The history, archaeology and material culture of 105 Radar Station, Cox Peninsula, Northern Territory

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The 105 Range and Direction Finding (RDF) Radar Station, Cox Peninsula, Northern Territory, was established as the second radar site in Darwin during the Second World War. The site was established as a consequence of a dire and urgent need to identify Japanese aircraft squadrons that were conducting bombing raids on Darwin and surrounds, which had commenced in February 1942. 105 RDF used a Modified Air Warning Device (MAWD) that allowed detection of planes up to 150 miles away. This paper tells the story of the camp where the 119 men who operated 105 RDF lived for nineteen months in a remote and isolated corner of the Northern Territory, at the front line of Australian defence.

The harsh bush conditions were adapted with the erection of a number of buildings, including a mess, kitchen (with a fridge for cold beer) and a recreation hut. The remnant archaeological pattern at 105 RDF provides evidence for the habitation of this area and the intention of Australian Defence to protect the location of 105 RDF, to ensure it remained unknown to the Japanese.

INTRODUCTION

Since the early 1930s the Japanese had been at war with the Chinese and by 1941 the Japanese occupied Indo-China and Thailand. At the end of December 1941 Japanese forces had taken Hong Kong, Malaya and the Australian territory of New Briton. As such, the outbreak of World War II (WWII) had an immediate effect on Australia due to the threat posed by Japanese military actions in the Pacific.

By 1942 the imminent threat of Japanese attack and invasion was recognised by the Australian government. Military actions in Australia's top end necessitated the reduction of Darwin's small population by 2000 civilians, leaving only a core of 2000 people, including around 100 women and children (Johnston 2006:7). On 19 February 1942 the threat of a Japanese air based attack was realised when two waves of Japanese warplanes bombed Darwin. At least 243 people were killed in this first attack along with the widespread destruction of Darwin (Lockwood 2005). The 19 February attack was to be the first of 64 air raids carried out over the following 22 months – February 1942 to November 1943 (Alford 2005).

The commencement of an aerial bombardment took Australia's defensive forces by surprise, and it became obvious that a sea and/or land based attack would not be forthcoming. The aerial threat posed considerable issues for the local defence force, which had put the limited resources for its defence in more traditional aspects such as shore based batteries (with 6 inch Mark XI guns), such as those at Elliot Point, Emery Point, East Point, Waugite Beach and West Point, Darwin (Rayner 2001:4-6). The only other defensive weaponry capable of defending Darwin against the Japanese Betty bombers and Zero fighters were ground mounted Lewis and Vickers machine guns – guns that were fired from exposed positions on top of trenches (Reid 2007:3). At the time of the first attack Darwin was not completely without air cover, as the United States Army Air Force (USAAF) had ten Kittyhawk fighters based in Darwin. The surprising speed of the Japanese attack meant that the US planes had little chance of becoming airborne to mount a counter attack and all bar one US Kittyhawk were quickly destroyed (five on the ground and four in the air) by the overwhelming numbers of Japanese Zeros.

Military analysis following the 19 February bombing showed that minimal advanced warning of the air attack had been possible (and the warning which did come had been ignored); it was apparent that for a successful defence of Darwin to be made, an advanced warning system was essential (Lockwood 2005). Such warning needed to provide sufficient time for allied planes to become airborne before the attacking force arrived.

The obvious answer was the employment of the new range and direction finding (RDF) equipment, more commonly known as radar (radio detection and ranging). The need for the system was so great that by the end of February 1942 the first early warning radar had been flown from Sydney to Darwin. This system was installed at Dripstone (Lee Point) and in March 1942 'Radar Station 31' (RS31) was operational. The first array provided a limited range of detection, and lacked coverage to the west of Darwin, so the decision was made that further RDF sites needed to be quickly established. A second RDF was established on the Cox Peninsula, at Charles Point and on 22 April 1942 the radar became operational and on 25 May 1942 the station was officially named 105 RDF.

THE COX PENINSULA

The Cox Peninsula is located to the west of Darwin, approximately six kilometres across the bay. Three defensive positions were established on the peninsula, two obvious and one in some secrecy (Figure 1).

Two military camps were established on the north eastern shoreline of the Cox Peninsula. West Point was initially established in 1939 with two 4 inch Mark VIII shore based guns (Rayner 2001:5) to defend the western end of the submarine net which extended from East Point across Darwin harbour. In 1942 West Point was expanded with anti-aircraft defences and an army camp that housed most soldiers stationed on the Peninsula.

Wagait Battery was established near to West Point in 1942 with two 6 pounder anti-aircraft batteries. Both settlements featured observation towers and numerous features set on concrete slabs.

THE RADAR STATION (105 RDF) AT CHARLES POINT

In February 1942 American forces (the 8th, 49th and 55th Fighter Groups) arrived in Australia and brought with them a wide range of equipment, including radar equipment, such as the SCR268s (Simmonds and Smith 1995:49, 52). The SCR268 was designed for use by the Army, but was quickly

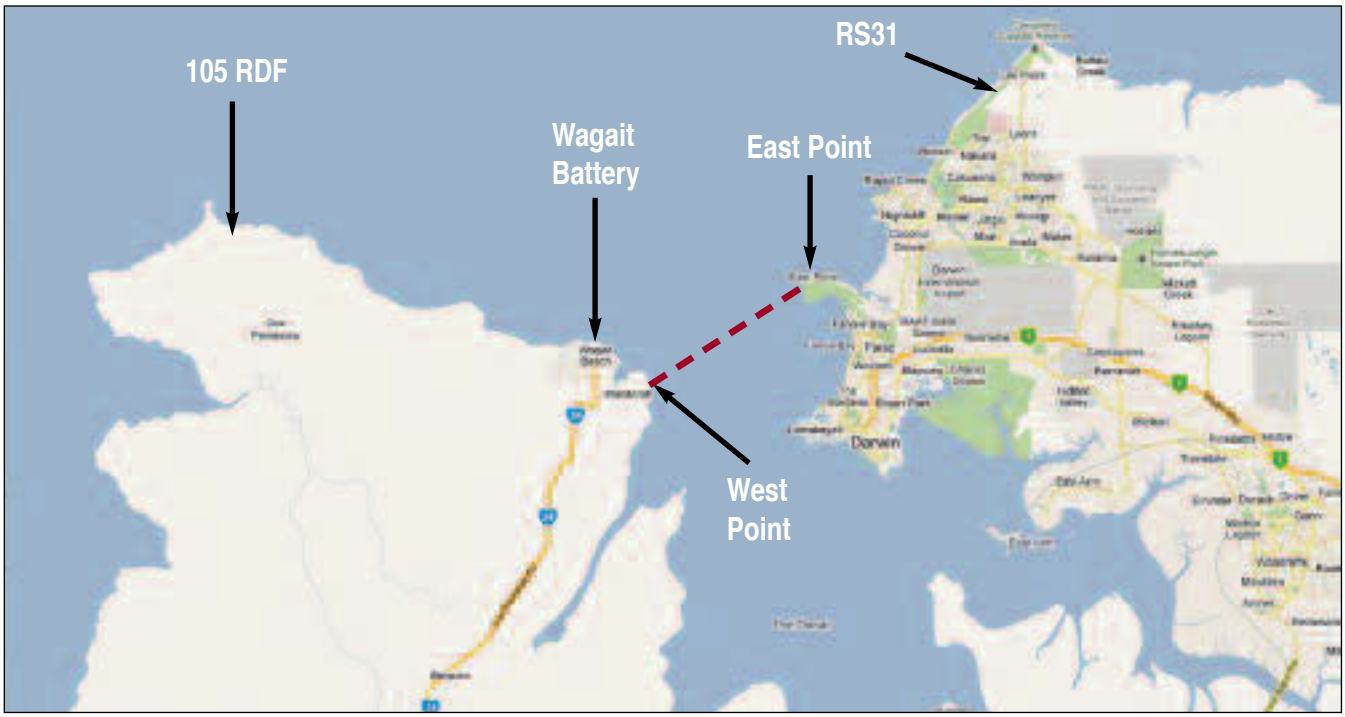

Figure 1: Key WWII Defences on the Cox Peninsula, East Point and RS31. Red line is the submarine net extending between East and West point (Image source: Google Maps).

acquired by the Royal Australia Air Force (RAAF) who modified it to become a land based system able to detect aircraft up to 160 kilometres away. After modification the SCR268 was known as the Modified Air Warning Device (MAWD). Eight MAWDs, numbered 101–105, 107 and 109, were set up in various defensive locations across Australia (Fenton 2000:10; Simmonds and Smith 1995). Simmonds and Smith describe the introduction of the MAWDs to the RAAF:

> *The RAAF obtained the SCR268s and ... modified them for air warning radar increasing their range to 100 miles ... There is no doubt that the MAWDs filled an urgent need in Australia. One has to admire the operators of the ... MAWDs because they sat out in the open exposed to all the elements, and hand turned the aerial with little complaint, even during tropical downpours, heavy winds etc* (1995:49).

Simmonds and Smith emphasise the importance of 105 Radar during 1942:

> *Of all the MAWDs, 105RS was probably the most outstanding due to its deployment to the Northern Territory. The situation in Darwin at the end of March 1942 can only be described as being extremely desperate. Certainly 31RS at Dripstone Caves was operating … but additional air warning was an urgent necessity with more range towards the west being requested. The only piece of radar equipment available was a trailer-mounted MAWD, weighing around 20 tons ...*
>
> *On 24 March 1942 a start was made to dismantle the set, which extended to reducing heavy items such as the alternator into more management components so that it could be transported in DC3 aircraft. By 6 April all of the essential elements had been completed and the unit was moved over 100 miles of bush track to Point Charles. W/Cdr Pither has stated that the unit was operational on 22 April and went further to claim that, 'this move must have established a record for air transport at the time'.*
>
> *The unit's record at Point Charles was outstanding in the field of air warning and it enhanced the credibility of radar within Fighter Sector. [For instance] 105RS had alerted No. 5 FS when* [a] *Japanese raid had split into two with one section proceeding to Darwin and the other going south towards Katherine. The plots were not believed until a telephone call was received from Katherine irately telling Fighter Sector that they were being bombed without warning* (Simmonds & Smith 1995:51).

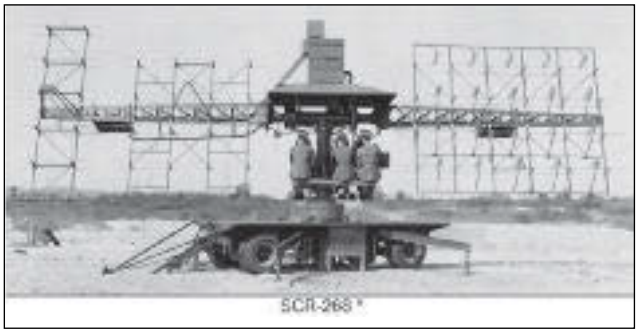

Figure 2: Exposed operators sat on a SCR 268 (NB this photograph is not of 105 Radar Station) (www.vectorsite.net).

Flight Lieutenant Porter was a radar operator posted to the Darwin region in May 1942. Porter provided a description of the difference that radar technology was providing through the early detection of enemy aircraft:

> *Radar was the watchword in the area and we swelled with pride at its magic. Remember we had never seen radar actually locate a target but we were confident of its ability, and we enjoyed confirmation …*
>
> *Now people had a good fifty minutes to finish their lunch, bring in their washing and disperse their transport …*
>
> *The heavy ack-ack put up a deterrent barrage at the night time, and American P40s (Kittyhawks) took to the*

air for combat. Morale had risen in a phenomenal way (Porter 1988:58).

Whilst the primary objective of 105 RDF was identification of Japanese aircraft, the men who lived and operated the station required basic facilities and accommodation if they were to remain healthy and in a state fit for operation:

> *When 105 first arrived at Charles Point, Army tents were the standard accommodation for sleeping and eating – in fact they were used for all station activities other than the Cook's endeavours with stove and copper. But in true radar fashion, the boys soon got to work, and large bark hut was the result – first known as the 'Gunyah', afterwards perhaps as the 'Woolshed' – where 6–8 men lived. Water was scarce, and a tank appeared (a Darwin souvenir perhaps?) and evidently a popular nightly game of Monopoly was instituted. Again, in typical radar fashion, a new Kitchen, Mess and Rec.* [sic] *hut were officially opened just before the station closed* (Fenton 2000:19).

> *Nearly half the station was suffering from tropical ulcers, four being in hospital ... It was very difficult to find enough fit men to man the gear ... This state of health was mainly due to walking in sandals and barefooted. When boots and gaiters were available, and worn, the ulcers quickly disappeared. The ankle is particularly susceptible to infection as it is exposed to dirt, and sharp grass which abounds in the area. With the poor washing facilities trouble easily starts (Porter 1988:64-65).*

The 105 RDF site at Charles Point was always intended as a temporary site, rapidly established to meet an urgent need, whilst other more permanent and better equipped sites were constructed. However 105 RDF continued to defend Darwin from the Charles Point site until September 1943 when some of the crew was transferred to Station 59 at Lee Point (Fenton: 2000:10). According to official records 105 RDF was disbanded on 20 October 1943 (Simmonds and Smith 1995:52). Between March 1942 and October 1943 Fenton records that an approximate total of 119 personnel manned 105 RDF (Fenton 2000:25-26).

The history of radar at Charles Point did not cease at the end of 105's operation in October 1943. Darwin's first Radar site, RS 31, suffered the loss of its foundations due to cliff fall in mid-1943. The immediate response was to relocate RS 31 to the 105 RDF site at Charles Point.

In September 1943 'foundations' were poured for the installation of the RS 31's array. On 30 September Radar 31's aerial arrived and by 15 October Radar 31 became operational. A number of the 105 operators and site personnel were transferred directly onto Radar 31's crew and remained on site until 14 January 1944, when Radar 31 also ceased operation. The short operation of Radar 31 (four months) did not see further building activity on site, and eventually the entire camp was demolished over a period of two weeks.

THE ARCHAEOLOGY OF 105 RDF

The identification of archaeological remains relating to 105 RDF was a chance discovery. In September 2009, whilst undertaking an initial assessment for Aboriginal and historical cultural heritage within Section 34, Cox Peninsula (Owen and James 2010a), the authors were taken by the local Aboriginal Traditional Owners through the former location of 105 RDF. The identification of what appeared to be a WWII era concrete slab aroused our attention and led to some rapid historical research (e.g. Fenton 2000).

July 2010 saw the preliminary search extended and a total of seven concrete slabs, a number of ancillary features and large quantity of material culture identified across the 105 site. In August 2010 the authors again returned to 105 RDF to undertake further archaeological investigations, with the aim of clarifying the extent of some archaeological remains, and to prepare an archival recording of salient site features (Owen and James 2010b). This work informed the Section 34 Heritage Management Plan (Owen and James 2011).

A geophysical survey of the site was undertaken to identify unexploded ordnance (UXO) (G-TEK 2010). This survey

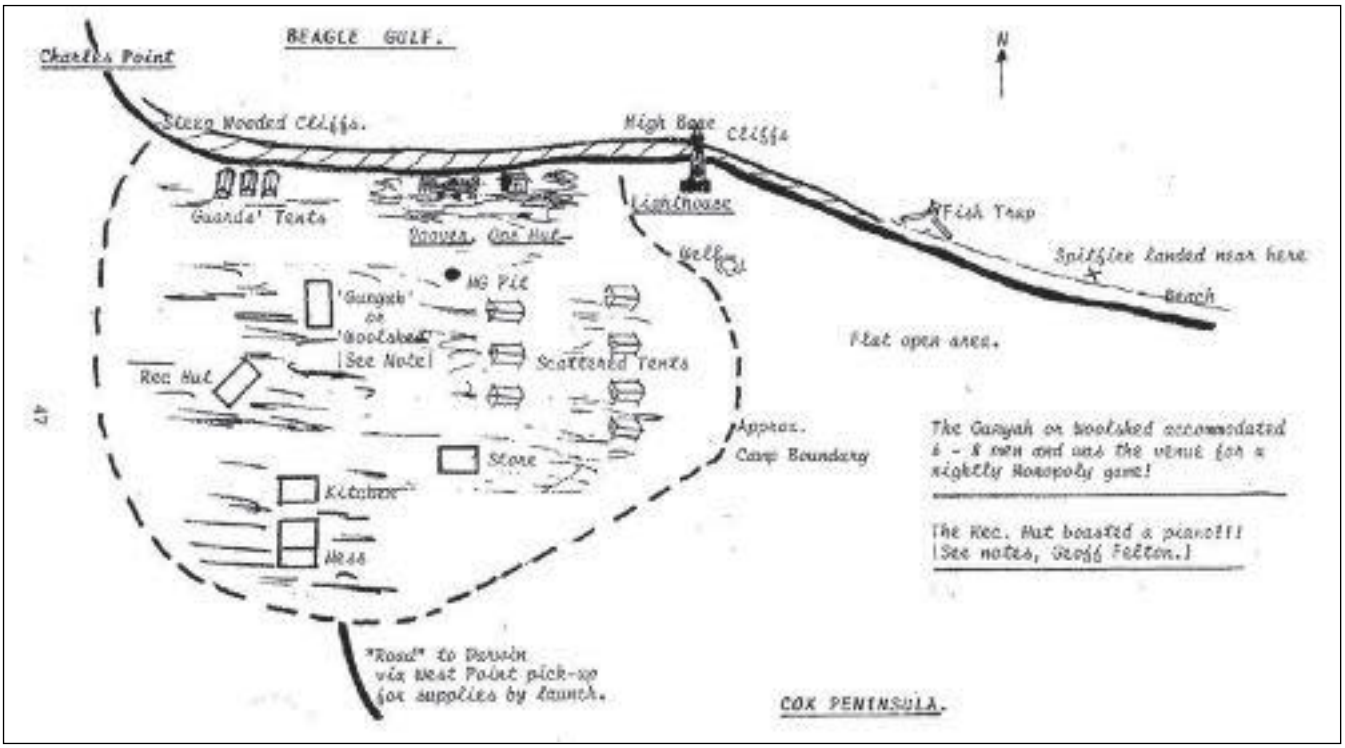

Figure 3: Mud map of Camp 105 (Fenton 2000:47). This mud map was drawn by Don Hobbins as he remembered 105 RDF in mid-1943.

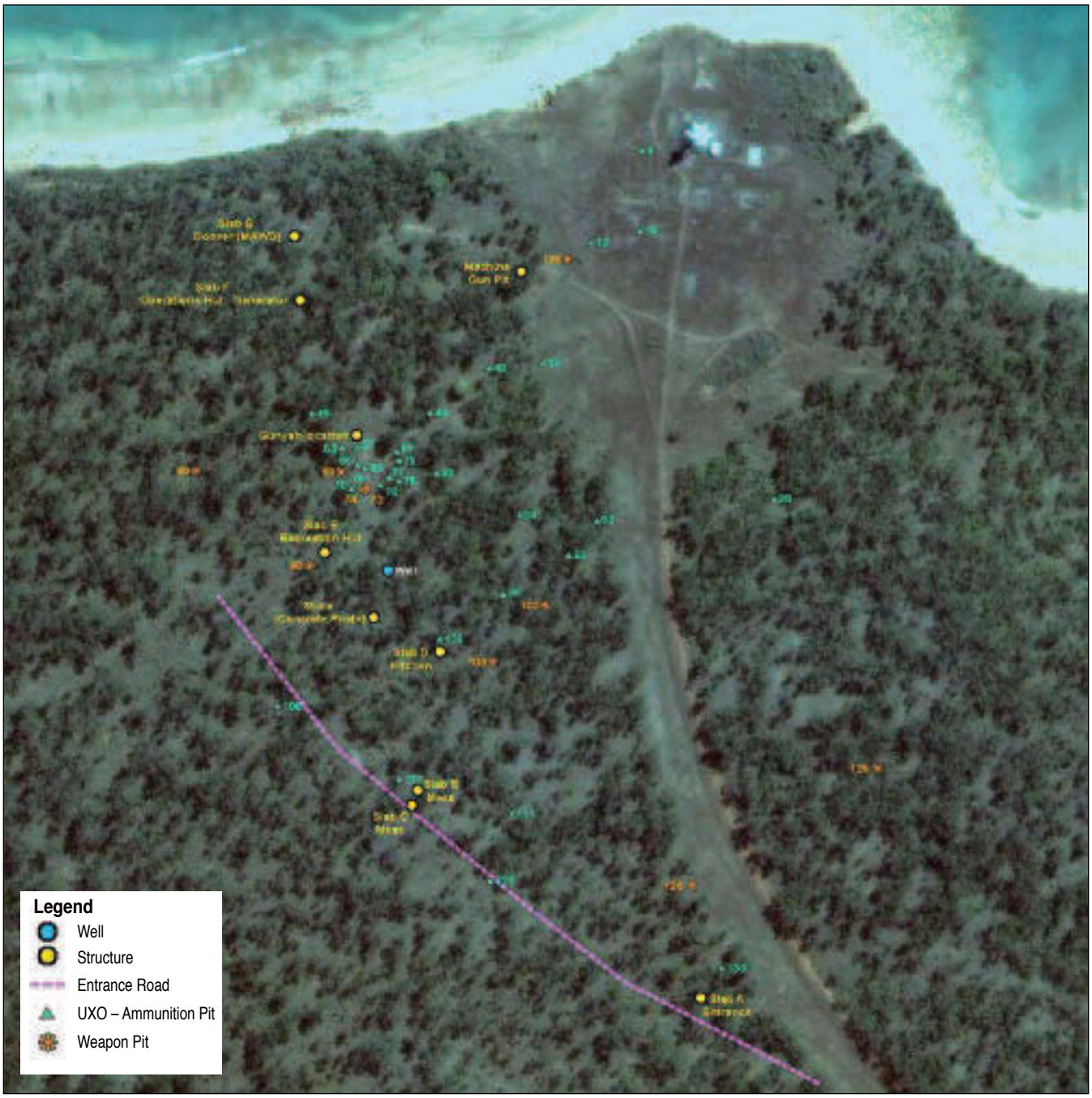

Figure 4: The layout of 105 RDF, as recorded in 2010, showing structures and ordnance (Owen and James 2010b:Figure 5).

identified small metal items, particularly spent cartridge cases, which would otherwise not have been observed or recorded due to the thick vegetation cover. In addition the pattern of spent ammunition and weapons pits provided evidence for the spatial use of the wider bush zone, otherwise devoid of signs relating to its WWII use.

ARCHAEOLOGICAL FEATURES

Hobbins' mud-map (Figure 3) was used as the initial basis for interpretation of the archaeological remains. It was immediately noticed that the spatial layout of items in Hobbins' plan were approximate and the location of features, such as the tents, had no readily definable archaeological signature and therefore could not be accurately relocated. Figure 3 shows the camp's features spread across a wide zone; however GIS based mapping (Figure 4) shows the primary site features were actually aligned North to South.

A total of 11 key archaeological features were identified at 105 RDF:

- An entrance road – an alignment through the trees with the remains of a hard packed gravel surface;
- Entrance building (concrete slab A) – a concrete slab (4.1 m by 4.6 m) with associated brick footings. This slab has been interpreted as a guard house (entrance) to the 105 camp;
- Mess building (concrete slab B) – a large rectangular slab (11.15 m by 3.6 m), with a doorstep on the NE side, a concrete water tank stand on the SW side and a gravity based grey water system extending off the slab to the SW, running past Slab C. The slab did not contain evidence for internal division of the rooms. This slab has been interpreted as a mess, with a small kitchen or bar to the rear;
- Mess building (concrete slab C) – a small concrete slab

(6 m by 2.3 m), with four vertical wooden posts inserted into the eastern end (possibly a support for a water tank) and a drainage channel set into the southern side of the slab;

- Kitchen building (concrete slab D) – a square concrete slab (3.9 m by 3.1 m) with a central drainage channel, which flowed south into a grey water system. The function of the slab is suggested to be the kitchen, where food preparation benches (with cut in half 44 gallon drums) would have been set over the drain (Figure 5);

Figure 5: Kitchen slab and grey water system (T. Owen).

- Store (concrete posts) – two concrete blocks (building support posts) set into the ground 3 m apart. The store building would have been elevated for ventilation and to prevent vermin easily entering the building. A glass beer bottle dump was adjacent to the store's entry;
- A Well – a thin metal pipe, set in concrete, sunk as a bore hole adjacent to the store building;
- Recreation Hut (concrete slab E) – a shallow concrete slab (approximately 4 m by 4 m), set against metal edging;
- Possible 'Gunyah' location – a cleared area in the bush that possibly contained the wooden building designated the "Gunyah" (Fenton 2000:47). This location included a large amount of material culture, including miscellaneous metal, service pipes and a lot of spent ammunition. It is possible that this area was also used for training and perhaps as the camp cricket pitch and badminton court;
- Machine Gun Pit – a U-shaped concrete pit facing the north-east (towards the lighthouse and sea). The Radar station diary (Fenton 2000) notes that two Vickers machine guns were mounted to defend 105 RDF, but the feature does not conform to the Vickers machine gun positions recorded at West Point, or in the Darwin area (which were circular features (2 m diameter) with a sunken corrugated iron surround and vertical metal mount in the centre);
- Operations Hut (concrete slab F) – two adjoining concrete slabs (3.97 m by 1.75 m);
- MAWD/Doover location (concrete slab G) – a square raised concrete block, formed from a fine-grained aggregate concrete (2.45 m by 2.45 m). Whilst it is not certain whether the MAWD was set on a concrete base (although the RS31's array was definitely mounted on one), the MAWD would have been positioned near this site (Figure 6); and
- Miscellaneous features which included weapon pits and spent ammunition (refer to the patterning in Figure 4), broken fragments of brown terracotta service pipes, numerous 44 gallon drums, one adapted as a brazier, piles of bricks stamped with "CARDUP – DBLE PRESS"

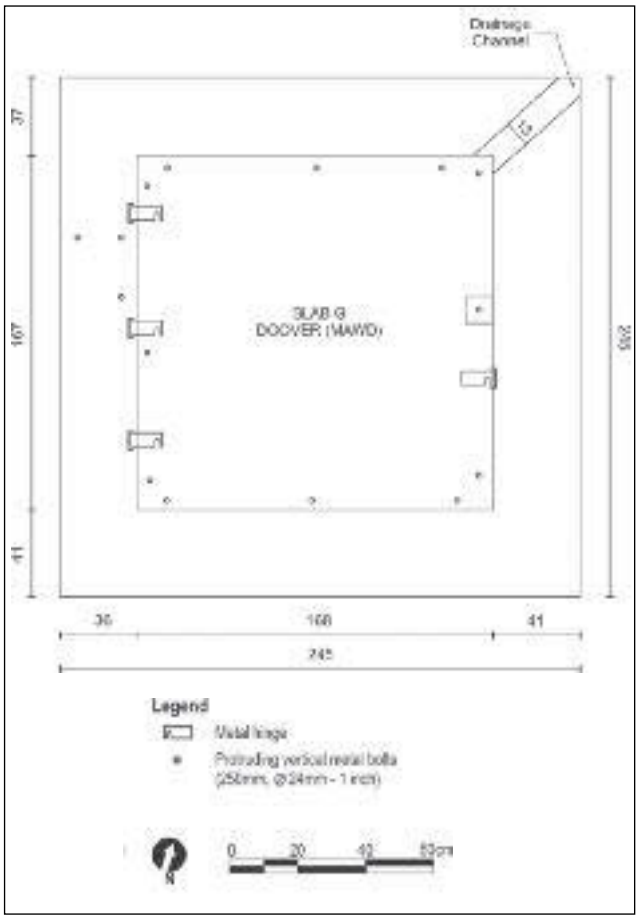

Figure 6: Scale plan of Concrete Slab G.

(possibly from NSW or WA), two dumps of broken bottle and window glass, and a depositary of unused coiled barb wire.

105'S MATERIAL CULTURE

A catalogue of surface based material culture was compiled. Of particular note were the following items:

- Numerous brown and clear glass bottles – including a number of brown beer bottles, stamped 1942 and 1943 with AGM (Australian Glass Manufacturer) and a clear 'JR Watkins' bottle which contained a liniment for 'tired and aching muscles';
- A padlock, two metals key and an oval keyhole escutcheon – the padlock was found outside the store building and one key was found adjacent to the mess slab (two locations that would have stored alcohol and thus required locking);
- Cutlery and storage tins – including a pale green enamel metal tea pot lid, a metal canteen with folding handle, a bully beef tin, a jerry can, two small white ceramic storage jars (possibly vegemite), a salmon colour ceramic mug with white polka-dots and a tooth paste tube (partially folded);
- RAN metal door sign and a metal tag – RAN door sign was found on the mess slab, the metal tag was stamped "James Tombs, Birmingham, England"; and
- A fuel 'drop tank' (Figure 7) and a cylinder block both from a Japanese Zero plane – fuel tanks were dumped by the Japanese prior to the commencement of bombing runs. These frequently washed up on Darwin's beaches and were used by the men of 105 RDF as canoes enabling them to paddle around the bay.

Figure 7: Crumpled drop tank from a Japanese zero (T. Owen).

INTERPRETATION

An archaeological interpretation of 105 RDF provides considerable evidence for a cultural landscape, where careful consideration appears to have been given to the camp's configuration, whilst the material culture provides an insight into the daily lives of the operators who lived in this remote and harsh location.

The location for 105 RDF appears to have been selected due to its proximity to Darwin (enabling radar detection and efficient communication) but also its remoteness, where Japanese planes were less likely to spot the radar, and once the inevitable detection occurred, a specific bombing run was required to target the site (the Cox Peninsula was bombed on 27 August 1942 by six bombers, 31 August 1942 by three bombers and 24 October by three bombers [Alford 2005:78-79] – the station diary does not record any loss of life attributable to these bombing events).

Archaeological recording of the structural remains (Figure 4) provides evidence for the deliberately positioning of buildings; the layout of the camp was planned with the intention of preventing detection by the Japanese. The alignment of all buildings on a north to south axis would have presented a minimum view corridor; a single row of buildings when viewed from a northern airborne aspect. The station diary (Fenton 2000) records that three separate visits by camouflage experts occurred between 1942 and 1943, with a re-arrangement of the camp for camouflage purposes in December 1942. Additionally, all of 105 RDF's infrastructure and buildings were constructed beneath the tree canopy, rather than in the open area adjacent to the Charles Point lighthouse (the lighthouse location contained pre-poured concrete bases, remnants of the former lighthouse buildings, which could have been reused by 105 RDF).

Within the 105 camp layout, it appears that the camp was divided into distinct zones. The first was a 'working' area, in the north of the camp, near the cliffs. This is where the MAWD and operations hut were located. The second zone was a 'living' area that held the mess, a store, a kitchen, the 'gunyah' and presumably accommodation tents. This area would have been central to the lives of the men operating the camp and contained the bulk of material culture, including all the beer bottles. The final zone was the 'entrance' area that contained the entry building, possibly a fuel store and the road leading to the central zone. It is suggested that these zones were devised to provide the men of 105 RDF with daily structure separating the various aspects of their lives (i.e. maintaining a distance between periods of work and leisure time).

The distance between these zones, and the separation between the buildings within each zone, would have made it more difficult to target 105 RDF during a bombing run. Had a bomb scored a direct hit at 105 RDF then only a single building or facility, rather than a number of items, would have been impacted.

The spread of material culture (excluding the ammunition) across the site appears to show a focus within the living zone, where the majority of bottles and food items (plates, cutlery, etc) were recorded. No such items were recovered from the operations zone; however, this zone did contain a number of miscellaneous metal objects, probably associated with construction, operation and maintenance of the MAWD. Outside the boundary of 105 RDF very little material culture was recorded, suggesting that the men did not venture far from the camp's location.

Ammunition was found across the site, but appears to be concentrated within the area of the Gunyah and possible location of the tents. The station dairy provides details of a number of occasions when defence and weapons training was provided for the men of 105 RDF. The concentration of UXO within a cleared zone (Figure 4) possibly indicates the location of this training.

Finally, there are a number of weapons pits located across the wider site (Figure 4). It is suggested that small dug-outs had been excavated for use during the Japanese air raids. However, the station diary notes that the men of 105 RDF valiantly remained at their posts during the air raids.

The quantity of remnant archaeology and material culture present was surprising for such an isolated location, but has possibly been conserved due to its remoteness. The remnant material culture of 105 RDF has shown that whilst the operators of 105 RDF lived far from the regimented daily lives of soldiers in Darwin, they nonetheless lived within a structured camp, with designated zones for working and habitation. 105 RDF appears to have been a place where planning, order and discipline was necessary for undertaking the required task in an isolated corner of Australia through adverse and perilous conditions.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the assistance of Lauren Grey and Danielle Cox (from the Department of Finance and Deregulation) and Irene Polski (United Group Limited) who currently have responsibility for management of Section 34. The project that saw the identification of the 105 RDF was part of the Department of Finance and Deregulations due diligence program in meeting its obligations under the *Environment, Protection and Biodiversity Conservation Act 1999*.

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