail as a unit - elevator, rudder and fin.

Field gun: These are usually part of a mobile field army, not used in fixed defences. At North Head two 40 pounder field guns were used as part of the North Battery defences.

Hotchkiss guns: Named for the French company that manufactured them.

Magazines: In a fort, the area set aside for the storage of ammunition.

Quick Firing Gun: These guns had recoil systems and special breech mechanisms that meant that they could be reloaded and fired rapidly. They were mainly used to repel motor torpedo boats.

RML: Rifled muzzle loader. Guns with rifling grooves to impart spin on the projectile. The term also signifies that the gun is loaded by the muzzle at the front of the gun, not a breech at the rear.

Appendix 2. Other flying school equipment

This material was not immediately relevant to the investigation but is of historical interest and is therefore included.

The assets of the New Zealand Flying School contained a large amount of material as well as the aircraft. This included a number of aero engines, some of which had come from Flying School aircraft, some of which appear to have been spares. These engines were recorded in the document relating to the sale of aero equipment from the 14th August 1926 (Fig. 4). This document gives the names of the purchasers and the engines bought.

The magazine that dealt with boat racing during the period, the *New Zealand Aquatic*, contained a section called 'Around the Yards'. This gave all the latest news on who was building what boat at which boatyard and often identified the engine types being fitted. From these two sources it is possible to ascertain the fate of at least some of the aero engines.

Apart from the Hall-Scotts fitted to the Boeings, the government also purchased from the Flying School the following aero engines:

1 x 160 hp Beardmore
2 x 90 hp RAF
2 x 90 hp Curtiss
2 x 275 hp Sunbeam Maori

These were disposed of in the government's 1926 sale of surplus equipment together with the 'gift engines', that is received as a gift from the British Government after the war (see Fig. 4). The purchasers were listed as:

G. B. Warman, 1 Beardmore
W. C. Mills, 1 Beardmore
T. M. Roberts, 1 Beardmore

One of these Beardmores may have been from the Walsh Brothers although four others of this type are listed as gift engines.

The *New Zealand Aquatic* of September 22 1928 records a Mr. Roberts from Clevedon building an 18 foot single step hydroplane to be powered by '...a 160 hp Beardmore aero engine - a straight six motor identical with the engine in Mr. Warman's Taroa...' (no page number, in the section 'Speedboat Comments'). These are almost certainly the engines bought by Roberts and Warman at the 1926 sale of aero equipment. Although the name of Roberts' hydroplane is not mentioned there is a similar boat listed in the literature called Miss Clevedon which, given Roberts' address, may be the boat described. Similarly there is no boat registered at this time by the name Taroa, but there is a launch called 'Tarua', so the Taroa named in the

1928 article may be a misprint (*NZ Aquatic*, Nov 26 1927 and *NZ Aquatic, Auckland's Official Registered Numbers*, Jan. 25 1930, p5)

The famous record setting hydroplane from the 1920s period, 'Miss Devonport', had her specially imported 200hp Curtiss V8 replaced with a Beardmore aero engine in 1927. This may also be one of the Beardmore engines from the 1926 sale, possibly the example bought by W.C. Mills of Devonport (P. Titchener, *North Shore Times Advertiser*, Nov 29 1977, p22 and 43 and Fig. 4 this volume)

The purchasers of the other Walsh engines were:

C. G. Herbert, 1 Curtiss

Hoyes Motors, 1 Curtiss, the Curtiss spares, and 2 Sunbeam Maori engines.

The sale of the 90 hp RAF is not recorded. Mr Hoyes appears to have sold at least one of the Sunbeam engines as the *New Zealand Aquatic* (26 June 1926) reports that the boat builder Arch Logan was building a step hydroplane for a Mr Alison jr to be powered by a 12 cylinder Sunbeam aero engine that '... has seen service at the Auckland Flying School'.

At the same time as we were hunting the 125 hp Hall-Scott engines from the Boeings we found that the Walsh brothers had themselves bought two smaller 100 hp Hall-Scott engines for their own aircraft.

These engines were fitted to the Walsh-Curtiss flying boat 'C' and the Walsh flying boat 'A' (Harvie 1974: 50,56). At the time the government assessors came to value the Flying School equipment, flying boat 'C' is listed as having no engine (ODF 7735/2 1331) and flying boat 'A' appears to have just been an engineless hull (ODF 7735/2 1369). It is not listed specifically in the aircraft assessment so is probably included in the list of hulls, that is aircraft without wings or empennage (ODF 7735/2 1369).

From the documentation it seems that neither of these aircraft was purchased by the government and similarly the smaller A7-A 100 hp Hall-Scotts that were fitted to them do not appear in the list of engines purchased, or even in the list of equipment assessed at the time of government purchase.

There is therefore no official record of what happened to the two smaller 100 hp Hall-Scotts. There is however a reference in the *New Zealand Aquatic* for January 23rd 1926 to the building of a 22 ft single step hydroplane called 'Cygnet' which was to be powered by a 100 hp A7-A Hall-Scott aero engine.

If this was one of the old Flying School engines, and from the date and engine type it seems likely that it was, it raises the possibility of another private sale of Flying School equipment undertaken by the Walsh brothers themselves. This in turn raises interesting possibilities about the fate of the other aircraft, including the Boeings, not sold to the government. Were they sold, and if they were what did happen to them?

Appendix 3. Material excavated at site 8

The material excavated at this site came from an area of approximately 2.5m x 2m. The depth was less than 1m. The excavation was carried out to test the existence of a possible tunnel entrance and the presence of a rubbish pit was not anticipated. For this reason the machine used dug straight into the accumulation of bottles and other debris. Surprisingly no intact bottles seem to have been broken in this procedure.

Much of the material had been burnt and broken, with a substantial amount of unidentifiable glass shards. Some of the bottles had melted in the fires that had been periodically lit in the dump, while others were only partially deformed or had had their colour changed by the heat.

Three layers were visible in the pit. These were marked by layers of broken glass and ash. The intact and diagnostic material was concentrated on the edges where presumably the fires were not as intense.

1. Material from the top of the pit, turf layer to approximately 0.3m

- Soft Drink bottle labelled, 'JUCY', Innes Schweppes (N.Z.) Ltd Auckland. Clear glass with blue and white applied labelling.
- Cordial bottle, cylindrical with plastic screw top. Marked 'P 459 6' on the base.
- Brown/amber glass crown cap 'stubby' size bottle. No marks.

2. Material from the middle of the pit, 0.3m to approximately 0.6m

- Clear glass soft drink bottle, top broken, embossed marks, 'Y-Y' in a circle on one side, with 'AUCKLAND' below it. 'Y-Y' on the base.
- Clear glass medicine bottles, screw top x 2. 'BAXTER'S LUNG PRESERVER CHRISTCHURCH' in embossed lettering on one side. 'MADE IN NZ' on the base with the mark of Australian Glass Manufacturers Co (Toulouse 1971: 563). One example with the number 5 and one with number 6.
- Clear glass medicine bottle, marking on the side as above but smaller size. Mark on base 'AGM' rather than the logo as on the larger examples. Metal screw top still in place.
- Clear glass rectangular bottle with fluting on two sides. Screw top with a very small opening. This bottle still smelled faintly of cologne when found.
- Clear glass tapering cylindrical screw top bottle. Opening of bottle small as in above example. Broken.
- Brown/amber glass long necked beer bottle. 'ABC' in triangle on side, '1939' on the base.
- Clear glass screw topped rectangular bottle, with 'BRYLCREEM' in embossed letters on the side.
- As above but smaller size.

- Clear glass tapered screw top hair cream jar. 'BRYLCREEM' in embossed letters on one side.
- As above in brown glass. No marks or labels.
- Clear glass ink bottle. Top for cork seal. 'PROPERTY OF STEPHENS NZ LTD' on the base together with the trade mark of the Australian Glass Manufacturers Co.
- Clear glass ink bottle. Screw top, no marks.
- Small brown glass pill or cooking essence bottle. '255A' on base.
- White glass Marmite jar. 'PROPERTY OF MARMITE COMPANY' on the base together with the trade mark of the Australian Glass Manufacturers Co.
- Clear glass screw top cylindrical bottle. Small. Mark of the Australian Glass Manufacturers Co. on the base.
- Clear glass, screw top, rectangular medicine bottle. 'L-' and 'C' marked on the base.
- Clear glass, ovoid rectangular, screw top bottle. Top still in place with contents intact. They smell like some sort of cologne or hairdressing preparation.
- Small clear glass pill bottle. Screw top. '18' on base.
- One enamel cup

3. Material from the base of the rubbish pit

- Dark green/black glass machine made crown top bottle. 'F.B.' and '2' in embossed letters on the lower edge of the sides.
- Green glass ring seal beer bottle.
- Base of stoneware Grey & Menzies bottle.
- Badly corroded Wax Vesta tin.

Discussion

Much of the material described here is from a much later period than is usual in an archaeological context and as such there are no easily accessible references on the marks present. The quantities and types of material found, however, do allow some conclusions to be reached. Firstly there was little material from either the later or earlier periods, with the bulk of the artefacts from the time of the Second World War when there were the largest numbers of people at the site. The middle group can be conveniently dated by the 1939 beer bottle.

The latest period appears to date from the 1960s, the two bottles being recognisable from my own youth.

The dates for the earliest layer are not exact as there was no clear information available on the material found, although it probably falls somewhere between the First World War and the 1930s. It appears that Wax Vestas were available in tins until the latter date (Anson 1983: 135). The tin unfortunately is too corroded to identify. The Grey & Menzies bottle can probably be dated between 1902, when Grey and Menzies merged, and 1930 since after that date the base of most of their bottles carried a date (Rusden 1979). The machine made crown seal beer bottle must post-date 1912, when these bottles first became available in New Zealand shops. The ring seal beer bottle was an earlier form but continued in use until c.1920 (Tasker 1989: 35).

It is noted that some of the material is associated with male activity, indicated by the hair cream and cologne bottles. The presence of these is also probably associated with the showers that during the 1940s were located on the terrace above the rubbish pit (see Fig. 18 in Veart 1990).

Finally there is the large number of bottles in the middle layers made by the Australian Glass Manufacturers Co. These included the Baxters Lung Preserver bottles, the ink bottles and the Marmite jar. All the bottles with an identifiable maker's mark from this layer have the mark of this one company. The beer bottle was made by AGC as well. During the World War 2 period (1930s to 1940s) this company, operating from its subsidiary factory in Penrose, Auckland, manufactured most of New Zealand's glass containers (Tasker 1989: 22).

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