Australian Army logistics 1943-1945

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Australian Army Logistics 1943-1945

by

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Abstract

This thesis examines the logistical support of the Australian Army's operations in the South West Pacific from January 1943 to August 1945. It begins by examining the strategic context. Succeeding chapters then examine various topics, including doctrine, base development, problems of storage and tropic proofing, inland water transport, road construction, air supply, amphibious operations and the support of combat operations. In this thesis I argue that the Australian Army's logistical acumen and ability steadily grew with each campaign, resulting in a highly effective military organisation that inflicted a series of crushing defeats on the Japanese.

Statements

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Introduction

The Second World War in general, and the campaigns of 1943-45 in the South West Pacific in particular, have not been popular with Australian military historians. A number of explanations have been advanced for this: that they were complex and difficult to understand; that they were undramatic; that they were so successful that an account might read like one long and boring sweep towards victory; that they were on a small scale; that they did not have a major impact on Australia or on the outcome the war; and that Australians are Eurocentric and apathetic towards Melanesia in spite of the country's location.[1] Logistics has been even less popular. Most historians have concentrated on operations and the high command, leaving logistics to historians of the logistical arms and services. Official Historian Gavin Long conceded that his Second World War Army series:

> ...is basically a history of military operations in the field. The administrative and technical achievements of the Australian Army in six years of war are touched on only when they directly affected the fighting man or were a subject of discussion between soldiers and statesmen.[2]

As early as August 1943 Major General L. E. Beavis, the Master General of Ordnance, had written to the Australian War Memorial to press for "a volume specifically on administration and maintenance" to be included in the Army series.[3] Reviewing Long's *Final Campaigns* in 1964, Beavis took issue with the decision not to cover administration:

> Perhaps if there had been a history of the administration by British and Australian authorities of the First AIF at the outset of the 1939-45 war we would not have been without the organisation to provide the material requirements of a force in the field based on Australia. Such a history might have helped the military authorities between the wars in their failure to train in peacetime an organisation which could have been expanded when war came. As it was, the organisation to look after the arms, ammunition and equipment of the field force had to be created at the same time it was required to function, and it was largely a case of the "blind leading the blind" until with experience and training an efficient organisation came into being.

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1 Stanley, Peter, "The Green Hole: exploring our neglect of the New Guinea Campaigns of 1943-44", *Sabretache*, Vol. XXXIV (April / June 1993), pp. 5-6.

2 Long, Gavin, *The Final Campaigns*, (Adelaide: Australian War Memorial, 1963), p. xv.

3 MGO to LGA, 4 August 1943, NAA (ACT): A2653 /1 M258/1943.

Beavis went on to suggest that "an administrative history of the 1939-45 war would be even more valuable in the future than would have been that for 1914-18".[4] It might well have been. The senior British logistics commander in the Gulf War read the *Administrative History of the Operations of 21 Army Group*,[5] while his American counterpart reached back further, reading *Alexander the Great and the Logistics of the Macedonian Army*, "early in the Gulf campaign, on one of our endless C-12 flights, and borrowed liberally from Alexander's techniques." [6]

Yet Logistics remained "a topic little understood or appreciated by most Australian historians"[7] and administrative histories continued to be a non-official part of Australian military history, with the peculiar exception of medical histories. The focus was on the battle, much as it had been in the British military doctrine of the period before the Great War. Many military historians of the early decades of the 20th Century "regarded battles as the principal, almost the only aspect of warfare which requires investigation".[8] This harkens back to a criticism made by Field Marshal Lord Wavell back in 1939:

> Unfortunately, in most military books strategy and tactics are emphasised at the expense of the administrative factors. For instance, there are 10 military students who can tell you how Blenheim was won for one who has any knowledge at all of the administrative preparations that made the march to Blenheim possible.[9]

The result has provided historians and general readers with an unbalanced, incomplete, and at times misleading account of Australia's war in the South West Pacific. For it was logistics that determined how, where, when, and not infrequently why, those very battles were fought.

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4 Beavis, L. E. "Review Article: The Final Campaigns", *Stand To*, (January-February 1964), p. 22.

5 White, Martin (ed), *Gulf Logistics: Blackadder's War*, (Oxford: Brassey's, 1995); *Administrative History of the Operations of 21 Army Group on the Continent of Europe 6 June 1944 – 8 May 1945*, (Germany: November 1945).

6 Pagonis, William G., and Cruikshank, Jeffrey L., *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*, (Boston: Harvard Business School Press,1992), p. 134; Engels, Donald W., *Alexander the Great and the Logistics of the Macedonian Army*, (London: University of California Press, 1978).

7 Beaumont, Joan, *The Australian Centennial History of Defence, Volume VI, Australian Defence: Sources and Statistics*, (Melbourne: Oxford University Press, 2001), p. 410.

8 Smail, R. C., *Crusading Warfare 1097-1193*, (Trowbridge: Cambridge University Press, 1956), p. 11.

9 Wavell, A. P., *Soldiers and Soldiering*, (Oxford: Alden Press, 1953), p. 22.

Had Long commissioned a volume on administration, then the Australian history might have resembled its US Army counterpart, with its excellent technical services volumes, along with two volumes entitled *Global Logistics and Strategy*. Yet, the finest work on logistics in the US Army series is part of an operations series: Ruppenthal's *Logistical Support of the Armies*.[10] This classic work provides a thorough and detailed overall view of logistics at the operational level, particularly in the campaigns in Normandy and Northern France, where logistical difficulties became overwhelming and ultimately halted the Allied advance. Regrettably, the volumes on operational logistics in the Mediterranean and South West Pacific Theatres were never written.

The term "logistics" was not in general use in the Australian Army before the Second World War. It is derived from the French *marechal de logis*, meaning quartermaster. By the time of King Louis XIV the *marechal de logis* was responsible for the administration of camps and billets.[11] The theorist Jomini used *logistique* to mean staff work in general in his *Precis de l'Art de la Guerre*, published in 1838.[12] In 1888 Alfred Mahan used "logistics" in the sense of supply and movement and by 1911 it had entered the US Navy lexicon in a somewhat broader sense.[13] During the Second World War the term was appropriated by organs of the American high command, including the Joint Logistics Committee and the Strategic Logistics Division of the Army Service Forces. Wartime US Army dictionaries defined logistics in terms of activities involving transportation, storage and supply.[14] Although official acceptance of the term did not occur in Australia until after the war, this does not mean that it was unknown. It does appear in paperwork, having most likely entered the vocabulary through contact with the US Army. In May 1943 "logistic support" appeared as the title of an Australian general staff study of the situation in New Guinea.[15] As the war went on, the US Army began to use the term in a

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10 Ruppenthal, *Logistical Support of the Armies: Volume May 1941- September 1944*, (Washington DC: Department of the Army, 1953); Ruppenthal, *Logistical Support of the Armies: Volume September 1944 - May 1945*, (Washington DC: Department of the Army, 1959).

11 Thompson, Julian, *Lifeblood of War: Logistics in Armed Conflict*, (London: Brassey's, 1991), pp. 5-7.

12 Elting, John R., *The Superstrategists*, (London: W.H. Allen, 1987), p. 280.

13 Furer, Julius Augustus, *Administration of the Navy Department in World War II*, (Washington, DC: U.S. Dept. of the Navy, 1959), pp. 691-692.

14 Millett, J. D., *The Organisation and Role of the Army Service Forces*, (Washington DC: Department of the Army, 1954), pp. 53-54.

15 DA&QMG to DCGS, "Logistic Support", 2 May 1943. AWM54 589/3/11.

wider context, embracing all military activities not included in "strategy" and "tactics".[16] In the Australian Army, this broader function is still termed "administration" while logistics is defined in a narrower sense as that subset of administration that is "the science of planning and conducting the movement and maintenance of forces",[17] a definition lifted from NATO, whose handbook goes on to elaborate that logistics is:

> The aspects of military operations which deal with:
>
> a) Design and development, acquisition, storage, transport, distribution, maintenance, evacuation and disposition of materiel (equipment in its widest sense including vehicles, weapons, ammunition, fuel, etc.);
>
> b) Transport of personnel;
>
> c) Acquisition or construction, maintenance, operation and disposition of facilities;
>
> d) Acquisition or furnishing of services; and
>
> e) Medical and health service support.[18]

This thesis aims to do for the logistical support of the Australian Army's campaigns in the islands to the north of Australia during the latter part Second World War what Ruppenthal did for the US Army's campaigns in North West Europe. As John Moremon has already covered the Papuan campaign of 1942,[19] this thesis commences at the beginning of 1943, and carries the story to the end of the war. It covers logistics, not administration. It does not cover the activities of other services except where they either derived logistical support from the Army or were under Army command, such as the RAN Beach Commandos and RAAF Airfield Construction Squadrons. Nor does it cover the logistical activities of the Army in Australia. An analysis of the failure of the Japanese Army to meet its logistical challenges is left to a Japanese-speaking historian. Because there are medical volumes of the official history, medical aspects of logistics are passed over except where they impacted other aspects of logistics. The Australian focus does permit a depth and breadth of detail which would not be possible in a larger theatre of war with a larger force.

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16 *Logistics in World War II: Final Report of the Army Service Forces*, (Washington DC: Department of the Army, 1993), p. ix.

17 *The Fundamentals of Land Warfare*, (Southwood Press, 1993), p. 93.

18 *NATO Logistics Handbook*. http://www.nato.int/docu/logi-en/logist97.htm. Accessed 20 June 2004.

19 Moremon, J. C., *A Triumph of Improvisation: Australian Army Logistics and the Campaign in Papua, July 1942 to January 1943*, PhD thesis, University College, Australian Defence Force Academy, University of New South Wales, 2000)

I shall attempt to present logistics in a straightforward manner, without shying away from the details, for it is within the details that many of the issues lie. The general dearth of interest in the topic compelled a reliance on primary documents, hundreds of which have been declassified for this thesis.

The normal form of a narrative of the war in the Pacific is a geographical one, with each campaign dealt with sequentially, and the narratives overlapping chronologically. This thesis follows this form in general, but in order to reduce repetition, each chapter also focuses on a particular aspect or aspects of logistics, going into more detail than is devoted to the same issues in other chapters. For example, the chapter on the Bulldog Road examines road construction in greater detail than the later account of the Wau-Labu Road. Normally, the detail comes in the chapter covering the period when techniques were developed, so that the problems involved can be examined in conjunction with their solution. Thus, the chapter on Wau and Salamaua covers the development of air supply techniques, although air supply is touched on again in the chapters on the Ramu Valley and the Mopping Up campaigns.

"The great problem of warfare in the Pacific," General MacArthur declared, "is to move forces into contact and maintain them. Victory is dependent upon solution to the logistic problem."[20] At times the narrative, like the logistical efforts it chronicles, may seem remote from the fighting, with the Japanese enemy nowhere in sight. Yet it was these same efforts which brought the operational units into contact with the Japanese and maintained them. In this thesis I shall explain the logistic efforts which made this victory possible. They were at times spectacular in their own right, ranking with the most remarkable achievements of the Australian Army.

The logistic problem was a complex and multifaceted one. The first challenge was the simple matter of vast distances. From Cairns, the closest Australian port, to Port Moresby is over 800 km, while Townsville lies more than 1,000 km away. Neither was a large, well-equipped port capable of supporting a major campaign. The nearest ports meeting this description were Brisbane, 2,000 km from Port Moresby, and Sydney, 2,700 km away. Nor was it possible to pick up a phone and call New Guinea, for there was no

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[20] Matloff, Maurice, *Strategic Planning for Coalition Warfare 1943-1944*, (Washington DC: Department of the Army, 1952), p. 461.

connecting submarine cable. Urgent signals were relayed by radio, an error prone process. Letters could be couriered by air. The isolation of the bases in New Guinea – to say nothing of the operational units in the jungle – imposed problems of command and control, ultimately requiring a re-think of doctrine.

The second challenge was that New Guinea lacked of the infrastructure needed to conduct modern warfare, with no railways and few roads, buildings, and wharves. There was not even any skilled labour. It was obvious enough that all supplies would have to travel to the islands by sea and air – mainly the former – but harder to envision how and where they would discharge without seaports or airports. A major construction effort was required to develop the necessary infrastructure.

Complicating this was a scarcity of resources. The forces in the South west Pacific did not have enough ships or aircraft. There was also a critical shortage of construction plant and equipment, and of trained units to use them. Only slightly less important, the Army lacked trained logistical units of all kinds, a legacy of its neglect of logistics in the pre-war years. A general transport or supply depot company could be formed quickly enough; but trucks did not last long in the hands of untrained drivers, and a depot run by inexperienced storemen proved to be little better than simply dumping the stores in the jungle. There was also a shortage of staff officers with expertise in logistical planning, and this shortage took than any other to remedy.

The climate and terrain of New Guinea was an enormous challenge. The heat, heavy rainfall, and high humidity made storage and handling difficult. Roads became seas of mud, or were washed out by swollen rivers, or blocked by landslides. Low cloud and mountains too high to fly over restricted aircraft operations. Lightening stuck signal lines and reduced them to ash. Tropical diseases were endemic and also took their toll.

The outbreak of war in 1939 found the Army lacking "the manpower, equipment and resources required to plan and conduct a campaign in *any* theatre of war".[21] Little had changed by 1942, yet the campaign in New Guinea saw the Australian Army having to stand on its own feet for the first time. In no way was the Australian Army dependent on the US Army for logistical support, although Lend Lease played an important part and the

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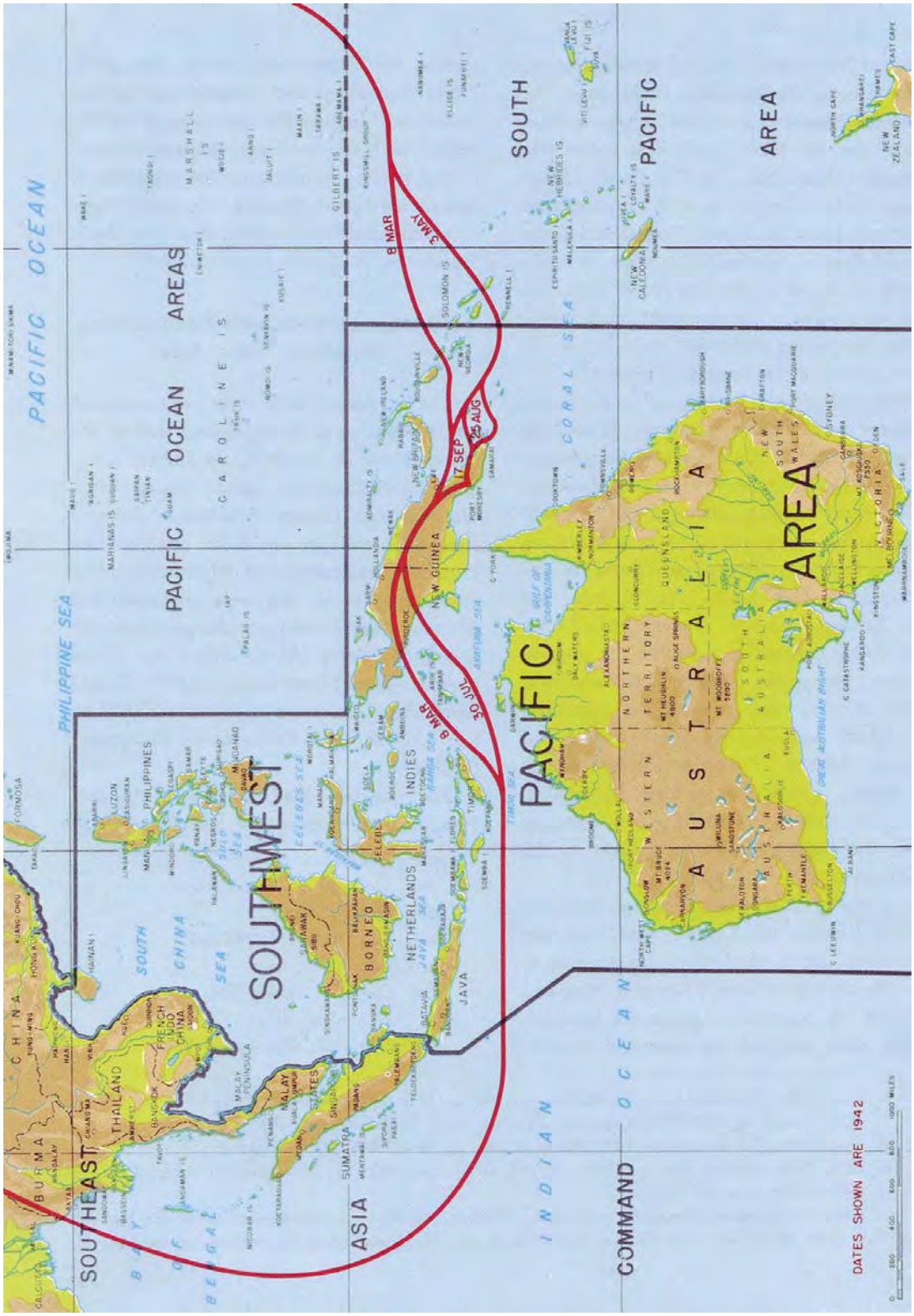
[21] Moremon, *A Triumph of Improvisation*, p. 53. (Emphasis mine).

US Army controlled much of the landing craft and inter-theatre shipping. Rather, it was the other way around: the US Army arrived in Australia without sufficient logistical support to sustain itself, and was heavily reliant on its Australian counterpart, especially for food and fuel, for a long time. The Australian Army was dependent on the RAAF and USAAF for transport aircraft and increasingly on the RAN and USN for amphibious lift. Construction projects often involved personnel from two or three services. Coordination and cooperation between the allies and the different services was necessary.

Last, but by no means least, there was the Japanese enemy, who was resourceful, tenacious and stubborn. Japanese aircraft and submarines had the potential to disrupt Allied supply lines, and on occasion the bases themselves could come under attack. Defeating the enemy would a comprehensive solution to the logistical problem.



Maps 1. South West Pacific Area

Source: *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, Volume I, p. 32.

1. Strategy, Command and Logistics

In the year since the South West Pacific Area (SWPA) had been formed in April 1942, there had been considerable fighting. But while the Japanese advance had been halted, the process of rolling it back had scarcely begun. Nor had an overall strategy for the ultimate defeat of Japan been formulated. The US Joint Strategic Committee had commenced work on a strategic plan in August 1942 but had not completed it. At Casablanca in January 1943, the British and American political and military chiefs merely reaffirmed their policy of defeating Germany first, with limited offensive operations against Japan, including the one underway since mid-1942 aimed at the capture of Rabaul.[1]

American planners had been studying the prospect of war with Japan for decades. As early as 1907, long before Japan had occupied Micronesia, the US Navy had decided that the "natural line of advance" had been determined to be across the Central Pacific. The logistics of fighting a war across the Pacific Ocean were properly recognised as daunting. It was estimated that over a thousand ships would be required just to haul fuel, ammunition and stores, while a score of naval construction battalions would be required to build advanced bases. From 1928 onwards the planners assumed that landings on the Micronesian islands that would have to be seized would be opposed.[2]

The course of events of the first few months of the war caused the pre-war plans for a Central Pacific offensive to be put aside rather than abandoned,[3] while "logistical concerns drew the United States to Australia".[4] Although the chances of the American forces holding out in the Philippines were acknowledged as militarily hopeless, it was still considered politically and psychologically important to make an effort to help them. As the line of communications across the Central Pacific was blocked by islands held by the

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1 Grace Person Hayes, *The History of the Joint Chiefs of Staff in World War II: The War Against Japan*, (Annapolis: Naval Institute Press, 1982), pp. 304-307.

2 Miller, Edward S., *War Plan Orange: The US Strategy to Defeat Japan*, (Annapolis, MD: Naval Institute Press, 1991), pp. 147, 336.

3 Ibid, p. 333.

4 Drea, Edward J., "'Great Patience is Needed': America Encounters Australia, 1942", *War and Society*, Volume 11 Number 1, (May 1993), pp. 21-51.

Japanese, the only way to reach the Philippines was from the South, and for that a base had to be established in Australia.[5]

The arrival in March 1942 of General Douglas MacArthur in Australia as Supreme Commander of SWPA[6], effected a change in the political situation, as he raised expectations among the public in the US and Australia that an offensive would soon be launched against the Japanese in the South West Pacific.[7] MacArthur became convinced that this route was altogether preferable to that through the Central Pacific:

> My strategic conception for the Pacific Theatre… contemplates massive strokes against only main strategic objectives, utilizing surprise and air-ground striking power supported and assisted by the fleet. This is the very opposite of what is termed 'island hopping' which is the gradual pushing back of the enemy by direct frontal pressure with the consequent heavy casualties which will certainly be involved. Key points must of course be taken but a wise choice of such will obviate the need for storming the mass of islands now in enemy possession. 'Island hopping' with extravagant losses and slow progress… is not my idea of how to end the war as soon and as cheaply as possible. New conditions require for solution and new weapons require for maximum application new and imaginative methods. Wars are never won in the past.[8]

By attacking on the periphery of the vast area occupied by Japan the enemy's logistical difficulties would be maximised while the Japanese would be unable to field more than a small fraction of their numerically superior land forces. Unfortunately, Japanese logistical difficulties did not translate into Allied advantages. New Guinea and the islands of the South West Pacific posed daunting challenges. The terrain was rugged, the climate was inhospitable, and the country was devoid of the infrastructure needed to conduct modern warfare. On the other hand, New Guinea and the islands were large enough to hold substantial bases, and were unfortified. A land-air campaign was possible, even if the Japanese fleet controlled the Pacific.

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5 Morton, Louis, *The War in the Pacific: The Fall of the Philippines*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1953), pp. 152-153.

6 MacArthur informed the Australian government that he preferred the title of Commander in Chief. James, Dorris Clayton, *The Years of MacArthur, Volume II 1941-1945*, (Boston: Houghton Mifflin, 1975), p. 844.

7 Hayes, *The History of the Joint Chiefs of Staff in World War II: The War Against Japan*, p. 121.

8 *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific, Volume I*, (Washington DC: U.S. Government. Printing Office, 1966), p. 100.

Then there was the presence of Australia itself, which served as both a base and a source of supplies. While American pre-war planners had assumed that Australia would be on America's side in any war with Japan,[9] the US Navy rejected the idea of obtaining supplies from Australia.[10] Yet, in no other theatre of war was local procurement by American forces so extensive. While Lend Lease to Australia was estimated at USD $1.4 billion, only 3.3% of Lend Lease to all countries, Australian Reverse Lend Lease came to USD $1.1 billion, which represented 13.0% of all aid to the United States.[11] General MacArthur noted that in the second half of 1942, between 65 and 70% of the needs of his American forces were supplied from local production and that Australia actually shipped more supplies to the neighbouring South Pacific Area (SOPAC) than the United States shipped to SWPA.[12]

Such figures actually understate the true value of Australian aid, for it went straight to the most important bottom line of all: shipping. Every ton procured in Australia saved two in the Atlantic. American procurement of meat in Australia, for example, was not only fifteen times as great as purchases in the United Kingdom but, being entirely local production, represented a substantial saving in shipping, whereas much of that purchased in the UK was originally imported from Argentina and therefore represented no such saving. In all, American forces acquired some 4,097,000 m^3 of supplies in Australia, of which food accounted for 1,930,000 m^3 or 47%, which led to it being described as the "most arresting example of successful Australian-American cooperation".[13]

Australian-American cooperation did not come easily. Neither army had considered the prospect of close logistical cooperation of the order that was required, and achieved, under the conditions of 1942. The two armies had quite different doctrine and procedures. Weapons were different, requiring different ammunition, thereby restricting the scope for cooperation in this regard. Even units of measurement were different. While agreement

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9 Gole, Henry G., *The Road to Rainbow: Army Planning for Global War, 1934-1940*, (Annapolis, MD: Naval Institute Press, 2003), p. 98.

10 Miller, *War Plan Orange*, p. 147.

11 Butlin, S.J. and Schedvin, C. B., *War Economy 1942-1945*, (Adelaide: Australian War Memorial, 1977), pp. 129-131.

12 MacArthur, Douglas, *Reminiscences*, (Annapolis: Naval Institute Press, 2001), p. 158.

13 Stauffer, Alvin P., *The Quartermaster Corps: Operations in the War Against Japan*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1956), pp. 98, 120-121.

was reached on the length of an inch, an Australian gallon was different from an American one, and the different types of tons provided a source of endless confusion.[14]

MacArthur had a clear concept of how the campaign should be conducted:

> The general scheme of manoeuvre is to advance our bomber line towards Rabaul; first by improvement of presently occupied air bases; secondly, by the occupation and implementation of air bases which can be secured without committing large forces; and then, by the seizure and implementation of successive hostile aerodromes.
>
> By destructive air attack soften up and gain air superiority over each attack objective along the two axes of advance. Neutralise with appropriate aviation supporting hostile air base and destroy hostile naval forces and shipping within range. Prevent reinforcement or supply of objectives under attack. Move land forces forward, covered by air and naval forces, to seize and consolidate each successive objective. Displace aviation forward onto captured airdromes. Repeat this process to successive objectives, neutralising by air action, or by air, land and sea action, intermediate hostile installations which are not the objectives of immediate attack.[15]

This was the "Step by Step" tactics of 1917, with air power substituted for artillery. In 1917, operations had ground to a bloody halt in the face of unfavourable terrain, bad weather, logistic difficulties and tenacious enemy resistance. This time, all these factors could be taken as given.

MacArthur moved his General Headquarters (GHQ) to Brisbane on 20 July 1942, this being the northernmost city in Australia with the necessary communications facilities.[16] Three major Allied commands had been established: the Allied Air Forces (AAF), under Major General George C. Kenney from 13 July 1942; the Allied Naval Forces (ANF), under Vice Admiral Arthur S. Carpender from 11 September 1942; and the Allied Land Forces (LHQ), under General Blamey.[17] The latter was largely an administrative

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[14] See the Appendix on Units of Measurement for more details.

[15] CoS GHQ SWPA, *Warning Order No. 2*, 6 May 1943, AWM54 589/5/3.

[16] Senior staff at GHQ were: Major General Richard K. Sutherland, Chief of Staff; Brigadier General Richard J. Marshall, Deputy Chief of Staff; Colonel Charles P. Stivers, Assistant Chief of Staff, G-1 (Personnel); Colonel Charles A. Willoughby, Assistant Chief of Staff, G-2 (Intelligence); Brigadier General Stephen J. Chamberlin, Assistant Chief of Staff, G-3 (Operations); Colonel Lester J. Whitlock, Assistant Chief of Staff, G-4 (Supply); Brigadier General Spencer B. Akin, Signal Officer; Brigadier General Hugh J. Casey, Engineer; Brigadier General William F. Marquat, Antiaircraft Officer; Colonel Burdett M. Fitch, Adjutant General; Colonel LeGrande A. Diller, Public Relations Officer. Milner, S., *Victory in Papua*, (Washington: Department of the Army, 1957), p. 23.

[17] Milner, *Victory in Papua*, p. 48; Morison, S. E., *Volume VI: Breaking the Bismarcks Barrier, 22 July 1942 - 1 May 1944*, (Boston: Little, Brown and Co., 1950), p. 32.

command, with land operations conducted by task forces directly under MacArthur. The most important of these was New Guinea Force, which was personally commanded by Blamey from 27 September 1942 to 13 January 1943. Each of these headquarters was operated by a single service, and run along service lines. GHQ was a US Army headquarters, ANF was a US Navy headquarters and LHQ was an Australian Army headquarters. This made for internal efficiency, as staff were familiar with the procedures, but it made coordination between the different headquarters more difficult, as they could be subject to inter-service or national conflicts. Neat lines of command and control were not a passion of General MacArthur's. SWPA's organisation was messy, with many individuals wearing multiple "hats", and there were a number of organisations whose authority was ill-defined.

In the wake of the American naval victory in the Battle of Midway, GHQ had worked up a plan, codenamed TULSA I, for the capture of Rabaul, along with bases in New Guinea and the Solomon Islands, in just ten days. Apparently the G-3 at GHQ, Brigadier General Stephen J. Chamberlin, felt that this was too ambitious, so a revised plan, TULSA II, was forwarded to Washington, in which the timetable was expanded to 18 days.[18] Although in retrospect "so grandiose and unrealistic that they appear to have been conceived without careful consideration of logistics or of enemy strength", [19] TULSA II was well-received in Washington. Air planners felt that the existing air base at Port Moresby was insufficient to cover a landing at Rabaul, so they recommended seizing the Japanese air bases at Lae and Salamaua. In view of the difficult terrain that made a land operation impractical and the Japanese air strength that ruled out a naval one, they suggested that paratroops be used. [20] None were available, but the US 503rd Parachute Infantry was ordered to SWPA.[21]

Blamey considered an attack on Lae as a follow on to the capture of Buna. In view of the enemy strength around Lae and Salamaua, he reckoned that at least two brigades would be required. As ships would be vulnerable to Japanese aircraft and the volume of supplies

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[18] James, *The Years of MacArthur, Volume II 1941-1945*, p. 188; FO I. C. Pratt, "The Strategy of the Joint Chiefs of Staff in the War Against Japan and the Planning of General of the Army Douglas MacArthur", 15 April 1946, AWM54 519/6/59.

[19] James, *The Years of MacArthur, Volume II 1941-1945*, p. 188.

[20] Hayes, *The History of the Joint Chiefs of Staff in World War II: The War Against Japan*, p. 142.

[21] Kelly, Robert H., *Allied Air Transport Operations in the South West Pacific Area in WWII Volume Two: 1943 – Year of Expansion and Consolidation*, (Brisbane: Harding Colour, 2006), p. 492.

required would be too much for the available small craft if they still had to supply Buna, he proposed an air landing at Nadzab followed by an overland advance on Lae down the Markham Valley.[22] MacArthur responded cautiously to this proposal:

> The successful employment of any considerable body of troops on the north shore of New Guinea is entirely dependent upon lines of communication. The enemy has complete control of the sea lanes and we are not now, nor have any reasonable expectation of being, in a position to contest that control. In consequence, although we shall employ shipping to the maximum extent possible in the supply of our forces, our fundamental plans are limited by the fact that the enemy can cut that line at will with so small a force as a few motor torpedo boats.[23]

In the event, the troops that Blamey intended to use, the 6th Division, were drawn into the fighting around Buna and Wau. His plan was incorporated into GHQ's ELKTON I plan for the capture of Rabaul, which was reviewed by Blamey and his staff in February. Blamey recommended the elimination of ELKTON I's first phase, the occupation of Woodlark and Kiriwina Islands, which was done.[24]

In March 1943, MacArthur sent a delegation to the Pacific Military Conference in Washington, where they presented ELKTON II to the US Joint Chiefs of Staff, hoping to gain additional resources, as the Japanese had reinforced their positions in New Guinea. The Joint Staff Planners looked at ELKTON II and what could be spared. They found that 128,000 troopship places and 87 cargo ship sailings would be available. Two additional infantry divisions were no problem for the US Army, which could replace them with new ones activated in 1943. The US Navy believed that it could supply the required landing ships from production originally ordered for cancelled operations in Europe that now had to be completed, if only to free up the slips for other ships. The sticking point was aircraft, particularly heavy bombers, which could only be taken from the air offensive against Germany. This, the Joint Chiefs would not do. They increased the number of US aircraft allocated to SWPA from 734 to 1,373 but only 144 of these would be heavy bombers. All told, the additional units required 107,000 troopship places and 90 cargo ship sailings.[25]

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22 CinC ALF to CinC SWPA, 18 October 1942, Blamey Papers, AWM 3DRL 6643 2/47.

23 CinC SWPA to CinC ALF, 20 October 1942, Blamey Papers, AWM 3DRL 6643 2/47.

24 CinC ALF to CinC SWPA, 15 February 1943, AWM54 519/5/5.

25 Memoranda by the Joint Staff Planners, "Plan for Operations for the Seizure of the Solomon Islands – New Guinea – New Britain – New Ireland Area", 18, 20 March 1943, NACP: RG218 Box 320 CCS381.

Owing to the required resources not being provided, ELKTON II's final phase, the assault on Rabaul, was postponed to 1944. Regrettably, MacArthur's chief of staff, Major General Richard K. Sutherland, reinstated the Kiriwina-Woodlark operation in the bargaining process.[26]

The American land forces in SWPA numbered around 111,000 at this time, of whom 30,000 were in New Guinea, 12,000 of them in logistical units.[27] The principal American logistics agency was US Army Services of Supply (USASOS), based in Sydney, under the command of Brigadier General Richard J. Marshall, and later Brigadier General James L. Frink from September 1943. In February 1943, United States Army Forces in the Far East (USAFFE) was reformed in Brisbane. Primarily an administrative agency, it also contained the chiefs of the services, resulting in dividing responsibility for logistics until they returned to USASOS in September 1943.[28]

As Blamey noted, since most of the additional American troops would not arrive until later in the year, "the great bulk of the land fighting in the South West Pacific fell on the Australian Army" in 1943, as it had in 1942.[29] In April 1943, the Australian Army numbered some 489,000, of whom 23,000 were women. Of these, some 55,000 were in New Guinea, 14,000 of them in service and base units.[30] Blamey's headquarters, Allied Land Forces Headquarters, (LHQ), was in Melbourne.[31] For coordination with GHQ, an Advanced LHQ was established in Brisbane in August 1942 under the Deputy Chief of the General Staff (DCGS), Major General F. H. Berryman.[32]

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26 Minutes of Joint Chiefs of Staff Meeting, 21 March 1943, NACP: RG218 Box 320 CCS381.

27 Dexter, David, *The New Guinea Offensives*, (Adelaide: Australian War Memorial, 1961), p. 15.

28 Bykovsky, Joseph and Larson, Harold, *The Transportation Corps: Operations Overseas*, (Washington: Department of the Army, 1957), pp. 430-431.

29 Long, Gavin, *The Final Campaigns*, (Adelaide: Australian War Memorial, 1963), p. 20.

30 Dexter, *The New Guinea Offensives*, p. 15.

31 Senior staff at LHQ were: Lieutenant General John Northcott, Chief of the General Staff (CGS); Major General F. H. Berryman, Deputy Chief of the General Staff (DCGS); Lieutenant General H. D. Wynter, Lieutenant General Administration (LGA); Major General V.P. H. Stantke, Adjutant General; Major General J. H. Cannan, Quartermaster General (QMG); Major General L. E. Beavis, Master General of Ordnance (MGO); Major General C. H. Simpson, Signal Officer in Chief; Major General C. S. Steele, Engineer in Chief; Major General J. S. Whitelaw, Major General, Royal Artillery; Major General S. R. Burston, Director General of Medical Services. Horner, David, *Blamey: The Commander in Chief*, (Singapore: Allen & Unwin, 1998), p. 277.

32 War Diary, G Branch Advanced LHQ, 1 August 1942, AWM52 1/2/1.

The primary supply service was the Australian Army Service Corps (AASC), which was responsible for the supply of food, fuel, fodder, and road transport. The primary road transport unit was the general transport company, which operated American ¼-ton 4x4 jeeps, Australian 3-ton 4x4 and American 2½ ton 6x6 trucks.[33] Supplies were handled by supply depot platoons. In the field, one or two of these would establish a Detail Issues Depot (DID), which would handle all types of supplies.[34] Further back, technical stores would be handled by the appropriate technical service, while fuel would be handled by Bulk Issues Petrol and Oil Depot (BIPOD) platoons. The Australian Army Ordnance Corps (AAOC) operated ammunition and ordnance depots. In November 1942, the repair and maintenance function was split off into a separate corps, the Australian Electrical and Mechanical Engineers (AEME).[35] In 1942 there were 137,236 men in the infantry, cavalry and armoured arms of the Army but by August 1945 they totalled only 62,097, while those in AAOC and AEME increased from 29,079 in 1942 to 42,835 by August 1945. Of 52 officers promoted to the rank of lieutenant colonel in the last half of 1944, only five were from the infantry and two were engineers. None came from the other combat arms, the remaining 45 all being from the services.[36]

On 6 May 1943, GHQ issued *Warning Instruction No. 2*, which provided a broad outline of the roles of the higher level commands in upcoming operations. Operations in New Guinea, codenamed CARTWHEEL, were divided into three parts: CHRONICLE, the occupation of Woodlark and Kiriwina Islands; POSTERN, the capture of Lae, Salamaua, Finschhafen and Madang; and DEXTERITY, the seizure of western New Britain.[37] Codenames were allocated by GHQ from a dictionary. The use of place names as codenames was avoided to prevent a repetition of incidents during the Papuan Campaign when confusion between place names and code names allegedly caused items to be accidentally shipped to places like Malvern, Victoria and Fall River, Massachusetts.[38]

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33 The term 4x4 meant a four wheel vehicle with four wheel drive. The fact that the 6x6 actually had ten wheels, since the wheels on the rear two axles were doubled, did not escape notice.

34 Lindsay, Neville, *Equal to the Task: Volume 1 – The Australian Army Service Corps*, (Brisbane: Historia Productions, 1991), pp. 331, 342-343, 363.

35 Tilbrook, J. D., *To The Warrior His Arms*, (Parramatta, New South Wales: MacArthur Press, 1989), p. 240.

36 Long, *The Final Campaigns*, p. 81.

37 Chief of Staff, SWPA, *GHQ Warning Order No. 2*, 6 May 1943, AWM54 589/5/3; DCGS to LGA 9 May 1943, AWM54 189/5/3.

38 Tilbrook, *To The Warrior His Arms*, p. 331; Morison, *Breaking the Bismarcks Barrier*, p. 52.

New Guinea Force, codenamed PHOSPHORUS, was assigned to POSTERN while CHRONICLE and DEXTERITY were assigned to the US Sixth Army, as New Britain Force, codenamed ALAMO, although there remained a strong possibility that Australian troops would become involved in DEXTERITY.

How long Lae would take to capture was difficult to predict. Allied intelligence reported that "the defences of Lae are by far the most complex and intricate of the areas under consideration and in this respect are perhaps nowhere surpassed in the SWPA", and Blamey was prepared for another knock-down-drag-out fight like Buna. He submitted an outline of his POSTERN plan to GHQ and New Guinea Force on 17 May, subdividing it into two phases: (1) the capture of Lae and the Markham River Valley and (2) subsequent operations to complete the seizure of the north coast as a far as Madang. As in 1942, Blamey intended to use the AIF as a spearhead while the militia provided the garrison forces. The first phase would be carried out by the 7th and 9th Divisions; the second by the 6th Division. The 7th Division would move to Moresby in troop transports, take coastal craft across the Gulf of Papua to the mouth of the Lakekamu River, travel up the river in small craft to Bulldog, and then take the Bulldog Road to Wau, where it would assemble. From there it would advance overland to the Markham River, cross it, and establish an airbase.[39] The area contained a number of old landing strips which could be developed and one at Nadzab was chosen as the most promising.[40]

Overland supply required the Bulldog Road to be completed and capable of carrying motor traffic. By June, it was estimated to be ready by 15 August. Once open, it would still take time to set up the transport and depots required to make it a fully functional line of communications. Given the resources to ship the required vehicles from Port Moresby, it was estimated that it would be in business by October. The alternative was to run a road through to Wau from Nassau Bay, but this could not be completed before the end of October – some thought November would be more like it. It therefore was not as good a prospect as the Bulldog Road. Driving a road forward from Wau to the Markham River required heavy equipment, and the only way to get it forward would be down the Bulldog Road, so construction could not begin until the Bulldog Road was completed, which was

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39 DCGS LHQ to GOC NGF, "Future Operations - New Guinea", 17 May 1943, AWM54 89/3/11.

40 CinC AMF, *Report on New Guinea Operations 4 Sep 43 – 26 Apr 44*, undated, AWM113 MH 1/151.

estimated to take 2½ months. If all went well, an overland line of communications might be ready by December.[41]

Continuation of a land supply line over the Markham River at first looked like it would require a bridge, which was estimated to take a field company about twelve weeks to construct.[42] Always receptive to new technologies, Blamey proposed to overcome this by using DUKWs,[43] amphibious trucks, to carry supplies across the river. They were not yet available in SWPA, as first priority on production went to the North African Theatre,[44] but some 100 were due to arrive in SWPA in June or early July and another 150 by mid-August, so GHQ was able to offer 50 for the Markham River and another 36 for the 9th Division's amphibious operation.[45]

About 5,000 troops could be transported to New Guinea each week and the trip from Port Moresby to Wau via the Bulldog Road, which was expected to carry about 1,200 troops per day, would take 10 days. Working backwards, from the POSTERN target date of 1 August 1943, the 7th Division would need to be ready to move on 21 May, so POSTERN was behind schedule before it began.[46] To make the target date, the troops would have to move to Wau by air. Admittedly, the target date was unrealistic and soon slipped, first to 27 August and later to 4 September. There were also concerns about the availability and capacity of the Bulldog Road, due to delays in acquisition of the craft and equipment required for the river, and slow progress on the road. It became increasingly clear that, in the initial stages of the operation at least, all movement and maintenance might have to be

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41 GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

42 Minutes, Planning Conference, Adv LHQ, 10 June 1943, AWM54 213/3/20.

43 Pronounced "duck". An amphibious truck developed by the General Motors Corporation from the standard 6x6 2½-ton design. The name came from the manufacturer's code: D for 1942, U for utility, K for front wheel drive and W for two rear driving axles. Green, Constance McLaughlin, Thomson, Henry C., Roots, Peter C., *The Ordnance Department: Planning Munitions for War*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1955), p. 227.

44 Leighton, Richard M. and Coakley, Robert W., *Global Logistics and Strategy 1943-1945*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1967), p. 489.

45 BGS (Ops), "Discussion between DCGS and Gen Chamberlin G3 GHQ 31 May 1943", 1 June 1943, AWM54 213/3/20.

46 GS(Ops), "Operations 6-7-9 Aust Divisions", 7 May 1943, AWM54 9/5/12.

by air. As all transport aircraft were based at Port Moresby at this time, the 7th Division and all its supplies were concentrated there.[47]

The use of paratroops was suggested to enable the Markham to be crossed, and the airstrip at Nadzab to be captured and readied for use as soon as possible. General Blamey persuaded GHQ to allocate the 2nd Battalion, US 503rd Parachute Infantry for the capture of Nadzab or some other airfield north of the Markham River. Orders went out to the battalion to proceed to Cairns and thence to Port Moresby by air on 18 August.[48] Major General G. A. Vasey, the commander of the 7th Division, was enthusiastic about the use of his paratroops, which may have come from his experience as a brigade commander during the German airborne assault attack on Crete in 1941. He doubted that one battalion would be enough and asked for the entire regiment, along with gliders to carry materials and equipment for the airstrip.[49] General Kenney was agreeable to this plan and Blamey was soon able to persuade MacArthur as well. The regiment was assigned to Blamey, subject to the restriction that it not be used in place of infantry. Orders went out on 8 August for the rest of the 503rd Parachute Infantry to move to Port Moresby. General Blamey was made responsible for its transportation to New Guinea, so the *Duntroon* and *Taroona* moved them up to Port Moresby on 20 August.[50]

In the original plan, the main attack on Lae was the overland one, with a "small, diversionary seaborne attack using landing craft operating from Morobe",[51] but after considering reports of Japanese strength along the north coast, Blamey decided to employ two brigades in the amphibious landing.[52] His operation would wind up taking the form of a classical double-envelopment, but its genesis was in a simple effort to use whatever means of transport were available in order to bring his troops into contact with the enemy.

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47 GOC I Corps, *Report on Operations New Guinea 22 Jan – 8 Oct 43*, AWM54 589/7/1.

48 *GHQ Operations Instruction No. 34/4*, 3 August 1942, AWM54 589/5/3.

49 GOC 7th Division to GOC NGF, "Operation EXCHEQUER", 2 August 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

50 OC 503 PIR to CG Airborne Command, "Report on Outlook Operation", 31 October 1943, AWM54 589/7/23; *GHQ Operations Instruction No. 34/5*, 8 August 1942, AWM54 589/5/3.

51 LHQ, "Plan for Offensive Operations SWPA: Alternative Proposal LHQ – 22 Feb 43", 22 February 1943, AWM54 591/5/5.

52 "Agenda, Conference Regarding Second Engineer Special Brigade", 14 June 1943, AWM54 213/3/20.

In this case, the means were the US Army's 2nd Engineer Amphibian Brigade, which was formed in 20 June 1942, as a result of a crash program to train Army boat crews for SLEDGEHAMMER, an operation in the English Channel. The US Army searched its personnel records for men with the required skills in small boat handling, such as fishermen and yachtsmen, and ran a recruiting campaign to obtain others. To differentiate themselves from the navy, the amphibian engineers emphasised "shore-to-shore" operations, in which troops travelled to the objective in their landing craft, as opposed to "ship-to-shore" operations, in which they travelled in transports and transferred to landing craft at sea for the run in to the beach. Eight brigades were authorised in June 1942 but changes in plans – the substitution of an invasion of North Africa for SLEDGEHAMMER – led to their number being cut to just three in August. It also left them without a mission, and their attention became drawn to SWPA.[53]

By Australian standards, the 2nd Engineer Amphibian Brigade was huge, with an establishment of 7,176 men, built around three boat and shore Regiments, each containing a boat battalion and a shore battalion.[54] Each regiment was capable of lifting a brigade so the brigade could transport a division. That it required half the strength of a division to do so did not escape critical comment.[55] An important component was the amphibian engineer scouts, whose job was reconnaissance, marking of beaches and ship-to-shore communications.[56] MacArthur was impressed with the capabilities of the amphibian brigades and requested three,[57] explaining that operation against Rabaul called for the use of three divisions and hence three amphibian engineer brigades.[58] The next month, the US Army concluded an agreement with the USN, under which the USN assumed

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53 Heavey, William F., *Down Ramp! The Story of the Army Amphibian Engineers,* (Nashville: The Battery Press, 1988), pp. 2-3, 13.

54 Casey, H. J. (ed), *Engineers of the Southwest Pacific 1941-1945: Volume IV: Amphibian Engineer Operations*, (Washington: Government Printing Office, 1959), p. 49.

55 Coll, B. D., Keith, J. E. and Rosenthal, H. H., *The Corps of Engineers: Troops and Equipment*, (Washington: Department of the Army, 1958), p. 387.

56 Casey, *Amphibian Engineer Operations*, p. 39.

57 MacArthur to AGWAR, 20 November 1942, NACP: RG496 Box 2061.

58 MacArthur to AGWAR 27 November 1942, NACP: RG496 Box 2382.

responsibility for landing craft, but MacArthur's three amphibian brigades were specifically exempted.[59]

SLEDGEHAMMER's cancellation freed up landing craft for other theatres and in October 1942 284 11-metre Landing Craft, Vehicle, Personnel (LCVP) and 172 15-metre Landing Craft, Mechanised (LCM) were allocated to SWPA, but delivery was slow and only 66 LCVPs, 10 LCMs and 3 of the larger 36-metre Landing Craft, Tank (LCT) had been shipped by 4 January 1943.[60] This was because landing craft were being shipped deck loaded. At most a Liberty ship could carry twelve this way, in competition with aircraft and other bulky items. Deliveries were therefore limited to around 60 per month. At this rate, ten months would be needed to ship the brigade's 600 boats. The amphibian engineers developed a proposal to ship landing craft disassembled and assemble them in Australia.[61] The finished weight of an LCVP was around 6,000 kg and allowing for 10% additional weight for crating the boat and engine, each disassembled boat would require just 11 m^3. Given that the net tonnage of a Liberty ship was around 12,400 m^3, it followed that 1,000 LCVPs could be carried disassembled in a single ship. Of course, so many valuable craft would not actually be risked on just one ship. Because there were no small boat yards of a suitable capacity in Australia, the supply of tradesmen was limited, and shipyards were under considerable strain owing to the demands of the war in the Pacific and the loss of ports and shipyards in Europe through enemy occupation, a special unit was created to assemble the boats.[62]

Cairns was chosen as the site for the boat assembly plant. It had a railway, deep-water harbour capable of handling Liberty ships, housing, shops and electric power and was closer to New Guinea than other prospective sites. The first LCVP came off the assembly line in April 1943. Output never came close to the original forecasts, but by working a two-shift, 17-hour day, 497 LCVPs were assembled by 20 July, when production was suspended. It resumed in September and continued until January 1944, by which time

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59 Memorandum of Agreement of the Chief of Staff, US Army and Commander in Chief, US Fleet and Chief of Naval Operations, 13 April 1943, NACP: RG496 Box 667.

60 Leighton, R. M. and Coakley, R. W., *Global Logistics and Strategy 1940-1943*, (Washington: Department of the Army, 1954), pp. 408-409.

61 *Engineer Memoirs: Lieutenant General Arthur G. Trudeau*, (Washington: United States Army, 1986), pp. 94-104.

62 Casey, *Amphibian Engineer Operations*, pp. 711-713.

over 900 landing craft had been assembled at Cairns and another assembly plant had been established at Milne Bay.[63]

The amphibian engineers' most important requirement was fuel. Each LCVP had a 112-gallon fuel tank and could carry four 44-gallon drums of distillate. It was estimated that 100 LCVPs would require up to 45,000 litres per day. As the US Army's resources were inadequate, the Australian Army agreed to supply their needs, in 44-gallon drums. Refuelling points were established at Townsville and Mackay.[64]

Like its American counterpart, the Australian Army recognised the potential of water transport but it was not until September 1942 was it given approval to operate small craft other than harbour craft. The RAN could not provide the manpower to operate small craft, which in any case it did not see as part of its responsibilities. The services agreed that the Army should "acquire, man and operate" small craft,[65] which became the responsibility of a new Directorate of Water Transport (Small Craft) at LHQ.[66] Vessels taken up include the Hawkesbury River ferries *George Peat* and *Frances Peat*; the Tasmanian schooner *Alma Doepel*, the Sydney Harbour ferry *Kalang*, the island trader *Muliama*, the Tasmanian ketches *Abel Tasman*, *John Franklin* and *Arga*, and many others. This wide variety of small craft was a nightmare to maintain, with many types and makes of engines, requiring different spare parts. Many of the craft acquired were unsuitable for the work they now had to undertake. Yet they gave sterling service.[67] Small craft provided logistic support in many areas that were otherwise inaccessible. Between January 1942 and July 1945, Army small craft carried 1,016,000 tons of cargo and 1,490,012 troops over the course of 141,319 voyages, logging over 3 million km.[68]

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63 Ibid, pp. 32-33, 39-41; Heavey, *Down Ramp!* p. 49.

64 Captain A. J. Yonkers to Petroleum Section OCQM, "Requirements for Automotive Diesel Fuel (Distillate)", 15 February 1943; DDST QLoCA, "POL Supplies 2nd Amphibian Brigade", 23 February 1943, AWM54 759/3/9.

65 Greville, P. J., *Paving the Way: The Royal Australian Engineers 1945 to 1972*, (Riverwood, NSW: AMHP, 2002), pp. 394-395.

66 GOC AMF, "Army Requirements for Small Craft", 16 September 1942, Blamey Papers AWM 3DRL AWM 3DRL 6643 2/54.

67 McNicoll, R. R., *Teeth and Tail: The Royal Australian Engineers 1919 to 1945*, (Netley, South Australia: Griffin Press, 1982), pp. 300-307.

68 Greville, *Paving the Way*, p. 396

The Army did not approach the War Cabinet for funding for small craft construction until April 1943. By this time US forces had placed orders in Australia for 1,710 vessels, which soon turned out to be well beyond Australia's capacity to produce. The Department of Munitions established a Small Marine Craft Committee to coordinate production, but there was no mechanism to control the allocation between the Australian and US services.[69]

This fleet of small craft in New Guinea in 1943 included 20 landing craft. Most of these were of American manufacture but four were Australian made. In mid-1942, when an amphibious assault on Rabaul was still on the cards, Blamey arranged with Wright Brothers of Brisbane for the production of a prototype wooden assault landing craft and a tank lighter.[70] The tank lighter was eventually developed by the Australian Shipbuilding Board into a 36-metre ocean-going powered lighter that, in the end, became one of the most important of all small craft.[71] Development of the landing craft went ahead with Army draughtsmen working alongside the Ford Motor Company.[72] Prototypes were constructed by sappers and launched on the Brisbane River. The initial 10-metre version, known as the ALCV (Australian Landing Craft, Vehicle) I was found to be too small, so the larger 12-metre ALCV II was developed. In August 1942, the Minister of Army approved the purchase of 300 ALCVs for training, lighterage and, subject to approval by the Navy, as assault landing craft. An Australian version of the LCM, the ALCM, was also developed and manufactured by Ford at Brisbane and later Geelong. The issue of their suitability, raised by the Business Board, was sidestepped by the Engineer in Chief, General Steele, who declared that tests had not proven them *unsuitable*.[73]

The Australian landing craft were distinguished by their large retractable ramps, which were raised and lowered by hand-operated winches. Their design was deliberately made as simple as possible, as they had to be built by factories and workers with no marine experience. Notably, they were of welded construction at a time when orthodox ship

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69 *War Cabinet Agendum No. 238/1945*, "Provision of Small Craft for the Australian Military Forces", 11 July 1945, O'Brien Papers.

70 Col (GS) to CinC AMF, 5 August 1942, Blamey Papers, AWM 3DRL 6643 2/53.

71 Mellor, D. P., *The Role of Science and Industry*, (Australian War Memorial, Adelaide, 1958), p. 476.

72 Pearn, J. H., *Watermen of War*, Amphion Press, Brisbane, 1993, p. 8.

73 "History of ALCV Mks I and II", Notes on War Cabinet Agendum 12/1944, NAA (ACT): A1308 776/1/51.

construction involved riveting. Because their bottoms were flat instead of fluted, they could not retract as easily as American landing craft but a flat bottom was easier to fabricate. Although small enough to be carried on a Liberty ship, they could not be lifted by the ships' tackle, as their hulls were metal instead of plywood like American craft, so they had to be placed on deck by wharf cranes. The original intention was to power them with the same Gray Marine diesel engines that propelled the American LCVPs and LCMs but, owing to shortages caused by the American landing craft program, Ford V8 Mercury petrol engines, also obtained under Lend Lease, were used instead.[74] A contract was placed with General Motors Holden to produce 500 Gray Marine diesel engines. At the time, they represented the most complicated engines ever produced in Australia, and deliveries did not commence until July 1944.[75]

The project received a boost from Blamey's report on the Papuan campaign, in which a lack of armoured support at Buna was blamed on the unavailability of landing craft.[76] Production was stepped up in 1943, with the Army estimating its requirements at 100 ALCV I, 100 ALCV II, 75 ALCM I and 125 ALCM II. Small craft construction requirements also included 11 seagoing barges, 49 300-ton deadweight merchant craft, 28 trawlers and 40 tugs.[77] To operate them, the RAE formed a number of water transport companies. There were three types: small craft, landing craft, and harbour craft. A demarcation dispute with the AEME ended with the latter being given responsibility for the 3rd and 4th Echelon repairs, as per the *Field Service Regulations*.[78]

Blamey's original plan limited the seaborne attack to one brigade because most of the landing craft were still being assembled in Cairns. Since then, the picture had brightened somewhat and it was estimated that 200 LCVPs would be available by June, 400 by July and 600 by August.[79] The shore-to-shore concept espoused by the 2nd Engineer Special

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74 McNicoll, *Teeth and Tail*, p. 310.

75 Mellor,, *The Role of Science and Industry*, p. 478.

76 "History of ALCV Mks I and II", Notes on War Cabinet Agendum 12/1944, NAA (ACT): A1308 776/1/51.

77 Secretary, Army to Secretary, Australian Shipbuilding Board, "Auxiliary Marine Craft – Construction", 25 February 1943, NAA (ACT): A2653/1 M84/1943.

78 MGO to CGS, "Supply and Maintenance of Small Craft – Responsibility for Repair", 3 July 1943, NAA (ACT): A2653/1 M84/1943.

79 Agenda, Conference Regarding Second Engineer Special Brigade, 14 June 1943, AWM54 213/3/20.

Brigade involved "infiltrating" along the New Guinea coast by night and hiding from the Japanese air forces in rivers and coves by day. As the amphibian engineers could only sail about 90 km in one night and the troops would be travelling in a fairly compact space with little protection from the weather and spray and without facilities for cooking or washing, a base as close as possible to the landing beaches was considered necessary. The Australians were sceptical, because a large force of landing craft would be difficult to conceal.[80] However, in early 1943, another source of sealift became available.

In October 1942, Cabinet had approved the conversion of three armed merchant cruisers to Landing Ships, Infantry (LSI) at Garden Island, Sydney.[81] The first, HMAS *Manoora*, was commissioned on 2 February 1943; HMAS *Kanimbla* followed on 1 June and HMAS *Westralia* on 25 June.[82] Initially, *Kanimbla* and *Westralia* carried ALCVs but these were replaced by LCVPs in December 1943. Eliminating the petrol driven ALCVs simplified fuel storage and reduced the risk of fire on board.[83] *Kanimbla* and *Manoora* then carried 22 LCVPs and 3 LCMs and *Westralia*, 15 LCVPs and 2 LCMs.[84] These three ships were the largest and most important ships in the RAN – far too important to risk in a combat area for the time being. With a barely serviceable American assault transport,[85] the USS *Henry T. Allen*, they became the nucleus of the Amphibious Force, Southwest Pacific, which was formed in December 1942 under the command of Rear Admiral Daniel E. Barbey, USN.[86] It was renamed VII Amphibious Force on 15 August 1943.[87]

The Guadalcanal and North African landings of 1942 had been carried out with assault transports carrying the troops to the landing area and landing them on the beaches with their landing craft but in 1943 seagoing landing ships began to appear which would radically alter amphibious doctrine. The first LCT was completed in October 1942, and

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80 GS(Ops), "Notes on 2 Amphibian Engineer Brigade", Blamey Papers, AWM 3DRL 6643 2/53.

81 *War Cabinet Minute* (2402), NAA (ACT): A2684 1080 Part 3.

82 Gill, G. Hermon, *Royal Australian Navy 1939-1942*, (Adelaide: Australian War Memorial, 1957), p. 87.

83 Commander VII Amphibious Force to Commander Seventh Fleet, "Allocation of Landing Craft to Assault Transports", NACP: RG496 Box 683.

84 DP to DCNS, "Disposal of LCVPs and LCMs", 17 October 1945, NAA (Vic): B6121 289E.

85 An American assault transport (APA) was the same as a British or Australian LSI.

86 Barbey, D. E., *MacArthur's Amphibious Navy: Seventh Amphibious Force Operations 1943-1945*, (Annapolis: United States Naval Institute, 1969), pp. 38-42.

87 Dyer, G. C., *The Amphibians Came to Conquer: The Story of Admiral Richmond Kelly Turner*, (Washington: Department. of the Navy, 1972), p. 598.

three were shipped to Australia by the end of the year, in three sections, deck-loaded on freighters. Later, LCTs were delivered deck loaded on LSTs, each carrying either one complete LCT or 1⅔ sectionalised LCTs. The Landing Craft, Infantry (LCI) had no ramp as it was designed to carry infantry only, disembarking them by means of gangways on either side of the bow. It could carry 188 troops but, being designed for commando raids in Europe, lacked quarters and mess facilities to do so for more than 48 hours. Larger still, and most important of all, was the Landing Ship, Tank (LST), an ocean-going vessel with a bow ramp. Capable of carrying 6,000 m^3, they could hold 20 medium tanks and had accommodation for 160 men. The designers managed to reconcile seaworthiness with a shallow draught for landings by using ballast tanks like submarines. If the beach grade was just right, about 1 in 50, they could beach and discharge tanks or trucks into shoal water.

These landing ships were part of another crash program for an invasion of France in early 1943, with a priority so high that the keel of an aircraft carrier was removed to enable LSTs to be built in her place.[88] Its cancellation provided another windfall for SWPA. While 92 LSTs and 110 LCIs were committed to the war against Germany in 1943,[89] 36 LSTs, 36 LCIs and 72 LCTs were allocated to Amphibious Force, Southwest Pacific by the Pacific Military Conference.[90] This was not the same as having them on hand. The actual strength of the Amphibious Force, Southwest Pacific on 1 April 1943 consisted of the USS *Henry T. Allen*, HMAS *Manoora* and just 5 LCTs.[91] The ships were under construction in United States and set out for Australia as they were commissioned. LST Flotilla 7, consisting of 36 LSTs, arrived between April and July. LCI Flotilla 7 also began arriving in April.[92]

GHQ estimated that one regiment of the 2nd Engineer Special Brigade could land and maintain 4,000 troops for one month, after which it would have to be relieved for

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88 Morison, S. E., *Volume II: Operations in North African Waters, October 1942 - June 1943*, (Boston: Little, Brown and Co 1947), pp. 266-271; Friedman, Norman, *US Amphibious Ships and Craft: An Illustrated Design History*, (Annapolis: Naval Institute Press, 2002), pp. 115-120, 131-134, 140-143; CG 3rd ESB to CE SWPA, 17 August 1943, NACP: RG496 Box 2382.

89 Matloff, *Strategic Planning for Coalition Warfare 1943-1944*, p. 398.

90 Memorandum by the Joint Staff Planners, "Plan for Operations for the Seizure of the Solomon Islands – New Guinea – New Britain – New Ireland Area", 20 March 1943, NACP RG218 Box 320 CCS381.

91 *Notes Concerning VII Amphibious Force*, NAA (Vic): B6121 290.

92 Barbey, *MacArthur's Amphibious Navy*, p. 52.

refitting, but if 12 LCTs were added, it could land another 4,000 troops and maintain them for five weeks. Blamey requested that the amphibian engineers be augmented by 17 LCIs and either 3 LSTs or 15 LCTs. Some 12 LCTs, 12 LCIs and 4 LSTs were expected to become available by 1 September, which implied a postponement of a month. Chamberlin backed Blamey's request, recommending that the 2nd Engineer Special Brigade be placed under the Amphibious Force Southwest Pacific for POSTERN, as he doubted that New Guinea Force could effect the necessary coordination with the US Navy.[93]

Admiral Barbey protested that he had neither the planning staff nor the administration facilities to work on both CHRONICLE and POSTERN simultaneously.[94] Nor, due to the possibility of damage to ships during CHRONICLE through grounding on coral reefs, could he state with certainty how many ships would be available for POSTERN. Some ships would also be required for training, for which Advanced LHQ wanted LCTs, LCIs and LSTs made available from 25 June.[95] Then there was the contentious matter of air cover *en route* to Lae, without which Barbey was reluctant to risk his ships. Nonetheless Admiral Carpender informed Blamey that the Navy was on board.[96] As soon as CHRONICLE was over the VII Amphibious Force planning staff would join New Guinea Force's to assist planning POSTERN.[97]

Thus, the second half of 1943 saw SWPA with more troops, more material and more equipment than the year before, with an undiminished determination to drive the Japanese from New Guinea, and the plans to do so. There remained only the formidable task of carrying them out.

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93 G-3 GHQ SWPA to Chief of Staff GHQ SWPA, "Control of Operations of the 2d Engineer Special Brigade", G-3 Journal, 25 May 1943, AWM54 589/3/8.

94 Minutes, CARTWHEEL Conference, GHQ 4 June 1943, AWM54 213/3/20.

95 Agenda, Conference Regarding Second Engineer Special Brigade, 14 June 1943, AWM54 213/3/20.

96 Extracts from Berryman Diary, 3 June 1943, AWM93 50/2/23/331.

97 GS(Ops), "Note on POSTERN", 28 June 1943, AWM54 213/3/20.

2. Organisation, Logistics and Doctrine

The Australian Army's doctrine was embodied in the *Field Service Regulations*, the handbook of the British Army that the father of the First AIF, Major General Sir W. T. Bridges, so memorably described as being about "as useful to most Australian militia officers as the cuneiform inscription on a Babylonian brick".[1] The *Field Service Regulations* divided administration into two types. General administration was defined as:

(i) Control of movement of men, animals and material from ports or general depots to the front (usually railheads) and *vice versa*;

(ii) Control of local sea transport, docks, railways and inland waterways;

(iii) Control of general reserves of all kinds, including the general reserves of transport, i.e. such transport as is not allotted to subordinate commands;

(iv) Selection of sites for, and control of, all general administrative installations, including their construction and operation;

(v) Control of record office work;

(vi) Control of pay services and the accounting transactions of all services.

Whereas local administration was that involving:

(i) Discipline;

(ii) Interior economy, such as:

- (a) Quartering and accommodation;
- (b) Provision of water, light, power &c;
- (c) Care and wellbeing of personnel and animals, including rationing;
- (d) Sanitation and hygiene;
- (e) Fire protection;
- (f) Maintenance of standing camps

(iii) Subject to instructions from GHQ, all local railway or inland waterway movement of personnel, animals and material;

(iv) Local road traffic control and movement;

(v) Preventive measures against theft and the custody of unoccupied standing camps;

(vi) Relations with the local civil population, unless a military governor has been specially appointed in the area of the command;

(vii) Allocation of the local pool of labour and transport.[2]

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[1] Bean, C.E.W., *The Official History of Australia in the War of 1914-1918: Volume V: The AIF In France During the Main German Offensive 1918*, (Sydney: Angus and Robertson, 1937), p. 522.

[2] *Field Service Regulations* (1935), (London: HMSO, 1935), Volume I, pp. 13-15.

A British observer noted that "the Australians go so far as to say that *Field Service Regulations* is 'the Bible' and contains all the answers".[3] The *Field Service Regulations* incorporated the British Army's experience in the Great War. In the initial phases of that conflict on the Western Front, the British Expeditionary Force had an Inspector General of Communications (IGC). This arrangement had not worked out because of conflicting lines of authority between the IGC and the British GHQ staff. This had led to the IGC being placed under the staff and, the post eventually being abolished altogether, with command of the personnel at the bases and ports allotted to a GOC Line of Communications.[4]

The *Field Service Regulations* therefore admonished that:

> The CinC controls the administration of the forces in the field through his staff and through the heads of services at GHQ, delegating to subordinate commanders such powers of local administration as may be desirable… Except in urgent and unforeseen circumstances no subordinate commander will interpose his authority in matters of general administration. [5]

For doctrinal purposes, New Guinea Force was equated with GHQ. Here, doctrine and reality met somewhat awkwardly, for Lieutenant General S. F. Rowell's New Guinea Force, although the senior headquarters in the area, was just I Corps, and a corps was intended to fight as part of an army, with the latter handling the bulk of the administration. General Blamey suggested that "due to the increased work additional to normal [field headquarters] functions consider you need additional staff to do gen[eral] adm[instration] also a base area commandant and staff for local adm[instration]"[6] but Rowell replied that this was neither desirable nor necessary; his need was for labour, not staff, and no base organisation was required.[7] All he wanted was a Port Moresby Base Sub Area commander with a small staff. The Town Major had been appointed acting

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3 Moremon, John, "No Black Magic: Doctrine and Training for Jungle Warfare", in Dennis, Peter and Grey, Jeffrey (eds), *The Foundations of Victory: The Pacific War 1943-1944*, (Canberra, ACT: Army History Unit, 2004), p. 79

4 Henniker, Col A. M., *Transportation on the Western Front 1914-1918*, (London: Imperial War Museum, 1937), pp. 193-194.

5 *Field Service Regulations* (1935), Volume I, p. 13.

6 LandForces to GOC NGF, 21 September 1942, NAA (Vic): MP729/6 2/401/92.

7 GOC NGF to LGA, 25 September 1942, NAA (Vic): MP729/6 2/401/92.

commander but his other duties kept him fully occupied.[8] Rowell emphasised that what he wanted was not some "officer wallah type" but a "practical man with commonsense". [9] So Blamey sent Major C. J. A. Moses,[10] who possessed the requested attributes, being a former officer of the 8th Division who had escaped from Singapore.[11]

While in the Great War the British Armies in France had drawn their supplies through six channel ports situated relatively close to, and therefore fairly easily administered from, their GHQ, the American line of communications stretched across France from their ports at Brest, Saint-Nazaire and Bordeaux to their railheads in north eastern France. Decentralisation therefore arose more naturally. A separate headquarters of the Services of Supply (SOS) was established which contained the heads of the services, who sent representatives to GHQ. Like the British, they encountered problems with the system. The relationship between GHQ and SOS was vaguely defined, and rivalry developed. Despite this the organisation worked and it became American doctrine that administration should be under GHQ, but exercised through a subordinate command.[12]

The commander of USASOS, Brigadier General Richard J. Marshall, therefore established a US Advanced Base in New Guinea at Port Moresby under Lieutenant Colonel Albert G. Matthews on 20 August 1942.[13] As part of USASOS it was not under New Guinea Force's command unless a Japanese land attack was "imminent or in progress".[14] General Wynter, citing the *Field Service Regulations* chapter and verse, explained how the new command would operate. He envisaged that it would handle American local administration with general administration except for records and office work remaining under New Guinea Force. He added that the US Advanced Base could

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8 War Diary, Port Moresby Base Sub Area, AWM52 1/8/2.

9 GOC NGF to LGA, 25 September 1942, NAA (Vic): MP729/6 2/401/92.

10 GOC NGF to LandForces, 25 September 1942, NAA (Vic): MP729/6 2/401/92.

11 Wigmore, Lionel, *The Japanese Thrust,* (Sydney: Australian War Memorial, 1957), pp. 377-384.

12 Huston, J. A., *The Sinews of War: Army Logistics 1775-1953*, (Washington: Department of the Army, 1966), pp. 356-364, 386-387.

13 *Military History of the United States Army Services of Supply in the Southwest Pacific*, USACMH 8-5 780-1, p. 61.

14 *LHQ Operation Instruction No. 30*, "New Guinea Force", 9 August 1942, AWM54 519/4/18.

make demands directly on USASOS for "items, the provision of which is a US responsibility".[15]

But there were also certain items, the provision of which was *not* an American responsibility. This particularly applied to two important classes of supply: subsistence and petrol, oil and lubricants (POL). When American troops first arrived in Australia, the American Quartermaster Corps was unable to provide the subsistence needs of American troops. Even if shipping space had been available, it lacked the personnel for procurement, storage and distribution of rations and, in view of a severe global shortage of service units, had scant chance of getting them in 1942. Nor did it have arrangements in place with the Australian government. Nonetheless, the Australian Army agreed to supply its needs, merely recording the number of rations handed over for a later financial adjustment. American subsistence requirements, except for use outside Australia which required the prior approval of Army Headquarters, were submitted to the Quartermaster General, Major General J. H. Cannan, who had rations delivered direct to US messes while building up a 90 day combined food reserve.[16]

The Americans were unimpressed with the standard Australian Army ration, which they found monotonous and lacking in many American favourites such as coffee, rice, spaghetti and fruit juices. This was partly a matter of national taste. For example, the average American at the time consumed only 2.5 kg of mutton per year while the average Australian ate 26 kg, whereas the former ate 23.5 kg of pork a year compared with the latter's 6.3 kg.[17] An agreement was reached on an "Australian-American" ration. Eggs, macaroni or spaghetti, rice and coffee were added, and beef, pork and ham substituted for most of the mutton in the Australian ration. To permit the increase in pork, the government lifted quarantine restrictions, requesting American co-operation in the

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15 LGA, *Administrative Instruction No. 1: Adm. Of Allied Forces in New Guinea*, 19 August 1942, War Diary, LHQ G(Ops), July-August 1942, AWM52 1/1/1.

16 Stauffer, A. P., *The Quartermaster Corps: Operations in the War Against Japan*, (Washington: Department of the Army, 1956), pp. 98-100; "The Story of Procurement of Food for US Forces by AMF", September 1944, NAA (Vic): MP742/1 47/402/2618.

17 Cramp, K. R., "Food - The First Munition of War", *Journal and Proceedings of the Royal Australian Historical Society*, Vol. XXXI Part II, 1945, p. 74.

disposal of refuse in order to prevent an outbreak of hog cholera.[18] The resulting ration cost around 2s per diem, as opposed to about 1s 6d for the Australian ration. To minimise potential damage to morale, it was agreed that Australians attached to American units would receive the American ration, and vice-versa.[19] Cannan's principal concern was neither the cost nor the potential impact on Australian morale but the sheer difficulty of providing the additional items with limited personnel and transportation.[20]

The magnitude of the task soon became apparent. Brigadier General Richard J. Marshall, the commander of USASOS, informed the Australian government that American forces in Australia would number 200,000 in 1943, which at 2s per ration would cost ₤7,300,000 to feed for the year. The next day he lodged a request for another year's rations for 200,000 *outside* SWPA.[21] The War Cabinet approved the request after receiving advice that the country's resources could supply up to 1,000,000 US troops, but assigned American forces in the South Pacific Area (SOPAC) a lower priority than that of those in SWPA.[22]

When it created the US Advanced Base, New Guinea, USASOS laid down a supply plan that called for 180 days' supply of rations for US forces. Colonel Matthews accordingly requested 140 days' supply from LHQ. General Wynter was unimpressed; reserves were clearly a matter of general administration and New Guinea Force was adequately handling the supply of rations. General Marshall backed down, notifying Matthews that those parts of the supply plan dealing with commodities supplied by the Australian Army would not become effective until further notice.[23]

Although General MacArthur believed, in principle, that each service should retain control of its own logistics, after conferring with General Blamey, he issued orders

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18 "The Story of Procurement of Food for US Forces by AMF", September 1944, NAA (Vic): MP742/1 47/402/2618.

19 AG, USAFIA, "Rationing Plan", 24 February 1942, NAA (ACT): A816 31/301/373 5/3.

20 QMG to Chairman, Administrative Planning Committee, "Supply of Rations to US Army in Australia", 12 February 1942, NAA (ACT): A816 31/301/373 5/3.

21 "The Story of Procurement of Food for US Forces by AMF", NAA (Vic): MP742/1 47/402/2618.

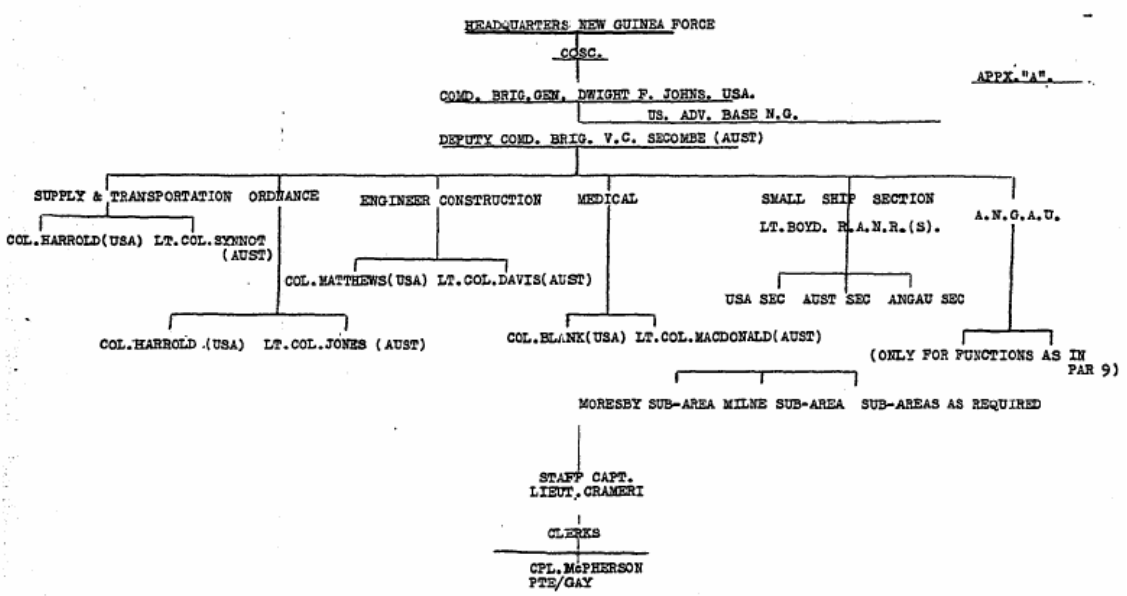
22 Minister of Commerce and Agriculture to War Cabinet, 19 July 1944, NAA (ACT): A2653/1 M37/1943.

23 *Origin and Proposes of Combined Operational Service Command and the Supply Plan For New Guinea at that Time*, USACMH 8-5 780-2, pp. 1-11.

establishing the Combined Operational Service Command (COSC). The new command was placed under the control of New Guinea Force and charged with the operation of all Australian line of communications and American USASOS units in New Guinea. COSC became responsible for coordination of construction and sanitation projects, except those directly related to combat operations, and all line of communications activities, including:

(a) Docking, unloading and loading of all ships;
(b) Receipt, storage and distribution of supplies and materials;
(c) Receipt, staging and dispatch of personnel;
(d) Transportation in Line of Communication areas, or incident to Line of Communications supply activities;
(e) The operation of repair shops, depots and major utilities;
(f) Hospitalisation and evacuation;
(g) Such other activities as may be designated by the Commander, New Guinea Force.[24]

Table 1. Structure of COSC (October 1942) [25]



Brigadier General Dwight F. Johns, the chief of staff of USASOS, was designated commander of both COSC and the Advanced Base, New Guinea on 8 October. Colonel

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24 Chief of Staff, GHQ SWPA, "Establishment of an Operational Service Command in New Guinea", 5 October 1942, AWM54 721/1/43.

25 GOC COSC, "Establishment of an Operational Service Command in New Guinea", 14 October 1942, War Diary, COSC, AWM52 1/11/1.

Matthews remained as head of its Engineer Construction Section.[26] Johns was given an Australian deputy, Brigadier V. C. Secombe, formerly DA&QMG of the Second Army.[27] The two men had met once before, in Java in February 1942.[28] They had similar backgrounds as regular engineer officers with administrative staff experience, although Secombe had never attended a staff course. Johns had been involved with the development of airbase construction techniques, notably the use of Marston Mat.[29] Secombe had directed the rehabilitation of the port of Tobruk in 1941. This had been a considerable achievement, involving clearing the quays of debris, reactivating the distillation plant, restoring the refrigeration service, repairing the petrol installation and bringing the electricity back on.[30] The two men soon established an excellent working relationship. Lieutenant General Sir Edmund Herring, the commander of New Guinea Force, described them as "born co-operators".[31]

Because COSC was intended "largely as a coordinating agency between the American and Australian forces" it was "organised on a basis of parallelism" with paired Australian and American representatives handling activities of their own service while working in close cooperation with each other. The only exception was ANGAU, which remained wholly Australian.[32] ANGAU controlled the allocation of local labour, and this was the poorest area of cooperation. In May 1943, the Chief Engineer at GHQ, Brigadier General Hugh J. Casey, noted that the Australian Army at Milne Bay had 2,500 native labourers,

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26 Dod, K. D., *The Corps of Engineers: The War Against Japan*, (Washington: Department of the Army, 1966), p. 182.

27 *Administration Instruction No. 25*, 15 October 1942, AWM54 721/1/25.

28 Brigadier V. C. Secombe to Lieutenant General Sir I. G. Mackay, 24 October 1942, Mackay Papers, AWM 3DRL 6850 161.

29 Coll, B. D., Keith, J. E. and Rosenthal, H. H., *The Corps of Engineers: Troops and Equipment*, (Washington: Department of the Army, 1958, pp. 60-62.

30 McNicoll, *Teeth and Tail*, p. 35.

31 Herring to D. Clayton James, 22 May 1972, Herring Papers, State Library of Victoria, MS 11355, Box 37.

32 GOC COSC, "Report on Recent Operations in the Owen Stanley - Buna Areas", 25 February 1943, War Diary, COSC, AWM52 1/11/1.

whereas the American sub base had only 250.[33] This partially compensated for the Australian Army's weakness in mechanical equipment.

Johns treated the relationship with the Australians with sensitivity. Supervisory and command activities with respect to the Australian forces were normally exercised through Secombe and all COSC actions and directives arose from discussion and agreement between the two.[34] Johns or Secombe or both attended the evening conference at New Guinea Force HQ and were informed of and involved in operational plans.[35] "So well did Johns and Secombe do their job", Herring recalled , "that as commander of New Guinea Force, I was seldom called in to exercise the control reserved".[36]

General Johns later explained:

> [COSC] had the responsibility - and the authority - to get the maximum utilization out of what means were available. The commander of COSC had the authority, with the approval of GOC New Guinea Force, to call on the local commanders of the Allied Ground Forces, Air Forces, Naval Forces or United States Army Services of Supply for such means as were available to assist in meeting any service problem. GHQ directive provided that such local commander, when called upon, "will furnish". Therein lay the authority of COSC.[37]

That part of MacArthur's directive that placed Australian line of communications units under COSC was not implemented in full "as it was thought the middle of an operation was not a propitious time to make any change in command", and New Guinea Force continued building up a base sub area at Port Moresby separate from COSC. Shortages of personnel and units slowed its implementation.[38] By February 1943, there were 7,500

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33 Powell, Alan, *The Third Force: ANGAU's New Guinea War 1942-1946*, (Melbourne: Oxford University Press, 2003), p. 170.

34 GOC COSC, "Report on Recent Operations in the Owen Stanley - Buna Areas", 25 February 1943, AWM54 721/1/43.

35 Minutes of New Guinea Force Staff Conferences, AWM54 519/6/45.

36 Herring to Dudley McCarthy, 15 May 1957, Herring Papers, State Library of Victoria, MS 11355, Box 11.

37 Johns, D. F., "We Are Doing What We Can With What We Have", *Military Review*, Vol. XXV No. 1, April 1945, pp. 15-16.

38 Deputy Comd COSC, "Report on Recent Operations in the Owen Stanley - Buna Areas", 2 March 1943, AWM54 721/1/43; War Diary, Supply and Transport Service, Port Moresby Area, 20 October 1942, AWM52 1/10/18.

personnel under COSC, responsible for the maintenance of 133,000 Australian and American troops and a considerable number of Australian units were assigned to it. Yet the Australian staff of COSC consisted of just three officers and four clerks.[39]

Under the terms of MacArthur's original directive, Johns was authorised to establish combined sub commands in each port.[40] The US Army practice was to assign a port detachment to run a sub base. These were complete in all service representatives, included dock and movement control officers, and were commanded by a full colonel.[41] The staffs of these sub areas consisted of both American and Australian personnel, and COSC used the American term "Sub Base" interchangeably with the Australian term "Sub Area". According to the *Field Service Regulations*:

> The ports of entry for material in a theatre of operations are points of transit only. They will be affiliated to base depots established by the providing service for purposes of storeholding only. The area containing the port, or ports, together with the base depots affiliated to them, will be constituted as a base area. [42]

The first of these, A Sub Area, was established at Milne Bay on 14 October 1942. Subsequently B Sub Area was established at Oro Bay on 20 December 1942 and C Sub Area on Goodenough Island on 24 April 1943.[43] In November and December 1942 there had also briefly been sub areas at Wanigela and Porlock.[44] Port Moresby, which had begun to decline in importance, became D Sub Area on 31 May 1943, and C Sub Area was discontinued in July. On 14 August 1943, the three remaining sub bases were redesignated advanced bases and the Advanced Base became the Advanced Section.[45]

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39 Deputy Comd COSC, "Combined Operational Service Command", 25 February 1943, NAA: A2653/1 M56/1943.

40 Chief of Staff, GHQ SWPA, "Establishment of an Operational Service Command in New Guinea", 5 October 1942, AWM54 721/1/43.

41 GOC NGF, "Formation of Sub Areas", 21 April 1943, NAA: A2653/1 M56/1943.

42 *Field Service Regulations* (1935), Volume I, p. 163.

43 GOC NGF, "Administrative Organisation - New Guinea", 10 November 1943, AWM54 9/5/9.

44 GOC COSC and Deputy Comd COSC, "Notes on Operations - Owen Stanley - Buna Area: Supply and Transport", 3 March 1943, AWM54 721/1/43.

45 Casey, H. J., *Engineers of the Southwest Pacific 1941-1945: Volume II: Engineer Supply*, (Washington: Government Printing Office, 1953), p. 66.

No war establishment was issued for COSC, as it was staffed by both Americans and Australians. The Australians were drawn, wherever possible, from New Guinea Force and posted to the "X" list as personnel "posted from units to fill vacancies in an authorised war establishment on a headquarters or extra-regimental unit".[46] They were fewer in numbers and junior in rank to their American counterparts.[47] Brigadier Secombe recommended, and General Johns concurred, that the Australian COSC Supply and Transportation, Medical, and Engineering Construction Section commanders be upgraded to full colonels in view of their responsibilities.[48] This was opposed by LHQ, noting that the GSO1 and AA&QMG of a division were only lieutenant colonels.[49] Nor did LHQ accept the argument about relative ranks of Australians and Americans, for often Americans were junior to Australians at the same level. For instance, Brigadier General Casey, the Chief Engineer at GHQ, was junior to his opposite number at LHQ, Major General Steele. LHQ's policy looked particularly strange in the Medical Section, as the commanders of both the two general hospitals in Port Moresby under COSC were full colonels.[50]

COSC was "a radical departure from that which the Australian Army considered normal administrative procedure".[51] Its activities related to general rather than local administration, which remained with New Guinea Force.[52] In matters of discipline, for example, COSC had no authority whatsoever over Australian personnel and any disciplinary action required had to be taken by New Guinea Force.[53] Some officers at LHQ felt that "COSC has no place" and favoured abolishing it and shifting its functions to a combined American and Australian New Guinea Force headquarters, thereby

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46 *Field Service Regulations* (1935), Volume I, p. 91.

47 AG, "Combined Operational Service Command New Guinea Personnel", 11 December 1942, NAA: A2653/1 M56/1943.

48 Deputy Comd COSC, "Combined Operational Service Command", 25 February 1943, NAA: A2653/1 M56/1943.

49 LGA, "LGA Conference for Adm PSOS", 19 March 1943, NAA: A2653/1 M56/1943.

50 *AMF Army List of Officers*, November 1942, p. 271.

51 McCarthy, Dudley, *South West Pacific Area - First Year*, (Adelaide: Australian War Memorial, 1959), p. 350.

52 Deputy Commander COSC, "Combined Operational Service Command", 25 February 1943, NAA: A2653/1 M56/1943.

53 GOC NGF, "HQ NG L of C Area", 12 March 1943, NAA: A2653/1 M56/1943.

returning the administrative to *Field Service Regulations* orthodoxy.[54] Nonetheless, a conference at LHQ agreed that "we should endeavour to retain COSC".[55]

Initially, the most important activity of COSC was the supply of rations. The Australian-American ration remained unpopular with American troops. Issues did not always meet the prescribed quantities, and substitutes were not always available.[56] While the principal difficulties were undoubtedly related to transportation problems and supply shortages, the Americans, rightly or wrongly, felt that "it was too much to expect that any army would try energetically to feed the soldiers of another army better than its own, even if that army was a close ally".[57]

The US Army decided to set up its own rationing system, bypassing the Australian Army and submitting its requirements directly to the Australian purchasing agencies. On 15 February 1943, General MacArthur informed Prime Minister Curtin that sufficient Quartermaster Corps personnel had arrived and received instruction from the Australian Army and the US forces wished henceforth to procure and distribute their own rations.[58] Approval was given by the War Cabinet on 23 March, subject to conformance to Australian standards, availability and reasonableness. Since General Cannan advised the government on what was reasonable, this gave him considerable power.[59]

On 23 February, Cannan issued instructions for the handover of 35 days' stocks of non-perishable items to the American base sections in Australia and New Guinea and by the end of April some 1,000,000 reserve rations had been transferred from Australian stocks in New Guinea. US forces began controlling their own rations on 15 March but until supplies became available, the Australian Army replenished rations on demand from American quartermasters and continued to deliver fresh foodstuffs. Some 465,000 rations were issued to the US Army in New Guinea fortnightly until the end of May. Supplies for

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54 DQMG (M), "COSC - Notes for MGO", 20 March 1943, NAA: A2653/1 M56/1943.

55 Minutes of LGA conference, "Administration, NG Area", 23 March 1943, NAA: A2653/1 M56/1943.

56 "The Story of Procurement of Food for US Forces by AMF", NAA (Vic): MP742/1 47/402/2618.

57 Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, p. 101.

58 MacArthur to Prime Minister, 15 February 1943, NAA (ACT): A5954 289/6.

59 Army Business Advisor to Minister of Army, "Army Ration Supply etc", Blamey Papers, AWM 3DRL 6643 2/94.

the period from 15 February to 31 May represented 3½ months' stock, while another 3 months' actual stocks were transferred. To round off a year's supplies, Cannan had 5½ months' worth of Australian Army supply contracts transferred to the Americans. This brought to an end the Army's involvement with the supply of food to US forces, although they continued to draw much of their subsistence from Australian sources. The Australian Army had supplied US Forces with 39,709,700 rations by September 1944.[60]

In addition to goods, the Australian Army supplied the American forces with a wide range of services. The extent of this contribution was the subject of debate in 1943. General MacArthur told the Prime Minister:

> Every ton of shipping used to bring service and maintenance personnel from the United States must correspondingly reduce the number of combat units brought out… It is clear that, in view of the limited amount of shipping available and the length of the supply lines that feed Australia, the best use can be made of the available shipping space by bringing out trained and equipped combat forces from the United States, keeping to a minimum the number of service troops of whatever kind…[61]

The Australian Commander in Chief, General Sir Thomas Blamey, did not agree:

> Continued inroads into our manpower in order to fulfil American requirements must, as the process continues, lead to further disbandments and in due course a reconsideration of the task, if any, the Australian Army will remain capable of undertaking. The ultimate logical result is that Australia may in this manner approach such a state of weakness of its armed forces that it may find itself very much in the same position as an occupied country… at issue, [is] Australia's capacity to supply the American Forces services which are a normal Army responsibility and for which it is normal that provision be made in any Order of Battle for a force which proceeds from its shores. [62]

This point could be applied equally to the Australian Army. In the end, Blamey won the day, and MacArthur was forced reverse his policy of giving priority to combat troops and lodge a sudden request with the US War Department for an additional 29,000 service troops by June 1944.[63] In early 1944, Blamey was able to report that:

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60 "The Story of Procurement of Food for US Forces by AMF", NAA (Vic): MP742/1 47/402/2618.

61 MacArthur to Prime Minister, 24 August 1943, NAA (ACT): A2653/1 M37/1943.

62 Blamey to Prime Minister, 5 October 1943, NAA (ACT): A2653/1 M37/1943.

63 *Logistics in World War II: Final Report of the Army Service Forces*, (Washington DC: Center of Military History, United States Army, 1993), p. 170.

> During the past year the American Forces have gradually built up their own services of supply and of general administration with the consequent release of the Australian Army from many activities of provision on their behalf. The strain, therefore, which was heavy up to a few months ago latterly has been greatly diminished. [64]

The winding down of the Australian Army's involvement in supply of food to the Americans meant that COSC was no longer directly responsible for American supply except for POL. This left COSC with less of a supply role and more of a coordinating one. Rumours reached Secombe from American sources concerning the abolition of COSC. With the fighting around Buna at an end, he decided that the time was right to raise the matter of the completion of the Australian part of the COSC organisation through the establishment of a New Guinea Line of Communications Area.[65]

This was taken up by Lieutenant General Sir Iven Mackay, who assumed temporary command of New Guinea Force on 30 January 1943. Mackay felt that a New Guinea Line of Communications Area was essential. It would provide an Australian counterpart to the USASOS Advanced Base, establish a command over Line of Communications units for the purpose of administration and discipline, free New Guinea Force from base functions so that it could move forward if necessary, clarify the role of COSC now that the Americans were taking over responsibility for their own supply, and improve efficiency by concentrating staff working on line of communications matters in one headquarters.[66]

According to the *Field Service Regulations*:

> The [Line of Communications] area will be commanded by an officer of suitable rank, whose duties on appointment will be clearly defined by the CinC. He will be responsible for the defence of his area as well as for its local administration, and for this purpose troops will be placed by GHQ at his disposal.[67]

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64 Blamey to Prime Minister, 15 January 1944, NAA (ACT): A2653/1 M37/1943.

65 Deputy Comd COSC, "Combined Operational Service Command", 25 February 1943, NAA (ACT): A2653/1 M56/1943.

66 GOC NGF, "HQ NG L of C Area", 12 March 1943, NAA (ACT): A2653/1 M56/1943.

67 *Field Service Regulations* (1935), Volume I, pp. 16-17.

General Blamey pointed out the "special conditions which require or at any rate justify a departure in detail from the normal system":[68]

(a) Although theoretically a GHQ, New Guinea Force was in reality just an enlarged corps headquarters and not equipped to handle all functions of general administration;

(b) Communications in New Guinea were mainly by sea and air, with conventional land communications practically non-existent;

(c) There was a need for co-ordination with US forces, who had a different doctrine of administration.

Blamey then announced the new regime *ex cathedra*:

(a) There would be no New Guinea Line of Communications Area. Local administration would be carried out by local commands answerable to New Guinea Force.

(b) The heads of services at COSC would be subordinate to the heads of services at New Guinea Force.

(c) The Deputy Commander of COSC, in addition to his duties of general administration as such, would command the Moresby Base Area, consisting of that area not belonging to field formations.[69]

With approval in principle from Blamey, Mackay created the Moresby Base Area under COSC on 15 March 1943.[70] He went on to submit proposals for five base sub areas, to be located at Port Moresby, Milne Bay, Oro Bay, Goodenough Island and Bulldog. Each had its own establishment, which took into account not just the size of the area and the workload but also the requirements of upcoming operations. Mackay recommended an especially strong staff for Bulldog, which would be a wholly Australian responsibility involving up to 10,000 troops.[71]

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68 CinC AMF to GOC NGF, "Adm Organisation in New Guinea", 30 March 1943, NAA (ACT): A2653/1 M56/1943.

69 CinC AMF to GOC NGF, "Adm Organisation in New Guinea", 30 March 1943, NAA (ACT): A2653/1 M56/1943.

70 DA&QMG NGF, *New Guinea Force Administrative Instruction No. 80*, 12 March 1943, War Diary, NGF G Branch, AWM52 1/5/51.

71 GOC NGF to LGA, "Formation of Sub Areas: New Guinea", 21 April 1943, NAA (ACT): A2653/1 M56/1943.

Meanwhile, command had changed at COSC. Secombe became DA&QMG of New Guinea Force and I Corps on 15 March 1943, and was replaced as Deputy Commander of COSC by Brigadier W. A. B. Steele. To staff his new headquarters, Steele brought in six officers from his former command, the 3rd Armoured Division.[72] A week later, Johns returned to his position as Chief of Staff of USASOS, and was replaced by Brigadier General Hanford N. MacNider.[73] Unlike Johns, MacNider did not concurrently command the US Advanced Base in New Guinea, which passed to Colonel E. Yeager, who was directly answerable to USASOS.[74]

Plans for the upcoming operations on Woodlark and Kiriwina depended on Milne Bay and it was becoming clear that the timetable agreed to in Washington could not be met without extraordinary effort. GHQ's solution to the problem was characteristic: to put a man in charge, with authority cutting across existing organisations. A Coordinator would regulate overwater movement of troops and cargo with a staff that included representatives of the various commands. The commander of the base or service concerned would submit requirements for shipments to and from Milne Bay to the Coordinator. Based on his directives from GHQ and his knowledge of operational and logistical requirements, and taking into consideration factors such as the availability of shipping and the capacity of the port, the Coordinator would assign a priority to each movement. The services could then send their demands to their respective supply sources on the mainland, along with the allocated priority.[75] A complete manifest of each ship scheduled for Milne Bay was sent to the Coordinator by airmail.[76] COSC would cease to function at Milne Bay as the Coordinator would be responsible for coordinating all logistic activities there.[77]

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72 GOC NGF to CinC AMF, 29 March 1943, NAA (ACT): A2653/1 M56/1943.

73 MacArthur to Blamey, 22 March 1943, NAA (ACT): A2653/1 M56/1943.

74 DST, "Report on Visit to New Guinea", May 1943, AWM54 431/13/6.

75 "Plan for the Regulation of Overwater Movement of Troops and Cargo From the Mainland to New Guinea and from New Guinea Bases to Other Areas", 24 May 1943, War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

76 Adjutant General, GHQ to CG, Sixth Army, CG USASOS SWPA, "Regulation of Shipping to Milne Bay", 28 May 1943, War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

77 DA&QMG Adv LHQ, "Coordination of Services – Milne Bay", 29 May 1943, War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

Major General John A. Chapman, DA&QMG at Advanced LHQ in Brisbane, General Herring, who resumed command of New Guinea Force in May, and General Wynter were all concerned. This involved a change in the Australian system of supply and maintenance from one of "push forward' to one of "call forward". The Australian representative at Milne Bay would have to represent New Guinea Force with only the relatively junior local service heads at Milne Bay to turn to for advice. Wynter noted that the formation of a base sub area at Milne Bay was now both urgent and necessary, for without COSC there was no longer any Australian commander specifically responsible for administration at Milne Bay at all. He also foresaw that as demands from New Guinea Force would now have to go through GHQ in Brisbane, this would increase the importance of nearby Advanced LHQ.

General Chapman met with Brigadier General Lester J. Whitlock, his opposite number at GHQ, and General Marshall, to discuss the matter. While accepting the need for an authority at Milne Bay to regulate the calling forward of shipping, Chapman suggested that priorities be set by GHQ in Brisbane, with each force allocated a monthly tonnage allotment according to its requirements, and a special pool to meet unforeseen contingencies. To this, Whitlock and Marshall agreed.[78] Initially the Australians were keen on a gradual implementation of the scheme but Chapman accepted the American position. He explained to Herring that:

> From the various discussions which I have had, such as the oil and petrol situation, the extraordinary demands (not ours) which are being received in such regard, it is evident that a co-ordinator should be established without delay. [79]

On 28 May, General MacNider was appointed Coordinator, Milne Bay Area while Brigadier Steele took over as commander of COSC, which still included the other American Advanced Sub Bases.[80] There being no suitable officer available in New Guinea for the post of New Guinea Force representative on the staff of the Coordinator, General Herring recommended the appointment of a "lieutenant colonel or colonel with a

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[78] DA&QMG Adv LHQ, "Discussion of a Plan for Control of Sea Movement of Troops and Cargo to and From New Guinea Bases", May 1943, War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

[79] Letter, Chapman to Herring, 30 May 1943, Herring Papers, State Library of Victoria, MS 11355, Box 11.

[80] DA&QMG Adv LHQ, "Discussion of Plan for Control of Sea Movement of Troops and Cargo to and from New Guinea Bases", 29 May 1943, War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

strong personality and tact".[81] The job went to Major H. T. Allan, a distinguished soldier who had won the Military Cross at Mont St Quentin, and had served as Brigade Major of the 20th Infantry Brigade during the siege of Tobruk. Before the war, Allan had been a Wau gold miner and his local knowledge had marked him out for an early assignment in New Guinea when the 9th Division returned from the Middle East. [82]

On 5 June, New Guinea Force issued orders to create the Moresby Base Area and four base sub areas, at Milne Bay, Buna, Bulldog and Morobe. Command of logistical units passed from New Guinea Force to the Moresby Base Area on 14 June, with Steele combining its command with that of COSC.[83] The base sub areas became responsible for local administration, except where a brigade, division or higher Australian formation was located in the area, and for matters of general administration including:

(a) Provision of loading and unloading facilities for ships;
(b) Unloading and loading of ships;
(c) Receipt, storage and distribution in bulk of all supplies;
(d) Control of small ships working out of their ports;
(e) Hospitalisation and medical evacuation;
(f) Movement control;
(g) Reception and staging of units and personnel in transit;
(h) Medical boarding; and
(i) All other responsibilities incidental to an advanced base. [84]

The immediate task of the Moresby Base Area was to get the base sub areas operational as soon as possible. LHQ did not issue War Establishments until 22 July, but New Guinea Force was authorised to proceed with raising them with the establishments that Mackay had recommended in April.[85] Some 330 additional personnel were required, more than was readily available in New Guinea, and a call for personnel went out to the mainland.

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81 GOC NGF to LandOps, 3 June 1943, AWM54 579/5/1.

82 LandOps to II Corps, 8 June 1943, NAA (ACT): A2653/1 M125/1943; Bean, C. E. W., *The Official History of Australia in the War of 1914-1918: Volume VI: The AIF In France During the Allied Offensives 1918*, (Sydney: Angus and Robertson, 1942), pp. 813-818, 833-834; Maughan, Barton, *Tobruk and El Alamein*, (Sydney: Australian War Memorial, 1966), pp. 121, 385, 399.

83 DQMG (Plans) to DSD, "New Guinea Sub Areas", 7 July 1943, NAA: A2653/1 M56/1943.

84 DA&QMG NGF, *New Guinea Force Administrative Instruction No. 102*, 5 June 1943, AWM54 9/5/9.

85 GOC NGF, "Administrative Organisation – New Guinea", 10 Nov 1943, AWM54 9/5/9.

Personnel had to be fit for tropical service, but could be medically Class B, fit for base service only.[86]

The regrouping of field forces for the campaigns of 1943 involved further changes to the administrative and command arrangements in New Guinea. On 6 July, the Base Sub Areas at Buna, Bulldog and Morobe were numbered, becoming the 1st, 2nd and 3rd Base Sub Areas respectively.[87] The imminent departure of the 5th Division from Milne Bay prompted the creation of the Milne Bay Fortress Command on 27 July to coordinate the defence of the area. Its headquarters was created from that of the defunct 14th Infantry Brigade. The Milne Bay Fortress became responsible for the command and administration of all Australian Army units there, including the Milne Bay Base Sub Area, and for the coordination and allocation of resources for all engineer and works projects. In other matters of general administration the Milne Bay Base Sub Area commander dealt directly with the Moresby Base Area.[88]

The subordination of base areas to field formations became the pattern for the rest of the year. On 5 August the commander of the 11th Division was appointed commander of the North Eastern Sector, which was defined as that portion of New Guinea from, and including, Oro Bay to, but not including, Nassau Bay. His brief was identical to that of the commander, Milne Bay Fortress and he became responsible for the command and administration of all Australian Army units in the sector, including the 1st and 3rd Base Sub Areas at Buna and Morobe, which dealt directly with the Moresby Base Area on matters of general administration.[89] The Moresby Base Area was abolished on 30 August and the 2nd Base Sub Area at Bulldog was expanded to include the area it formerly controlled.[90]

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86 AG to NSW LOCA, Vic LOCA, SA LOCA, 9 June 1943, NAA (ACT): A2653/1 M56/1943.

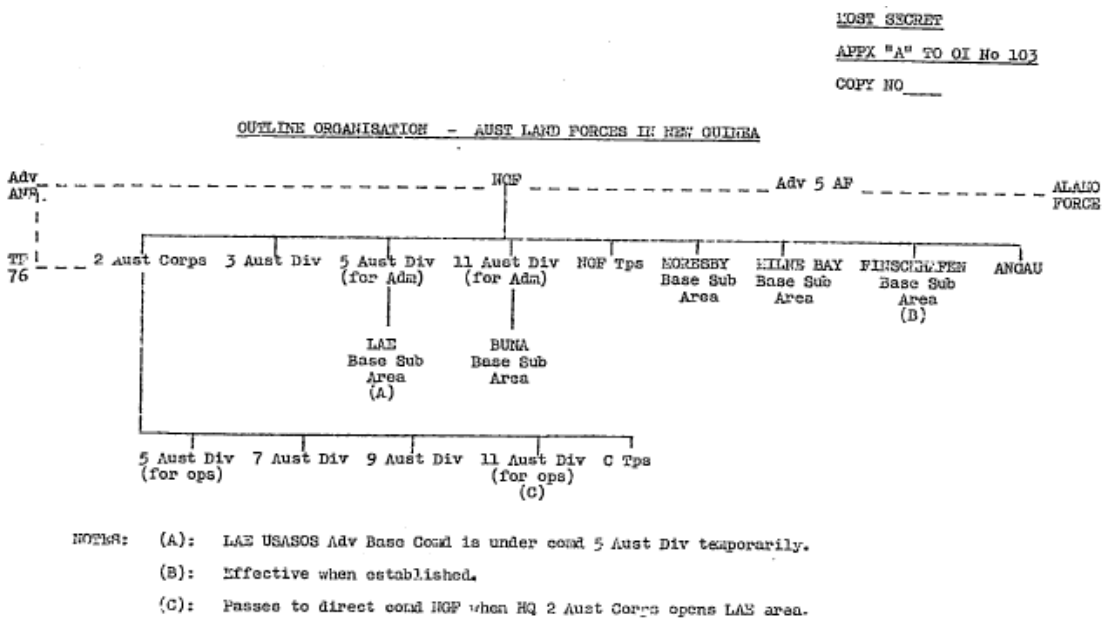
87 NGF to LandOps, Moresby Base Area, 6 July 1943, War Diary, Adv LHQ DA&QMG Branch, AWM52 1/2/6.

88 *New Guinea Force Operational Instruction No. 87: Regrouping of Forces in New Guinea, Designation, Composition and Role of Such forces At Milne Bay*, 27 July 1943, War Diary, NGF G Branch, AWM52 1/5/51.

89 *New Guinea Force Operational Instruction No. 88*, 5 August 1943, War Diary, NGF G Branch, AWM52 1/5/51.

90 *New Guinea Force Operational Instruction No. 120*, 30 August 1943, War Diary, NGF G Branch, AWM52 1/5/51.

Table 2. New Guinea Force Organisation, 20 October 1943.[91]



This set-up lasted just one month. On 1 October, the 2nd Base Sub Area became the Moresby Base Sub Area, organised on the war establishment of the old Moresby Base Area. Under it was the Port Moresby Base Sub Area and Area Commandant Wau, organised on the war establishment of the original 2nd Base Sub Area at Bulldog. At Milne Bay the need for two administrative headquarters was questionable, so the Milne Bay Fortress Command was abolished on 20 October and its headquarters merged with that of the Milne Bay Base Sub Area, which took over all its responsibilities, including operational ones, although the prospect of an enemy amphibious or parachute attack was now slight.[92] At Buna, the 1st Base Sub Area became the Buna Base Sub Area and it took over the area controlled by the 3rd Base Sub Area at Morobe, which was abolished. North Eastern Sector ceased to exist on 1 October and the Buna Base Sub Area was placed under New Guinea Force for general administration, and the 11th Division for local administration.[93] Local administration of Australian troops at Milne Bay, Port Moresby

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91 *New Guinea Force Operational Instruction No. 103: Organisation and Command of Australian Land Forces in New Guinea*, 20 October 1943, War Diary, NGF G Branch, AWM52 1/5/51.

92 *New Guinea Force Operational Instruction No. 103: Organisation and Command of Australian Land Forces in New Guinea*, 20 October 1943, War Diary, NGF G Branch, AWM52 1/5/51; GOC NGF, "Administrative Organisation – New Guinea", 10 November 1943, AWM54 9/5/9.

93 *New Guinea Force Operational Instruction No. 97: Organisation and Command of Australian Land Forces in New Guinea*, 1 October 1943, War Diary, NGF G Branch, AWM52 1/5/51.

and Buna areas became the responsibility of the eponymous base sub areas. The new order contained two notable departures from orthodoxy: operational units were under control of the Base Sub Areas, as was some responsibility for general administration.[94]

The Australian advance created a need for more Base Sub Areas. The Lae Base Sub Area was formed at Port Moresby on 11 September with the same establishment as the Buna Base Sub Area.[95] On 22 September, I Corps created the Lae Fortress Command to control the defence of the Lae area, including the port, American and Australian bases, and all Australian troops in the area except those of the 7th and 9th Divisions .[96] It was dissolved on 20 October and the Lae Base Sub Area came under the direct command of New Guinea Force.[97] A small unit known as the Area Commandant Salamaua was raised to administer Salamaua but with the decision not to develop Salamaua as a base, it was sent to Nadzab instead.[98] Meanwhile, orders were issued on 25 September for the creation of yet another base sub area, this time for Finschhafen.[99] In November, GHQ finally decided to abolish COSC. The two armies had now built their own logistical organisations and the need for COSC was greatly reduced. GHQ was informed that there was no objection from Advanced LHQ or New Guinea Force.[100] Thus, COSC quietly passed away.

That month, Lieutenant General Sir Leslie Morshead, who assumed command of New Guinea Force on 7 November,[101] moved to regularise the base sub areas by standardising their establishments. While tailor-made establishment might seem ideal, in practice they proved to be inflexible, for circumstances quickly changed and left the base sub area lacking staff. Morshead proposed a "type" establishment that contained staff for all

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94 *New Guinea Force Operational Instruction No. 125*, 25 September 1943, AWM54 9/5/9.

95 War Diary, Supply and Transport Services, Lae Base Sub Area, 11 Sep 1943, AWM52 10/1/19; GOC NGF, "Administrative Organisation – New Guinea", 10 Nov 1943, AWM54 9/5/9.

96 *I Corps Operations Instruction No. 2*, 22 September 1943, War Diary, I Corps G Branch, AWM52 1/4/1.

97 *New Guinea Force Administrative Instruction No. 131: System of Adm – New Guinea*, 20 October 1943, AWM54 9/5/9.

98 GOC NGF, "Administrative Organisation – New Guinea", 10 Nov 1943, AWM54 9/5/9.

99 *New Guinea Force Operational Instruction No. 125*, 25 September 1943, AWM54 9/5/9.

100 Minutes, Adv LHQ Daily Staff Conference, 25 November 1943, War Diary Adv LHQ G Branch, AWM52 1/2/1.

101 War Diary, New Guinea Force, 7 November 1943, AWM52 1/5/51.

services, with fixed allocations based on the number of troops to be administered, which would also simplify planning. There would be four types:

Table 3. Standard Base Sub Area Types [102]

Type	Troops	Officers	Other Ranks	Total
A	40,000 to 60,000	50	225	275
B	20,000 to 40,000	48	220	268
C	10,000 to 20,000	36	163	199
D	Up to 10,000	7	138	145

Similarly, there would be two types of Headquarters of an Area Commandant:

Table 4. Standard Area Commandant Types [103]

Type	Troops	Officers	Other Ranks	Total
A	1,500 to 6,000	7	23	30
B	Up to 1,500	5	15	20

The new establishments provided for the Type A, B and C Base Sub Areas to be commanded by a brigadier or full colonel; the Type D Base Sub Area and Type A Area Commandant by a lieutenant colonel; and the Type B Area Commandant, by a Major. Moresby Base Area would be Type A, Buna and Lae, Type B and Milne Bay and Finschhafen, Type C. The tiny Port Moresby Sub Area would be abolished. In addition to the Base Sub Areas, New Guinea Force proposed to create two Type headquarters of Area Commandants, at Bulldog and Nadzab, and three Type B at Terapo, Wau and Morobe.[104]

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[102] GOC NGF, "Standards for HQs Base Sub Areas and HQs Area Commandant", 14 Nov 1943, AWM54 9/5/9.

[103] Ibid.

[104] Ibid.

At this time, the base staffs had the following strengths:

Table 5. Base Staff Strengths [105]

	Officers	Other Ranks	Total
HQ 14th Infantry Brigade	-	-	-
HQ Port Moresby Base Sub Area	2	2	4
HQ 1st Base Sub Area	16	44	60
HQ 2nd Base Sub Area	9	47	56
HQ 3rd Base Sub Area	7	34	41
HQ 4th Base Sub Area	14	44	58
HQ Moresby Base Sub Area	28	179	207
HQ Milne Bay Base Sub Area	21	87	108
Administrative Staff Port Moresby	2	31	33
Area Commandant Salamaua	2	7	9
TOTAL	**101**	**475**	**576**

The new organsation was:

Table 6. Proposed Base Staff Strengths [106]

	Officers	Other Ranks	Total
HQ Port Moresby Base Sub Area	50	225	275
HQ Milne Bay Base Sub Area	36	163	199
HQ Buna Base Sub Area	48	220	268
HQ Lae Base Sub Area	48	220	268
HQ Finschhafen Base Sub Area	36	163	199
HQ Area Commandant Terapo	5	15	20
HQ Area Commandant Bulldog	7	23	30
HQ Area Commandant Wau	5	15	20
HQ Area Commandant Nadzab	7	23	30
HQ Area Commandant Morobe	5	15	20
TOTAL	**247**	**1082**	**1329**

That this called for more than twice the number of personnel formerly assigned did not go unnoticed, but by this time the value of base headquarters personnel had been demonstrated and the new establishments were accepted without modification.[107] The

[105] Ibid.

[106] Ibid.

[107] DSD to A Branch (D of O), "Raising of various HQs Base Sub Areas and HQs Area Commandant in New Guinea", 29 November 1943, NAA (Vic): MP729/6 240/1/879.

additional personnel required were obtained from a "comb out" of Class A and B personnel fit for overseas service in the Victorian Line of Communications Area.[108]

The unorthodox nature of the base sub areas still disturbed Wynter, who felt that "we have generally got 'off the rails' somewhat in regard to the functions of our rear organisations in New Guinea... base sub areas are given functions of gen[eral] adm[inistration]".[109] While conceding that this was a "contentious point", Blamey staunchly defended the practice:

> The Base Sub Area as we visualise and use it in this theatre is entirely different to a sub area organisation envisaged when the *FSR [Field Service Regulations] Vol I* was written (ie European or Atlantic conditions). Our base sub areas are normally (at least initially) the actual advance base for the campaign being fought and are divorced from the main base by a lack of adequate communications. Consequently, base sub areas need to be established where little immediate control and no supervision can be exercised by the Force HQ (which is normally hundreds of miles away) and in areas where staff officers from Force often have not had the opportunity to carry out rec[onnaissan]ce.

To make his point clear, Blamey gave a couple of examples:

> (a) The [Commander] Base Sub Area has just arrived in a newly captured undeveloped port. Force has issued orders that 30 days' for 30,000 will be maintained in the area. In theory, the [Commander] Base Sub Area has no responsibility for selection of sites for these general adm[inistration] depots, no responsibility for the calling forward of units to man them. These are Force HQ functions. In fact, Force HQ will only produce the first key plan and will not be able to conveniently send a large rec[onnaissan]ce party to the area to work on the final layout. This task should fall on the base sub area staff.
>
> (b) Again, the Force HQ will, in theory, receive via service channels a stream of requests for adm[inistration] units of all services. Back hundreds of miles from the area in question and unaware of the actual situation, this HQ is not in a position to decide relative priorities for movement and the need for a strict priority queue system needs no stressing. All units required, even urgently, cannot be got in early

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108 GOC NGF, "Reorganisation of HQs Base Sub Areas and HQs Area Commandant in New Guinea", 8 Dec 1943, NAA (Vic): MP729/6 240/1/879.

109 LGA to DA&QMG NGF, 9 October 1943, NAA (ACT): A2653/1 M56/1943.

> and the only staff capable of determining in what priority the units are wanted in the base sub area is its staff.[110]

Orthodox or not, the base sub areas were a crucial part of the administrative organisation with which the Australian Army fought the campaign in New Guinea.

General Blamey's pragmatic vision of how base sub areas should operate inevitably carried the day. He was undeniably right in asserting that the conditions of the New Guinea campaign justified a departure from a doctrine that had been formulated for a very different theatre and very different conditions. Whether or not it would have been better to have gone further still and adopted the American model is arguable. As it was, the Australian Army thought and fought its way towards a new doctrine of logistics, drawing on British and American experience while engaging in internal debate.

3. The Bases in Papua

Operational units would probably have preferred supply ships that were loaded so as to facilitate discharge, unloaded as close to the front line as possible and selectively discharged as required, but this was impractical for several reasons. There was a global shortage of shipping and after a brief moment in the spotlight in early 1942, "in worldwide Allied strategy, the Southwest Pacific led the list of 'have nots' and 'won't gets'".[111] This compelled GHQ to make the best use of what was available. The standard cargo ship was the Liberty ship, of which some 2,751 were built.[112] With a maximum speed of 11 knots (20 kph), they were slow, and therefore required escorts, but most merchant ships did, and this was considered less important than their ability to be turned out cheaply and in large numbers. A faster 15 knot (28 kph) version, the Victory ship, was indeed produced, but the first one was not delivered until February 1944, and while 531 Victory ships were ultimately built, only 82 were in service by November 1944.[113] Nor

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110 "Allocation of General Adm Responsibility – Future Task Force", 27 April 1944, War Diary, Adv LHQ DA&QMG Branch, April 1944, AWM52 1/2/6.

111 Morison, *Breaking the Bismarcks Barrier*, p. 32.

112 For a full list of Liberty ships, see http://www.usmm.org/libertyships.html

113 Morison, S. E., *Volume I: The Battle of the Atlantic, September 1939 - May 1943*, (Boston: Little, Brown and Co, 1947), pp. 292-195. For a full list, see http://www.usmm.org/victoryships.html

were the Liberty ships ideal for logistical purposes. They were deliberately built small, which reduced the loss when one was sunk by a U-boat, but limited the cargo capacity to 12,400 m^3. Liberty ships had five small holds, each with its own hatch. The ships' curved sides made them wider at the top than the bottom, and wider amidships than fore and aft.

Containerisation of shipping did not begin until a decade after war, so most wartime military shipments were breakbulk dry cargo.[114] This was efficient in terms of shipping space albeit manpower intensive. It also meant that often ships could be unloaded with their own tackle, without special port facilities. Loading a Liberty ship was therefore something of an art form, in order to make best use of the irregular spaces, while still being easily unloaded. Goods had to be stowed so as to wedge everything tightly together, as items that shifted at sea could break open and cause damage to their contents and other items. In the worst case, a load that shifted could cause the ship to capsize.[115]

Ideally, ships were loaded "full and down" – filling up all available cargo space and with enough weight to take it down to the Plimsoll line[116] – but this was difficult to achieve in practice. For a Liberty ship, it implied a load of around 780 kg/m^3 but military cargoes tended to be bulkier than that.[117] It precluded loading plans in which items were shipped as required, resulting in stores, equipment and even troops arriving spread over multiple ships, out of order, or with urgently required items preceded by, or overstowed with, other cargo. A Liberty shipload of stores might be too large to unload quickly in a forward area, as New Guinea had few deepwater berths capable of handling them, and would be vulnerable to enemy air attack if left standing offshore for any length of time. A ship could be subjected to enemy air or submarine attack almost anywhere north of Sydney, and in forward areas, "up to May 1943, every merchant ship of over 2,000 tons which

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[114] Bulk cargo refers to commodities that can be loaded continuously without packaging or sorting, like coal and wheat, whereas "Breakbulk" cargo consists of discrete items that must be individually handled.

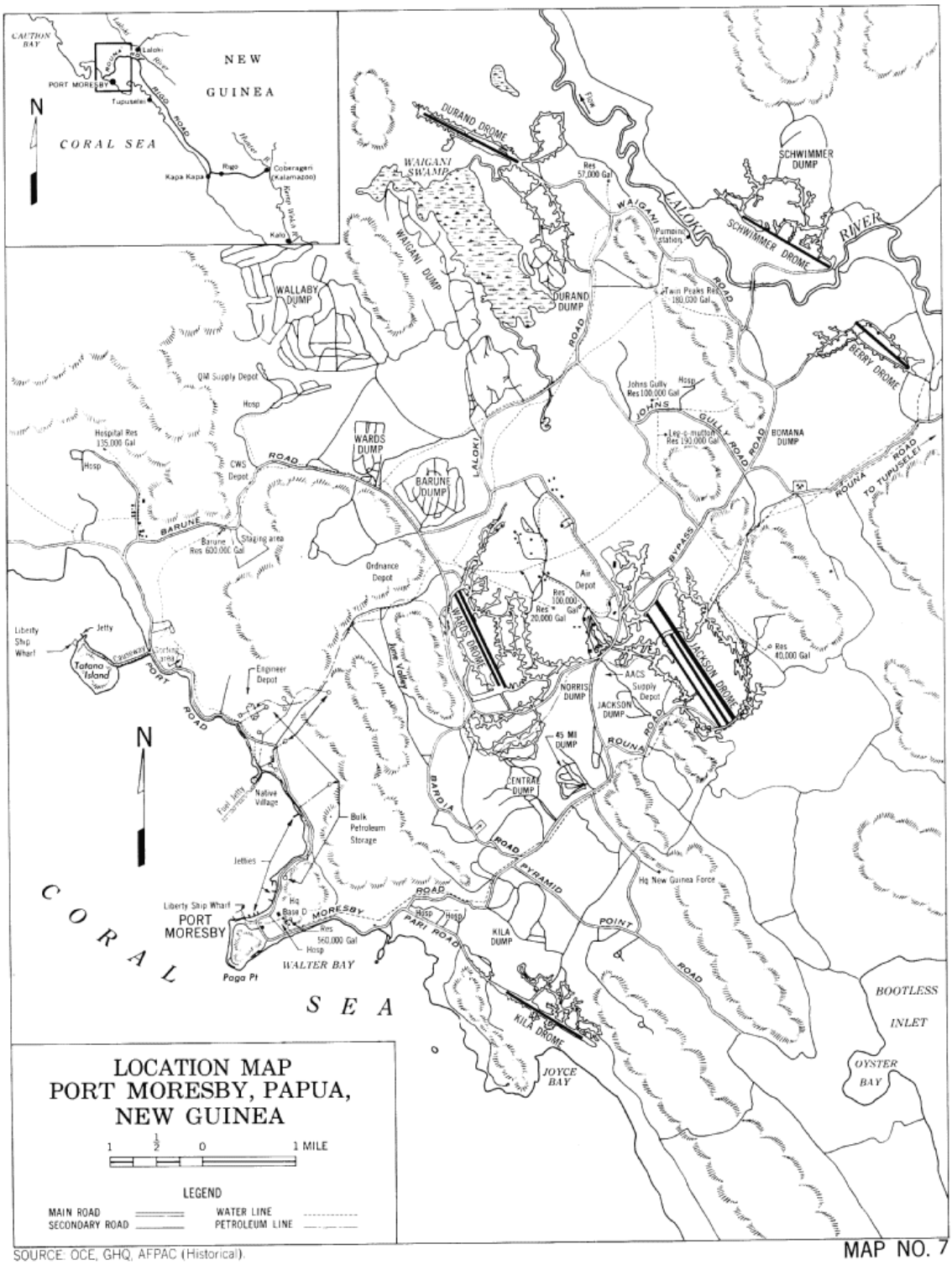
[115] Levinson, Marc, *The Box: How the Shipping Container made the World Smaller and the World Economy Bigger*, (Princeton: Princeton University Press, 2006), pp. 19-20.

[116] The Plimsoll line is the mark on the hull of a ship that shows where the waterline is when the ship is loaded to full capacity according to the condition of the water at the point of loading. See Jones, Nicolette, *The Plimsoll Sensation: The Great Campaign to Save Lives at Sea***,** (Boston: Little, Brown Book Group, 2007)

[117] Wardlow, Chester, *The Transportation Corps: Responsibilities, Organization and Operations*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1951), p. 273.

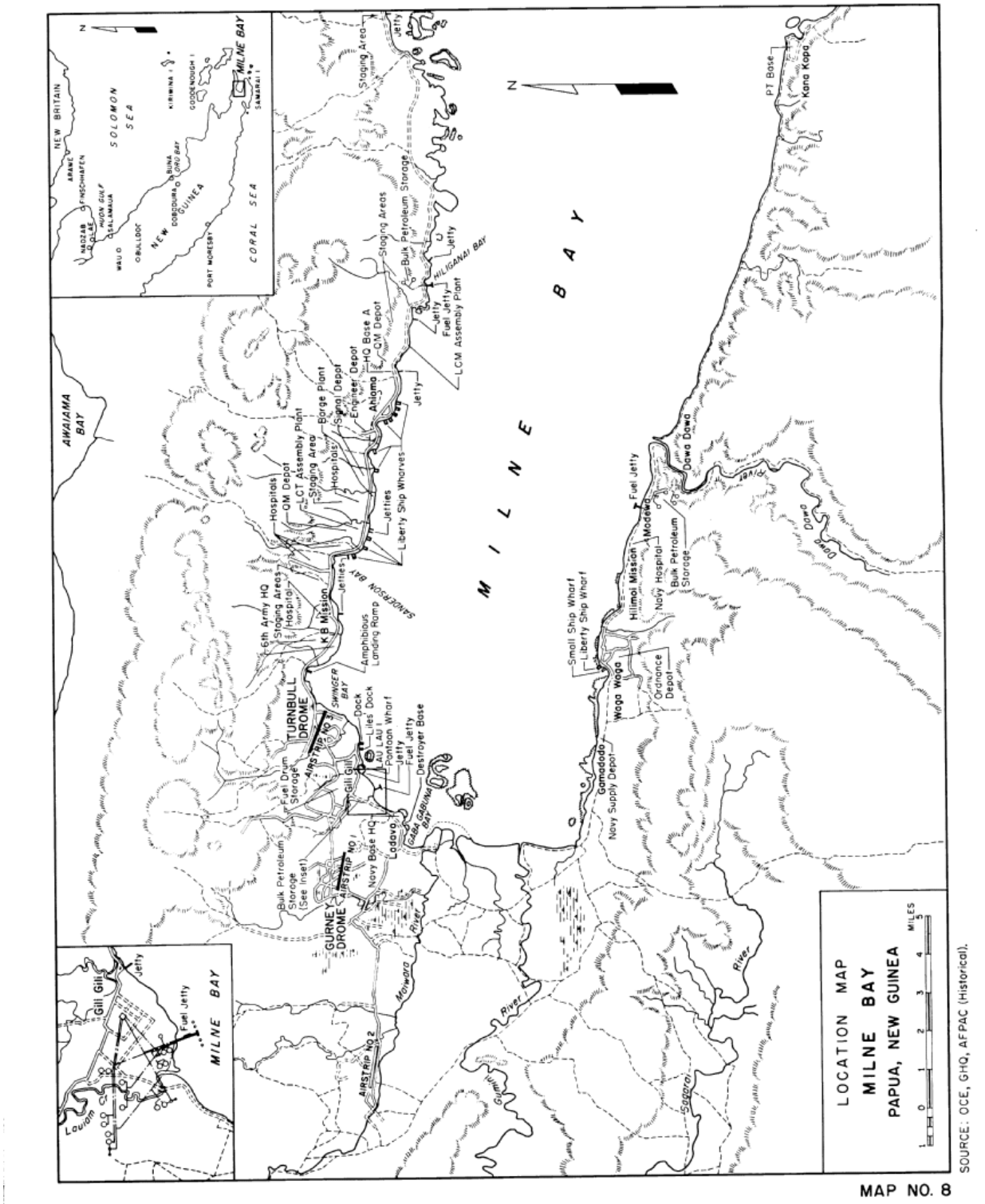
ventured around East Cape got bombed and many were sunk".[118] To minimise the impact of such a loss if it did occur, sufficient reserves had to be held forward so as to cover the time until another ship could arrive with replacement stores, which could be anything up to 30 days.

[118] Morison, *Breaking the Bismarcks Barrier*, p. 32.



Map 2. Port Moresby

Source: Casey, *Airfield and Base Development*, p. 79.



Map 3. Milne Bay

Source: Casey, *Airfield and Base Development*, p. 103.

Base Development

These factors mandated advance bases where stores could be stocked, sorted and forwarded. The bases in Papua were therefore the logistical foundations of the upcoming campaigns. The role of the bases was not so much as to support the operational units as the other way around, for it was the bases that were important, allowing air and naval units to move forward. Only then could the land forces advance and seize areas for new bases. In the meantime the function of the operational units was to defend the bases. During 1943, the Australian Army expended 2,500,000 man-days on base development at Port Moresby, 1,000,000 at Milne Bay and 100,000 at Buna.[119]

Journalist Osmar White eloquently described the base development effort as:

> the foundations that had to be laid before the defence against could be stabilised and a counter offensive planned. Cities had to be built in the wilderness, mountains levelled, swamps drained, ports equipped, airfields scooped out of jungles, thousands of miles of road pushed through unprofitable lands. The soldier with his man-killing tools was merely the cutting edge of the tool of conquest, a tool as complicated as the body of a mechanical civilisation itself.[120]

General MacArthur's strategy was perforce heavily dependent on engineers. The Royal Australian Engineers (RAE) had a strength of around 25,000 at the end of 1942, rising to 28,000 by the end of 1943. Like those of the services, its units tended to be company sized. The main combat unit was the field company. Supporting them was the field park company, which had more equipment. The mechanical equipment company, the first of which was formed in 1941, operated a pool of construction equipment. The RAE had a headquarters structure with Deputy Commander, Royal Engineers (DCRE) headquarters headed by majors; Commander, Royal Engineers (CRE) headquarters, headed by lieutenant colonels; and Chief Engineer (CE) headquarters headed by full colonels. These headquarters could be assigned control of projects, supervising various units.[121]

The RAAF began forming its own airbase construction units in April 1942 and by mid-1943, fourteen RAAF works units had been formed. These were reorganised in July 1944

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[119] US LO LHQ, *Report on Royal Australian Engineers for 1943*, USACE Series X, Box 60, A-148.

[120] White, Osmar, *Green Armour*, (Sydney: Angus and Robertson, 1945), p. 189.

[121] McNicoll, *Teeth and Tail*, pp. 143, 189, 288, 377.

into ten airfield construction squadrons, each was 580 strong. US Army engineer strength in SWPA increased from 7,600 at the end of 1942 to 42,000 by end of 1943, including 17 aviation and three airborne aviation battalions. Nine naval construction battalions totalling 8,300 men also arrived, which concentrated on naval base construction. Airbase construction was normally handled by the American aviation and RAAF airfield construction units, while other units built roads and facilities.[122] Unfortunately, there were insufficient engineers to carry out more than the most urgent and important construction tasks, so many logistical units had to build their own installations.[123]

When the war with Japan began, Port Moresby was the capital and most important town of Papua. It had a deepwater harbour and wharf, electricity and water supply, roads, and two aerodromes: Seven Mile (later renamed Jackson) Drome, a 1,500-metre bitumen RAAF airstrip; and Kila, a civil airstrip. Five other airbases were developed in the Port Moresby area in 1942: Berry, Durand, Rogers, Schwimmer and Wards. Work continued throughout 1943 on all except Rogers, which was abandoned early in the year. All were paved and brought up to all-weather standard.[124] Much was learned about airbase construction in New Guinea, where "there was throughout something almost cynically malignant about the weather and geography".[125] One of the best-equipped units in SWPA, the US 808th Engineer Aviation Battalion, spent eight months working on Jackson. Instead of being located on high ground, the airstrip was situated in a depression surrounded by hills. Hydroscopic clay under parts of the runway became supersaturated through seepage and springs developed. The engineers were forced to install underground drains, repave the entire runway with rock and seal it with bitumen. The importance of proper drainage would become a recurring theme in every subsequent construction project.[126]

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122 Casey, H. J. (ed), *Engineers of the Southwest Pacific 1941-1945: Volume II: Organisation, Troops and Training*, (Washington, DC: Government Printing Office, 1953), pp. 33-35, 88-90.

123 GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

124 Wilson, David, *Always First: The RAAF Airfield Construction Squadrons 1942-1974*, (Canberra: Airpower Studies Centre, 1998), pp. 47-48; Casey, *Airfield and Base Development*, pp. 87-89.

125 Casey, *Engineers in Theater Operations*, p. 65.

126 Casey, H. J. (ed), *Engineers of the Southwest Pacific 1941-1945: Volume VI: Airfield and Base Development*, (Washington, DC: Government Printing Office, 1951), pp. 78-79.

Long runways became the rule, for overloaded aircraft needed longer to take off, damaged ones longer to land, and a long runway could be used for bombers as well. To be useful, airbases required dispersal bays, taxiways and revetments to protect the aircraft during air raids but each revetment involved the movement of around 2,000 m^3 of earth and three 24-hour days' work for three bulldozers and carryalls. Additional runways were constructed parallel to existing ones rather than intersecting them. It made it easier to find a site, simplified drainage and grading, and allowed the first runway to be used during the construction of the second.[127]

Runways were often constructed using pierced steel plank known as Marston Mat.[128] These were sheets of steel with holes in them for lightness, and clips along the sides so they could be connected together. They could also be stacked in storage. Marston Mat required a well-compacted subgrade but could be used over sand and gravel surfaces that would not otherwise be able to form a satisfactory surface for want of a binder, such as beaches or dry river beds. At Milne Bay, due to inexperience and urgent operational requirements, it was laid over a subgrade that was not properly drained and mud oozed through the holes, making the plank slippery and causing aircraft to skid. To correct the problem, the mat was rolled back and bitumen was applied to the base. [129]

While the primary purpose of Port Moresby was as an airbase, its development required that considerable effort also be put into roads, water supply and port facilities. Crucial to road and airstrip development was the output of the Nine Mile Quarry. Initially it was run by the 1st Army Troops Company, which installed suspended electric lighting, allowing the quarry to be worked around the clock from 30 April 1942.[130] The US 96th Engineer Battalion took over the running of the quarry in June.[131] In turn, they were relieved by the 2/1st Pioneer Battalion in November. Work went on in three eight hour shifts per day, seven days a week. The face of the quarry was drilled from the top and dropped to the floor by blasting. Knapping hammers were used to break the stone into pieces small

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127 Dod, *The Corps of Engineers: The War Against Japan*, pp. 218-219.

128 Named for Marston, Georgia, where it was first used.

129 Casey, *Airfield and Base Development*, p. 437.

130 War Diary, 1st Army Troops Company, 30 April 1942, AWM52 5/15/14.

131 Dod, *The Corps of Engineers: The War Against Japan*, p. 152.

enough to be loaded into trucks. There were two rock crushers on hand; an old model and a modern mobile diesel crusher supplied by the US Army. The work was hard and without respite except for an eight hour break on Christmas Day. In the New Year Brigadier Secombe granted two days rest for 50 men per day. In April, they were given three days at a rest camp. In June, the quarry was handed over to the 5th Employment Company. The 2/1st Pioneer Battalion had produced 58,000 m^3 of crushed metal.[132]

The 1st Army Troops Company was responsible for Port Moresby's utilities: the power house, freezers, electrical installations, lighting and water supply. By June 1942 the water supply was close to its maximum capacity, with the pumping station at Bomana pumping water from the Laloki River 24 hours a day. The main water pipe ran close to Jackson Drome and was prone to damage from enemy air attack. From one cause or another there were 40 to 50 breaks per month. During the first half of 1943 the bases in Papua were subjected to frequent Japanese air raids. Port Moresby suffered its 100th air raid on 23 January 1943, while Milne Bay had eleven in the last two weeks of January, including a particularly destructive one on 17 January.[133]

By October 1942 the reservoir level was falling, indicating that usage was exceeding pumping capacity. A new intake and pumping station was constructed near Schwimmer Drome to bring water from the Laloki River to a treatment plant and concrete reservoir on Twin Peaks Mountain. The 1st Army Troops Company assumed responsibility for its operation upon its completion in March 1943. This unit, renumbered 101st, continued to maintain Port Moresby's utilities until relieved by the 3rd and 8th Army Troops Companies in November and December 1943, finally returning to Australia in February 1944.[134]

Base installations around Port Moresby were usually located on pre-war roads. Depots were established inland rather in the vicinity of the port because the Japanese threatened a landing on the coast. A 20 mph speed limit was imposed to minimise damage to the main

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132 Osborn, Gordon, *The Pioneers: Unit History of the 2/1st Australian Pioneer Battalion, Second AIF*, (Beverly Hills, NSW: M. D. Herron, 1988), pp. 106-111.

133 Watson, Richard L. Jr, *USAAF Historical Study No. 113: The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, (Washington: USAAF Historical Office, 1946), pp. 109, 116; McCarthy, *South West Pacific Area - First Year*, p. 589.

134 War Diary, 1st Army Troops Company, June 1942 - Feb 1944, AWM52 5/15/14; Casey, *Airfield and Base Development*, pp. 99-100.

road. This was covered with 10 cm of dust that turned to mud when it rained, while the surface soon broke up under heavy military traffic. The road was only wide enough to allow for one-way traffic and had a number of hairpin bends that required 3-ton trucks to make three-point turns.[135]

Locations were addressed by their location on the main road, measured from Port Moresby. The 10th Advanced Ordnance Depot was established at 17 Mile in prefabricated huts, erected by Papuan labour, while the 8th Advanced Ammunition Depot handled the ammunition depot at 12 Mile and 19 Mile. In the crisis days of early 1942 some 2,500 tonnes of ammunition was dumped where it was unloaded off the trucks and covered with tarpaulins, with only one storeman on hand to receive it. Soon, no one knew what lay under tarpaulins. This was hard to rectify as there was an acute shortage of ordnance personnel due to the low priority accorded to service units. The 19 Mile site was poor and a new depot was developed on a better site at 12 Mile.[136] Hasty siting was common. The 2/9th General Hospital arrived to find its site, selected only the day before, a smouldering patch of burned-off scrub. The site had been chosen for the possibility of extending the piped water supply from the 5th Casualty Clearing Station; but it was five weeks before more than one line was available.[137]

Milne Bay had just 30 km of lightly constructed single lane roads in July 1942, and these soon fell apart under the undisciplined military traffic and heavy tropical rainfall, 250 mm a day not being uncommon.[138] By June 1944, it had some 160 km of roads, but continuous maintenance was required. During a storm on 29 April 1944, 635 mm of rain fell in one day. Roads were cut, communications went out, two bridges were washed away, stores and equipment were lost or damaged and two Papuans drowned.[139]

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135 Tilbrook, *To The Warrior His Arms*, pp. 310-312.

136 Ibid, pp. 312-315.

137 Walker, Allan S., *The Island Campaigns*, (Adelaide: Australian War Memorial, 1957), p. 38.

138 OC 24 Field Coy, *Report on Operations at Milne Bay by 24 Aust Fd Coy from Aug 42 to Mar 43*, 18 March 1943, AWM52 5/13/40; Casey, *Airfield and Base Development*, p. 112.

139 Casey, *Airfield and Base Development*, p. 113; War Diary, Milne Bay Base Sub Area, 29 April 1944, AWM52 1/8/4.

1. Port Moresby, December 1943. Armco huts at 10th Advance Ordnance Depot.

2. Milne Bay, 4 April 1944. 2nd Bulk Petroleum Storage Company. Note open hut design.

3. Milne Bay, 26 June 1943. 5th Division headquarters in Native style huts.

The Problem of Storage

At Milne Bay, the Australian Army ran into the problem of storing goods in tropical climates. Port Moresby had, for New Guinea, a fairly dry and mild climate with an average rainfall of around 1,000 mm per year and a dry season from May to January.[140] At Milne Bay the average annual rainfall was over 5,000 mm.

The parabolic Armco hut design, while easily erected, could become an incubator for mould if the ends were installed, as was the case with all of the 4th Advanced Ordnance Depot's huts at Milne Bay, because this prevented the free flow of air. Humidity inside rose to 90% during the day and goods deteriorated rapidly. On the other hand, if the ends were not installed, certain goods could be subject to pilferage.

Once the need for adequate ventilation was recognised, more open designs were developed. Perhaps the best solution was the

[140] Walker, *Clinical Problems of War*, p. 81.

use of native style huts. Initially used mainly for offices and messes, they soon became used for other purposes. Constructed of local timber, they were nailed together or tied with vines, with roofs of thatched sago palm or Kunai grass. A team of twenty Papuan workers could gather, erect and thatch a hut in three days, at a cost of £4.[141] It was found that adequate drainage could not be achieved by digging ditches around the huts. Instead, floors were raised 75 cm above the ground. The best type of flooring for ammunition storage turned out to be Marston Mat raised on earth mounds. The holes in it provided ventilation below the stacks. Raised floors also made it easier to load and unload trucks.[142]

When operations proceeded faster than hutting could be erected, considerable use had to be made of temporary shelter. Tarpaulins gave trouble when used as semi-permanent cover. Draped over stores, the heat and humidity underneath the tarpaulin was often greater than outside. A better arrangement was to drape only over the top of stores, allowing air to circulate. This general principle applied to the stacking of boxes, which required gaps to be left between the stacks for ventilation. Dunnage was essential to lift stores off the wet ground but often the only dunnage available was timber or logs with ARC mesh[143] placed on top. At Milne Bay, dunnage sometimes sank into the mud.

With so much depending on them, the deterioration of tents, tarpaulins and canopies was especially serious, whether measured in terms of financial loss, discomfort experienced by the troops, or operational difficulties. By mid-1943, there were over 30,000 tents in Papua and the majority were leaking. The main culprits were cellulose eating fungi. Apart from directly attacking the cotton, they created by-products that secondary fungi could feed on and caused a loss of water resistance. Poor storage conditions that offered little protection from moisture and humidity were the main cause. Many of the tents sent to Papua in 1942 were white and required camouflage treatment. All sorts of materials were used, from approved camouflage paints to bitumen, sump oil and mud. Many of these

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141 *Report on the Condition of Service Material under Tropical Conditions in New Guinea*, 21 October 1943, NAA (Vic): MP742 94/1/1051.

142 Tilbrook, *To The Warrior His Arms*, p. 342.

143 Steel mesh developed jointly by US and Australian engineers for use in road and runway surfacing, bridge decking, and various other purposes. Consisted of a wires in a grid 2” apart longitudinally and 3” apart transversely, and spot welded at the intersections. Made in standard 10’ x 6’ (3.0m x 1.8 m) sheets weighing 75 lbs (34 kg) per sheet.

caused a loss of water resistance. In most cases, careless or no maintenance also contributed to the deterioration of tentage. Almost none had been treated with an anti-rot agent. The Army developed fungicides safe enough to be used not just on tents but on boots and clothing. [144]

When good storage could not be obtained, packaging became all the more important. Packaging needed to be sturdy enough to withstand excessive tropical heat and humidity, rough handling (including, ideally, being tossed out of an airplane), exposure to salt water during shipping and rainwater at least during handling. A typical package might be handled 18 to 26 times between Australia and the point of consumption in New Guinea. Such packaging was not available in 1942. Cardboard boxes disintegrated, cans rusted, and wooden boxes rotted or were eaten by insects. Waterproof cardboards were developed, and metal straps were added for support.[145]

Packaging needed sturdy, waterproof lining. Cushioning materials such as straw, wood wool or cardboard needed to be dry at packing time lest they too become part of the problem. Of course, this was all to no avail if the packaging was too heavy and the contents had to be broken up in order to be ported by Papuan carriers, who could not handle items weighing more than about 18 kg. It took time to develop and change over to smaller packages. Sometimes the solution was simple. It was found that 44-gallon drums were best stored on their sides so that water did not collect on the tops of the drums.[146]

One of the most important forms of packaging was canning. Before the war canning activity in Australia had concentrated on fruits and only about 4,500 tonnes of vegetables were canned. By 1943, 50,800 tonnes of vegetables were canned.[147] There was a global shortage of tinplate and Australia never had more than a few weeks supply, a real problem in a seasonal industry. The lifetimes of cans could be improved by lacquering. Water also

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144 DGMS, "Fungicides for Rotproofing", 8 December 1943, NAA (Vic): MP742 94/1/441; *Report on the Condition of Service Material under Tropical Conditions in New Guinea*, 21 October 1943, NAA (Vic): MP742 94/1/1051.

145 Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, pp. 177-180.

146 *Report on the Condition of Service Material under Tropical Conditions in New Guinea*, 21 October 1943, NAA (Vic): MP742 94/1/1051.

147 Cramp, K. R., "Food - The First Munition of War", *Journal and Proceedings of the Royal Australian Historical Society*, Vol. XXXI Part II, 1945, p. 78; M. G. Edgell to Dr Mellor, 14 September 1955, AWM74 29.

caused the labels to fall off. The simple loss of labels caused mountains of cans to pile up, the contents of which were unknown. It was gradually realised that cans had to have their contents stamped on them.[148] When wet, cans were liable to corrosion, especially where the tinplate was stretched during manufacturing or dented during handling. Once a pinhole developed in the can, air was sucked in, bringing bacteria with it. These produced gases that caused the can to swell and "blow". An outbreak of botulism in Queensland in November 1942 caused by bad cans of beetroot resulted in 16 cases among American servicemen, seven of whom died.[149] An outbreak among Australian servicemen in the Northern Territory resulted in another five cases and one death. As a result, the canning process was investigated and improved, and a large number of cans of beetroot were dumped at sea.[150]

Given the formidable climate of Papua, the notion of storing several months' stores of any kind had to be regarded as wishful thinking. Yet operations planning staffs continued to call for 180 days' supply or more, and large surpluses were not unknown or even unusual. The underlying problem remained one of transportation and distribution. In this the bases had a part to play, but in the face of the difficulties of storage, there was a limit as to how far stocking reserves at the bases could ameliorate the problem. The inevitable result could only be waste.

POL Storage

POL differed from other commodities in that the Australian Army supplied all forces in Australia until the end of the war and the US Army in New Guinea until mid-1943, when the US Army assumed responsibility for its own distribution at Milne Bay and Oro Bay. Yet Australia produced no petroleum products except certain greases. There were two refineries; Shell's plant at Clyde, NSW and the Commonwealth Oil Refinery at Laverton, Victoria and both closed in early 1942 after the Japanese overran their main sources of supply in Indonesia. Thereafter, petroleum was imported from Iran or the United States under Lend Lease, and supplied free to US forces as Reverse Lend Lease. As there was a

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148 Mellor, *The Role of Science and Industry*, pp. 569-570; Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, p. 108.

149 Coates, Col. John Boyd, Jr. (ed), *Volume IV: Communicable Diseases Transmitted Chiefly Through Respiratory and Alimentary Tracts*, (Washington: Office of the Surgeon General, 1958), pp. 440-441.

150 Walker, *Clinical Problems of War*, pp. 38-39.

greater shortage of oil tankers than refining capacity in countries under Allied control, the Commonwealth Oil Board used the storage capacity at the refineries to hold refined rather than crude oil. They held somewhere between 1,500,000,000 and 2,000,000,000 litres which, even in March 1945, represented five times the capacity available elsewhere in SWPA.[151]

By December 1942, the monthly requirements of the USASOS Small Ships Section, which ran supplies along the coast from Milne Bay to Buna, had grown to 650 tons of diesel oil (marine diesel, as opposed to distillate, or automotive diesel). As the navy was normally the principal user of this fuel, arrangements were made to supply it in 44-gallon drums from RAN stocks.[152] The Australian Army assumed responsibly for the maintenance and distribution of the estimated 3,500 drums per month at Port Moresby and Milne Bay,[153] along with POL products it normally carried. Products not normally carried, even if available in Australia, remained the responsibility of USASOS.[154]

The latter represented an important lesson. In peacetime it is possible to assign a specific lubricant to give the best possible life and performance for each type of bearing, and engines came with maintenance instructions that called for products with commercial brand names like "Mobil Grease No. 2" and "Texaco Marfax No. 1".[155] In wartime, procurement of the correct product and the determination of substitutes becomes problematic, and at best the supply of similar products adds unnecessary complexity to the tasks of supply and distribution. In the United States, the US Army took steps to standardise petroleum products, reducing the number of grades of petrol to just one (80 octane, known to the Americans as mogas, and to the Australians as MT petrol or MT80),

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151 Mellor, *The Role of Science and Industry*, pp. 212-213; Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, pp. 214-217.

152 DST to DNS Navy Office, "Diesel Fuel Requirements - USASOS Small Ships Section", 18 December 1942, NAA (Vic): MP729/6 299/1/1761.

153 DST to DDST Adv LHQ, "Diesel Fuel Requirements - USASOS Small Ships Section", 19 December 1942, NAA (Vic): MP729/6 299/1/1761.

154 CQMG to LHQ, 19 January 1942, NAA (Vic): MP729/6 299/1/1761.

155 Captain A. P. Helm to Petroleum Officer, US Advanced Base, "Lubricants for Earthmoving Equipment", 24 January 1943, NAA (Vic): MP729/6 118/2/105.

and the number of gear lubricants to just one type and three grades.[156] Unfortunately, this process took most of 1943, by which time much the same task had already been carried out in SWPA, with the Australians adopting American specifications while the Americans reduced the number of different petroleum items to the bare minimum.

Problems could arise even when the product in question was identifiable and obtainable. The Americans discovered that Australian MT80 was often 12 to 15% alcohol. This was a measure supported by the Australian government as a means of reducing dependence on, and hence shipping required for, imported fuel and it actively encouraged the production of alcohol for this purpose. The affinity of alcohol for water caused it to separate from the petrol if water entered the tanks – always a problem in tropical areas. [157]

A shortage of 44-gallon drums developed in late 1942. Some 150,000 went north but only 10,000 returned. New production was ordered from Rheem and civilian holders of 44-gallon drums were urged to empty and return them.[158] Unserviceable drums were either repaired by the BIPOD or handed over to salvage. A well-organised collection effort was undertaken by the Port Moresby Base Sub Area which resulted in over 20,000 empty drums being returned to Australia in November.[159] Thereafter, a steady stream of drums made their way back from Port Moresby, some 267,000 between November 1942 and August 1943.[160] Milne Bay still "proved a sink for 44-gallon drums" until a 12-man BIPOD detachment was sent there from Port Moresby, with one of its main functions being to collect and return empty drums.[161] The drum situation was thought to be resolved

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156 Risch, E., *The Quartermaster Corps: Organisation, Supply and Services Volume I*, (Washington, DC: Department of the Army, 1952), pp. 143-144. The term MT80 will be used from now on for petrol and distillate for automotive diesel.

157 Mellor, *The Role of Science and Industry*, pp. 215-217; Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, pp. 213-214.

158 EC/HP to AHO, 27 November 1942, NAA (Vic): MP729/6 299/1/1761; Butlin. and Schedvin, *War Economy 1942-1945*, p. 93.

159 BIPOD New Guinea and Bulk Petroleum Storage Company, "Minutes of Meeting 26 February 1943", AWM52 1/10/18.

160 SOPOL, Port Moresby Base Sub Area, *Report on POL for 1 November 1942 to 31 January 1943*; *Report on POL for February* through *August 1943*, War Diary, Supply and Transport Services, Port Moresby Base Sub Area, AWM52 1/10/18.

161 Major M. T. Cowles, "Tour of Duty - New Guinea Area", 18 March 1943, NAA (Vic): MP729/6 118/2/105.

but shortages recurred in 1944 because as the distances to the bases became greater, the number of drums in transit correspondingly increased.[162]

Two alternatives were suggested to storing reserves in drums. The first was floating storage. The RAN agreed to send HMAS *Karumba*, a 7,930 ton oil supply vessel,[163] to be relieved as soon as possible by one of the 1,200-ton fuel lighters then under construction in Sydney.[164] A better solution was construction of some form of bulk storage connected to a wharf by a pipeline. The shipment of POL in bulk had the potential to effect considerable saving of shipping, as 44-gallon drums required 75% more shipping space than the same amount of POL in a tanker.[165] Instead of returning drums to Australia, they could be refilled in New Guinea. It could also save congestion at the wharves and speed up the rate of discharge. At first it was reckoned that small tankers would be required. The GHQ Area Petroleum Officer, Colonel L. W. Elliott, did request some, known as Y tankers, from Washington.[166] The first of 31 arrived in SWPA in August 1943.[167]

Meanwhile, someone discovered that Liberty ships had two deep tanks capable of carrying 110,000 and 208,000 litres of bulk distillate. Liberty ships carrying general cargo to New Guinea could therefore also carry bulk POL.[168] It was believed that tanks that had previously contained fuel oil would be satisfactory for loading distillate so long as they were pumped dry before refilling. Engineers complained of contamination of the second and third shipments of bulk distillate by fuel oil, which required replacing the filters and cleaning out the fuel systems of heavy earthmoving machinery. The USASOS Water Transportation Service baulked at the suggestion that the tanks be steam cleaned, in view of the time and effort involved, and sought reassurances that this was absolutely

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162 *Weekly Resume – S&T Service to 7 July 1944*, War Diary, S&T New Guinea Force, AWM52 10/1/12.

163 Straczek, J. H., *Royal Australian Navy A-Z: Ships, Aircraft and Shore Establishments*, Navy Public Affairs, Sydney, 1995.

164 "Provision of Oil Fuel at Milne Bay", 18 December 1942, NAA (Vic): MP729/6 299/1/1761.

165 Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, p. 218.

166 Col L. W. Elliott, Memorandum for the Records, 30 May 1943, AWM54 517/3/2.

167 Bykovsky and Larson, *The Transportation Corps: Operations Overseas*, p. 455.

168 S. G. Cruikshank, "The Carriage of Bulk Distillate in Liberty Ships", 14 December 1942, NAA (Vic): MP729/6 299/1/1761.

necessary.[169] The fourth shipment was therefore carefully tested and found to be satisfactory.[170] The second shipment was used for road building as a bitumen flux while the third was consumed in power stations and heavy prime movers that normally burned diesel oil obtained from Navy stocks.[171]

Looking at the problem of POL storage in June 1942, the LHQ Services Petroleum Section in Melbourne decided to obtain twenty 2,000-barrel (327,000 litre) bolted steel tanks from America through Lend Lease at a nominal cost of £620 each.[172] At the request of the RAAF, the order was subsequently increased to fifty.[173] These were considered ideal for bulk storage of POL in forward areas as they could be erected by relatively unskilled Army engineers in areas without electricity, compressors or welding plant. Repair of the tanks was easier if damaged by enemy action and they could be dismantled and re-erected as tactical needs dictated.[174]

The first group of 16 bolted tanks, complete with 165 sets of gate valves and 368 lengths of pipe, was shipped from San Francisco in February 1943.[175] Half the shipment was misdirected to Sydney, instead of Brisbane,[176] and five tanks went missing on arrival, requiring several weeks of effort on the part of Colonel Elliott, and others to locate them.[177] LHQ arranged with Shell for one of the Sydney tanks to be erected at its facility at Clyde as a training exercise.[178] Four more tanks arrived in Sydney in May and the remaining 30 in Brisbane in November.[179] Another 20 arrived from a USASOS order but

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169 DDST NGF to DST LHQ, "POL for Engineering Equipment", 24 January 1943; OCQM USASOS to Major M. T. Cowles, 14 February 1943, MP729/6 118/2/105.

170 Major M. T. Cowles, "Tour of Duty - New Guinea Area", 18 March 1943, NAA (Vic): MP729/6 118/2/105.

171 DDST, "POL: Disposal of U/S Products", NAA (Vic): MP729/6 118/2/105.

172 QMG to Sec Army, 2 July 1942, NAA (Vic): MP742/1 118/6/172.

173 Sec Air Force to Sec Army, 7 August 1942, NAA (Vic): MP742/1 118/6/172.

174 Reply to DG War Supplies, 19 October 1942, NAA (Vic): MP742/1 118/6/172.

175 Director, DIVIMPRO, 30 January 1943, NAA (Vic): MP742/1 118/6/172.

176 DG War Supplies, 4 February 1943, NAA (Vic): MP742/1 118/6/172.

177 GHQ Petroleum Area Officer, "Delivery Bolted Steel Tanks", 3 September 1943, NAA (Vic): MP742/1 118/6/172.

178 Shell Co to DST, 1 March 1943, NAA (Vic): MP742/1 118/6/172.

179 DST to DDST Adv LHQ, "70,000 gallon Bolted Storage Tanks", 27 November 1943, NAA (Vic): MP742/1 118/6/172.

it was agreed that all tanks would form a pool. Of the first shipment of 16, two were consigned to the USAAF for erection in Port Moresby while VII Amphibious Force took five for Cairns, a couple for Bribie Island, a couple for Mackay and one for the Amphibious Training Centre at Port Stephens.[180] In June 1944, the bolted tanks were disposed as follows:

Table 7. Location of Bolted Tanks, June 1944 [181]

Location	Number	Purpose
Brisbane	5	In storage
Brisbane	2	In storage. Formerly at Mackay for VII Amphibious Force
Bribie Island	2	In storage. Originally in use by VII Amphibious Force
Cairns	5	Distillate
Brock Creek, NT	3	RAAF
Alice Springs	3	RAAF
Buna/Dobodura	8	USAAF Avgas
Port Moresby	2	USAAF Avgas
Kiriwina Island	5	USAAF Avgas
Lae	7	USAAF Avgas
Finschhafen	4	USAAF Avgas
Finschhafen	2	In storage
Oro Bay	5	MT80
Cape Gloucester	5	USAAF Avgas
Aitape	4	USAAF Avgas
Darwin	2	USAAF Avgas
Saidor	5	USAAF Avgas
Lost due to enemy action	1	
Total	**70**	

[180] DST to DES, "Bolted tanks", 26 March 1943, NAA (Vic): MP742/1 118/6/172.

[181] DDST, "Pool of 2,000 bbl bolted tanks", 9 June 1944, NAA (Vic): MP742/1 118/6/172.

The RAE commenced construction of a bulk POL terminal at Port Moresby in November 1942 near Hanuabada on the north east shore of the harbour, where there was already a 12,000-ton tank used by the RAN for diesel oil. There was also a refueling point at Government wharf but its use would delay unloading of military cargoes.[182] Some 44 American engineers – all that could be spared – pitched in, constructing a 900 metre jetty. They had only one pile driver, which lacked power for the hammer and required hand operation to drive in the 24 metre piles. This consumed all the piles in Port Moresby at the time. The Australians assembled the welded tanks. There was an acute shortage of skilled welders and construction personnel and the Army resorted to combing out skilled personnel and drafting skilled welders from reserved occupations. Tanks B and C were ready by the end of February 1943. Tank A was completed in April and D, E, F and G followed at three week intervals. By this time the jetty and pipeline were substantially complete. Drumming and filling platforms were finished by 12 March, filling stands for petrol tanker trucks followed, and a special foam fire fighting system was developed.[183]

To move the fuel from the storage tanks to the aerodromes, US Army engineers constructed smaller tanks at the aerodromes, located on hillsides in such a way that aviation fuel could be fed both from and into the tanks by gravity. A 4-inch pipeline was laid from tanks E, F and G to the tanks at Wards and then on to Jackson. This work was shared between the two armies, with the Americans laying the pipe and the Australians providing the connections to the storage tanks.[184] Pending its completion, fuel was hauled by tanker trucks. The Australian Army did not have any but the Shell and Vacuum Oil Companies agreed to sell surplus tanks, which were installed on standard 3-ton truck chassis and used to haul the fuel.[185]

The next task was the construction of a naval fuel installation. The RAN had no construction units of its own so it arranged with General Blamey for the Army to carry

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182 ADP, "Oiling Facilities at Port Moresby", 15 September 1943, NAA (Vic): B6121 359A.

183 Casey, *Airfield and Base Development*, p. 93; DADS NGF, "Bulk Ocean Terminal - Port Moresby", 7 March 1943, MP729/6 118/2/105.

184 Casey, *Airfield and Base Development*, p. 94; "Bulk Delivery of Aviation Petrol - Port Moresby", Minutes of meeting held on 25 February 1943, MP729/6 118/2/105.

185 Vacuum Oil to Department of Army, 16 January 1943; Shell Oil to Department of Army, 12 January 1943, MP729/6 118/2/105.

out the work.[186] Work began on four tanks, two 5,000-ton tanks for fuel oil, one 5,000-ton tank for distillate and one 2,000-ton tank for diesel oil. Pipelines were laid from the new tanks and the existing one to a new fuel jetty at Elevara.[187] While they were under construction, a check of the offtake of the 12,000-ton tank for the year ending 30 June 1943 revealed that 88% had been supplied to navy ships for use as furnace oil.[188] It was therefore decided to drain it into one of the new tanks and use it for fuel oil.[189] At the Army's request, the RAN agreed to make one of its 5,000-ton tanks available for storage of aviation fuel.[190] Since the RAN did not have the personnel, the installation was operated by the 1st Bulk Petroleum Storage Company, which arrived at Port Moresby on 7 March 1943.[191] This unit assumed responsibility for the receipt of bulk POL and filling of drums. The return of drums to Australia then temporarily ceased in order to build up a stockpile in New Guinea.[192]

The Allied Naval Forces began discussing the requirements of a naval base at Milne Bay in January 1943, but things did not get moving until May.[193] Over the next year, five battalions of US Navy Seabees would work on the naval base, which had ever-expanding requirements.[194] The Australian Army drew the task of constructing a slipway and bulk oil facilities, including pipelines, access roads, fueling berths and drum filling and rumbling[195] plants. The naval slipway was built at Ladava. Underwater work was required but the unit had no diving equipment, so this was improvised using ordinary

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186 Sec Navy to Sec Army, "Naval Projects at Port Moresby", undated, NAA (Vic): B6121 359A.

187 AD Gen Allied Works to DES, "Naval Oil Storage Port Moresby", 14 July 1943, NAA (Vic): B6121 359A.

188 DP, 12 August 1943, NAA (Vic): B6121 359A.

189 Sec Army to Sec Navy, 10 November 1943, NAA (Vic): B6121 359A.

190 Sec Navy to Cdr ANF, 3 November 1943, NAA (Vic): B6121 359A.

191 NGF to Landforces, 22 October 1943, NAA (Vic): B6121 359A; War Diary, 1st BPS Coy, 7 March 1943, AWM52 10/20/1.

192 "Operating Instructions – BIPOD New Guinea and Bulk Petroleum Storage Company", 26 February 1943, War Diary, 1st BPS Coy, AWM52 10/20/1.

193 Minutes of Conference with CSWPF, 26 January 1943, NAA (Vic): MP1185/8 1937/2/185

194 *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps 1940-1946*, Volume II, (Washington, DC: Government Printing Office, 1947), pp. 286-290.

195 The slow and prolonged rotation of a drum to remove scale or rust from inside without further weakening it.

respirators and compressors. This improvised equipment was good enough to allow men to work six metres underwater for an hour at a time.[196]

Plans for bulk oil facilities called for four 500,000-gallon tanks for MT80 and Avgas and three 2,000-ton tanks for diesel oil and distillate at Gili Gili on the North shore of Milne Bay and three 2,000 ton tanks at Waga Waga on the South shore. As an interim measure, a 350,000-gallon bolted tank was erected near Liles' Wharf. Supervising the effort once again was Major Baldwin.[197] Work commenced in July with the clearing of areas designated for the roads, tanks and drum filling plants and the construction of the oil berth with piles supplied by timbers cut on nearby islands.[198] The 1st, 2nd and 3rd Oil Tank Construction Platoons were formed at Kapooka on 25 May with a combined strength of 116 men, embarked from Brisbane on 29 July, and commenced work at Milne Bay on 16 August. The bolted tank was assembled but leaked badly when filled with distillate on 11 September. The tank was a second hand one, formerly used in Australia by VII Amphibious Force and it was discovered the hard way that re-erecting bolted tanks was more difficult than anticipated. Attempts were made to seal it with bitumen but it was not completely sealed and tested satisfactorily until 15 February 1944.[199]

On 11 October 1943, GHQ added four more 500,000-gallon tanks for avgas and three for MT80, increasing the scope of the project from seven tanks to fourteen.[200] Later, the navy decided it did not need so much storage for fuel oil and those tanks were filled with distillate instead.[201] A September GHQ directive assigned responsibility for the operation of the terminal at Gili Gili to Allied Land Forces and those on the south shore to Allied Naval Forces.[202] The 2nd Bulk Petroleum Storage Company was formed in Australia for the task from a cadre supplied by the 1st Bulk Petroleum Storage Company and arrived at

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196 McNicoll, *Teeth and Tail*, p. 292.

197 DoC GHQ, "Coordination of Oil Storage Construction in Milne Bay", 29 May 1943, AWM54 517/3/2.

198 OC 4 Field Coy, "Bulk Oil Installation – Milne Bay – Progress Report to 15 Aug 43", 15 August 1943, AWM54 905/3/2.

199 War Diary, 1st Oil Tank Construction Platoon, 25 May - 16 August 1943, AWM52 5/29/1.

200 CinC SWPA, "Bulk Storage and Handling Facilities for Petroleum Products at Milne Bay", 11 October 1943, AWM54 517/3/2.

201 DDST NGF, "POL – Gili Gili Installation – Milne Bay", 17 February 1944, AWM54 517/3/2.

202 CinC SWPA, "Assignment Responsibility Operating Bulk Installation, Milne Bay", 22 September 1943, AWM54 517/3/2.

Milne Bay in November 1943.[203] The installation was completed in March 1944. By this time, operations were in full swing, with drums were being repaired and refilled by the thousand. Milne Bay became a transhipment point, loading drums onto freighters, or bulk fuel into Y tankers for movement to forward areas. [204]

Port Development

Port Moresby had only one deepwater wharf and two small jetties in early 1942. To increase the rate of discharge, the Tug and Lighter Company, a unit which had served at Tobruk, was sent to New Guinea in August. It found only two lighters and no tugs. The company improvised, salvaging tackle from the wreck of the *Macdhui*, sunk in the harbour in an air raid in June. Harbour craft arrived on Liberty ships over the next couple of months. The Tug and Lighter Company was absorbed into the 1st Water Transport Group in November.[205]

The existing wharf could handle only one ship at a time, but extending it required piling and heavy timber that was not immediately available. The Australian Army eventually completed it in October 1943.[206] But Tatana Island, separated from the mainland by shallow water with a coral reef bottom, had deep water off its northwest side. Colonel Albert G. Matthews decided to divert American engineers from aerodrome construction to construct a causeway. The project was risky, for without the engineers, heavy rains might shut down the roads and aerodromes, and there was the possibility that a causeway could not withstand tidal action. The US Fifth Air Force was opposed to the project, but Herring backed it. Engineers were ferried across to Tatana Island. Working from both ends at once, 40,000 m^3 of earth was moved to create a 685-metre causeway, while a floating pier was constructed from wooden pontoons and decked with heavy timber planks. Port capacity was thereby nearly tripled, from 1,600 m^3 per day to 4,500 m^3 per day, and the first vessel docked there on 3 November 1942. For Herring, this incident highlighted the advantages of the American supply system, which accorded USASOS "a

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203 ADST Moresby Base Area, "1 Aust Bulk Petroleum Storage Coy and Proposed 2 BPS Coy", 7 August 1943, AWM54 517/3/2.

204 OC 2nd BPS Coy, *Report on BPS Coy Activities Week Ending 15 January 1944*, AWM54 517/3/2.

205 War Diary, Tug and Lighter Company, November 1941 - November 1942, AWM52 5/54/1.

206 NOIC Port Moresby, 2 October 1943, NAA (Vic): B6121 359A.

measure of independence much greater than that accorded to the services in our own Army."[207]

While Milne Bay never became an important airbase, it had attractions as a port. The harbour was deep and commodious enough to hold any number of ships. Although the northern shore was exposed to strong winds, it had a very steep shelf and a short ten metre wharf could have ten metres of water on its outer side. If large ships could unload at Milne Bay, this would free smaller coastal vessels from the voyage from Australia. Moreover, if shipping from the United States could sail directly to Milne Bay, this could potentially save two or three days' travel time.

4. Milne Bay, 14 September 1942. SS *Kremer* unloads at pontoon wharf

Initially, Milne Bay was served by a couple of small jetties. The first effort to improve the port facilities was the construction of Pontoon Wharf in June and July 1942. Papuan labourers, supervised by ANGAU, filled coconut crib piers with coral carried in baskets. A floating pier was made from 44-gallon drums. This successful improvisation enabled ships to be unloaded directly onto trucks but only four at a time. A Liberty ship wharf was then built but on the opposite side of Milne Bay, at Waga Waga. Piles were driven with a floating pile driver from a frame and winch sent from Australia and mounted on a pontoon. The site was cut off from the north side by swamps, the small harbour there could only handle three ships and installations were restricted to the narrow coastal plain.

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[207] Casey, *Airfield and Base Development*, pp. 94-98; Johns, Dwight F., "We Are Doing What We Can With What We Have", *Military Review*, Vol. XXV No. 1, April 1945, pp. 14-15; Letter, Herring to McCarthy, 15 May 1957, Herring Papers, State Library of Victoria: MSS 11355 Box 10.

In September and October, No. 2 Wharf was constructed. Subsequently named Liles' Wharf after Captain S. E. Liles of the US 43rd Engineer General Service Regiment, who supervised its construction, it was a pile wharf, connected to the shore by two piled stems. Eventually, there would be ten Liberty ship wharves along the north shore, of the same basic design as Liles' Wharf.

Timber was found on the north shore of Milne Bay and the nearby islands of Sideia and Basilaki. Papuan workers, under ANGAU supervision, cut piles and floated them down rivers to the sea, where they were loaded onto coastal steamers or buoyed with balsa wood or 44-gallon drums and towed. The best timber was *Kasi Kasi* but this grew up country and was hard to get and only the wharf at Waga Waga was constructed from this timber. The others used large leaf mangrove, an excellent timber for piles as it grew tall, straight and of uniform thickness but was it not resistant to water borers (toredoes) and only lasted two to three years in salt water – something which would become quite obvious in 1944. [208]

5. Milne Bay, 16 April 1943. Pontoon Wharf and the sunken *Anshun*.

The *Anshun*, a British vessel of 3,188 tons, was sunk by gunfire from the Japanese cruiser *Tenryu* at the Pontoon Wharf on 6 September 1942.[209] Sinking in about twenty minutes, the vessel came to rest on her starboard side in 10 metres of water.[210] *Anshun* contained

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[208] OC 24 Field Coy, *Report on Operations at Milne Bay by 24 Aust Fd Coy from Aug 42 to Mar 43*, 18 March 1943, AWM52 5/13/40Casey, *Airfield and Base Development*, pp. 107-110; McNicoll, *Teeth and Tail*, pp. 151, 291.

[209] Gill, G. Hermon, *Royal Australian Navy 1942-1945*, (Adelaide: Australian War Memorial, 1968), pp. 171-172.

[210] "History – Shipping", AWM70 156.

numerous items including 3.7 inch antiaircraft guns, 3-ton trucks, jeeps and 170 bags of mail. The mailbags were recovered after being immersed in oil and salt water for 17 days. Letters were carefully dried out and 85% were ultimately delivered. Parcels had deteriorated more and only half could be delivered.[211] In February 1943, the 24th Field Company cut a hole cut in the hull and salvaged three jeeps and some 3-ton trucks.[212]

6. Milne Bay, May 1943. Salvage divers work on the *Anshun*.

For some months, ships were able to berth between the wreck and the wharf but the gap gradually silted up and it was decided to salvage the vessel.[213] Work commenced under the direction of Captains Williams and Johnson with the salvage vessel *San Salvador*. The hole in the ship's side was too large to be repaired but a concrete patch was placed underwater. Compartments were pumped out but the ship did not refloat because it was stuck in the silt. Six steel legs were welded to the port side and rigged to a dozen 10-ton winches mounted in concrete on the foreshore, while 70 steel buoyancy tanks were sunk and attached to the starboard side. Finally, in February 1944, the vessel was refloated, and Salvage Board tugs towed it back to Sydney, where it was repaired and restored to service.[214]

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211 Osborn, *The Pioneers*, p. 120; Proud, E. W. B., *History of the Australian Military Postal Services 1914-1950*, (Heathfield, East Sussex: Proud-Baily, 1991), p. 56.

212 OC 24 Field Coy, *Report on Operations at Milne Bay by 24 Aust Fd Coy from Aug 42 to Mar 43*, 18 March 1943, AWM52 5/13/40.

213 *Resume of Engineer Activities 2 May - 8 May 1943*, AWM54 313/4/15.

214 McNicoll, *Teeth and Tail*, p. 291; "History – Shipping", AWM70 156.

Tropical Diseases

In addition to the difficulties imposed by the climate, terrain and lack of infrastructure in New Guinea, there was also that of tropical disease. Dysentery, typhus and dengue were all endemic. Outbreaks of dysentery occurred sporadically and 21,015 Australian soldiers contracted bacillary dysentery during the war, of whom 21 died. The usual problem was a local breakdown in hygiene, which could be tackled by tightening up on the disposal of refuse and waste. Flies were the usual culprits and fly-proofing and removing their breeding grounds helped bring outbreaks under control. Sometimes water was the cause. Water from the Bomani pumping station was not chlorinated and had to be sterilised before use.[215]

Scrub typhus was spread by mites that lived in the soil. Soldiers walking through mite-infested areas were fairly safe, but if they sat or lay down or stood still for long enough, the mites could attach themselves. Although the incidence of typhus was much less than malaria or dysentery, it was particularly lethal. Of 2,839 Australian servicemen affected in SWPA, 9.05% died. Starting in late 1943, the diggers were provided with dibutyl phthalate, a mite repellent, to treat their clothing, socks and blankets, and the incidence of typhus declined. [216]

Nonetheless, the greatest health problem was malaria, the incidence of which was so great in 1942 and early 1943 that it seriously hampered operations. The disease is caused by parasites, *Plasmodium falciparum* and *Plasmodium vivax*, transmitted by female *Anopheles* mosquitoes. Before the war, the main drug used to combat malaria was quinine, but the world's major producer was Java, which was overrun by the Japanese. Attention then turned to two synthetic drugs, atabrine and plasmoquine.[217] Although the Army had experience with malaria in the Middle East, and had formed malaria control units there, most troops had a poor understanding of anti-malaria precautions and few medical officers had encountered the disease. In combination with critical shortages of drugs and anti-malarial supplies such as netting, insecticides and repellents, the result was a medical disaster. In the 13-week period from 31 October 1942 to 1 January 1943, the

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[215] Walker, *Clinical Problems of War*, pp. 4, 12-16.

[216] Ibid, pp. 179, 191-194.

[217] Now known as quinacrine and chloroquine respectively. For simplicity, the old names will be used.

Army reported 4,137 battle casualties, but 14,011 casualties from tropical diseases, of which 12,240 were from malaria.[218] "Our worst enemy in New Guinea," General Blamey declared, "is not the Nip – it's the bite."[219]

This caused him to dispatch a medical mission to the United States and the United Kingdom in September 1942, headed by Colonel H. N. Fairley, the Army's Director of Medicine, to present the Army's case for a more adequate and equitable share of anti-malarial supplies. Failey's mission was successful. Not only was he able to secure supplies and expedite the delivery of those that were already on order but held up for lack of shipping or priority, but in bringing the problem to the attention of the highest authorities overseas, he lifted the profile and priority of malaria control measures globally. His proposed use of atabrine as a prophylactic agent was accepted, and it was calculated that Allied requirements for atabrine would be 200 tonnes per annum, of which 50 tonnes would be manufactured in the United Kingdom and 150 tonnes in the United States. American production in 1942 was estimated at 60 tons but efforts were soon underway to increase production. The possibility of producing atabrine in Australia was considered, but the drug was complicated to synthesise and required little shipping space, although steps were taken to produce mosquito repellent. As in the Middle East, the Army relied on a combination of quinine, atabrine and plasmoquine to cure malaria. The United States and United Kingdom agreed to each produce two tons of plasmoquine each per annum. The requested drugs and supplies began arriving in December 1942.[220] The loss of Java's quinine was thus a blessing in disguise, for it forced the Army to rely on atabrine and plasmoquine, which ultimately turned out to be far more effective drugs.

As "one of the reasons for the lamentable record in malaria control in 1942 and early 1943 was the absence of medical authority at the level of the theatre commander's headquarters",[221] General MacArthur created the "Combined Advisory Committee on

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218 *Defence Committee Agendum No. 14/1943*, 4 March 1943, NAA (ACT): A5954 473/4.

219 Sweeney, Tony, *Malaria Frontline: Australian Army Research during World War II*, (Melbourne: Melbourne University Press, 2003), p. 31.

220 Director Medicine, *Report by Colonel N. Hamilton Fairley on Result of Mission to USA and UK Regarding Malaria, Anti-Malarial Drugs and Other Essential Supplies for the Control of Malaria*, 20 February 1943, NAA (ACT): A5954 473/4.

221 Coates, Col. John Boyd, Jr. (ed), *Volume VI: Communicable Diseases: Malaria*, (Washington, DC: Office of the Surgeon General, Department of the Army, 1963), p. 540.

Tropical Medicine, Hygiene and Sanitation", with Colonel Fairley as its chairman, in March 1943. The committee proceeded to make a series of recommendations regarding training, discipline, equipment, procedures and priorities, which then went out as GHQ orders to all commands. As stores were received, discipline tightened and anti-mosquito activities started to make progress, the malaria situation gradually brightened in 1943.[222]

While the problems of base development in Papua were truly formidable, by mid-1943 the Allies were making headway, and the bases would soon be supporting the effort to drive the Japanese from New Guinea.

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[222] Walker, *Clinical Problems of War*, pp. 99-100, 111-112.

4. The Bulldog Road

The major logistical feature of jungle warfare in New Guinea was the absence of wheeled transport. The road network was largely restricted to what little had been constructed in the base areas around Port Moresby, Milne Bay and Buna. The inland tracks or "pads", of which the Kokoda Track is the most famous, were for foot traffic only. They often followed sharp razorback ridgelines that were "wide enough for only a single, narrow footpath, and the slopes down to the valleys were so steep that they were virtually ladders".[1] A common first attempt at improvement was the cutting of steps into the path, as at the infamous "Golden Stairs" on the Kokoda Track, but opinion turned against these in 1943, and it was reported that "remarkable savings in time and effort followed the construction of easily graded zigzag tracks up steep slopes, as compared with cutting of steps and the range of carrier trains was correspondingly extended".[2]

Resort was made to sea and air transportation, but these had their limitations, being subject to disruption by the unpredictable New Guinea weather and enemy action. So while he hoped to be able to support operations against Lae by sea and air, General Blamey decided to supplement them with an alternative overland supply route, utilising Papua's inland waterways in combination with newly-constructed roads and tramways. The existence of a backup plan was a hallmark of Blamey's approach to strategy and logistics. Thus, on New Year's Day 1943, work began on "one of the most ambitious engineering projects ever undertaken by the Australian Army".[3] The difficulties involved in road construction and inland water transportation in the rugged interior of New Guinea were formidable indeed, but an understanding of them is necessary to fully appreciate not just the logistics of land operations, but the value of sea and air support as well.

Before the war, Wau had been the centre of a rich gold mining district. The miners partially cleared the area, built houses, workshops and aerodromes, and established a water supply and an electricity grid. There were no roads leading into the area, so everything was flown in: machinery, vehicles, even the dredges used for gold mining.

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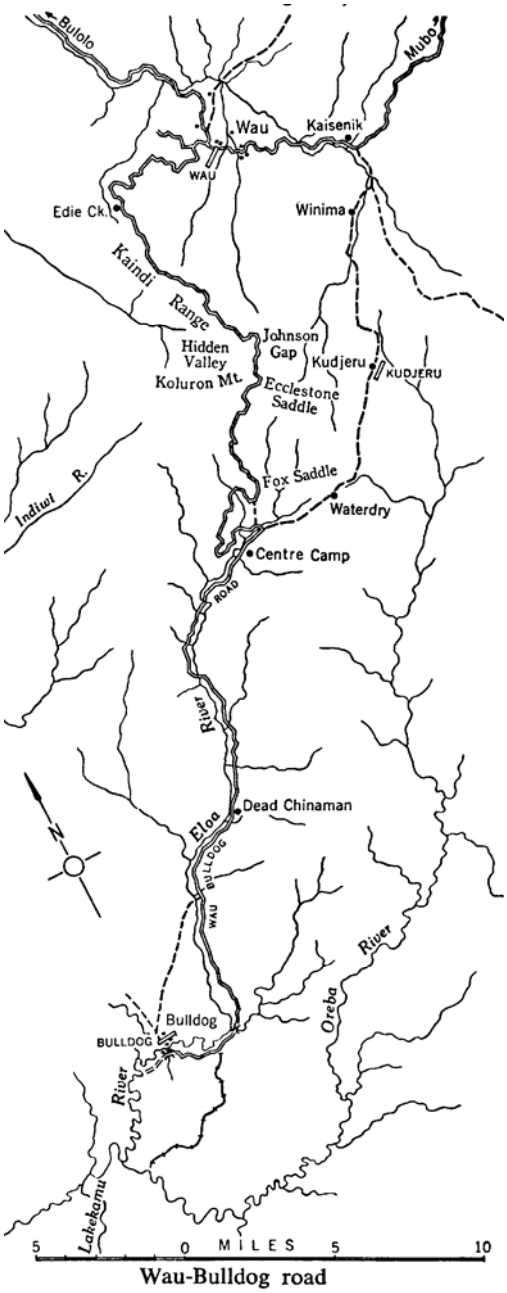
1 Casey, *Airfield and Base Development*, p. 159.

2 *!8th Infantry Brigade Report on Operation CUTTHROAT*, [1944] AWM54 595/7/18.

3 McCarthy, *South West Pacific Area - First Year*, p. 578.



Map 4. Wau-Bulldog Track

Source: McCarthy, *South West Pacific Area - First Year*, p. 579

After the war with Japan began, non-native women and children were evacuated while men of military age were called up. Initially civilians were evacuated from Wau by air but as the Japanese drew closer – bombing Wau on 23 January 1942 – it became too dangerous to fly without fighter escort, which was unavailable. This left some 250 European and Asian men stranded. The idea of falling into Japanese hands having no appeal whatsoever, these refugees made a hazardous journey over the unexplored and uncharted Owen Stanley Range on foot by way of the Bulolo and Eloa Rivers to Bulldog, an old mining settlement where there was an aerodrome, and thence down the Lakekamu River to the sea.[4]

An elderly Chinese man succumbed to pneumonia and was left unburied in the tree hollow where he had sought shelter during a storm. Dead Chinaman, one of the rough camps used as staging posts along the route, was named after him.[5] After six weeks travelling, the survivors reached Port Moresby gaunt, emaciated, exhausted and plagued by fevers and jungle ulcers.[6]

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4 McCarthy, *South West Pacific Area - First Year*, pp. 57-58.

5 White, Osmar, *Green Armour*, (Sydney: Angus and Robertson, 1945), p. 106.

6 Reinhold, W. J. *The Bulldog-Wau Road: The John Thompson Lecture for 1945*, (Brisbane: University of Queensland, 1946), pp. 1-3, Reinhold Papers, Fryer Library, University of Queensland, Special Collection Box 62.

With the possibility of the route thus demonstrated, it was decided to establish a line of communications to Wau via Bulldog. A platoon of the 1st Independent Company left Port Moresby in a schooner and traversed the route, joining the men of the New Guinea Volunteer Rifles holding the Wau area.[7] This was the beginning of what became KANGA Force on 23 April 1942.[8] Supplies began to trickle in, brought from Port Moresby to the mouth of the Lakekamu River by small ships, manhandled across the sandbar, moved up the river in canoes, and carried over the mountains to Wau by native porters, some 1,000 of whom were working by December.

Captain H. N. Vidgen of the 2/1st Mechanical Equipment Company, an officer of the Queensland Main Roads Commission before the war, carried out a reconnaissance of the route in July with a party that included Lieutenant C. W. G. Fox, one of the refugees. His report reached General Blamey, who ordered that the route be upgraded to a mule track. Lieutenant Fox and Lieutenant J. W. Ecclestone, another of the original refugees, were ordered to survey the route with the aim of constructing the mule track as soon as it was determined practical. In November, Fox and Ecclestone reported back to Port Moresby for a conference, the result of which was a directive from Blamey that a jeep track be constructed along the route.[9]

The CRE of the 11th Division, Lieutenant Colonel W. J. Reinhold, was made responsible for all activities relating to the road.[10] He arrived at Bulldog on 10 January 1943 with orders from Blamey to push road construction forward as rapidly as possible. Reinhold had graduated from the University of Queensland with a Civil Engineering degree in 1914, and had served on the Western Front in the Great War with the Royal Engineers and the Tank Corps, winning the Military Cross.[11] Returning to Queensland, he became a consulting engineer, working with the Main Roads Board and local authorities on roads, bridges and a sugar tramline. In 1941 he was appointed to the Army with the rank of major. Promoted to Lieutenant Colonel in January 1942 he was posted to Milne Force,

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7 *New Guinea Force Operation Instruction No. 5*, 28 March 1942, AWM54 578/6/1.

8 *New Guinea Force Operation Instruction No. 7*, 23 April 1942, AWM54 578/6/1.

9 Reinhold, *The Bulldog-Wau Road*, pp. 4-5.

10 BGS NGF, "Preparation of Jeep Track Bulldog-Wau", 31 December 1942, AWM54 583/5/1.

11 *London Gazette* No. 30204, 24 July 1917, p. 23.

which subsequently became the 11th Division, in September. For his work at Milne Bay, he was appointed to the Order of the British Empire. His citation read:

> On taking over the CRE's duties at Milne Bay in face of adverse conditions of weather and terrain and labouring under a lack of proper mechanical equipment and resources, he had the duty of undertaking, in particular, the task of constructing an adequate system of road communications in a particularly undeveloped area. In fulfilling this task and others, he displayed marked powers of control and organisation and a timeless devotion to duty. His attitude and demeanour were at all times an example and inspiration to all associated with him, whether under his command or otherwise. [12]

If Blamey thought that Reinhold was the right man for the job, he was absolutely correct. A more fortuitous choice could hardly have been made. Reinhold became the driving force behind the project, which would require all his resources, both as a commander and as an engineer.

His first task was to settle on the route. Personal inspection was the only means available of doing this, for maps were poor, incomplete or non-existent and aerial photographs were unavailable. RAAF *Wirraways* and USAAF F-4s (the photo-reconnaissance version of the P-38 *Lightning*) detailed to aerial photography were limited in numbers and hampered by the persistent mists over the mountains and the limited photographic reproduction facilities in Port Moresby.[13] Accompanied by Captain J. W. Maynes, Reinhold made a reconnaissance from Bulldog up the Eloa River through Dead Chinaman, Fox Camp, Centre Camp, Waterbung, Waterdry and Kudjeru to Wau, crossing the range at its lowest point at around 2,500 metres. At this altitude, the terrain mostly consisted of mossy forest. Reinhold described it thus:

> The mossy forest is grotesque. A gnarled mangrove-like tree growth in ground covered with moss sometimes 6 to 7 feet [two metres] thick brought back childhood memories of Grimm's Fairy Tales, but there were no beautiful princesses. Literally, one walked on the spider roots feet above the ground and horizontal tree trunks, with fantastically twisted branches, in an eerie silence, made a scene that was peculiarly depressing and macabre. [14]

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[12] OBE Citation, 23 December 1943, Reinhold Papers, Fryer Library, University of Queensland, Special Collection 62/1.

[13] Craven. and Cate, *Guadalcanal to Saipan*, p. 124.

[14] Reinhold, *The Bulldog-Wau Road*, p. 14.

7. Reinhold Highway, New Guinea 25 February 1944. The Mossy Forest near the highest point in the road, at around 3,000 metres above sea level

Reinhold had two problems with the proposed route. The major one was strategic: the road was exposed to enemy action from Salamaua and in late January, the Japanese advanced on Wau and cut the track between Kudjeru and Wau, penetrating to within 400 metres of the aerodrome itself.[15] The other was technical. The military situation was such that a carrier or mule track was essential but it had to be located in such a way that it could be later upgraded to a jeep track and then a road suitable for trucks. This required a route that was less steep and with gentler bends than that required just for a mule track. Reinhold felt that the proposed route would be "fighting the country" by running against

[15] NGF to LandForces, 30 January 1943, Blamey Papers, AWM 3DRL 6643 2/48.

the natural lie of the land. Progress through the steep gorges leading to the Eloa River was bound to be difficult and slow and he had his doubts as to whether a road could be constructed in time with the resources available.[16] The river itself was "a series of rapids and waterfalls over slaty boulders".[17] Reinhold therefore went looking for an alternative route and found one to the west. It was less subject to enemy interference; being higher up made drainage easier and landslides less hazardous; the gradients were easier; and the rock was broken up by horizontal shattering and easier to move with picks, shovels and crowbars, the primary implements of roadwork in the middle sections of the road for some months to come.

Lieutenant Ecclestone was charged with the survey from Edie Creek to Ecclestone Saddle; Lieutenant F. A. Smith with that from Ecclestone Saddle to Fox Saddle; and Lieutenant Fox with the stretch from Fox Saddle to Centre Camp.[18] Fox and WO2 R. Bannon of ANGAU, an old New Guinea hand who had been on the field staff of the Bulolo Dredging Company before the war, managed to find a turning point on the proposed route that became known as Bannon's Lookout. The survey from Bulldog to Centre Camp was already advanced enough for immediate requirements and Fox resumed work on it after he completed the survey from Fox Saddle to Centre Camp. He had to find suitable crossings of the Clowes Creek while avoiding a steep gorge along its right bank and the extremely rugged Thursday Creek area. He decided to make a turn on the watershed between Thursday Creek and Clowes Creek and cross the Eloa River at the same point as on the original Kudjeru-Bulldog carrier track. This avoided the rugged Thursday Creek area but entailed negotiating difficult country in Herring Gorge.

While it was possible that a superior alternative might yet be found to the difficult stretch along the Eloa River from Bulldog to Centre Camp, time was now running short and the advantages of a better route could easily have been lost in the time required to locate it. Reinhold therefore determined that the best course of action was to proceed with construction along the route that he had, putting personnel to work as soon as they

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16 Reinhold, *The Bulldog-Wau Road*, pp. 5, 16-17.

17 White, *Green Armour*, p. 104.

18 For simplicity, all place names in this chapter will be the final place names allotted to the features in June 1943, as displayed on the maps. See *Bulldog-Wau Project Interim Report Period 30 May to 13 June 1943*, 19 June 1943, AWM54 863/2/16.

arrived. ANGAU supervisors and about 450 civilian labourers had already begun grubbing and clearing a road from the Bulldog end on New Year's Day. Clearing camps were established at intervals between Bulldog and Fox Camp.[19]

The road gradient was initially set at 5% with a minimum curve radius at 80 feet (24 metres). After reading Reinhold's 12 February report on the road location, the Chief Engineer at GHQ, General Casey, pointed out that a grade of 10% was not excessive for a military road in mountainous country. In view of the amount of additional work that might be required he recommended that 10% be the limiting grade. He also queried the width of clearing that was proposed, 100 feet (30 metres), and suggested that labour could be saved by reducing this to 60 feet (20 metres) or less.[20] His recommendations were adopted and the requirement was relaxed to a gradient of 10% and a minimum curvature of 50 feet (15 metres). Nonetheless, the challenge remained to find a practical route that did not exceed even these limits. Use was made of rocky ledges and benches, some of which were granite, while others were hard schist. The road gained its altitude by climbing from ledge to ledge. Rockwork was necessary between the ledges in order to meet the grade requirements.[21]

Responsibility for the line of communications was divided between COSC and New Guinea Force. The latter was responsible for the construction of the road, landing stages, wharves, huts and warehouses while COSC was responsible for water and overland transport, receipt and storage of supplies and their distribution as far as Bulldog. New Guinea Force drew up an establishment of 11 officers and 48 other ranks for a headquarters to administer the new line of communications, which became the Bulldog Base Sub Area on 5 June and the 2nd Base Sub Area in July.[22] Appointed to command it was Lieutenant Colonel Arnold Brown, an officer with a distinguished combat record in

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19 Reinhold, *The Bulldog-Wau Road*, pp. 5, 16-17.

20 CE GHQ SWPA to E-in-C LHQ, 21 February 1943, AWM54 863/2/16.

21 Reinhold, *The Bulldog-Wau Road*, pp. 7, 13-15.

22 *New Guinea Force Administrative Instruction No. 102*, 5 June 1943, AWM54 9/5/9; War Diary, Bulldog Base Sub Area, 16 July 1943, AWM52 1/8/1.

the Great War. More recently he had commanded the 2/1st Pioneer Battalion in Middle East.[23]

Units proposed for the sub area included a field company for maintaining the road; an army troops company for work on the river, landing stages and base area; water transport units and workshops; a docks operating company to unload the boats; and two general transport companies. Supply units would include a BIPOD section; a field ammunition depot; a field ordnance depot; and an advance depot of medical and veterinary stores. With medical, provost, pay, signals and canteens personnel, the total came to well over 2,000 men, in support of 10,000 more. Reserves of 30 days' of ammunition, ordnance, medical and engineer supplies for 10,000 would be held at Wau, Bulldog and Terapo. The daily transportation requirements of the sub area were estimated at 250 tonnes:

Table 8. Daily Transport Requirements of the Bulldog Sub Area [24]

Item	**Weight (tonnes)**	**Volume (m^3)**
Rations – European 10,000 @ 7.5 lbs each	36	79
Rations – native 2,500 @ 2.5 lbs each	3	6
Ammunition	69	77
POL – Petrol 21,000 gallons, Oil 1,260 gallons	101	113
Distillate 1,320 gallons	5	6
Engineer stores	20	45
Other – ordnance, signals, mail etc	20	45
TOTAL	**254**	**371**

Captain Maynes set a platoon of the 14th Field Company and 40 Papuans to work desnagging the river.[25] This was slow work as they had no special vessel or equipment for

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23 Bean, C.E.W., *The Official History of Australia in the War of 1914-1918: Volume III: The AIF In France 1916*, (Sydney: Angus and Robertson, 1929), pp. 703, 708, 709, 712, 935, 936; Bean, C. E. W., *The Official History of Australia in the War of 1914-1918: Volume IV: The AIF In France 1917*, (Sydney: Angus and Robertson, 1933), pp. 97, 98, 471, 473, 480-1, 836.

24 DA&QMG NGF, "Report on the Establishment of Moresby – Bulldog – Wau L of C", 1 April 1943, AWM54 863/2/16.

the task.[26] Explosives were used to dislodge snags from the riverbed and cut them up into manageable sizes. They were then pulled onto the banks with winches and cut up by hand. Later, an ALCV specially equipped with shear legs and a winch was used. [27]

In mid February a detachment of the 1st Water Transport Group moved to Terapo, at the mouth of the Lakekamu River, beginning a ferry service to Bulldog. Initially, the detachment consisted of an ALCV, an ALCM and some boats supplied by ANGAU. Known as the "Ark Royal" series, these were of a pair of native canoes that were lashed together and powered by a Ford V8 Mercury engine. They could carry loads of around 6 tonnes and were the mainstay of river transport for a time. Eventually, powered steel barges replaced them but canoes were often towed behind the barges when necessary due to particularly heavy river traffic.[28]

General Johns, the commander of COSC, had his Transportation Officer, Colonel E. M. Grimm, conduct a study of the needs of the water line of communications down the Lakekamu River. Considering the requirement to move some 370 m^3 of supplies and equipment per day on the Lakekamu River, Colonel Grimm recommended that dumb barges and ALCMs be used and estimated requirements at four 300 HP diesel tug boats, two 150 HP diesel tug boats, ten 300-ton flat topped steel barges and 150 ALCMs.[29] In view of that fact that the success of the whole venture depended on this floating equipment, General Johns urged that that it be acquired without delay.[30]

Colonel Lief J. Sverdrup, chief of the Construction Section at GHQ, began an inspection of the proposed road on 12 April, despite attempts by Brigadier A. G. Torr, CE New Guinea Force, to dissuade him, "suggesting that it was practically beyond human endurance to make it".[31] This was all in a day's work for Sverdrup, a Great War veteran

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25 Reinhold, *The Bulldog-Wau Road*, pp. 5, 16-17.

26 Letter, CRE 11 Division to CE NGF, 22 April 1943, AWM54 863/2/16.

27 Reinhold, *The Bulldog-Wau Road*, p. 25.

28 CRE 11 Division, *Report on Construction of the Reinhold Highway*, Appendix I: Water Transport, 1 September 1943, AWM54 863/2/1.

29 Colonel E. M. Grimm, Memorandum for General Johns, 28 March 1943, AWM54 863/2/16.

30 GOC COSC, "Water Transportation up the Lakekamu River to Bulldog", 28 March 1943, AWM54 863/2/16.

31 Col L. J. Sverdrup, Memorandum for CE GHQ, 10 April 1943, NACP: RG496 Entry 386 Box 2320.

who had run a successful civil construction company before the war. A contract to build a chain of airstrips across the Pacific brought him to Australia in early 1942, where he had been reappointed to the US Army with the rank of colonel on the recommendation of General Casey. Since then he had travelled widely through Papua and New Guinea.[32] He reported to Casey that:

> It is very hard for me to understand how it is possible to complete the road in accordance with the schedule if it is one half as difficult as described. However, Brigadier Torr is quite certain that the road will be opened for jeep traffic by the end of May and for limited truck traffic by the end of June.... the main bottleneck is the matter of water transportation insofar as getting additional units and equipment on the job. [33]

Sverdrup was met by Reinhold, who accompanied him over most of the road, making sure that he saw the river bottleneck at Terapo. "As a result", Reinhold reported, "he is now quite pessimistic".[34] "Sverdrup came back from his trip", Torr wrote, "convinced that we were all mad".[35] General MacNider, who replaced Johns as commander of COSC on 22 March,[36] recommended that the project receive further consideration before more resources were committed but Torr stood by Reinhold and the project, maintaining that, while difficult, it was not impossible.[37]

The alternative to the Lakekamu River was to ship to Hall Sound, where there was a good anchorage for ocean going ships that was protected from the south easterly weather that prevails from April to September, and transport supplies overland from there to Bulldog; but no practical overland route was found. Supplies were moved to Hall Sound by ocean-going ships and unloaded into 300-ton barges, which were towed to the mouth of the Lakekamu River by ocean-going tugs. This journey across open water was free of reefs but exposed to the weather and therefore potentially hazardous for shallow draught barges.

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32 Franzwa, Gregory M. and Ely, William J., *Leif Sverdrup: "…Engineer Soldier at his Best"*, (Tuscon, AZ: Patrice Press, 1980), pp. 82-108, 150.

33 Col L. J. Sverdrup, Memorandum for CE GHQ, 10 April 1943, NACP: RG496 Entry 386 Box 2320.

34 CRE 11 Division to CE NGF, 22 April 1943, AWM54 863/2/16.

35 CE NGF to E-in-C LandOps, 23 April 1943, AWM54 863/2/16.

36 General MacArthur to General Blamey, 22 March 1943, NAA (ACT): A2653/1 M56/1943.

37 GOC COSC to GOC NGF, 22 April 1943, AWM54 863/2/16; CE NGF to DA&QMG NGF, 23 April 1943, AWM54 863/2/16.

There were two entrances to the river. At Lalapipi,[38] it entered the sea across a sandbar varying from two to three metres in depth, so a shallow draught tugboat was required. Navigation was difficult when there was a surf running, so the best time to cross the bar was around dawn when it was calm and at high tide but such conditions only occurred for a few days each month. The other entrance was over the Tamafura Bar and up a winding creek to the Lakekamu but this was even more difficult to navigate due to tight bends.[39] From Lalapipi it was 126 km to Bulldog. The river was a broad stream with a 4 knot current meandering through swamp and dense jungle. Water depth was over two fathoms (3.6 metres) all the way in March when it was in flood but only half this level could normally be expected. Flooding could cause rapid rises in the river level – as much as 2 metres in 3 days and tended to wash a lot of logs and other debris into the river, which often floated semi-submerged or embedded in the riverbed, requiring more desnagging effort. A series of narrow and tortuous bends in the stream made navigation difficult but not impossible for vessels up to 20 metres long.

The Army asked the RAN to establish a pilot service at the mouth of the Lakekamu River. In May, Lieutenant Commander G. J. R. Cox, RANVR, naval liaison officer to the Army Water Transport, was appointed Beachmaster, Lakekamu River Mouth and given complete control of all traffic into and from the Lakekamu River across the sandbar. He was also pilot for craft not acquainted with the bar crossing and responsible for the construction and positioning of leading marks, lights, buoys and beacons marking the entrance channels.[40]

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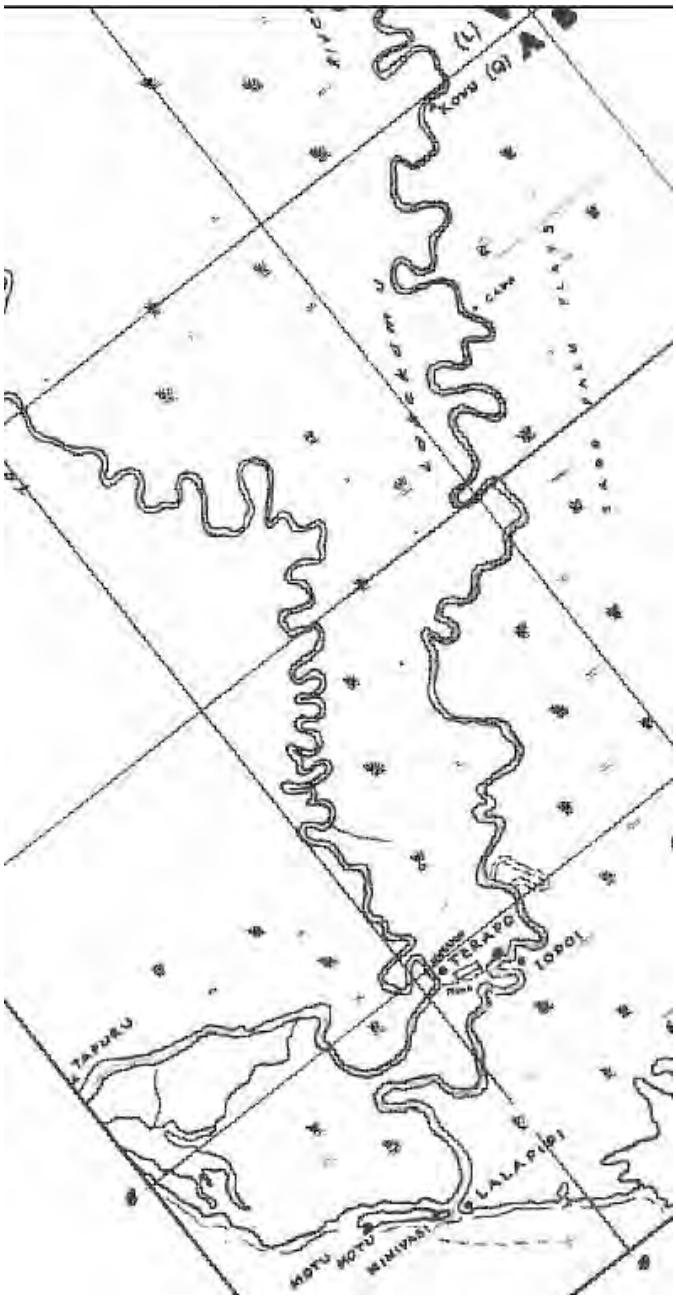
38 River placenames were standardised by the 2nd Base Sub Area on 30 August 1943. As with placenames on the road, the final names are used. OC 2 Base Sub Area, "Territorial Nomenclature", 30 August 1943, War Diary, Bulldog Base Sub Area, June - August 1943, AWM52 1/8/1.

39 DA&QMG NGF, "Report on Establishment of Moresby-Bulldog-Wau L of C", 1 April 1943, AWM54 863/2/16.

40 NOIC Port Moresby to Lieutenant G. J. R. Cox, "Appointment as Beachmaster, Lakekamu River Mouth", 14 May 1943, AWM54 863/2/16.



Map 5. Lower Section of the Lakekamu River

Source: AWM54 863/2/1

Beyond Grimm Point, a spur running up the bank of the river about 24 km south of Bulldog, the water became shallower, the snags more frequent and navigation more difficult such that landing craft were required. Terapo was low lying and had limited space, and any craft capable of getting over the sandbar was capable of proceeding up the river. Consideration was therefore given to moving the transshipment area to Grimm Point, which provided good ground for a transit area, and the planned depots for 30 days' stores at Terapo were eliminated.[41] The trip from Lalapipi to Bulldog took a barge about 17½ hours to make the run upstream while full and around seven hours downstream when empty.[42]

The 2/55th Light Aid Detachment moved from Terapo to Bulldog via the Lakekamu in June to handle the inspection of motor vehicles and equipment, including

[41] DA&QMG NGF, "Report on Establishment of Moresby-Bulldog-Wau L of C", 1 April 1943, AWM54 863/2/16.

[42] Casey, *Amphibian Engineer Operations*, p. 54.

tractors and compressors, and the repair and maintenance of river craft.[43] Unfortunately, it had to leave most of its equipment behind at Grimm Point, taking only hand tools and some spare parts with it to maintain the jeeps.[44] The river was hard on watercraft. It had a high sand content that injured cooling systems and caused wear and tear on all parts that came into contact with the water. Numerous bends required a high rate of revs to negotiate them, resulting in excessive wear on the engines. Collisions with snags were frequent.[45] Brass propeller shafts were found to be unsuitable for river work and were replaced with steel. The battle to keep the boats running was a tough one but days lost in maintenance per craft per week gradually declined from 67.8% in June to 36.1% in September, 26.4% in October, 13.8% in November and 13.0% in December.[46]

8. Terapo waterfront, 16 September 1943

The Wau end of the road was supplied by air, with the 2/34th Supply Depot Platoon hauling rations from Wau to Edie Creek.[47] Two additional small airstrips were cleared to support the work, one at Bulldog that was completed in August,[48] and one at Terapo,

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43 ADME NGF, "Periodic Progress Report on Operations in Connection with Wau – Fortnight Ending 28/4/43", 28 April 1943, AWM54 583/7/10.

44 OC 2/55 LAD, "Movement of LAD: Terapo-Bulldog", AWM54 863/2/7.

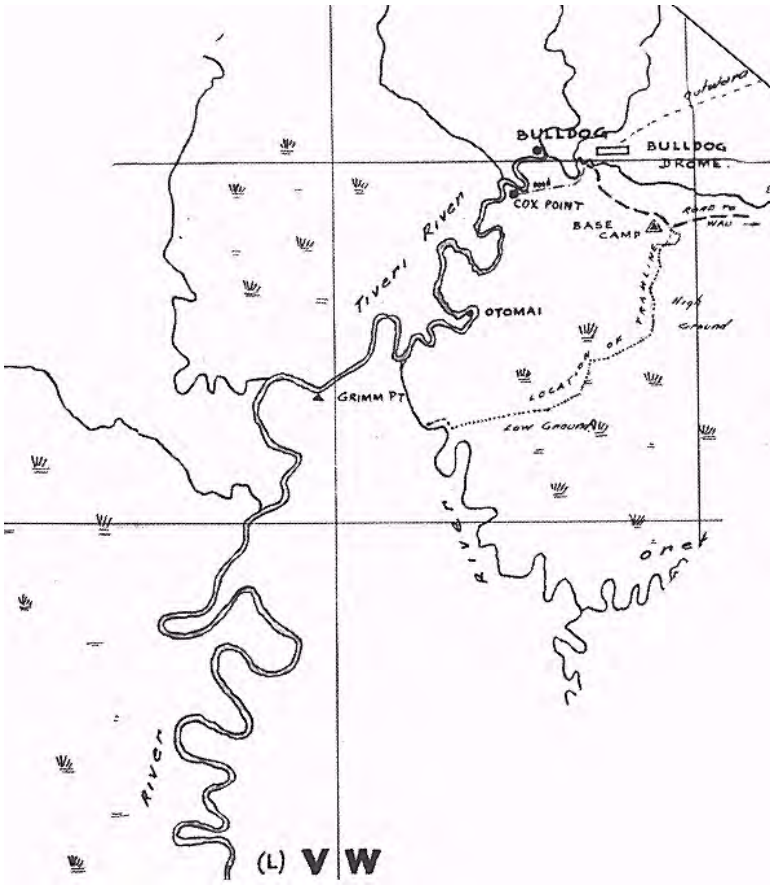
45 GOC COSC to GOC NGF, "The Lakekamu River Project", 22 June 1943, AWM54 863/2/12.

46 1st Water Transport Group, *Intelligence Summary No. 17*, 1 December 1943; *No. 19*, 1 January 1944; *No. 20*, 15 January 1944, AWM54 313/4/46.

47 Reinhold, *The Bulldog-Wau Road*, pp. 32-33.

48 OC 2nd Base Sub Area, *General Report No 8*, 8 August 1943, War Diary, Bulldog Base Sub Area, June August 1943, AWM52 1/8/1.

completed in March,[49] that could take a *Dakota* in good weather.[50] In July, General MacArthur ordered General Kenney to provide 24 planeloads for stores and equipment for the road project between 28 July and 16 August and two planes a week thereafter for maintenance.[51]



Map 6. Upper section of Lakekamu River.

Source: AWM54 863/2/*1*

General Johns placed the 1st Battalion, US 91st Engineer General Service Regiment, an African American unit at Port Moresby, under Reinhold's operational control for work on the road.[52] An advance party of 11 Americans arrived on 20 April and some equipment

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49 "Bulldog-Wau Project: Period 26 Feb – 4 Mar", AWM54 863/2/16.

50 GOC COSC to GOC NGF, "The Lakekamu River Project", 22 June 1943, AWM54 863/2/12.

51 GOC SWPA, "Bulldog-Wau Road", 28 July 1943, G-3 Journal, NACP: RG407 Box 594.

52 *New Guinea Force Administrative Instruction No. 91*, 5 April 1943, War Diary, NGF QMG Branch, March – April 1943, AWM52 1/5/53.

was landed at Terapo but there was no equipment available on the river for handling of heavy engineering equipment such as bulldozers and road making machinery at this time so it had to be manhandled. Moreover, the largest landing craft available prior to the arrival of LCMs in May could carry no more than 20 tonnes. It was estimated that the move would therefore require 40 days. Two American tugs, *Vim* and *Valiant*, were in usebut *Valiant* was required back in Port Moresby for port duties, and *Vim* had to return to Port Moresby for repairs.[53] This brought all traffic on the river to a complete halt on 5 April and made it impossible to move the American battalion and its equipment up the river.[54] In the end, it was never sent and the advance party was withdrawn on 15 May. [55]

It fell to LHQ to round up the required vessels for the river run. A 220 kW diesel tug with a 2 metre draught, the *Shell* was available in Sydney from 20 May, while another, the *Bucra*, a 75 kW tug of 2 metre draught was available in Melbourne from the end of May. Some 20 ALCMs, eight 300-ton Philippine lighters and 18 100-ton lighters were earmarked from production in Brisbane and four small vessels would be available in Sydney and Hobart, while *Katoora* and *Melinga* were already on hand at Port Moresby.[56] The 41st Water Transport Company was formed to operate landing craft on the river, opening its headquarters at Terapo on 26 May.[57]

None of the promised vessels arrived in New Guinea before the middle of June and only two small ships were available for the Moresby-Terapo run. Consideration was given to using the *George Peat*, a former Hawkesbury River ferry that had been acquired by the Army in October 1942 and was engaged in moving guns and vehicles around the coast of New Guinea.[58] The value of this vessel was high and it was felt that it was better utilised elsewhere, where it was not in danger of damage from snags.[59] However, it was used to

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53 Deputy Comd COSC to Comd COSC, "Constructional Work – Bulldog – Wau L of C", 17 April 1943, AWM54 863/2/16.

54 CG US Adv Base New Guinea to CG USASOS, 5 April 1943, AWM54 863/2/16.

55 Reinhold, *The Bulldog-Wau Road*, p. 16.

56 LandForces to NGF, 20 April 1943, AWM54 863/2/16.

57 1st Water Transport Group, *Intelligence Summary No. 5*, 7 June 1943, AWM54 313/4/46.

58 NOIC Sydney, 23 October 1942, NAA (Vic): B6121 359A.

59 GOC COSC to GOC NGF, "The Lakekamu River Project", 22 June 1943, AWM54 863/2/12.

bring vehicles on the Port Moresby-Terapo run. It arrived on 1 August on its first voyage to the area with a cargo of vehicles for use on the road. [60]

As a stopgap measure, General Casey arranged for ten LCMs of the US 2nd Engineer Amphibian Brigade to be sent up to Port Moresby in May to haul supplies from Port Moresby to Terapo, and later up the river. Transferred from the US Navy without tools or spare parts, these were the first LCMs to be operated by the amphibian engineers and the first to see service in New Guinea. They could travel much faster than the unpowered barges but could only carry about 30 tonnes each.[61] Of the ten, just three were on the job in June, for three were diverted to Nassau Bay and four to Milne Bay. The brigade's commander, Brigadier General William F. Heavy, felt that it was unsound to use LCMs on the Port Moresby-Terapo run and recommended that they be confined to the river.[62]

From 3 to 11 July no barges reached Bulldog at all as the river level fell too low. Instead they were unloaded at Cox Point.[63] Reinhold had an innovative solution to the problem: a 2-foot gauge tramline, similar to the sugar trains in Queensland, from Grimm Point to Base Camp, running in a broad arc running from the Kunimaipa River to a point about 4 km north of Bulldog Landing.[64] This was not the first time that a light railway had been proposed in relation to the project. Brigadier Steele, Deputy Commander of COSC, had suggested that boats could sail up the Tauri River and unload at Terapo if a light railway was built from Terapo West to Terapo East.[65] Although this was not built, the route remained an important alternative for shipping which otherwise might have had to wait up to three days for suitable conditions to cross the sandbar.

An investigation of the Kunimaipa tramline was conducted by an RAAF *Tiger Moth* while surveyors moved in concert along the ground, guided by the aircraft and communicating with it by smoke signal. This method was necessary because there were

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60 War Diary, Bulldog Base Sub Area, 1 August 1943, AWM52 1/8/1.

61 Casey, *Amphibian Engineer Operations*, pp. 52-54.

62 GOC COSC to GOC NGF, "The Lakekamu River Project", 22 June 1943, AWM54 863/2/12.

63 War Diary, Bulldog Base Sub Area, 13 July 1943, AWM52 1/8/1.

64 CRE 11 Division to CE NGF, 22 April 1943, AWM54 863/2/16.

65 Deputy COSC to GOC COSC, "Maintenance via the Bulldog L of C", 21 April 1943, AWM54 863/2/16.

no high features that the surveyors could climb to get a view of the area. The same factor made it possible for the aircraft to fly low enough to guide them. In late May a preliminary survey was carried out. No high ground could be located, so the line had to run across ground that could become swampy if the river flooded. This was accepted, for the line was only needed when the river level was low. The lie of the land was such that the building of trestle bridges was impractical, so the tramline route took advantage of natural gaps that could be spanned by temporary span bridges.

Clearing work began in early July about 6 km south of the base, near the point where the route changed direction from south to southwest. Only hand tools were available, but 118 Papuans were employed from 7 July, and they were able to clear a 6 metres wide path the whole length of 12 km in 11 days. A method known as "pigstying" or "cribbing" was utilised in construction of the line itself. Logs were laid transverse to the line and then longer logs laid on top of them. The pressure of traffic on the line kept the logs pressed down. After about after 3.6 km of track had been laid, the supply of rails ran out. Because there was difficulty procuring additional rails, doubts about whether sufficient rolling stock would be available, and the work contracts of the Papuan labourers were due to expire on 31 August, work on the tramline was discontinued on 15 August. A road was constructed from Cox Point to Bulldog, a distance of about 2½ km, to avoid the worst part of the river. It followed the route of an existing track and presented no problems with construction, although the swampy nature of the ground required it to be corduroyed. [66]

[66] CRE 11 Division, *Report on Construction of the Reinhold Highway*, Appendix III: Kunimaipa Water Transport, 1 September 1943, AWM54 863/2/1.

9. Minivasi, 29 June 1944. Sappers working on the groyne.

On 12 June, a detachment of the 2/4th Field Squadron began work on a 485 metre curved wooden groyne in the hope of improving the bar crossing through scouring action. Work was carried out under difficult conditions that called for a great deal of ingenuity and improvisation. Piles and wooden sheeting were cut in the jungle near Terapo, about 14 km upstream, tied to empty 44-gallon drums and towed down the river by steel barges of the 1st Water Transport Group. Notably, axemen were the only Papuans employed on this project. Owing to peculiarities of the sand, the piles had to be jetted in rather than driven.[67] The pile driver and jetting pumps were mounted on two large barges. Men worked in the water at low tide, manhandling the heavy piles and cross pieces into position. When the tide rose in the afternoon, barges and timber had to be tied and securely anchored. The action of the surf at high tide caused cession of work. Rough surf might cause logs to break away from their moorings. As the pile drivers extended the line of piles out towards the bar, other men bolted on the crosspieces. Timber slats and sheeting were then attached. This project, favoured by Brigadier Torr, was undertaken "with no guarantee of success", but an ALCV that sank in the old channel on 30 July caused rapid silting to occur around it, widening the whole bar. In combination with the

[67] In jetting, water is pumped under pressure through a steel tube into a soil. The force of the jetted water moves and compacts the bedding or backfill material below it. Sand can be jetted to produce good compaction, especially in areas that are difficult to mechanically compact.

groyne, the increased current achieved the desired result, and on 6 September Commander Cox piloted a barge through the new channel.[68]

The tonnage carried on the river gradually increased. While never coming even close to 250 tonnes per day, the practicality of the route was demonstrated:

Table 9. Lakekamu River Traffic
Selected periods, June – December 1943 [69]

Date	Trips	Hours	Tonnes	Kilometres
15-30 June	46	650	375	6,779
15-31 July	58	852	454	7,792
16-30 Aug	137	1,978	997	15,997
1-15 September	103	1,982	770	19,136
16-30 September	118	2,389	1,595	22,252
1-15 October	185	3,006	2,303	29,768
16-31 October	114	2,557	1,123	26,997
1-15 November	121	2,737	1,321	28,711
16-30 November	158	3,424	1,835	35,937
1-15 December	113	2,323	1,147	25,108
16-31 December	99	2,475	1,768	24,088

Fuel economy averaged 0.34 km per litre over the September–December period.

On 14 August, in response to a critical shortage of rations and POL at Bulldog, the Moresby Base Area ordered all available craft onto the Moresby-Terapo run. Some 14 small craft of the 1st Water Transport Group made 25 trips, carrying 510 tonnes of supplies, more than half of it in the *George Peat*, which made two trips. The vessel made its last trip to Terapo on 29 August before proceeding to Brisbane for refit. Working the

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68 CRE 11 Division, *Report on Construction of the Reinhold Highway*, Appendix II: Groyne at the Mouth of the Lakekamu River, 1 September 1943, AWM54 863/2/1; 1st Water Transport Group, *Intelligence Summary No. 9*, 7 August June 1943, AWM54 313/4/46.

69 CRE 11 Division, *Report on Construction of the Reinhold Highway*, Appendix I: Water Transport, 1 September 1943, AWM54 863/2/1; 1st Water Transport Group, *Intelligence Summary No. 20*, 15 January 1944, AWM54 313/4/46.

coast of New Guinea in 1943, it had made 33 voyages, clocked up 15,740 km and carried 6,343 tonnes of cargo and 2,061 passengers. It was replaced by the 110-ton ketch *Abel Tasman.*[70] The *Muliama* joined it in the last week of September and deliveries were increased to 66 tonnes per day.

Meanwhile, construction of the road was underway. Roadwork was under Reinhold, who was directly responsible to New Guinea Force,[71] with the 2/16th Field Company at Wau and the 9th Field Company at the Bulldog under his command.[72] The 2/16th Field Company, then at Milne Bay, was ordered to leave its transport behind and proceed to Port Moresby, where it collected additional equipment and then moved to Wau. Meanwhile the 9th Field Company came directly from Australia with personal and administrative equipment only.[73] On 25 February the 9th Field Company began clearing and constructing the pilot track between Ecclestone Saddle and Fox Camp. Soon after, 500 Papuan labourers and eight ANGAU supervisors under Lieutenant C. K. Johnson began clearing and benching between Edie Creek and Ecclestone Saddle with the 2/16th Field Company, which commenced work on 27 February, as the authority for all roadwork on the section except the clearing. [74]

Equipment was shipped to both Bulldog and Wau to enable work to proceed simultaneously from both ends. On 17 February the *Melinga* set out from Port Moresby for Terapo carrying three D6, two D4 and four D2 bulldozers; an 84-foot Steele bridge; a month's supply of POL for the bulldozers; and part of the 9th Field Company and its stores. Two D2 tractors, a plough, a scoop and a grader had already been sent. Drawing about 3 metres, the ship successfully crossed the Lakekamu sandbar to reach Terapo.[75] Three of the larger 14-ton D8 bulldozers were dispatched in late February and hauled up

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70 1st Water Transport Group, *Intelligence Summary No. 10*, 21 August 1943; *No. 11*, 7 September 1943, AWM54 313/4/46.

71 *New Guinea Force Administrative Instruction No. 91*, 5 April 1943, War Diary, NGF QMG Branch, March – April 1943, AWM52 1/5/53.

72 GOC NGF to CinC AMF, 17 February 1943, Blamey Papers, AWM 3DRL 6643 2/95.

73 BGS NGF, "Preparation of Jeep Track Bulldog-Wau", 31 December 1942, AWM54 583/5/1.

74 Reinhold, *The Bulldog-Wau Road*, p. 15.

75 Bulldog-Wau Project: Progress Report to 23 February, AWM54 863/2/16.

the Lakekamu River by ALCMs.[76] Four D4 bulldozers, two D2 tractors, 6 ploughs, 2 jeeps and trailers, hand tools, POL and stores were flown from Port Moresby to Wau and a D2 tractor from Kokoda to Wau.[77] Tip trucks were transported by air, stripped down with their trays cut in two. [78]

Road Construction proceeded in stages. The first stage was clearing and grubbing. An area about 10 metres wide was cleared which allowed the sun to dry out the ground. A road for military traffic needed to be about 4 metres wide. Overtaking lanes were placed where construction was easiest. The humus and muck was cleared away and the foundations drained. Because humus retains water like a sponge, it had to be separated from the clay. Some apparently flat areas were found to actually be depressions filled with plastic clay that also had to be removed. A base of rock or gravel was laid down. Where this was not available, wood was used, a process known as "corduroying". Admittedly, the wood would rot away sooner or later – in New Guinea, probably sooner rather than later – but military roads need to be built to strict deadlines dictated by operational requirements and do not need to last. The final step was surfacing. Clay was strong enough to carry traffic so an aggregate was added to stabilise it. Quartz sand was found to be ideal. By contrast, sands and gravels were not affected by water but were seldom strong enough to make a road so clay was mixed with the sand to stabilise it. Once surfaced, the road could then be graded.[79]

Reinhold delegated responsibility for bridging of the Eloa River and its subsidiary streams to his second in command, Major Maynes, who was allocated two sergeants and 16 other ranks drawn from the 2/4th Field Squadron, 14th Field Company and 2/1st Field Company, plus an average of 30 natives. Owing to the mountainous nature of the region, the high rainfall, and the large catchment area, the streams had a swift current and were subject to severe flooding, which carried a large quantity of debris and fallen timber. Bridgework had to keep pace with roadwork so the road itself could be used to bring up supplies and equipment. The bridges therefore had to be capable of carrying heavy construction

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76 E-in-C LHQ to CE GHQ SWPA, 25 February 1943, AWM54 863/2/16.

77 GOC NGF to CinC ALF, 17 February 1943, Blamey Papers, AWM 3DRL 6643 2/95.

78 Reinhold, *The Bulldog-Wau Road*, p. 33.

79 Ibid, pp. 14-17.

equipment. Some 17 bridges were built in 80 days, one three span, three two span, and fourteen one span, bridging gaps from 6 to 30 metres, making a total of 250 metres of bridges, all built to a similar "crib" design. Two of the double span bridges used existing large boulders as a formation for trestle piers, while the third had a trestle pier erected in the shelter of a large boulder. For the triple span bridge, a timber capsill was used for the approach span, and a triangular crib pier filled with rubble for the central support. [80]

10. 19 January 1944. Trestle bridge over Eloa River.

Additional troops arrived April, including the 2/1st Field Company, 1st Pack Transport Company, 2/4th Field Squadron and 2/16th Field Company while the pioneer platoon of the 2/7th Infantry Battalion was loaned to Colonel Reinhold by the battalion commander, who had taken an interest in the project.[81] In early April 25 men of the 2/1st Mechanical Equipment Company arrived and assumed control of the mechanical equipment at the Bulldog end of the road. The equipment was mostly new and in fair condition, which was fortunate because some months of heavy and continuous use lay ahead.[82] Aided by 220 Papuans, the detachment worked on the road until the end of July, when it was relieved by another section of the same company.

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80 Reinhold, *The Bulldog-Wau Road*, pp. 40-42.

81 Reinhold, W. J., *The Wau-Labu Road*, 30 April 1944, pp. 11-13, Reinhold Papers, Fryer Library, University of Queensland, Special Collection Box 62 7.

82 OC 2/55 LAD, "Movement of LAD: Terapo-Bulldog", AWM54 863/2/7.

The first section of the road, from Bulldog to 8 Mile, traversed low lying and difficult to drain river flats. The 2/1st Mechanical Equipment Company made good progress at first although the soil was difficult to stabilise and some gigantic granite boulders had to be cleared out of the way. Because work started forward of Base Camp before it was complete, supply traffic from Bulldog destroyed the road foundation and turned it into a quagmire which became a serious bottleneck. Corduroy was laid and covered with sand, which was found in abundance adjacent to the road, and a satisfactory surface was in use by the end of June. [83]

From 8 Mile to Dead Chinaman boulder-strewn terraces of the Eloa River precluded the efficient use of mechanical equipment. This necessitated the wholesale use of compressors for drilling and prolific use of explosives, principally gelignite, an explosive mixture composed of nitroglycerine, guncotton, wood pulp and potassium nitrate. Surface or blister charges were used for boulders up to about 3 m^3 in size. Charges of about 8 kg/m^3 were pressed against the face of the rock in slight depressions and tamped with damp sand or clay. While possibly wasteful of explosives, it was quick, freed up the compressors for use on larger rocks, and avoided the danger of flying rock near base camp areas. Wear on drill bits was rapid in the hard granite and the life of drill bits was about 45 cm of hole without sharpening. There were no workshops on the road with sharpening facilities, so bits were hand sharpened with an emery wheel or grindstone.[84]

A dense field of massive granite boulders before Dead Chinaman was a formidable obstacle. Two steep side cuts were required but two compressors and a great deal of gelignite enabled the road to be driven through in just a month. A single lane road was made using local gravel, allowing mechanical plant to move forward. Compressors were sent forward ahead of the bulldozers to clear away the boulders. The rocky ground permitted a rough formation by bulldozers and was immediately corduroyed before supply traffic was allowed to pass over it. The corduroy was subsequently covered with gravel when tip trucks became available. [85]

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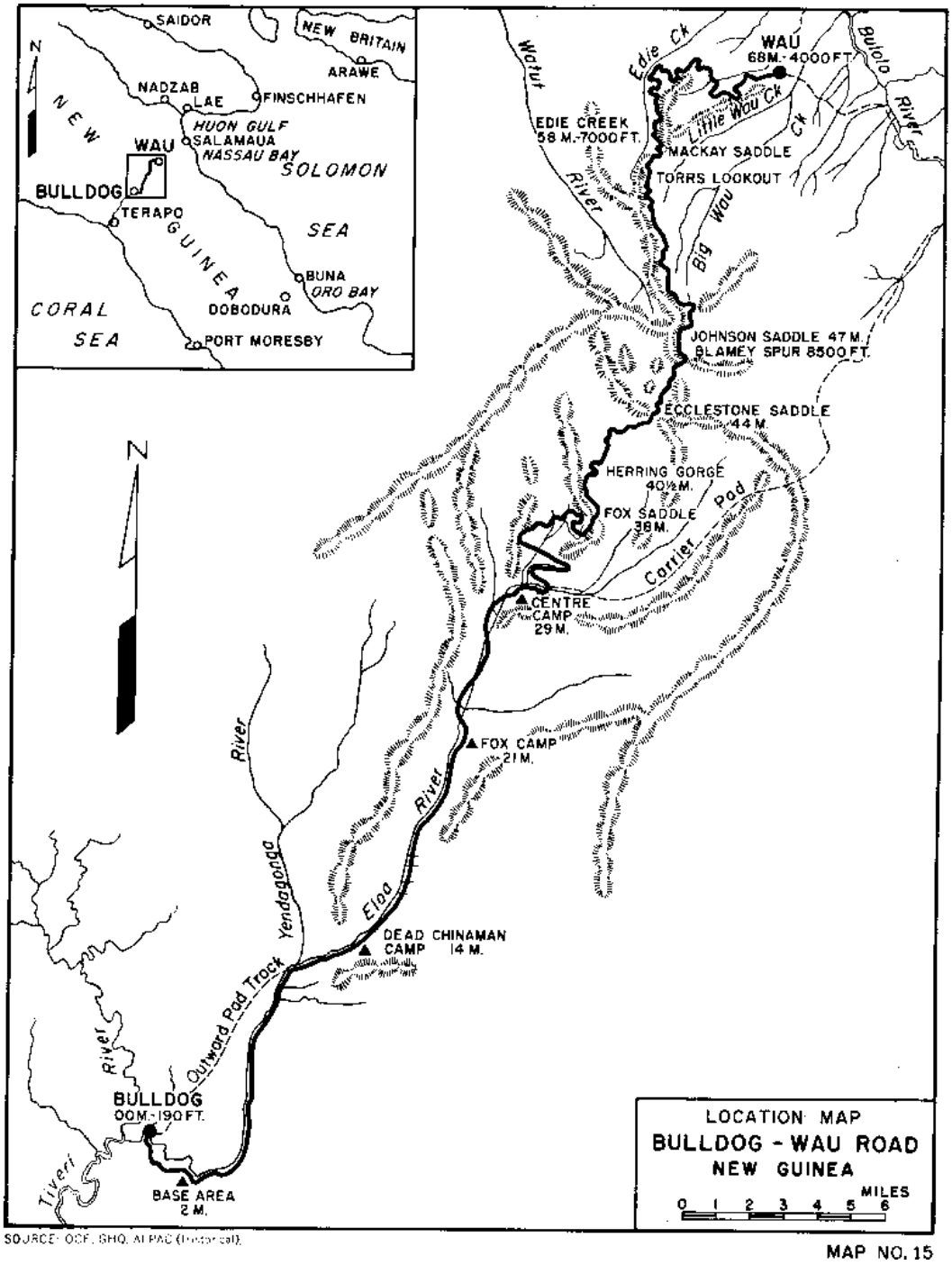
83 Reinhold, *The Bulldog-Wau Road*, p. 16.

84 Ibid, pp. 43-44, 49-50.

85 Ibid, pp. 24-25.



Map 7. The Bulldog-Wau Road

Source: Casey, *Airfield and Base Development*, p. 159

11. Reinhold Highway, 18 July 1943. Papuan porters carrying compressor parts negotiate a narrow and dangerous ledge about one mile south of Ecclestone's Saddle.

The last mile and a half in to Fox Camp required three rock cuts on gorge formations. The 2/55th Light Aid Detachment took a standard 785 kg Ingersoll Rand compressor and broke it down into 17 loads, which were carried by 51 Papuan porters. The largest three components, the crankcase, engine block and chassis each weighed between 80 and 90 kg

and required eight porters to carry them.[86] The most difficult piece was the chassis, which was bulky, awkward and difficult to move down steep slopes and narrow tracks. Although a slow, laborious and exhausting job for the porters, the compressor was moved forward 5 km. The results were so dramatic that five more compressors were immediately dismantled and carried forward to locations up to 24 km distant, enabling the stretch to be completed on time. Once the boulders were cleared away, tip trucks and a D8 angledozer were employed to construct the section with local materials.

The road then moved into steeper country where shale was hand benched by European and Papuan labour, aided by an angledozer in the later stages. Three steep rock cuts were dealt with by a compressor, later assisted by a second, tractor-drawn, compressor. The shale was used for surfacing and the road was metalled with rock from broken up boulders, hauled by tip trucks during the later stages of construction.[87]

The last few kilometres into Centre Camp were the most difficult section of the entire road, consisting almost entirely of gorges and immense boulders. The construction of this section was all the more remarkable for having to be carried out largely with hand tools and explosives until a compressor was brought up in July. The road passed through a series of formidable rock faces and unstable granite sections where landslides could be caused by blasting. It was found that landslides were often comprised of good road making material. Water in the material was drained away as much as possible, explosives used to shift debris into the gorge below and bulldozers worked to grade level. The worst hazard was falling timber, which was avoided where possible by clearing timber away from the road in the first place.

The gorges along the Eloa River contained steep rock faces. The extremely hard rock was largely excavated by Papuan labourers working under ANGAU supervision who used hand drills to lay explosives although dismantled compressors were carried up from Johnson's Saddle during the final stages. Precipitous rock faces characterised the Ecclestone Saddle area in particular. Fortunately, most of the rock faces were comprised of schist, which was not difficult to excavate. Blasting could be hazardous, especially in

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86 OC 2/55 LAD to CE NGF, "Stripping and Assembly for Portage by Native Carriers Ingersoll Rand Compressor – Wakesha Moror – Prime Mover", 27 July 1943, AWM54 863/2/7.

87 Reinhold, *The Bulldog-Wau Road*, pp. 26, 49-50.

the Steele Falls area where very steep granite was combined with irregular jointing and large sections were prone to break away during blasting, potentially destroying the bench.[88]

From Johnson's Saddle to Edie Creek the 2/16th Army Field Company, working from the north end, pushed forward a metalled all-weather road rapidly through boggy granite clay.[89] From 24 April, it was resurfaced with decomposed granite.[90] The final stretch, from Edie Creek to Wau, ran along an existing road, which was widened, reformed and metalled.

Initially, two forward dumps were established, one at 52 Mile and one at Johnson's Saddle. A line of 130 natives operated to the former, and 60 more between the two. At this stage the carrier pad led over Big Wau Mountain, a terrific climb over a rough path and steep slope. As the roadwork progressed, a "jeephead" was established at 52½ Mile, thereby releasing the first line. Later, another dump was established at Blamey Spur, which eventually became the new jeephead. At one stage the carrier line was transporting 11 tonnes per week. At the other end of the road, dumps were established at the Base Area where, on 6 April, Captain L. Tinker of the 9th AASC Company arrived with a small staff to take charge of the distribution of rations. Advanced dumps were established at Dead Chinaman, Fox Camp and Centre Camp, manned by the 9th AASC Company.[91] Gradually, the line from Base Area to Dead Chinaman was replaced by motor transport but it still occasionally had to revert to porters if a bridge was washed out or something.

One of Reinhold's biggest problems was labour. A thousand Mount Hagen labourers were assembled for work on the road but could not be moved due to lack of fighter protection for the transport aircraft. In May 400 New Guinea labourers arrived. Some 300 Papuans were placed under Lieutenant Ecclestone for clearing and benching the section from Blamey Spur – so named because it was the highest point of the road – towards

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88 Reinhold, *The Bulldog-Wau Road*, pp. 20-23.

89 CRE 11 Division to CE NGF, *Weekly Report Bulldog-Wau Road, 12 Jun 43 - 19 Jun 43*, 21 June 1943, AWM54 863/2/4.

90 CRE 11 Division to CE NGF, *Report Bulldog-Wau Road, 17 Apr 43 – 24 Apr 43*, 27 April 1943, AWM54 863/2/4.

91 Reinhold, *The Bulldog-Wau Road*, p. 34.

Centre Camp.[92] This served the secondary purpose of gradually transferring the Papuans from the cold mountain climate back to the warmer climate. The promise that they would not be turned back gave them an extra incentive.[93]

Native workers were crucial to the construction effort. At the height of the project, over 3,000 were working on the road. They could be found along the entire route, working as fitters and turners in the workshops maintaining the river craft; as pilots on the barges plying the river; as carpenters building the staging camps; and, of course, as workers on the road itself. As roadwork progressed, carriers were gradually phased out in favour of motor vehicles and released for work on the road but in the early stages of construction they were indispensable. They overcame tremendous difficulties to carry heavy loads over native pads, which were matted with roots hidden below the mud and slush of the jungle floor, and seemed to climb interminably, in some cases from 1,000 to 3,000 metres. They made it possible for work to be carried out on the middle sections of the roads in the early months. Each working party had an attached carrier line and on one day of each week, escorted by ANGAU or RAE personnel, it would go to its forward dump and bring back a week's rations for the whole party.

Local recruitment was by conscription. Contracts were for one or two years, although draftees were informed that they may be asked to sign on for longer if the Japanese were not driven from New Guinea in this time. In certain circumstances, such as on the Kunimaipa tramline, workers were contracted for short terms. Workers signed their contracts with an X in the case of those from New Guinea or by touching the pencil with which an ANGAU officer signed their contract in the case of Papuans. Pay was set at 10/- a month, with all food, clothing and tobacco provided but Papuans were paid at the termination of their contract whereas the New Guineans were allowed to draw monthly payments. Punishments ranged from stoppage of the tobacco ration for trivial offences to being posted to work high mountain sections for desertion.[94]

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92 CRE 11 Division to CE NGF, 4 June 1943, AWM54 863/2/4.

93 Reinhold, *The Bulldog-Wau Road*, pp. 17-19.

94 CRE 11 Division, *Report on Construction of the Reinhold Highway*, Appendix IV: Native carriers and Labourers, 1 September 1943, AWM54 863/2/1.

Their perseverance in the face of the harsh terrain and unaccustomed hardships was a tribute to their finer qualities and the work of ANGAU. At one point, it appeared that desertions were heavy, with over 200 natives out of 1,950 listed as deserters, [95] but the ANGAU Assistant District Officer discovered they had been indentured on 6-month contracts that had expired, and had legally gone home. They returned to duty after he paid out ₤1,472 in wages owed. Addressing groups of Papuans in fluent Motuan, the basic language of Papua, he emphasised the importance of their work and exhorted them to help drive the Japanese out of New Guinea.

The road builders worked under severe conditions. Rainfall ranged from 3,000 to 5,000 mm per annum. They were always damp and clothes did not dry properly except in front of a fire. At bedtime they would simply take off their boots, as they were already wearing all their clothing, and get in between as many blankets as they could scrounge. In the mossy forest, five blankets were needed but many units arrived with only one per man. Camps were often groups of tents sited on mud or moisture-laden moss. In the early days there was a shortage of tents. These were of the Indian pattern, weighing up to 40 kg when dry, somewhat more when they inevitably became wet. As 20 kg was about the maximum weight that could be carried by a porter, it was difficult to haul them over the mountains. Later, supplies of waterproof materials such as Sisalkraft became available, easing the accommodation problem. Cooking gear was in short supply and kerosene was unavailable. Slush lamps were improvised from oil tins with rags for wicks. Beds were made of anything the troops could lay their hands on. A favourite was the sacks that were used to transport supplies. Pilferage of tools and stores was a major problem that started as far back as Australia. The local Kukukuku people made off with considerable equipment, being particularly attracted to axes, knives and explosives, although they were partial to anything metallic or edible.[96] Colonel Brown issued an order threatening to court-martial soldiers caught pilfering. [97]

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95 CRE 11 Division to CE NGF, 23 April 1943, AWM54 863/2/4.

96 Reinhold, *The Bulldog-Wau Road*, pp. 29-31.

97 *Routine Orders No. 1*, War Diary, Bulldog Base Sub Area, June - August 1943, AWM52 1/8/1.

In May, a 20% increase in rations was approved for units working on the road, but it was not always possible to deliver it due to supply and transportation problems.[98] Sometimes, the troops were fed native rations, sometimes the natives had to eat the troops' rations. Sometimes both ran out and things became grim. One unit lived for several days on nothing but rice; another, lacking meat, ate curried biscuits. Game such as cassowary, wild pig, opossum, hornbill and various exotic species of birds were eaten. Fish were caught in the Eloa River using gelignite for bait.[99] POL also occasionally ran short, forcing the tip trucks to cease work.[100]

Four men died building the road. One was killed by a falling tree, one by a landslide and two through careless use of explosives, while one serious but non-fatal injury resulted from each of these three causes.[101] The major medical problem affecting the troops was malaria, while the Papuans suffered from pneumonia and bronchitis. Many malaria cases were new infections but others were reoccurrences. A detachment from the 2/5th General Hospital arrived on 14 February and set up a small 20-bed hospital at Bulldog and later a 3-bed hospital at Centre Camp. Native hospitals were staffed by ANGAU medical assistants at Dead Chinaman, Centre camp and Edie Creek. In April a detachment of the 46th Camp Hospital arrived at Centre Camp. As road construction progressed the hospital's two stretcher-carrying ambulance jeeps were able to range along the road.[102]

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98 CE NGF to Q Branch NGF, "Extra Rations – Units of Bulldog-Wau Project", 27 April 1943; Notation dated 1 May 1943, AWM54 863/2/16.

99 Reinhold, *The Bulldog-Wau Road*, pp. 31-32.

100 CRE 11 Division to CE NGF, Weekly Progress Report Bulldog-Wau Road, 3 Jul 43 – 10 Jul 43, 21 June 1943, AWM54 863/2/4.

101 Reinhold, *The Bulldog-Wau Road*, pp. 35-36.

102 CRE 11 Division, Report on Construction of the Reinhold Highway, Appendix V: Medical, 1 September 1943, AWM54 863/2/1.

12. Reinhold Highway, 23 August 1943. Colonel Reinhold traverses the road.

On the morning of 23 August 1943 two jeeps (above) left Edie Creek for Bulldog, returning the next day with a convoy of 14 trailer-hauling jeeps. In the first jeep was Colonel Reinhold. That day he received a signal from General Blamey:

> Congratulations on first passage. The road is now named the Reinhold Highway. [103]

The 2/34th General Transport Company began to arrive on 17 August and took control of all transport on the road.[104] Initially, 3-ton trucks could run only as far as Dead Chinaman, the rest of the trip to Wau being accomplished by jeeps hauling trailers.[105] On 1 September, Reinhold, under orders from General Blamey to proceed to Australia on leave, handed over command of the Reinhold Highway to Lieutenant Colonel J. C. Saint Smith, CRE First Army Troops. His job was to widen and improve the road to take 3-ton trucks,[106] which first traversed it on 23 September.[107] Between 8 October and 10

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[103] CRE 11 Division, *Report on Construction of the Reinhold Highway*, 1 September 1943, p. 1, AWM54 863/2/1.

[104] War Diary, Bulldog Base Sub Area, 17 August 1943, AWM52 1/8/1.

[105] OC 2nd Base Sub Area, General Report No. 11, 30 August 1943, War Diary, Bulldog Base Sub Area, June - August 1943, AWM52 1/8/1.

[106] Reinhold, *The Bulldog-Wau Road*, p. 26.

November 18 landing craft hauled 35 Ford trucks up the Lakekamu in 27 trips.[108] By this time Lae had fallen and the strategic value of the highway began to decline. Its main use was to supply troops engaged in construction of a rest camp near Wau. The road could no longer justify the effort required to maintain it and was closed on 18 March 1944.[109]

General Casey wrote:

> Construction of this road was a typical example of the sometimes inevitable need for an expenditure of effort far in excess of the eventual utilization value of a project to insure flexibility of operations under any tactical contingency. The engineer manpower, equipment-hours and supplies invested in the development of this road far exceeded its subsequent value and use. It was pointed out that the same logistical support could have been provided better and more quickly by not more than 25 C-47 air transports. However, if theatre success had not be attained elsewhere, and if air transports had proven unavailable, the Bulldog-Wau Road would have taken on far greater importance as a principal means of communication and supply to theatre forces in forward areas. [110]

If the Reinhold Highway never carried the volume of supplies that had been envisaged, it still yielded a benefit beyond price: operational and logistical flexibility. No more could be asked of any military engineering project.

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107 CRE 11 Division, *Report on Construction of the Reinhold Highway*, 1 September 1943, p. 21, AWM54 863/2/1.

108 1st Water Transport Group, *Intelligence Summary No. 16*, 15 November 1943, AWM54 313/4/46.

109 "The Wau-Labu Road", 30 April 1944, Reinhold Papers, Fryer Library, University of Queensland, Special Collection Box 62 Item 7.

110 Casey, *Airfield and Base Development*, p. 162.

5. From Wau to Salamaua

Away from the coastal areas, operations in New Guinea depended heavily on air transport for logistical support. While the difficulties involved in providing logistical support in New Guinea over roads and rivers were tremendous if not insuperable, the alternative, of supply by air, was also daunting. For a start, air supply required appropriate aircraft, available in sufficient numbers. It required suitably situated air bases that aircraft could operate from, where they could be supplied with fuel and loaded with supplies, and at the other end of the flight, suitable landing or dropping zones. Less obviously, it involved the development of special equipment and techniques for delivering supplies by air. Even when all these factors were satisfied, there still remained the difficulties imposed by New Guinea's formidable terrain and climate, and Japanese opposition, which could bring operations to a standstill. In the operations around Wau, air supply played a crucial role but ultimately fell short of providing a panacea.

The Development of Air Transportation in SWPA

Air transportation in SWPA began in a small way in December 1941, when the US Army Forces in Australia acquired five C-53 aircraft from two freighters originally bound for the Philippines but which had been diverted to Australia.[1] These became the nucleus of the Air Transport Command, which was redesignated the US 21st Troop Carrier Squadron in April 1942. That month, the US 22nd Troop Carrier Squadron was formed at Essendon Airport.[2] A troop carrier squadron normally had 13 aircraft, but between them they possessed 36 planes of various types in May 1942, obtained from ships' cargoes or purchased from the Dutch RNEIAF and KNILM.[3] In response to a request from General MacArthur to increase USAAF air transport strength in the theatre to one group of four squadrons as a "first priority",[4] the US 6th Troop Carrier Squadron arrived in mid-

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1 Kelly, Robert H., *Allied Air Transport Operations in the South West Pacific Area in WWII Volume One: Development of Air Transport 1903-1943*, (Brisbane: Harding Colour, 2003), pp. 317-318.

2 Jacobson, Richard S. (ed), *Moresby to Manila via Troop Carrier: The True Story of the 54th Troop Carrier Wing*, (Angus & Robertson, 1945), pp. 1-3; Williams, E. Kathleen, *USAAF Historical Study No. 9: The AAF in Australia to the Summer of 1942*, (Washington: USAAF Historical Office, 1944), pp. 53-55.

3 For a list of them, with serial numbers, see Kelly, *Development of Air Transport 1903-1943*, p. 326.

4 MacArthur to Marshall 10 July 1942, RG496 Entry 271 Box 2060.

October, and the US 33rd Troop Carrier Squadron followed a month later. These four squadrons were grouped together as the US 374th Troop Carrier Group.[5] The two new squadrons were equipped with the C-47 or *Dakota*, as it was known to the Australians, from the acronym DACoTA for Douglas Aircraft Company Transport Aircraft. A military version of the Douglas DC3, it henceforth became the principal transport aircraft in SWPA.[6]

The RAAF had no transport squadrons when the war began. The War Cabinet approved the formation of the first transport squadrons in July 1941.[7] Some 130 aircraft were acquired from civil aviation, but most were light types used as trainers, and not until February 1942 were four squadrons formed.[8]

To control intra-theatre air transport the Directorate of Air Transport (DAT) was created in Melbourne under the command of Group Captain H. Gatty, a pioneering aviator who had been regional director of Pan American Airlines. He soon made progress getting air transportation under control, although at first he lacked aircraft, equipment and trained personnel. Priorities, loading policy and departure times were all set by DAT.[9]

The Chief of US Army Air Forces, Lieutenant General Henry H. Arnold, was approached by the Australian Military Mission in Washington with a proposal that the aircraft of the second transport group earmarked for SWPA be used instead to re-equip the four RAAF transport squadrons, thereby saving on both trained personnel and shipping.[10] General MacArthur and Prime Minister Curtin supported the idea of sending more aircraft for the RAAF, but not at the expense of the USAAF, so the idea was dropped.[11] MacArthur

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5 Jacobson, *Moresby to Manila via Troop Carrier*, p. 10.

6 The C-53 version mentioned earlier was intended as a troop transport and did not have the reinforced floor and wide doors of the C-47 version.

7 *War Cabinet Agendum No. 227/1941*, NAA (ACT): A705/1 151/2/253.

8 Gillison, *Royal Australian Air Force 1939-1942*, p. 481.

9 Craven, W. F. and Cate, J. L. (eds), *Volume I: Plans and Early Operations*, (Chicago: University of Chicago Press, 1948), p. 424; Craven, W. F. and Cate, J. L. (eds), *Volume VII: Services Around the World*, (Chicago: University of Chicago Press, 1958), pp. 13-14, 178-179.

10 Arnold to MacArthur, 13 September 1942, RG496 Entry 255 Box 1929.

11 Grace Person Hayes, *The War Against Japan*, pp. 159, 163.

allocated the highest Lend Lease priority to transport aircraft for the RAAF,[12] which of course was less than the priority that the USAAF gave its own aircraft. The RAAF received its first five *Dakotas* from the US 21st Troop Carrier Squadron in January 1943.[13] Lend Lease aircraft trickled in and by March 1944 the RAAF had six *Dakota* squadrons.[14]

Dakotas were tempting targets for Japanese fighters and they required a substantial fighter escort. A typical flight of 18 *Dakotas* might have an escort of up to 36 fighters: 12 P-39 *Airacobras*, P-40 *Kittyhawks* or P-47 *Thunderbolts* flying close cover; 16 P-38 *Lightning*s or P-39 *Airacobras* flying medium cover; and 8 P-38 *Lightning*s or P-47 *Thunderbolts* on top cover.[15] Thus, the *Dakotas* could be grounded for want of fighter cover if fighters were diverted to supporting other air, land or naval operations. Their war was not an easy one. In July 1943 General Kenney informed General Arnold that:

> In the case of troop carriers, I figure that I can get five hundred hours of New Guinea operation out of them. It is asking a lot, for the figures show that between weather and Nips a man lives longer in a P-39 than he does in a C-47 flying the troop carrier supply runs in New Guinea.[16]

While most Australian bases were located on the coast, three inland bases assumed importance in operations in 1943. Bena Bena was a village on a high plateau in the Bismarck Range with a 1,200 metre airstrip. At the beginning of 1943, it was held by an ANGAU detachment that had been driven out of Madang in December 1942.[17] When the Japanese advanced on Wau in January, New Guinea Force developed Bena Bena as "an alternative to Wau as a supply landing ground for troops operating in the Markham

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12 MacArthur to Curtin, 20 February 1943, NAA (ACT): A2653/1 M53/1943.

13 Kelly, Robert H., *Allied Air Transport Operations in the South West Pacific Area in WWII Volume Two: 1943 – Year of Expansion and Consolidation*, (Brisbane: Harding Colour, 2006), p. 452.

14 Nos 33, 34, 35, 36, 37 and 38 Squadrons. *Units of the Royal Australian Air Force: A Concise History. Volume 4: Maritime and Transport Units*, (Canberra: AGPS, 1995), pp. 37, 43, 49, 56, 63, 67.

15 "Information for RAAF on Movement and Maintenance of 7 Aust Div Operation during period 5 Sep 43 - 31 Oct 43", AWM54 81/3/4.

16 Watson, Richard L. Jr, *USAAF Historical Study No. 113: The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, (Washington: USAAF Historical Office, 1946), p. 157.

17 Powell, Alan, *The Third Force: ANGAU's New Guinea War 1942-1946*, (Melbourne: Oxford University Press, 2003, pp. 31, 121.

Valley", and provided a small garrison.[18] Supply was almost entirely by air. Occasionally it was possible to supplement the rations from trade and gardens. Native labour was plentiful but they had no resistance to malaria and could not leave the highlands. The airstrip was bombed and strafed on 14 June and a small quantity of stores was destroyed. More raids followed and to prevent the garrison being cut off if the airstrip was put out of action, a new strip was built at nearby Garoka. With over 1,000 local labourers on the job, a 2,000 metre airstrip with dispersal bays and a road connecting it to Bena Bena was completed in just a week. Aircraft could not be spared to support a large garrison and Bena Bena never became more than a commando base and emergency landing strip, although it was important in maintaining the loyalty of the local population.[19]

Tsili Tsili was developed as an emergency landing strip and a refueling base to support air strikes against the Japanese air base at Wewak. The area north of Wau was reconnoitred in May 1943 and an old airstrip was found at Marilinan. Although overgrown with Kunai grass, it was considered suitable for transports and upgradeable to take fighters, although it would have to be abandoned when the heavy rains came in September. ANGAU-directed natives burnt off the Kunai and prepared the field. A platoon of the 57/60th Infantry Battalion arrived on 15 June and an AASC detachment landed the next day. Then the Americans changed their minds and decided to develop the airstrip at nearby Tsili Tsili instead. Native carriers moved the small supply depot to Tsili Tsili. C Company, US 871st Airborne Engineer Aviation Battalion flew in on 10 July. This, the first unit of its type to arrive in SWPA, was equipped with light, air portable bulldozers, graders, carryalls and mowers, and Tsili Tsili was precisely the sort of mission that it had been raised for. Two runways were constructed. The base was camouflaged to avoid early detection by the Japanese and ANGAU worked with the local people to prevent them learning about it from the "bush telegraph". Japanese reaction began on 15 August, when the airstrip was bombed and two *Dakotas* were shot down, but over the next three days,

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18 *New Guinea Force Operation Instruction No. 63*, 22 January 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

19 War Diary, Bena Force, 23 January 1943, 1-14 June 1943, 1 August, AWM52 1/5/42.

the Fifth Air Force launched a series of strikes against Wewak, employing Tsili Tsili as a emergency refueling base.[20]

Wau

The most important inland base was Wau. The US 21st Troop Carrier Squadron began flying supplies and troops, including the commandos of the 2/5th Independent Company, to reinforce KANGA Force on 22 May 1942.[21] The 2/7th Independent Company followed in October 1942.[22] Wau aerodrome was a rough Kunai grass airstrip 1,100 metres long. A 1 in 12 slope heading directly for Kainde Mountain added excitement. Aircraft could approach from the northeast only, landing uphill and taking off downhill.[23] This also precluded extension of the strip. The ceiling of a fully laden *Dakota* was around 3,000 metres but the Owen Stanley Ranges are up to 4,000 metres high so aircraft sometimes had to fly between the mountains rather than over them.[24] This required good visibility but cumulus clouds built up over the ranges in the mornings followed by showers in the afternoon. On most days operations over Wau were possible for no more than four or five hours.[25] It was hoped that, through improving the track, building bridges and rest camps and reorganising the carrier lines, the Bulldog line of communications would deliver some 3 tonnes per day by land and water but this actually represented about a week's deliveries.[26] Any substantial relief or reinforcement could only come by air pending the completion of the Bulldog Road.

On 6 January 1943 a Japanese convoy set out for Lae from Rabaul. Forewarned by ULTRA intelligence reports,[27] allied aircraft spotted, shadowed and attacked the convoy

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20 Watson, *The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, pp. 186-190; DDST NGF, *Reports on Operations*, 30 June 1943, AWM54 583/7/10.

21 Craven and Cate, *Plans and Early Operations*, pp. 477-478; *New Guinea Force Operational Instruction No. 11*, 12 May 1942, AWM54 578/6/1.

22 *New Guinea Force Operational Instruction No. 36*, 9 October 1942, AWM54 578/6/1.

23 Wau Air Field Data Sheet, 1 October 1943, NAA (ACT): A9716/1 1453.

24 DST, Report on Visit to New Guinea, 2-19 May 1943, AWM54 431/13/6.

25 Deputy CG AAF to GOC NGF, "Air Supply of Wau-Bulolo-Mubo Area", 9 March 1943, Mackay Papers, AWM 3DRL 6850.

26 "First Narrative of the Operations of KANGA Force 1 May 1942 to 15 January 1943", undated, AWM54 578/1/4.

27 Drea, Edward J., *MacArthur's Ultra: Codebreaking and the War against Japan 1942-1945*, (Lawrence, KS: University Press of Kansas, 1992), p. 64.

but it succeeded in reaching Lae and landing about 4,000 troops.[28] General Blamey knew this meant trouble for the Wau garrison and moved to counter the threat.[29] Brigadier M. J. Moten's 17th Infantry Brigade received orders to move from Milne Bay to Wau on 4 January – before the Japanese convoy had even set sail – and the first group of the 2/6th Infantry Battalion embarked for Port Moresby on *Pulganbar* on 9 January. The rest of the battalion travelled on *Muliama* and *Mulcra* over the next two nights. The 2/7th Infantry Battalion followed on *Taroona* on 13 January and the 2/5th on *Duntroon* the next day.[30]

The prospects of the 17th Infantry Brigade beating the Japanese to Wau did not look too good. Only 28 Dakotas were available in New Guinea and these had to be shared with the Buna front. Two events helped turn the situation around. The fighting at Buna ended on 23 January, freeing up aircraft to support Wau, and 52 brand-new *Dakotas* of US 317th Troop Carrier Group had recently arrived in Australia,[31] their movement having been expedited in response to urgent requests from General MacArthur arising from the Buna fighting.[32] After a quick maintenance check, they were flown up to Port Moresby to help the US 374th Troop Carrier Group fly the 17th Infantry Brigade to Wau.[33] This meant that up to 40 aircraft were available daily. Between 10 and 19 January the 2/6th Infantry Battalion was flown in from Port Moresby to reinforce the garrison. In the process there were three crashes and poor flying weather forced many aircraft to return without landing. Brigadier Moten was twice forced to return to Port Moresby before reaching Wau on the third attempt. The poor weather continued for over a week, limiting air operations and sometimes precluding them entirely.

Finally, on 28 January, the weather cleared and a record 60 planeloads arrived, bringing in 814 men before air operations were suspended in the early afternoon.[34] The next day 57

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28 Gillison, *Royal Australian Air Force 1939-1942*, pp. 673-676; Craven and Cate, *Guadalcanal to Saipan*, p. 136; War Diary, Adv HQ NGF 6-7 January 1943, AWM52 1/5/51.

29 McCarthy, *South West Pacific Area - First Year*, p. 545.

30 War Diary, 17th Infantry Brigade, 4-12 January 1943, AWM52 8/2/17; War Diary, 2/6th Infantry Battalion, 4 to 11 January 1943, AWM52 8/3/6.

31 Kelly, *Allied Air Transport Operations, Volume II*, pp. 106, 420-421.

32 Marshall to MacArthur, 2 December 1942, RG496 Entry 255 Box 1933.

33 Jacobson, *Moresby to Manila via Troop Carrier*, p. 10.

34 McCarthy, *South West Pacific Area - First Year*, pp. 545-558; Diary, 17th Infantry Brigade, 4-12 January 1943, AWM52 8/2/17.

planeloads arrived, bringing most of the 2/7th Infantry Battalion and the remainder of the 2/5th. On 30 January the Japanese penetrated to within 400 metres of the airstrip.[35] Although subjected to small arms fire as they came in and unloaded, 40 aircraft made 66 trips that day. Their cargo included two dismantled 25-pounders with 688 rounds of ammunition, which were landed in the morning and in action in the early afternoon. On 31 January 35 aircraft made 71 trips and on 1 February 40 aircraft made 53 trips, bringing KANGA Force to over 3,000 men. Three *Dakotas* were lost over the three days. [36]

Allied air power helped turn a likely defeat at Wau into an important victory. Yet Wau also demonstrated its limitations, particularly its acute sensitivity to weather. Inexplicably, the Japanese did not attempt to intercept the transports until 6 February, when a flight of *Dakotas* escorted by eight P-39s was attacked and one *Dakota* was shot down. Meanwhile about nine bombers and 20 fighters struck Wau itself, damaging the strip and destroying a *Wirraway*.[37]

New Guinea Force was eager to follow up the victory by driving the Japanese out of Mubo and Salamaua but the difficulties involved in doing so were daunting. The maximum air effort was, of course, only temporary. The 317th Group exchanged its new aircraft for 374th Group's motley collection of old aircraft and the 374th was concentrated in New Guinea while the 317th took over the route from the mainland.[38] This left Brigadier General Ennis C. Whitehead, the air commander in New Guinea, with 47 *Dakotas* on hand on 14 February.[39] The Pacific Military Conference allocated another 2½ troop carrier groups to SWPA but these would not arrive until the second half of 1943.[40]

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35 NGF to LandForces, 30 January 1943, Blamey Papers, AWM 3DRL 6643 2/48.

36 *Report on Operations in New Guinea, Wau-Salamaua Areas 1 May 42 – 13 Sep 43*, AWM54 587/7/28; Jacobson, *Moresby to Manila via Troop Carrier*, p. 13.

37 Craven and Cate, *Guadalcanal to Saipan*, p. 137; War Diary, NGF GS Branch, 6 February 1943, AWM52 1/5/51.

38 Jacobson, *Moresby to Manila via Troop Carrier*, pp. 13-14, 23; Craven and Cate, *Guadalcanal to Saipan*, pp. 137, 157-158.

39 *Notes on Daily Conference*, 16 February 1943, War Diary, NGF GS Branch, March 1943, AWM52 1/5/51.

40 Joint Staff Planners, "Plan for Operations for the Seizure of the Solomon Islands – New Guinea – New Britain – New Ireland Area", 20 March 1943, NACP RG218 Box 320 CCS381.

The US 54th Troop Carrier Wing was activated to control the troop carrier groups but existed mainly on paper until May.[41]

Another difficulty was the provision of adequate fighter cover. During the Papuan Campaign it had been possible to provide fighter cover over the Buna area but this was only 150 km from the airbases at Port Moresby whereas Wau was some 240 km distant. This meant that twice as many fighters were required to maintain the same cover but actual fighter strength was one squadron less. Even so, the weather still remained the most important limitation on air operations. General Whitehead pinned his hopes for an improvement of the situation on the development of Dobodura, a flat area near Buna suitable for airstrips, with a deep water harbour at nearby Oro Bay. Construction of airstrips began even before the fall of Buna and fifteen tactical airstrips were developed by the end of 1942. After the fall of Buna it was decided to improve seven of these and develop facilities for a major airbase. Being north of the Owen Stanley Range, aircraft based there did not have to make the arduous flight over the mountains and operations were less restricted by weather.[42] Two fighter squadrons were already based at Dobodura but progress on developing the port at Oro Bay was slow and hopes that the road from Oro Bay to Dobodura would soon be open were washed away by floods along with the bridges. Without the capability to deliver supplies by water the development of Dododura, which required a great deal of heavy engineering stores such as Marston mat, had to be supported by air, requiring two of Whitehead's four transport squadrons.

Whitehead recommended that no more troops be moved to Wau than could be supplied without airdropping and any offensive action against Mubo or Salamaua be predicated on supply by sea.[43] He agreed to provide 23 planeloads per day to maintain KANGA Force, plus 665 to build up a 30 day reserve. Despite heavy commitments with regard to the transport of aerodrome construction materials to Dobodura, he was prepared to commit to flying to Wau and Bulolo one day in three, and one day in two when the Dobodura

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41 Watson, Richard L. Jr, *USAAF Historical Study No. 113: The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, (Washington: USAAF Historical Office, 1946), p. 116.

42 Casey, *Airfield and Base Development*, pp. 118-119.

43 Deputy CG AAF to GOC NGF, "Air Supply of Wau-Bulolo-Mubo Area", 9 March 1943, Mackay Papers, AWM 3DRL 6850.

project was complete. In return he wanted the Bulolo strip completed, with six to nine dispersal areas and antiaircraft guns in the vicinity.[44]

The New Guinea Force G Branch drew up a new plan for the defence of the Wau which called for two infantry brigades and three independent companies with support units including two batteries of 25-pounders and 30 days' reserves of ammunition.[45] The Q Branch deemed this plan "impractical". The troops already at Wau required 12 planeloads per day for maintenance. The additional troops would require 251 planeloads just to move to Wau. Once there, they would need 26 planeloads per day for maintenance. And a week's reserve of ammunition would require 528 loads or 26 planes per day for three weeks. The 25-pounder ammunition alone, at 180 rounds per gun per day for 16 guns, came to 86,400 rounds which, at 25 lbs (11 kg) per round, would weigh around 950 tonnes and require 432 planeloads.[46] General Mackay, who had temporarily assumed command of New Guinea Force on 30 January, decided not to pursue the Japanese but "to keep our present force where we can supply it" until sufficient reserves could be built up.[47]

On 19 February General MacArthur received ULTRA intelligence that the Japanese were planning another attempt at running a convoy through to Lae.[48] A series of attacks by aircraft and PT boats sank all the transports in the convoy in what became known as the Battle of the Bismarck Sea, thereby removing the danger to Wau for the time being.[49]

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44 DCGS to OC KANGA Force, "Maintenance of KANGA Force by Air", 6 February 1943, AWM54 583/5/1.

45 *New Guinea Force General Staff Minute*, "Staff Directive – Planning Future Operations in the Wau Area", War Diary, NGF GS Branch, February 1943, AWM52 1/5/51.

46 DA&QMG NGF, "Maintenance of Wau by Air", 6 March 1943, Mackay Papers, AWM 3DRL 6850.

47 Mackay to Blamey, 10 March 1943, Mackay Papers, AWM 3DRL 6850.

48 Drea, *MacArthur's Ultra*, pp. 68-69.

49 Morison, *Breaking the Bismarcks Barrier*, pp. 54-65.

Battle of the Ridges

Since KANGA Force was built around an infantry brigade, an operational formation with little logistical capability, New Guinea Force ordered the 3rd Division to supply it with an Administrative Staff.[50] The advance party of this staff, under Lieutenant Colonel E. A. Griffin, AA&QMG of the 3rd Division, arrived at Wau by air on 26 March. They found a number of logistical units already in the area. The 13th Field Bakery, using ovens made from 44-gallon drums, was baking 900 kg of bread daily. A five man detachment from the Port Moresby-based 10th Advanced Ordnance Depot was running an ordnance depot near the airstrip, which became the 102nd Forward Ordnance Depot. There were DIDs and FSDs located near the airstrips at Wau and Bulolo, manned by 57 men from the 2/2nd AASC Company, handling ammunition in far greater quantities than was normally handled by the AASC ammunition points. In April the 82nd and 83rd Field Ammunition Depots took over responsibility for the ammunition. In the forward areas AASC detachments might consist of one man, often a driver who was untrained in supply duties.[51]

Keeping reserves of ammunition and stores near the airstrips was convenient but costly when Japanese bombing raids on the airstrip destroyed stores, ammunition and POL. The Administrative Staff ordered the depots – along with the transit camp, field post office, canteen and transport pool – moved away from the airstrips. Sappers constructed twelve huts, six each at Wau and Bulolo, from Kunai grass and galvanised iron, located some distance from the airstrips with room for expansion. Those at Wau were sited with an eye to later receiving supplies over the Bulldog Road. Shortages of materials, sappers and native labourers delayed completion of the new buildings. The next task was to provide accommodation for the 15th Infantry Brigade. Two forward battalion areas were established at Sunshine and Bulwa and one for a reserve battalion at Bulolo.[52] Town majors were appointed for Wau and Bulolo and made responsible for the local

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50 *New Guinea Force Administrative Instruction No. 83*, 25 March 1943, War Diary, NGF Q Branch, March 1943, AWM54 1/5/53.

51 "Function of Q Branch 3 Aust Div Wau – Bulolo Area", 27 July 1943, War Diary, 3rd Division AQ Branch, AWM52 1/5/6; AQMG NGF, "Report – Wau Ops 27 Mar -12 Apr 43", 15 April 1943, AWM54 583/7/10.

52 CASC 3rd Division, "Notes on ASC Functions Prior to and During DOUBLET", 22 October 1943, AWM54 587/7/1; "Function of Q Branch 3 Aust Div Wau – Bulolo Area", 27 July 1943, War Diary, 3rd Division AQ Branch, AWM52 1/5/6.

administration of the areas within 500 metres of the airstrips. This included traffic control, provost, sanitation and anti-malarial measures, allocation of camp sites, and custody of stores and materials not charged to units.[53]

Transport was centralised. The 17th Infantry Brigade established a motor pool which was taken over by a detachment of the 152nd General Transport Company in June. This consisted mainly of jeeps but some 3-ton tip trucks were cut up with oxy-acetylene torches and flown in for work on the roads. Keeping vehicles running was the task of the 2/46th Light Aid Detachment aided by a detachment of the 156th Light AA Workshop and a Special Workshop Detachment – a total of 46 men. Only the latter had anything other than hand tools.[54]

The 17th Brigade created a pack transport company with 50 donkeys, mules and horses obtained by rounding up the local wild horses. Grazing land was scarce so feed had to be flown in. Their diet of 2 kg of oats per day was meagre but somehow the pack transport company was able to keep the animals in working condition.[55] The animals suffered from harness galls and, in response to an urgent request, New Guinea Force sent up brushes, combs, a veterinary officer's kit and a saddler's valise. A herd of 73 cattle were rounded up, which were occasionally slaughtered for fresh meat, while five dairy cattle gave a few litres of milk each day.[56]

KANGA Force was dissolved on 22 April and units under its command passed to the 3rd Division, whose commander, Major General S. G. Savige, assumed command of the Wau-Bulolo area.[57]

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53 AA&QMG 3rd Division, *Admin Instruction No. 19/43*, 11 May 1943, War Diary, 3rd Division AQ Branch, AWM52 1/5/6.

54 AQMG NGF, "Report – Wau Ops 27 Mar -12 Apr 43", 15 April 1943, AWM54 583/7/10.

55 CASC 3rd Division, "Notes on ASC Functions Prior to and During DOUBLET", 22 October 1943, AWM54 587/7/1; *Weekly Resume of Activities Q Branch*, 21 May 1943, AWM54 917/1/4.

56 CASC 3rd Division, *Bi Monthly Report – Wau-Bulolo 24 Jun – 9 Jul 43*, AWM54 587/7/14.

57 *New Guinea Force Operation Instruction No. 80*, "Defence of Wau-Bulolo-Markham River Area – Assumption of Responsibility by 3 Aust Div", 20 April 1943, War Diary, NGF G Branch, AWM54 1/5/51.

> Thus there passed from the Order of Battle a name which spanned the whole of the most critical year of the war in New Guinea… From those humble and brave beginnings KANGA Force, as its year drew to a close, identified itself with the adaptation of air power in its most dramatic form to the needs of the army in the field. [58]

Savige was ordered to "bring about aggressive overland action against Salamaua from Wau – Bulolo area and along the coast from Morobe… to drive the enemy north of the Francisco River by aggressive action as soon as possible".[59] Salamaua itself lay just north of the Francisco River. The logistical difficulties involved in this were not overlooked but operations were about to begin in the Solomons and the Wau-Salamaua area was the only place where real pressure could be brought against the Japanese. According to Savige:

> It was late in the night of 20 May when I had finished my plan and when I called Griffin into the discussion with my G man [Lieutenant Colonel J. G. N. Wilton] and myself as the plan then depended entirely on his ability to supply when borne down by other almost insuperable difficulties.
>
> I outlined the situation and my plan to meet it to Griffin and asked him if he could administratively support it. In all the difficult circumstances of the moment he knew it was well-nigh impossible to do so, and particularly to find a solution to the problem to hastily establish an LoC and provide a boy line and escort for the Sunshine-Jari route. The Powerhouse-Bobadu route itself presented problems in reinforcing the supply line but it was the lesser of the two.
>
> Griffin sat down and figured out ways and means. He could almost reach a solution when he would run into other problems which denied that particular solution but, finally, he rose and said 'You can put your plan into execution, Sir. I can support it administratively.'[60]

Events would prove this assessment overly optimistic.

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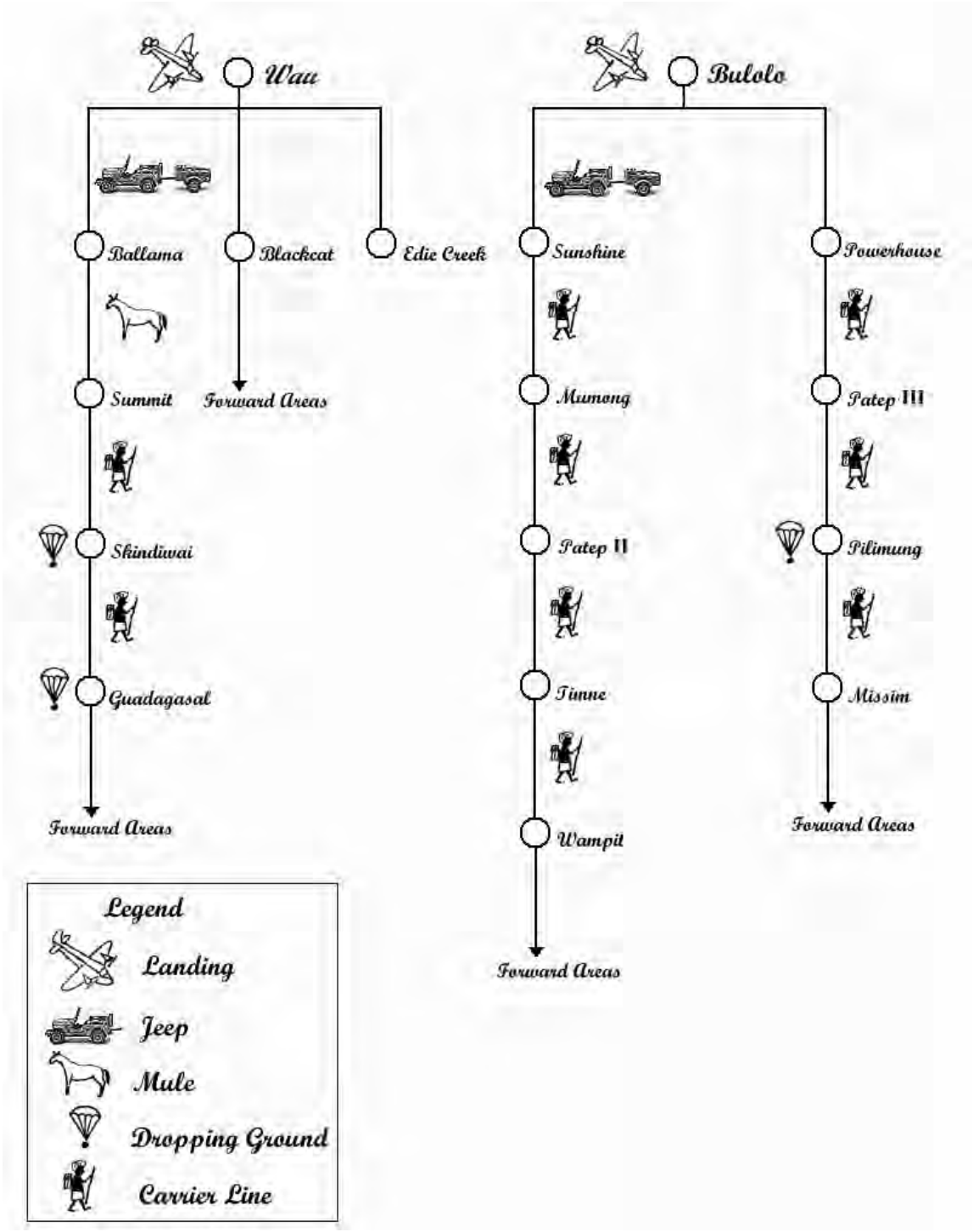
58 McCarthy, *South West Pacific Area - First Year*, p. 588.

59 *New Guinea Force Operation Instruction No. 81*, "Operations Against Salamaua", 26 May 1943, War Diary, NGF G Branch, AWM54 1/5/51.

60 Notes on Chapter 2 of Dexter's draft of *The New Guinea Offensives*, Savige Papers, AWM 3DRL 2529 126.



13. Supply Routes between Wau and Salamaua

Source: NGF, "Report – Wau Ops 27 Mar - 12 Apr 43", 15 April 1943, AWM54 583/7/10

Map 8. Supply Routes between Wau and Salamaua

Source: AWM54 587/7/28

Three lines of communications were organised. The Markham line of communications ran north from Bulolo towards the Markham River and was operated by the 1st Supply Depot Company. It only supported patrols operating in the Markham area and therefore did not have to cope with much volume. The other two supported the operations aimed at Salamaua. The Mubo line of communications was operated by the 2/2nd AASC Company and supported the 17th Infantry Brigade. The Missim line of communications was run by the 1st Supply Depot Company in support of the 15th Infantry Brigade, which arrived at Pilimung on 9 June. Forward units were maintained by carrier lines from the dropping grounds. As the campaign progressed the jeepheads were closed and from July to August maintenance was carried out entirely by airdropping. New dropping grounds were established forward and old closed out. Rations and ammunition were delivered to forward dumps directly in the rear of the forward units which were controlled by AASC detachments rather than the unit quartermasters.[61]

Unable to affect the primary variables involved in air dropping, namely the weather and the number of aircraft, New Guinea Force strived to improve the efficiency of the airdropping effort. An Ordnance Corps unit, the 1st Parachute Refolding Platoon, was formed at Port Moresby in July and tasked with the receipt, inspection, repair, refolding and storage of parachutes. Initially, it had three huts: one for storage of American parachutes and containers, one for Australian parachutes and wrapping equipment and one with five large refolding tables. Where possible parachutes were collected in the field by native women and children, sent to a parachute recovery dump at a forward airstrip, flown back to Port Moresby and returned to the 1st Parachute Refolding Platoon. They were inspected and repaired if necessary. Some 70% of returned parachutes proved to be repairable while 20% were sent to salvage and 10% were cut up for patches. For repair work, the 1st Parachute Refolding Platoon had three electric sewing machines of a special design. The parachutes were taken to a special building with a 15 metre drying tower where they were hung from the roof and dried out using a heater. New and repaired parachutes alike were dried, inspected and refolded before use. Unfortunately, the very reasons that made airdropping supplies necessary – remote areas and long lines of

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61 CASC 3rd Division, "Notes on ASC Functions Prior to and During DOUBLET", 22 October 1943, AWM54 587/7/1.

communications – militated against their recovery. Parachutes might also deteriorate while waiting to be shipped back.[62] Prior to the fall of Salamaua on 11 September, only about 5% were returned but many had been collected and stored, and were returned after the campaign was concluded.[63]

An early problem was the failure of parachutes to open, which reduced the effectiveness of the drop by as much as 40%. After two weeks of investigation, it was discovered that the parachute was being prevented from leaving its bucket by the tightness of the cord around the lip of the bucket, which had shrunk as a result of humid storage conditions. This was remedied by cutting the cord around the lip and slitting the side of the bucket. The proportion of parachutes opening immediately jumped to over 95%.[64]

The pressure of the campaign against Salamaua caused an unprecedented demand for parachutes. Parachutes of both Australian and American manufacture were used, the most common being the 24-foot Australian 1-, 2- and 4-point; the 28-foot Australian 4-point; the American 24-foot G1; and, for very heavy loads, the 48-foot American G5. For important items, brightly coloured parachutes were used to aid recovery.[65] On 27 June New Guinea Force asked Advanced LHQ for 10,000 over the next 30 days and 8,400 per month thereafter.[66] General Herring informed LHQ that:

> The success of operations in New Guinea will depend, during certain phases, upon the effective maintenance of relatively large numbers of troops by means of stores dropped by parachute.[67]

There were 8,000 parachutes in ordnance depots back in Australia. By 13 August, every last one of them was on its way to the 10th Advanced Ordnance Depot in Port Moresby. This left 1,000 parachutes on order by the RAAF and 10,000 by the Army from sources in Australia, and 30,000 on order from India that were expected to be delivered by the end of

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62 Tilbrook, *To The Warrior His Arms*, pp. 347-351.

63 *A Report on Maintenance by Air in New Guinea,* NAA (Vic): MP729/6 246/1/25.

64 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

65 *A Report on Maintenance by Air in New Guinea,* NAA (Vic): MP729/6 246/1/25.

66 NGF to LandOps, 27 June 1943, NAA (Vic): MP729/6 47/401/2901.

67 GOC NGF to LHQ, 18 August 1943, NAA (Vic): MP729/6 47/401/2901.

the year.[68] The Master General of Ordnance, General Beavis, took steps to obtain more from American sources. Fortunately, although parachutes were used at an unprecedented rate, demand dropped off rapidly after the fall of Salamaua. Not until the Ramu Valley campaign would parachute dropping be again used on such a scale and then under more favourable circumstances that enabled 90% of parachutes to be retrieved.[69]

An AASC unit, the 1st Air Transport Supply Platoon, was formed on 10 December 1942 to pack goods for dropping, load aircraft and provide personnel for pushing stores out of the planes.[70] A 2nd Air Transport Supply Platoon was formed on 25 March 1943.[71] In July they were absorbed into the 1st Air Maintenance Company, which was formed in Port Moresby under the command of Major D. S. Esplin, a pioneer of air maintenance, with a War Establishment of 6 officers and 212 other ranks. It was responsible for packing, loading, storing and checking of all items to be delivered by air.

The major difficulty that the 1st Air Maintenance Company had to contend with was the uncertainty of air transport in New Guinea. In July, bad flying weather, diversion of transports to other activities, lack of fighter cover, and enemy air activity resulted in the cancellation of some 53% of the 1,397 planeloads that were sent to the aerodromes. Each load returned resulted in double handling, for the load had to be unpacked and returned to the depots. Moreover, the company's War Establishment was based on the servicing of 18 aircraft per day but when weather was good, three or four times as many loads were called for. Indeed, the July average was 51.7 loads per day. To get through its workload the company drew on the nearby units for "casual" personnel.[72]

On 17 July General Herring decided to continue troop movements from Port Moresby but switch the daily maintenance flights to Dobodura, where the newly-arrived US 375th Troop Carrier Group was stationed from 12 July.[73] A 2nd Air Maintenance Company was

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68 MGO to LGA, 25 August 1943, NAA (Vic): MP729/6 47/401/2901.

69 *A Report on Maintenance by Air in New Guinea*, NAA (Vic): MP729/6 246/1/25.

70 War Diary, 1st Air Transport Supply Platoon, AWM52 10/31/7.

71 War Diary, 2nd Air Transport Supply Platoon, AWM52 10/31/8.

72 War Diary, 1st Air Maintenance Company, 4 July 1943, AWM52 10/31/1. Since the 1st Air Maintenance Company was formed on 4 July 1943, the month of July was reckoned at only 27 days.

73 Watson, *The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, p. 300.

formed at Port Moresby on 15 July. Although it contained a cadre of experienced personnel from the 1st Air Maintenance Company, about 95% were inexperienced in air maintenance duties and it was given only twelve days' training before moving to Dobodura on 28 July and commencing operations on 4 August.[74]

14. POL prepared for dropping. Cornsacks are used between and under the drums

Each day the air maintenance companies would receive a priorities list from the Q Branch at New Guinea Force specifying the number and types of aircraft involved. The distance of the haul and the weather conditions would dictate how much fuel was required and hence how much cargo an aircraft could carry. Bombers used for airdropping required extra personnel to load but did not need droppers to accompany them. Each aircraft load would be allocated a serial, with its own trucks, loaders and droppers assigned. If the number of aircraft that needed to be loaded required more personnel or more transport than the air maintenance company had it would be requisitioned from the base sub area. General transport companies in the Port Moresby area supplied the 1st Air Maintenance Company with an average of 24 3-ton trucks per day. Casual loaders and droppers would be supervised by the air maintenance companies' personnel. Aircraft loading had to be accomplished as expeditiously as possible. Departure times had to be strictly observed. The airbases were used for fighter and bomber missions as well and the transports had to be clear at specified times. Fighter cover might be coming from another base and had to rendezvous with the transports at pre-arranged times. Moreover, the fighters might only have a limited amount of fuel for circling over the dropping ground. For this reason, spare trucks were kept on hand.

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74 War Diary, 2nd Air Maintenance Company, 15 July 1943, AWM52 10/31/2; *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43,* AWM54 519/6/32.

Stores were brought to the packers for preparation. The general principle of preparation for dropping was to use the manufacturers' packaging – which was considerably better than that used in 1942 and steadily improved as the war went on – reinforced if need be with rope or wire. The most notable exception was mortar rounds, which had to be specifically prepared. Steel containers were available but were only used for unusual stores or for special missions flown by *Wirraways* or *Boomerangs*. They were heavy, their use usually required the manufacturers' packs to be broken up, and they were useless to the recipients. The air maintenance companies preferred packaging such as cornsacks, sandbags and blankets, which were useful to the troops. Heavy use of blankets as padding material on the order of 30,000 to 40,000 per month almost exhausted stocks in Australia. Tables were drawn up showing the weight of items with packing. Anything not in a standard package needed to be weighed. In some cases, changes in the manufacturers packaging might require re-weighing. Oversized scales were kept on hand for this.

Droppers accompanied the aircraft with the task of pushing cargo out the door. Major Esplin devised a slide to make this work easier. A roll was kept, noting who was on which plane, in case one crashed. Droppers had to remain with their assigned aircraft, so if it flew more than one mission, so did they.[75]

Dropping missions were increasingly performed by B-25 *Mitchell* bombers which were faster than *Dakotas* and could release their whole cargo at once. This meant less time over the target and thus less vulnerability to ground fire, but it also meant that the cargo was more scattered and less was recovered.[76] Dropping planes would fly in single column. The leader would make a run over the target at 60 to 90 metres, throttling down if possible to 240 mph, and then pull away in a tight turn. Each aircraft would follow in succession. Meanwhile the leader would join the end of the column. The planes would circle until all stores were dropped. A successful dropping mission required determination, courage and skill. The last-mentioned was the biggest problem, as there were many inexperienced pilots. One pilot varied the procedure by turning in the wrong direction, with the result that two planes flew over the dropping zone at the same time,

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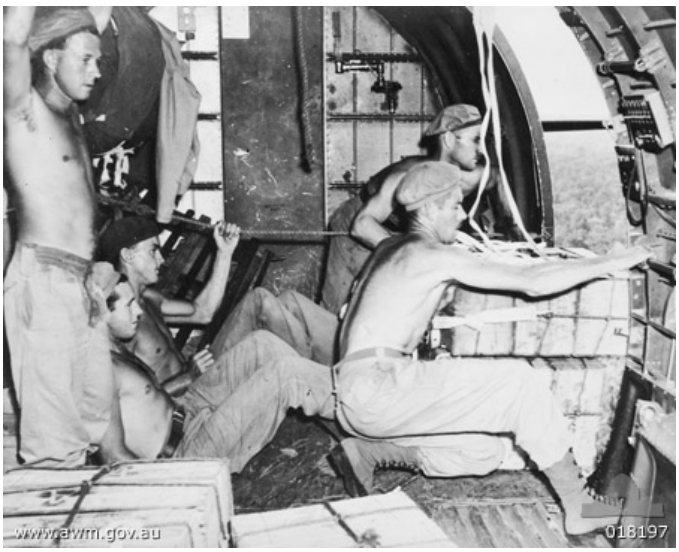
[75] *A Report on Maintenance by Air in New Guinea*, NAA (Vic): MP729/6 246/1/25; War Diary, 1st Air Maintenance Company, 4 July 1943, AWM52 10/31/1.

[76] *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

one above the other, and the lower aircraft was stuck by something dropped by the higher one, resulting in "a very startled crew and a hole in the side of the fuselage large enough to drive a jeep through".[77]



15. Bougainville, March 1945. Droppers prepare to push stores out of the plane with their feet.

As during the Papuan Campaign, much of the fighting occurred over areas that were incompletely or inaccurately mapped. Designation of a dropping zone therefore required more than just a map reference. Oblique photographs of the area were taken and a gridded photograph with the dropping zone coordinates marked was given to the US 54th Troop Carrier Wing.[78] If possible, Captain N. R. Wilde, the wing's Australian liaison officer, or another officer with local knowledge, would guide the lead aircraft. A Great War veteran, Captain Wilde had been a private pilot in Wau before the war. Commissioned into ANGAU, he was assigned to the Air Transport Command, who discovered that he was "one of the few men who knew where to locate the mountain-locked airstrips and how to find his way through the lofty, cloud-obscured mountain passes". Wilde had directed the construction of the airstrip at Wangela during the Papuan campaign and "was instrumental in the selection of Tsili Tsili as an airstrip site."[79]

The dropping zone would be marked with coloured panels and smoke. Three types of dropping grounds were used: cleared areas on mountain tops; basins in Kunai hills; and open river flats. In all, twelve dropping grounds were used during the advance on Salamaua. The ideal dropping ground was an area of open ground at least 70 by 250

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77 *A Report on Maintenance by Air in New Guinea*, NAA (Vic): MP729/6 246/1/25.

78 *Report on POSTERN Air Maintenance*, 17 October 1943, AWM54 587/7/4 .

79 Jacobson, *Moresby to Manila via Troop Carrier*, pp. 203-204.

metres in size that was clear of stumps and obstructions, easily identifiable from the air, with good approaches from multiple directions and room for turning circuits, located sufficiently close to the forward area that it could be used for a while as the troops advanced but not so close as to be subject to enemy artillery or ground attack. It also needed to have weatherproof shelters nearby but not adjacent to the dropping ground where they could be struck by falling stores. [80]

Regrettably, but inevitably, many dropping grounds fell short of the ideal. The best dropping ground in terms of recovery was New Bobdubi, a river flat.[81] The worst was Skindewai, which lay within a camp area that was covered with tree stumps. Pioneers blasted the stumps to improve the area but nothing could be done about the fact that a deep gully ran along one side and the air approach was bad. Guadagasal was better but results still left much to be desired. Wind socks were erected at the corners of the strip to help mark it;[82] yet a drop by *Mitchells* on 27 June managed to get only 6 out of 40 parachutes within the dropping ground.[83]

The dropping ground had to be cleared and the supplies moved under cover as quickly as possible to prevent their deterioration. This job was carried out by native workers, often women and children. The job of delivering the ammunition, rations and stores to the units fell to the carrier lines, escorted by ANGAU overseers. ANGAU officers advised commanders on matters relating to native labour, although the actual allocation of labour was handled by the brigade staffs. Clashes between ANGAU officers and local commanders resulted in Savige issuing a clarification of their role:

> The ANGAU representative regardless of rank shall be the deciding authority as to whether native labour is available for carrying etc or otherwise. In the event of carriers being overworked or in ill health, and in the opinion of the ANGAU representative

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80 *Report on POSTERN Air Maintenance,* 17 October 1943, AWM54 587/7/4 .

81 CASC 3rd Division, "Notes on ASC Functions Prior to and During DOUBLET", 22 October 1943, AWM54 587/7/1.

82 DDST NGF, *Reports on Operations,* 27 April 1943, AWM54 583/7/10.

83 Dexter, David, *The New Guinea Offensives*, (Adelaide: Australian War Memorial, 1961), p. 87.

> immediately available such carriers should NOT be employed on further duties until rested, such advice irrespective of the ANGAU person's rank shall be accepted.[84]

Throughout June, the supply situation steadily worsened, with the troops often hungry or down to their last meal. By 27 June the 15th Infantry Brigade was in dire straights, with no rations for the natives in the Missim area and none for the troops either around Hote. Fortunately, the dropping that day and the next at Selebob and Hote was successful.[85] After working hard for three days in continuous rain with little food, some 48 out of 153 carriers at Missim became ill. The brigade ANGAU officer, frustrated with the treatment of the workers and himself by the brigade staff, was relieved on his own request.[86]

The biggest hazard to the carrier lines was air attack. Guadagasal in particular was prone to air raids by Japanese planes from nearby Lae and they caused the workers, who had not signed on to be shot at, to flee. Nor was the Japanese air arm the only danger, for Allied aircraft sometimes cleared their guns over the forward area, and on 11 June a ghastly incident occurred at Guadagasal when four RAAF Beaufighters strafed the wrong hill and wounded two carriers. Another 300 went bush and strenuous efforts were required by ANGAU officers to round them up again.[87]

Airdropping gave the storemen considerable difficulties with subsistence, usually the easiest item to manage as usage is so predictable. Stocks were reported in rations but the rations themselves were supplied in bulk quantities, packaged rations like the 10-in-1 packs so familiar to later generations of soldiers having not yet made their appearance in New Guinea. Problems arose due to the erratic nature of air transport, in which random aircraft might fail to arrive and deliveries could not be made on a regular basis. This was compounded by the even more unpredictable nature of air dropping, which inevitably lost a proportion of the supplies dropped; by deterioration of some items; by excessive use of

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84 *Amendment to Administration Instruction No. 9/43*, War Diary, 3rd Division AQ Branch, July - August 1943, AWM52 1/5/6.

85 Dexter, *The New Guinea Offensives*, pp. 70, 87.

86 Captain Vertigan to Brigadier Hammer, "Employment of Native Labour", July 1943, War Diary, 3rd Division AQ Branch, July - August 1943, AWM52 1/5/6.

87 Dexter, *The New Guinea Offensives*, p. 66; *Report on Operations 26 August to 21 September 1943*, AWM54 587/7/14.

certain commodities; and by pilferage, which was frequent, widespread, and particularly affected items liked cigarettes, chocolate, tinned fruit and razor blades.

The result was that stocks became unbalanced. This was an acute problem because the unreliability of air transport required stocks on hand to tide the troops over in the event of the unavailability or non-arrival of transports. Moreover, the limited number of transport sorties available mandated the most economical use of airlift tonnage. This, in turn, required accurate stock reporting. If, for example, 20 days' reserves were available less 14 days' supply of tea then half a planeload of tea might lift the number of days' supply on hand by 14 days. Initially, stock returns cited only three basic items: tea, biscuits and meat. Dividing the smallest figure by the ration strength of the force gave the number of days' reserves on hand. In the example, though, this would have yielded a figure of six days' reserves on hand, which was very misleading as the danger if tea ran out was not too great.[88] Various schemes were discussed but it became apparent that, under the circumstances, only a detailed stock report would do. This was complicated by the time factor, which forced the supply points to radio their stock situations. To reduce signal traffic, a system of four-letter commodity codes was created. As a result of the experience of the Salamaua campaign, the Army adopted a system whereby a flow of balanced rations was maintained, with periodic rebalancing.[89]

No campaign was ever more hand-to-mouth than this one, with supplies actually running out entirely on occasion, and bringing the operation to the brink of disaster. The development of new organisations, equipment and techniques for delivering supplies by air could not overcome the problems involved in supporting operations by air. Aircraft numbers remained too few, and the notorious New Guinea's weather and Japanese opposition, both from the air and from the ground, still had the capacity to halt air operations. In the light of this, the wisdom of General Blamey's decision to persist with the Bulldog Road can be seen in a different light. Little wonder then, that even as staunch an advocate of air power as General Whitehead would look to sea transport as a better solution.

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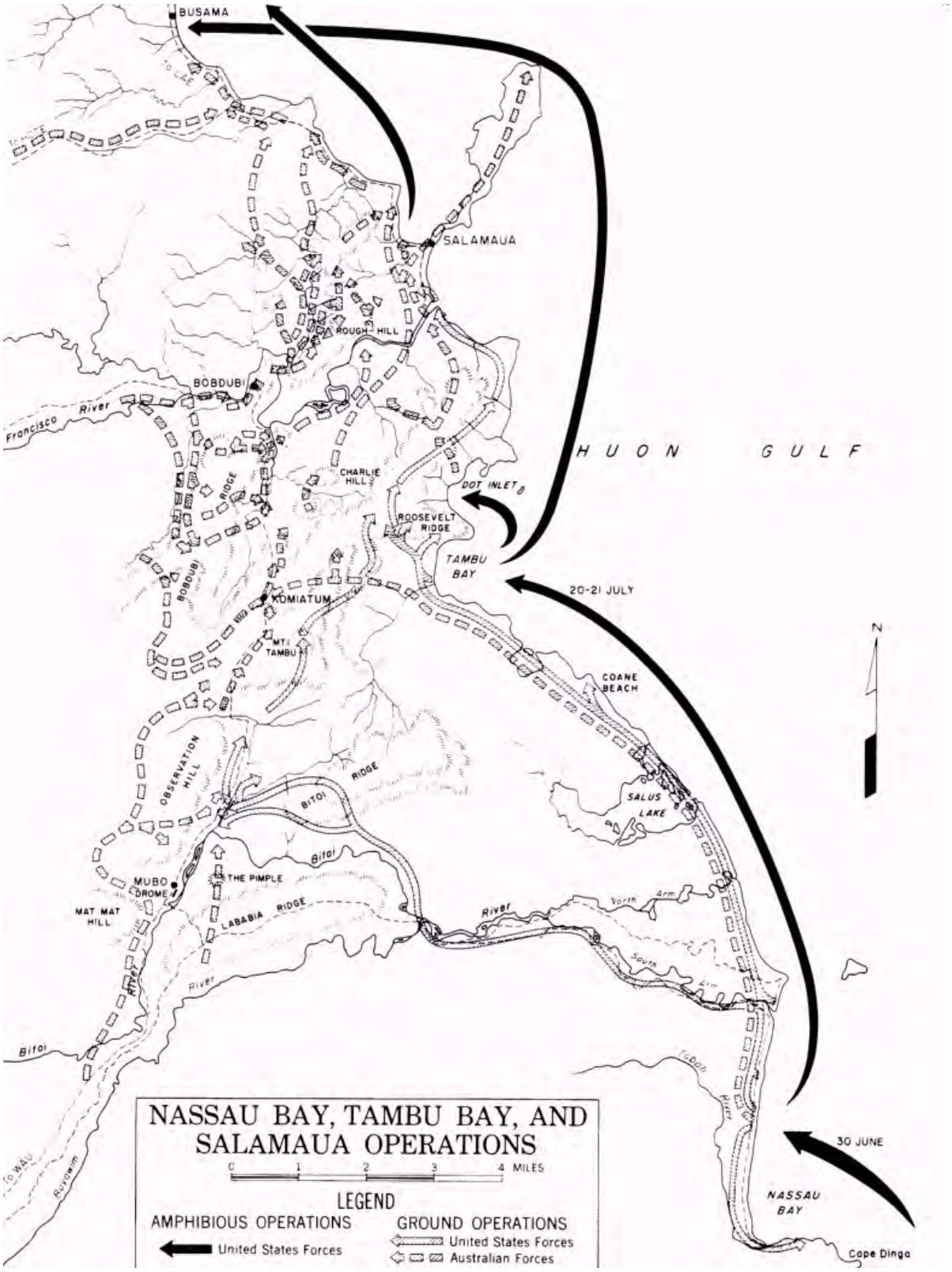
88 HQ 3rd Division, "Method of Compilation of Rations", 28 April 1943, AWM54 587/7/14.

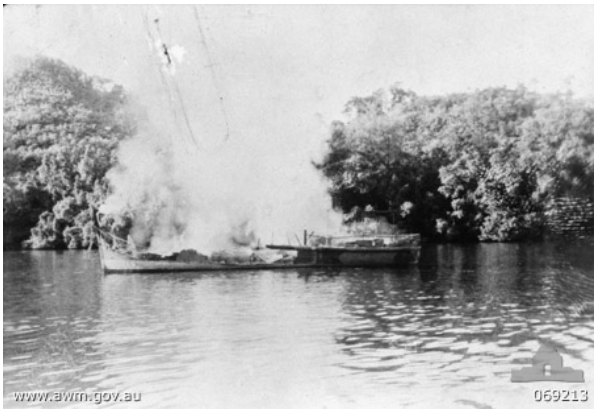
89 CASC 3rd Division, "Notes on ASC Functions Prior to and During DOUBLET", 22 October 1943, AWM54 587/7/1.



Map 9. Nassau Bay and Tambu Bay

Source: Casey *Amphibious Engineer Operations*, p. 60

Nassau Bay



16. Douglas Harbour 19 May 1943. AS28 set ablaze by an enemy air attack

Coastal shipping was important in New Guinea, where there were few ports capable of receiving deep draught vessels. Supplies were carried by trawlers, ketches and luggers of the 1st Water Transport Group and the American Small Ships Section, manned by Army and civilian crews. Originally intended for a "commando" type role, the small ships became an important element of the transportation system. By December 1942 the American Small Ships Section had 1,000 personnel and 195 vessels,[90] while the Australian Army was operating some 348 small craft in April 1943, of which 200 were in New Guinea with the 1st Water Transport Group.[91]

There was a "constantly decreasing enthusiasm on the part of the shipping people and the navy about running supplies even as far north as Oro Bay",[92] for there were dangerous reefs that had to be avoided which were not lit, and therefore could not be navigated at night. By daylight, there was the danger of air attack. The USASOS Small Ships Section had orders to enter and clear Oro Bay in the dark. Perversely, this sometimes required them to remain at Oro Bay throughout the day but at least there were antiaircraft guns for protection there. The only means of unloading was by lighter and when Oro Bay became congested, ships had to wait at Porlock Harbour where there was no protection at all until

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90 Comd USASOS to CinC SWPA 30 April 1942, NACP: RG496 Entry 255 Box 1927; *History of the Transportation Corps in Australia*, Vol. I, pp. 14, 21.

91 McNicoll, *Teeth and Tail*, pp. 300-307.

92 Craven, W. F. and Cate, J. L. (eds), *Volume IV: The Pacific: Guadalcanal to Saipan*, (Chicago: University of Chicago Press, 1950), p. 158.

the bombing of two ships there on 19 March 1943 caused General Johns to rescind this order.

A wharf was completed on 27 March but the next day Japanese bombers struck it. The first ship to berth there, the *Bantam*, and an oil barge were set on fire and sank. The wharf was destroyed and the port reverted to using lighters.[93] With the completion of operations around Buna, the US 41st Infantry Division relieved the 7th Division and US 32nd Infantry Division in the Oro Bay - Gona area on 25 January 1943.[94] General Mackay sent small units up the coast in pursuit of the retreating Japanese, supported by Australian artillery and Papuan infantry patrols. Douglas Harbour was taken on 6 March[95] and, using small ships supplied by COSC,[96] a landing was made at Morobe on 3 April.[97]

The trawler *AS25* carried out a survey of the coast between Oro Bay and Morobe. Morobe was reconnoitred and found to be "by far the best harbour so far encountered on the northeast coast"; deep, sheltered and roomy with a jetty for small craft. The 1st Water Transport Group began running supplies from Oro Bay to Morobe but the northeast coast was still dangerous. On 18 May *AS25* left Oro Bay with 18 tons of stores for Douglas Harbour and Morobe. It arrived at Douglas to find the trawler *AS28*, anchored in the harbour, had been strafed, bombed and sunk by 13 Japanese aircraft that morning. This was the first ship lost by the 1st Water Transport Group. One of the crew was killed and the rest wounded. On the way back from Morobe, *AS25* itself came under air attack. Two bombs were dropped and the ship was strafed but remained afloat. Nonetheless, the Oro Bay Detachment moved to Morobe, followed by the rest of the Operating Company, which moved from Milne Bay to Morobe on 30 July.[98]

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93 Beachmaster Oro Bay, "Naval Activities – Oro Bay", 31 May 1943, NAA (Vic): B6121 74W.

94 *New Guinea Force Operation Instruction No. 64*, "Change of Command and Relief of Units Area Oro Bay - Gona", 23 January 1943, War Diary, NGF GS Branch, January 1943, AWM52 1/5/51.

95 *Report on Operations in New Guinea: Wau – Salamaua Areas 1 May 42 – 13 Sep 43*, AWM54 587/7/28*New Guinea Force Operation Instruction No. 71*, 21 March 1943, War Diary, NGF GS Branch, January 1943, AWM52 1/5/51.

96 Mackay to Fuller, 15 March 1943, AWM54 583/3/4.

97 Williams, Mary H., *Special Studies: Chronology 1941-1945*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1960), p. 102.

98 1st Water Transport Group, *Intelligence Summary No. 4*, 21 May 1943; *No. 5*, 7 June 1943; *No. 8*, 21 July 1943, AWM54 313/4/46.

Yet even Morobe was thought to be too far away to serve as a final point of departure for the attack on Lae. The DA&QMG at Advanced LHQ, Major General J. A. Chapman, urged the capture of Nassau Bay, which was 96 km from Morobe and only 56 km from Lae.[99] Ironically, during POSTERN, the amphibian engineers would demonstrate that they could operate from bases over 240 km away. General Kenney weighed into the debate, noting that 120 transport aircraft would be available in August against commitments of 115. He wanted to know when new lines of communications along the north east coast of New Guinea and along the Bulldog Road could start relieving his aircraft of responsibility for the Wau-Bulolo area.[100] Nassau Bay could serve this purpose.

Two companies of the US 532nd Engineer Boat and Shore Regiment (EBSR) sailed from Cairns to Milne Bay with 10 LCVPs deck loaded on a Liberty ship. Because the navy did not permit Liberty ships to travel north of there, due to the dangers of uncharted obstacles, Japanese aircraft and a general propensity for getting sunk, the LCVPs had to make their own way to Oro Bay. Once there, it became apparent that the operation being proposed required more landing craft. New Guinea Force gave them three LCMs from the ten that had been allocated to the Lakekamu River and three Japanese barges that had been salvaged from Milne Bay, while one of the first Liberty ships allowed to enter Oro Bay brought another 22 LCVPs.

On the evening of 29 June a force of 29 LCVPs, an LCM and two Japanese barges carrying the 1st Battalion, US 162nd Infantry, set out for Nassau Bay. An Australian patrol on the beach set up lights and the first two waves landed at around midnight. The landing was a disaster. The troops were landed successfully but all but one boat was swamped and pounded to bits by the heavy four metre surf. Most of the stores, ammunition and equipment were lost. The third wave failed to even find the beach. It sailed as far as Salamaua and then returned to Morobe. This was actually very fortunate, for such heavy landing craft losses had not been foreseen, and its landing craft were thereby saved. As it

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99 Minutes, Planning Conference Adv LHQ 16 June 1943, AWM54 213/3/20.

100 Minutes, Conference GHQ 17 June 1943, AWM54 213/2/20.

was, the American supply situation was still precarious until additional landing craft could be brought up.[101]

A new forward beach was established a bit further north at Coane Beach on 16 July. A new sub base was established at Nassau Bay but the surf there was heavy and *AS29* was fired upon and unable to approach closer than 150 metres to the beach.[102] Because of this, trawlers of the 1st Water Transport Group and the USASOS Small Ships Section towed barges to Nassau Bay. The Japanese air menace required movement to be carried out by night. The barges, usually half a dozen per night, carrying 10 m^3 of stores each, were beached while the trawlers headed back to Morobe towing empty barges. Without adequate transport to clear the beaches, stores were left unattended on the beaches where they became a tempting target for pilferers.[103] On 4 July, the amphibian engineers began a nightly resupply run from Morobe to Nassau Bay, with ten to twelve LCVPs, each carrying up to 9 m^3 of stores. A navy LCT also made a nightly run, carrying up to 170 m^3 of stores. From 10 August, this was replaced by three LCTs sailing direct from Milne Bay on alternate nights.[104] A COSC Nassau Bay Sub Area was established with a staff of about 20 Australians, 20 Americans and 100 natives. Most transport belonged to the Americans but 15 jeeps with trailers were shipped to Nassau Bay for COSC to move stores from the beaches to the dumps. No drivers were sent with them so they were operated by the 2/6th Field Regiment until a detachment of the 152nd General Transport Company arrived in August.[105]

In the main, the coastal resupply effort supported the Americans and the artillery. There were five American batteries whose primary role was to support the American infantry but they sometimes supported the Australians. Eight 25-pounders arrived from Buna by barge in July. The gunners were allotted 200 rounds per gun per day. In late August, two 155mm guns arrived by LCT, providing the diggers in New Guinea with the support of

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101 LandOps to NGF, 4 May 1943, AWM54 963/22/16; Casey, *Amphibian Engineer Operations*, pp. 66-67.

102 1st Water Transport Group, *Intelligence Summary No. 9*, 7 August 1943, AWM54 313/4/46

103 HQ AASC 3rd Division, "Notes on Supplies 21 Aug 43 – 22 Sep 43", AWM54 587/7/14

104 SO(I) *Fairfax* to DNI, "Allied Activity in the Nassau Bay Area", NAA (Vic): B6121 78

105 Report by DAQMG of Visit to Nassau Bay 13-23 July 1943, AWM54 587/7/4

medium artillery for the first time. The ready availability of artillery made this battle considerably different from that at Buna six months before.[106]

The prospect of using sea transport to relieve the pressure on air transport was not immediately realised. A jeep track ran from Nassau Bay to the junction of the Bitoi and Buisval Rivers. From there, carriers could bring supplies to Mubo. This route required considerable work to make it usable, even on an emergency basis. The jeep track and foot tracks required upgrading and staging camps needed to be constructed.[107] To decrease the number of air transport missions required, the 3rd Division reduced the number of troops in the Wau-Bulolo Valley to 1,500. [108]

With the clearing of Komiatum Ridge on 19 August, it finally became possible to run a shorter line of communications through from Tambu Bay. The 3rd Base Sub Area was not able to provide a staff to man the beachhead there so this was drawn from the 1st Supply Depot Company. It was hoped that airdropping could cease but a shortage of carriers prevented this and both the 15th and 29th Infantry Brigades – the latter having relieved the 17th Infantry Brigade on 24 August – had to establish new dropping grounds.

The 15th Infantry Battalion, operating inland from Dot Inlet, was supplied by landing craft from Tambu Bay and its own carrier line from Dot Inlet. The capture of Davidson Ridge permitted the line of communications to be shortened further still. The transit shed on Komiatum Ridge was closed and new one established at the American jeephead at Davidson on 9 September. A proportion of the carriers were withdrawn from the brigades and placed under division control. They carried from Tambu Bay to Davidson; the brigade carriers picked up from there. Only two carrier lines made the trip before Salamaua fell on 11 September. New beaches were then established around Bayern Bay

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106 *Artillery in Operations in New Guinea – January to October 1943*, AWM54 587/6/9.

107 GOC 3rd Division to HQ NGF, "Nassau Bay-Mubo L of C", 27 July 1943, AWM54 587/7/4.

108 *New Guinea Force Operation Instruction No. 90*, 13 August 1943, War Diary, NGF GS Branch, August 1943, AWM52 1/5/51.

and delivery by barge from Tambu to Salamaua commenced. Rear dumps were closed out and stocks were moved forward to Salamaua and, ultimately, Lae.[109]

The capture of Salamaua cost the Australian Army 358 killed and 666 wounded, while the US Army lost 81 killed and 396 wounded.[110] The 3rd Division estimated that 2,512 Japanese had been killed between 30 June and 25 August.[111] "The Australians," wrote Gavin Long, "had now developed doctrines which gave them decisive tactical and administrative superiority over the Japanese in bush warfare."[112]

There was much truth in this; but the actual results were far less impressive. Thus far, the Australian Army had demonstrated that it was possible to build a road and develop a river as a line of communications, but only at staggering cost; that it was possible to support operations by air, but not with an acceptable degree of reliability; and that it was possible to support operations along the coast with small ships, but they were also vulnerable to weather and Japanese air opposition. The doctrines may indeed have been developed, but a decisive administrative superiority was not yet apparent. Another, revolutionary change was required before this was to occur.

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109 *Report on Operations 26 August to 21 September 1943*, AWM54 587/7/14; HQ AASC 3rd Division, "Notes on Supplies 21 Aug 43 – 22 Sep 43", AWM54 587/7/14.

110 Dexter, David, *The New Guinea Offensives*, p. 324.

111 *Report on Operations of 3 Aust Div in Salamaua area from 2 April 43 to 25 Aug 43*, 10 January 1944, War Diary, 3rd Division GS Branch, AWM52 1/5/4.

112 Long, Gavin, *The Six Years War: A Concise History of Australia in the 1939-45 War*, (Sydney: Australian War Memorial and Australian Government Publishing Service, 1973), p. 314.

6. CARTWHEEL Gets Rolling

According to the *Field Service Regulations*, the first stage of any operation was the "strategical concentration", "the process by which an army is assembled in the theatre of operations".[1] Unless successfully carried out the removal of the Japanese from New Guinea was extremely unlikely as the two armies would remain a thousand miles apart. Yet it rarely receives much attention from military historians. In this chapter, I shall examine in detail how the concentration for POSTERN was carried out.

LHQ controlled the railways and its own ships. The Bruce-Page government had sold off the Government Line at a loss in 1928 but Australian-registered ships were taken up, some "refugee" ships were obtained from occupied countries and some were leased from the British Ministry of War Transport (BMWT).[2] The most important Army ships were five coastal passenger vessels used as troop transports: *Katoomba* and *Duntroon*, which could each carry 1,500 troops; and the smaller *Gorgon*, *Taroona* and *Ormiston*, which carried between 590 and 650 troops each.[3]

USASOS also controlled ships, a fleet built around 21 Dutch coastal vessels of 1,500 to 5,000 tons chartered in Australia and India in April 1942, and seven other ships.[4] Such coastal vessels were initially vital, as New Guinea had few wharves capable of handling larger ships. As wharves were constructed GHQ came to depend on the temporary diversion of inter-theatre shipping for intra-theatre use. SWPA's appetite for shipping grew inexorably to the point where it began to affect other theatres and had to be curbed by Washington.[5]

The logistics section of GHQ *Warning Instruction No. 2* divided responsibility for overwater transportation between LHQ, which would be responsible for the Merauke and Australian Army units at Port Moresby, and USASOS, which would be responsible for

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1 *Field Service Regulations* (1935), Volume III, p. 11.

2 "Ships: A Government Line Again?", *Sunday Sun*, 13 May 1945, NAA (ACT): A2684/3 1353; Butlin, S.J. and Schedvin, C. B., *War Economy 1942-1945*, (Adelaide: Australian War Memorial, 1977), pp. 220-223.

3 QMG to CGS, "Provision of Shipping for AMF", 16 May 1945, Blamey Papers 3DRL6643 2/94.

4 Not to be confused with the smaller luggers and other craft of the USASOS Small Ships Section.

5 Bykovsky and Larson, *The Transportation Corps: Operations Overseas*, pp. 450-451.

Milne Bay, Oro Bay and points north, and the US Army and RAAF at Port Moresby.[6] This represented an important change, for the shipping for the maintenance of Australian Army units in New Guinea had hitherto been the responsibility of LHQ.[7] LHQ had responsibility for the RAAF as well until GHQ transferred this to USASOS on 8 December 1942.[8] GHQ felt that centralised control of shipping was necessary if everything was to get into position on time for POSTERN.

In early 1943 the personnel of the 6th, 7th and 9th Divisions were on leave following the fighting at Buna and El Alamein. First Army estimated that Major General G. F. Wootten's 9th Division could be concentrated on the Atherton Tableland by 30 April and ready for operations by 15 June, while Major General J. E. S. Stevens' 6th Division and Major General G. A. Vasey's 7th Division could be concentrated at Atherton by 8 May and ready for action by 20 July.[9] The AIF division were reorganised on the new jungle division establishment which greatly reduced the scale of transport and logistical support organic to the infantry. The number of AASC personnel was nearly halved, with the three AASC companies replaced by a general transport company and a supply depot company. In all, the jungle division had about 4,000 less men than its predecessor – an important factor in getting the divisions ready for further operations.[10] As regards equipment, the 9th Division was almost complete except in certain items such as pistols and binoculars but the 6th and 7th Divisions had just 40-50% of their equipment and it was estimated that it would take up to eight weeks to reequip them.[11] General Chamberlin was understandably disappointed with these availability dates.[12]

Moreover, GHQ wanted the US 41st Infantry Division returned from New Guinea so it could be rested before participating in DEXTERITY. Blamey proposed relieving it with the

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6 Chief of Staff, SWPA, *Warning Order No. 2*, 6 May 1943, AWM54 589/5/3.

7 LGA, "Allied Land Forces in South West Pacific Area Administrative Instruction No. 2 - Overwater Supply", 19 August 1942, NAA (ACT): A2653/1 M140/1945.

8 AG GHQ, "Movement of Air Force Units by Water Transportation", 8 December 1942, NAA (ACT): A2653/1 M140/1945.

9 BGS(Ops), "State of Readiness for Operations 6-7-9 Divisions", 8 April 1943, AWM54 9/5/12.

10 Palazzo, Albert, "Organising for Jungle Warfare", in Dennis and Grey, *The Foundations of Victory*, pp. 92-98

11 Col (Adv LHQ) to HQ First Army, 20 April 1943, AWM54 9/5/12.

12 Extracts from Berryman Diary, 8 April 1943, AWM93 50/2/23/331.

11th Division, with the 7th Infantry Brigade moving from Port Moresby and the 29th Infantry Brigade from Milne Bay.[13] This made GHQ nervous, for it meant reducing the Milne Bay garrison to just one brigade, but approval was eventually forthcoming, subject to it not being carried out before CHRONICLE had established bases at Woodlark and Kiriwina,[14] which put the movement back to early August. The resulting plan contained multiple major troop movements:

Table 10. Major Troop Movements for Operation POSTERN [15]

Formation	**From**	**To**	**Commencing**	**By**
29th Infantry Brigade*	Milne Bay	Moresby	By 1 July	Sea
	Moresby	Dobodura	5 July	Air
US 163rd Infantry Regiment	Buna	Moresby	5 July	Air
7th Infantry Brigade**	Moresby	Buna	15 July	Air
US 186th Infantry Regiment	Buna	Moresby	15 July	Air
HQ 5th Division	Milne Bay	Moresby	15 July	Sea
HQ 11th Division	Moresby	Dobodura	15 July	Air
HQ US 41st Infantry Division	Dobodura	Moresby	15 July	Air
25th Infantry Brigade	Australia	Moresby	10 July	Sea
20th Infantry Brigade	Australia	Morobe***	20 July	Sea
24th Infantry Brigade	Australia	Morobe***	28 July	Sea
HQ 9th Division	Australia	Morobe***	28 July	Sea
HQ 7th Division	Australia	Moresby	28 July	Sea
11th Division Troops	Moresby and Milne Bay	Oro Bay	1 Aug	Sea
26th Infantry Brigade	Australia	Morobe***	28 July	Sea
US 162nd Infantry Regiment	Buna	Moresby	15 August	Sea and Air

13 *New Guinea Force Operation Instruction No. 85*, 3 July 1943, War Diary, NGF, AWM52 1/5/1.

14 Chief of Staff, SWPA, "Defensive Garrison – PEMMICAN", 21 June 1943, AWM54 213/3/20.

15 GS (Ops) to DA&QMG, "Operation CARTWHEEL", 3 July 1943.

* Movement delayed until August.

** Replaced by 6th Infantry Brigade in July.

*** Changed to Milne Bay in July.

Since the US 41st Infantry Division was returning to Australia, GHQ's permission was obtained for the 11th Division to take the 41st Infantry Division's vehicles in order to save on shipping. This included 440 jeeps, 87 4x4 and 57 6x6 trucks, and a quantity of engineer equipment including tractors, compressors, dump trucks, scoops, and power shovels.[16]

Logistic coordination in New Guinea would be effected by COSC under New Guinea Force, which would be responsible for the support of the Australian Army, American forces assigned to New Guinea Force and Allied Air Forces in areas where USASOS had not yet established bases. New Guinea Force was ordered to enlarge and stock the bases at Port Moresby and Milne Bay in preparation

A firm Order of Battle, including all logistical units required, was a priority. GHQ wanted estimates of personnel supplies and equipment for all movements, broken down by organisation; designation and strength; ports of embarkation and debarkation; priority and ship tonnage; and GHQ wanted it by 1 July for sea movements and 1 August for air movements.[17] New Guinea Force's list of logistical units required for POSTERN reached Advanced LHQ in Brisbane on 4 June. No individual unit priorities were indicated; Brigadier Secombe, now DA&QMG of New Guinea Force, merely requested that all be in position by D-30. He did specify relative priorities for different troops and supplies:

1. Logistical troops
2. Stores to provide shelter for personnel, dumps and depots
3. Reserves of stores and supplies to fill depots and dumps
4. Operational troops

Secombe sent Advanced LHQ a list of *additional* units required, so, for example, no engineer units were listed, as New Guinea Force expected to be able to provide them. This made it difficult for Advanced LHQ to verify that everything required – as opposed to requested – was truly available and that something had not been overlooked. Inevitably, something had. Advanced LHQ noticed that New Guinea Force was considering a considerable expansion of the medical facilities but had asked for no new

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16 Notes on Daily Conference, NGF, 27 July 1943, War Diary, NGF, AWM52 1/5/1.

17 *Annex 4 (Logistic) to Operations Instructions No. 34*, 12 Jun 1943, AWM54 589/5/3.

mobile laundries, raising the spectre of the Gallipoli Campaign, when nurses were forced to burn linen for lack of laundry facilities. The requirement for ordnance units was also queried, resulting in a confused exchange of signals between Port Moresby and Brisbane while they attempted to work out the type and number of units required.[18] New Guinea Force urgently required additional ordnance units to operate depots, ammunition repair facilities to cope with the climate, and workshops for motor vehicles and watercraft. [19]

The technical services at LHQ in Melbourne were asked to nominate units for New Guinea. This drew a disappointing response. The Medical Department offered two general hospitals and a base depot of medical stores; AEME nominated some workshops and the Pay Corps believed that it could put a new field cash office together at short notice. The other services reported that no units were available.[20] Units would have to be created in the limited time available and operational units would have to be disbanded to provide the necessary personnel.

GHQ instructed New Guinea Force to "initiate as soon as the tactical situation permits, following the capture of BINOCULAR [Lae], the establishment of an advanced base at BINOCULAR".[21] General Herring suggested that a new Lae Base Sub Area headquarters be raised in Australia with the same establishment as that of the 1st Base Sub Area at Buna.[22] This was accepted in principle but LHQ decided that the 1st Base Sub Area's establishment would be but a guide, with a special establishment being drawn up in due course.[23] Unfortunately, LHQ was unable to assemble even the nucleus of the new headquarters in Brisbane by 30 June as promised.[24]

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18 DA&QMG, LHQ, "Administrative Planning for POSTERN", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

19 *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

20 BGS (Ops), "State of Readiness for Operations 6-7-9 Divisions", 8 April 1943, AWM54 9/5/12.

21 *Annex 4 (Logistic) to Operations Instructions No. 34*, 12 Jun 1943, AWM54 589/5/3.

22 GOC NGF, "Proposed BINOCULAR Advanced Base", 29 July 1943, War Diary, Adv LHQ DA&QMG Branch, AWM52 1/2/6.

23 This being before the development of standard base establishments referred to earlier.

24 OC Lae Base Sub Area, "Raising of HQ Lae Base Sub Area", 18 November 1943, War Diary, Lae Base Sub Area, August – December 1943, AWM52 1/8/15.

Initial estimates of the number of troops required for the base were around the 2,000 mark, but over the next few weeks the numbers gradually increased until nearly 5,000 troops were earmarked for the Lae Base Sub Area, not counting American units for the US Advanced Base, and the operational units needed to defend it, which included eight Australian and six American antiaircraft batteries and the coast defence guns of M and N Heavy Batteries.[25]

All additions and corrections received by Advanced LHQ up to 28 June were incorporated into a final schedule of units, vehicles and stores, which was lodged with GHQ two days late on 3 July. The figures were:

Table 11. Troop and Cargo Movements for Postern [26]

Destination	**Personnel**	**Vehicles and Guns**	**Stores and Equipment (m^3)**
Port Moresby	30,000	3,550	79,000
Milne Bay	20,000	1,420	44,000
Buna	1,000	40	17,000
Total	**51,000**	**5,010**	**140,000**

This meant that Advanced LHQ faced a severe transportation problem. Although shipping to Port Moresby was the responsibility of LHQ, Australian shipping could lift no more than 8,000 personnel, 450 guns and vehicles and 3,400 m^3 of stores and equipment. Nor was this the full extent of the problem, for 18,000 troops, 2,300 vehicles and 23,000 m^3 of supplies would still have to be moved by water from Port Moresby to Terapo. At Milne Bay the Australian allocation for July was three Liberty ships, capable of carrying 11,000 personnel, 600 vehicles and 40,000 m^3 of stores, somewhat less than required. Moreover, in order to actually be on hand at Milne Bay by the end of July, they had depart by the middle of July, which was not practical out of Sydney, where the Australian Army could only load one ship at a time. From Milne Bay, some 15,000 personnel, 1,019 vehicles and 8,000 m^3 of stores had to be moved forward to Buna during August. Two ships could sail

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25 Col (GS), NGF, 22 August 1943, AWM54 589/7/13.

26 DA&QMG, LHQ, "Administrative Planning for POSTERN", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

direct to Buna in July, assuming that facilities were available to unload them.[27] Otherwise, moving stores to Buna and Morobe would require small ships. New Guinea Force reported that 684 m^3 of small shipping in New Guinea was available under Australian control, while the US Advanced Base had 16,324 m^3. [28] The discrepancy in numbers was because the USASOS Small Ships Section employed several hundred Australian civilian seamen to crew its vessels. They were exempted from military service, and paid Australian award wages corresponding to their working conditions.[29] The best that USASOS could offer was 113 m^3 per day, and it was not willing to operate forward of Buna. Admiral Barbey was approached to see if VII Amphibious Force could assist but he was unable to provide anything until August, as his command was committed to CHRONICLE.[30]

A shipping crisis was already in progress in Milne Bay. LHQ had planned to deliver 2.9 million litres of POL to Milne Bay in April and May. Assuming a daily consumption of 22,700 litres, this represented 127 days' supply. In the first three weeks of April some 3,400 tonnes or 1.6 million litres, representing 70 days' supply, were consigned, but it was discovered that this was not enough. Somewhere along the line POL consumption at Milne Bay had doubled. A check revealed that this had been caused by a series of consignments to Oro Bay. Accordingly, LHQ was asked to send another 4,000 tonnes. Two ships were duly laden, the *Suva*, which departed Melbourne on 11 May with 813,000 litres, and the *Ban Hong Liong*, which departed Sydney on 25 May with 1.3 million litres.

The two ships reached Townsville on 23 and 30 May respectively. There they waited to be called forward to Milne Bay, in accordance with a procedure dating back to September 1942 when congestion at Port Moresby had precluded ships from sailing as soon as they were loaded, and Townsville had been adopted as a convenient assembly point.[31] By May

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27 Col Adm(Q), LHQ, "Shipping Position, Placing of Reserves and Transport of Troops, Vehicles and Stores", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

28 DA&QMG, LHQ, "Administrative Planning for POSTERN", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

29 *History of the Transportation Corps USASOS SWPA*, NACP RG403 Box 1409 Entry 427

30 DA&QMG, LHQ, "Administrative Planning for POSTERN", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

31 Chief of Staff, GHQ, "Regulation of Shipping to New Guinea", 26 September 1942, AWM54 963/23/20.

1943, the situation had improved so much that ships were routinely called forward immediately and none other than those allotted for special tasks had been held at Townsville since January.[32] On 29 May, Milne Force sent a message to New Guinea Force urging that the *Suva* be called forward, but New Guinea Force no longer had the authority to do so, for a transition period had been entered, with the responsibility for the calling forward of shipping to Milne Bay about to pass to the Coordinator Milne Bay. With supplies starting to run low, the US Fifth Air Force was approached and generously agreed to release 500 drums of 91 Octane, which could be blended with range fuel to produce fuel suitable for motor vehicles. COSC at Port Moresby loaded 5,250 drums containing 874,000 litres on the *Empire Humble* on 2 June, which arrived at Milne Bay three days later, making it unnecessary to use the 91 Octane, and *Suva* had been called forward on 3 June and arrived at Milne Bay on 6 June.[33]

Meanwhile, another vessel, the *Charon*, with maintenance stores for the Australian garrison at Milne Bay, including 470 tonnes of petrol, refrigerator cargo and 1,000 live sheep, had sailed from Sydney on 2 June and anchored at Townsville on 6 June. On 10 June, LHQ sent a message to COSC pointing out the urgency of calling *Charon* and *Ban Hong Liong* forward.[34] The message was repeated to Milne Bay, where it was seen by Colonel E. E. Grant, the Colonel (Q) from Advanced LHQ, who immediately went to see the Coordinator, General MacNider, to ask for the ships to be called forward. MacNider produced a list of ships from USASOS but the two Australian ships were not on it and in consequence he could not commit himself to a date when they could be called forward.[35]

In view of this, LHQ considered unloading the sheep in Townsville but the government veterinarian reported that they were in good condition. The problem then became supplying the 10 tonnes of fodder per day that they required from 14 June.[36] On that day, New Guinea Force reported that petrol stocks at Oro Bay had fallen below the safety

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32 GOC NGF to LHQ, "Shipping to New Guinea", 25 May 1943, AWM54 963/23/20.

33 DDST Adv LHQ to Col Q Adv LHQ, "POL Stocks - Milne Bay", 7 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

34 LandForces to MilCommand Moresby, 10 June 1943, NAA (ACT): A2653/1 M125/1943.

35 Col Admin (Q) Adv LHQ, "Notes on Shipping Position", 7 July 1943, War Diary, DA&QMG LHQ, July 1943, AWM52 1/2/6.

36 LandForces to Movements Townsville, 12, 13 June 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

margin and suggested that the 800 tonnes on *Ban Hong Liong* be shipped directly to Oro Bay, thereby bypassing the Coordinator.[37] This was not necessary, for both ships were called forward on 17 June. Even then, *Charon* reported that she had to wait another three days at Milne Bay before she could discharge.[38]

All in all this represented a gross waste of shipping space and LHQ cancelled another sailing of POL and engineer stores, including urgently required oil storage tanks, rather than have the ship lie idle at Townsville.[39] Unfortunately, the Australians treated the affair as a problem of coordination and liaison rather than logistics. Now that the transition period had passed the coordination problem was solved, as responsibility for Australian maintenance to Milne Bay and points north became the sole responsibility of USASOS. They thereby missed an important lesson, namely that even a trifling operation like CHRONICLE could place the theatre's barely adequate port resources under great strain.

General Blamey noted that New Britain Force was planning to use Oro Bay as a base but New Guinea Force would also need it for the maintenance of the coastal drive. As Oro Bay was too small for both to use it simultaneously,[40] the Australians decided to develop an alternative port at Buna. This was no simple matter, for Buna Harbour was little more than a roadstead formed by coral reefs. It was exposed to the north and east and could be reached only by means of a tortuous channel between the coral heads. Before vessels drawing more than 3.6 metres could use the anchorage, it first had to be properly surveyed and marked.[41] This task fell to the Port Director, Lieutenant Commander J. M. Band, RANR. Considerable improvisation was necessary. The steaming and side lights of *Anshun* were salvaged and used to light buoys at Buna. This made it possible to enter Buna at night and so operate the port around the clock.[42]

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37 NGF to 5 Division, 14 June 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

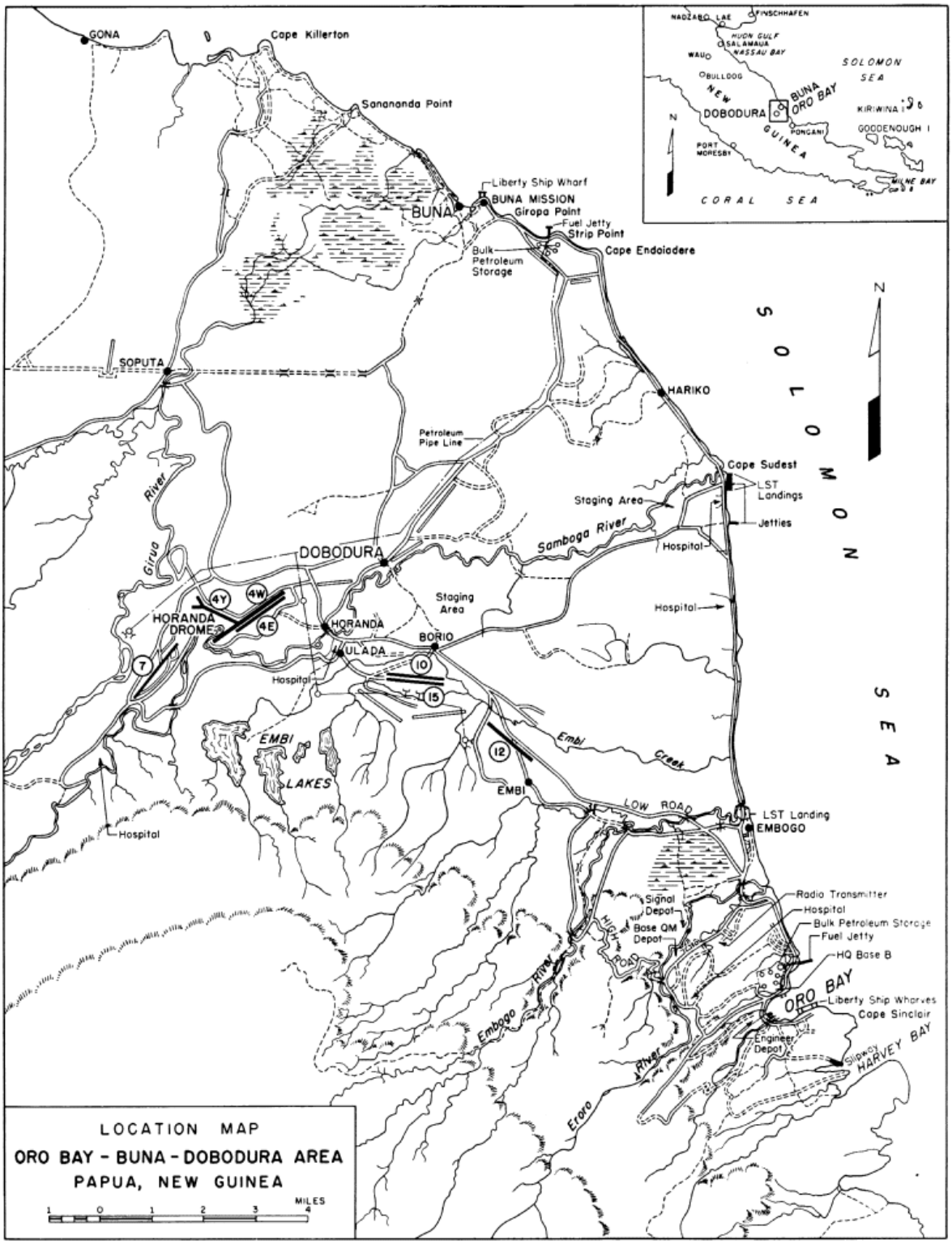
38 Col Admin Q Adv LHQ, "Shipments Milne Bay May/June 1943", [July 1943], War Diary, DA&QMG LHQ, AWM52 1/2/6.

39 DDST Adv LHQ to Col Q Adv LHQ, "POL Stocks - Milne Bay", 7 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

40 Comd ALF to GHQ SWPA, "Warning Instructions No. 2 dated 30 April 1943", 5 May 1943, AWM54 589/3/11.

41 Casey, *Airfield and Base Development*, p. 128.

42 Gill, *Royal Australian Navy 1942-1945*, pp. 172, 327.



Map 10. Buna, Oro Bay and Dobodura

Source: Casey, *Airfield and Base Development*, p. 117

Because there was insufficient time to develop an adequate network of all-weather roads, and a lack of suitable locations, supply installations were clustered near the beach. While this facilitated rapid unloading of the ships, it presented a tempting target to the enemy. This risk was accepted in the short term. Eventually new installations were constructed further afield and the old ones transformed into transit depots.[43] The 4th Advanced Ordnance Depot, for example, moved from Milne Bay to a new site at Warisota, near Dobodura, but not until October.[44]

For effective use to be made of Buna, it required a wharf where stores and troops could be unloaded, but when Colonel Grant inspected the area on 10 June he found that work on the wharf had stopped owing to a shortage of piles and decking.[45] In response to a query from Advanced LHQ as to an estimated completion date New Guinea Force replied that it was now around 15 August, assuming the arrival of materials.[46]

Accordingly, Advanced LHQ decided that ships at Buna would have to be unloaded over the beaches using landing craft and GHQ was asked if it could provide some LCTs. This GHQ did not have to give, for all available LCTs were assigned to the Amphibious Force and committed to CHRONICLE. They were able to offer half a dozen LCMs, to be transported to Buna on Liberty ships carrying three apiece, provided that they were released by the end of July. As an LCM carries much less than an LCT, the Australians felt that more than six LCMs were required, and the Americans agreed to send nine, six by 10 July and three more by 15 July. GHQ then discovered that the US Navy did not have nine serviceable LCMs in New Guinea. The Navy in turn suggested sending some of the twelve awaiting shipment in Brisbane and Townsville but shipping them from the mainland made the agreed delivery dates unlikely to be met.[47] In the end, the Amphibious Force's fast transports, the USS *Henry T. Allen*, HMAS *Manoora* and HMAS *Westralia*,

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43 GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

44 Tilbrook, *To the Warrior His Arms*, pp. 354-355.

45 Col Admin (Q) Adv LHQ, "Notes on Shipping Position", 7 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

46 LandOps to NGF, 20 June 1943, NGF to LandOps, 25 June 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

47 Minutes, POSTERN Conference, 7 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

carried fourteen LCMs from Townsville to Papua in late July.[48] Some 22 landing craft were working the port on 21 August.[49]

DUKWs arrived in July and were also used to unload the ships. They needed maintenance every ten hours or so but were still considered worthwhile. Mobile cranes were required to help unload the landing craft and four were to be shipped from Sydney but it was uncertain if they were on the *James Goodhue* or awaiting shipment in Sydney. Colonel Grant ordered a fifth crane to be shipped from Brisbane. A section of the 2/1st Mechanical Equipment Company was shipped to Buna in mid-July to work on the roads. Two more ships were offered to lift units and equipment from Brisbane but only one, the *Yochow*, was taken up, to transport heavy artillery, as no more units were ready.[50]

Meanwhile, piling was on its way from Port Moresby to Buna and the wharf's completion was expected by 30 July.[51] In order to get the required stores in, USAFFE reckoned that shallow draught vessels would not be enough; Liberty ships would have to be used. Anything less would be like "dumping a bucket out with a teaspoon". Examining their chart, the navy was sceptical that Liberty ships could be accommodated. Admittedly, the chart was 50 years old but this was nothing exceptional by SWPA standards. The engineers at Buna reported that the depth at the wharf was 6.7 metres with a 60 cm tide and a sandy bottom.[52] Unfortunately, a Liberty fully laden down to the Plimsoll line drew 8.4 metres.[53] The solution was to partially unload the Liberty with the LCMs, and then dock it to unload the rest.

Colonel Grant went to USAFFE on 26 June and asked for the first available Liberty ship on or soon after 1 July. The next day they phoned back with an offer of a ship in Brisbane on 28 June. Grant accepted the offer, pointing out that the stores and troops to be loaded would not be available before 1 July. On checking, he found that while stores and troops

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48 Minutes, POSTERN Conference HQ NGF, 25 July 1943, AWM54 213/3/20.

49 Dexter, David, *The New Guinea Offensives*, p. 220.

50 Col Adm(Q), "Adm Notes", 5-8 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

51 NGF to LandOps, 27 June 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

52 Minutes, Conference at GHQ, 8 July 1943, AWM54 213/3/20.

53 Morison, *The Battle of the Atlantic*, p. 293.

for a whole load were available in Sydney, only half a shipload was available in Brisbane. Grant discussed the situation with the DA&QMG, Major General J. A. Chapman, and after considering the shallow draught of the new berth in Buna, the fact that Buna's requirements for July could be met by 1½ Liberty shiploads, and the time that would be lost bringing the ship down from Brisbane to Sydney and loading from two ports, they decided to go back to USAFFE and ask for either a smaller ship or permission to send the ship half loaded. Such permission was necessary because, in view of the shortage of tonnage, GHQ policy was not to permit any ship to sail at less than its full capacity. USAFFE responded by offering two ships, one of similar capacity to a Liberty, which commenced loading in Brisbane on 8 July, and a Liberty for Sydney. [54]

New Guinea Force intended that administrative units required by the 1st Base Sub Area at Buna would be provided by moving units from Goodenough Island that were still operating in support of the nearby US Sixth Army. GHQ was approached with a request that the units in question, which included employment and docks operating companies necessary for the discharge and reception of cargo, be relieved by 20 June. GHQ ruled that this was a matter for mutual arrangement between New Guinea Force and the US Sixth Army, which agreed to send a representative to Goodenough Island to arrange the relief. The plane carrying his party crashed at Milne Bay and he was fatally injured. Despite this setback, arrangements were made for the relief of units of Goodenough Island.[55] The problem was that the shipping needed to provide an American relief could only be taken from CHRONICLE, and therefore the movement of these units, including the 6th Docks Operating Company, had to be delayed until 24 July.[56] As a stopgap measure, twelve winch operators were flown in to Buna from Port Moresby but this was not sufficient. The first ship, the *Anhui*, arrived on 22 July, and was unloaded by lighters at a rate of 500 tonnes per day.[57]

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[54] Col Admin (Q) Adv LHQ, "Notes on Shipping Position", 7 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

[55] DA&QMG, LHQ, "Administrative Planning for POSTERN", 8 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

[56] GHQ G-3 Journal, 6 July 1943, AWM54 497/1/9.

[57] GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

Efforts were made to increase the capacity of the port by rounding up more docks personnel in Port Moresby, using operational troops as labourers and securing additional landing craft.[58] Docks operating companies were originally organised as a headquarters and four platoons, each able to handle one ship for one shift. Being organised to unload two ships was found to be inconvenient, as often there was only one ship and they were reorganised in January 1943 with three platoons, intended for three eight-hour shifts per day.[59] The 6th Docks Operating Company, on the old establishment, worked 24 hours per day in four 6-hour shifts even though it was under strength due to the detachment of 85 men to Morobe. Some 45 men of the 11th Division were temporarily attached to replace them.[60] The discharge rate steadily increased to an average of 1,000 tonnes per day in September.[61]

The Milne Bay shipping situation received close attention at Advanced LHQ in Brisbane. Three ships were requested for July, one for the first week, one for the second and one for the third. The Americans replied that the first ship would be available around 12 July but would have to be unloaded first and would therefore not be available for loading until around 17 July. Advanced LHQ accepted this as the second ship, asking that another be made available earlier. Another ship was made available, but not earlier than the first. This put Australian maintenance a month behind schedule.[62]

On 1 July, USAFFE advised Colonel Grant that the Liberty ship *James Goodhue* had been allotted for the voyage to Milne Bay from Sydney and would berth ready for loading on 9 July. Advanced LHQ prepared a tentative allotment of 500 personnel and 30 vehicles. After some discussion it was decided to carry 630 personnel. This required using two decks for personnel, reducing the cargo capacity to 8,200 m^3. The vessel began

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58 DA&QMG LHQ, "Movement of Aust Personnel, Vehicles and Supplies on USASOS vessels", 4 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

59 "Notes on Australian Units used for Port Operation on Mainland and in SWPA", [undated], AWM54 765/1/2.

60 Col Adm(Q), "Adm Notes", 5-8 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

61 Col Adm(Q), "Buna Shipping", 24 September 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6. It did not escape notice at Adv LHQ that New Guinea Force was quoting discharge rates at Buna in deadweight tons when shipping measurements were always in measurement tons.

62 DA&QMG LHQ, "Shipping – Maintenance Milne Bay", 16 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

loading on 9 July, but the next day Advanced LHQ got a phone call from Movements Sydney, who reported that US Base Section 7 was of the opinion that with 630 persons only 6,400 m^3 could be loaded, owing to the US Navy insisting that a maximum of six vehicles be stored below deck, and wanted to know what cargo should be short shipped. This information was provided over the phone. Then on 12 July, USAFFE called to say that DUKWs were urgently required at Milne Bay. GHQ had instructed that the maximum number were to be shipped immediately, and the use of the *James Goodhue* was being considered. Grant rang Movements Sydney, told them to suspend loading vehicles until 1430, and then rang USAFFE requesting a decision by that time so the vessel could sail with its convoy on 15 July. The decision was to load the DUKWs, and Movements Sydney was informed that it would have to short ship 17 vehicles of the 2/3rd Infantry Troops Workshop to accommodate them, DUKWs being larger than most vehicles. Due to the loss of time, only some 5,000 m^3 had been loaded when the vessel had to leave but Colonel S. E. Bullock of the G-4 Section at GHQ promised that there would be time for it to load an additional 1,200 of rations when the ship docked in Brisbane to collect the ten DUKWs.[63]

The final straw came on 23 July with GHQ's announcement of an August Australian allocation for Milne Bay of just 12,400 personnel and 43,000 m^3. The feeling at Advanced LHQ was that the Australian Army had not received a fair and reasonable amount of shipping in June or July and that this had prevented the movement of vital logistical units to New Guinea, jeopardising the target date for POSTERN, which had now slipped to 1 September.[64] There was pique at GHQ's pronouncement to the effect that unused tonnage from July could not be carried over to August, as it implied that part of the July allocation had not been used. General Chapman informed the G-4 Section at GHQ that he intended to place the matter before General Blamey, who would take it up with General MacArthur. He promised Colonel Bullock that he would meet with him before doing so.[65]

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63 AQMG (Movements), "Personnel and Maintenance – CHIVALRY – Vessel 640 *James Goodhue*", 15 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

64 Minutes, Planning Conference Adv LHQ 16 June 1943, 20 June 1943, AWM54 213/3/20.

65 War Diary, DA&QMG LHQ, 26 July 1943, AWM52 1/2/6.

Chapman showed up at GHQ on 27 July armed with a summary of June and July shipping into Milne Bay that showed that up to 23 July American forces had received an estimated 300,000 m^3 of supplies while the Australian Army had gotten just 27,000 m^3.[66] He explained the situation as he saw it to the G-4 Section, who responded in a conciliatory spirit. Chapman's main concern was the allocation of just 12,400 troop spaces, which was not enough to cover the movement of the 9th Division, some 15,000 men. Bullock ruled that the figure in the memo would not include the 9th Division, and that logistical personnel in excess of that number could be moved. Ships loaded during July would not count against the August tonnage, nor would shipments of POL destined for the US Sixth Army. The maximum would therefore be determined by whatever could be handled by the unloading facilities at Milne Bay. [67]

On 29 July General MacArthur issued an order that POSTERN was to take absolute precedence over DEXTERITY and the highest priority was to be given to shipment of freight handing equipment from the Australian mainland to Oro Bay. Units not required in the early phases of POSTERN were to be held at Milne Bay to avoid congestion at Oro Bay.[68] The next day Chapman lodged a list of demands for August. For Buna, with urgent Australian operational traffic of over 1,100 personnel and 500 vehicles, totalling 8,000 m^3, and 40,000 m^3 of supplies, he wanted: a Liberty ship berthed in Brisbane by 1 August for urgently required personnel, vehicles and stores; a vessel from Sydney to transport the 2/7th General Hospital by 12 August; and another from Brisbane or Sydney, where a backlog of 5,700 m^3 was available for immediate loading. The ship originally allocated to the hospital, *Hangyang*, was reallocated to American units and supplies by the commander of US Base Section 7 in Sydney. Another ship was substituted but its cargo capacity was insufficient for the hospital's equipment. Chapman requested – and got – GHQ to reverse this decision on the grounds that the hospital was required at Buna to support the assault phase of POSTERN.

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66 DA&QMG LHQ, "Summary of Vessels Called Forward to Milne Bay, US or Aust, Jun – Jul", War Diary, DA&QMG LHQ, AWM52 1/2/6.

67 DA&QMG LHQ, "Record of visit by DA&QMG to G-4 Section GHQ (Col Bullock)", War Diary, DA&QMG LHQ, AWM52 1/2/6.

68 CinC SWPA to CG ALAMO FORCE, 29 July 1943, AWM54 589/6/4.

For Milne Bay, Chapman had a requirement for 2,700 personnel and 1,200 vehicles including 67 30-ton medium tanks, and some 25,000 m^3 of maintenance stores. For this, he wanted three Liberty ships, departing Brisbane on a weekly basis from 8 August. Earmarked for Port Moresby were 2,700 personnel and 800 vehicles for which four Liberty ships, departing weekly from Brisbane, were required. Although there was sufficient troop lift, American ships were needed to move vehicles. Units headed to Buna and Milne Bay respectively left behind 500 and 800 vehicles.

The 7th Division moved to Port Moresby in transports controlled by LHQ, the *Duntroon, Canberra, Katoomba* and *Taroona*,[69] while the 9th Division moved to Milne Bay in the assault transports *Henry T. Allen*, *Manoora* and *Westralia*.[70] Chapman subsequently applied to GHQ for the use of *Westralia* to convey administrative units, as it was not required for a second voyage for 9th Division units.[71]

Major General Richard J. Marshall, the commander of USASOS was unimpressed. The real problem in New Guinea remained not the availability of ships but the lack of capacity of the primitive ports to handle them. Ships loading for or *en route* to Buna would congest the small port to the extent that only one more ship could be discharged there during August. Ships loading for or *en route* to Milne Bay would actually exceed the capacity of the port by over 11,000 m^3. Thus, the assignment of more shipping to Milne Bay would be futile. Assignment had to be made based on port capacity. In any case, GHQ ordered USAFFE to allocate shipping to deliver 1,700 Australian troops to Milne Bay by 1 September and to assign a Liberty ship in Sydney to the Australian Army for Milne Bay cargo.[72] The Australians had considered port capacity in their calculations, rating the capacity of Milne Bay at around 136,000 m^3 per month, and had concluded that there was sufficient capacity if GHQ suspended American maintenance during August as their own

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69 DA&QMG LHQ, "Movement of Aust Personnel, Vehicles and Supplies on USASOS vessels", 31 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

70 Minutes of Q Conference, 24 July 1943, War Diary, II Corps QMG Branch, AWM52 1/4/11.

71 DA&QMG LHQ, "Movement of Aust Personnel, Vehicles and Supplies on USASOS vessels", 3 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

72 G-4 GHQ to CinC ALF, 31 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

shipments had been suspended during June and July.[73] The 1st Base Sub Area even believed that Buna, far from being congested, would be idle from 1 September, and Grant, then on the spot, urged that another shallow draught ship be sent.[74] A check on 4 September revealed 27 ships in Townsville awaiting call forward and no less than 42 in port in New Guinea: 10 at Port Moresby, 21 at Milne Bay, 3 at Buna, 6 at Oro Bay and 2 at Goodenough.[75] This represented an obvious waste of scarce shipping resources. New Guinea Force was forced to concede that Marshal had been right, and "the bottleneck in New Guinea is not caused by lack of shipping, but the speed at which ships can be unloaded".[76] Moreover, there was an air raid on Buna on 22 September. Five ships were in port and one, which had arrived five days earlier, was damaged. In retrospect, it might have been better to have loaded ships so as to facilitate unloading, rather than so as to maximise the use of shipping space.

Yochow arrived at Townsville on 1 September but was not called forward until 12 September and did not arrive at Buna until 17 September. Part of the problem was that New Guinea Force, responding to a shortage of rations at Buna, shipped some 3,300 m^3 from Port Moresby. Advanced LHQ considered that this only utilised shipping that could have been used for other purposes, and contributed to the congestion at Buna. There were already two other ships at Townsville loaded with 4,000 m^3 of rations waiting to be called forward, and one could have reached Buna before the rations were even loaded in Port Moresby, while the other would have arrived a few days later.[77]

General MacArthur obtained permission from Washington to retain 21 Liberty ships already assigned to the theatre, and to increase that number to 71 by mid-October. He explained that:

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73 Col Adm (Q), "Notes on Measures to Hit Target Date", 27 July 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

74 Col Adm (Q), "Adm Notes", 5-8 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

75 Col, Adm (Q), "Q Notes Ref NG – 20 Sep 1943", 20 September 1943, Mackay Papers, AWM 3DRL 6850 168.

76 *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

77 Col Adm(Q), "Buna Shipping", 24 September 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

> Sustained effort may be impossible in this theatre because of lack of mobility which effectively prevents taking advantage of hostile weaknesses developed or success gained. Each successive operation will be delayed for purposes of concentration, thus allowing the Japanese to reconsolidate ahead of our offensive effort. This results from lack of shipping. If any form of limited offensive is to be continued, heavier concentrations must be on hand closer to the combat zone and ships must be on hand to carry these concentrations to forward staging areas and maintain them there. Because of the inadequacies of port facilities in the forward area and the considerable period of time required to build them, reserves of supplies, equipment and personnel must be held afloat.[78]

The wisdom of this request, which was approved, is questionable. Given that the limiting factor was port capacity, the addition of more ships could – and did – exacerbate the congestion at the ports, and it did nothing to alleviate the global shortage of shipping, but holding reserves afloat rather than in warehouses in New Guinea was potentially a good idea. It could save on construction, which would conserve the shipping needed for engineering stores and free engineers to work on other projects. For stores that had to be forwarded by sea, it could reduce handling, which always involved the risk of damage and loss through pilferage and exposure to the elements, and save on port capacity. If they were not used, then they would not require any port capacity. Reserves could also be shared among ports, potentially cutting down the stocks needed to be held. Conversely, if these ships had to be selectively unloaded then they would greatly exacerbate the port capacity problem. They would also require careful management. What was on each ship and where it was would need to be carefully recorded, and as the stores were drawn upon they might become unbalanced or depleted and so less economical. The best technique turned out to be commodity loading, with each warehouse ship carrying a limited range of stores.

General Blamey had another answer to the problem. He decided to save on maintenance shipping by reducing the New Guinea garrison. Over the course of the build up for POSTERN the number of Allied personnel in New Guinea grew from 158,000 at the end of May to over 265,000 by the end of August.[79] Blamey decided that the 17th Infantry

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[78] Leighton and Coakley, *Global Logistics and Strategy 1943-1945*, p. 458.

[79] *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

Brigade, which had been involved in heavy fighting at Wau and Salamaua, should be returned to Australia, followed by the 7th Infantry Brigade, which had fought at Milne Bay and had been in New Guinea for a year. The newly-arrived 6th Infantry Brigade was sent to Dobodura in its place. The remaining brigade at Milne Bay, the 4th Infantry Brigade, would move to Buna, making the 6th and 29th Infantry Brigades available for the capture of Salamaua.[80] Surprisingly, in view of his earlier objections to moving the 29th Infantry Brigade, General MacArthur accepted the movement of the 4th Infantry Brigade in principle, subject to it not commencing until after POSTERN began. General Chamberlin even agreed to supply Liberty ships for the movements from Port Moresby to Buna and Milne Bay to Port Moresby.[81]

The movement of the personnel of the 7th and 9th Divisions to New Guinea was completed on 19 and 24 August respectively, although each still needed a couple of Liberties to lift their remaining vehicles. Priority shifted to the logistical and independent units, some 13,000 strong, requiring 18 Liberty voyages. Next up were around 3,000 personnel earmarked for the new Lae Base Sub Area requiring another three ships. Meanwhile, the 6th Division and 4th Armoured Brigade had been alerted to move.[82] The 4th Armoured Brigade (less the 2/6th Armoured Regiment) was scheduled to arrive on 10 September, the 16th Infantry Brigade and the Headquarters of the 6th Division on 20 September, and the 19th Infantry Brigade and the 2/6th Armoured Regiment on 30 September.[83]

The 7th and 9th Divisions were supposed to be fully re-equipped in Australia, but they arrived in New Guinea without certain items of equipment, necessitating a comb out of the depots there. This process was made more difficult by the paperwork needed to determine exactly what the shortages were having not been shipped with the first troops. A shortage of green dye had caused men to be sent forward with khaki shirts and white mosquito nets.[84] Canvas gaiters were in short supply so some 700 men of the 25th Infantry

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80 Minutes, *POSTERN* Conference HQ NGF, 25 July 1943, AWM54 213/3/20.

81 Minutes, Conference at GHQ, 28 July 1943, AWM54 213/3/20.

82 DA&QG, "Decisions Affecting Planning", 13 August 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

83 Col, Adm(Q), "Q Notes Ref NG – 20 Sep 1943", 20 September 1943, Mackay Papers, AWM 3DRL 6850 168.

84 Report by DDOS II Corps, 29 July 1943, AWM54 497/2/33.

Brigade arrived in New Guinea without them.[85] A shipment of cloth gaiters was forwarded to New Guinea by air at the end of July.[86] The rest of the 7th Division was equipped with web anklets, cloth gaiters or American gaiters.[87] The 4th Infantry Brigade at Milne Bay was stripped of stores and equipment to equip the 9th Division. The 1st Tank Battalion arrived without ammunition. Fortunately, there was time to rectify this before this unit went into battle.[88]

One problem was especially serious. On arrival in New Guinea, the 7th Division's 2/4th Field Regiment was reorganised on a new War Establishment, which provided for two batteries of eight Mark II 25-pounders and one battery of eight of the new short 25-pounders. These were received from the 10th Advanced Ordnance Depot at Port Moresby on 23 August. Two short 25-pounders were handed over for training while, as a precaution, the remaining six were sent the 2/117th Field Workshops for inspection and checking. All six were provisionally condemned, owing to a number of serious defects in assembly and manufacture. On 30 August the gunners received orders to move the next day, so the 2/51st Light Aid Detachment cannibalised six guns to produce two working guns, which were proofed by firing 20 rounds per gun. Only one was ready in time to leave with the gunners so the other followed on a special flight. Eight of the 2/4th Field Regiment's Mark II 25-pounders were also condemned owing to the presence of filings in the buffer system. Needless to say, General Vasey was less than impressed.[89]

The 7th Division encountered other equipment problems. Thirty-six of its 2-pounder anti-tank guns required overhaul; some eighty 3-inch mortars needed modifications; .38 calibre pistol ammunition manufactured in Australia was found to be defective and had to be recalled and replaced with ammunition made in Canada; prismatic compasses lacked

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85 Minutes of Q Conference, 24 July 1943, War Diary, January – July 1943, II Corps QMG Branch, AWM52 1/4/11.

86 GOC II Corps, "Embarkation of 7 and 9 Divisions", 29 July 1943, AWM54 497/2/33.

87 Letter, DCGS Adv LHQ to GOC NGF, 5 August 1943, Herring Papers, State Library of Victoria: MSS 11355 Box 10.

88 GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

89 OC 2/4th Field Regiment, "Report on 25 pdr (light)", 3 September 1943; OC 2/51st Light Aid Detachment, "Defects in 25 pdr light guns", 3 September 1943, NAA (Vic): MP742/1 94/1/450.

luminosity and had to be repainted; hand grenades were affected by damp detonators; some jeeps had no oil and forty jeep Ford inner tubes had defective valves.[90]

The 7th Division also had complaints about the handling of its equipment:

> During the unloading of the 21st Brigade's stores at Port Moresby such delicate equipment as anti-tank guns, anti-aircraft guns and wireless equipment were dropped the last few feet onto the wharf. Crates burst open and when the brigade officer detailed to prevent pilfering asked that more care be taken in the unloading of crates whose contents were valued at £2,000 each, the reply was "Righto Mate", and another crate slipped from the sling and crashed into the lighter below. No care was taken to place generators and predictors upright, as requested, in the lighters.[91]

An American unit reported that "due to the customary rough handling of dock workers, every item of [communications] equipment had been damaged in some way".[92]

Another problem was pilfering. A practice had arisen whereby the contents of cases containing foodstuffs, cigarettes or alcohol that had been broken in transit, whether accidentally, carelessly or deliberately, could be salvaged for personal use. The persons involved were civilian and military personnel tempted by the shortage of such luxuries in wartime Australia. Pilfering extended throughout SWPA, from Melbourne to remote forward areas. As the Black Market grew in Australia, thefts increased in size and number until many became convinced that organised crime must be involved.[93] Some 40 cases of the 19th Line of Communications Signals' equipment out of a shipment of 354 were missing, while many others were damaged or pilfered. The Chief Signal Officer at New Guinea Force reported that "it would appear that pilfering is a well-organised racket, and not just casual".[94] USASOS estimated that a staggering 19% of all food shipped to US forces from the US and Australia in 1943 and 1944 had been lost. Some 6% was due to

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90 GOC 7th Division, "Report on Defects in Equipment", 13 September 1943, NAA (Vic): MP742/1 94/1/450; GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

91 Dexter, David, *The New Guinea Offensives*, p. 271.

92 *Military History of the United States Army Services of Supply in the Southwest Pacific*, USACMH 8-5 780-18, "Base at Lae until March 1944".

93 *Draft of History of USASOS*, "The Year 1943 from January to September", NACP RG403 Box 1397 Entry 427.

94 DA&QMG. "Pilfering of Cargo – Signals", 28 September 1943, War Diary, DA&QMG LHQ, AWM52 1/2/6.

enemy action; another 6% was lost due to deterioration or spoilage, the hazards of which have already been described at length; but 5% was lost to pilferage.[95] Such a figure was too large to ignore at a time when shipping was short and food was being rationed. The Army had already encountered problem of pilferage in the Middle East and in 1940 General Blamey had formed the Special Investigation Branch (SIB) of the Provost Corps. SIB investigators began operating in New Guinea in July 1943, and SIB New Guinea was established in December 1943. SIB made 1,606 arrests between October 1943 and September 1944, recovering £33,830 worth of property. During the corresponding period in 1944-45, another 1,670 arrests were made and £43,062 worth of property was recovered. SIB noted that "indifference on the part of some senior officers to losses and thefts of Army stores was apparent by their failure to carry out frequent checks and to adequately punish offenders when caught."[96] Clearly, there was acceptance of pilferage as being inevitable. A realistic appreciation of the magnitude of the problem was required in order to generate an appropriate response.

The biggest equipment headaches were with motor vehicles. To assemble the required amount of motor transport to bring the 7th and 9th Divisions up to their War Establishments and to provide for the new logistical units, Advanced LHQ established a motor pool at Enoggera and ordered units on the mainland to contribute to it.[97] As might have been expected, the best transport was not invariably turned in, nor did all units have any vehicles in good condition. The result was that a large number of vehicles that had seen service in the Middle East were shipped to New Guinea, where many were found to be unroadworthy on arrival. Some were of odd types for which no spare parts were available.[98] This was critical because the divisions were being permitted to take only 75% of their jungle establishments, along with a divisional pool of 50 jeeps.[99]

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95 Stauffer, *The Quartermaster Corps: Operations in the War Against Japan*, p. 192.

96 *History of Provost Marshal Directorate HQ AMF*, AWM54 803/1/1; "With the Australian SIB in New Guinea during WW2", http://home.iprimus.com.au/buckomp/SIBNG.htm Accessed 1 September 2007.

97 GOC II Corps, "Embarkation of 7 and 9 Divisions", 29 July 1943, AWM54 497/2/33.

98 GOC 7th Division, "Report on Defects in Equipment", 13 September 1943, NAA (Vic): MP742/1 94/1/450; GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

99 Minutes of DCGS Conference on POSTERN, 26 May 1943, AWM54 213/3/20.

The ordnance depots faced a number of foreseeable difficulties in receiving stores and supplies. They were undermanned and the additional units that had been requested arrived late. So too did most of the three months' maintenance that should have preceded the operational units, most of which did not arrive until after the campaign was underway. Stocks of ammunition were unbalanced and some stocks were in doubtful condition. A stocktake was required, but this could not be undertaken before the additional personnel arrived. Many stores were short of authorised levels even excluding requirements for the upcoming campaign.

It was realised that logistical plans had to be extremely flexible, as operational requirements were likely to change. To achieve this, the ordnance depots attempted to avoid the dispersion of stores, especially those in short supply. Initially, two lines of communications were planned, a Southern one running from the advanced ordnance and ammunition depots at Port Moresby to forward ones at Bulldog and Wau; and a Northern one with advanced ordnance and ammunition depots at Milne Bay and forward ones at Buna and Morobe. Supply on the Southern Line of Communications would be on demand but that on the Northern would be automatic, with complete packs of items shipped on a fixed schedule. Flexibility could still be attained by diverting shipments to different destinations and provision was made for periodic rebalancing. The composition of the automatic shipments was based on the actual usage rates of the Kokoda and Buna fighting.[100]

New Guinea Force issued its outline administration plan on 7 June 1943. Moresby Base Area was instructed to prepare three transit areas for brigade groups at Milne Bay, Buna and Bulldog and hutting for additional stores. By D minus 30, New Guinea Force hoped to have 30 days' supplies for 15,000 troops at Morobe, 30 days' for 25,000 at Buna, 60 days' for 40,000 at Moresby, 10 days' for 20,000 at Bulldog and 20 days' for 20,000 at Wau.[101] Brigadier Secombe recommended that only 7 days' supplies be sent with the

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[100] *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

[101] *New Guinea Force Administrative Instruction No. 105*, 7 June 1943, War Diary, DA&QMG NGF, June 1943, AWM52 1/5/53.

troops instead of the usual 30, as this would represent a waste of shipping space in view of the build up of reserves.[102]

The plan was subjected to major modifications. It was decided that concentrating troops and stocking supplies at Morobe, where minimal fighter cover was available, was not worth the risk.[103] The opening of Buna to Liberty ships led to a downgrading of the role of Milne Bay. It was decided to cancel further development of storage facilities there, as the climate was particularly bad for storage, and to concentrate on expanding the facilities at Buna instead. The completion of an all-weather road from Buna to Dobodura allowed Buna to support air supply operations as well.[104] Two transport squadrons were slated to commence operation from Dobodura in August and four from September. Thereafter all transport squadrons were to operate from Dobodura.[105] The subsequent decision that the 7th Division would neither be moved nor maintained through Bulldog threw an additional burden on Buna without lessening that on Port Moresby, as New Guinea Force cautiously decided that maintenance should be possible from both places. Scrapping the Southern Line of Communications did free up logistical units, which were diverted to Lae. [106]

General Chamberlin still had concerns about the POSTERN plan. All that Advanced LHQ had delivered to GHQ was "an outline plan most general in scope and containing no detail of air or naval cooperation or detail" that covered the assault phase only. Chamberlin noted that the assault elements for Lae comprised about 13,000 men. Follow up elements he conservatively estimated at 15,000. He estimated the tonnage, including 30 days' supply, at 140,000 to 170,000 m^3. Chamberlin warned:

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102 Minutes, Planning Conference, Adv LHQ, 10 June 1943, AWM54 213/3/20.

103 BGS (Ops) LHQ, "Discussion by BGS (Ops) with G-3 GHQ (Gen Chamberlin) 16 Jun 43", 17 June 1943, AWM54 213/3/20.

104 *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

105 Discussion between Colonel Barham and Colonel Beebe, 23 July 1943, AWM54 213/3/20.

106 *New Guinea Force Report on Operation POSTERN to 2 October 1943*, AWM54 589/7/27.

> This total force must be transported into Lae either for assault or immediate follow-up by the Amphibious Force and maintained until an SOS supply line can be established. In addition, some 7,000 to 10,000 men must be maintained at Salamaua. It is not believed that this entire problem has been presented to the Commander, Amphibious Force. It is being presented by the New Guinea Force piece-meal. The action of the Amphibious Force on each piece-meal submission is to approve it without any knowledge of what is to come behind. Unless the whole problem is carefully reviewed and checked there is apt to come a time when the forward area will become so saturated that it cannot be maintained by the Amphibious Force.

To allay his fears, Chamberlin met with Major General F. H. Berryman, Deputy Chief of the General Staff (DCGS) at Advanced LHQ on 4 August but left with the impression that Berryman "knew nothing of the progress of the detail planning" and had "little conception… of the logistic problem involved".[107] In fact, Berryman's estimates were actually higher that Chamberlin's. Plans for subsequent operations were based on a division and an armoured brigade operating overland towards Madang while another division moved by sea to capture Finschhafen. Two brigades would garrison Salamaua and Lae, which, it was assumed, would not be available for a base before D plus 21. Allowance was made for 20,000 USASOS and 5,000 USAAF personnel, and 30 days' supplies of all classes.[108] Of his meeting with Chamberlin, Berryman wrote in his diary:

> [Chamberlin] wanted to know our detailed plans for POSTERN and arrangements for coordination. I explained I had nothing more to say than General Blamey told General MacArthur and did not expect detailed plans to be finalised until about 10 days before D-Day when General Blamey would be in New Guinea. I explained our system was to allow commands concerned to work out plans together with air and navy on the spot in accordance with the general outline plans as submitted. He is anxious to know course of ops because he has to ensure provision and preservation of the means. I explained the instructions given to General Herring re the doublet ops and said if he wanted more then [General MacArthur] would need to discuss the matter with my chief. The difference is that we work on a decentralised basis whilst GHQ have a highly centralised one.[109]

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[107] Asst Chief of Staff, G-3 GHQ SWPA to Chief of Staff GHQ SWPA, "Status of Plans for POSTERN", 5 August 1943, NAA (Vic): B6121/3 74A.

[108] DA&QMG Adv LHQ, HQ NGF GS Minute "Binocular Advance Base", 23 July 1943, AWM54 589/3/4.

[109] Extracts from Berryman Diary, 4 August 1943, AWM93 50/2/23/331.

This prompted the Chief of Staff at GHQ, Major General R. K. Sutherland, to "cross examine" Herring about his plans and request copies.[110] These were supplied but Chamberlin was not placated. He noted, in a memorandum to Sutherland:

> An analysis of this order from the basis of the missions which have been assigned to the New Guinea Force by GHQ indicates only partial compliance with our directive. The missions omitted are more numerous than those covered…
>
> Judged from our standards of the preparation of combat operations orders it is elementary and incomplete and would draw a "C.U." at any of our staff schools. It is extremely lacking in vision of the function this force is to perform. It decentralises control along with execution. Generally speaking, only the initiation of the operation is covered. The most serious defect is the total lack of appreciation of the logistic problem. [111]

MacArthur intended to direct CARTWHEEL from an advanced headquarters in Port Moresby and he ordered Blamey to assume personal command of New Guinea Force.[112] Blamey arrived at Port Moresby and assumed command on 20 August.[113] MacArthur followed, arriving at Port Moresby on 25 August.[114] As in 1942, Advanced New Guinea Force headquarters under Herring went forward to direct operations, although it was decided that for legal reasons that this headquarters should be called I Corps instead.[115] Herring opened his I Corps headquarters at on 27 August.[116] This added an extra link to the chain of command, but a necessary one. The main Australian base was at Port Moresby but the Owen Stanley Range and tropical weather played havoc with radio traffic between Port Moresby and points north.[117] Blamey intended to keep in contact with Herring by telephone. Herring in turn would control his corps by radio. Additional

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110 CoS GHQ SWPA to GOC NGF, 15 August 1943, NAA (Vic): B6121/3 74A; Horner, David, *General Vasey's War*, (Singapore: Melbourne University Press, 1992), p. 260.

111 G-3 GHQ SWPA to Chief of Staff GHQ SWPA, 30 August 1943, NAA (Vic): B6121/3 74A.

112 Chief of Staff, SWPA, *Warning Order No. 2*, 6 May 1943, AWM54 589/5/3.

113 Miller, J., *CARTWHEEL: The Reduction of Rabaul*, (Washington DC: Office of the Chief of Military History, Department of the Army, 1959), p. 189.

114 James, *The Years of MacArthur*, Volume II, p. 799.

115 *New Guinea Force Operation Instruction No. 95*, "Organisation of Allied Land Forces in New Guinea for Future Operations", 25 August 1943, War Diary, 9th Division GS Branch, October 1943, AWM52 1/5/20.

116 War Diary, I Corps, 27 August 1943, AWM52 1/4/1.

117 Miller, *CARTWHEEL: The Reduction of Rabaul*, p. 53.

signals units were deployed to New Guinea to beef up the communications for POSTERN.[118]

Blamey knew that he was taking a risk by launching POSTERN from what today might be termed a "running start", with operations commencing before all combat and logistical forces were fully deployed.[119] He later explained that:

> As the target date approached it became obvious that complete readiness for the operation would not be obtained. The strategic position was such, however, that to delay the operation until the administrative position was entirely complete, would have granted the Japanese the time necessary to reinforce his forward troops and improve his general situation. I therefore decided to begin the offensive early in September when the administrative position would be capable of supporting the initial stages of the operation and of rapid expansion immediately afterwards. [120]

The Australian Army's "strategical concentration" in New Guinea was therefore only a qualified success. It was carried out sufficiently well for operations to commence in September 1943, but only after two postponements and without the resources considered necessary to support the campaign beyond its initial stages. The Australian Army continued to demonstrate what Winston Churchill described as a tendency of the British mind to "assign a larger importance to opportunism and improvisation, seeking rather to live and conquer in accordance with the unfolding event than to aspire to dominate it".[121]

The Australian Army placed great emphasis on initiative, ingenuity and improvisation, always seeking to adapt to circumstances, but the down side of this was a tendency to complacency, relying too much on its ability to adapt and assuming that be "she'll be right". Events would demonstrate the extent to which this was the case.

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118 *New Guinea Force Operation Instruction No. 95*, "Organisation of Allied Land Forces in New Guinea for Future Operations", 25 August 1943, War Diary, 9th Division GS Branch, October 1943, AWM52 1/5/20.

119 Petz, Eric, Robbins, Marc L., Girardini, Kenneth J., Eden, Rick, Halliday, John M., and Angers, Jeff, *Sustainment of Army Forces in Operation IRAQI FREEDOM: Major Findings and Recommendations*, (Santa Monica CA: Rand Corporation, 2005), pp. 1-2.

120 Dexter, David, *The New Guinea Offensives*, p. 231.

121 Quoted in Buell, Thomas B., *Master of Sea Power: A Biography of Fleet Admiral Ernest J. King*, (Boston: Little, Brown and Co, 1980), pp. 165-166.

7. The Markham and Ramu Valleys

17. Nadzab, 25 September 1943. Australians advance on Lae.

The Markham and Ramu Valleys form a flat, elongated depression varying from 8 to 32 km wide that cuts through the otherwise mountainous terrain of the interior of New Guinea, running from the mouth of the Markham near Lae to that of the Ramu some 600 km away. The two rivers flow in opposite directions, separated by an invisible divide about 130 km from Lae. Between the Ramu Valley and Madang lay the aptly named Finisterre Mountains. The 7th Division's mission was to prevent the Japanese at Madang from using the Markham and Ramu Valleys to reinforce Lae.

The campaign in the Markham and Ramu Valleys remains one of the most remarkable and daring ever fought by Australian troops. Ingenious logistical arrangements made it possible for the 7th Division to gain operational surprise by deploying by air and then to be maintained solely by air for a prolonged period – far longer than originally anticipated. Although air supply had been used during the Papuan and Salamaua campaigns, this campaign saw significant innovation and change as the technique was refined. New methods for handling rapidly changing priorities were implemented, procedures for efficient loading aircraft were worked out and special packaging for supplies delivered by air was developed.[1] The entire 7th Division was treated to a 12-minute training film

[1] GOC I Corps, *Report of I Aust Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

entitled "Loading the Douglas C-47".[2] Moving a brigade group was estimated to require 361 *Dakota* loads, broken down as follows:

Table 12. Plane Loads Required for a Brigade Group Air Movement [3]

Units	**Vehicles**	**Plane Loads**
Brigade HQ, Signals Section, LAD and Guards platoon	3 jeeps	17
Three infantry battalions		180
One Field Artillery Battery	8 x 25-pounders, 9 jeeps	39
One Light AA Battery (airborne)	1 jeep	26
One Field Company	2 jeeps	25
Brigade Group AASC	31 jeeps	32
Field Ambulance	3 jeeps	28
Brigade Ordnance Field Park		3
Brigade Workshop		9
Detachment, Provost Company		1
Detachment, Postal Unit		1
TOTAL	**49 jeeps**	**361**
Daily Maintenance		**19**

Based on this, Advanced LHQ reckoned that two infantry brigades and one parachute battalion would require 2 x 361 + 1 x 28 + 19 = 769 plane loads, while seven days' reserves would add another 290 for a total of 1,060 planeloads. Daily maintenance would require 42 planeloads.

The switch to an airborne operation made it imperative that the airstrip at Nadzab be captured and readied for use as soon as possible. General Blamey persuaded GHQ to allocate the 2nd Battalion, US 503rd Parachute Infantry for the capture of Nadzab or some other airfield north of the Markham River. Orders went out to the battalion to proceed to

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2 *7 Aust Division Training Instruction No. 7*, 7 August 1943, War Diary, 7th Division, AWM52 1/5/14.

3 "Notes for C-in-C Discussion with Gen MacArthur", 15 July 1943, AWM54 213/3/20.

Cairns and thence to Port Moresby by air on 18 August.[4] Blamey arranged for the regiment's commander, Colonel K. H. Kinsler, accompanied by four of his staff officers, to fly up to New Guinea on 31 July for a conference about the upcoming operation.[5] Colonel Kinsler found Major General G. A. Vasey, commander of the 7th Division, enthusiastic about the use of his paratroops to secure the Nadzab area. This may have come from Vasey's experience as commander of the 19th Infantry Brigade during the German attack on Crete in 1941. Vasey doubted that one battalion would be enough and requested the entire regiment and the greatest possible number of gliders brought up to Dobodura to carry materials and equipment for the airstrip.[6]

Herring passed Vasey's request on to Blamey on 2 August, adding that he considered it "most vital" that the regiment be made available.[7] General Whitehead supported the plan and Blamey was able to persuade MacArthur as well.[8] Lifting a battalion required 28 *Dakotas*, so lifting three required 84 aircraft, somewhat more than the number guaranteed to be available in New Guinea. Unfortunately, RAAF transport squadrons could not be used. The Chief of the Air Staff, Air Vice Marshal George Jones, had removed RAAF transport aircraft from General MacArthur's control by cancelling the order assigning them to SWPA,[9] and a personal appeal from MacArthur to Prime Minister Curtin was unable to get them back.[10] Ample airlift slowly became available. The US 375th Troop Carrier Group arrived in July and moved to Dobodura, and the US 65th and 66th Troop Carrier Squadrons arrived at Port Moresby in August, bringing the nominal *Dakota* strength in New Guinea to 130 aircraft.[11] Since Advanced LHQ pessimistically assumed

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4 *GHQ Operations Instruction No. 34/4*, 3 August 1942, AWM54 589/5/3.

5 NGF to LandOps, 30 July 1943, AWM54 589/3/10; Chief of Staff, GHQ to CG US Sixth Army, 30 July 1943, AWM54 589/3/10; Letter, CinC ALF to GOC NGF, 30 July 1943, Herring Papers, State Library of Victoria: MSS 11355 Box 10.

6 GOC 7th Division to GOC NGF, "Operation EXCHEQUER", 2 August 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

7 GOC NGF to LandOps, 7 August 1943, AWM54 589/3/10.

8 Griffith, Thomas E., Jr., *MacArthur's Airman: General George C. Kenney and the War in the Southwest Pacific*, (Lawrence KS: University Press of Kansas, 1998), p. 135.

9 CAS to CG AAF, "Control of Transport Aircraft", 30 May 1943, NAA (ACT): A2684/3 1611 Attachment 2.

10 Letter, CinC SWPA to Prime Minister, 9 June 1943, NAA (ACT): A2684/3 1611 Attachment 2.

11 Watson, *The Fifth Air Force in the Huon Peninsula Campaign, January to October 1943*, p. 148.

that only 40% would be operational, the US 317th Troop Carrier Group back in Queensland would also have to be drawn upon.[12] Two of its squadrons, the 41st and 46th, moved up to New Guinea in August.[13] The regiment was assigned to Blamey, subject to the restriction that it not be used in place of infantry. Orders went out on 8 August for the rest of the 503rd Parachute Infantry to move to Port Moresby. Blamey was made responsible for its transportation, so the *Duntroon* and *Taroona* carried them on 20 August.[14] Delaying the operation until September gave time for the aircraft of one more group, the US 433rd Troop Carrier Group, to arrive in New Guinea, although in the event, neither the 374th nor the 433rd participated in the actual parachute drop.[15]

Nadzab

On 5 September an armada of 303 fighters, bombers, weather planes and transports set out from Jackson and Wards dromes at Port Moresby for Nadzab. Watched by General MacArthur, circling overhead in a B-17, they commenced jumping at 1010. There was no opposition in the air or on the ground although three paratroopers were killed and 33 injured in the jump.[16] After a stopover at Tsili Tsili, Australian gunners parachuted to join them that afternoon.[17] No equipment was damaged but in the long Kunai grass, sufficient parts could be located to assemble only one of their two short 25-pounders, which was ready for action within two and a half hours. It took three days to find the remaining parts and assemble the second gun.

The 2/6th Field Company, 2/2nd Pioneer Battalion and some 800 native labourers reached Nadzab after crossing the Markham River using rubber boats and a folding boat bridge. They began work on the airstrip with hand tools the next day. Trees were felled, potholes filled in and a windsock erected. Fourteen gliders were supposed to fly in three light tractors, three mowers, a wheeled rake and other engineering equipment but, owing to a

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12 GSO2 (Air) to DCGS, 7 August 1943, AWM54 589/3/10.

13 Jacobson, *Moresby to Manila via Troop Carrier*, p. 24.

14 OC 503 PIR to CG Airborne Command, "Report on Outlook Operation", 31 October 1943, AWM54 589/7/23; *GHQ Operations Instruction No. 34/5*, 8 August 1942, AWM54 589/5/3.

15 Kelly, *1943 – Year of Expansion and Consolidation*, pp. 497-498.

16 Miller, *CARTWHEEL: The Reduction of Rabaul*, pp. 207-210.

17 Dexter, *The New Guinea Offensives*, p. 345.

"stuff up", they were not called forward from Dobodura. Lacking mowers, the Kunai grass was burned off, causing the destruction of stores and equipment that had been lost in the long grass and subsequently caused clouds of black soot that inconvenienced the operation of the airstrip.[18]

The first plane to land was an L-4 *Piper Cub* on 6 September.[19] Three transports soon followed.[20] Some 200 native labourers were on hand to help them unload.[21] The plant platoon of the 53rd Field Park Company landed, bringing seven pieces of dismantled plant on skids.[22] The US 871st Airborne Engineer Aviation Battalion followed the next day with its small air-portable bulldozers and graders. They located a site for a new airstrip, which became known as Drome No. 1, the existing one becoming No. 2. The site proved to be an excellent one; an old, dry riverbed with soil largely composed of gravel. A gravel base and steel plank was laid to accommodate the fighters based at Tsili Tsili that were in danger of bogging down as the weather deteriorated. By the end of October there were four airstrips at Nadzab, one of which was 2,000 metres long and sealed with bitumen.[23]

To control activities at the airstrips a special headquarters, the Nadzab Station Command, was raised by the 7th Division. Tasked with loading and unloading stores and supplies; checking and recording planeloads against manifests; ensuring that the airstrip area was kept clear of stores and equipment; establishing dumps in the airstrip area; and traffic control of aircraft and vehicles on the ground in the airstrip area, it arrived at Nadzab on 7 September. There was no war establishment for such an organisation, so one was

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18 GS 7th Division, "Allotment of Gliders for Z Day", 3 September 1943; GOC 7th Division, "Report on Operation OUTLOOK", 27 November 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

19 A small, light aircraft used mainly for artillery spotting.

20 Dexter, *The New Guinea Offensives*, , p. 357.

21 OC 503rd Parachute Infantry Regiment to CG Airborne Command, "Report on Operation OUTLOOK", 31 October 1943, AWM54 589/7/23.

22 McNicoll, *Teeth and Tail*, p. 192.

23 Casey, *Airfield and Base Development*, pp. 168-170.

improvised, consisting of a station commander, second in command and detachments of engineers, ordnance, medics, signallers, clerks, and checkers.[24]

Some 116 planeloads arrived on 9 September, clearing 7th Division stores and personnel from Tsili Tsili. The ground organization was good enough for 27 aircraft to land, unload and take off again in 45 minutes. Overnight rain made the strip almost unusable on the morning of 10 September. After it dried out, aircraft carrying personnel from the US 871st Airborne Engineer Aviation Battalion landed, but overcast conditions prevented most 7th Division units from arriving that day or the next, although both strips were ready to receive them. This was made up for over the following days, but it was a timely reminder of the importance of weather to airborne operations.[25]

Table 13. Summary of Landings at Nadzab [26]

DATE	NUMBER OF PLANES					PROGRESSIVE TOTAL	DAILY AVERAGE
	TROOP MOVEMENT	MAINTENANCE	RESERVES	US ARRIVALS	TOTAL		
6 Sep	15	-	-	-	15	15	
7	72	-	-	4	76	91	
8	79	31	-	2	112	203	
9	80	33	-	3	116	319	
10	17	-	-	8	25	344	
11	-	11	-	49	60	404	
12	88	31	-	11	130	534	
13	78	37	23	27	165	699	
14	46	26	29	5	106	805	
15	62	35	-	20	117	922	
16	6	18	-	22	46	968	
17	21	8	-	51	80	1048	
18	21	17	-	62	100	1148	
19	14	4	-	84	102	1250	
20	18	22	4	50	94	1344	
21	20	6	-	72	98	1442	
22	51	3	-	-	54	1496	
23	55	27	-	124	206	1702	
24	17	8	-	24	49	1751	
25	88	43	-	133	264	2015	
	848	360	56	751	2015		100.75

Another hazard of airborne operations was accidents. A terrible one occurred at Jackson Drome on 7 September, when an American B-24 *Liberator* bomber, heading for a reconnaissance sortie over Rabaul laden with bombs and fuel, crashed shortly after

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24 GOC 7th Division, "Report on Operation OUTLOOK", 27 November 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14; *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

25 Craven and Cate, *Guadalcanal to Saipan*, p. 186; War Diary, 7th Division GS Branch, 10-11 September 1943, AWM52 1/5/14.

26 War Diary, 7th Division GS Branch, 1943 Part 1, AWM52 1/5/14.

takeoff. Five trucks of the 158th General Transport Company carrying men of the 2/33rd Infantry Battalion were struck by debris and burning fuel. All 11 American aircrew died, as did 60 Australians, while 92 more were injured. Despite the tragedy, the 2/33rd Infantry Battalion flew out to Tsili Tsili later that morning.[27]

Some 36 aircraft were available daily from Dobodura and 54 from Port Moresby, which was expected to yield 54 and 49 planeloads per day respectively.[28] The daily maintenance requirement of 24 aircraft loads – six for Australian rations, one for native rations, 15 for ammunition and two for POL – left 30 discretionary loads per day to build up reserves. As there was less fighting than anticipated, ammunition and medical stores began to pile up, and were eventually deleted from the daily maintenance run and sent forward on demand only. Between 6 and 24 September, some 2,015 planes landed at Nadzab, more than 100 per day on average. Of these, 848 were troop movements, 360 were maintenance, 56 were reserves and 751 were American arrivals.[29]

While the US 433rd and 375th Troop Carrier Groups concentrating on supplying Nadzab from Moresby and Dobodura respectively, the US 66th Troop Carrier Squadron moved to Nadzab on 25 September to support the 7th Division's operations, followed by the 70th on 10 October. The 65th supported the operation from Tsili Tsili, moving to Nadzab on 31 October.[30] The 66th flew Australian loads from September 1943 to April 1944, and built up a close relationship with the 3rd Air Maintenance Company.[31] The whole of the US 433rd Troop Carrier Group was concentrated at Nadzab in early 1944.[32] Three *Dakotas* were shot down and six were written off between 5 September and 31 October. Twelve

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27 Bradley, Phillip, "Tragedy at Jackson's Strip", *Wartime*, No. 23 (2003), pp. 31-33.

28 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

29 GOC 7th Division, "Report on Operation OUTLOOK", 27 November 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

30 Jacobson, *Moresby to Manila via Troop Carrier*, pp. 41-42.

31 *A Report on Maintenance By Air in New Guinea From April 1943 to March 1944*, NAA (Vic): MP729/6 246/1/25.

32 *Backload, February 1943-June 1944: 433rd Troop Carrier Group, New Guinea*, (Sydney: Halstead Press, 1945), p. 38.

aircrew were wounded. The Japanese bombed Tsili Tsili, Dobodura and Nadzab in an attempt to curtail the *Dakotas*, but without success.[33]

To operate the airhead at Nadzab, the 3rd Air Maintenance Company was formed on 27 September at Dobodura from detachments of the 1st and 2nd Air Maintenance Companies and the 141st General Transport Company and placed under the command of Major Esplin, who brought with him a number of specialist officers and senior NCOs from the 1st Air Maintenance Company. As a result of the experience gained in the Salamaua campaign its establishment had been revised, adding more personnel. It left Dobodura with a headquarters, air crew platoon, packing platoon, transport platoon, supply depot platoon and a relief driver increment, a total of 8 officers and 305 other ranks. Together with the attached 2/101st Supply Depot Platoon and a detachment of the 59th Field Park Company, it sailed to Lae on *LST 468* on 1 October. Carried by the 151st General Transport Company, it set out for Nadzab over the Markham Valley Road on 3 October, taking four hours to make the 42 km trip with all its vehicles and stores, owing to the appalling state of the road. Many vehicles became bogged and had to be manhandled onto firmer ground. It was fortunate indeed that they were able to get through at all.[34]

The Allied Geographical Section had reported that the Markham Valley Road would pose no problems for motor vehicles in dry weather if the bridges were rebuilt but warned that the ground could be soft after rain.[35] September was normally a wet month in the middle of the wet season which ran from May to November.[36] Based on patrol reports, the 7th Division General Staff concluded that the road from Yalu was not usable by motor transport "but could easily be made jeepable",[37] but the 7th Division found the road in unexpectedly poor condition. The first 8 km from Lae had been formed and gravelled before the war and could carry military traffic but from there to Nadzab, another 34 km

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33 "Information for RAAF on Movement and Maintenance of 7 Aust Div Operation during period 5 Sep 43 - 31 Oct 43", AWM54 81/3/4; Jacobson, *Moresby to Manila via Troop Carrier*, p. 41.

34 War Diary, 3rd Air Maintenance Company, 21, 29 September - 11 October 1943, AWM52 10/31/3.

35 Allied Geographical Section, *Special Report No. 17 – Road - Nadzab to Lae*, 17 May 1943, AWM57 6/13.

36 GS 7th Division, "Notes on the Markham Valley", 9 August 1943, War Diary 7th Division GS, AWM52 1/5/14.

37 *7th Division Intelligence Summary No. 1*, 22 August 1943, War Diary 7th Division GS, AWM52 1/5/14.

away, only a rough track existed that became impassable even to jeeps after rain. The surface was soft and wet, and drainage was inadequate, with the few culverts blocked with debris. A start was made on improving it by the 2/6th Field Company, 2/2nd Pioneer Battalion and 100 native labourers on 11 September, who began widening the existing track, clearing the drainage, forming the surface and constructing additional culverts. Several bad sections were corduroyed, a bridge was constructed and one section was relocated. CRE 7th Division estimated that constructing an all-weather road between Lae and Nadzab capable of carrying 50 3-ton trucks each way per day would require a mechanical equipment company, two field companies and 500 native labourers and take seven weeks.[38]

The US 842nd Engineer Aviation Battalion took over the task.[39] Starting from the Lae end on 23 September, it cleared and shaped the road to a width of 6 metres. At this point, it was ordered to Nadzab to work on the airbase, arriving on 4 October. Against the advice of its commander, drainage was neglected in order to expedite this movement.[40] This was a direct consequence of General Casey's engineer plan, which stated:

> Sufficient effort will be applied to roads and ports to ensure development of essential communications as are necessary concurrently with the development of aerodromes in the Markham Valley.[41]

Three days later, the road became impassable owing to a combination of heavy vehicle traffic, with loads of up to 25 tonnes being allowed to use the road, and rain, with some 580 mm of rain falling in just six days. The road was closed on 7 October,[42] and there was no prospect of it being reopened quickly. On 11 October General Kenney conceded that "betting on the road is 1 December".[43] The bookies may have cleaned up, for the road did not reopen until 20 December.[44] Its closure turned out to be the turning point of the entire

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38 CE NGF, "Operations RAE 7 Aust Div Markham Valley Sep 43", 14 October 1943, AWM54 595/7/21.

39 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

40 Casey, *Airfield and Base Development*, pp. 174-176.

41 *Engineer Plan BINOCULAR – EXCHEQUER Area*, NACP: RG495 Box 1468.

42 Casey, *Airfield and Base Development*, p. 176.

43 Kenney to Sutherland, 11 October 1943, GHQ G-3 Journal, 12 October 1943, AWM54 13/7/2.

44 War Diary, Lae Base Sub Area G Branch, 20 December 1944, AWM52 1/8/15.

campaign, for it left Nadzab isolated, supplied entirely by air, and ultimately led to the initiative passing back to the enemy.

The 6th Supply Depot Platoon established an FSD at Nadzab on 7 September. This was handed over to the 7th Supply Depot Platoon on 25 September so the 6th could move forward to Kaiapit. When the 7th followed on 2 October it, in turn, handed the FSD over to a detachment of the 2nd Air Maintenance Company consisting of 6 droppers and 12 packers, none of whom had experience as storemen or clerks.[45] They were absorbed into the 3rd Air Maintenance Company when it arrived. By this time the FSD was in disarray owing to the oversupply of stocks, poor accounting and a lack of transport. All available staff were thrown onto the task of straightening it out. Major Esplin regarded the depot site as unsuitable and decided to establish a new one. His detachment of the 59th Field Park Company built sheds for the stores out of timber cut from the surrounding jungle, with Sisalkraft or waterproofed paper for roofing. The ammunition sheds had a raised floor, and there was a special lockup shed with steel mesh sides for the pilferable items. On 10 October all inward stores were diverted to the new depot and the old one closed.

The company headquarters divided itself into two, with an inwards section that handled the receipt of goods and the depot, and an outwards section responsible for forwarding supplies to the 7th Division. An operational plan for the following day's supplies was received each night sometime between 2300 and 0100. Loading lists were prepared at around 0300 in the morning and loading of vehicles began at 0430. Planes were loaded between 0500 and 0530 and all planes were in the air by 0645. Outwards had first call on vehicles, which meant that a certain number of vehicles, usually about 12, were unavailable to for inwards work until the last flight of the day had taken off. This left 10 to 12 vehicles. Flights of 18 planes landed *every hour* from 0800 to 1500, far more than could be handled immediately and loads were often not cleared from the strip area until after midnight. On the night of 11/12 October, the last load was not brought in to the depot until 0345.

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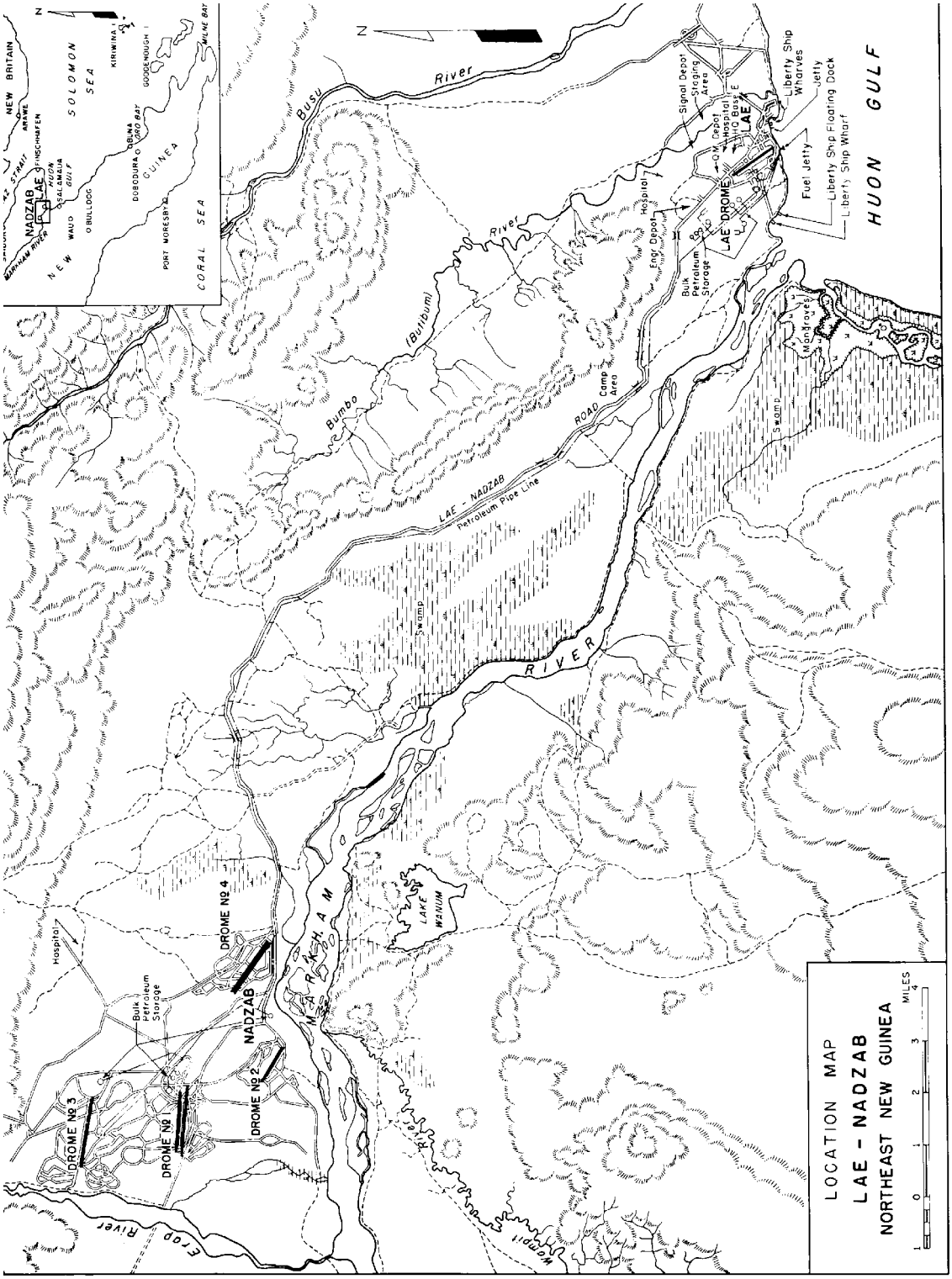
[45] War Diary, 7th Division AASC, 7, 25 September, 2, 7, 8 October 1943, AWM52 10/2/22.



MAP NO. 16

Map 11. Lae-Nadzab area

Source: Casey, *Airfield and Base Development*, p. 167

Fresh commodities arriving for the 7th Division were not sent to the depot but were immediately transferred from an inbound plane to an outbound one. A new manifest was prepared and forwarded with the load. A copy was delivered to the air maintenance company for accounting purposes. The books could not be reconciled until the aircraft had returned from their missions and manifests were sometimes missing, incomplete, inaccurate or indecipherable. It was also difficult to rule off the books for the day as laid down in the accounting procedures when the last load from the strip arrived after 2300. Yet most of the vehicles would have to be on the job again the next morning. Over 650 inwards and 530 outwards planeloads were moved to and from the depot between 6 and 31 October.

Apart from the workload, the 3rd Air Maintenance Company had two major problems. The first was transport. A minimum of 60 trucks were required to shift the loads from the airstrip to the depots but usually only 20 to 25 were available. The vehicles they had received from the 151st General Transport Company were in poor condition, both bodily and mechanically. Spare parts were scarce, which prevented all but first line repairs. No tow trucks were available in the Nadzab area and several vehicles became isolated until a mobile crane could be brought in to haul them out. A workshop section was supposed to have been attached to the 3rd Air Maintenance Company but, owing to the closure of the Markham Valley Road, it had been unable to get through. A sergeant and 4 other ranks from the 2/123rd Brigade Workshops were attached to the company on 15 October to help keep the vehicles in running order.

The other problem was pilferage. This was prevalent when loads had to be left unguarded in the vicinity of the airstrips. Each day an officer and 36 men armed with rifle and bayonet stood guard over the loads from 0830 until 1600, when they were relieved by another guard of the same composition who stood guard until the last load was cleared, which was usually after midnight. Such guards were not always reliable and a lot depended on the officer in charge. Where pilferable goods were placed on planes, they were accompanied by a conductor whose task was to hand over the goods and get a receipted manifest. This was facilitated by the switch from balanced planeloads to commodity loads. Whereas a planeload of balanced rations carried 33 different commodities, only 3 or 4 commodities would be carried on a commodity loaded plane.

The concentration of pilferable goods on the one plane ensured that they would be accompanied by a conductor. It also reduced the amount of handling they were subjected to. Inwards pilferable goods were immediately placed in the lockup shed, which was picketed by two NCOs during the day and a depot guard was mounted from 1900 to 0700 every night. Vehicles were checked out at the airstrips and checked into the depot at a check post at the depot entrance. In this way, the 3rd Air Maintenance Company made headway against the problem.[46]

Working the 3rd Air Maintenance Company this hard could not be a long-term solution. To reduce the workload, maintenance for Dumpu was flown from Lae or direct from Dobodura, couriered by the 2nd Air Maintenance Company, with the aircraft using Nadzab as a refuelling stop. Major relief came only in December, with the reopening of the Markham Valley Road, greatly reducing the number of inbound flights. The shipment of POL from Lae to Dumpu ceased on 11 January 1944 and from then on POL for Dumpu was supplied from Nadzab.[47]

Postal

Three Army Postal Services personnel were attached to the Nadzab Station Command to establish a Field Post Office (FPO). Mail fell into two classes. First Class Mail, consisting of letters and small parcels weighing less than 8 ounces (250 g), comprised about 1.3% of all mail by weight and was dispatched from Brisbane to Port Moresby by air. Second Class Mail, consisting of newspapers and parcels, which respectively made up about 80.4% and 18.3% of mail by weight, travelled to New Guinea from Townsville by sea.[48] It could take from one to four days for a parcel to make its way from the letterbox to the Army Post Office and three to eight days to make it to Townsville by rail. Mail could then be immediately loaded on board a ship that was in port loading, or it could wait for

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46 War Diary, 3rd Air Maintenance Company, 11 - 31 October 1943, AWM52 10/31/3; APM NGF to AQMG (Movts and Tn), "Pilfering – Conditions Observed at Lae, Nadzab, Dumpu, Finschhafen", 24 October 1943, AWM54 917/8/1.

47 *Weekly Report – S&T Lae Week Ending 15 January 1944*, War Diary, S&T Lae, AWM52 10/1/19.

48 *Weekly Resume of Q Branch Activities*, Week Ending 3 May 1943, AWM54 917/1/4.

anything up to three weeks for the next ship to arrive. The voyage to New Guinea took another five to seven days.[49]

Once there, mail destined for the 7th Division LOB Group,[50] Rear Party and evacuees was separated. First Class Mail was forwarded to Nadzab by a daily flight, weather permitting. Second Class Mail was retained with the LOB Group until aircraft space became available. Forward of Nadzab, all mail was delivered by the 7th Division Postal Unit.[51] In the case of undeliverable mail, letters and personal items were returned to the sender, while newspapers and other items were distributed among the unit or to hospitals.[52] The rapid build up of Australian troops in New Guinea for POSTERN brought about a corresponding increase in the volume of mail, and consideration was given to halting the shipment of newspapers, a step which was not taken owing to the potentially undesirable effect on morale.[53]

This made for slow and at times partial delivery of the Second Class Mail. Sergeant W. J. Blore of the 7th Division Postal Unit flew down to Port Moresby to see if something could be done. He returned with two planeloads. A huge pile of letters and parcels consisting of 260 bags of mail weighing around 3,700 kg was deposited in a Kunai field. Army Postal Service personnel worked through the night to sort the pile so that that it could be forwarded by air to Kaiapit, Dumpu and Bena Bena the next morning. The result was that on 9 October, some diggers in the Ramu Valley received mail postmarked in Sydney on 7 October. Some 12½ special planeloads of parcels and newspapers were eventually despatched to Nadzab, weighing around 24,000 kg. The 3rd Air Maintenance Company helped out by providing a storage shed for holding mail awaiting despatch.[54]

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49 DA&QMG Adv LHQ, "Newspaper and Parcel Shipment to AMF Beyond the Mainland", War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

50 LOB – Left Out of Battle. A cadre containing key personnel that were left behind when the unit or formation went into action. The LOB Group enabled a unit to be reformed if it was wiped out. The practice originated in the Great War when very heavy casualties were sustained.

51 *New Guinea Force Report on Operation Postern to October 1943*, AWM54 589/7/27.

52 *History of the Army Postal Service 1938-1946*, AWM54 61/3/3.

53 DA&QMG Adv LHQ, "Newspaper and Parcel Shipment to AMF Beyond the Mainland", War Diary, DA&QMG Adv LHQ, AWM52 1/2/6.

54 F. B. Peterson, "Quick Mail Delivery to Ramu Men", *Sydney Daily Telegraph*, 13 October 1943, War Diary, Adv LHQ DA&QMG Branch, AWM52 1/2/6.

Map 12. Huon Peninsula

Source: Walker, *The Island Campaigns*, p. 176

The Ramu Valley

Within days, it was clear that POSTERN was proceeding well, and plans began to change in response. On 11 September Chamberlin suggested deferring movement of the 4th Armoured Brigade from Australia to save shipping.[55] The 1st Tank Battalion was already in New Guinea but the movement of the remainder of the 4th Armoured Brigade was cancelled and 6th Division units took their place in the shipping schedules. When the 7th Division entered Lae on 16 September the 6th Division units were not immediately required either, and LHQ postponed their movement as well, in favour of logistical units urgently required to operate the base at Lae.[56] Some 60,000 troops were earmarked for Lae. USASOS had three ships available but was unwilling to risk them at Lae until fighters and antiaircraft guns were established there. USASOS would not take over from VII Amphibious Force until 1 November.[57]

Herring visited Salamaua by PT boat on 14 September, three days after its capture, and found little more than bomb craters and corrugated iron.[58] He recommended cancelling the development of Salamaua, and concentrating all available resources on Lae. The base that had originally been envisaged now looked like a waste of effort, as Salamaua was a poor site for a port or airbase and its main purpose, to support the attack on Lae, was no longer necessary.[59] GHQ cancelled the relevant instructions and diverted the US 842nd Engineer Aviation Battalion to Lae.

Attention now turned to the airstrip at Kaiapit, which the RAAF's No. 4 (Army Cooperation) Squadron reported was apparently in good condition, with the Kunai grass recently cut.[60] Whitehead wanted it seized as quickly as possible in order to obtain air bases that brought the Japanese base at Wewak within range of his fighters. The problem

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55 Extracts from Berryman Diary, 11 September 1943, AWM93 50/2/23/331.

56 Col, Adm(Q), "Q Notes Ref NG – 20 Sep 1943", 20 September 1943, Mackay Papers, AWM 3DRL 6850 168.

57 G (SD & Trng) NGF, Minutes of Conference at HQ NGF 7 September 1943, War Diary, GS Branch NGF, AWM52 1/5/51; Col, Administration Q, "Q Notes Ref NG – 20 Sep 1943", 20 September 1943, Mackay Papers, AWM 3DRL 6850 168.

58 Dexter, *The New Guinea Offensives*, p. 400.

59 War Diary, VII Amphibious Force, 15-16 September 1943, NACP: RG38 Box 179.

60 RAAF Reconnaissance Report, 11 September 1943, War Diary, 45 Air Liaison Section, 1/14/40.

was that once captured, it could be supplied only by air, and flying in an airborne engineer aviation battalion to work on the airfield would involve taking aircraft from those supporting the 7th Division. The 25th Infantry Brigade's movement to Nadzab was still incomplete by 61 planeloads of troops and 205 planeloads worth of reserves, while the 21st Infantry Brigade was short 362 planeloads of troops and 178 planeloads of reserves.[61] To reduce the number of aircraft required for maintenance in the Markham Valley, GHQ deferred the movement of the division's remaining brigade, the 18th, to Nadzab until after the completion of the Markham Valley Road – then estimated at 13 October – and the number of troops requiring air supply was reduced by returning the 503rd Parachute Infantry and 15th Infantry Brigade to Port Moresby.[62]

Everyone agreed that the supply situation would remain precarious until the Markham Valley Road was reopened, which the engineers now estimated would take two months, but Herring estimated that there were sufficient reserves at Nadzab to allow maintenance flights to be suspended for a week or so after the capture of Kaiapit.[63] He even put forward a bold plan of moving on Dumpu before Kaiapit, but Blamey did not approve; [64] the Japanese were known to be building a road from Madang to the upper Ramu,[65] so their supply situation might be good, while the Allies would be dependent on air supply at a time when fighter cover might become unavailable due to the Finschhafen operation.

Captain Everette E. Frazier, an American aviation engineer who had helped choose the site at Tsili Tsili, selected a level, burned-off area near the Leron River, not far from Kaiapit, and landed an L-4 *Piper Cub* there. Colonel David W. Hutchison, commander of the US 2nd Air Task Force approved this site for *Dakotas* on 16 September.[66] The next

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61 Col (GS) NGF, "Notes on Conferences 16 September 1943", Blamey Papers, AWM 3DRL 6643 2/48.

62 Minutes of Conference at Adv 5AF, 25 September 1943, War Diary, NGF GS Branch, AWM52 1/5/51; GOC 7th Division, 18 September 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14; DCGS to I Corps, 17 September 1943, War Diary, GS Branch New Guinea Force, September 1943, AWM52 1/5/51.

63 Col (GS) NGF, "Notes on Conferences 16 September 1943", Blamey Papers, AWM 3DRL 6643 2/48.

64 Extracts from Berryman Diary, 16 September 1943, AWM93 50/2/23/331; Dexter, *The New Guinea Offensives*, p. 414.

65 Appendix D "Road Bogadjim – Ramu Valley", *7th Division Intelligence Summary No. 1*, 22 August 1943, War Diary 7th Division GS, AWM52 1/5/14.

66 Craven and Cate, *Guadalcanal to Saipan*, p. 190.

day, the 2/6th Independent Company flew in from Port Moresby in a special flight of 13 *Dakotas*. Two were damaged in the landing and left on the strip.[67] One was subsequently salvaged, but the other was a total loss.[68] That evening the 2/6th Independent Company received airdropped messages from General Vasey to occupy Kaiapit as soon as possible, and prepare a landing strip for troop carrier aircraft.[69] An action on the morning of 20 September resulted in the capture of the town and the complete defeat of the enemy forces in and around Kaiapit.[70] Lieutenant Frazier landed on the newly captured airstrip at 1230 and oversaw the preparation of a new strip. The next day, Colonel Hutchison flew in for a test landing. He collected the wounded and returned to Nadzab with them, to return about half an hour later with a load of rations and ammunition and Brigadier I. N. Dougherty, commander of the 21st Infantry Brigade, who took charge of the area.[71] The commandos attributed much of their success to being armed with Owen submachine guns when the Japanese were only equipped with bolt action rifles,[72] but their ammunition was nearly exhausted in the effort, and they would have had to withdraw had it not been possible to rapidly resupply them by air..

Logistics at Kaiapit were at the mercy of the vagaries of air transportation in New Guinea. Taking advantage of good flying weather on 22 September,[73] Colonel Hutchison's 18 *Dakotas* made 99 round trips from Nadzab to Kaiapit, bringing in Dougherty's 2/16th Infantry Battalion.[74] On 23 September, 45 *Dakotas* arrived, flying the 2/27th Infantry

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67 OC 2/6th Cavalry Commando Squadron, "2/6 Aust Cav (Commando) Sqn General Report – September", AWM54 595/7/27; Jacobson, *Moresby to Manila via Troop Carrier*, p. 41.

68 Bradley, Phillip, *On Shaggy Ridge: The Australian Seventh Division in the Ramu Valley: From Kaiapit to the Finisterres*, (Melbourne: Oxford University Press, 2004), p. 19.

69 GS 7th Division, *7th Division Operation Instruction No. 6*, 17 September 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

70 GOC 7th Division, *Situation Report No. 36*, 21 September 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

71 Craven, and Cate, *Guadalcanal to Saipan*, p. 190; OC 2/6th Independent Company, "2/6 Aust Cav (Commando) Sqn General Report – September", AWM54 595/7/27.

72 Bradley, Phillip, *On Shaggy Ridge*, p. 44.

73 OC 21st Infantry Brigade, "Report on Operations in Markham-Ramu Valleys 15 Sep - 9 Nov 43", AWM54 595/7/11.

74 Kenney, George C., *General Kenney Reports: A Personal History of the Pacific War by George C. Kenney*, (New York: Duell, Sloan and Pierce, 1949), p. 301.

Battalion direct from Port Moresby.[75] No planes at all landed on 24 September, leaving the 2/16th and 2/27th out on a limb, with the only reserves of food and ammunition being with the battalions.[76] Only nine aircraft were available on 25 September but they managed 87 trips, bringing in the 2/14th Infantry Battalion. The following day, in spite of General Vasey's protests, the US Fifth Air Force restricted landings at Kaiapit to between 0930 and 1530, and 15 aircraft made only 44 trips.[77]

18. Kaiapit airstrip, 21 September 1943. The 2/16th Infantry Battalion arrives.

The 21st Infantry Brigade put in a temporary staff to control the airstrip, which became a bottleneck owing to a shortage of labour, transport and formed tracks, before its operation was handed over to the Nadzab Station Command.[78] The headquarters of the 2/2nd Supply Depot Company arrived on 26 September, along with its 5th Supply Depot Platoon. A jeep and trailer of the 2/153rd General Transport Company arrived on 23 September and by 27 September there were 22 jeeps and trailers at Kaiapit.[79] The labour situation improved with the arrival of 120 native labourers by air from Nadzab on 25 September and soon some 600 were available, working on a fighter strip and handling stores.

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75 Jacobson, *Moresby to Manila via Troop Carrier*, pp. 41-42.

76 OC 21st Infantry Brigade, "Report on Operations in Markham-Ramu Valleys 15 Sep - 9 Nov 43", AWM54 595/7/11.

77 Message, GOC 7th Division to GOC I Corps, "Operations – 7 Aust Div", 27 September 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

78 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep - 31 Oct 43", AWM54 595/7/11.

79 War Diary, 7th Division AASC, 23- 27 September 1943, AWM52 10/2/22.

From a hygiene point of view, Kaiapit presented many problems, not the least of which was the large number of dead Japanese left unburied after the battle. Some 107 of them were buried over the next few days but in the meantime the flies became particularly bad.[80]

When WOII P. A. Ryan of ANGAU questioned one of the locals, he was informed of a landing strip west of Sagerak that was not marked on the map but which had been able to take two- and three-engined Junkers aircraft before the war. Brigadier Dougherty immediately resolved to seize it.[81] The 21st Infantry Brigade advanced on Sagarak, rationed by jeeps over bush tracks. Transport was minimal; six jeeps and trailers carrying two days' rations, two jeeps and a trailer for the brigade signals, two jeeps for brigade headquarters, two for the attached section of 2/4th Field Regiment towing a pair of short 25-pounders and three jeeps and trailers for the 2/6th Field Company. Each unit was allocated 64 native porters to carry unit stores. Use was also made of jungle carts.

The swift-flowing Umi River was crossed in rubber boats. Three jeeps and trailers were dragged across and a ferry system was set up, with stores dumped on one bank, carried across by natives and then transported in the jeeps and trailers. The Japanese did not attempt to hold the area and Sagarak was occupied on 29 September. The airstrip was opened and three *Dakotas* arrived, bringing in four more jeeps and trailers. By first light on 30 September, the riverbank was clear of stores. An attempt to ration the forward troops that morning was frustrated by the number of creeks that had to be bridged but by that evening stores had been brought up to Marawasa and an issue of chocolate was made to the 2/16th Infantry Battalion by jeep.[82] The following day 55 planeloads landed at Sagarak.[83]

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80 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep - 31 Oct 43", AWM54 595/7/11.

81 OC 21st Infantry Brigade, "Report on Operations in Markham-Ramu Valleys 15 Sep - 9 Nov 43", AWM54 595/7/11.

82 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep - 31 Oct 43", AWM54 595/7/11.

83 Jacobson, *Moresby to Manila via Troop Carrier*, p. 41; Kenney, *General Kenney Reports*, p. 301.

ANGAU assembled 180 native porters and two carrier trains set off on the morning of 1 October to resupply the 2/16th and 2/27th Infantry Battalions but the infantry moved too fast and an airdrop was requested. This proved to be difficult to arrange as the drop area was not well defined. When the *Dakotas* flew over at 1900, fading light, high Kunai grass and insufficient manpower to search for the dropped supplies resulted in a recovery rate of only 50%. Lieutenant Frazier and the 2/27th Infantry Battalion established an airstrip at Gusap on 1 October. A landing was requested for the next day but an airdrop was made on the completed strip instead.

Brigadier Dougherty expected to halt for 10 to 12 days but was ordered to push on. The Gusap River was bridged and the brigade set out for Dumpu on the morning of 4 October.[84] The Japanese withdrew and it was occupied at 1700.[85] That evening the troops in Dumpu dined on captured Japanese rice and tinned fish.[86] At 1900, a delivery of fresh meat, bread and butter was made. Working through the night, the DID broke it down into unit lots. The fast flowing Surinam River rose 50 cm owing to rain the night before but at first light, 2 jeeps and trailers were towed across by tractor and then used to ferry the fresh stores to the battalions. With the help of native porters, the unit stores and DID were then carried across the river as well. By the evening of 6 October, the DID was established in a patch of jungle adjacent to Dumpu, as was the light section of the 2/6th Field Ambulance. Evacuation and resupply remained difficult due to the river and a permanent team of native labourers was posted to the spot to carry stores across the river and casualties back.

Two airstrips were prepared at Dumpu and the first planes landed on 9 October.[87] Overall, tonnages hauled by air by the US 54th Troop Carrier Wing rose from 10,000 tonnes in September to 19,000 tonnes in October, 26,000 tonnes in November, and 29,000 tonnes in December. The reopening of the Markham Valley Road caused the tonnages to decline to

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84 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep – 31 Oct 43", AWM54 595/7/11.

85 *7th Division Intelligence Review No. 3 to 1600 Hrs 8 Oct* 43, 8 October 1943, War Diary, 7th Division GS Branch, AWM52 1/5/14.

86 Dexter, *The New Guinea Offensives*, p. 443.

87 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep – 31 Oct 43", AWM54 595/7/11.

26,000 in January and 24,000 in February.[88] The Nadzab Station Command assumed control of the airstrips and the 7th Supply Depot Platoon took over responsibility for the Dumpu area. Initially, the 21st Infantry Brigade's jeeps had to be used but by 11 October 23 jeeps and 10 trailers were available in Dumpu, and the FSD began to move forward from Gusap to Dumpu.[89] Meanwhile, the 21st Infantry Brigade had moved onto the high ground above the eastern slopes of the Ramu Valley and established a jeephead at Kumbarum. Maintenance of troops forward of there was by porters. The carry was long and at one point the line of communications was cut by the Japanese.[90]

This ended the advance for the time being, for an advance into the mountains would require aircraft that were not available. The 7th Division was ordered to conduct operations north of Dumpu so as "to avoid a logistic commitment outside resources of I Corps".[91] General Mackay, who resumed command of New Guinea Force on 23 September, calculated that the 7th Division would require a minimum of 30 planeloads per day, 29 for maintenance and one for ammunition, while building up reserves at Nadzab to 21 days would require another 550 planeloads for maintenance and 100 for ammunition. He also asked the US Fifth Air Force for two planeloads per day for fresh produce.[92] In retrospect, even 21 days' reserves at Nadzab seems excessive, given that there were only two troop carrier squadrons based there, and the ease with which supplies could be delivered from Lae and Dobodura.

A DID was established at Guy's Post, and reserves were built up there. The two forward infantry battalions, the 2/16th and 2/27th, were allocated 50 native porters each for internal maintenance while 160 were based at Guy's Post. Another 200 were at Kumbarum, half a day's carry away. Subsequently, the track was improved and the carry reduced from 3 hours to 1¾ hours. The track ran along the Uria and Faria Rivers, so there was a danger

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88 Jacobson, *Moresby to Manila via Troop Carrier*, pp. 41-42; Kelly, Robert H., *1943 – Year of Expansion and Consolidation*, p. 535.

89 War Diary, 7th Division AASC, 9-13 October 1943, AWM52 10/2/22.

90 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep – 31 Oct 43", AWM54 595/7/11.

91 *New Guinea Force Operation Instruction No. 96*, "Role of I Aust Corps Consequent on Capture of Lae", 29 September 1943, War Diary New Guinea Force GS, AWM52 1/5/51.

92 GOC NGF, "Maintenance by Air 7 Aust Div", November 1943, AWM54 595/1/1.

that it could be cut by rising water. Accordingly, an alternate track was cut to Guy's Post, running over higher ground, which took the carriers about 2½ hours.[93] A series of Japanese counterattacks from 8 to 13 December caused the US 54th Troop Carrier Wing to deliver 900 tonnes of supplies to forward drop zones.[94] The headquarters of the 2/4th Field Regiment and the 25-pounders of its 8th Field Battery arrived by air at Dumpu in late October, joining those of the 54th Field Battery that had travelled overland from Kaiapit. As the 7th Division advanced into the mountains, four guns were dismantled and moved forward by jeeps. The Japanese defenders in the Shaggy Ridge area found themselves outranged by Australian artillery that was not apparently short of ammunition. During an Australian attack on 27 December, the two batteries fired 3,368 rounds.[95]

Extraordinary efforts were made to implement General Blamey's directive that every single soldier in the New Guinea receive a Christmas hamper, for in addition to the main forces there were some extremely isolated commando patrols, ANGAU District Officers and radar warning stations. Nonetheless, it was done. It not only let everyone know that the Army cared, but also, more importantly, that it had a logistical system that could deliver.[96] On Christmas Day, the 2/16th Infantry Battalion sat down to a Christmas dinner of giblet soup, roast turkey with seasoning, green peas, mashed potatoes and gravy, shredded carrots, and plum pudding with sauce. A diarist pointedly noted: "It is worthwhile comparing this with Christmas Day in Gona last year".[97]

Airmen and engineers were divided over the merits of Kaiapit, which was swampy and malarial, and considered a switch to Marawasa. By the time their surveys had been completed, Dougherty's men had opened Gusap. There, the engineers found a well-drained area with good soil conditions, an unobstructed air approach and a pleasant climate. It was decided to limit construction at Kaiapit and concentrate on Gusap.

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93 OC 21st Infantry Brigade, "Adm Report on Operations, 21st Infantry Brigade 15 Sep – 31 Oct 43", AWM54 595/7/11.

94 Jacobson, *Moresby to Manila via Troop Carrier*, p. 56.

95 Horner, David, *The Gunners: A History of Australian Artillery*, (Sydney: Allen & Unwin, 1995), pp. 371-372.

96 *A Report on Maintenance By Air in New Guinea From April 1943 to March 1944*, NAA (Vic): MP729/6 246/1/25.

97 Dexter, *The New Guinea Offensives*, p. 705.

American airborne aviation engineers constructed ten airstrips and numerous facilities. Although some equipment was able to make the trek overland, most had to be flown in and all of it was worn out by the time the work was completed. The first P-40 *Kittyhawk* fighter squadron began operating from Gusap in November and an all-weather fighter runway was completed in January 1944.[98]

One matter of concern was the rate of malaria casualties, which reached 5% per week in operational units. Among forward units of the 7th Division, malaria represented 90% of sickness casualties, and 85% of all casualties, while the corresponding figures for the 9th Division were 60% and 44%.[99] Given the evidence, both from the field and from clinical studies undertaken by the Army in Cairns,[100] that one tablet of atebrine per day, six days a week was effective in suppressing the symptoms of malaria, Colonel Fairley could draw only one conclusion:

> THAT TROOPS ARE NOT TAKING ATEBRINE AS DIRECTED, AND THAT ITS ADMINISTRATION IS NOT EFFECTIVELY SUPERVISED.[101]

The Ramu Valley campaign differed from that against Salamaua in that the terrain had largely been Kunai rather than jungle and the availability of airstrips, or at least usable airstrip sites, permitted a more extensive use of the more efficient landing of supplies instead of dropping.

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98 Craven, and Cate, *Guadalcanal to Saipan*, p. 190; Casey, *Airfield and Base Development*, pp. 171-172.

99 Walker, Allan S., *The Island Campaigns*, (Adelaide: Australian War Memorial, 1957), p. 233.

100 Sweeney, *Malaria Frontline*, pp. 62-76.

101 DGMS, "Casualties from Malaria", 2 November 1943, AWM54 267/6/7. Capitalisation original.

The Development of Lae

Lae fell on 16 September and command of the area was vested in Brigadier D. A. Whitehead of the 26th Infantry Brigade. His first task was to scrub down the place in order to prevent disease. There were some 30 to 40 unburied or barely covered Japanese dead in the area in various stages of decomposition. The dead, the rotting food and the shallow pit latrines attracted large numbers of flies. Anophelene mosquitoes responsible for the spread of malaria were found breeding in bomb and shell craters. As the condition of most of the dead rendered their burial impractical, they were thrown into dugouts, covered with oil and burned. The dugouts were then filled in. Rotting food and clothing were gathered in heaps and similarly disposed of. The open trench latrines were treated with lime and covered over. Oil soaked hessian bags were placed over them about 15 cm below the surface to prevent flies hatching from previously laid eggs making their way to the surface while the 2/3rd Malaria Control Unit and an American malaria control unit sprayed the mosquito breeding grounds. Bomb craters and the shell holes were filled in and an extensive drainage system was established to drain the swamps into the rivers or the sea.[102] This produced good results, although there were still 62 cases of malaria at Lae from 4 through 17 September.[103]

On 24 September, Brigadier Whitehead handed over command of the town area to Brigadier General Carl W. Connell, the former head of the US Fifth Air Force Service Command, who was now commander of the US 23rd Port which arrived at Lae on the night of 19 September.[104] Control of the American base was vested in New Guinea Force by GHQ.[105] The development of Lae would be undertaken jointly, with the Australians handling the area east of the Butibum River and the Americans to the west. The Australian area was subsequently extended on 26 October to include the entire area from Nadzab to Hopoi, except for the American base itself.

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102 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

103 Walker, *The Island Campaigns*, pp. 237-238.

104 *Military History of the United States Army Services of Supply in the Southwest Pacific*, USACMH 8-5 780-18, "Base at Lae Until March 1944".

105 *GHQ Operation Instruction No. 34*, 13 June 1943, Blamey Papers, AWM 3DRL 6643 3/97.

To avoid any repetition of the confusion that a divided Allied command had caused at Nassau Bay, Herring created the Lae Fortress under Major General E. J. Milford, the commander of the 5th Division, and gave him command of both American and Australian base installations, the port of Lae, and the airfields at Lae and Malahang. Milford had operational control of all Australian troops in the Lae Fortress Area except those of the 7th and 9th Divisions and controlled the allocation of native labour.[106] He was directly responsible to General Mackay, as commander of New Guinea Force, although priorities were set by Herring.[107]

Under the original plan, the first base units would not arrive until at least three weeks after the capture of Lae but New Guinea Force had urged that the new 4th Base Sub Area headquarters be moved by air to New Guinea as soon as possible to study the local conditions and prepare for the development of the base.[108] Lieutenant Colonel O. A. Kessels assumed command on 23 August and the other officers commenced duty during September, by which time it was far too late for study and preparation.[109] Kessels and the advance party of his headquarters departed Buna for Lae by air on 18 September, with the main body following by sea on 30 September. Kessels was particularly disturbed at the quality of other ranks assigned to his headquarters, which seemed to have been used as a dumping grown for medical defectives, possibly because LHQ had ruled B class personnel acceptable. Of 31 other ranks posted from the mainland for duty with the headquarters, 23 had one ailment or another, mostly related to eyes and feet, and one (ironically one of four classed as A) was "sub normal". Within a month, ten of them had been consigned to the medical establishment, some for discharge from the Army.[110]

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106 *I Corps Operation Instruction No. 2*, 22 September 1943, War Diary, I Corps GS, AWM52 1/4/1.

107 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

108 "BINOCULAR – Advanced Base", 5 August 1943, AWM54 589/7/18GOC NGF, "Proposed BINOCULAR Advanced Base", 29 July 1943, War Diary, Adv LHQ DA&QMG Branch, AWM52 1/2/6.

109 OC Lae Base Sub Area, "Officers posted to HQ Lae Base Sub Area", 18 November 1943, War Diary, Lae Base Sub Area, AWM52 1/8/15.

110 OC Lae Base Sub Area, " HQ Lae Base Sub Area – Other ranks Posted from the Mainland for Raising of HQ ", 18 Nov 1943, War Diary, Lae Base Sub Area, AWM52 1/8/15.

The 4th Base Sub Area was redesignated the Lae Base Sub Area on 11 October.[111] Colonel Kessels was replaced by Brigadier I. G. Fullarton on 10 December,[112] who, in turn, was relieved by Brigadier E. L. Vowles on 29 April 1944.[113] The 5th Division remained responsible for the area until 11 December, when it handed over control of the Lae Base Sub Area to New Guinea Force.[114]

Broadly speaking, the Americans were responsible for the development of the port, the airfields and the American base and the Australians for the roads and the Australian base. Where there was overlap between their activities, arrangements were made between Milford and Connell. The Australian construction effort was headed by Lieutenant Colonel A. J. Bell, CRE I Corps Troops, who also became CRE Lae Fortress on 11 October. Under his command was 5th CRE (Works) and CRE 3rd Division. Milford met with Bell each morning to discuss the day's work.[115] On 20 September Milford sent Herring his appreciation of the situation:

> American [engineers] under [Colonel Albert G.] Matthews have instructions to undertake port development and exit roads in immediate vicinity of the port. Matthews contemplates no work in [Australian] base area except as necessary adjunct to American requirements. He states his programme which also includes BINOCULAR [Lae] strip and Markham Rd and strips is already beyond his resources and he cannot divert his resources to meet needs in the [Australian] base sub area. The existing roads in the [Australian] base sub area are merely narrow earth tracks which will immediately become impossible if much traffic is put on them. To remove [Australian] stores from beach even to temporary locations involves immediate construction of roads through low lying ground. The acceptance of stores until some roads are available will be extremely difficult. There is practically no [Australian] [engineer] mechanical [equipment] now available at BINOCULAR. All mechanical equipment of KEYBOARD [9th Division] engineers except tip trucks goes to DIMINISH [Finschhafen]. US engineers at DOUBLET [Salamaua] will not release their mechanical equipment for immediate transfer to BINOCULAR without directives from

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111 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

112 War Diary, S&T Lae Base Sub Area, 12 December 1943, AWM52 10/1/19.

113 War Diary, S&T Lae Base Sub Area, 29 April 1944, AWM52 10/1/19.

114 *5th Division Administrative Instruction No. 42*, 13 December 1943, War Diary, 5th Division AQ Branch, AWM52 1/5/11.

115 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

> USA authorities… this [equipment] is in any case in very poor condition and quite insufficient. The need for [Australian] [engineer] units with heavy [mechanical equipment] is therefore extremely urgent especially tip trucks, gravel loading [equipment], and graders. The construction of access roads to permanent depots involves a very large construction programme.[116]

The heavy early October rainfall that closed the Markham Valley Road made the few tracks in the Lae area unable to carry heavy military traffic. Initially, both the Australians and Americans suffered from shortages of engineers, mechanical equipment and native labour. A shipment on 26 October 1943 satisfied American requirements for plant and equipment but it was not until 18 November that the arrival of a portion of the Corps pool of mechanical plant and equipment brought the Australian engineers almost enough to meet their commitments. Much of this was in poor condition due to hard use on previous campaigns, and while there were sufficient workshops, there was a shortage of spare parts. By mid October, some 60% of mechanical equipment was out of commission. A satisfactory situation was finally reached with the arrival of a platoon of the 2/1st Mechanical Equipment Company at the end of November but this unit was earmarked for Finschhafen.

Australian requirements for native labour were reckoned at around 4,000 labourers but owing to competition from the 7th and 9th Divisions and the US Fifth Air Force, and the fact that many of the more populated areas of the Huon Peninsula were still in enemy hands, the number of labourers on hand in the Lae Base Sub Area seldom exceeded 1,500.[117]

While Matthews may have had better equipment than Bell, he was still in the same position regarding shipping. There was no shortage of ships as such; the difficulty was in unloading them. Loaded ships waited at Townsville and Milne Bay, sometimes for weeks, tbefore being called forward. This set up a viscious circle, because the equipment they carried was required to construct the wharves, roads and depots which could make a rapid turn-around possible.

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[116] GOC 5 Division to GOC I Corps, 20 September 1943, War Diary, 5 Division AQ Branch, AWM52 1/5/11.

[117] Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

The sappers found the port of Lae lacking in facilities and blocked by sunken barges and debris. The only discharge facilities were two rickety jetties unable to hold trucks.[118] Soundings of the harbour were undertaken by an RAN Survey group and it was found that the harbour was quite deep, although there were shoals on the north shore.[119] The RAN closed its Port Directorate at Morobe and moved its headquarters to Lae on 1 October. The Port Director assumed responsibility for the safety of shipping in the harbour, including the organisation and coordination of escort vessels and air cover.[120] The Lae Base Sub Area assumed responsibility for dock and beach clearance on 10 October. [121]

The first cargo was delivered by LST and brought ashore by DUKWs, LCMs and lighters over the beach between Voco Point and the Butibum River. Australian and American DUKWs were operated as a pool.[122] The coarse sand was 15 to 45 cm deep and quite soft and could not withstand the traffic demands of unloading. An Australians bulldozer pulled out trucks that became bogged in the sand, which was stabilised on 30 September by a combination of Marston mat and clay binder. Each night at around 2300 a convoy of three or four LSTs arrived. Unloading had to be carried out in total darkness due to the danger from enemy aircraft and LSTs that had taken ten or twelve hours to load at Milne Bay, Oro Bay or Buna had to be unloaded in the three hours that US Navy permitted them to stay on the beach. If unloading was not finished by 0400, as was frequently the case, they were forced to depart with whatever was left onboard.[123] Constant heavy rains presented difficulties for the signalmen whose job it was to see that the LSTs came into the beach in proper order. The signal tower was a tall tree fitted with makeshift steps. A signalman would climb the steps and then, crouching over on a small platform, direct the barges to come in with his flashlight, sending out Morse code in the dark. Valuable time was lost by craft cruising up and down offshore searching for the beach. This state of affairs continued until ranging lights were installed. Finally, in the first week of

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118 Bykovsky and Larson, *The Transportation Corps: Operations Overseas*, p. 462.

119 Gill, *Royal Australian Navy 1942-1945*, p. 326.

120 Norman, R., "The Development of Naval Bases in New Guinea", 6 June 1949, AWM69 23/89.

121 War Diary, S&T Lae Base Sub Area, 10 December 1943, AWM52 10/1/19.

122 *Weekly Report S&T Lae Base Sub Area*, Week Ending 25 December 1943, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

123 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

November, LSTs and LCTs began to arrive by daylight.[124] USASOS assumed responsibility for delivery of supplies to Lae on 1 November. It was estimated that Lae would require 1,100 m^3 per day until 1 January 1944, then 1,700 m^3 per day, of which 570 m^3 was for the Australian forces.[125] A regular schedule of eight LCTs was arranged, with two departing every three days, starting 22 October.[126]

Sunken Japanese barges were cleared away by a 150-ton floating crane. American engineers then installed a floating dock, which was towed to Lae in sections. It opened for business on 20 October, and a Liberty ship, the *Cape Kreig*, discharged there that day.[127] A permanent timber dock for Liberty ships was constructed on the Eastern side of the harbour. This work was held up by shortages of hardware and lumber after some 25 piles had been driven. Some 70 piles were shipped in from Morobe.[128] A shipment of heavy lumber and one of dock hardware arrived in late October. The new dock was completed on 23 November, although it was used to unload the *Fremont Older* on 15 November. Construction of a second pile bridge was begun east of Voco Point but swells developed at this beach that were heavy enough to endanger shipping at a permanent wharf so the floating dock was moved there, reopening on 28 November, and the construction of the second permanent dock shifted to the site formerly occupied by the floating dock. This dock was opened on 20 December, only to be destroyed by a subsidence of the shoreline resulting from a minor earthquake on 8 June 1944. It was then replaced by another floating dock, as this type had proven to be superior since the harbour bottom was river silt over steeply sloping rock, and piles were held only by the silt and rested on the rock. A third dock was authorised in February 1944, but severe storms delayed its construction

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124 *Military History of the United States Army Services of Supply in the Southwest Pacific*, "Base at Lae Until March 1944", USACMH 8-5 780-18.

125 Minutes of Conference held at HQ II Corps 19 October 1943, AWM54 591/3/3.

126 Minutes of Conference held at HQ II Corps 20 October 1943, AWM54 591/3/3.

127 Bykovsky and Larson, *The Transportation Corps: Operations Overseas*, p. 462; Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

128 Minutes of Conference held at HQ II Corps 20 October 1943, AWM54 591/3/3.

until nearly the end of the year. Despite the weather, the port of Lae handled a considerable amount of cargo, peaking at 97,000 m^3 for the month of April 1944.[129]

Supply and transport were controlled by the CASC of the 3rd Division, Lieutenant Colonel F. W. McLean, until 10 October, when it was assumed by the Lae Base Sub Area.[130] The 151st General Transport Company arrived on 1 October and came under the Lae Base Sub Area the next day. Unfortunately, the vehicles of this unit were in very poor mechanical condition and the rate of mechanical failures was very high. The largest number of vehicles operational on a single day in October was just 48 out of its 97 3-ton trucks. Some days less than 40 vehicles were operational. By December, availability was down to 40 out of 71, 11 vehicles having been cannibalised and written off, and 15 having been sent to Finschhafen. More vehicles arrived on the *Cape Krieg* on 20 October, including 110 belonging to the 133rd General Transport Company. Of these, all but 20 were found to have flat batteries.[131] Inevitably, the Americans asked for the return of the 200 trucks that had been loaned to the 9th Division.[132] These they described as "unserviceable" and "junk" when received, forcing them to ship in 150 crated trucks in December.[133]

Vehicle maintenance was handled by the 104th and 2/104th Brigade Workshops but these units, located near the Malahang Airstrip, could only service units located nearby, so it fell to the 2/3rd Composite AA Regiment Workshop to take care of all vehicles in the Lae town area. Fortunately, a period of good weather in late October enabled the Busu Road to be opened as far as the airstrip. On 4 November, it was opened to two-way traffic between 1000 and 2000. These restrictions were relaxed on 15 November. The Lae Fortress Workshops and the 2nd Mechanical Equipment Workshops arrived in late

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129 Casey, *Airfield and Base Development*, pp. 178-179; Bykovsky. and Larson, *The Transportation Corps: Operations Overseas*, p. 462; Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1; War Diary, Lae Base Sub Area, 8-9 June 1944, AWM52 1/8/15.

130 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

131 DADST Lae Base Sub Area to ADST Lae Base Sub Area, "Transport Activities – October 1943", 30 October 1943 War Diary, S&T Lae Base Sub Area, November 1943, AWM52 10/1/19.

132 Minutes, Conference GHQ SWPA 17 October 1943, War Diary, Adv LHQ DA&QMG Branch, October 1943, AWM52 1/2/6.

133 Craven and Cate, *Guadalcanal to Saipan*, p. 192.

November. As well as maintaining motor vehicles and mechanical plant, they found themselves responsible for work on watercraft, including the hospital ship *Stradbroke II*.

Cargo that had been placed in the area just in rear of the beach during the night was sorted and dispatched to the proper destination during the day. Clearance was impeded by the lack of roads suitable for the heavy trucks and equipment; barbed wire entanglements; bomb craters; wreckage and heavy rain. The first depots were established by the 2/1st Ordnance Beach Detachment, which landed at Lae on 18 September and set up camp near Voco Point. It took on responsibility for unloading the LSTs. This passed to the 8th Movement Control Group on 24 September. Temporary staging areas were established near the beach. On 20 October a large temporary AASC dump was opened, operated by the 162nd Supply Depot Platoon. By this time roads between the port and the dump had been developed but the Butibum River had to be forded. In mid November a six-span all-traffic bridge was opened. The AASC dump then became the advanced supply depot (ASD), pending the completion of the permanent site. The 43rd Field Ordnance Depot, which relieved the 2/1st Ordnance Beach Detachment on 28 October so the latter could move to Finschhafen, temporarily located itself on the Malahang airstrip. The 103rd Field Ammunition Depot handled fast moving stores from Voco Point and slow moving ones from the permanent site on the Butibum River, which was accessed by using the river bed at low tide. The first permanent depot, the main DID, opened on 13 November.[134]

The 5th Division Provost Company controlled vehicle traffic between the beaches and the dumps but could not secure the beach area. In the rush to unload landing craft as rapidly as possible, there was no check of the manifests of the LSTs, nor of the truckloads taken to the depots. Only after arrival at the depots was a check made of the goods received. This was then reconciled with the manifests. The result was opportunities for pilferers, and the Provost Marshal noted considerable traffic in stores, such as American cigarettes, between Australian and American soldiers.[135]

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134 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

135 APM NGF to AQMG (Movts and Tn), "Pilfering – Conditions Observed at Lae, Nadzab, Dumpu, Finschhafen", 24 October 1943, AWM54 917/8/1.

As attention turned from the wharves and roads to hospitals and other semi-permanent structures, a heavy demand arose for timber. The local timber was of poor quality so timber for the wharves and other heavy duty structures had to be shipped in, but it was good enough for construction of most bridges, culverts and buildings. Saw benches[136] were established by the various field companies and by November, five were in operation. The 59th Corps Field Park Company set up a sawmill. A site was chosen on the Markham Valley Road, but it was abandoned when it became apparent that the road would not be open until December. A new site was chosen on the Busu Road, where it was estimated that there was six months' supply of timber. Output was around 19 m^3 per day, yielding, along with the five company saw benches, a total of 28 m^3 per day.

Colonel Bell intended to continue working on the road with most of his resources and then turn attention to the Butibum Road so as to give early access to the 103rd Field Ammunition Depot and the 43rd Field Ordnance Depot permanent sites, but Milford directed that work on the Butibum Road should instead commence from the Lae end so as to provide access to the Ordnance Depot and to the Casualty Clearing Station, which was using the bed of the Butibum River itself as a road during periods of low tide.

The Casualty Clearing Station was initially set up by a detachment of the 10th Field Ambulance. On 22 October 1943, it was relieved by the 7th Field Ambulance and a nucleus of the 106th Casualty Clearing Station which opened a 500 bed Casualty Clearing Station on the site. The remainder of the 106th arrived in the second week of November, along with part of the 2/7th General Hospital. At one point in November some 963 beds were occupied, a very heavy workload for a casualty clearing station that was staffed to care for only 200 patients. The 111th Casualty Clearing Station at Nadzab, handling the 7th Division's casualties, was even more overworked, with over 1,000 patients. As far as was possible patients were not evacuated beyond Lae if they could be returned to their units within 21 days.

Plans for the Lae base envisioned two general hospitals, the 2/7th and 128th. Reconnaissance of the Australian area East of the Butibum River failed to discover a

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136 A bench or table with a flat top for sawing, especially with a circular saw which projects above the table.

suitable site and the US Advanced Base was approached for permission to use a site on the Markham Valley Road. The first site chosen had already been earmarked by the Americans for a dump and so another site was chosen on the road at Yalu. The disadvantage of the site was that it could not be developed until the Markham Valley Road was opened in December. Milford was critical of the decision to send the 2/7th General Hospital to Lae in advance of the opening of the road, when corps and base units were still awaiting shipment to Lae.

Initially, the Australian base at Lae drew its water supply from temporary water points established by the 2/13th Field Company on the Butibum and Busu Rivers shortly after the fall of Lae, and from some wells. Eventually, the temporary canvas water tanks were replaced with iron. To provide for the base's long-term needs, the Americans built a 2.387 ML reservoir on Mount Lunaman and a pumping station capable of supplying 1.137 ML per day was constructed. Some 8 km of pipes were laid to kitchens, showers, public water points, and to the wharf so ships could be watered.

An electrification scheme was begun on 5 November, using a 41 kW unit salvaged from the Lae airstrip and a 25 KW unit as an emergency backup. On the day Lae fell, Brigadier Whitehead sent seven men of the 2/78th Light Aid Detachment to repair the Lae ice works. The Japanese had attempted to wreck it but the job was not well done and the 2/78th soon had it back in action. A 142 m^3 refrigeration plant arrived on the Liberty ship *Fremont Older* on 15 November for the DID and thereafter the amount of refrigeration capacity was steadily increased.[137]

The 9th Division handed over its remaining dumps in the Lae area to the 5th Division on 26 November and New Guinea Force decided to close them out. The Lae Base Sub Area discovered 100 m^3 of ammunition at West Beach; 96 m^3 of ammunition and 1.7 m^3 of POL at Red Beach; and 138 m^3 of rations, 85 m^3 of ammunition and 12 m^3 of POL at G Beach. Arrangements were made with the 532nd EBSR for 6 LCVPs to assist 4 ALCMs in

[137] Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

the task of shifting the stores to Voco Point, from whence they were taken to the Lae dumps.[138]

Although there was no intention of developing Lae as a major air base, GHQ had directed New Guinea Force to establish facilities at Lae for a fighter squadron and had assigned an engineer aviation battalion to build it.[139] The 9th Division had given priority to getting the aerodrome ready so the RAAF's No. 4 (Army Cooperation Squadron), then operating out of Tsili Tsili, could use it for casualty evacuation and artillery spotting.[140] The aerodrome was repaired, improved and extended to 1,500 metres and the first Allied aircraft to land there were four *Wirraways* of No. 4 Squadron on 18 September.[141] POL, arriving at Lae in 44-gallon drums, was unloaded from ships, trucked to the airstrip and air freighted to Nadzab and later Gusap.[142] On 3 October, when record keeping began, some 17 planeloads were despatched. This grew to 2,210 planeloads for the month, an average of 76.2 per day. Only 165 were Australian cargoes. In November, some 4,996 planeloads were despatched, an average of 166.5 daily. Of this, some 1,897 planeloads consisted of avgas. Thus, the airstrip only intended to carry fighters and light aircraft became a base for transport aircraft. This required more work on the airfields to provide the required hardstands and parking areas for the *Dakotas*.[143]

Development of the airbase at Nadzab was the principal objective of the whole campaign, with the port of Lae supplying Nadzab. This was reflected in the appointment of Connell, an Air Corps officer, to command the American base. Since "even the most fervent advocates of air transport admitted that troop carriers could not develop the Nadzab area

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138 Message, Lae Base Sub Area to Movts Lae, 25 November 1943, War Diary, 5 Division AQ Branch, AWM52 1/5/11.

139 *GHQ Operation Instruction No. 34*, Amendment, 23 July 1943, Blamey Papers, AWM 3DRL 6643 3/97.

140 Record of Conferences at HQ 9th Division 27 July 1943, War Diary GS Branch 9th Division, AWM52 1/5/20.

141 Casey, *Airfield and Base Development*, pp. 170-171; War Diary, 45th Air Liaison Section, 18 September, AWM52 1/14/40.

142 Craven and Cate, *Guadalcanal to Saipan*, p. 192.

143 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

to the extent desired",[144] it was first necessary to improve the Markham Valley Road to enable heavy construction equipment to be brought up to develop the airbase.

The Markham River downstream from Nadzab consisted of a number of gravel beds intercut by deep channels 30 to 100 metres wide and 3 to 4 metres deep, giving the river a braided look on the map. The current was normally 4 to 6 knots but when the river was in flood in the wet season it ran as fast as 7 knots. The swift current, the winding courses of the deep channels and the abundance of snags and debris made the river a challenge to navigate, so the use of LCMs to move stores and equipment up the river was not attempted, although the Australian Army moved some personnel and modest tonnages of stores up the river both in daylight and at night using canoes and folding boats with outboard motors.[145]

As soon as the fighter runway at Nadzab was completed, work resumed on the road, this time from the Nadzab end. It was dogged by rain on 46 of the next 60 days and the subgrade could only be worked only in the afternoon when the rain stopped, with work continuing into the night. A 6 metre wide road was finally opened on 15 December, enabling four American engineer aviation battalions and the RAAF's No. 62 Works Wing to move heavy plant along the road and join in the development of Nadzab.[146]

No. 62 Works Wing, with Nos 2, 6 and 7 Mobile Works Squadrons, arrived at Lae in early December and commenced work at Nadzab on a new airfield known as Newton on 16 December. *Kittyhawks* of No 75 Fighter Squadron arrived at the end of the month and commenced operations on 20 January. No. 62 Works Wing commenced work on a second airfield, known as Texter, on 5 February 1944, completing it on 10 March. Both were all-weather airfields, sealed with gravel and bitumen.[147] By January 1944, there were 12,986 Army, 175 RAAF, 38 RAN and 2,300 native personnel in the Lae area and 2,103 Army,

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144 Craven and Cate, *Guadalcanal to Saipan*, pp. 191-192.

145 War Diary, GS 7th Division, "Notes on the Markham Valley", 4 Aug 1943; "Use of Folding Boats Mk III for Ferrying Stores and Personnel in Fast Flowing Streams in New Guinea" [September 1943], AWM52 1/5/14.

146 Casey, *Airfield and Base Development*, p. 176.

147 Wilson, *Always First*, pp. 59-60.

1,397 RAAF and 1,642 native personnel at Nadzab. All were the logistic responsibility of the Lae Base Sub Area.[148]

On 21 December, the Lae Base Sub Area began to use the road to supply the 3rd Air Maintenance Company at Nadzab. This included rations for 12,000 and was estimated to require 36 3-ton truckloads per day until at least 25 December. For the first two days the road was closed until midday and the convoys were only able to make one trip. From 23 December the road was open all day and two trips were made. By Christmas, the number of trucks was reduced to ten, making two trips.[149] The POL requirements of the RAAF works units at Nadzab necessitated a daily increase of five vehicles in January 1944. [150]

Although hauling fuel overland was more economical and reliable than sending it by air, keeping the road open required an entire battalion of engineers for road maintenance and more than a little luck in view of the extremes of tropical weather. It also tied up trucks needed for other tasks, which in turn required workshops to keep them operational. Accordingly, plans called for the construction of eight 2,000-barrel tanks for aviation fuel, two 2,000-barrel tanks for petroleum and a pipeline to Nadzab. Three km of 6-inch Victaulic pipe[151] were laid from the fuel jetty in Lae harbour, which was completed on 20 October, to a tank farm consisting of three 2,000-barrel tanks. Fifty km of four-inch pipeline and three pumping stations moved the fuel from there to two 2,000-barrel tanks at Nadzab. The pipeline ran roughly parallel to the Markham Valley road and usually less than 30 metres from it. By April 1944, there were three 2,000-barrel tanks and two 10,000-barrel tanks at Nadzab and four 2,000-barrel tanks and a 10,000-barrel tank at Lae

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148 *Weekly Report S&T Lae Base Sub Area for Week Ending 1 January 1944*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

149 *Weekly Report S&T Lae Base Sub Area for Week Ending 25 December 1943*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

150 *Weekly Report S&T Lae Base Sub Area for Week Ending 22 January 1944*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

151 Named for the company that was the originator and developer of the method for rapidly joining pipe, Victaulic pipe consisted of a synthetic rubber gasket held in place by two semicircular metal castings. Hydraulic pressure from inside the pipe caused the gasket to expand and form a flexible joint that was as tight as a welded one.See Coll, Keith and Rosenthal, *The Corps of Engineers: Troops and Equipment*, p. 418.

for aviation fuel, along with two 10,000-barrel tanks for petroleum and one for diesel fuel.[152]

Some 700 m^3 of POL were cleared over the beaches in October, with consumption by the Lae Base Sub Area coming to over 364,000 litres of MT80 and 36,000 litres of distillate.[153] Stocks ran short in early November, dipping to only 2 days of MT80 and 35 days of distillate on 7 November.[154] More critical were lubricants, which ran out entirely, forcing all non-essential vehicles to be grounded on 6 November.[155] POL rationing was introduced on 9 November.[156] The situation remained critical until the Liberty ship *Fremont Older* arrived from Sydney on 12 November with 1,000 m^3 of POL.[157] This retrieved the situation for the Australians but the American base's position remained acute. In January the *Stephen Gould* not only sailed with 1,000 drums of MT80 intended for the US base still on board, part of its cargo was accidentally delivered to the Australian BIPOD due to errors in its stowage plans. The decision was taken to accept it and adjust the discrepancies later. By 22 January the Americans were out of MT80 and down to their last two days of distillate and were forced to draw on Australian stocks of MT80. The Americans did not ask for any distillate, which was fortunate, as the Australian stocks were too low to provide any.[158] By 29 January shipments of 12,000 drums of American POL were in port awaiting discharge but in the meantime another 190,000 litres was drawn from Australian stocks, reducing reserves of MT80 to 14 days. Distillate was also a concern as 56 m^3 was being shipped to Finschhafen and No. 62 Works Wing wanted another 800 44-gallon drums worth. New Guinea Force was asked to provide shipping space to bring 900,000 litres up from Milne Bay. While *AK94* and *AK95*

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152 Casey, *Airfield and Base Development*, p. 178.

153 *POL Report For Week and Month Ending 30 October*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

154 DASC (POL) to ADST Lae Base Sub Area, 7 November 1943, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

155 War Diary, S&T Lae Base Sub Area, 6 November 1943, AWM52 10/1/19.

156 AA&QMG 5 Division, "Issue of POL", 8 November 1943, War Diary, 5 Division AQ Branch, AWM52 1/5/11.

157 Sergeant E. E. Smith, *The Account of the Development of Lae as an Allied Base*, 30 November 1944, AWM 54 589/3/1.

158 *Weekly Report S&T Lae Base Sub Area for Week Ending 1 January 1944*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

were primarily devoted to moving troops, all additional space in them was utilised for moving distillate from Buna.[159]

By early 1944, Lae had supplanted Port Moresby as the main Australian base in New Guinea.

> Lae had now grown into a fairly comfortable town of considerable size. Along wide heavily-metalled roads were lines of buildings with concrete or timber floors, walls only half-height to allow the air to circulate, and ceilings of Hessian or tar board. Neatly-painted road signs – Wau Avenue, Finschhafen Avenue and so on – guided the traveler. It was long since enemy aircraft had disturbed Lae's tranquility. Twice a week there was an open-air picture show, and often films not yet seen on the mainland were shown. Here as elsewhere, if a tropical storm broke during the show the audience put on gas capes and went on watching the screen through the pouring rain. Five miles away on the banks of the Busu was an officers' club with room for 200 to dine, served by well-drilled native waiters and a fine floor on which officers danced with nurses to music played by a four-man band.[160]

Signals

With I Corps in Dobodura, a land line was required to connect it with New Guinea Force in Port Moresby. During the Papuan Campaign a tree slung galvanised iron wire and field cable line was erected.[161] This was limited in capacity and not of sufficiently high standard to support the needs of the Australian Army and US Army Air Force. Between 12 May and 15 July 1943, 400 km of wire was strung over a 200 km route over the Owen Stanley Range from Port Moresby to Dobodura. About 100 Americans, 100 Australians and 500 Papuans worked on the project.[162] The Australian contingent was drawn from the 18th Line of Communications Signals.

Initially a single channel carrier telephone system released by the PMG for military use was selected, pending receipt of a more modern American three-channel system that was on order. This was delivered while work was in progress and replaced the Australian

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159 *Weekly Report S&T Lae Base Sub Area for Week Ending 29 January 1944*, War Diary, S&T Lae Base Sub Area, AWM52 10/1/19.

160 Long, *The Final Campaigns*, pp. 89-90.

161 Sgt Robinson, "A Corps Signals in New Guinea", undated, AWM54 425/6/42.

162 Craven and Cate, *Guadalcanal to Saipan*, p. 156; Thompson, G. R. and Harris, D. R., *The Signal Corps: The Outcome*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1966), p. 248.

system, providing two speech and 12 telegraph circuits between Port Moresby and Dobodura. Line construction stores were moved by rail to Brisbane, by ship to Port Moresby and air dropped or hauled over the Kokoda Trail by Papuan carriers. Supplied largely by air, the linesmen worked their way over steep mountains, razorback ridges and dense jungles. In such difficult terrain, construction of a normal pole line was impractical, so a tree-slung technique was adopted. Trees were chosen that would not bend and sway too much in a strong wind. Special, barrel-shaped, grooved insulators were employed and galvanised iron wire was used to tie the insulators to tree branches. Lines were erected with an exaggerated sag in the hope that heavy branches falling over the line would cause it to sag further but no so much that lines would touch one another. Failing that, the galvanised iron ties were designed to break so the wire would remain intact, continuing to work even if it were lying on the ground. Although it followed the Kokoda Trail, extensive clearing was still required. Teams of Papuans led by Australian NCOs cleared the way, followed by parties of 15 soldiers and six Papuans, commanded by an officer. The Papuans deposited the slings at the chosen trees, while four signalmen erected the slings, four joined the wires, two assembled the tree slings and one was in charge of the stores.

The line required constant maintenance for in the dampness of New Guinea, wooden poles rotted, wires corroded and trees fell over and brought the line down. Metal wire at high altitude proved prone to lightning strikes from the frequent tropical storms that reduced stretches of line to white ash. One day around 400 metres of cable met this fate. Maintenance stations were established along the line, each staffed by three men so that one could remain at his post while the other two inspected the line. Where a vehicle track existed and patrols could be made by jeep, the stations could be up to 30 km apart but in less accessible areas, they might be only 2 km apart. Their job was to clear the fallen trees and branches, mend broken lines, clear away the undergrowth, adjust the regulation and distance between the wires, and replace broken slings.[163]

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[163] Barker, Theo, *Signals: A History of the Royal Australian Corps of Signals 1788-1947*, (Canberra: Royal Australian Corps of Signals Committee, 1987), pp. 193-194; Sgt Robinson, "A Corps Signals in New Guinea", undated, AWM54 425/6/42.

In September 1943 the 19th Line of Communications Signals assumed control of base communications and work began on linking the New Guinea Force HQ in Port Moresby with Lae and the Markham Valley.[164] The 18th Line of Communications Signals was charged with extending the existing line that ran over the Kokoda Track to Inonda to connect it to Morobe. The 19th was given the task of taking it from Morobe to Lae. American signals units, aided by two sections of the 19th, were to extend the line from Lae to Nadzab and Finschhafen.

The 19th Line of Communications Signals established the headquarters of its 1st Company at Morobe on 12 October, along with all but one of its line sections, and work began. The line ran along the coast through mangrove swamps and the foreshore was frequently rugged and rocky. Men often had to work up to their waists in waters infested with crocodiles and sharks. Supply of the signallers was mainly by water transport, which also moved personnel forward. Shortages of water transport were the main cause of delay. There were numerous swift flowing streams to be crossed and these were prone to flash flooding. Most difficult was the crossing of the 1,300 metre wide Markham River. A submarine cable was considered impractical because of the swift current and the number of logs that were washed down the river whenever it flooded, so an aerial line crossing was constructed. Engineers erected a 23 metre pylon on an island in the river and a 12 mm steel bearer cable carrying the insulated wires was strung from trees on each bank to the pylon.

The 400 km line reached Lae on 9 January 1944 and the circuits were tested and in operation in early February. Construction had involved some 300 Australians and 500 natives.[165] It required constant maintenance. Some 69 stations were established along the line between Lae and Moresby, manned by 241 linesmen and 209 natives.[166] The worst trouble spot was the Markham River crossing, where there were constant outages from lightning, river craft and low flying aircraft.

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164 Secretary, Department of Army, "Submarine Cable and Telegraph Line Between Cape York and Port Moresby", 18 August 1943, NAA (Vic): MP742/1 94/13/571.

165 Barker, Theo, *Signals: A History of the Royal Australian Corps of Signals 1788-1947*, (Canberra: Royal Australian Corps of Signals Committee, 1987), pp. 195-196.

166 DAQMG NGF, "Maintenance of Personnel Stations in the Lae-Moresby Trunk Line Route", AWM54 425/5/24.

The task of running the line up the Markham Valley fell to the US 440th Signal Construction Battalion. Two of its platoons flew up to Nadzab on 23 September 1943, bringing with them a quantity of "Spiral Four". This remarkable invention, which combined the long range of open wire with the ease of use of field wire, consisted of four insulated conductors wound spirally around a central core. It was manufactured in lengths that could be easily handled in the field, could be laid quickly and could be joined together with plug-like connectors. Developed by the Germans, it had been captured by British commandos and copied. The first shipment of Spiral Four to reach SWPA – some 3,600 quarter-mile reels – arrived on 17 June 1943. [167]

A detachment of the US 440th Signal Construction Battalion flew up to Kaiapit. A right of way from Nadzab to Dumpu through the dense Kunai grass was cleared by a hundred native women obtained by ANGAU. Communication was established between Nadzab and Kaiapit on 25 October, Gusap on 7 November and Dumpu on 15 November. The intention was to build a conventional pole line between Lae and Nadzab but boggy ground and the delay in completing the Markham Valley Road led New Guinea Force to use Spiral Four. This was completed on 10 October 1943. On the other side of Lae, Spiral Four was run between Lae and Dreger Harbour, 13 km from Finschhafen, establishing communications on 8 December.[168] Responsibility for maintenance of the line from Lae as far as Batula – roughly half way – passed from USASOS to the Australian Army on 4 October 1944.[169]

Spiral Four was intended as a temporary expedient rather than a permanent solution,[170] to be replaced by what became known as the Markham Valley Pole Line. Assigned to its construction were the Americans of the US 60th Signal Battalion and the Australians of the 27th and 28th Line Sections, none of whom had served in New Guinea before. Wooden poles were used with four arms so that they could carry 16 circuits (32 wires) using

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[167] Terrett, D., *The Signal Corps: The Emergency*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1953), pp. 115-116, 232-233.

[168] GHQ SWPA G-3 Journal 23 May 1944, "Spiral Four in the SWPA", AWM54 492/4/29.

[169] BGS GOC First Army to HQ NG L of C Sigs, "Maintenance of Signal Line Lae-Batula", 4 October 1944, AWM54 425/5/24.

[170] CinC SWPA, *Operations Instruction No. 38, Annex 5 (Communications)*, 22 September 1943, Blamey Papers, AWM 3 DRL 6643 3/97.

Australian 200 lb per mile copper wire. In fact, virtually all the materials used in the pole line were manufactured in Australia. Although engineers were constructing the Markham Valley Road parallel to the right of way, it was closed to traffic and the signallers could not get permission to use it. This made for a slow job and it was not until after the road was opened in December that construction of the pole line began to make headway, reaching Nadzab on 11 January 1944.

Beyond Nadzab the line carried only 8 circuits (16 wires) and there was no road at all. Fortunately, 6x6 trucks could negotiate the Kunai grass and ford streams. To span rivers, 'H' fixtures, a modification of the common 'A' frame anchored with guy ropes, were used. After they were in position, a soldier would swim the river with a rope tied to his waist. The wire would then be pulled across. The far side of the Leron River was reached on 3 February. Beyond this point, resupply had to come by airdrop or through trade with the locals. To span the Umi River, parts were found between Lae and Kaiapit for an Australian 75-foot Steele bridge, which was delivered to Kaiapit by air. Although none of the linesmen had ever built a bridge before, it was successfully erected in four days, opening the area to motor vehicle traffic. West of the Erap River, 25-foot tubular steel poles were used. The line ultimately reached Gusap on 8 April 1944. By this time, the war had moved on and GHQ cancelled the final leg from Gusap to Dumpu, ruling that Spiral Four would be sufficient for Dumpu's needs.[171] New Guinea Force assumed responsibility for maintenance of the Markham Valley Pole Line on 15 September 1944 and immediately decreed that the line from Nadzab to Gusap need not be maintained, although this directive was soon ameliorated to support some antiaircraft units based 20 km out from Nadzab.[172]

As on the Kokoda Track, lightning proved to have a great affinity for signal cable, whether suspended or buried. By 20 April 1944, the Markham Valley Pole Line had been struck five times and the Finschhafen Line at least twice. Other natural hazards also took their toll. Jungle roots grew into the rubber shielding. Insulation was eaten by insects.

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[171] *The Markham River Valley Pole Line: An Official History of Project 1201-A*, 13 May 1944, AWM54 595/7/22.

[172] BGS NGF to HQ NG L of C Sigs, "Maintenance of Signal Lines Lae-Nadzab", 15, 16 September 1944, AWM54 425/5/24.

Flash floods carried sections away. Line laid in water was ripped up by anglers fishing with hand grenades. Some natives used it for belts and an artillery major even cut a section to wire his tent. Yet, as on the Reinhold Highway, the biggest hazard to signal wire was the activities of the engineers. Engineer equipment working around airstrips continually cut cables that had to be buried because of low-flying aircraft. Things were particularly bad along the stretch where engineers were working on the Markham Valley Road. [173]

Meanwhile, the Australian Army was working on one of its most ambitious undertakings of the war: laying a submarine cable to provide a secure line circuit between Australia and New Guinea. A cable laying ship, the SS *Mernoo*, was chartered for eight weeks for £200 per day.[174] Because stocks of submarine cable in Australia were small and the prospect of obtaining more from overseas was negligible, the initial plan was to lay cable to the closest point on the Papuan coast to Cape York and run an overland tree slung line to Port Moresby from there. Before surveys of the route were complete, the Post Master General's Department (PMG) offered to recover one of two cables laid across the Bass Strait from Victoria to Tasmania in 1909. These were still in use but only as spare lines, having been superseded by a more modern cable laid in 1935. Lieutenant Colonel N. J. McCay, an officer on the staff of the Signal Officer in Chief, Major General C. H. Simpson, managed to persuade the PMG to release the other cable as well. Laid end to end and connected to new cable allocated to the project, a single cable could be laid from Cape York all the way to a point near Port Moresby.[175] The Army Minister, Hon. F. M. Forde, was aghast when he discovered that the Army and the PMG had removed the second cable. While acknowledging the military value of the project, he thought that

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[173] GHQ SWPA G-3 Journal 23 May 1944, "Spiral Four in the SWPA", AWM54 492/4/29; Thompson and Harris, *The Signal Corps: The Outcome*, pp. 249-251.

[174] Secretary, Department of Army, "Submarine Cable and Telegraph Line Between Cape York and Port Moresby", 18 August 1943, NAA (Vic): MP742/1 94/13/571.

[175] Secretary, Department of Army, "Provision of Submarine Cable Australia – New Guinea", 19 August 1943, NAA (Vic): MP742/1 94/13/571.

decisions involving national infrastructure should be put before Cabinet for consideration.[176]

On board the *Mernoo* – which also lifted the Bass Strait cables – was Major J. W. Read, another of Simpson's staff officers, with a team of PMG trained submarine linesmen. The plan was to lay cable parallel to the shore for 280 km, then directly to Cape York. Cable laying began on 1 October 1943 but soon ran into difficulty. *Mernoo* encountered an uncharted area of deep water of up to 1,000 fathoms and the cable broke under its own weight. The ship's recovery gear could not work in such deep water and although the cable was retrieved near the shore, it broke again when *Mernoo* returned to the deep water, with the loss of some 85 km of cable. [177]

To replace the cable lost in the Torres Strait, the Army turned to local manufacturers.[178] Although this type of cable had never before been manufactured in Australia, the only real difficulty lay in procuring the insulation. Gutta Percha, a naturally occurring plastic chemically similar to rubber obtained from the sap of certain trees in Asia, was normally used for insulating submarine cabling but was unavailable, so the Army turned to PVC. Several manufacturers were involved in the production of the cable, the final stages of which were carried out by Metal Manufacturers Ltd at Port Kembla.[179]

A second attempt was made starting from Delana, about 200 km northwest of Port Moresby. This time *Mernoo* managed to avoid the deep water but there was still trouble. On 19 October the ship's RAN escort picked up a submarine contact and *Mernoo* had to be blacked out. At the time it was suspected that the security of the operation had been breached and the enemy was making a deliberate effort to sink *Mernoo*. It was not possible to stop cable laying, and in view of the danger of someone being decapitated by the cable in the darkness, Major Read ordered the crew out of the hold for the duration of the alert. Without manual control, the cable uncoiled in large loops but did not break and

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176 Minister for Army to Prime Minister, "Australia – New Guinea Submarine Cable", 19 October 1943, NAA (Vic): MP742/1 94/13/571.

177 Barker, *Signals*, pp. 196-198.

178 CGS to LGA, "Submarine Cable Supplies", 13 October 1943, NAA (Vic): MP742/1 94/13/571.

179 Mellor, *The Role of Science and Industry*, p. 500.

was successfully laid to Cape York. To complete the job, linesmen connected the Cape York terminal to the carrier repeater station and thence to Jacky Jacky, 48 km south of Cape York, using steel poles. From there, the line ran to Townsville. The 19th Line of Communications Signals ran a PVC-insulated tree-slung copper wire line from Port Moresby to Delena, through a series of crocodile infested swamps and inlets. Work on landlines was completed around 10 November. The mouth of the Galley Reach still needed to be crossed with a submarine cable and *Mernoo* returned to New Guinea to lay the required 55 km of submarine line. By early December, the installation was complete and the line tested between Port Moresby and Townsville.[180]

In March 1944 Colonel McCay, on board the chartered ship *Enterprise*, supervised the repair of a fault in the cable about 46 km from Cape York. Later the same ship replaced the land line between Delena and Boera, west of Port Moresby, with a submarine line employing the new PVC cable. The cable broke on 30 November 1944, putting it out of action until it was repaired on 31 January 1945.[181] The submarine cable served its intended purpose well, providing secure communications between New Guinea and the mainland until June 1945, when it was parted by tidal action where the loops had been laid when the *Mernoo* was interrupted by the submarine alert. It was still awaiting a cable ship to repair it on 15 August, when Lieutenant General V. A. H. Sturdee wrote to LHQ, recommending that use of both the submarine cable and the Jungle Trunk Route be discontinued in view of the much reduced traffic, which could be handled by radio.[182] His recommendation was accepted on 28 September 1945 and the signallers began to salvage the line.[183]

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180 Barker, *Signals*, pp. 196-198; *Weekly Signal Review for Week Ending 24 October 1943*; *Weekly Signal Review for Week Ending 7 November 1943; Weekly Signal Review for Week Ending 5 December 1943*, AWM54 313/4/15.

181 Barker, *Signals*, p. 198.

182 GOC First Army to LHQ, "Jungle Trunk Route and NG-Mainland Cable", 15 August 1945, AWM54 425/5/24.

183 CGS to GOC First Army, "Submarine cable Australia-New Guinea and Jungle Trunk Line Moresby-Lae", 28 September 1945, AWM54 425/5/24.

CUTTHROAT

Meanwhile, on 1 January 1944 the 18th and 15th Infantry Brigades began the relief of the 21st and 25th Infantry Brigades in the upper Ramu Valley, the latter returning to Australia. Thirty-six *Dakotas* per day were allocated to the task. Two missions were flown on the first day but this proved too much for Dumpu and thereafter only one mission was flown per pay. By 3 January the relief of the 21st Infantry Brigade was complete and the 18th occupied its positions on and around Shaggy Ridge. The subsequent relief of the 25th Infantry Brigade by the 15th was effected by 9 January.[184]

Incoming units carried two days' rations with them. The 7th Division laid down a policy that one day's SWPA rations be held at all posts. This had not been entirely carried out but some posts held two or three days O2 rations in addition to the SWPA rations.[185] The Operational Ration O2 was the culmination of a development effort by the Army Catering Corps, led by Brigadier Sir Stanton Hicks. It was designed as a field ration, containing all the required dietary elements to satisfy hunger and provide proper nutrition, including vitamins and calories, and was capable of being eaten hot or cold, which was fortunate in the Ramu Valley, where dry firewood was scarce. It was lightweight, could withstand heat, and would not deteriorate during storage. Packaging was the most obvious improvement: three meals separately wrapped in separate waterproof cartons in a tin strong enough to be airdropped but which could be opened with an attached opener. The ration included wheat germ caramel, chocolate, a tin of meat or stew, tea, sugar, cheese, wholemeal biscuits, vegemite, cigarettes and matches. The O2 ration was popular, although it was mainly used by patrols, with most of the troops eating two hot meals per day brought up from company kitchens even in forward areas.

No component of the ration was enjoyed as much as fresh bread. The 21st Infantry Brigade set up a field bakery, using three ovens made from 44-gallon drums and improvised trays and utensils. Finding dry wood was a major difficulty. Native parties scoured the surrounding area for fuel and packing cases were sometimes used. The ovens were capable of producing 11,000 rolls in a working day but this was found to be too

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184 *Summary of Operations 7 Aust Div 15 Oct 43 – 31 Jan 44*, AWM54 595/7/2.

185 OC 18th Infantry Brigade, *Report on Administration – Ramu Valley*, AWM54 595/7/15.

much for the bakers and production was limited to 7,000 rolls per day, with the daily bread supply augmented by 180 kg from the 7th Division field bakery.[186]

A systematic check was made of rations held by all posts and contaminated tins were destroyed. Reserves were built up and by 18 January all posts held one day's SWPA rations and three days' O2 rations were held by the forward posts. Infantry battalion headquarters also held two days' native rations. Some 740 natives were reassigned to the 18th Infantry Brigade from the outgoing 21st, a total soon built up to over 1,000. Many of the natives had been carrying for four months without letup, so steps were taken to rest one-seventh of them daily, and to limit their hours of work.

Ammunition too was inspected. A large number of 2-inch and 3-inch mortar bombs and hand grenades were found to have been affected by moisture and the primary and secondary charges were replaced. A quantity of small arms ammunition was destroyed. Ground sheets were set up, dunnage was laid to lift the ammunition up off the ground and drains were dug around the dumps. All posts were stocked with ammunition for three days' usage and special reserves of 3-inch mortar ammunition were held in forward areas. The 18th Infantry Brigade took over 10 jeeps and trailers from the 21st. By this time, the jeephead had been pushed forward to Guy's Post by the 2/5th and 2/6th Field Companies. Timber bridges were thrown over the Faria, Mosia, Mene and Ioge Rivers and pipe culverts were improvised from 25-pounder shell cases, apple drums and 44-gallon drums. From Guy's Post, native carriers moved stores to the forward positions. Since it normally rained at night, the road to the DID was closed until 1000 or 1100 and no traffic was allowed through to Guy's Post until 1100 to give the sappers time to effect any necessary maintenance.[187]

The 18th Infantry Brigade was therefore well-situated to hold its positions indefinitely, but its commander, Brigadier F. O. Chilton, had other ideas. Operation CUTTHROAT would drive the enemy from Shaggy Ridge and forward positions on Kakiryo Saddle. The big question was whether it would be logistically feasible to maintain the brigade using only

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186 Walker, *The Island Campaigns*, pp. 269, 270, 278; Jan Roberts Billett to the author, 23 July 2003.

187 McNicoll, *Teeth and Tail*, pp. 207-208; OC 18th Infantry Brigade, *Report on Administration – Ramu Valley*, AWM54 595/7/15.

carriers and the occasional airdrop until a supply route over Shaggy Ridge could be opened. “Once again,” wrote Brigadier Chilton, “administrative problems proved the limiting factor throughout these operations”.[188]

The line of communications over Shaggy Ridge was opened on 25 January, the sixth day of the attack. Ammunition expenditure was light except for 3-inch mortar ammunition for the 2/9th Infantry Battalion, which was without artillery support in the early stages. Troops were pressed into service to assist the carriers. For a time even the mail was held up in favour of ammunition. Due to the stony nature of some of the tracks, some natives became casualties due to cut feet and there was some sickness among them, mostly colds attributable to the overnight chill at high altitudes. On 23 January, three *Dakotas* dropped 900 SWPA rations, 900 O2 operational rations, and small arms ammunition to the 2/12th Infantry Battalion to relieve the strain on the natives and to enable them to bring up blankets and water. Some 90% of the drop was recovered.

Water was a serious problem for the entire brigade but particularly for the 2/12th Infantry Battalion as its water had to be carried from the Mene River, up to three hours away. A spring was found close by but, even then, troops had to assist in carrying. On 23 January 50 waterbags were dropped by RAAF *Wirraway*. That day 100 2-gallon tins were brought up by native carriers, who filled them from water tanks belonging to the 2/9th Infantry Battalion *en route.*[189]

Heavy rain in the catchment of the Faria River 20 January caused the river to rise by 2.4 metres and change its course, bypassing the principal bridge. The sappers replaced it and other bridges with decked cable suspension bridges or box girder bridges.[190]

By 6 February the 18th Infantry Brigade had achieved its objectives and the 15th Infantry Brigade pressed on across the mountains to Bogadjim.[191]

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188 *!8th Infantry Brigade Report on Operation CUTTHROAT*, AWM54 595/7/18.

189 OC 18th Infantry Brigade, *Report on Administration – Ramu Valley*, AWM54 595/7/15.

190 McNicoll, *Teeth and Tail*, p. 209.

191 Dexter, *The New Guinea Offensives*, pp. 756, 771-779.

After the war, Lieutenant General Hatazo Adachi, the defeated Japanese commander, opined that, while it was successful, CUTTHROAT was a mistake:

> From the point of view of supply, it cost a great number of jeeps and transport planes to keep in action such a big force as the division in the Ramu Valley, where it could not be as effective as it could in other areas. In other words, it would have been much more advisable for the Australian forces to have employed about a brigade in the Ramu Valley as a threat only to Madang and use the bulk of the forces for operations along the coastline. In New Guinea operations it is taboo for the raiding party to engage in inland actions. The operations should have been carried out along the coast. This is the doctrine to which the Japanese have always adhered rigidly.[192]

Thus, both sides claimed a victory of sorts: the Australians for driving the Japanese from Markham and Ramu Valleys and the Finisterre Range; the Japanese for tying down an Australian division that could have been better used elsewhere. From the point of view of supply, Blamey could not have employed the 7th Division along the coast. From the very origin of the POSTERN plan, the concept was to advance overland, supported by road and air, precisely because sealift was not available. Whereas, although it might have cost a number of jeeps and transport planes, the 7th Division was effective in the Ramu Valley. The Australian Army never had any rigid doctrine concerning where operations should be conducted or how they should be supported. On the contrary, it sought to exploit every available means to bring the enemy to battle and defeat it wherever it could. And in that sense, the 7th Division achieved a notable success.

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[192] Ibid, p. 762.

8. Amphibious Warfare

During the early part of the Great War, the Australian Army had conducted amphibious operations at Rabaul and Gallipoli, but its first amphibious operation of the Second World War was in October 1942, when a battalion was landed on Goodenough Island from the destroyers HMAS *Arunta* and *Stuart* in an operation which "planned as a standard amphibious operation, did not go smoothly".[193] The 9th Division's amphibious operations at Lae and Finschhafen therefore represented a venture into the unknown so far as logistical support was concerned. Amphibious warfare doctrine was still in flux. As VII Amphibious Force still had only four assault transports, the beaching ships, the LSTs, LCIs and LCTs, would have to be used for resupply as well as for the assault. New techniques had to be developed.[194] Yet ship-to-shore logistics, using amphibious ships to move troops and supplies from distant bases to enemy-held beaches, promised to be the most effective means of logistic support of all.

Since Guadalcanal, when the US Navy had left the US Marines stranded, Army commanders had distrusted the willingness of the amphibious force to continue regular supply runs, so doctrine called for forces to be landed with at least 20 days' supplies,[195] which was what the 9th Division took with it to Lae. Calculating so-many days' supply of rations is a matter of straightforward multiplication; ammunition and POL are another story as usage will be dictated by the progress of operations. The quantity of ammunition was calculated based on the British WUR (War Usage Rate). For 25-pounders, this was 32 rounds high explosive (HE), 2.5 rounds smoke, 2 rounds armour piercing (AP) and 5.2 supercharge rounds per gun per day; for the 40 mm Bofors guns it was 100 rounds per gun per day.[196] That usage rates based on the North African campaign were unlikely to be applicable to jungle warfare was not overlooked, but due to the supply difficulties during the Papuan Campaign there was no relevant experience in the South West Pacific to draw

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193 McCarthy, *South West Pacific Area - First Year*, pp. 347-349.

194 Barbey, *MacArthur's Amphibious Navy*, p. 43.

195 Brig R. N. L. Hopkins, *Notes on Amphibious Operations No. 5*, AWM54 589/7/22; Hough, Frank O., Ludwig, Verle E. and Shaw, Henry I., *Volume I: Pearl Harbor to Guadalcanal*, (Nashville: The Battery Press, 1993), pp. 260-261.

196 *Operation Diminish – 9 Aust Div Operation Order No. 15*, 20 September, War Diary, 9th Division GS Branch, AWM52 1/5/20.

upon. Some 1,200 tonnes of ammunition was drawn from the 10th Advanced Ammunition Depot at Milne Bay and placed in four groups on the Turnbull airstrip, which was handy to the embarkation beach. One group of 50 tonnes was handed over to the 20th Infantry Brigade for a special operation. The main group of 600 tonnes was to be landed on D-Day; the second, of 300 tonnes; on the second night; and the remainder was shipped to Buna as a reserve.[197]

POL, also assembled at Turnbull, included distillate for tractors and *Matilda* tanks, and avgas for an airstrip near Red Beach.[198] POL was decanted into 4-gallon drums, denuding the Milne Bay area of them in the process, and some 5,000 jerry cans obtained from the US Army. Use of packaged fuel made for quicker loading and unloading. [199] Of the total weight of stores and supplies, rations accounted for around 20% and ammunition for 50%, of which 75% represented artillery ammunition.[200]

VII Amphibious Force planners recommended that its LSTs carry fully loaded trucks, allowing quick unloading by simply driving them off, with the LSTs reloaded with empty trucks for the return journey. This made good sense from the US Navy's point of view, for a bulk loaded LST could take up to six days to unload and they had absolutely no intention of sitting around on a beach that long waiting for Japanese aircraft to put in an appearance. Alas, this would require three general transport companies with 250 trucks, more than the 9th Division had available. Someone suggested borrowing them from the USASOS, as it would have to ship trucks in to develop the US Advanced Base at Lae,[201] so arrangements were made to temporarily transfer 200 trucks from the US Sixth Army and USASOS to the 9th Division.[202] Vehicle loading also reduced cargo capacity by about 2,000 m^3. About 900 m^3 could be carried by 12 LCTs, which General Wootten particularly wanted in order to expedite the movement of equipment. Another 750 m^3

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197 "Ammunition Report – Lae Campaign", War Diary, 9th Division AASC, AWM52 10/2/24.

198 CRE 9th Division, *Report on Operation Postern*, NACP RG496 Entry 386 Box 2325.

199 POL Officer, 9th Division, "POL Report – Lae Campaign", War Diary, 9th Division AASC, AWM52 10/2/24.

200 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

201 Minutes, POSTERN Conference HQ NGF, 25 July 1943, AWM54 213/3/20.

202 GOC 9th Division to GOC I Corps, 14 August 1943, Herring Papers, State Library of Victoria: MSS 11355 Box 10.

could be carried vehicle-loaded by LSTs on the second night if the top deck could to be used as well as the tank deck. This represented a grave tactical risk, for a bomb hit could start a catastrophic fire, potentially resulting in the loss of the ship.[203] VII Amphibious Force would not yield on this point and the only items they permitted to be carried on the top deck were 40 mm antiaircraft guns. Each LST would carry 95 m^3 of bulk cargo on the tank deck, which would take about 2½ hours to unload.[204]

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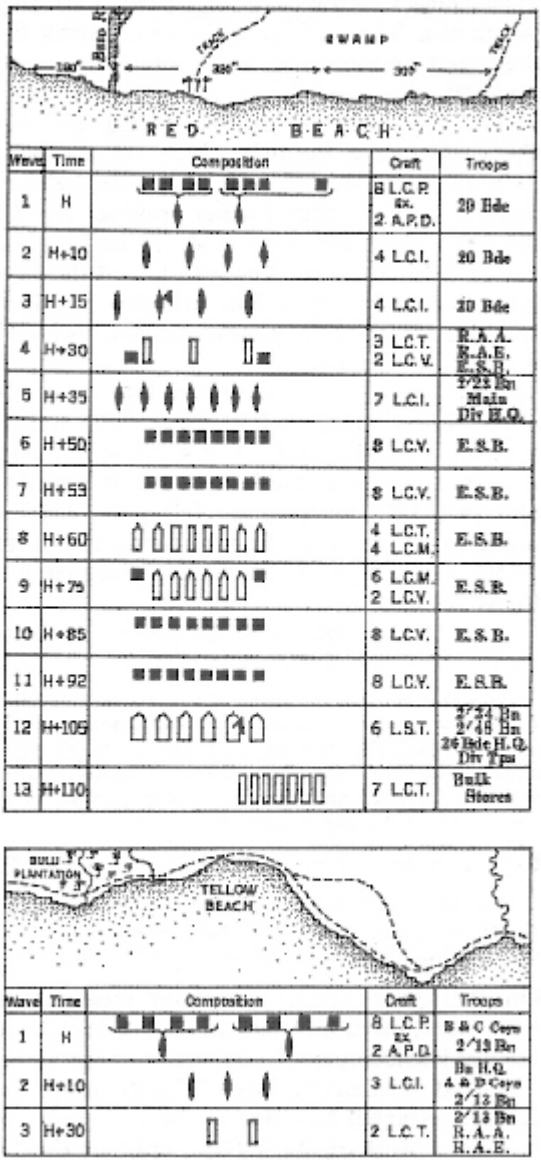
[203] "Points with Reference to Plan", undated, War Diary, 9th Division GS Branch, AWM52 1/5/20.

[204] CTF 76, "Naval Aspects: Lae Operation – Report On", undated, AWM54 589/7/27.



19. Landing at Red and Yellow Beaches

Source: Dexter, *The New Guinea Offensives*, p. 331

Red Beach

Shortly after dawn on 4 September 1943 the 9th Division began landing east of Lae. Conditions were perfect, with a clear sky and calm sea. The beaches were found to be excellent, with a steep 1:10 grade clear of obstructions and a shelf dropping off into deep water a few metres offshore, but inland, conditions were swampy.

There was little opposition ashore, but Japanese aircraft dropped a dozen bombs. *LCI 339* took a direct hit and two near misses and was set on fire, resulting in 7 Australians killed and 28 wounded,[205] while *LCI 341* received a near miss that blew a large hole in her side.[206] Both managed to beach and land their troops, but *LCI 339* remained on the beach for a week, a target for Japanese bombers. It was eventually towed clear but then drifted onto a reef, and was lost.[207]

The US 532nd EBSR Group was some 1,296 strong. It included a reinforced boat company with 10 LCMs, 3 LCSs, 44 LCVPs and four attached US Navy LCTs; the Shore Battalion; and signals and medical detachments. The Shore Battalion was well

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205 Dexter, *The New Guinea Offensives*, p. 332.

206 *Naval Aspects Lae Operation – Report on*, AWM54 589/7/27.

207 Morison, *Volume VI: Breaking the Bismarcks Barrier*, pp. 263-264.

equipped with mechanical plant, which included a crane, a grader, a D7 bulldozer and 7 TD9 angledozers.[208]

By contrast the 9th Division engineers, despite the innovative addition of a mechanical equipment section, had only seven bulldozers, two of which had been built from salvaged parts at the last minute. Nonetheless, it became apparent that the 532nd EBSR Group had insufficient resources to operate the beachhead alone, for it was designed to support only one brigade.[209] In this, the 9th Division staff had miscalculated, for they had assumed the that the shore battalion could support the entire division and had failed to request additional logistic units, even rejecting the offer of the 2/1st Ordnance Beach Detachment, a unit specifically trained for such work. Another mistake was appointing the division AA&QMG, Colonel B. R. W. Searl, as Military Landing Officer, because the workload was too great for him to adequately perform both duties. The lack of a proper naval beach party was also keenly felt, with confusion arising over beach lights, signs and the control of vessels.[210]

The steep beach grade allowed the six LSTs, each loaded with around 400 men, 35 vehicles and 95 m^3 of supplies, to run up onto the beach, and the prefabricated ramps that had been prepared were unnecessary.[211] A company of the 2/24th or 2/48th Infantry Battalion accompanied each LST, and were available to unload it. They did an excellent job, with one LST completely unloaded in 105 minutes and the rest within 135 minutes. All LSTs retracted from the beach by 1030 except for one that had to be pulled off by the tug USS *Sanoma*. The unloading of the seven LCTs, each carrying 136 m^3 of bulk stores, was less satisfactory. The unloading plan called for a platoon from the 2/3rd Pioneer Battalion to travel in each LCT and to unload, and for this to be increased to two platoons if they were not required by the CRE. In the event, some were required to help construct beach exits, without which stores began piling up on the beach. The remainder were not enough, and unloading took over six hours to complete, even with the Americans pitching

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208 Casey, *Amphibian Engineer Operations*, pp. 95-100, 104.

209 CRE 9th Division, *Report on Operation Postern*, NACP RG496 Entry 386 Box 2325.

210 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

211 Casey, *Amphibian Engineer Operations*, p. 99; *Naval Aspects Lae Operation – Report on*, AWM54 589/7/27.

in to help.[212] In all, some 7,800 troops and 1,700 m^3 supplies had been landed. The boats of the 532nd EBSR Group returned to Morobe under their own power, leaving 10 LCVPs, 10 LCMs and 2 LCSs behind at the request of General Wootten.[213]

That afternoon, the Japanese mounted a strong air attack with over 70 aircraft.[214] They passed over the small craft of the 532nd EBSR returning to Morobe and launched a coordinated attack on six LSTs headed for Red Beach. *LST 471* and *473* were hit; 15 Americans and 36 Australians were killed and 16 Americans and 51 Australians wounded.[215] The remaining four LSTs continued on, arriving at around 2300, and were unloaded in the dark.[216] On returning *LST 452* and *458* took the two damaged LSTs in tow. At Morobe they took on their cargoes and joined the next LST group the next day. *LST 471* and *473* met up with the repair ship *LST 455* and first aid ship *LST 464*, and were towed to Brisbane by the tugs USS *Sprightly* and *Coucal*.[217]

The seven LCTs which arrived late on the night of 8/9 September after being delayed by an air attack were less than half unloaded before they had to withdraw. Admiral Barbey's position was that unloading at night was necessitated by Japanese air raids on Red Beach, of which there were three on 5 September and three more on 6 September, resulting in damage and light casualties.[218] When Wootten refused to accept that ships should withdraw at a certain hour and demanded that they be fully unloaded, Barbey restricted the amount they carried to what could be unloaded in the time. This was better, because at least everyone knew what was at Red Beach and what was not, sorting and cataloguing stores in the dark being difficult. In particular the 9th Division discovered that while drums were a fine way of packaging many commodities, black writing on green drums was not an ideal colour scheme at night. To speed up unloading a special labour detail of 950 men

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212 AA&QMG 9th Division, "Unloading Organisation for LSTs and LCTs; Wave 12 D-Day", 22 August 1943, War Diary, 9 Division AG Branch, 1/5/21; *Naval Aspects Lae Operation – Report on*, AWM54 589/7/27; 2nd ESB, "Summary of Lae Operation", 21 October 1943, USACE Box X-77 E-15

213 Casey, *Amphibian Engineer Operations*, p. 104.

214 Craven and Cate, *Guadalcanal to Saipan*, pp. 183-184.

215 *Naval Aspects Lae Operation – Report on*, AWM54 589/7/27.

216 Casey, *Amphibian Engineer Operations*, p. 105.

217 War Diary, TF 76, 5, 6, 7, 20, 30 September 1943, NACP RG38 Box 179.

218 War Diary, TF 76, 8, 12 September 1943, NACP RG38 Box 179; CTF 76, *Lae Operation – Report Upon*, 23 October 1943, NAA (Vic): B6121/3 74B.

was sent from the 4th Infantry Brigade to augment the 450 men already provided to assist the Shore Battalion.[219]

The engineers laid matting on the sand to facilitate the movement of vehicles, with a lateral steel ARC mesh road constructed along the full length of the beach. The area behind the beach was found to be swampy and roads behind the beach had to be corduroyed. Only one exit could be prepared from each of the beach areas, and stores and equipment had to be stacked on the fringe of the jungle. Vehicles were dispersed in the riverbed of the Buso River.[220] Under the circumstances, it was not possible to properly segregate the supplies and in some cases stores, ammunition and fuel dumps were 20 metres apart, and with only tree cover for concealment. When, inevitably, nine Japanese bombers attacked the maintenance area, an ammunition dump exploded and a fuel dump was set on fire. Flames spread to nearby stores and nearly 100 tonnes of stores and equipment were lost. One American was killed and 12 wounded.[221] The intended maintenance area was not used owing to bad approaches, and was shifted the next day to the west bank of the Buso River.[222]

Petrol consumption was high in this operation, amounting to nearly 73,000 litres per day, owing to vehicles being forced to use their lowest gear at all times. This, combined with the fact that vehicles were constantly being marooned in flooded river crossings, resulted in double the normal consumption of oils and lubricants. The countryside was scoured for Japanese petrol and some 86,000 litres were obtained, but this accentuated the disproportionate use of oils and lubricants, which had to be severely rationed, as was petrol for a time.[223]

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219 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

220 Casey, *Amphibian Engineer Operations*, pp. 99-100; CRE 9 Division, *Report on Operation Postern*, NACP RG496 Entry 386 Box 2325.

221 Casey, *Amphibian Engineer Operations*, p. 103; War Diary, 9th Division GS Branch, 4 September 1943, AWM52 1/5/20.

222 SSupO 9th Division, "Report on Sups – Lae Operations", War Diary, 9th Division AASC, October 1943, AWM52 10/2/24.

223 POL Officer, 9th Division, "POL Report – Lae Campaign", War Diary, 9th Division AASC, AWM52 10/2/24.

As the 9th Division advanced towards Lae it became apparent that it would not be possible for road building to keep pace with the advance. Supplies could be moved forward only as far as Aluki, where a DID was established.[224] A road to the Apo fishing village was supposed to be completed on the second day but the engineers found the ground swampy and three creeks needed bridging.[225] The situation worsened after torrential rains began on the night of 6 September, flooding the swamps, turning the tracks into quagmires and damaging perishable commodities.[226]

The 532nd EBSR was called upon for help. In the early hours of 7 September, 5 LCMs and 6 LCVPs were sent forward from Red Beach with supplies, rations and ammunition. Three LCMs and 5 LCVPs were unloaded near the Apo fishing village, and one LCM at Singaua Beach, where a small dump was established in the nearby Copra Shed.[227] This was no simple matter for the amphibian engineers, as their landing craft were not equipped with chartrooms or navigational equipment; nor, owing to a wartime shortage of non-magnetic steel, were their compasses reliable.[228] Nonetheless, they somehow managed to make their way in the dark, avoiding the dangers of uncharted reefs, submerged rocks and landing on the wrong beach. The uncharted reefs turned out to be out there alright, and rendered the approach to the beach too dangerous for regular use.

Another beach had to be found, and soon, as the tracks were being badly cut up and were closed on 7 September to all but the most urgent traffic. Responsibility for traffic control was given to the RAE and additional sappers and pioneers were set to work on the Aluki-Apo Road. That night Australian and American engineers inspected the area near the mouth of the Burep River, which they discovered to be suitable for landing craft operations. They decided to establish a regular LCM ferry service from Red Beach to the

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224 SSupO 9th Division, "Report on Sups – Lae Operations", War Diary, 9th Division AASC, October 1943,AWM52 10/2/24.

225 CRE 9 Division, *Report on Operation Postern*, NACP RG496 Entry 386 Box 2325.

226 S SupO 9th Division, "Report on Sups – Lae Operations", War Diary, 9th Division AASC, October 1943, AWM52 10/2/24.

227 Casey, *Amphibian Engineer Operations*, pp. 107-109; War Diary, 9 Division GS Branch, 7, 8 September 1943, AWM52 1/5/20.

228 Friedman, *US Amphibious Ships and Craft*, p. 98.

area, henceforth known as G Beach, where a maintenance area was established. The first night's run brought up not only supplies but also bulldozers and a pair of 25-pounders.

The 24th Infantry Brigade, operating along the coast, was soon getting all its supplies by water. The beaches were completely exposed and a gale on the night of 10 September washed half a dozen LCMs ashore. A salvage team was sent up from Morobe. Meeting Wootten's request for 10 LCMs and 10 LCVPs to be on hand eventually required twice that many additional craft to be despatched. Requests for LCTs to land at G Beach were resisted by the US Navy, although they landed a couple of 155 mm guns. As the advance on Lae continued, another beach was opened at D Beach, west of the Busu River mouth. It was found that by sending out the first resupply mission of the day at 1730, each boat could make three trips to a forward beach before dawn. This meant that the shore parties had to be split between Red Beach and the forward beaches.

Meanwhile, the 9th Division engineers managed to clear and corduroy the Aluki-Apo road through the swamp, and erect the required bridges, opening the road on 10 September. Roadworks were pressed along in all sectors in order to bring up supplies and ammunition for a major attack on Lae on 16 September.[229] This turned out to be unnecessary, because the Japanese withdrew and the 9th Division entered the town shortly after the 7th Division.

Operating the string of dumps and supply points that had been established was beyond the resources of the service troops in the area, so after the fall of Lae the depots at Aluki, Apo, Singaua and D Beach were closed and soon afterwards the DIDs at Lae and Busu were handed over to the 5th Division.[230]

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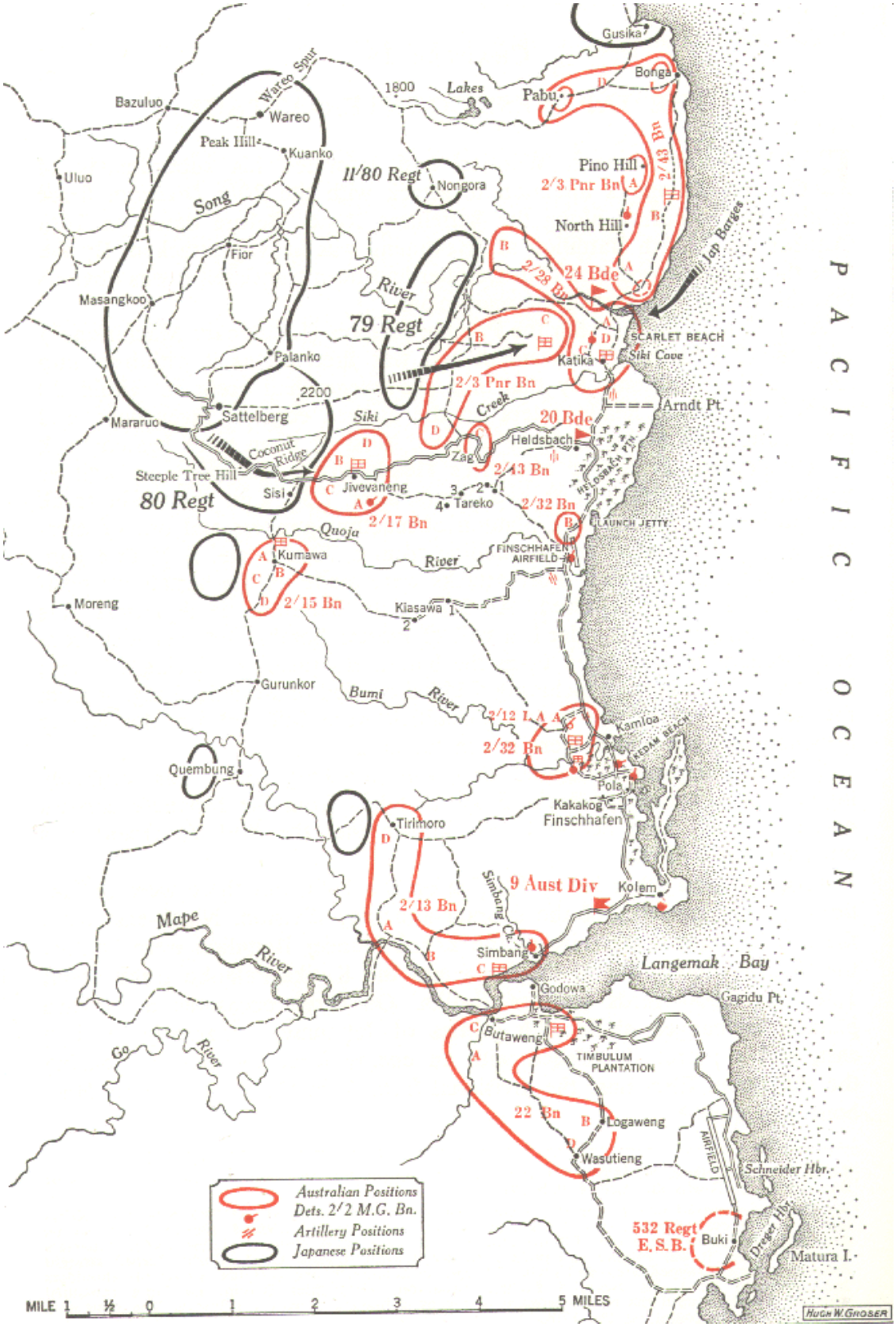
229 Casey, *Amphibian Engineer Operations*, pp.109-110; SO Arty I Corps, "Notes on Artillery Operations", AWM54 587/6/9; CRE 9th Division, *Report on Operation Postern*, NACP RG496 Entry 386 Box 2325.

230 SSupO 9th Division, "Report on Sups – Lae Operations", War Diary, 9th Division AASC, October 1943,AWM52 10/2/24.



Map 13. Finschhafen. Situation as at 16/17 October. 1943

Source: Dexter, *The New Guinea Offensives*, p. 528.

Finschhafen

After Lae, New Guinea Force's next objective was Finschhafen,[231] which GHQ decided would become a large base.[232] I Corps had already prepared a plan for its capture, selecting the area south of the Song River for an amphibious landing.[233] The landing beach was called Scarlet Beach after the coloured markers that would be used to mark it, the very same ones that had been used at Red Beach with a slightly different name to avoid confusing the two beaches.[234] The target date was 21 September,[235] in order to have the airstrips ready for DEXTERITY.[236] Planning conferences were held at Buna.[237] Two scenarios were examined: a ship-to-shore operation using the 6th Division's 16th Infantry Brigade, and a shore-to-shore operation with the 9th Division's 20th Infantry Brigade. The latter option was selected, as it could be mounted at short notice.[238] The operation came to be called DIMINISH, which was actually GHQ's codename for Finschhafen itself.[239]

General Herring, who was critical of the amphibian engineers' performance at Lae, toyed with the possibility of replacing the amphibian engineers with a company of pioneers and a detachment of the 1st Water Transport Group, with landing craft supplied by the US Navy.[240] The idea was shelved as there was insufficient time to organise a proper Australian amphibian engineer organisation,[241] but Herring would later pursue the idea in Australia.

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231 *GHQ Operation Instruction No. 34/12*, 15 September 1943, Blamey Papers, AWM 3DRL 6643 3/97.

232 "Notes on Conference in USS *Conynham* off Buna 18 Sep 43", War Diary, NGF GS Branch, AWM52 1/5/51.

233 Dexter, *The New Guinea Offensives*, p. 444.

234 "Notes on Conference HQ 9th Division 2000 Hrs 18 Sep 43", War Diary, 9th Division GS Branch, AWM52 1/5/20.

235 "Capture of Finschhafen – Narrative of Events from 13 Sep 43 to 2 Oct 43", AWM54 591/7/20.

236 GHQ SWPA G-3 Journal, 15 September 1943, AWM54 595/3/2.

237 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

238 GOC I Corps to CinC AMF, [10 September 1943], Herring Papers, State Library of Victoria, MS 11355, Box 10.

239 "Notes on Conference HQ 9th Division 2000 Hrs 18 Sep 43", War Diary, 9th Division GS Branch, AWM52 1/5/20.

240 GOC I Corps to CinC AMF, [10 September 1943], Herring Papers, State Library of Victoria, MS 11355, Box 10.

241 DCGS to G-3 GHQ SWPA, 25 September 1943, War Diary, G Branch, NGF, AWM52 1/5/51.

Admiral Barbey allocated sufficient ships to lift a reinforced brigade: 4 APDs, 15 LCIs and 6 LSTs. Also available were 10 LCMs and 15 LCVPs of the US 532nd EBSR.[242] Given the difficulty of maintaining a larger force, one brigade was all that General MacArthur would authorise. Intelligence estimates differed considerably over the number of Japanese in the Finschhafen area. GHQ believed that there were only about 350.[243] LHQ, with an independent organisation using a different methodology, thought that it was more like 4,000.[244] The 9th Division's own estimate, based on maps and documents captured at Lae, was around 2,000.[245]

One of the lessons of the Lae operation was the need for a naval beach party to take soundings, mark the beaches and channels, and handle communications between ship and shore. US Navy doctrine held that these should be comprised of personnel drawn from the assault transports, but none were involved in the Lae operation. The task had been given to the amphibian engineer scouts, but they were not trained, equipped or organised for the task.[246] For Finschhafen, an eight-man RAN Beach Party was organised under the command of Lieutenant Commander J. M. Band, RANR.[247]

The 20th Infantry Brigade's commander, Brigadier W. J. V. Windeyer, immediately asked for an extra day to concentrate his brigade at G Beach as the brigade and its equipment were tactically dispersed over a wide area and following recent heavy rains the jungle tracks in the vicinity were sodden, and in some cases impassable. A large number of personnel and a considerable amount of equipment and stores had to be moved from beach to beach by the amphibian engineers.[248]

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242 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

243 CinC SWPA to GOC NGF, 27 September 1943, War Diary, NGF G Branch, September 1943, AWM52 1/5/51.

244 DMI to GSO I (Int) FE Adv LHQ, "Notes for DMI on Enemy Strength Issue", 30 October 1944, Blamey Papers 3DRL 6643 2/55.

245 *9th Division Special Intelligence Summary No. 1*, 19 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

246 Mss, *MacArthur's Amphibious Navy*, p. XVI-7, Barbey Papers, USNHC, Box 32.

247 *Command History of VII Amphibious Force*, p. II-31, Barbey Papers, USNHC, Box 34.

248 Brig R. N. L. Hopkins, *Notes on Amphibious Operations No. 5*, AWM54 589/7/22.

To reduce unloading times without detaching large numbers of men from the 20th Infantry Brigade, a new unloading method was adopted. Each LST would take along a dedicated unloading party of 200 men from the 26th Infantry Brigade and the 2/2nd Machine Gun Battalion,[249] who would return to Buna with their LSTs, help reload them, return to Scarlet Beach with the first resupply mission, and then return to Buna once more before rejoining their units. Other units would help loading at Red Beach, but would remain there.[250]

To help overcome the USN's objection to the time required for unloading of LSTs, Herring cut the ammunition from 20 days' to 12 days' WUR, and rations, POL and stores to 15 days' supply in order to reduce the load per LST to 125 m^3.[251] No engineering stores, controlled stores or signal stores would be taken.[252] This would have to do until the next resupply run, which was expected around D+5.[253] At Red Beach the mass of supplies had been more of a liability than an asset, creating one problem in clearing the beach and later another bringing them up to the advancing troops. The capture of Lae left some 2,300 m^3 of stores at Red Beach that could only be moved by water.[254] For Herring, going in with only 15 days' supplies represented a calculated risk but he was optimistic. "If you have any maps," he advised Wootten, "have a look at [Cape] Gloucester". [255]

A set of oblique aerial photographs of Scarlet Beach were taken on 19 September by the USAAF's 8th Photo Reconnaissance Squadron, the only unit in the theatre trained and equipped to take them. Delivered to VII Amphibious Force that evening, they revealed what appeared to be a shallow sand bar along the southern half of the beach, rendering it

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249 9th Division to 26th Infantry Brigade, 2/2nd MG Battalion, 18 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

250 *9th Division Operation Order No. 15*, "Operation DIMINISH", 20 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

251 "Notes on Conference HQ 9th Division 2000 Hrs 18 Sep 43", War Diary, 9th Division GS Branch, AWM52 1/5/20.

252 "Notes on Conference HQ 9th Division 0900 Hrs 18 Sep 43", War Diary, 9th Division GS Branch, AWM52 1/5/20.

253 *Operation Diminish – 9 Aust Div Operation Order No. 15*, 20 September, War Diary, 9th Division GS Branch, AWM52 1/5/20.

254 Brig R. N. L. Hopkins, *Notes on Amphibious Operations No. 5*, AWM54 589/7/22.

255 GOC I Corps to GOC 9th Division, 20 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

unsuitable for landing craft, thus leaving beaching space for only three LSTs.[256] The landing plan was changed so only three of the six LSTs would beach with the initial assault, the other three returning to Buna, and arriving on the beach at 2300 that night. On considering the situation, Herring realised that this might be a blessing in disguise, as spreading the LST arrivals might make unloading easier.[257] Wootten noted that this would mean that one battery of 25-pounders, one light antiaircraft battery, a quarter of the engineer stores and the casualty clearing station would arrive with the second group of LSTs. The immediate problem was re-sorting the vehicles so the ones most immediately required were loaded on the first three LSTs.[258] Ironically, soundings taken by the RAN Beach Party after the landing revealed that the "sand bar" was actually a white shingle bottom, and in fact the beach was ideally suited to LST operations.[259]

To speed up loading, the LSTs were loaded with bulk supplies at Buna, leaving only vehicles and personnel to be loaded at G Beach.[260] There was considerable confusion at Buna arising from the haste with which the operation had been thrown together. Although LSTs *18, 67, 168, 204, 452* and *454* were beached at Buna by 1000 on 20 September, loading was delayed until 1115 while the 11th Division altered the loading tables, and was halted from 1230 to 1615, while it altered them a second time. The manner of tactical loading was left up to the 1st Base Sub Area, which placed stores well forward on either side of the tank deck to permit rapid unloading by hand. Loading went on through the night in spite of the discovery that the 9th Division had requested stores in excess of the 125 m^3 per LST limit and in the morning there was uncertainty about what should remain loaded and what should be taken off. In the end, the LSTs retracted at 1600 with what was loaded at the time and departed Buna at 2300. At 0345, Buna was raided by six undetected Japanese planes that dropped 12 bombs. An LCS(S) was destroyed, the dock

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256 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

257 GOC I Corps to GOC 9th Division, 19 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

258 GOC 9th Division to GOC I Corps, 21 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

259 Beachmaster Buna to CTF 76.9, "Report on the Landing Operation on Scarlet Beach", Barbey Papers, USNHC, Box 31.

260 "Capture of Finschhafen – Narrative of Events from 13 Sep 43 to 2 Oct 43", AWM54 591/7/20.

and two merchant ships were damaged, and 9 men were killed and 27 wounded.[261] In altering the loading tables without informing I Corps, the 11th Division set up a potentially disastrous situation for when ships were damaged I Corps could not tell what had been lost and was unable to make up the deficiency quickly.[262]

The 2/23rd and 2/48th Infantry Battalions were supposed to be ferried from Lae to G Beach in an LCT in loads of about 300 but the LCT failed to arrive. To get its units in place on time the 9th Division utilised every available amphibian engineer craft.[263] The amphibian engineers, loaded with construction equipment and antiaircraft guns, began retracting from Red Beach at around 1345 on 21 September and set off for Scarlet Beach, some 130 km distant. Loading of the 20th Infantry Brigade commenced at G Beach at around 1500.[264] In addition to bulk stores loaded at Buna, each took on about 38 vehicles and 200 troops. As in the Lae Operation, only light antiaircraft guns were carried on the weather decks. Loading was interrupted at 1730 by a Japanese air raid on G Beach, where troops and supplies were being staged in the open. They dropped a few bombs that fell wide of the mark and caused slight damage but no Australian casualties.

The APDs and LCIs arrived at around 1930 and loading began shortly afterwards. *LCI 31* returned to Buna with mechanical trouble and its place had to be taken by *LCI 343*,[265] leaving part of the 2/13th Infantry Battalion without its transportation. Its commander arranged for one platoon to travel with the 2/15th Infantry Battalion and for his two remaining ships, LCIs *28* and *210*, to stay a bit longer and take the rest. They were now loaded with around 210 men each and had insufficient lifejackets. Loading was completed ahead of schedule and all craft were clear of the beach by 2105 except *LCI 28*, which became stuck on the beach and joined the convoy two hours late.[266] LSTs *67*, *452* and

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261 War Diary, 1st Base Sub Area, 19 September 1943, AWM52 1/8/7; War Diary, TF 76, 20-21 September 1943, NACP RG38 Box 179.

262 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

263 9th Division to 20th Infantry Brigade *et al*, 18 September 1943; "Notes on Conference HQ 9th Division 0900 Hrs 18 Sep 43"; GOC 9th Division to GOC I Corps, 21 September 1943; GOC 9th Division to GOC I Corps, 21 September 1943, War Diary, 9th Division GS Branch, AWM52 1/5/20.

264 Casey, *Amphibian Engineer Operations*, p. 121.

265 Commander LCI Group 20, *Report on Beaching Operations Finschhafen*, Barbey Papers, USNHC, Box 31.

266 War Diary, 2/13th Infantry Battalion, 21 September 1943, AWM52 8/3/13.

454 departed for Morobe, while the rest headed for Scarlet Beach, the faster vessels overtaking the slower ones *en route*.[267]

The landing at Scarlet Beach was opposed. Commander Band was mortally wounded, and the role of Beachmaster was assumed by Sub Lieutenant R. R. Barnes, RANR.[268] The Military Landing Officer, Major J. R. Broadbent, second in command of the 2/17th Infantry Battalion, had the task of coordinating the defence of the beach, movement of stores to the dumps, development of the beachhead and control of traffic. Described as "quick, energetic and full of initiative", he "proved an excellent choice, and in the succeeding days the force owed much to his drive and flair for improvisation".[269]

The sappers assigned to the operation arrived in LSTs *18*, *168* and *204*, which beached at 0650. They carried engineering stores on the same scale as for the Lae operation but with additional axes and machetes. As mechanical equipment had proved to be so useful there, everything in running order was taken to Finschhafen, except for two carryall scoops that had been called forward from Buna, but which I Corps forbid being taken to Finschhafen. After the experience on Red Beach, the sappers were prepared for a strenuous road building effort, but fortunately the hard black sand and white coral of Scarlet Beach facilitated the movement of supplies by jeep and tractor. Between the beach and the Kunai grass inland was a bank five metres high which was cut through by bulldozers to form four beach exits. Vehicles were rapidly cleared and supplies moved off the beach to pre-selected dumps in the bushes.[270] A track to the brigade dump was opened at 0830.[271]

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267 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27; War Diary, 9th Division GS Branch, 21 September 1943, AWM52 1/5/20; War Diary, VII Amphibious Force, 21 September 1943, NACP RG38 Box 179.

268 Beachmaster Buna to CTF 76.9, "Report on the Landing Operation on Scarlet Beach", Barbey Papers, USNHC, Box 31.

269 Dexter, *The New Guinea Offensives*, pp. 450, 464; *RAE 9 Aust Div Report on Operation DIMINISH*, AWM54 589/4/10.

270 Casey, *Amphibian Engineer Operations*, pp. 121-125; Major J. A. Oliver, "Report on Operations – 20 Aust Inf Bde: Finschhafen 22 Sep 43 to 2 Oct 43", AWM54 591/7/24; *RAE 9 Aust Div Report on Operation DIMINISH*, AWM54 589/4/10.

271 Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 – 6 Oct 43", War Diary 9th Division AASC, AWM52 10/2/24.

20. Scarlet Beach, 22 September 1943. LSTs unload in the background and supplies move inland by jeep and truck

The new unloading scheme was a success, with the LSTs cleared at a rate of 60 m^3 and 20 vehicles per hour. A lone Japanese reconnaissance aircraft appeared over Scarlet Beach at 0910, only to be shot down by the fighter cover. Ten minutes later, a bomber dropped two bombs on the beach near an LST without causing casualties or damage. Two dive-bombers followed, causing casualties but still no damage. The LSTs had had enough, and retracted at 0930. Two of them were completely unloaded, but the third was not, leaving with about 8% of the bulk stores on board.[272] Altogether, some 5,300 personnel, 180 vehicles, 32 25-pounder and 40 mm antiaircraft guns, and 960 m^3 of bulk stores had been landed in four hours.[273]

Returning to Buna, the LSTs were subjected to a major air attack by twenty to thirty bombers and thirty to forty fighters.[274] Miraculously, no ships were hit or damaged by torpedoes or bombs, although there were 12 casualties from strafing.[275] The US Naval

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272 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

273 War Diary, TF 76, 22 September 1943, NACP RG38 Box 179.

274 Craven and Cate, *Guadalcanal to Saipan*, p. 188.

275 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

Historian wrote that "this little action helped to dispel an old Southwest Pacific bugaboo, the fear of land based air attack",[276] but this was not the immediate effect.

At 1030, it was discovered that there was a shortage of 9 mm ammunition for the Owen submachine guns. Apparently, 80% of the Owen gun ammunition that had been loaded was in the 8% of stores that had not been landed, having apparently been on the LST that had been incompletely unloaded. The loading plans for all three LSTs had ammunition up the back, where it would have been among the last items to be unloaded. A special airdrop was requested. At Port Moresby, the 1st Air Maintenance Company prepared and checked 30 parachutes, each carrying two boxes of 2,560 rounds of 9 mm, a total of 153,600 rounds, and loaded them on board three USAAF B-24 *Liberator* bombers at Ward's Drome. The aircraft took off at 1655, and the drop was carried out at 1915. A Kunai patch behind Scarlet Beach was used as a drop area, indicated by six men with hand torches. Although one aircraft was forced to land at Dobodura, all three delivered loads, and some 115,000 rounds had been dropped, of which around 112,000 (97%) were recovered.[277]

That evening, Sub Lieutenant Barnes marked Scarlet Beach for the second wave of LSTs with the help of the amphibian engineers. Due to a misunderstanding, the beach lights were not turned on until 2230, the time at which the LSTs were supposed to arrive on the beach, instead of a half hour earlier, when they arrived offshore.[278] The result was that LSTs *67, 452* and *454* beached half an hour late and although they stayed an hour later than scheduled, unloading and taking on board all the wounded who were capable of being moved, they retracted at 0300 with some 10% of the bulk stores still on board.[279] This included 20,000 litres of distillate for the amphibian engineers and a quantity of No.

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276 Morison, *Volume VI: Breaking the Bismarcks Barrier*, p. 270.

277 "Capture of Finschhafen – Narrative of Events from 13 Sep 43 to 2 Oct 43", AWM54 591/7/20; OC 1st Air Maintenance Company, "Report on Emergency Drop 9mm Ammunition for 9 Division", War Diary, 1st Air Maintenance Company, AWM52 10/31/1.

278 CO Shore Battalion to CO 532nd EBSR, 24 September 1943, NACP RG496 Entry 388 Box 2383.

279 CTF 76, "Finschhafen Operation – Report On", AWM54 589/7/27.

231 fuses for the 25-pounders. Another emergency airdrop was requested, which took place at 0830, and some 1,446 fuses were recovered.[280]

At 1740 that evening three Japanese bombers attacked the beachhead, scoring a direct hit on an ammunition dump. Two hours of explosions followed, but no casualties. Seeking a location that was better protected from the air raids and more convenient to provide support to the infantry, the amphibian engineers moved their bivouac about 800 metres inland. At 0725 the next day a major Japanese air raid by 27 bombers devastated the old area and dropped a bomb on the new, killing four and wounding 19.[281] A small quantity of supplies and POL was destroyed.[282] There were Japanese air raids almost every day for the next two weeks.[283] Major Broadbent felt that this had one positive effect: it kept the beach clear of non-essential traffic.[284]

The coastal road leading from the northern end of the Heldsbach Plantation as far as Launch Jetty was found to be of coral, well drained and in good condition. Portions of the road were improved by widening it and constructing fords, culverts and bridges. Boggy sections were improved with the aid of a Quickway shovel, tip trucks and a TD9 dozer spreading limestone pavement. This became the main supply line to Finschhafen. Secondary tracks were cut as operations demanded for the maintenance of the forward troops, but it was not possible to develop them into all-weather tracks in the available time, so they became impassable after heavy rain. After rainy periods all vehicles except jeeps and trailers were barred from using the road. Advantage was taken of dry weather to build up supplies in the forward areas to tide them over during the wet spells and artillery ammunition was stockpiled forward near the guns.[285]

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280 Major J. A. Oliver, "Report on Operations – 20 Aust Inf Bde: Finschhafen 22 Sep 43 to 2 Oct 43", AWM54 591/7/24.

281 Casey, *Amphibian Engineer Operations*, p. 126; CG 2nd ESB to CE GHQ SWPA, 29 September, 4 October 1943, NACP RG 496 Entry 388 Box 2383.

282 Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 – 6 Oct 43", War Diary 9th Division AASC, AWM52 10/2/24.

283 "Summary of Finschhafen Operation", [September 1943], USACE: X-77 Box E-15.

284 Coates, *Bravery Above Blunder*, pp 75-76.

285 *RAE 9 Aust Div Report on Operation DIMINISH*, AWM54 589/4/10; Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 – 6 Oct 43", War Diary 9th Division AASC, AWM52 10/2/24.

The preparation of an airstrip suitable for light aircraft was taken in hand by the 2/3rd Field Company, which found the original strip at Finschhafen overgrown by scrub and Kunai grass. This was cleared, and the tall timber at either end was felled. Bomb craters were filled in and the strip was graded with a section of bridging drawn by a caterpillar tractor.[286] Eventually the strip was lengthened to 700 metres and widened to 45 metres, although it was only used by *Wirraways* and *Piper Cubs*. Cambers across the main axis provided drainage, with outlets from a drain along the side of the strip. Subsequently, four more airstrips suitable for light aircraft were created by clearing gravelly Kunai grass areas with an autopatrol or drawn grader and tractor.[287]

Blamey returned to Australia on 23 September, handing over command of New Guinea Force to Mackay, but before departing he instructed Herring to arrange for Finschhafen to be reinforced by a second brigade group. Barbey demurred.[288] His ships needed to be overhauled, and Chamberlin had asked him to resist demands for more shipping. He replied that he could not move the extra brigade without reference to GHQ.[289] Herring flew to Port Moresby, where he met Carpender, Berryman, Kenney, and Mackay.[290] They agreed that VII Amphibious Force was obliged to carry the troops as requested, and Kenney offered to provide air cover.[291] But when Berryman rang Carpender the next day and asked what would be done about moving the brigade and evacuating the wounded,[292] which the 9th Division had been led to expect would occur by 27 September,[293] the answer was disappointing:

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286 *RAE 9 Aust Div Report on Operation DIMINISH*, AWM54 589/4/10.

287 *Report on Operations of RAE 9 Division, period Oct 1943 – Jan 1944*, AWM54 591/7/17.

288 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

289 *Notes on Conference Morning 25 Sep 43 at HQ 5 Aust Div - Bitibum*, 25 September, War Diary, 9th Division GS Branch, AWM52 1/5/20; GOC NGF to CinC AMF, "Finschhafen – Transport of Troops", War Diary, NGF GS Branch, October 1943, AWM52 1/5/51; Gavin Long interview with Lieutenant General F. H. Berryman, 11 September 1956, AWM93 50/2/23/331.

290 DCGS to G-3 GHQ SWPA, 25 September 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

291 *Report of I Corps on the Operations in New Guinea from 22 Jan 43 to 8 Oct 43*, AWM54 519/6/32.

292 Extracts from Berryman Diary, 25 September 1943, AWM93 50/2/23/331.

293 *Operation Diminish – 9 Aust Div Operation Order No. 15*, 20 September, War Diary, 9th Division GS Branch, AWM52 1/5/20.

> Transportation of additional [troops] to Finschhafen will be undertaken in increments by small craft staging out of Lae when Finschhafen area cleared and when my representatives who will make [reconnaissance] determine Finschhafen and Langemak harbours are usable. Please advise when 200 wounded can be embarked for night evacuation which will undertaken at earliest possible moment.[294]

Not satisfied with this response, Berryman sent a message to MacArthur, who replied:

> Large forces reinforcements of the DIMINISH area requires considerable risk to both ship and life. Produces a large continuing supply commitment. Diverts air effort from advance on EXCHEQUER [Markham Valley], LAYMAN [Ramu Valley] and other operations intended. Requires commitment of amphibious forces necessary for other operations endangering ability for further advance. Presents more attractive target to hostile bombing which cannot at present be adequately countered. Best initial estimates which were confirmed by your HQ indicate that Jap strength was approx 350 in the area. More recent information indicates that Japs intend or have started to evacuate the area. The above considerations make it desirable that combat reinforcements should be limited to those required to maintain full strength existing units in area pending the establishment of airfields. Before definite decisions are reached further information is requested to the size of the hostile forces which have been encountered.[295]

Blamey then went to see MacArthur, who agreed that the desired movements should be carried out in due course – but not immediately unless forced by tactical necessity. However, he was willing to direct Carpender to send a battalion.[296] This was a symptom of a flaw in the command arrangements of SWPA. Carpenter was answerable to Admiral Ernest J. King, the Commander in Chief US Fleet in Washington, and "operations were carried out by 'mutual cooperation' rather than 'unity of command' practices".[297]

Carpender was not inflexible and had already reached a compromise with Mackay to that effect.[298] Herring considered how many supplies could be shipped with the reinforcing battalion. If they were travelling in LSTs, each could take 136 m^3 of rations – perhaps 15

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294 DCGS to GOC ALF, 25 September 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

295 CinC SWPA to GOC NGF, 27 September 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

296 Cdr ALF to CinC SWPA 28 September 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

297 Wheeler, Gerald E., "Thomas C. Kinkaid: MacArthur's Master of Naval Warfare", in Leary, William M. (ed), *We Shall Return! MacArthur's Commanders and the Defeat of Japan*, (Lexington, Kentucky: University Press of Kentucky, 1988), pp. 118-119.

298 Gavin Long interview with Lieutenant General F. H. Berryman, 11 September 1956, AWM93 50/2/23/331.

days' worth. On the other hand, if they were transported in APDs, the troops would be limited to taking what they could carry. He decided to fly to Milne Bay to confer with Barbey, but as his plane was about to take off, the undercarriage collapsed. A propeller shattered on Marston Mat runway, and Herring's chief of staff, Brigadier R. B. Sutherland, was struck by a flying fragment, killing him instantly. Everyone else on board escaped shaken but unscathed. The meeting was cancelled.[299]

On 29 September LSTs *168*, *468*, *470* and *474* moved 838 troops from Lae to Buna, where they were transferred to four APDs, which made a high speed run to Finschhafen. Arriving at Scarlet Beach at 0330 on 30 September, they disembarked the troops, and embarked 134 wounded, but heavy surf prevented the evacuation of the most serious cases. Due to the selection of this means of transport, only 7 m^3 of packaged rations were carried. [300]

The position of the wounded was a difficult one. A voyage from Finschhafen to Lae courtesy of the amphibian engineers involved an eight to ten hour trip in an open landing craft. There were fears about them suffering from seasickness and exposure, although their condition turned out better than expected. As there were no facilities in Lae for handling them, they were landed at G Beach, taken to the Main Dressing Station, and moved to Lae the next day in time to meet an aircraft which flew them to the 2/11th General Hospital at Dobodura. In early October a detachment of the 10th Field Ambulance began carrying out sea ambulance duties, accompanying the wounded whenever there was room on board for them.[301]

While Carpender and Barbey remained on good terms with Mackay, their relationship with Herring had deteriorated. Now Mackay wrote to Blamey saying that *his* relationship with Herring had also become strained. Blamey's response was characteristically forthright. It had always been his intention to eventually replace Herring's I Corps

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299 I Corps to 9th Division, 27 September, War Diary, 9th Division GS Branch, AWM52 1/5/20; Sayers, Stuart, *Ned Herring: A Life of Lieutenant-General the Honourable Sir Edmund Herring*, (Canberra: Hyland House, 1980), pp. 274-277.

300 War Diary, TF 76, 29-30 September 1943, NACP RG38 Box 179; I Corps to 9th Division, 28 September, War Diary, 9th Division GS Branch, AWM52 1/5/20.

301 Walker, *The Island Campaigns*, p. 223.

headquarters with Lieutenant General Sir Leslie Morshead's II Corps. Now he signalled Mackay that he could relieve Herring with Morshead whenever he liked.[302]

Morshead flew up to New Guinea on 29 September, accompanied by his DA&QMG, Brigadier J. R. Broadbent, and he relieved Herring on 8 October. Officially, II Corps replaced I Corps, but the main body of its headquarters did not arrive at Oro Bay until 2 November on HMAS *Manoora*.[303] As it turned out, Herring had fought his last battle, for the Victorian government appointed him as Chief Justice of the Supreme Court in February 1944.[304] So too, had Carpender, who was replaced by Vice Admiral Thomas C. Kinkaid on 26 November 1943,[305] and Mackay, who was appointed High Commissioner to India. Morshead stepped up to command New Guinea Force on 7 November, and Berryman became commander of II Corps.[306]

Carpender assigned responsibility for the resupply of Finschhafen to the amphibian engineers, who were running short of spare parts. The 120 days' stock for 300 boats they had brought to SWPA had been exhausted for certain critical items.[307] On 2 October, the amphibian engineers opened up a regular supply run from Lae, with six LCMs making a run from Lae every third night.[308] The next day, control of the 532nd EBSR passed from VII Amphibious Force to New Guinea Force, except for the half of its Shore Battalion at Lae, which came under the Lae Advanced Base.[309] The US Fifth Air Force was unable to wrest control of the air from the enemy. It lost 66 aircraft in October, and 84 more in

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302 Gavin Long interview with Lieutenant General F. H. Berryman, 11 September 1956, AWM93 50/2/23/331.

303 War Diary, II Corps GS Branch, 29 September, 8 October, 2 November 1943, AWM52 1/4/8.

304 Premier of Victoria to Prime Minister, 2 February 1944, NAA (ACT): A2684/3 1392.

305 Wheeler, Gerald E., "Thomas C. Kinkaid: MacArthur's Master of Naval Warfare", in Leary, *We Shall Return! MacArthur's Commanders and the Defeat of Japan*, p. 117. Carpender's relief had been decided upon on 23 September, before the operations at Finschhafen.

306 War Diary, New Guinea Force, 2-7 November 1943, AWM52 1/5/51.

307 CG 2nd ESB to CE GHQ SWPA, 4 October 1943, NACP RG 496 Entry 388 Box 2383; Casey, *Amphibian Engineer Operations*, p. 129.

308 Heavey, *Down Ramp!*, p. 67; New Guinea Force to Landforces, 9 October 1943, Blamey Papers, AWM 3DRL 6643 2/48.

309 *GHQ Operation Instruction No. 34/15*, "2nd Engineer Special Brigade", 27 September 1943, Blamey Papers, AWM 3DRL 6643 3/97.

November,[310] 22 of them on one disastrous raid over Rabaul.[311] Without adequate air cover Carpender would not expose his ships and, in spite of the amphibian engineers' best efforts, "the Japanese build up and occupation of the best ground in the area were always faster than the Allies".[312] The diggers of the 9th Division at Finschhafen would have a fight on their hands.

The 22nd Infantry Battalion moved along the coast from Hopoi to Finschhafen. Due to the difficult country, which could not support so much as a jeep road, it was supplied by Lae-based boats of the 532nd EBSR from Red Beach. A series of forward beaches was established from which supplies were carried to the forward troops by native porters. The 22nd Infantry Battalion encountered a series of strong defensive positions which the Japanese did not attempt to hold and on 1 October it captured Dreger Harbour.[313]

Meanwhile, the 2/13th Infantry Battalion forced a crossing of the Bumi River and attempted to outflank the strong Japanese positions on Kakakog Ridge which dominated the Salankaua Plantation and Finsch Harbour. It was found that it would be a major engineering task to form a track in such country, so engineers, pioneers, and infantry alike were pressed into carrying supplies and ammunition up the precipitous and slippery slopes.[314] Fresh water started to become a problem for the forward troops as insufficient containers were available. This caused Brigadier Windeyer to abandon his plan to outflank Kakakog Ridge, and to attempt a frontal assault.[315] After bitter fighting, the Japanese withdrew. The 20th Infantry Brigade swept south, taking Kakakog, Salankaua Plantation and Finschhafen itself, and linking up with the 22nd Infantry Battalion on the shores of Langemak Bay.[316]

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310 *US Army Air Forces, Statistical Digest, World War 2*, p. 258, AWM124 4/492.

311 Griffith, *MacArthur's Airman*, p. 141.

312 Coates, *Bravery Above Blunder*, p 148.

313 Casey, *Amphibian Engineer Operations*, p. 126.

314 *RAE 9 Aust Div Report on Operation DIMINISH*, AWM54 589/4/10.

315 War Diary, 9th Division GS Branch, 1 October 1943, AWM52 1/5/51.

316 Dexter, *The New Guinea Offensives*, pp. 485, 489, 498-499.

The capture of Langemak Bay and Dreger Harbour opened up these sheltered areas for landing craft, although they were not yet developed as ports, and a new supply dump was established at the Salankaua Plantation.[317] This came at just the right time, for the surf was starting to become a problem at Scarlet Beach due to the monsoon season. Launch Jetty, the only place between Scarlet Beach and Finschhafen where landing craft could approach the shore, was developed by Australian engineers so that LCMs could beach safely. This involved the demolition of underwater obstacles, flattening the beach, and pushing loose coral into the sea to provide a landing area.[318]

Two companies of the 542nd EBSR moved from Salamaua to Lae in late October, coming under the command of the Lae Advanced Base, and a boat company moved from Oro Bay to Labu on 22 October, so there were now 63 LCVPs and 10 LCMs of the 532nd EBSR and 54 LCVPs and 19 LCMs of the 542nd EBSR available.[319] This allowed the amphibian engineers to increase the frequency of supply runs, first to every other night and then to nightly. During October, the 542nd EBSR accomplished 447 boat missions, including 165 from Lae to Finschhafen, 25 from Lae to Dreger Harbour and 15 from Lae to Launch Jetty. Meanwhile, the 592nd EBSR arrived at Oro Bay. During October the three regiments made 3,900 trips, carrying 5,900 troops and 29,000 m^3 of cargo.[320]

GHQ received intelligence reports of a major enemy effort at Finschhafen.[321] To head it off, Morshead wanted 14 LCIs to move reinforcements from Lae to Finschhafen and 6 LSTs to fetch ammunition from Buna.[322] Some 13 LCIs and three LSTs were provided on 19 October, bringing the 26th Infantry Brigade from Lae in the LCIs, and C Squadron of 1st Tank Battalion from Morobe in an LST. The other two LSTs brought supplies and

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317 Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 - 6 Oct 43", War Diary 9th Division AASC, AWM52 10/2/24.

318 *Report on Operations of RAE 9 Division, period Oct 1943 – Jan 1944*, AWM54 591/7/17.

319 Col (GS) I Corps, "Visit Colonel Barham to I Aust Corps 6 October", 7 October 1943, Mackay Papers 3DRL 6850 176.

320 Casey, *Amphibian Engineer Operations*, pp. 134-135.

321 GOC NGF to CinC AMF, "Finschhafen – Transport of Troops", War Diary, NGF GS Branch, AWM52 1/5/51.

322 GOC II Corps to CTF 76, 17 October 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

munitions.[323] C Squadron arrived at Langemak Bay in pelting rain with 18 *Matilda* tanks, five jeeps, a Bren gun carrier converted to carry stores, a fitter's carrier, and 10 days' supply of rations, ammunition and POL. An unloading party met them, but the novelty of armour had them standing around gawking rather than unloading. All tanks were offloaded, but the LST retracted at 0430 with quantities of POL, ammunition and rations still on board. [324]

21. A *Matilda* Tank arrives at Kedam Beach in a 2nd Engineer Special Brigade LCM to support the attack on Sattelberg.

Since the three LSTs did not completely discharge their stores,[325] General Morshead asked for another three to move supplies, a battery of antitank guns and two batteries of the 2/6th Field Regiment, and to evacuate stretcher cases.[326] GHQ ordered the batteries moved, with a plea to keep requests for air cover to a minimum and develop the airfield at Finschhafen as quickly as possible.[327] The 2/6th Field Regiment was brought from Lae by four LCTs on 2 November, except for the 56th Field Battery at Tambu Bay, which followed two days later. Thereafter, a steady procession of LCTs and occasionally LSTs

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323 II Corps to NGF, 19 October 1943, AWM54 591/3/1.

324 Dexter, *The New Guinea Offensives*, p. 549.

325 War Diary, II Corps GS Branch, 20 October 1943, AWM52 1/4/8.

326 War Diary, NGF GS Branch, 18, 20 October 1943, AWM52 1/5/51.

327 GHQ SWPA, 20 October 1943, War Diary, NGF GS Branch, AWM52 1/5/51.

made their way to Finschhafen during November. VII Amphibious Force still gave them only three hours to unload. [328]

The amphibian engineers of the "9th Divvy Navy" remained the mainstay of the logistic effort, running supplies to Launch Jetty, from whence a good track ran through the Heldsbach Plantation for delivery to the forward units by jeep. Although the sappers worked hard to upgrade the coastal road to an all-weather road, it remained rough and muddy, passable in wet weather only by jeeps. Maintenance continued without interruption throughout the Japanese counterattack of 16-28 October, even when the 24th Infantry Brigade became isolated by land. The amphibian engineers ran supplies to Scarlet Beach and evacuated casualties, sometimes under fire. Two amphibian engineers manning a .50 calibre machine gun on Scarlet Beach became involved in a fight against Japanese troops landing from barges. Corporal Stephen Popa was awarded the Silver Star and Private Nathan ("Junior") Van Noy, posthumously, the Medal of Honor. The Japanese counterattack was defeated.[329]

By end of October reserve holdings at Finschhafen had been reduced to 5 days, and 25-pounder ammunition, in particular, was starting to run short.[330] The greatest efforts could not guarantee to replace an expenditure of more than 600 25-pounder rounds per day. A request for 155 mm guns was refused by II Corps because of probable difficulties with movement and ammunition supply.[331] Rations became unbalanced and at one stage only two days' balanced rations were held.[332] Tea was airdropped on 30 September.[333] Lesser items in short supply included Canned Heat for cooking meals in the field, pipe

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328 War Diary, II Corps GS Branch, November 1943, AWM52 1/4/8.

329 *October 1943 – January 1944, Report on Operations* War Diary, 9th Division GS Branch, AWM52 1/5/20; Casey, *Amphibian Engineer Operations*, pp. 132-133.

330 Col (GS) LHQ, "Visit Colonel Barham to I Aust Corps 6 Oct", 7 October 1943, Mackay Papers, AWM 3DRL 6850 174.

331 *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

332 Col (GS) I Corps, "Visit Colonel Barham to I Aust Corps 6 October", 7 October 1943, Mackay Papers 3DRL 6850 176; *October 1943 – January 1944, Report on Operations* War Diary, 9th Division GS Branch, AWM52 1/5/20.

333 Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 – 6 Oct 43", War Diary 9th Division AASC, AWM52 10/2/24.

tobacco, toilet soap and razor blades.[334] The transport of vehicles was particularly difficult. As late as January 1944 there were still 9th Division vehicles at G Beach awaiting transport. Shortages of vehicles in turn created overworked workshop facilities at Finschhafen, a situation that remained acute until late December.[335]

Evacuation of the wounded improved in November with the arrival of the *Stradbroke II*, a luxury yacht requisitioned by the Army in April 1943 and converted to a hospital ship, manned by the 4th Sea Ambulance Company. At Lae, patients were transferred ashore in DUKWs. Later in the month *Stradbroke II* was joined by the American hospital ship *Norab*, which carried on alone after the *Stradbroke II* broke down.[336]

22. Hospital Ship Stradbroke II in Sydney Harbour in 1945.

USASOS was scheduled to take over responsibility for delivery of supplies to Finschhafen on 15 November. Until then, maintenance remained the responsibility of VII Amphibious Force, which had orders not to run landing ships forward of Lae, in spite of the US Fifth Air Force's reassurances that the route from Lae to Finschhafen was now safe. The supply situation therefore remained uncertain throughout October.[337] On 23 October LSTs bringing the US 808th Aviation Battalion to Langemak Bay were the first

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334 Minutes, Q Conference, 16 October 1943, War Diary, II Corps QMG Branch, AWM52 1/4/11.

335 *October 1943 – January 1944, Report on Operations* War Diary, 9th Division GS Branch, AWM52 1/5/20.

336 Walker, *The Island Campaigns*, p. 223.

337 Minutes of Conference held at HQ II Corps 19 October 1943, AWM54 591/3/3.

amphibious ships to operate at Finschhafen in daylight.[338] To build up 14 days' reserves, some 280 m^3 per day were required but actual deliveries averaged only 125 m^3 per day.

The advanced headquarters of the 9th Division opened on the north shore of Langemak Bay on 10 October, relieving the 20th Infantry Brigade of responsibility for logistics. The Division Maintenance Area was laid out so it could be subsequently developed into a base sub area. Kedam Beach was developed to maintain dumps in the Finschhafen area and Launch Jetty to supply the Heldsbach area. Scarlet Beach became a forward supply beach but, due to the weather, was closed in November. Stores were landed by the US Navy at Godowa Beach in Langemak Bay, but despite strong representations, it refused to land at Kedam Beach and stores and vehicles, including the *Matilda* tanks, had to be transhipped by the amphibian engineers to Launch Jetty or Kedam Beach,[339] as the coastal road from Finschhafen to Scarlet Beach was 60 cm deep in mud.[340]

This meant that stores had to be handled five times before they reached the divisional dumps – a serious waste of manpower. Lieutenant Colonel H. T. Allan, formerly the New Guinea Force representative on the staff of the GHQ Coordinator, Milne Bay, had served with the 20th Infantry Brigade in the Middle East and now accompanied it again at Brigadier Windeyer's request as his advisor on native affairs.[341] Allan lost no time in attempting to recruit local labourers, but they remained scarce and labour needs were met by the allotment of detachments from the 22nd Infantry Battalion, 2/2nd Machine Gun Battalion, and later the 2/3rd Pioneer Battalion. Between 30 October and 3 November the 4th Infantry Brigade made the trip from Lae in small craft, resuming control of its 22nd Infantry Battalion, and assuming responsibility for the defence of the Finschhafen-Langemak Bay area, thereby releasing the rest of the 2/3rd Pioneer Battalion to assist the sappers on the roads, but its main task was providing labour to unload ships at Godowa Beach and Kedam. At one point in November, 800 men were employed on these beaches

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338 War Diary, II Corps GS Branch, 23 October 1943, AWM52 1/4/8.

339 *October 1943 – January 1944, Report on Operations* War Diary, 9th Division GS Branch, October 1943, AWM52 1/5/20.

340 War Diary, II Corps GS Branch, 20 October 1943, AWM52 1/4/8.

341 Coates, *Bravery Above Blunder*, p. 280.

by day and 400 at night.[342] In the later stages of the campaign, stores unloaded from vessels in Finch Harbour were moved to a transit dump at Kedam and thence by road.

Berryman asked Herring what units were required for the development of Finschhafen, stressing that there was an acute shortage of logistical units and the "utmost economy" be exercised in addressing requirements.[343] Herring sent back a reasonably short list of fifteen units, which included neither signals units, which were requested separately, nor medical units. He did not believe that any units could be diverted from Lae, except the 2/1st Ordnance Beach Detachment.[344] New Guinea Force consolidated them into a single list of thirty units required for the development of the base at Finschhafen, arranged in priority order.[345] Then began a comb-out of the other base sub areas for the requested units.[346] On Morshead's recommendation, Allan was appointed commander of the new Finschhafen Base Sub Area,[347] which became active on 1 November, albeit with only with a skeleton staff of 5 officers and 6 other ranks.[348] On 26 November it ceased to be under the command of the 9th Division, and came directly under New Guinea Force.[349] Base units arrived during November. The Australian base was intended to support operations in the area and a coastal advance to Sio,[350] which was expected to require an infantry division; but was laid out so as to be capable of being expanded to provide for two divisions. Some 30 days' stores for 10,000 were to be maintained.[351]

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342 *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

343 DCGS to GOC I Corps, "Protection and Development of DIMINISH", 2 October 1943, AWM54 591/3/1.

344 GOC I Corps to DCGS, "Protection and Development of DIMINISH", 6 October 1943, AWM54 591/3/1.

345 DCGS, "Development of Lae and Finschhafen", 24 October 1943, AWM54 589/3/4.

346 Col (GS) NGF to G (SD) NGF, "Protection and Development of DIMINISH", 9 October 1943, AWM54 591/3/1.

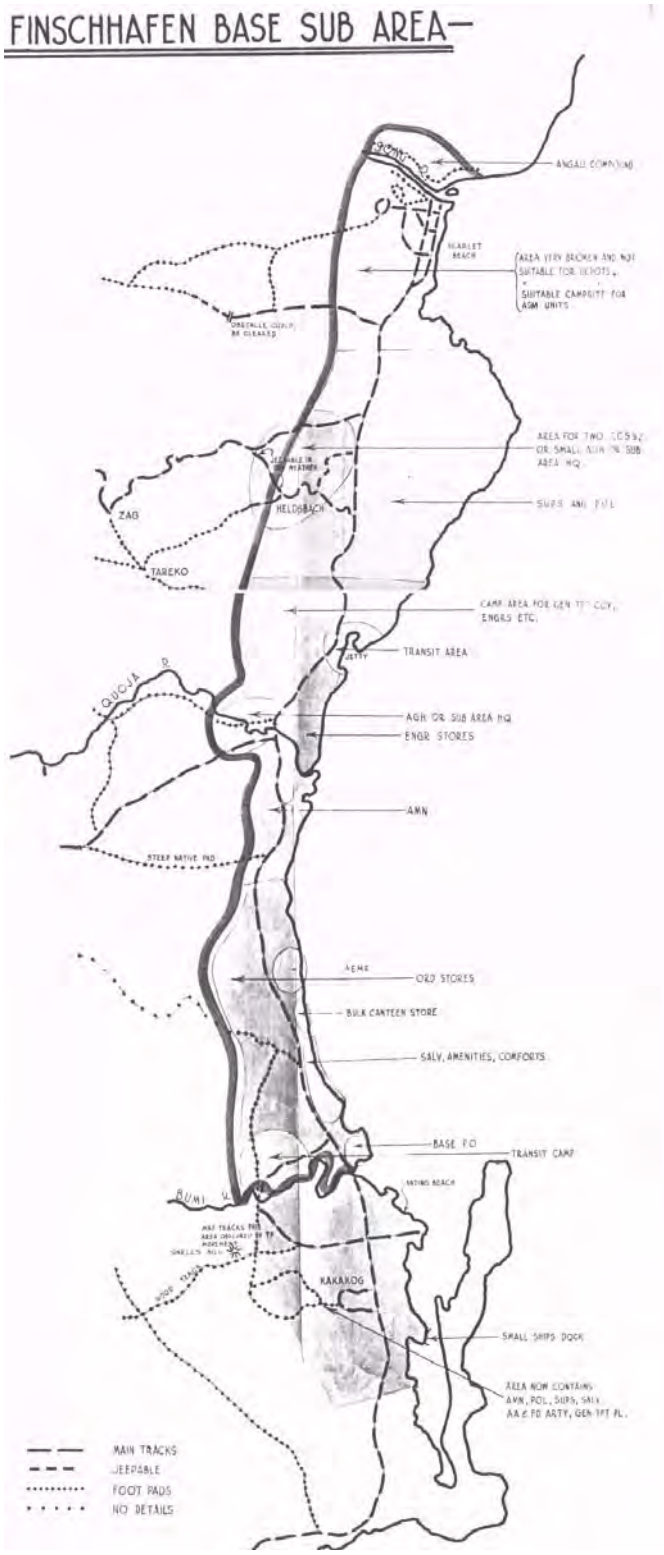
347 Minutes of Conference held at HQ II Corps 20 October 1943, AWM54 591/3/3.

348 War Diary, Finschhafen Base Sub Area, 1 November 1943, AWM52 1/8/5; GOC NGF, "Administrative Organisation – New Guinea", 10 November 1943, AWM54 9/5/9.

349 *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

350 *Notes on Conference Morning 25 Sep 43 at HQ 5 Aust Div - Butibum*, 25 September, War Diary, 9th Division GS Branch, AWM52 1/5/20.

351 *I Corps Administrative Instruction No. 3*, "Development of the Finschhafen Base", 5 October 1943, I Corps G Branch, AWM52 1/4/1.



Map 14. Finschhafen Base Sub Area

Source: AWM54 591/3/4.

Food, fuel and ammunition dumps were established by the 27th Supply Depot Platoon. The 9th Division FSD and DID in the Heldsbach area were taken over by 161st Supply Depot Platoon in December. The 56th BIPOD Platoon began operating in the area, although the main POL stocks remained in the old site in the Finschhafen town area.[352] Transport was supplied by a detachment of the 2/156th General Transport Company. As the distance between the troops and the dumps grew, about half the company was brought in, so trucks could relieve jeeps for work further forward. Eight DUKWs were transferred from the 9th Division to unload ships and move supplies from dumps in the Finschhafen area to the Heldsbach area where the

[352] *Report – S& T Service – Finschhafen Base Sub Area Week Ending 15 Dec* 43, War Diary, Finschhafen Base Sub Area, AWM52 1/8/5.

permanent dump sites were located.[353]

The main ordnance dump was established in the jungle near the Bumi River by part of the 2/1st Ordnance Beach Detachment. Coconut logs were split and used as uprights and roof slats and covered with tarpaulins. Logs also provided dunnage, keeping the ammunition and stores out of the mud and allowing the air to circulate. Although still primitive, the measures taken were far more effective in preventing avoidable damage to stores than those in Papua the year before. Eventually, the engineers constructed timber-framed storehouses with corrugated iron roofs. In November personnel were drafted from various ordnance units and sent to Finschhafen, where they were organised as the 44th Forward Ordnance Depot and the 104th Forward Ammunition Depot. They took over the dumps from the 2/1st Ordnance Beach Detachment in December, although it remained to assist until it departed for Brisbane in February 1944.[354]

First Class Mail for the 9th Division at Lae and Finschhafen was shipped from Port Moresby to Dobodura by air, but from there it was moved forward by barge or small ship via Buna. Owing to the vagarious nature of shipping in the forward area, mail delivery was sometimes delayed for several days. Second Class Mail was held at Buna and despatched as shipping became available. The principal means of transportation for this mail was also by barge, although some was unloaded at Morobe and sent forward by small craft. Delays occurred due to lack of shipping, resulting in an accumulation of thousands of bags of mail at Buna. This required the construction of additional buildings to hold it but because other buildings such as hospitals had higher priorities, sheltered storage space for mail lagged behind, resulting in some mail being damaged by the elements. Other bags were water damaged on the barges for lack of tarpaulins. Once the port of Lae was opened up, Second Class Mail was shipped direct from Australia to Lae and the backlog at Buna gradually cleared, although there were still delays in moving the mail forward to Finschhafen.[355]

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[353] OC Finschhafen Base Sub Area, "Progress Report – Development of Finschhafen Base Sub Area", 18 December 1943, War Diary, Finschhafen Base Sub Area, AWM52 1/8/5.

[354] Tilbrook, *To The Warrior His Arms*, pp. 359-365.

[355] *New Guinea Force Report on Operation Postern to October 1943*, AWM54 589/7/27.

Sattelberg

Dominating the Finschhafen area was Sattelberg Heights and Gusika-Wareo Ridge, which gave the enemy observation over the coastline as far south as Dreger Harbour. For this reason alone, the Japanese on these heights had to go, but Sattelberg also controlled a number of important inland tracks which were the enemy's supply routes. In Australian hands, an offensive could be launched from Sattelberg which could drive the Japanese from the Huon Peninsula entirely.[356] Preparations therefore began in earnest for a full-scale assault on these positions.

Supplies travelled down the Sattelberg Track. Approximately 14 km in length, it was on a continuous winding grade cut through heavily timbered country with the occasional bamboo clump, rising to the Sattelberg Heights at an elevation of 960 metres. The track was about 4 metres wide on average, with a surface of brown or yellow clay from the decomposition of coral limestone. No suitable pits or quarries for surfacing material were found nearby and the track could only carry limited jeep traffic in dry weather. So that the attack would not be halted by wet weather, forward dumps were established at Jivevaneng and Kumawa. It was therefore necessary to improve the track as far as Jivevaneng. A clearing was opened up to 15 metres to expose the ground to the drying action of sunlight and drains and culverts were provided. Soft patches were corduroyed with logs that were laid over the ground and pressed into it by running a tractor over it. This was obviously a short-term solution but an acceptable one given the short tactical life of the road. To allow nine *Matilda* tanks to traverse the road, some sharp corners and steep grades were eased by two D6 angledozers. At times the tanks had to be hauled by the angledozers or a TD14 tractor but all nine made the trip to Jivevaneng.[357]

Traffic was generally restricted to daily maintenance and medical jeeps. The road was subject to enemy fire and on 6 October a driver was killed by a sniper while hauling blankets.[358] The dumps were built up by jeeps and trailers during a spell of fine weather and were fully stocked by 14 November, Jivevaneng with 20 days' supplies for 2000 and

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356 *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

357 *Report on Operations of RAE 9 Division, period Oct 1943 – Jan 1944*, AWM54 591/7/17.

358 Major A. J. Overell, "Report on Finschhafen Ops 21 Sep 43 – 6 Oct 43", War Diary 9th Division AASC, October 1943, AWM52 10/2/24.

Kumawa with 20 days' for 500. From there stores were moved by native porters, only some 250 of whom were initially available to the 26th Infantry Brigade. ANGAU arranged for 1,000 more to be recruited in the interior, flown to Lae and transported to Finschhafen by the 542nd EBSR in groups of 200 every two days. Some 600 were assigned to the 26th Infantry Brigade. Because it was not expected that water would be available in the Sattelberg area, every available 2-gallon container in the division was withdrawn and held filled at Jivevaneng, to be moved forward by jeep or native carrier as required. Although there were only 12,000 rounds of 25-pounder ammunition in Finschhafen on 1 November, stocks were increased by 2,000 rounds – two LCM loads – from G Beach each day, and a reserve was gradually built up.[359]

The attack on Sattelberg marked the first time that medium tanks had been employed in New Guinea but they presented no special logistical problems apart from the effort to get them there. Each *Matilda* tank carried 88 2-pounder or 3-inch howitzer rounds, and 36 belts of 7.92 mm Breda machine gun ammunition. In a normal day's combat a tank would expend the lot, replenishing at a rally point that night from jeeps sent from the forward dumps. The *Matildas* averaged 0.10 km/l, but even at this rate of consumption they still had an ample range of 37 km. Oils and lubricants carried on the tanks were adequate for several days fighting. Mechanical work, though, had to be done during the day rather than by night as specified by Armoured Corps doctrine, because any noise at night tended to attract fire from Bren and Owen guns and even the odd Japanese woodpecker.[360] The effect on the Japanese was devastating, for they had no antitank weapons capable of stopping the heavily armoured *Matildas*.[361]

Supported by machine guns, mortars, artillery, *Matildas*, USAAF *Mitchell* and *Boston* bombers and RAAF *Vengeance* dive bombers, the infantry of the 26th Infantry Brigade

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359 Casey, *Amphibian Engineer Operations*, p. 134; *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

360 Not the bird but the name given to the Japanese Type 92 7.7mm heavy machine gun due to its distinctive sound.

361 GOC 9th Division, "Report on Employment of Tanks in Operations of 9th Division in Area North of Finschhafen, New Guinea", AWM54 591/7/25.

attacked on 17 November and advanced relentlessly uphill.[362] On 25 November, following an exploit the previous day that had earned him the Victoria Cross, Sergeant T. C. Derrick hoisted the Australian flag on a tree over Sattelberg. [363]

GHQ now decided to establish a base of "major proportions" at Finschhafen. Plans called for the establishment of a PT boat base and the construction of an airfield near Dreger harbour as a staging area for fighters and light bombers.[364] Priorities were: (1) advance air and naval facilities; (2) a floating dock on the south shore of Langemak Bay for Liberty ships; (3) two Liberty ship wharves; (4) a fuel jetty and bulk petroleum storage facilities for 1,270,000 litres of aviation gasoline and 9,000,000 litres of general petroleum products and (5) roads, docks, camps and staging facilities, and hospitalisation.[365] It didn't take too long for the realisation to set in that the task was way beyond the capabilities of the assigned units.

Control of the new US bases at Lae and Finschhafen passed to USASOS when it took over responsibility for the transportation of personnel and supplies. Operational control of American service troops in New Guinea remained with the commander of New Guinea Force, subject to the usual proviso that it not be exercised unless an attack was imminent or in progress. At the same time, the Advanced Section became the Intermediate Section, under the command of Brigadier General William H. Donaldson, Jr, and its three advanced bases (at Milne Bay, Oro Bay and Port Moresby) were redesignated Bases A, B and D. A new Advanced Section was created at Lae under Brigadier General Connell to control the bases at Lae and Finschhafen, which were designated Bases E and F respectively.[366] On 15 December an office of Coordinator Finschhafen Area was

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362 T. Southwell-Keely, "Tanks Surprise Japanese Defenders – Australians Near Sattelberg – Immense Difficulties Overcome", *Sydney Morning Herald*, 22 November 1943, AWM54 593/7/6.

363 Dexter, David, *The New Guinea Offensives*, (Adelaide: Australian War Memorial, 1961), p. 649.

364 *GHQ Operation Instruction No. 34/12*, 15 September 1943, Blamey Papers, AWM 3DRL 6643 3/97.

365 AG GHQ SWPA, "Establishment of a Base at DIMINISH", 5 November 1943, AWM54 13/7/11.

366 Senior Adm LO USASOS to DA&QMG NGF, "Reorganization of USASOS Installations and Functions of Intermediate and Advance Sections", War Diary, Adv LHQ DA&QMG Branch, November 1943, AWM52 1/2/6.

established along the lines of the Coordinator Milne Bay Area. The Coordinator Milne Bay Area, Brigadier General Dwight F. Johns, was appointed to the new post.[367]

A major problem was that there was no air cover at Finschhafen, without which the USN would still not risk heavy shipping in Dreger Harbour.[368] MacArthur ordered Connell to expedite the movement of engineer units to Finschhafen in order to get a usable airstrip ready by 20 November. Pointedly, he directed New Guinea Force to arrange their transportation by water.[369] A Marston Mat runway was almost finished by 10 December when the US Fifth Air Force began moving in. A lack of facilities resulted in numerous accidents on the runways, but the operational advantages were considered to outweigh the hazards.[370]

The first *Dakota* landed at Finschhafen on 7 December, carrying Captain Wilde, who had also been on board the first one to land at Lae, and the next day some 478 patients were flown out to relieve congestion in the hospitals. This task was carried out by *Dakotas* of the US 804th Medical Air Evacuation Transport Squadron. Due to the workload, the RAAF was asked to assist and a RAAF doctor and 12 orderlies were attached to the 804th. After they had been working with the Americans for two months, the RAAF decided to form its own unit and No. 1 Medical Air Evacuation Unit, a unit with six officers and 25 nurses, was formed in March 1944. It became operational in July 1944 and was attached to the 804th at Nadzab.[371]

On 2 December Seabees began reconnoitring an area on the Heldsbach Plantation for a site for a new naval airstrip.[372] This caused considerable concern, because the plantation was right in the middle of the Australian base area, which extended from Launch Jetty to

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367 AG GHQ SWPA, "Coordinator, Finschhafen Area", 6 December 1943, War Diary, Adv LHQ DA&QMG Branch, December 1943, AWM52 1/2/6. Johns had relieved Brigadier Hanford MacNider as Coordinator Milne Bay Area on 16 October 1943. AG GHQ SWPA, "Coordinater Milne Bay Area", 16 October 1943.

368 Minutes of Conference held at HQ II Corps 19 October 1943, AWM54 591/3/3.

369 CinC SWPA to CG 23rd Port, 9 October 1943, Mackay Papers, AWM 3DRL 6850 176.

370 Craven and Cate, *Guadalcanal to Saipan*, p. 193.

371 Jacobson, pp. 50-56; Walker, Allan S., *Medical Services of the RAN and RAAF*, (Adelaide: Australian War Memorial, 1961), pp. 360-361.

372 War Diary, NGF HQ and G (Air), 2 December 1943, AWM52 1/5/51.

the Bumi River, and some construction work had already been carried out in the area, including accommodation which had already been occupied by the 2/2nd Casualty Clearing Station on 30 November.[373] As Australian stores were being moved north of the Bumi River to clear out the area allotted to USASOS, development of both American and Australian bases was placed on hold until a decision was made.[374] The area north of the allotted area was considered unsuitable for base development and the additional space offered to the south of the Bumi River was inadequate. Without the Heldsbach area, the space allotted to the Australian Army would be very cramped.[375] It would also be inconvenient for the Australian area to be divided in two. Accordingly, GHQ was asked to allot additional space south of the Bumi River as compensation.[376] In the end though, what turned out to be fatal to the proposal was that the Japanese had not yet been cleared out of the area. Work by night under lights was therefore considered unwise.[377] GHQ dropped the plan and confirmed the use of the area north of the Bumi River for the Finschhafen Base Sub Area.[378] On 18 December, General Johns confirmed that the area north of the Busim River, allocated to the Australians under the GHQ plan, was a permanent allotment, while the area north of the Bumi River could be occupied as long as operationally necessary.[379]

While the Americans worked on the airbase, port and naval base, the Australians concentrated on building up their own base. Bridges were thrown over the Bumi and Siki Rivers and a road constructed from Launch Jetty to the Quoja River. The 4th Field Bakery baked rolls which were packed in clean flour drums and sent to the forward units of the 9th Division. Some 17,000 litres of refrigeration space was completed in early December. Owing to a shortage of Methyl Chloride it was not as cold as desired, but was sufficient

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373 Walker, *The Island Campaigns*, p. 192.

374 NGF to LandOps, 3 December 1943, AWM54 591/3/4.

375 NGF to LandOps, 4 December 1943, AWM54 591/3/4.

376 CinC ALF to G-4 GHQ SWPA, "Aust Base at Finschhafen", 4 December 1943, AWM54 591/3/4.

377 NGF to LandOps, 5 December 1943, AWM54 591/3/4.

378 LandOps to NGF, 7 December 1943, AWM54 591/3/4.

379 OC Finschhafen Base Sub Area, "Aust and US Areas for Base Installations", 18 December 1943, War Diary, Finschhafen Base Sub Area, December 1943, AWM52 1/8/5.

for butter, fruits and vegetables.[380] Although the small ship docks at Salankaua and Maneba Point were in the USASOS area, it was arranged for them to be temporarily under Australian control, worked by the 7th Docks Operating Company, with priority in unloading being given to Australian cargoes, until American stevedores arrived. Transport to move Australian stores to the dumps was supplied by the Americans. [381]

The Pursuit to Saidor

The 4th Infantry Brigade began an advance north along the coast on 5 December 1943, supported by the *Matilda* tanks and the most powerful artillery support of the campaign to date, with some 4,700 rounds being fired in a single day. Maintenance was from beachheads. RAE personnel and amphibian scouts of the 532nd EBSR advanced with the infantry and reconnoitred beaches from the landward side as they were secured. If a beach looked suitable, a second reconnaissance was made from the sea. Once a beach was selected, a shore party consisting of AASC, ANGAU, medical and EBSR detachments was brought in by landing craft to set up a DID, evacuation post and administrative area. Beachheads were successively established at Coconut, Kiligia, Lakona and Masaweng beaches.[382] The 532nd EBSR ran a daily average of 32 supply missions to them.[383]

The 20th Infantry Brigade took over on 21 December, moving along a coral coastal shelf covered with Kunai grass. Sappers cut tracks from the beachheads to the brigades, permitting supply by jeep, although forward elements on high ground had to be supplied by carriers. General Wootten required that at least seven days' reserves be kept forward to allow for the possibility of bad weather interrupting landing craft operations. Stocks were cleared from the rearward beaches as quickly as possible, for infantry were required to defend them so long as they were in use and there was a danger that the whole force could become strung out along the coast. The beach would then be closed and the detachments manning it used to open a new one. Whenever possible, troops were also moved forward

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380 *Report – S& T Service – Finschhafen Base Sub Area Week Ending 15 Dec* 43, War Diary, Finschhafen Base Sub Area, December 1943, AWM52 1/8/5.

381 OC Finschhafen Base Sub Area, "Progress Report – Development of Finschhafen Base Sub Area", 18 December 1943, War Diary, Finschhafen Base Sub Area, AWM52 1/8/5.

382 *5th Division Administrative Instruction No. 1*, "Maintenance – Forward Units 8 Aust Inf Bde", 20 January 1944, War Diary, 5th Division AQ Branch, AWM52 1/5/11.

383 *Monthly Historical Report of Operations – 2d ESB*, December 1943, USACE: X-78 E-20.

by landing craft to prevent fatigue. Tanks generally moved by land but were ferried around obstacles such as deep ravines by LCM. Artillery pieces were normally transported by LCM. The advance had to be halted for a day or two on occasion to allow reserves and artillery to be brought up.

A halt was called when Kelanoa was reached on 6 January 1944 while all available road and water transport cleared the rearward beaches, moving everything to a new division maintenance area at Sialum Island that eventually held 21 days' reserves. A round trip from the base dumps at Launch Jetty to Sialum was about 160 km. As the weather became rougher due to the northwest monsoon, the use of LCVPs became restricted. [384] The 532nd EBSR reported that the seas were the most difficult that it had ever encountered; rough enough to bend the steel I-beams supporting the LCMs' bottoms and open the seams of older LCMs. Because the seas were so heavy during the day, most supply missions were conducted at night.[385]

II Corps made a 20-ton trawler, *AS 31*, available from 6 January and a 60-ton trawler, *AS 11*, from 9 January. Between them, they could deliver 240 tons of rations and medical supplies per week to Sialum, and later Kelanoa, under II Corps control. Fresh produce was delivered by the refrigerator ship *AS 141*, under the control of the Finschhafen Base Sub Area. This solved the rations problem but other classes of supply still had to travel by LCM. All three vessels could evacuate casualties: eight to ten lying and fifteen sitting in the case of *AS 31*, twelve lying and sixty sitting in *AS 11* and 12 lying and fifteen to twenty sitting in *AS 141*.[386] An approach was made to the US Navy on 14 January for LCTs. It was unable to provide them immediately, owing to other commitments, but made three LSTs and three LCIs available to help move personnel and stores from Buna to Lae and Finschhafen.[387] Labour to load the ships at Finschhafen was supplied by the 24th Infantry Brigade, a shore company of the 532nd EBSR, and reinforcements and X List personnel from the 9th Division Reception Camp at Kedam. The Japanese offered only

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384 *9th Division Report on Operations October 1943 – January 1944*, War Diary, 9th Division GS Branch, AWM52 1/5/20.

385 *Monthly Historical Report of Operations – 2d ESB*, January 1944, USACE: X-78 E-20-1.

386 *II Corps Administration Instruction No. 14*, "Maintenance 9 Aust Division from Finschhafen", 7 February 1944, War Diary, II Corps QMG Branch, AWM52 1/4/11.

387 GOC NGF to CinC ALF, 2 February 1944, Blamey Papers, AWM 3DRL 6643 2/48.

sporadic resistance, retreating in the face of concentrated artillery and mortar fire. The main Japanese supply base at Hambariwa was occupied without a fight on 13 January and Sio was reached two days later. Japanese losses were heavy: between Finschhafen and Sio, 3,099 enemy dead were counted and 38 prisoners taken, while 8 Australians were killed and 48 wounded.[388] Between 2 October 1943 and 15 January 1944, the 9th Division lost 66 killed and 952 wounded while the amphibian engineers lost 8 killed and 33 wounded. They counted 5,099 enemy dead and took 38 prisoners.[389]

On 20 January the 8th Infantry Brigade relieved the 20th and the 5th Division took over from the 9th. The incoming brigade assumed command of the 241st and 242nd Supply Platoons, operating the FSD and FAD at Kelanoa which was stocked with 21 days' rations and expense stores and 91,000 litres of POL.[390] On 27 January DIDs were opened at Sialum, Nambarina and Sio. Sialum was closed. Unfortunately, only one examiner was available to check the ammunition stocks.

The 39th Independent Transport Platoon provided transport from the beaches with 25 jeeps, 20 trailers, 10 3-ton 4x4s and 8 DUKWs. The DUKWs proved invaluable and efficient, especially for unloading small ships and moving stores between beaches. Salt water was bad for their components and the rough seas forced them to operate with the engine hatch closed, subjecting them to overheating. They required constant maintenance and ultimately AEME personnel were attached to service them.[391] One DUKW foundered in heavy seas on 30 January with eleven men on board, one of whom drowned. The rest were rescued by the 532nd EBSR.[392] A second DUKW was lost on 26 April when it was

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388 *9th Division Report on Operations October 1943 – January 1944*, War Diary, 9th Division GS Branch, AWM52 1/5/20.

389 Casey, *Amphibian Engineer Operations*, p. 137; *II Corps Report on Operations 8 Oct 43 – 1 Mar 44*, War Diary, II Corps GS Branch, AWM52 1/4/8.

390 *5th Division Administrative Instruction No. 1*, "Maintenance – Forward Units 8 Aust Inf Bde", 20 January 1944, War Diary, 5th Division AQ Branch, AWM52 1/5/11.

391 CASC 5th Division, "AASC Operations: Huon Peninsula Campaign", [undated], War Diary, 5th Division AASC, January 1944, AWM52 10/2/20.

392 War Diary, 39th Independent Transport Platoon, 1 February 1944, AWM52 10/4/39. The US 532nd EBSR reported that "on February 15, thirteen Australian soldiers were rescued from the water about three miles offshore near Vincke Point by a Co 'A' boat mission. The men had been riding in a DUKW that had swamped in the heavy seas and were nearly exhausted at the time of rescue." The only DUKW lost up to the date of the report was this one, so the date must be wrong. *Monthly Historical Report of Operations 2nd ESB February 1-29 1944*, USACE: X-78 E-20-2.

washed onto rocks and broke up.[393] Nonetheless, the DUKWs proved themselves very hardy and capable of operating under surf conditions that damaged LCVPs.[394] The CASC 5th Division was critical of the way that logistical units were attached to the infantry brigades, which had no staff to control or supervise them. He recommended that in similar circumstances an AASC company headquarters should be assigned to the brigade.[395]

The 8th Infantry Brigade pressed on, carrying five days' rations in case the weather deteriorated to the extent that resupply by sea became impossible.[396] Rough weather caused 3 LCMs and 2 LCVPs to broach at Singor on 2 February but both were unloaded before the stores they were carrying spoiled. To make matters worse, *AS11* broke down and required a week's repairs.[397] A request was lodged for air supply but bad weather delayed it for two days.[398] A recovery rate of 82% was reported, as some of the packages fell into the sea.[399] Finally, the US Navy made three LCTs available for a supply run from Finschhafen to Butu Butu on 9 February, hauling some 50 tons of rations, 15 tons of native rations and a large quantity of POL and distillate,[400] enough, it was hyperbolically reported, "for ten years".[401] The next day the Australians linked up with the American forces that had landed at Saidor on 2 January.[402]

This ended the pursuit for the time being. GHQ ordered the 532nd EBSR to concentrate at Finschhafen by 1 March and New Guinea Force withdrew all forces in the forward area,

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393 War Diary, 39th Independent Transport Platoon, 26 April 1944, AWM52 10/4/39.

394 CASC 9th Division, "Operation of DUKWs – Finschhafen Campaign", [17 January 1944], War Diary, S&T New Guinea Force, AWM52 10/1/12.

395 CASC 5th Division, "AASC Operations: Huon Peninsula Campaign", [undated], War Diary, 5th Division AASC, January 1944, AWM52 10/2/20.

396 *II Corps Report on Operations October 1943 – March 1944*, War Diary, II Corps GS Branch, AWM52 1/4/8.

397 War Diary, 5th Division AQ Branch, 2 February 1944, AWM52 1/5/11.

398 War Diary, 5th Division AQ Branch, 3 and 6 February 1944, AWM52 1/5/11.

399 War Diary, 5th Division AQ Branch, 11 February 1944, AWM52 1/5/11.

400 CASC 5th Division, "AASC Operations: Huon Peninsula Campaign", [undated], War Diary, 5th Division AASC, January 1944, AWM52 10/2/20.

401 War Diary, 5th Division AQ Branch, 9 February 1944, AWM52 1/5/11.

402 *Monthly Historical Report of Operations – 2d ESB*, February 1944, USACE: X-78 E-20-2; Krueger, Walter, *From Down Under to Nippon: The Story of the Sixth Army in World War II*, (Battery Press, Nashville, 1953), p. 36.

concentrating the 5th Division around Kelanoa. On 2 March it began moving back to Kaligia by road and landing craft. In the advance from Sio to Saidor, 734 Japanese had been killed and 1,775 found dead, while 48 prisoners were taken. Australian casualties came to 4 killed and 6 wounded.[403] The Americans at Saidor killed 119 Japanese and captured 18, losing 40 killed, 110 wounded and 10 missing.[404]

The airbase at Saidor was required to bring the Japanese bases around Hollandia within fighter range and the US Fifth Air Force wanted to operate up to 232 aircraft from there. The pre-war airstrip, sabotaged in 1942 by trenches dug across the runway, was repaired enough for twelve *Dakotas* loaded with ammunition to land on 11 January. Construction of the two 1,800 metre all-weather strips was another matter. Between 10 and 31 January there were only three days when it did not rain and around 635 mm fell. By 10 March General Whitehead was describing Saidor as "a terrible mess". The first runway and its hardstands were not ready until 18 March. To get around the problem, the air force concentrated long-range P-38 *Lightning* fighters at Nadzab, made use of the airstrips around Gusap and Dumpu, attempted to increase the range of its fighters, and got the Pacific Fleet to support operations against Hollandia with its aircraft carriers. These workarounds were successful and in April the second runway at Saidor was cancelled. Work was finally completed on 7 May.[405]

In the end, "the valour, stamina, rugged determination and resources of the 9th Division had proved too much" for the Japanese.[406] A maturing and improving logistics system provided those resources and sustained that stamina. Their achievement was there for all to see, in a burgeoning base that was rapidly rising up from the jungle, from which the offensives of the coming year would be launched. It was now clear that ship-to-shore was the best solution to the "logistic problem" of how to bring sufficient forces into contact

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403 War Diary, 5th Division GS Branch, 2 March 1944, AWM52 1/5/10; *II Corps Report on Operations October 1943 – March 1944*, War Diary, II Corps GS Branch, AWM52 1/4/8.

404 Krueger, *From Down Under to Nippon*, pp. 38, 381; GHQ G-3 Journal, 14 February 1944, AWM54 16/2/2.

405 Casey, H. J., *Engineers of the Southwest Pacific 1941-1945: Volume VI: Airfield and Base Development*, (Washington, DC: Government Printing Office, 1951), pp. 196-200; Craven, W. F. and Cate, J. L., *Volume IV: The Pacific: Guadalcanal to Saipan*, (Chicago: University of Chicago Press, 1950), pp. 580-581.

406 Dexter, *The New Guinea Offensives*, p. 679.

with the enemy and maintain them. Yet the effort spent on developing other means of supply was far from wasted. When Owen gun ammunition ran short, an airdrop was requested; when forces moved inland to Sattelberg, road transport was required; and it should not be forgotten that for much the campaign, the 9th Division was maintained by the efforts of the amphibian engineers' shore-to-shore logistics. These methods provided an important supplement and a vital fall back. Moreover, ship-to-shore was not entirely free of the constraints imposed by the New Guinea terrain. Amphibious operations required suitable beaches, preferably with firm, flat ground close by inland where stores could be dumped and airfields and bases could be rapidly developed. Such locations were rare, and if the Allied offensive faltered the Japanese could be expected to wrest back initiative, as they had done at Finschhafen. That amphibious ships were vulnerable to air attack was demonstrated by the loss of four ships at Lae. Fighter cover was required and this limited the radius of amphibious operations to that of fighters from existing bases.

With the fall of Madang on 24 April, all of CARTWHEEL's objectives had been achieved, except for the capture of Rabaul, which, over the objections of General MacArthur, the US Joint Chiefs of Staff wanted neutralised rather than captured.[407] Already, the US Army had commenced RENO, the advance along the northern coast of New Guinea towards the Philippines. On the Atherton Tableland, the Australian Army would ponder the lessons of Lae and Finschhafen and prepare for the next campaign.

[407] CoS WD to CinC SWPA, 21 July 1943; CinC SWPA to CoS WD, 23 July 1943, AWM54519/6/59.

9. The Bases in New Guinea in 1944

Normally, logistics is in support of actual or intended operations, but the end of operations in New Guinea in April 1944 left the Australian Army in Papua-New Guinea with a large logistical establishment, much of which had served in New Guinea for prolonged periods and was overdue for return to Australia, and no intended operations. Plans called for an across-the-board reduction of troops in New Guinea from 111,000 in January to 66,000 by June.[1] The resultant "roll up" is the final logistical phase of most successful operations, and one of the most challenging, but probably the least studied. The effort to reduce the bases in Papua and New Guinea proved to be difficult and complicated. Its importance was great, for unless the bases were reduced, there would be no Australian operations in 1945 for want of logistical support.

Saidor and Madang

For the US 32nd Infantry Division to be used in the Hansa Bay operation, tentatively scheduled for 25 April 1944,[2] it had to first be relieved at Saidor. So on 10 April Chamberlin rang Brigadier L. de L. Barham in Melbourne, and informed him that MacArthur wanted the 5th Division to take over the area. Barham agreed, but with conditions: it was not to be used for offensive operations; supply and transportation would be provided; and the US 32nd Infantry Division would be withdrawn from the area as soon as possible. Chamberlin was surprised at the first condition and balked at the third, which he considered unreasonable.[3]

USASOS assumed responsibility for supplying the Saidor garrison, which now numbered over 14,000, from VII Amphibious Force on 1 March and logistic responsibility for all US troops there on 13 April, plus responsibility for transporting the incoming Australians. The Coordinator Finschhafen Area was appointed Coordinator Saidor Area.[4] The

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1 AQMG (Plans), "Notes on the Administrative Implication of the New AMF Policy in NG", 10 January 1944, AWM54 213/3/15.

2 *Reno IV*, 30 January 1944, AWM54 519/6/59.

3 GHQ G-3 Journal, 11 April 1944, AWM69 23/50.

4 Miller, *CARTWHEEL: The Reduction of Rabaul*, p. 302; Message, GHQ SWPA to GOC NGF, 13 April 1944, War Diary, 5th Division GS Branch, AWM52 1/5/10.

Finschhafen Base Sub Area was ordered to furnish most of the units for a new Saidor Base Sub Area.[5] A small staff of 70 was cobbled together in Port Moresby.[6] In all, 5th Division's 8th Infantry Brigade Group, earmarked to relieve the Americans, comprised 5,000 personnel, with 557 vehicles, 32 artillery pieces, and 520 tons deadweight of unit stores and ammunition.

Thirty days' maintenance was to be taken, which added another 2,200 tonnes. II Corps emphasised that Saidor was to be a "temporary and minor base only" but base units moving from Finschhafen still comprised 250 personnel and 21 vehicles, those from Lae, 230 personnel and 23 vehicles with 600 tonnes of stores of which two thirds were engineering stores, and those from Buna, 32 personnel, 49 vehicles and 15 tonnes of stores.

A shortage of shipping out of Finschhafen, coupled with a desire to move the 5th Division forward as soon as possible, led to it employing many forms of transportation. Two Liberty ships were available, with the turnabout time between Saidor and Finschhafen estimated at 10 days, as was a boat company of the 3rd ESB and the destroyer HMAS *Vendetta*. Some 184 aircraft loads were also employed. Yet nearly three months passed before all vehicles and heavy equipment were moved, owing to "continual changes and cancellations in the shipping programme". The final figures for the movement were:

Table 14. Movement to Saidor [7]

Means	**Personnel**	**Vehicles**	**Stores (tonnes)**
Air	4,090		179
HMAS *Vendetta*	1,767		22
LCM	7,131	158	1,021
Liberty Ship	3,054	680	1,396
LCT	850	106	142
Total	16,892	944	2,760

5 Message, AAG to DA&QMG, "Formation of Saidor Base Sub Area (Type D)", 14 April 1944, AWM54 597/3/1.

6 Message, AAG to DA&QMG, "Rammer Operations", 16 April 1944, AWM54 597/3/1.

7 II Corps to New Guinea Force, 16 April 1944, AWM64 597/3/1; *II Corps Report on Operations October 1943 – March 1944*, War Diary, II Corps GS Branch, AWM52 1/4/8.

Patrols of the 8th Infantry Brigade soon linked up with those of the 15th Infantry Brigade, which had broken out of the Ramu Valley and entered Bogadjim on 17 April. A proposal to move the entire 15th Infantry Brigade over the mountains was rejected on the grounds that it would put undue strain on the troops, so while the 57th/60th and 58th/59th Infantry Battalions made the trek, the rest of the brigade personnel and some equipment were moved by air from Dumpu to Sio. Heavy equipment and vehicles were shipped through Lae.[8] A rapid advance followed until the 15th Infantry Brigade reached the wide, deep, swift-flowing and crocodile-infested Gogol River. C Company, 593rd EBSR ferried troops of the 8th and 15th Infantry Brigades to the far side of the river and Madang fell on 24 April. Like Lae and Salamaua, it was a foul-smelling booby-trapped shambles, although the amphibian engineers found an intact boat maintenance depot with working winches for pulling boats up onto the beach.[9]

The possibility of Madang being captured early had been anticipated and it had been decided that further movements of personnel and stores should be made direct to Madang. The RAN carried out a survey of the harbour the day after it was captured. All airstrips in the area had been rendered unusable but 160 planeloads of personnel were flown to Saidor and ferried to Madang by LCM, as was the 15th Infantry Brigade from Bogadjim. The 5th Division was now concentrated around Madang, except for the 24th Infantry Battalion, which eliminated some parties of Japanese in the hills around Saidor before it too moved to Madang by LCM in July.[10]

Between 24 April and 3 May HMAS *Vendetta* made a series of trips from Langemak Bay to Madang, carrying a total of 1,937 troops and 95 tons of stores, a role reminiscent of her service with the "Tobruk Ferry" in 1941.[11] The final trip brought in an advance party of a

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8 II Corps to New Guinea Force, 16 April 1944, AWM64 597/3/1; *II Corps Report on Operations October 1943 – March 1944*, War Diary, II Corps GS Branch, AWM52 1/4/8.

9 Casey, *Amphibian Engineer Operations*, pp. 330-333; Corfield, Robin S., *Hold Hard Cobbers: The Story of the 57th and 60th and 57th/60th Australian Infantry Battalions 1912-1990, Volume Two: 1930-1990*, (Burwood, Vic: Brown Prior Anderson, 1991), pp. 151-153.

10 *II Corps Report on Operations October 1943 – March 1944*, War Diary, II Corps GS Branch, AWM52 1/4/8.

11 Gill, G. Hermon, *Royal Australian Navy 1942-1945*, (Adelaide: Australian War Memorial, 1968), p. 438.

new Madang Base Sub Area.[12] The advance party proceeded to select sites for an ASD, DID, bakery, BIPOD and transport area. The Madang Base Sub Area was under the command of Colonel Allan, who first had to wind up the Finschhafen Base Sub Area.[13] Its headquarters, a type C headquarters, was formed from that of the Finschhafen Base Sub Area. Most of the units assigned to it were also drawn from Finschhafen, the rest coming mainly from Lae.[14]

A Liberty ship, *Edward D. Baker*, arrived on 8 May with 1,500 tons of rations, 520 tons of POL, 13 3-ton trucks and a 400-gallon water vehicle. The vehicles were unloaded first and set to work unloading the ship, assisted by four 3-ton trucks and eight jeeps loaned by the 5th Division. As the wharf was still under construction, the ship was unloaded into the stream on barges. Stores were moved to a transit area. Owing to a lack of suitable lighting equipment, the transit area was dark at night and suffered from pilferage. To relieve pressure on the main beach head, a temporary beach transit area was opened, accessible by barge and close to the main road. Roads in the area were in poor condition and vehicles were frequently in mud up to their axles. Repair work was continuous. Coconut logs were used for corduroy and coral gravel was employed as a binder. A shortage of tip trucks meant that ordinary trucks had to be used and the gravel manhandled. Local timber was unsuitable for construction purposes but in June the capture of Karkar Island, about 56 km away, provided a better source of timber.[15] Works, including storage accommodation, hospitals, the airstrip and the wharf were carried out by 5th CRE (Works).[16]

POL was dumped in a temporary location a short distance from the beach area, which heavy rain soon reduced to a quagmire. Japanese 91 octane (which they used as aviation fuel) was found near the abandoned airfield. It was salvaged and used in lieu of MT80. Empty drums were supposed to be returned to Lae, but due to a shortage of shipping they

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12 War Diary, Supply & Transport Area Command - Madang, AWM52 10/1/52.

13 War Diary, Madang Base Sub Area, May 1944, AWM52 1/8/23.

14 *New Guinea Force Administration Instruction No. 149*, "Maintenance of Australian Forces in the Madang area", 9 May 1944, AWM54 9/5/9.

15 War Diary, Supply & Transport Area Command - Madang, AWM52 10/1/52.

16 CRE 5 (Works), *Tech Summary No. 3*, 8 August 1944, War Diary, Madang Base Sub Area, AWM52 1/8/23.

tended to accumulate, and by the end of November some 13,500 empties were held at Madang.

Despite heavy rain that fell throughout May no running water was available so water was obtained from wells and delivered by water truck. The 1st Section of the 7th Field Bakery began baking on 13 May, turning out 1,000 kg of bread per day. The 2nd Section began on 25 May and the two of them were able to produce enough bread for the 5th Division and other units in the area to enjoy 250 g per man per day. Sappers of the 2/4th Field Squadron concentrated on getting the civilian refrigeration plant working, but were unable to do so immediately due to lack of spare parts, which had to be sent from the mainland. The first reefer[17] to arrive was *AS141*on 22 May with 5,500 kg of boneless beef and 2,000 kg of butter. Since the refrigeration plant wasn't working yet, issues were made direct from the ship, except for the 111th Casualty Clearing Station which had its own refrigeration and was able to store 5 days' worth of butter. Several small reefers and barges followed. An 8,500 litre refrigerator was installed by the end of the month and from 1 June two issues of meat and butter were made weekly. In August a 142,000 litre refrigerator came online. It suffered a breakdown on 9 April 1945, resulting in a series of double issues, and the utilization of all available Army, RAN and RAAF storage space until it was repaired.

Ships carrying fresh supplies from the mainland could come only as far as Finschhafen. Produce was stored in USASOS refrigerators until a small vessel like *AS141* could bring them forward. Generally speaking, it required four small ship voyages to move the contents of one shipment. Reconciliation of stores was impossible. In one incident, a shipment of fresh produce arrived at Finschhafen. It was found that some of the apples and oranges had deteriorated, so an issue of 59 cases of oranges and 99 cases of apples was made to units in the Finschhafen area. The rest was stored in USASOS refrigerators as usual. Due to an error, the Quartermaster at Base F issued the Swedes, carrots and part of the fruit to American troops. When the error was discovered, he could not replace them, so a like quantity of potatoes was substituted for them and the remaining 397 cases of apples. Fresh rations were supplemented by purchase and barter with the local communities, which yielded quantities of paw paws, bananas and galip, a popular species

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[17] A type of ship typically used to transport perishable commodities which require temperature-controlled transportation, mostly fruits, meat, fish, vegetables, dairy products and other foodstuffs.

of native nut. Another example of the chaotic supply situation was the arrival of a section of the 5th Field Butchery in June, allowing animals to be slaughtered. New Guinea Force asked LHQ to send 500 to 1,000 live sheep per month but no livestock arrived, and the unit returned to Lae in October. Such an error attracted little comment. Some additional food was harvested locally by the 3rd Farm Company and the 1st Marine Food Supply Platoon. In addition to supporting Army units, the Madang Base Sub Area also rationed the 2,000 RAAF and to some extent the 1,200 RAN personnel in the area. RAAF units were rationed in the same manner as Army units while the RAN drew rations, except bread, in bulk to supplement its supplies, as it had the supply ship *Wang Poo* anchored in Madang Harbour.

In September units began shipping out and the Madang Base Sub Area began to wind down. It became an area command on 27 September. The departure became an exodus in October and the withdrawal of transport units left only 28 vehicles available daily, making it difficult to meet RAAF demands. Although the Madang Area Command slowly shrank, it remained in operation until the end of the war.[18]

The Wau-Labu Road

Returning units to Australia was good for morale and troop efficiency, but costly in terms of shipping. The alternative, of keeping them in New Guinea, and staging from there, had to be considered, at least for units that had not yet served in the tropics for long periods. With four divisions on the Atherton tableland or on the way, the camps there were at capacity. Advanced LHQ decided to provide a rest area for a brigade in New Guinea. Wau was a natural choice, as it was an existing base with a good climate, water supply and electric power. But first, road access had to be provided to the Wau-Bulolo Valley.

It will be recalled that the original plan of the 1943 campaign called for the 7th Division to be supported over a land line of communications.[19] A pre-war road existed as far as Sunshine, at the northern end of the Bulolo Valley. In August 1943 the 2/14th Field Company began work on the first section of the new road, through the Watut River gorge.

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[18] War Diary, Supply & Transport Area Command - Madang, AWM52 10/1/52; War Diary, New Guinea Force Q Branch, June 1944, AWM52 1/5/53.

[19] DCGS LHQ to GOC NGF, “Future Operations - New Guinea”, 17 May 1943, AWM54 589/3/11.

In September CRE First Army Troops, Lieutenant Colonel J. C. Saint Smith, took charge of the work, bringing in the 2/9th Field Company and the 4th Platoon, 2/1st Mechanical Equipment Company from the Bulldog Road. A bridge was thrown over the Snake River and mechanical equipment began work on the Zenag Plateau while the 2/9th Field Company began working on the boulders in the Watut River gorge. All work was done with local materials, except for some ironwork. Timber was cut on the spot, and road metal was obtained locally. A gravel pit was opened on the plateau, using a carryall scoop and Chinaman loader.

23. 1 March 1943 Chinaman loader at Wampit. This device is used to facilitate the loading of tip trucks.

On 20 December 1943 CRE Wau Construction took over command of the road work. This was none other than Colonel Reinhold, builder of the Reinhold Highway, back from leave in Australia. His command was increased with the addition of the 9th Field Company and 1st Platoon, 2/1st Railway Construction Company (Mechanical Equipment). By now there were some 1,250 native labourers working on the road under ANGAU supervision and the road itself was under construction as far as Wampit. Reinhold was given technical control of the work only, as he had no staff until the 14th CRE (Recce), of which he was also commander, arrived on 20 January 1944. Administration was initially a jumble, with some units under the Lae Base Sub Area while others came under the Moresby Base Sub Area, until the Lae Base Sub Area assumed responsibility for the entire area in March 1944. Reinhold was also responsible for maintenance of the Reinhold

Highway from 20 January 1944 until it was closed on 18 March. Instead of attempting to cross the wide and swift-flowing Markham River, he decided to divert the road to Labu, on the coast south of the river.

The 2/33rd Supply Depot Platoon established DIDs at Mumeng and Wampit, stocking them with rations and POL. Stores were moved by barge or the *Muliama* from Port Moresby, then via the Lakekamu River and Reinhold Highway to dumps around Wau. Urgent stores were flown direct from Port Moresby to Wau. Initially supplies were carried forward of Deks by RAE jeeps, but this became harder as the road lengthened and the number of jeeps was reduced by hard usage, so Reinhold asked the Wau Station Command for help. It assigned a platoon of the 2/34th General Transport to Deks. Work began from the Labu end with mechanical equipment on 4 February, supplied from Lae by barge.

Unlike the Bulldog Road, the majority of the road work was by mechanical equipment rather than by hand, with 26 angledozers (including a D8 and two D7s), 24 tractors, a Quickway shovel, and several scoops on the job. Much of it had already seen hard service, with nearly all having over 1,000 hours on the clock, and some equipment had over 3,000 hours. Keeping it working was beyond the resources of the one section of the 8th Motor Transport Workshop initially deployed at Wau, forcing mechanical equipment units to carry out their own repair work. In February, the headquarters of the 8th Motor Transport Workshop moved to Wau and a section to Wampit, providing better support.

On 3 March Reinhold travelled from Deks to Labu by jeep. That day, two jeeps carrying members of the Army Business Board made the trip in the opposite direction. Thus, the road was open from Bulldog to the coast. The brigade accommodation was finished on 15 April, the day after the road was opened, but on the night of 14 April the area experienced very heavy rainfall. The Wampit and Snake Rivers broke their banks and two bridges were washed away.[20] Other parts of the road were blocked by landslides

[20] "The Wau-Labu Road", 30 April 1944, Reinhold Papers, Fryer Library, University of Queensland, Special Collection Box 62 Item 7.

and it became impossible to drive from Wau even so far as Bulolo. The damage was repaired and the road reopened on 24 April.[21]

Brigadier P. S. McGrath, DDST at New Guinea Force, paid a visit to the road. He found the 2/34th General Transport Company struggling to move stores down the road with a collection of jeeps that were in a poor state of repair. The road's soft edges and many winding sections without room for vehicles to pass made for a lot of one way traffic. It was also rough and difficult, putting hard wear on the jeeps. McGrath ordered the 133rd General Transport Company down from Lae with its GMC 2½-ton 6x6 trucks. A half dozen 3-ton 4x4s of the 2/34th were earmarked for use on maintenance convoys, being able to carry as much as 24 jeeps, while the 6x6s moved personnel and stores. A few jeeps were retained as admin vehicles. McGrath ordered all the rest turned in to the 102nd Forward Ordnance Depot at Wau, which already held 150 jeeps and 40 3-ton 4x4s that had been laid up due to lack of parts or workshop facilities. McGrath ordered these backloaded to Lae. The 2/34th was earmarked to return to Australia.[22] The transfer of the 133rd put pressure on the 151st General Transport Company back in Lae and for a time the use of vehicles there was restricted to essential demands.[23]

Reinhold assigned the 48th DCRE (Works) and 2/4th Field Squadron to the task of constructing the new rest camps arounfd Wau, and work commenced on 17 February. Huts were erected and water and electricity connected. Timber was milled on site at an existing mill, but its output was insufficient, so a second mill was constructed. [24]

11th Division Headquarters opened at Wau on 18 May and divisional units were concentrated there, as was the recently arrived 23rd Infantry Brigade, which moved into

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21 War Diary, 8th Motor Transport Workshops, 14, 15, 24 April 1944, AWM52 14/50/7.

22 DDST, "Transport Commitment Wau-Labu", 26 May 1944, War Diary, S&T New Guinea Force, AWM52 10/1/12.

23 *Weekly Resume, S&T Service to 23 June 1944*, War Diary, S&T New Guinea Force, AWM52 10/1/12.

24 "The Wau-Labu Road", 30 April 1944, Reinhold Papers, Fryer Library, University of Queensland, Special Collection Box 62 Item 7.

the new rest area at Wau on 1 June. On 13 July 11th Division Headquarters was relieved by that of the 3rd Division and returned to Australia.[25]

Regrouping

On 12 April 1944 the headquarters of Lieutenant General S. G. Savige's I Corps moved up from Queensland to relieve that of Lieutenant General F. H. Berryman's II Corps at Finschhafen. The two staffs had hoped to exchange office equipment, thus saving on shipping, but Advanced LHQ ordered that each should move with all its stores. Instead, the designations of the two corps were exchanged, with the result that I Corps was still the corps in Australia and II Corps the one in New Guinea. Apart from creating resentment among long-serving staff, and numerous difficulties for the Army Postal Service, it required the re-posting of all the personnel of both headquarters, which was especially frustrating because on 20 April II Corps was ordered to assume the designation and function of New Guinea Force with an increment of 51 officers and 309 other ranks and its personnel had to be re-posted a second time. The existing headquarters of New Guinea Force in Port Moresby was broken up.[26] Savige assumed command of New Guinea Force from Morshead, his new headquarters opening at Lae on 6 May.[27] MacArthur discarded the task force organization and from 9 September the US Sixth and Eighth Armies and Lieutenant General V.A.H. Sturdee's First Army reported directly to him.[28] First Army headquarters arrived at Lae on 1 October and assumed control of Australian troops in New Guinea. At midnight New Guinea Force passed into history, its headquarters becoming II Corps once more.[29]

In its operations around Madang, the 15th Infantry Brigade rigorously enforced anti-malarial precautions, with the result that its average malarial rate was no higher than that at the base at Lae.[30] A conference at Atherton in June 1944 provided Colonel Fairley with

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25 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53.

26 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53.

27 War Diary, New Guinea Force G Branch, 6 May 1944, AWM52 1/5/51.

28 *GHQ Operations Instructions No. 67*, 9 September 1944, Blamey Papers: 3DRL 6643 3/102.

29 New Guinea Force, 29 September, War Diary, New Guinea Force, AWM52 1/5/51.

30 Walker, *Clinical Problems of War*, p. 115.

an opportunity to present the results of the Army's research to its corps, division and brigade commanders.[31] The conference concluded with the Director General of Medical Services, Major General S. R. Burston, telling the attendees that "the ball is now in your court". [32] General Savige responded by issuing a new anti-malarial code which declared:

1. Malaria can and will be suppressed in the Aust. Army in New Guinea.
2. This code tells you how to do it.
3. It is the result of hard practical experience and expert advice. It can be carried out and will work.
4. If it is obeyed there will be no malaria.
5. If it is not obeyed there will be malaria.
6. Success in fighting malaria will be treated as just as important as fighting in the field. Failure to defeat malaria will be regarded in the same way as failure in the field due to neglect or incompetence. [33]

With only two operational formations in New Guinea, the 5th Division at Madang and the 3rd Division in the Wau-Bulolo Valley, large numbers of logistic units were no longer necessary. It was decided to maintain only two base sub areas, Lae and Madang, and to close Milne Bay, Buna and Finschhafen, and reduce Port Moresby. The army remained responsible for the bulk oil installations at Port Moresby and Milne Bay, the coast defences at Port Moresby, Milne Bay, Buna, Lae and Finschhafen, the antiaircraft defences of Port Moresby, Lae and Buna, and the provision of rations to the RAAF and civilians.[34]

The nature of the Army's responsibility for supporting the RAAF was a matter of considerable concern because, while logistic support of the RAAF in forward areas was doctrinally an Army responsibility,[35] RAAF units were now operating in places where the Army presence was very small, such as Goodenough, Kiriwina and Manus.[36] These units

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31 Sweeney, *Malaria Frontline*, pp. 240-242.

32 Walker, *Clinical Problems of War*, p. 118.

33 *New Guinea Force Routine Order No. 210*, 28 August 1944, War Diary, NGF A Branch, AWM52 1/5/52.

34 AQMG (Plans), "Notes on the Administrative Implication of the New AMF Policy in NG", 10 January 1944, AWM54 213/3/15.

35 *Field Service Regulations* (1935), p. 148.

36 QMG to CG USASOS, "Rationing of RAAF units in US Army Areas", AWM54 917/1/6.

were being supplied by the US Army through the 232nd Supply Depot Platoon, which was entirely occupied in drawing rations in bulk from American depots, breaking them down into unit allotments, and delivering them to RAAF units.[37] When the US Army had assumed responsibility for its own rationing, it was agreed that where small groups of Americans were stationed in places where the majority of troops were Australian, or vice versa, the larger force would provide rations for the smaller. But small US Army units operating with the Australian Army were being supplied individually, eliminating the need break down their bulk issue. On this being brought to GHQ's attention by General Cannan, General MacArthur issued a directive that reciprocal treatment would be extended to Australian units.[38]

When the commander of the RAAF's No. 73 Fighter Wing, based in the Admiralty Islands, heard that the Army was planning to pull out, he immediately protested. While the current setup was working well, the local US quartermaster was not set up to ration individual units and no trained RAAF personnel were available to perform the function.[39] Moreover, the wing had a strength of around 2,500, far too large to be considered a small unit,[40] which GHQ defined as being no more than about 200 strong. GHQ emphatically refused to accept responsibility for the RAAF in the Admiralty Islands.[41] This left Cannan no choice but to continue the existing arrangements, even though it meant assigning tiny Army detachments to RAAF units operating with American task forces, something he regarded as unnecessary and wasteful.[42] When the Americans pulled out of Goodenough, Kiriwina and Woodlark during 1944, support of the RAAF units there devolved upon the Army. By the end of the year they were operated as emergency airstrips only.[43]

A considerable amount of redistribution was required, not just of personnel, but of vehicles and stores, all of which were seriously unbalanced. This required shipping,

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37 NGF to DA&QMG Adv LHQ, 14 July 1944, AWM54 917/1/6.

38 CinC SWPA, "Distribution of Rations", 19 April 1944 , AWM54 917/1/6.

39 RAAF Northern Command to RAAF HQ, 24 June 1944, AWM54 917/1/6.

40 QMG to DA&QMG, 24 June 1944, AWM54 917/1/6.

41 Sen Adm LO to DA&QMG, "Responsibility of Allied Forces for the Supply of RAAF", AWM54 917/1/6.

42 QMG to CG USASOS, 27 July 1944, AWM54 917/1/6.

43 Casey, *Airfield and Base Development*, pp. 146, 154, 156.

always hard to extract from USASOS. Two ships, *Clarence King* and *Bontekoe*, were allotted by USASOS but for one voyage only. The movements program took months.[44] Shipping to New Guinea remained chronically short in 1944. Shipments from December 1943 to April 1944 totalled 222,000 m^3 as against requirements of 324,000 m^3, although part of this represented cancellations due to the reduction of troop strength in New Guinea, or for want of refrigeration space, while some was compensated for by the receipt of POL from overseas shipments.[45] USASOS did make some of the 30 Liberty ships that returned from New Guinea ports to Australia each month available for back-loading, but some units could not return until their reliefs were in place, and the increasing use of shipments direct from the US to New Guinea meant that the number of ships returning to Australia declined during 1944.[46] USASOS also offered up some refrigeration space on its vessels for shipments to Australian bases, representing, in June 1944, some 8.5% of reefer space to Milne Bay, 32% of that to Lae and 6% of that to Finschhafen.[47] Similar allocations in July and August, coupled with a dramatic increase in refrigeration capacity, particularly at Lae, permitted the highest rates of issue of fresh commodities since operations began in New Guinea.[48]

At Milne Bay, the major commitment was the bulk oil installation at Gilli Gilli which, it may be recalled, was completed in March 1944. In February Cannan wrote to USASOS, asking if it could be turned over American forces. USASOS noted that an engineer petroleum distribution company would be required to run the installation. Four were scheduled to arrive in SWPA during 1944 but they were earmarked to run new advance base installations and none could be spared for Milne Bay.[49] In April New Guinea Force

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44 AQMG (Plans), "Notes on the Administrative Implication of the New AMF Policy in NG", 10 January 1944, AWM54 213/3/15.

45 AQMG (Maint), "Shipping Facilities for Australian Services and Complaints Regarding Mail Services", 25 May 1944, War Diary Adv LHQ DA&QMG Branch AWM52 1/2/6.

46 SC (Adm), "Movement of Units etc ex New Guinea", 2 March 1944, War Diary Adv LHQ DA&QMG Branch AWM52 1/2/6.

47 War Diary, New Guinea Force Q Branch, June 1944, AWM52 1/5/53.

48 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, AWM54 519/6/29.

49 CG USASOS to CinC SWPA, "Bulk Petroleum Ocean Terminal, Milne Bay", 5 February 1944, AWM54 517/3/2.

suggested that the installation at Port Moresby also be handed over to the Americans.[50] This was done in May, allowing the 1st Bulk Petroleum Storage Company to return to Australia.[51] Cannan continued to press his case for months without success. Then, on 4 June, the GHQ Area Petroleum officer visited New Guinea Force HQ, where the POL position was discussed and he announced a change of heart. Where the Australian Army strength had dwindled, USASOS would undertake responsibility for POL.[52] A directive from MacArthur followed, ordering USASOS to assume responsibility for the operation of Gilli Gilli from 15 August 1944.[53] The sub area was then rapidly reduced to an area command of about 480, mostly ANGAU.

The base reduction programme began in earnest in May. Port Moresby received its last air raid on 20 September 1943,[54] and ceased to be a defended port on 25 April 1945.[55] Port Moresby Base Sub Area was reduced to an area command in October 1944, but a shortage of shipping prevented the base from being reduced to less than 3,500 personnel,[56] and in December 1944 Area Command Moresby became a base sub area again, known as the 6th Base Sub Area.[57] Buna Base Sub Area's main commitment was now the support of ANGAU and the signallers maintaining the Jungle Trunk Line from Port Moresby to Lae. It too was reduced to an area command and was disbanded on 25 November 1944.[58] Finschhafen Base Sub Area became an area command under the Lae Base Sub Area on 26 June, which it remained for the rest of the war.[59] By September 1944 Area Command Finschhafen was reduced to a few details who managed its use as a

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50 DA&QMG New Guinea Force to LHQ, "Bulk Petroleum Ocean Terminals – New Guinea", 24 April 1944, AWM54 517/3/2.

51 GOC NGF to Adv LHQ, "Bulk Petroleum Ocean Terminals – New Guinea", 29 May 1944, AWM54 517/3/2.

52 *Weekly Resume S&T Service to 9 June 1944*, War Diary, S&T New Guinea Force, AWM52 10/1/12.

53 MacArthur to Cdr ALF, CG USASOS, "Bulk Petroleum Ocean Terminal, Milne Bay", 7 July 1944, AWM54 517/3/2.

54 "Dates of Enemy Air Attacks – Port Moresby and adjacent areas", undated, AWM54 812/3/17.

55 NOIC Port Moresby, 25 April 1945, NAA (Vic): B6121 359A.

56 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53.

57 War Diary, 6th Base Sub Area, 14 December 1944, AWM52 1/8/3.

58 War Diary, Buna Base Sub Area, 25 November 1944, AWM52 1/8/6.

59 *New Guinea Force Administrative Instruction No. 156*, "Administration – Finschhafen Area Command", 8 July 1944, War Diary, New Guinea Force G Branch, AWM52 1/5/53.

transshipment point for refrigerated cargo moving between Australia and Madang, to which most of its units were transferred. A small staff of six personnel manned Saidor as an air terminal for movements from Lae to Madang that landed there in *Dakotas* and completed the journey to Madang by *Anson* or *Piper Cub*.[60] By August, passengers and freight were being moved directly from Lae to Madang and all Australian troops and stores were withdrawn from Saidor.[61] Madang too was reduced to the status of an area command on 27 September.[62] In September, New Guinea Force ordered the Wau-Bulolo area to be vacated, and the Wau-Labu Road was closed.[63] Lae Base Sub Area remained the major Australian base until the end of the war.

On 21 September, a staff officer at Advanced LHQ checking the ration statements uncovered an astonishing fact. Milne Bay had disappeared. On being queried, New Guinea Force revealed that USASOS were now issuing the rations at Milne Bay, where there were still 316 Army and 2,133 RAAF personnel. When queried as to the authority this was done under, New Guinea Force produced a March 1944 order from LHQ intended to cover the rationing of the population in Australian territories such as Bougainville and the Admiralty Islands, where US forces were operating but the Australian Army was not. Cannan, unimpressed, sent a message to the effect that rationing the Army and RAAF was not an American responsibility.[64]

The departure of the 1st and 3rd Pack Transport Companies meant that their animals had to be disposed of, for quarantine regulations precluded their return to Australia. Some 24 horses were transferred to ANGAU for sale, while 28 were given to various units. The rest had to be put down.[65] As farm units returned to Australia, the army farm at Port Moresby was handed over to ANGAU, as was the farm at Wau, which could no longer

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60 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53.

61 War Diary, New Guinea Force Q Branch, August 1944, AWM52 1/5/53.

62 War Diary, Supply & Transport Area Command - Madang, AWM52 10/1/52.

63 BGS NGF, "Army Installations Wau", 4 September 1944, War Diary, New Guinea Force G Branch, AWM52 1/5/51.

64 Col (Q) Adv LHQ to DA&QMG Adv LHQ, "S&T to AMF in Milne Bay", 27 September 1944 AWM54 917/1/6; DA&QMG to GOC First Army, 3 October 1944, AWM54 917/1/6.

65 War Diary, New Guinea Force Q Branch, June 1944, AWM52 1/5/53.

supply the army now that the Wau-Labu Road had closed. A third farm at Nadzab was closed after a disastrous flood. This left only the farm at Lae. Although the army farms at Port Moresby and Wau had supplemented the rations in New Guinea, there remained doubts about whether army farms were worthwhile, given the short time that units normally spent in an area.[66]

Problems arose from an unexpected quarter. By mid-1944 the war had long since passed Kokoda by, and it was a backwater. Nonetheless, ANGAU and Jungle Trunk Line maintenance personnel of the 18th Line of Communication Signals, some 200 soldiers and 650 Papuan civilians, still relied on the airstrip, as they were maintained by fourteen 2,500 kg *Anson* shipments per month. Planes skidded on the runway, overshooting and winding up in the grass beyond, leading to DAT announcing in late July that future missions would be airdrops until the airstrip was levelled and gravelled. Nor were any light aircraft available to return parachutes or mail.[67] The departure of the 3rd Air Maintenance Company on 5 June for a well-deserved rest left New Guinea Force without any air maintenance units, although a monthly requirement remained for 27,000 kg of supplies to be delivered by air. Most were landed at Kokoda, Dumpu and Bena Bena, but there was still the occasional airdrop to remote and isolated AIB and ANGAU parties. Luckily, ordnance units still contained men skilled in storing, folding and packing parachutes and the 3rd Air Maintenance Company was able to train the 2/163rd Supply Depot Platoon in air maintenance before it departed.[68]

Although Kokoda was outside its boundaries, the Moresby Base Sub Area was responsible for its maintenance.[69] A search by the 22nd Supply Depot Company in

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66 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53.

67 OC Moresby Base Sub Area to NGF, "Rationing: ANGAU and Jungle Line Maintenance Personnel at Kokoda", 29 July 1944, AWM54 425/5/24; DA&QMG, "Priority of Air Transport", 26 April 1944, War Diary, NGF Q Branch April 1944, AWM52 1/5/53.

68 *II Corps Report on Operational and Administrative Activities 10 April 1944 – 30 September 1944*, Savige Papers, AWM 3DRL 2529 53; *Q Branch Weekly Summary of Events for Week Ending 28 July 1944*, War Diary, NGF Q Branch July 1944, AWM52 1/5/53; DDST New Guinea, "Proposed Air Maintenance Unit for Service in New Guinea", 16 July 1944, War Diary, S&T New Guinea Force, AWM52 10/1/12.

69 *Weekly Report for Week Ending 10 June* 1944, War Diary S&T Lae Base Sub Area, AWM52 10/1/19; DA&QMG NGF to OC Moresby Base Sub Area, "Maintenance of ANGAU and Signals Personnel at Kokoda", 2 August 1944, AWM54 425/5/24.

Moresby revealed 30 parachutes on hand, enough for only six planeloads,[70] so another 20 were flown in from Lae.[71] Meanwhile, ANGAU had the airstrip levelled and sufficient gravel spread to bind the surface enough for Kokoda to be declared fit for *Dakotas* again on 10 August.[72] Then, on 10 September, the Chief Regulating Officer (CREGO) at GHQ announced that air supply of Kokoda would cease on 12 September. Protests that it was impossible to supply Kokoda by carrier line were to no avail.[73] An appeal extended the deadline to 23 September;[74] another, direct to GHQ, to 30 September. Arrangements were made for native carriers to bring supplies in from Buna by carrier starting on 1 October. Buna Base Sub Area was ordered to provide what assistance it could, although it was in the process of disbanding.[75]

Many logistical functions require a certain number of personnel to carry out at all, but can then be expanded rather easily. This is good when strength in an area is being built up, but makes it difficult when it is being reduced. The support of the troops around Kokoda was a good example. Their needs were quite modest; but the provision of a single aircraft requires much the same amount of support as an entire squadron. When many squadrons were available, the occasionally flight was easy to arrange, but in a drawdown situation it became highly uneconomical. The question then became: how much logistical effort was the Jungle Trunk Line really worth?

The Americans Depart New Guinea

In June 1945, GHQ announced that America forces were evacuating New Guinea and expected almost all to leave by 31 July. After three years, the two armies had naturally leant on each other to some extent, and untangling everything in a hurry was fraught with danger that something important might be overlooked.

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70 OC Moresby Base Sub Area to NGF, "Rationing: ANGAU and Jungle Line Maintenance Personnel at Kokoda", 29 July 1944, AWM54 425/5/24.

71 DA&QMG to OC Moresby Base Sub Area, 10 August 1944, AWM54 425/5/24.

72 AQMG ANGAU to HQ Southern Region, "Kokoda Airstrip", 10 August 1944, AWM54 425/5/24.

73 NGF to LandOps, 18 September 1944, AWM54 425/5/24.

74 LandOps to ForLand, 18 September 1944, AWM54 425/5/24.

75 ForLand to NGF, 22 September 1944, AWM54 425/5/24.

Since 15 February 1945 the US bases in New Guinea been consolidated as the New Guinea Base Section (NUGSEC),[76] whose commanding general was empowered to make "emergency" Lend Lease deals. GHQ's policy was that all troops and as much equipment as practical was to be removed, while the Australian government's policy was that goods obtained under Lend Lease must be in good condition.[77] Both GHQ and LHQ were anxious to avoid giving the appearance of a fire sale, but this was not entirely successful, partly because while there were sufficient troopships to evacuate personnel, there was a shortage of LSTs, AKAs and ordinary cargo vessels to move equipment, particularly vehicles.[78]

First Army headquarters consolidated requests from the technical services, whose wish lists included generators, Victaulic pipe, refrigerators, tractors, cranes, spare parts for DUKWs, jeeps and small marine craft, tyres, batteries, gaiters and penicillin.[79] Even the Chaplain's department put in a request, for Base E's chapel at Lae,[80] prompting an order from First Army HQ that no chapel buildings were to be demolished or have their contents removed without its approval.[81] Much valuable equipment was acquired. At Lae the engineer depot handed over a Quickway shovel and five generators;[82] at Finschhafen, a D8 tractor, six TD14 tractors and 16 tractor engines, which were shared between Lae, Torokina, Aitape and Jacquinot Bay.[83]

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76 Casey, H. J. (ed), *Engineers of the Southwest Pacific 1941-1945: Volume VII: Engineer Supply*, (Washington, DC: Government Printing Office, 1947), p. 188.

77 Conference Notes, "Evacuation Of New Guinea by American Forces", 18 June 1945, AWM54 16/12/11.

78 Leighton, R. M. and Coakley, R. W., *Global Logistics and Strategy 1943-1945*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1967), pp. 604-605.

79 First Army to CG NUGSEC, 5 July 1945, AWM54 917/4/12.

80 ACG (CofE) to First Army, 20 July 1945, AWM54 917/4/12.

81 DA&QMG First Army to Lae Base Sub Area, "Base E Chapel", 21 July 1945, AWM54 917/4/12.

82 CE First Army, 22 June 1945, AWM54 16/12/11.

83 CE First Army, "Takeover of Equipment from US Forces – Finschhafen", 30 June 1945, AWM54 16/2/11.

A review of intra-area shipping revealed that American vessels played a vital part, hauling an average of 3,500 m^3 per month:

Table 15. Intra- First Army Area Shipping [84]

Month	**Total Tonnage (m^3)**	**In US Vessels (m^3)**
January 1945 (to 14 January)	6,397	5,642
February	3,764	3,217
March	2,507	2,031
April	1,821	1,739
May	4,789	4,081
June (to 14 June)	1,178	782

Of particular concern were refrigeration vessels. First Army had *AS141* on the run from Port Moresby to Milne Bay, and *Wayanna* on that from Lae to Buna, Finschhafen, Madang and Nantambu. *TP242* was taken over from the USASOS to supply Aitape from Wewak.[85] Unfortunately, *TP242* had a non-standard engine for which spare parts were unavailable, and its unsheathed hull was potentially affected by marine borers.[86]

Unloading watercraft required heavy cranes. Normally, the large cranes at Finschhafen were used. First Army recommended that one be acquired, but this was not pursued.[87] Australian watercraft required a floating dock, but none could be handed over.[88] Of the three wharves at Oro Bay, two were in an advanced state of disintegration, while a bridge on the approach to the third was breaking up, and usable only by jeeps. Other bridges on the Oro Bay-Dobodura and Dobodura-Buna roads were also deteriorating rapidly.[89]

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84 GOC First Army to CG NUGSEC, "Shipping Intra-First Army Area", 21 June 1945, AWM54 16/2/11.

85 "Notes on Evacuation of New Guinea by US forces", June 1945, AWM54 16/2/11.

86 Col (M&Tn) First Army, "Evacuation of New Guinea by US forces", 11 July 1945, AWM54 16/2/11.

87 DDOS First Army, "Unloading Watercraft", 24 July 1945, AWM54 16/2/11.

88 Lt Col J. a. North, "Report on Visit to New Guinea Base Section USASOS", 1 July 1945, AWM54 917/4/12.

89 Major J. H. Taylor, "Report on Visit to Finschhafen on 17 August 1945", AWM54 917/4/12.

NUGSEC agreed that, before departing, it would hand over 60 days' dry supplies, expense stores, beer and cigarettes, fresh stores to the limit of available refrigeration space and 180 day's of POL. ANGAU and RAAF units would have to draw supplies from a ship's side, and break bulk themselves.[90] The Americans agreed to leave one 10,000-barrel and four 2,000-barrel bolted tanks at Oro Bay. Drummed POL would be left at Dobodura and Milne Bay. The Army had to warn the RAAF that it had no resources to handle the supply of avgas, and could offer no assistance.[91]

The whole effort soon slipped behind schedule, although Base D at Port Moresby duly closed on 24 July.[92] In mid-July AFWESPAC, the new American high-level administrative and logistic command which had absorbed USASOS on 7 June,[93] notified First Army that Milne Bay and Oro Bay would not be closed until 20 August, Lae until 7 September and Finschhafen until October.[94] Milne Bay and Oro Bay soon slid to 7 September.[95] Even then, the caretaker force at Finschhafen would be quite large, and include half a base hospital, which could continue to treat Australian cases. The RAAF, which had 900 personnel at Finschhafen to the Army's 120, agreed to provide a medical officer and some limited hospital facilities when it departed.[96] The US Bases at Oro Bay, Milne Bay and Lae finally closed on 7 September but fortunately the end of the war postponed the closure of Base F at Finschhafen until 1946.[97]

In reducing the bases in New Guinea, both the US and Australian Armies found the process difficult, especially in the face of the shortage of shipping. The effort required a high degree of flexibility and attention to detail.

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90 Major J. H. Taylor, "Report on Visit to Dobodura-Buna 6-8 August 1945", AWM54 917/4/12.

91 GOC First Army, "Evacuation of New Guinea by US forces", 10 July 1945, AWM54 16/2/11; Lt Col J. a. North, "Report on Visit to New Guinea Base Section USASOS", 1 July 1945, AWM54 917/4/12.

92 Casey, *Airfield and Base Development*, p. 101.

93 Casey, *Engineer Supply*, p. 189.

94 USAFWESPAC to GOC First Army, 16 July 1945, 16/2/11.

95 Major J. H. Taylor, "Report on Visit to Dobodura-Buna 6-8 August 1945", AWM54 917/4/12.

96 Major J. H. Taylor, "Report on Visit to Finschhafen on 17 August 1945", AWM54 917/4/12.

97 CO Base E, 6 September 1945, AWM54 917/4/12; Casey, *Airfield and Base Development*, p. 116; Casey, *Engineer Supply*, p. 192.

10. The Mopping Up Campaigns

On 1 May 1944 General MacArthur announced his intention to relieve the American garrisons of Australian and British territories with Australian troops.[1] Prime Minister Curtin had impressed upon MacArthur Australia's "special interest in the employment of its own forces in operations for the ejectment of the enemy from territory under its own administration",[2] and his desire that Australia should contribute to the garrison of those territories.[3] Although it was government policy, General Blamey was cautious about employing too many troops in view of the Army's commitments and its inevitable reduction in size. While the Militia was legally restricted to the South West Pacific Zone,[4] the AIF could serve anywhere, and he intended to save it for offensive operations in the Philippines.[5] The extent of the Australian contribution was the subject of negotiation in July 1944. Blamey proposed assigning three brigades to Aitape and two to New Britain. The sticking point was the Northern Solomons, which he proposed to garrison with three or four militia brigades. GHQ insisted on at least five, with four on Bougainville and another on the "outer islands" – Green, Emirau, the Treasury Islands and Munda.[6] This forced Blamey to commit the 6th Division to Aitape, even though it might also be required in the Philippines. The result was that MacArthur, who did not contemplate – but did not oppose – active operations in these areas, made them feasible, by allocating sufficient troops, and desirable, in order to free up those troops for use elsewhere. MacArthur ordered General Sturdee's First Army to continue "the neutralisation of Japanese forces within assigned areas, seizing every opportunity for the destruction of hostile forces".[7]

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1 LHQ to AAS (London), 1 May 1944, Blamey Papers, AWM 3DRL 6643 2/49.

2 Curtin to MacArthur, 22 November 1943, http://www.info.dfat.gov.au/info/historical/HistDocs.nsf/vVolume/D71B4110F62CF8F2CA256D3B00187415. Accessed 15 January 2006.

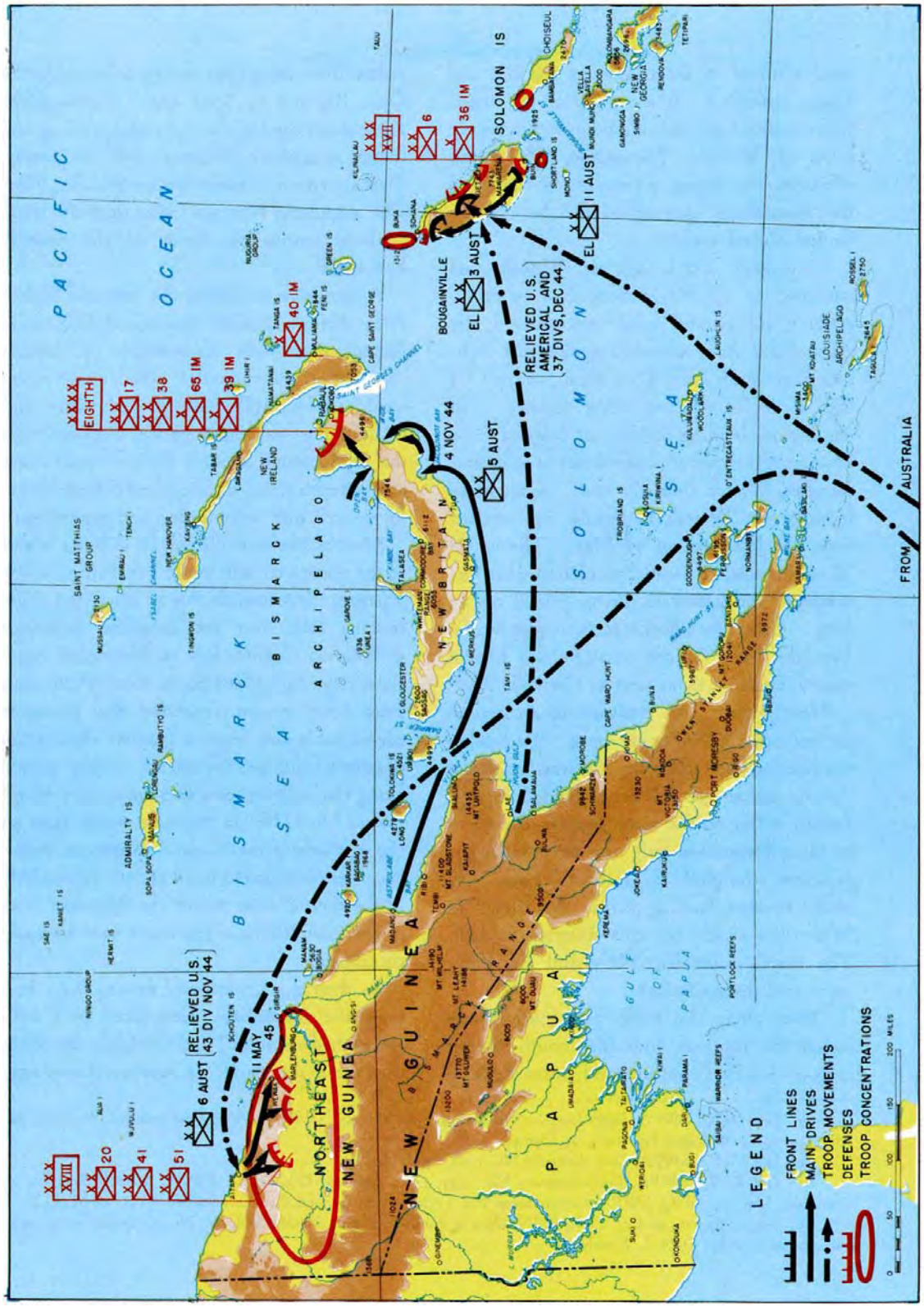
3 Notes of discussion between Curtin, MacArthur and Wilson, 30 September 1944, NAA (ACT): A5954 Box 3.

4 The area bounded by the Equator and 100° E and 159° E longitude. See Hasluck, P., *The Government and the People 1939-1942*, (Sydney: Australian War Memorial, 1952), p. 341.

5 Long, *The Final Campaigns*, p. 21.

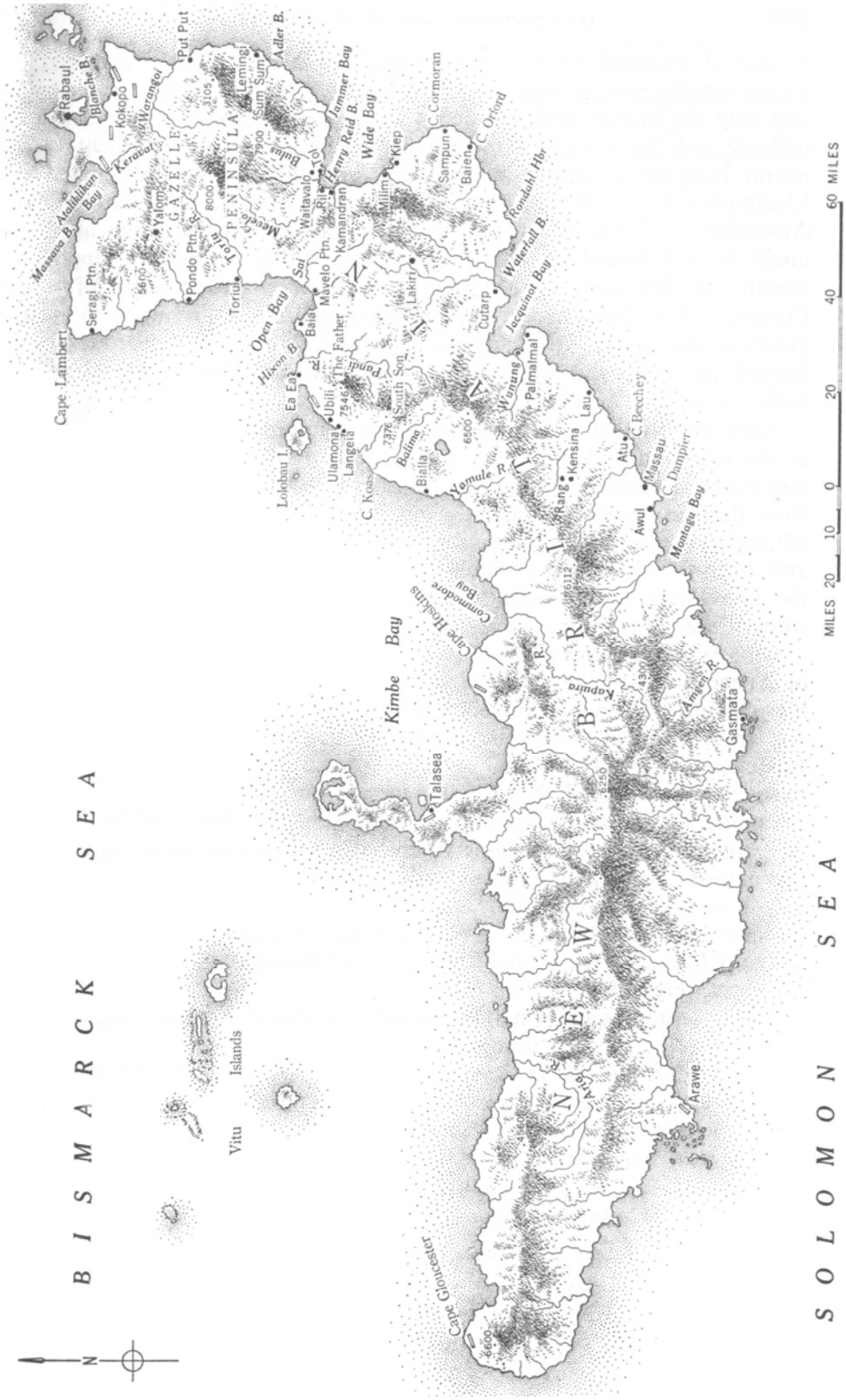
6 "Notes on Staff Discussion with General Chamberlin", 20 July 1944, AWM54 519/6/49; *GHQ Operations Instruction No. 65*, 30 August 1944, Blamey Papers 3DRL6643 2/102

7 *GHQ Operations Instruction No. 67*, 9 September 1944, Blamey Papers AWM 3DRL6643 2/102.



Map 15. The Mopping Up Campaigns

Source: *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, Volume I, p. 385.



Map 16. New Britain

Source: Long, *The Final Campaigns*, p. 243.

New Britain

In late December 1943 the US 1st Marine Division and the US 112th Cavalry Regiment landed at Cape Gloucester on the western tip of New Britain and at Arawe on the southern coast. Talasea and Gasmata were occupied in March and Cape Hoskins in May.[8] Consideration was given to relieving the marines with the 6th Division or Militia, but the area had no docks, so inward and outward movement of troops, equipment and stores had to be made in amphibious craft, and insufficient craft were available. Exchange of equipment between American and Australian divisions was impractical, so the quickest and easiest solution was to bring in the US 40th Infantry Division.[9] This problem had to be faced again when, on 20 August 1944, Major General A. H. Ramsay's 5th Division was ordered to relieve the US 40th Infantry Division.[10] In four months on New Britain, the US 1st Marine Division claimed 4,288 enemy dead and took 420 prisoners. In the following seven months, the US 40th Infantry Division killed just 31 and took 18 prisoners, losing contact with the enemy, who withdrew to Rabaul.[11] This left an estimated 38,000 Japanese on New Britain,[12] a figure which subsequently proved to be far too low – the true figure was more like 93,000 – but was still too high to contemplate their removal with the forces at hand.[13] Nonetheless, the 5th Division was ordered, "by offensive action to destroy enemy resistance as opportunity offers without committing major forces".[14]

To do this, a base closer to Rabaul was desirable. New Guinea Force decided to locate the main Australian base at Talasea or, better still, at Jacquinot Bay. Little was known about the Jacquinot Bay area, so a reconnaissance was carried out by a party in the corvette HMAS *Kiama*. They found a site where a Liberty ship wharf could be built just 10 metres offshore, with a protected anchorage large enough for six Liberty ships, and a nearby site for an airfield. They concluded that it would make a suitable base location. M Special

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8 Casey, *Amphibian Engineer Operations*, pp. 143-201.

9 GHQ G-3 Journal, 3 April 1944, AWM69 23/50.

10 *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

11 Shaw, H. I. and Kane, D.T., *Volume II: Isolation of Rabaul*, (Nashville TN: The Battery Press, 1993), p. 431.

12 *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

13 Long, *The Final Campaigns*, p. 241.

14 *LHQ Operation Instruction No. 66 – Roles of First Aust Army*, AWM113 1/154.

Unit reported that the area was clear of Japanese, the last one having been killed a few days before.[15]

A signal was sent to Advanced LHQ outlining their recommendations, but warning that if Jacquinot Bay were approved, it would be necessary to put troops into the area to protect the base. Advanced LHQ approved the selection, directing that a battalion should also go to Cape Hoskins, but suspended the operation five days later when a hitch developed over the availability of amphibian engineers. There were doubts as to whether A Company, 594th EBSR — the boat company at Cape Gloucester supporting the US 40th Infantry Division — could be made available, since the Australians were not going to areas occupied by American forces. A liaison officer was dispatched, who reported that the Americans were willing to release the company whenever it was required, and that it would go wherever it was needed. The operation then resumed.

Owing to a lack of shipping, the movement to Cape Hoskins was made in two lifts. *Swartenhondt*, a Dutch KPM ship, arrived from Lae on 8 October with troops including most of the 36th Infantry Battalion. A Company, 594th EBSR helped them unload. A detachment of eight LCMs of B Company, 594th EBSR arrived from Finschhafen under their own power on 29 October. *Swartenhondt* sailed for Cape Hoskins again that day with the rest of the garrison. Relief of the American forces in the area was deemed effective on 13 November.[16]

The old Japanese airstrip at Cape Hoskins was neither graded nor formed, but it had been mined, bombed and cratered. Rehabilitation of the strip began on 10 November, and it was operational again on 24 December.[17] On 10 October, a patrol in LCMs reconnoitred Nantambu and Ubili, where they found the Japanese airstrip overgrown. A landing was made at Nantambu on 13 January 1945. The airstrip at Ubili was reconstructed to take

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15 Gill, *Royal Australian Navy 1942-1945*, p. 491; *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

16 *Report on Operational and Administrative Activities of I Corps, II Corps, New Guinea Force 10 April 44 – 30 September 44*, AWM54 519/6/24; *Monthly Historical Report 4th Engineer Special Brigade*, 30 November 1944, USACE: X-82 E-47.

17 *RAE Operations in Solomon Islands, New Guinea and New Britain 1944-1945*, AWM54 313/3/13.

Dakotas, while a new airstrip was prepared at Nantambu for light aircraft.[18] Units in the Cape Hoskins area were maintained direct from Lae rather than through Jacquinot Bay.[19]

Although no opposition was expected, the landing at Jacquinot Bay was performed as a minor combined operation. The RAN supplied the destroyer HMAS *Vendetta*, frigate HMAS *Barcoo*, and sloop HMAS *Swan* to escort the transport *Cape Alexander*, carrying the 14th/32nd Infantry Battalion and the advance party of the 5th Base Sub Area, while *ML 827* escorted *Frances Peat* from Lae. *ML 802* and the salvage tug HMAS *Tancred*, towing a workshop barge, escorted B Company, 594th EBSR, less the eight LCMs sent to Cape Hoskins. The RAAF provided two *Beauforts*. The force commenced landing on 4 November 1944, the warships standing by for four days in case the Japanese tried to reoccupy the area by barge.

The Advance Party of the 5th Base Sub Area, 180 troops under its commander, Lieutenant Colonel H. T. Allan, disembarked on 5 November and set up under canvas.[20] Allan was the former commander of the base areas at Finschhafen and Madang, from which the 5th Base Sub Area had been raised in September.[21] It started raining around noon, and continued for most of the week. Unloading continued as long as it was light. Stores were dumped on the beach and once again POL and ammunition had to be stacked together. Three bulldozers cleared away the undergrowth, campsites were established, and tracks cut. Without roads, stores and tents had to be carried up the muddy slopes by hand. The hardest work of all was the movement of large numbers of 44-gallon drums of MT80. A pontoon jetty was erected and rollers installed to help unload them. Altogether, some 3,400 m^3 of stores and equipment were unloaded by 12 November.

The balance of the base troops arrived on 11 and 12 November on *J. Sterling Moreton* and *Swartenhondt*. The former had not been tactically loaded, with rations and accommodation stores deep in the holds. The result was that some men had to sleep in the

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18 *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

19 Lindsay, *Equal to the Task*, pp. 280-281.

20 *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

21 DA&QMG NGF, "Raising of HQ 4 Aust Base Sub Area, HQ 5 Aust Base Sub Area", 7 September 1944, War Diary NGF War Diary, NGF A Branch, AWM52 1/5/52.

open in the rain, and rations ran short. Some 670 native labourers arrived and, after establishing their own camp, cleared the undergrowth around the base area.

24. Jacquinot Bay, 9 June 1945.

The main road, looking towards the dock area. The DID is on the right, then Ordnance depot and bakery. The road is dressed with coral.

Building commenced in the second week, starting with latrines and kitchens, and then moving on to essential administration buildings, a field bakery and a sawmill. Most units erected mess and recreation huts using native materials and scrap timber. Some buildings were held up by shortages of engineering stores which had been loaded in standard blocks, with the result that many items not immediately required, such as cement, iron rods, wheelbarrows, steel mesh and bridging materials, were received that consumed unloading time and dump space, while urgently required items such as corrugated iron, timber, Sisalkraft, and nails, ran short. The 2/3rd Railway Construction Company arrived on 21 November and set to work on the roads. By 24 November the beachfront road was in use, as were some access roads. To protect them, vehicles were banned from using them in wet weather, a practice carried over from Finschhafen. This had an incidental health benefit, as it avoided creating the water-filled ruts that were breeding grounds for malaria. The incidence of malaria was extremely low in this campaign, with the 5th Division reporting only 41 cases up to April 1945, a rate of just 0.085%.

A flying boat arrived on 7 November with the mail, inaugurating a weekly courier run. The Japanese still had at least 25 aircraft still based around Rabaul, but the first air raid did not occur until 23 November. 5th Division Headquarters opened at Jacquinot Bay on

27 November but due to lack of shipping and urgency, units continued arriving until April 1945. By this time the 5th Division had occupied positions across the neck of the Gazelle Peninsula from Wide Bay to Open Bay, killed 206 Japanese, and captured five prisoners.

Aided by a prolonged spell of dry weather, priorities shifted to major projects in December: a Liberty ship wharf capable of handling two ships simultaneously, buildings for the 2/8th General Hospital, the aerodrome, and covered depots. Plans were expanded from the original concept of 30 days' holdings for 13,000 troops to 60 days' for 13,000. The dry weather had a downside. Ten days without rain in January 1945, normally the wettest month of the year, caused the reservoirs to dry up. Water restrictions were implemented and wells were dug, but they were too brackish, so for three days water was delivered by water carts, sent to the forward area by LCM.

B Company, 594th EBSR worked the port with 14 LCMs and 9 LCVPs, nearly all of them in poor condition. The coral shelf surrounding the coastline made life hard for LCVPs, and after several were holed their use was restricted to daily courier runs between the divisional beaches and the base area. Stone jetties with mesh piers were built to accommodate them. The average life of an LCM was reckoned at six to eight months, but these were in their ninth month of active service. Many of their hulls had sustained damage, some had engine trouble, and several had defective ramps.[22] No more than ten were available for duty at any time, and their loads were reduced to 23 m^3. Six more arrived from Cape Gloucester on 6 December, but were immediately laid up for repairs. Another 15 arrived on 8 January 1945. These too were in poor condition.[23] To make more effective use of the serviceable LCMs, Type 108 radios were installed, putting them in contact with the beaches and movement control. Provost personnel were posted on boats to act as guides and prevent unauthorised diversion or use.

Many lessons concerning landing craft had been learned in 1943. One concerned the relative efficiency of certain types. The LCM was harder to maintain than the LCVP, with

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22 McNicoll, *Teeth and Tail*, p. 235; *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7; *Formation of 5 Aust Base Sub Area*, 2 February 1945, AWM54 609/7/17; War Diary, 5th Base Sub Area, 4 November – 22 December 1944, AWM52 1/8/19.

23 GOC 5th Division to GOC First Army, "Report on Small Craft Jacquinot Bay Area (Coy B 594 EB&SR)", 23 December 1943, AWM54 509/7/7; DAQMG 5th Division, "Q Notes for War Diary", 31 December 1944, War Diary, 5th Division A&Q AWM52 1/5/11.

half the fuel economy, but could carry ten times as much, and was far more useful, as it could handle heavier and bulkier equipment. The latest model, the LCM(6), was two metres longer than the old LCM(3). This improved cargo capacity, speed, and seaworthiness, at the cost of 10% more steel and making it too large for some assault transports to carry. The sentiment was summed up by General Heavey, who rammed his point home with capitalisation: "WE DO NOT WANT ANY MORE LCVPs". It was agreed that production at Cairns would cease, and the 1,100 LCVPs in the theatre were sufficient for all three engineer special brigades.[24]

The Australian experience was similar. New Guinea Force reported that the need was for larger landing craft.[25] The answer was the ALCV III, an enlarged version of the ALCM II with four Ford V8 engines and twice the cargo capacity.[26] It also cost 2½ times as much, so the Army cancelled 50 ALCV IIs on order in favour of 20 ALCV IIIs. An order of 100 was costed at £600,000, including 200 spare engines and £24,000 worth of other spare parts. To the Treasury Department, this looked like Army incompetence, but ultimately war cabinet approval was obtained.[27] If the Army was hamstrung by funding arrangements, it was not restricted by agreements with the RAN like the one the US Army had with the USN that prevented it from acquiring LCTs.[28] The Army ordered 15 ALCM IIIs,[29] a new type of similar capacity to an LCT, with five Ford V8 engines.[30] Only four were delivered before the end of the war.[31] In mid-1944, the Army changed the designations of Australian landing craft, based upon cargo capacity in long tons, since the

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24 Casey, *Amphibian Engineer Operations*, pp. 446-450; Friedman, *US Amphibious Ships and Craft*, p. 212; OC 2nd ESB to CE GHQ, 1 April 1944, USACE: X-85 370.2.

25 GOC NGF to LHQ, 16 October 1943, NAA (ACT): A1308 776/1/51.

26 *Details of Combined Operations Watercraft, Volume II (Australian landing Craft)*, NAA (Vic): B6121 194C.

27 *War Cabinet Agendum 12/1944*, "Landing Craft – ALCV Mk III", NAA (ACT): A1308 776/1/51.

28 Memorandum of Agreement of the Chief of Staff, US Army and Commander in Chief, US Fleet and Chief of Naval Operations, 13 April 1943, NACP: RG496 Box 667.

29 *Review of Direct War Effort – Small Marine Craft Programme as at 30 June 1945*, NAA (ACT): A816 40/301/560.

30 *Details of Combined Operations Watercraft, Volume II (Australian landing Craft)*, NAA (Vic): B6121 194C.

31 Minutes, Small Marine Craft Sub Committee, 21 August 1945, NAA (ACT): A816 40/301/560.

difference between an ALCV and an ALCM was now blurred. Production numbers remained disappointing.

Table 16. Types and Production of Australian Landing Craft (1942-1945) [32]

Old Name	ALCV I	ALCV II	ALCV III	ALCM I	ALCM II	ALCM III
New name	ALC3	ALC5	ALC40	ALC15	ALC20	ALC120
Production	21	137	106	176	137	5

In March 1944, at the height of the cyclone season, a convoy of 26 landing craft sailing from Brisbane to Cairns was caught in a cyclone, and an ALCV III and an ALCM I were lost. General Steele sent two officers, one recently returned from New Guinea, to explain to the Small Marine Craft Sub Committee. They emphasised that the loss of the two landing craft was due to poor handling rather than any intrinsic design fault and managed to head off proposals that Army landing craft face seaworthiness certification.[33] While vessels taken over by the Army had to be certified seaworthy, Blamey pointed out that "the very nature of Army vessels and the roles for which such vessels are intended renders it impractical that they be subjected to routine certification by civilian authorities".[34]

Part of the 41st Landing Craft Company arrived at Jacquinot Bay on 19 February 1945, with 19 ALC40s, an ALC120, two fast supply launches and two workboats. Having made the trip all the way from Cairns under their own power, they spent the next fortnight under repair. Together with the completion of the Liberty ship wharf, and the opening of roads and bridges from the base sub area, this allowed the LCMs to be relieved, overhauled, and ultimately withdrawn on 15 April 1945.[35]

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32 Askey, M. W., "'By the Mark Five' : a Definitive History of Australian Water Transport Units in World War II , unpublished manuscript, AWM, p. 68.

33 EinC to Vice Chairman, Small Marine Craft Sub Committee; Minutes, Small Marine Craft Sub Committee, 22 June 1944, AWM234 3.

34 Blamey to Minister of Army, "Small Craft Certificates of Seaworthiness", 29 March 1944, Blamey Papers AWM 3DRL 6643 2/54.

35 Ephraim P Hansell, "Co B, 594th", http://www.armyamphibs.com/html/co_b_594th.htm

The ALC120 proved especially useful, although it required special stone or coral landing berths. Three empty trucks could be carried, with ships unloading directly into the trucks. The ALC120 would take them ashore, and the trucks would head directly to their depots. The ALC40s did not prove as useful as LCMs. Their Ford V8 engines were neither as reliable nor as powerful as the LCMs' Gray diesels; they sometimes became stuck on the beach and had to be towed off by an LCM.[36]

25. New Britain, 8 April 1945. Pile bridge over the Kalumalagi River built from local timber. The raised centre span allowed barge traffic.

Supplies had to be moved forward from Jacquinot Bay by barge until the sappers opened the roads. This, in turn, required bridge work. The Japanese road from Sampun to Kiep was restored and the sappers drove the road through to Rile. A 130-metre ARC mesh and timber bridge was thrown over the Mevelo River and a track constructed to the Henry Reid River. This too was bridged, despite an air attack by two Japanese fighters. Completed on 15 March, it was washed away on 24 March by a flood which also destroyed the Mevelo Bridge. The sappers had it rebuilt by 27 March. Where vehicles destroyed the surface, coral was used for repairs but some sections had to be corduroyed. At 197 metres, the Henry Reid River Bridge was the largest in the First Army area and

[36] *5 Aust Div Report on Operations – New Britain 8 Oct 44 to 19 Apr 45*, AWM54 509/7/7.

just 7 km down the road, was the Bulus River, which required another 112 metres of bridge. Flooding on 28 July destroyed the former and damaged the latter. [37]

The opening of the roads came none too soon, for the landing craft situation became tight with the withdrawal of the amphibian engineers and the diversion of part of the 41st Landing Craft Company to support the attack on Wewak. That the 5th Division was able to shift to a more conventional mode of land supply was as much due to good luck as good management. The general transport company of the Jungle Division establishment was only equipped with jeeps and trailers – an overreaction to the lessons of the Papuan Campaign – but fortunately the conversion of the 5th Division's 154th General Transport Company to the Jungle Division establishment was carried out at Jacquinot Bay and the trucks were still available. While 3-ton trucks represented only 7.5% of the vehicles used, they accounted for more than half the tonnage hauled.[38]

The acting Minister for the Army, Hon. J. M. Fraser, paid a visit to Jacquinot Bay in April 1945, and was amazed at what he saw:

> Five months ago, the area was virgin jungle, interspersed with small plantations and mangrove swamp. It now has splendid roads, well laid out camp areas, bridges over two wide and swift-flowing rivers, and is generally a major engineering achievement…[39]

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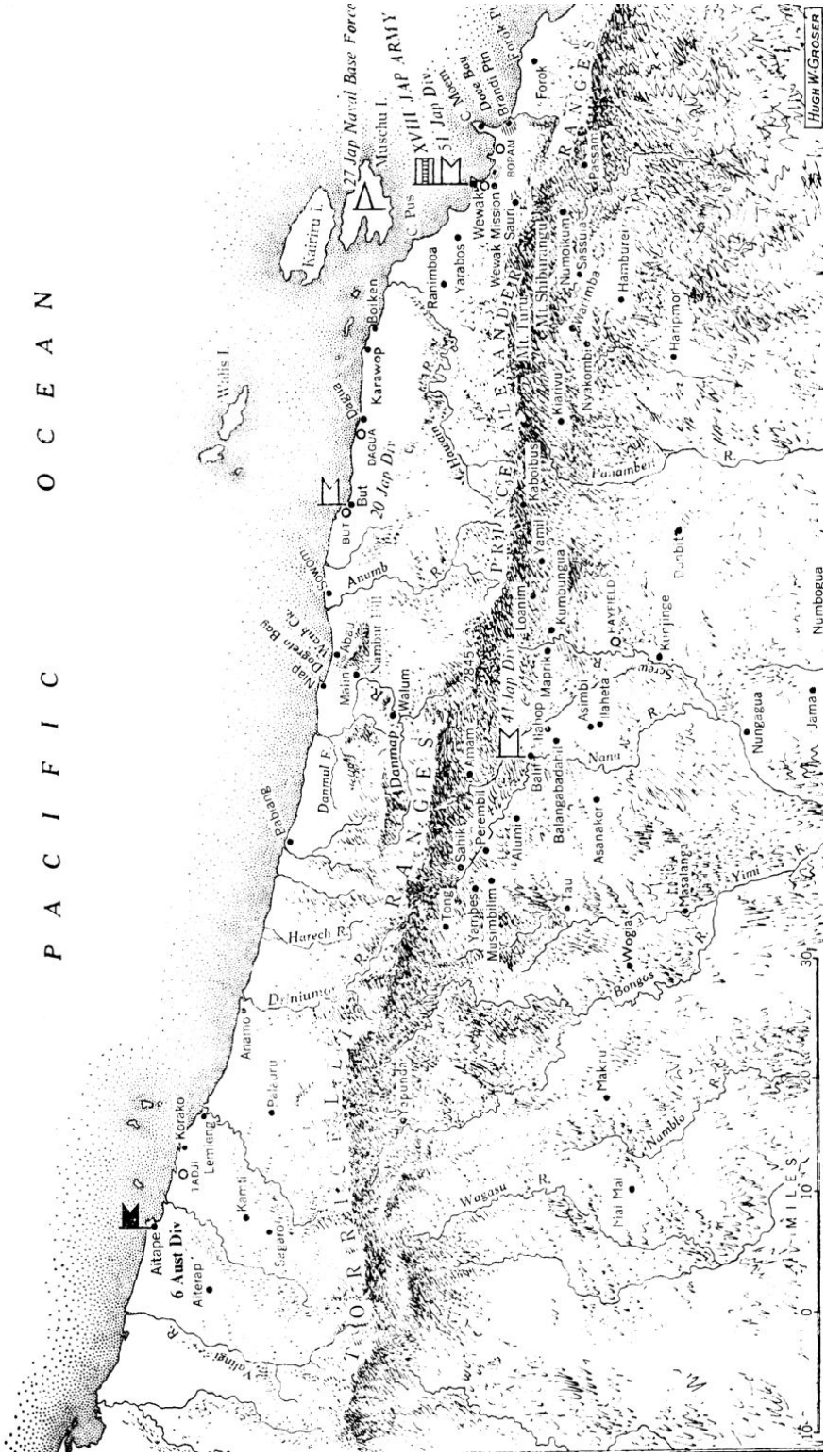
37 *RAE Operations in Solomon Islands, New Guinea and New Britain 1944-1945*, AWM54 313/3/13.

38 Lindsay, *Equal to the Task*, p. 283.

39 Acting Minister for the Army to Prime Minister, 18 April 1945, NAA (ACT): M75/1945, A2653/1 1945/3.



Map 17. Aitape-Wewak

Source: Long, *The Final Campaigns*, p. 273.

Aitape

American forces landed at Aitape in north western New Guinea in April 1944 and repulsed a fierce counterattack by the *Japanese XVIII Army* along the Driniumor River in July. By October, the area was occupied by the US 32nd and 43rd Infantry Divisions. The former was under orders to move to Leyte, while the latter was in a defensive posture east of Aitape, defending the base and the airfield at Tadji built by No. 62 Airfield Construction Wing.[40] The original strength of the *Japanese XVIII Army* was around 100,000, but this had been reduced to 54,000 in the fighting around Salamaua, Lae and Finschhafen, and to less than 35,000 by the Driniumor fighting.[41] Major General J. E. S. Stevens' 6th Division was tasked with defending the airfield; preventing the westward movement of Japanese forces and seizing opportunities for their destruction; and freeing and protecting the native population.[42] Its initial objective was to push the Japanese far enough back to enable the airstrip to be held securely with a small force. It would be fighting outnumbered, but with vastly superior logistical support.

The movement of Australian troops into the area commenced on 11 October with the arrival from Brisbane of *Gorgon*, carrying Lieutenant Colonel J. T. Lang's newly-raised 3rd Base Sub Area headquarters and various logistical units. The situation differed from New Britain in that at Aitape Australian troops relieved the Americans in place, allowing logistical units to precede operational ones. *Gorgon* finished discharging on 17 October, proceeded to Lae and Madang, where it embarked more troops, and returned to Aitape on 29 October. In the meantime four more troopships arrived, bringing troops that included the first operational unit, the 2/6th Commando Regiment. By 26 October over 1,000 field and 1,500 base troops had arrived, along with 848 vehicles and over 17,000 m^3 of cargo. The departure of the US 32nd Infantry Division freed up room for operational units and the 6th Division arrived over the next weeks. By the end of December there were 17,000 Australian troops in the Aitape area.

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40 Smith, Robert Ross, *The Approach to the Philippines*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1953), pp. 103-205.

41 Long, *The Final Campaigns*, pp. 272, 386.

42 *First Army Operation Instruction No. 49*, "Relief of 43 US Div in Aitape Area", 18 October 1944, War Diary, First Army G(Ops) Branch, AWM52 1/3/12.

There was no harbour at Aitape, just an open roadstead and 21 km of beach. The beach grade was such that a Liberty ship wharf would have had to be over 200 metres long. Instead, a short jetty was provided for shallow draught lighters in fair weather. The amphibian engineers of the US 533rd EBSR had some 150 landing craft, but only six LCTs, 41 LCMs and 20 DUKWs were actually used in October.[43] Australian planners were aware that while calm seas prevailed from May through September, from October the northwest season caused heavy swells, reducing the rate of discharge of ships to around 40% of the normal rate.[44] An October storm destroyed the fuel jetty, requiring POL to be landed in drums.[45]

Heavy surf conditions meant that the responsibility for working the port increasingly fell upon the six USN LCTs, which could cope best with the conditions, although three HD7 tractors had to be assigned to anchoring them to the beach.[46] Before the first Australian troops arrived, Advanced LHQ sought assurances that the LCTs would remain so long as Australian forces were using Aitape. GHQ could only reply that the requirements for LCTs at the various ports in SWPA exceeded the number available, but that the needs of the Australian forces at Aitape would be considered. After the 533rd EBSR left for the Philippines in December, C Company, 593rd EBSR was brought up from Madang, but extreme weather limited their utility.[47] Finally, on 10 March 1945, GHQ assigned five LCTs indefinitely.[48]

The discharge of Australian cargo proceeded smoothly until late November 1944, but then the port's resources became stretched as the US 43rd Infantry Division began shipping out for Luzon. Allocating resources between the competing priorities was the

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43 HQ First Army, "Report on Matters Regarding Aitape Port Raised in LHQ Memo CGS275 dated 26/6/45", 4 July 1945, NAA (ACT): A2653/1 1945/7.

44 GS(Ops) to CoS Forward Echelon LHQ, "Planning General", 5 September 1944, Berryman Papers, AWM PR84 870 49.

45 War Diary, 3rd Base Sub Area, 11 October 1944, AWM52 1/8/12; Casey, *Airfield and Base Development*, pp. 237-241.

46 CRE 6th Division, *History of Campaign Aitape-Wewak*, AWM54 313/3/6.

47 "History of Repeated Attempts to Remove Landing Craft Tanks from Aitape", undated, NAA (ACT): A2653/1 1945/7.

48 GOC GHQ to Cdr ANF, "Landing Craft Tank Requirements along the New Guinea Axis", 10 March 1945, NAA (ACT): A2653/1 1945/7.

role of the GHQ Regulating Officer. GHQ instituted a priority system in June 1943, but it was not a success. Colonel Grant explained that

> As these priorities are allotted without any reference to the capacity of the transportation agencies, they mean very little, except that a unit with an N priority should be moved before one with an O priority and similarly O3 should move before O4. This, however, is not adhered to... [49]

In July 1943, Lieutenant Colonel H. Bennett Whipple became Chief Movement Priority Officer at USAFFE. He centralised control of rail, water and air transport under a Chief Regulating Officer (CREGO), who exercised control through CREGOs at the ports.[50] General Wynter insisted that the Land Transport and Shipping Control Boards not be overridden and GHQ agreed that while it would establish priorities, Australian Movement Control would remain the authority for rail movements. Initially, there were 24 CREGOs, stationed at Townsville, Port Moresby, Milne Bay, Goodenough, Oro Bay, Buna, Lae, and Merauke, seven of whom were from the Australian Army. Another five Australian Army officers were posted to CREGO at GHQ, including the Chief of its Rail Section.[51] By January 1945 the system had been extended to 22 ports and CREGO had a staff of around 150. By its nature, CREGO irritated stakeholders like USASOS and the Air Transport Command and "remained under constant attack throughout 1944". [52]

The CREGO at Aitape gave priority to the departing units. The discharge of Australian stores did not keep pace with consumption and reserves began to decline. By 28 December there were only ten days' rations left in the supply depot, although sufficient reserves were on board five vessels awaiting discharge that held 34,000 m^3 of cargo 270 vehicles and 2,000 personnel.[53] GHQ expressed concern, but directed that priority

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49 Col, Adm(Q), "Q Notes Ref NG – 20 Sep 1943", 20 September 1943, Mackay Papers, AWM 3DRL 6850 168.

50 Bykovsky. and Larson, *The Transportation Corps: Operations Overseas*, p. 438.

51 LGA, "Establishment of GHQ Regulating System", 20 October 1943; AG SWPA, "Proposed GHQ SWPA", 21 October 1943; AQMG to DQMG LHQ, "Establishment of GHQ Regulating System", 27 October 1943, War Diary, Adv LHQ DA&QMG, AWM52 1/2/6; LHQ to GHQ, 15 November 1943, AWM54 497/1/7.

52 Bykovsky. and Larson, *The Transportation Corps: Operations Overseas*, pp. 441-442.

53 LandOps to GHQ SWPA, 1 January 1945, NAA (ACT): A2653/1 1945/7.

continue to be given to loading the outbound ships.[54] From GHQ's point of view, Aitape was but a small part of a theatre-wide shipping crisis that involved 221 ships, and culminated in the US Joint Chiefs of Staff cancelling sailings and ordering the return of ships.[55]

Logistical units worked around the problem. In early January 1945 First Army gave permission for surplus stocks of American rations to be transferred to the Australians, but by February rations were down to seven days' supply, as was avgas, which had to be reserved for supply dropping aircraft, grounding RAAF close air support aircraft.[56] The 126th General Transport Company helped unload ships while awaiting the discharge of its vehicles. In the meantime transport was supplied by the Americans.[57] Some 500,000 rounds of belted .303 ammunition were dispatched from Lae to Aitape in small ships.[58] Stocks of jungle green shirts and trousers were low, but only partly due to the shipping hold up, for there was heavy demand for large sizes. First Army sent 14,000 pairs of trousers and 27,000 shirts on three ships that arrived in April and May. Another 10,000 shirts and 19,000 pairs of trousers were received by 1 July. Certain canteen stores were in short supply, particularly beer and cigarettes,[59] and the 104th Advanced Depot of Medical Stores arrived with an inadequate scale of medical stores. More were on the *River Derwent*, which arrived on 20 December 1944, but it did not complete discharging until 25 January 1945. Until then, medical supplies were flown in from Lae.[60]

On 5 February 1945 General MacArthur ordered CREGO to give priority to *S. G. Reid*, which arrived on 18 December 1944 carrying rations, and *San Simeon*, which arrived on 28 December carrying general cargo, and he arranged for 12,000 drums of avgas to be

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54 LandOps to First Army, 28 December 1944, NAA (ACT): A2653/1 1945/7.

55 Leighton and Coakley, *Global Logistics and Strategy 1943-1945*, pp. 459-460; Bykovsky. and Larson, *The Transportation Corps: Operations Overseas*, p. 444.

56 First Army to 3rd Base Sub Area, 3 January 1945; First Army to LandOps, 2 February 1945, NAA (ACT): A2653/1 1945/7.

57 DDST First Army, "S&T Comments on Establishment of Aitape Base", undated, AWM54 9/2/2.

58 AQMG Conference Notes, 29-30 December 1944, War Diary, First Army QMG Branch, AWM52 1/3/11.

59 "Q Comments re 6 Aust Div Memo Q7275 dated 20 Jun 45", undated, AWM54 99/2/2.

60 "Establishment of 3 Aust Base Sub Area – Aitape", 1 July 1945, AWM54 99/2/2.

loaded at nearby Hollandia.[61] As a result, *S. G. Reid* was fully discharged on 15 February and *San Simeon* on 10 March. Unfortunately, *San Simeon* carried Christmas parcels in the bottom hold, many of which were ruined by the prolonged period in the tropics.[62]

The problem with relieving the Americans was that they occupied the best sites and could not release them until they departed. Australian installations that had to be in operation before then were forced to accept lower quality sites. The only fixed installations taken over by the Australians were some native style huts. Two supply depot platoons had the ASD up and running by 20 October, but the site was poor and heavy rains caused the roads to deteriorate. The 52nd BIPOD Platoon, which arrived on 18 November, also found its site unsatisfactory.[63] The 19th Advanced Ordnance Depot (AOD), one of three ordnance units raised for Aitape, refused to accept its swampy site, and found a new one that was not only on drier ground but also conveniently located next to an American engineer unit that loaned six dump trucks to assist in gravelling the depot's roads.[64] When it departed, the 19th AOD took over its site.[65] The DID was established by the 6th Division's 2/5th Supply Depot Company on 9 November.[66] The 2/160th Supply Depot Platoon took over its operation on 12 November but, owing to the increased use of air maintenance, it was diverted to the operation of an air maintenance depot, and the 6th Division resumed operation of the DID.[67]

The 2/11th General Hospital likewise had to settle for a less than ideal location, in this case a site below sea level, which made drainage difficult. The sappers installed sumps that were pumped out into the ocean daily, and built the floors up above ground level. The hospital opened on 1 January 1945, before works were completed, with patients housed in

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61 MacArthur to GHQ Regulating Officer, Aitape, 5 February 1945, NAA (ACT): A2653/1 1945/7.

62 Blamey to Forde, "Take-Over from the Americans at Aitape", 14 July 1945, NAA (ACT): A2653/1 1945/7. The shipping crisis also caused many American servicemen in the Philippines to receive irregular mail and Christmas packages were still being received there in May 1945. Craven, W. F. and Cate, J. L. (eds), *Volume V: The Pacific: Matterhorn to Nagasaki*, (Chicago: University of Chicago Press, 1953), p. 389.

63 DDST First Army, "S&T Comments on Establishment of Aitape Base", undated, AWM54 9/2/2.

64 War Diary, 19th AOD, 10-30 October 1944, AWM52 13/5/20.

65 COO 19 AOD to DADOS 3 BSA, "Expansion – 19 AOD", 28 December 1944, AWM52 23/5/20.

66 War Diary, 6th Division AASC, 9 November 1944, AWM52 10/2/21.

67 DDST First Army, "S&T Comments on Establishment of Aitape Base", undated, AWM54 9/2/2.

tented wards. These were replaced by native style huts, but these were not completed until May owing to shortages of construction materials. Annexes to the wards were made of timber and Sisalkraft, with corrugated iron roofs and concrete floors.[68] As the nurses' area was prone to inundation by floodwaters, the sappers built a double-storey building to house the nurses and physiotherapists on higher ground, with dormitory rooms that featured built-in wardrobes and dressing tables. A shower block was constructed with hot and cold running water and an entertainment building where dances were held. Finally, the sappers built the hospital a fly proof dining hall for 250 persons.[69]

General Sturdee reckoned that that the base sub area headquarters was undermanned, and a change of command was required:

> Lieutenant Colonel J. T. Lang has demonstrated that he has not the capacity to run a large and troublesome base like Aitape. He has done his very best but he has not the organising ability for a job of such magnitude. He is essentially a fighting commander and depends more on personal example than precept for the control of troops under his command.

Sturdee felt that the rank of lieutenant colonel was not commensurate with the responsibilities of the 3rd and 5th Base Sub Area commanders, who each had over 4,000 troops under their command, including units commanded by lieutenant colonels and, in the case of the 2/11th General Hospital, a full colonel. He may not have been aware that others had been making this case for two years without success, but this time it was accepted. On Sturdee's recommendation, Lang was replaced by Lieutenant Colonel H. T. Allan from the 5th Base Sub Area on New Britain, who was promoted to full colonel and assumed command of the 3rd Base Sub Area on 25 April 1945.[70]

The 6th Division was well-equipped with engineers, with four field companies instead of the traditional three, and its 2/22nd Field Park Company incorporated a mechanical equipment platoon, but the 3rd Base Sub Area was not so lucky. It had only the 1st Field Squadron for base development, and a mechanical equipment platoon from the 2/1st

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68 DDMS First Army, "Establishment of 3 Aust Base Sub Area – Aitape", 1 July 1945, AWM54 99/2/2; *Report of 2/11 AGH for Quarter Ending 31 Mar 45*, *War* Diary, 2/11th General Hospital, AWM52 11/2/11.

69 *Report of 2/11 AGH for Quarter Ending 30 June 45*, *War* Diary, 2/11th General Hospital, AWM52 11/2/11.

70 GOC First Army to CinC AMF, 26 March 1945, Blamey Papers 3DRL6643 2/35.

Railway Construction Company for road works. The 2/22nd Field Park Company operated the stores depot until a platoon of the 13th Workshops and Park Company arrived in March, and the sawmill until a platoon of the 2/2nd Forestry Company arrived in February.[71]

During 1944 there was considerable criticism of the Australian army's scale of issue of mechanical equipment. Based upon that of the British Army, it was found to be inadequate for conditions in SWPA. The *Sydney Morning Herald* lamented the "heartbreaking paucity" of mechanical equipment and called for the Treasury purse strings to be loosened.[72] This was done. By early 1944, the Army had placed orders for over £5,000,000 worth of engineer stores, of which nearly £4,500,000 was from the United States under Lend Lease. Some £3,000,000 of this was for earthmoving equipment, including 513 bulldozers, 381 tractors, 112 angledozers, 131 cranes, 108 autopatrols, 72 excavators and 12 scoops.[73] General Steele reported that all equipment received in 1943 had been forwarded to New Guinea but owing to hard, round-the-clock use, it was being expended at a rate of 12.5% per month.[74]

Steele was no less concerned about the workload of his sappers in New Guinea, where nine units had been labouring for over twelve months, and some as long as 23 months.[75] Three railway construction companies were reorganised as mechanical equipment companies, although they retained their old titles,[76] and the 5th Field Squadron was converted to a mechanical equipment company in June 1944.[77] As the new equipment arrived, Steele created five more mechanical equipment companies, numbered 6th through

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71 HQ First Army, "Report on Matters Regarding Aitape Port Raised in LHQ Memo CGS275 dated 26/6/45", 4 July 1945, NAA (ACT): A2653/1 1945/7.

72 "Equipment Lack in War Areas", *Sydney Morning Herald*, 4 April 1944, NAA (ACT): A2684/3 1392.

73 EinC, "Orders for Engineer Stores", 13 March 1944, NAA (Vic): MP742/1 94/25/820.

74 EinC, "Engineer Stores – Requirements for Overseas Army", 23 March 1944, NAA (Vic): MP742/1 94/25/820.

75 EinC to QMG, "Equipment for Five Mech Eqpt Coys", 23 March 1944, NAA (Vic): MP742/1 94/25/676.

76 McNicoll, *Teeth and Tail*, p. 189.

77 War Diary, 5th Mechanical Equipment Company, 30 June 1944, AWM52 5/21/3.

10th, by conversion of field and field park companies.[78] Field park companies were given a mechanical equipment platoon with two D4 and six D6 bulldozers, two autopatrols, a shovel and a crane, with the same organisation as the three platoons of the mechanical equipment company. The Army also created mechanical equipment park companies, which held larger pools of mechanical equipment.[79]

Unlike earlier campaigns in New Guinea, the coastal advance of the 6th Division was supported by road. This required a considerable amount of bridge building. Initially, the beach was used as a road, with ARC mesh laid over the sand. In December work began on a road. By Christmas some 5 permanent and 29 semi-permanent bridges, totalling 945 metres, had been constructed and the road was open to motor transport as far as the Danmap River. For operational reasons the advance often proceeded faster than the roads could be built. Sometimes it was necessary to run trucks over them while the sappers were still working on them.[80] A Field Maintenance Centre (FMC) was established at Dogreto by the 6th Division. FMCs had a supply depot platoon, two sections of heavy and two of light transport and divisional signals, medical, ordnance, workshop, pay, postal and canteens detachments.

In addition to the 2/155th General Transport Company, the light transport company equipped with jeeps as authorised by the Jungle Division establishment, the 6th Division also had the 2/3rd General Transport Company, equipped with GMC 2½-ton 6x6 trucks. This was fortunate because the 2/155th experienced great difficulty towing trailers through the muddy terrain. It became restricted to the transport of personnel and operations in areas with good roads – the reverse of the intention of the Jungle Division establishment. The burden of supporting the advance fell on the 2/3rd, with drivers working twelve to

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78 EinC to QMG, "Equipment for Five Mech Eqpt Coys", 23 March 1944, NAA (Vic): MP742/1 94/25/676.

79 Lt Col F. B. Martin, USA liaison officer, EinC LHQ to CE GHQ SWPA, "Summary of Activities and Information on Australian Engineer matters for the period 4 September to 9 September 1944", NACP: RG496 Box 2826.

80 CRE 6th Division, *History of Campaign Aitape-Wewak*, AWM54 313/3/6.

fourteen hours a day. Rough terrain, flooding, long distances, and constant operation took their toll on the vehicles and kept the workshops busy.[81]

A storm washed away eight bridges on 26 January 1945. Arrangements were made for emergency airdrops to forward units and on 30 January LCTs were diverted from coastal maintenance to make runs to Dogreta Bay, each carrying 100 m^3 of fuel, ammunition, and supplies.[82] GHQ ordered a cession of this practice on 10 March, as the LCTs were supposed to be used for working the port.[83] Between 1 January and 31 July, landing craft brought 59,000 m^3 of cargo from Aitape. The road from the Driniumor to Babiang reopened on 8 February, but the section from Aitape to the Driniumor remained out until 21 March.

Forces moving inland, and occasionally those on the coast as well, were supplied by RAAF *Dakotas*, who flew 2,410 missions between 5 November 1944 and 13 September 1945, while *Wirraways* flew two missions and *Beauforts* flew 89. RAAF air and ground crews worked long hours under adverse weather conditions to keep the 6th Division supplied. Some 27,000 parachutes were used; 2,500,000 kg were dropped by parachute, 1,500,000 kg was free dropped and 1,000,000 kg was landed. The 2/160th Supply Depot Platoon acted as an air maintenance platoon until the 12th Air Maintenance Platoon arrived in March 1945. The 17th Infantry Brigade, moving inland, had experience with air supply from its advance on Salamaua in 1943 and was proficient at establishing and operating dropping zones. It occupied Maprik on 22 April and reconstructed the airstrip to take light aircraft. A few kilometres to the South, a suitable site was located for a *Dakota* airstrip which was constructed with hand tools and native labour, women being used to cut the Kunai grass. The airstrip, named Hayfield after Major D. O. Hay of the 2/6th Infantry Battalion, was opened on 14 May, enabling the 17th Infantry Brigade to be

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81 6th Division, *Report on Operations Aitape - Wewak Campaign, 26 Oct 44 - 13 Sep 34*, AWM54 603/6/5.

82 War Diary, 6th Division AASC, 26 January - 21 February 1945, AWM52 10/2/21.

83 War Diary, 6th Division GS Branch, 10 March 1945, AWM52 1/5/12.

supported by air landing. Three bulldozers and four 25-pounders were flown in. A 1,000-metre *Dakota* strip was opened at Dogreto Bay on the coast.[84]

The Anumb River was 100 metres wide and 3 metres deep in places, with a swift current. Vehicles and stores were moved across on rafts made from 44-gallon drums and later on pontoons capable of carrying trucks. The next river, the Ninahau, turned out to be fordable once the banks were cut down. Vehicles that could not get through were ferried forward by LCM.[85] The town of But, with its small but sheltered harbour, was captured on 17 March. Two *Dakotas* made an airdrop within two hours of the capture of its small airstrip, which was prepared for light aircraft, and nine LCMs landed stores and artillery on 19 March.[86] Up to the capture of But there was a shortage of bridging equipment due to unanticipated heavy demand but as the 6th Division advanced on Wewak, the usage was anticipated and there was sufficient bridging equipment available to meet all requirements. From Aitape to But, 100 km of road required 88 bridges totalling 2,113 metres; from But to Wewak, 60 km of road required 30 bridges and 627 metres of bridge.

In December 1944 the 19th Infantry Brigade, moving along the coast, began to experience a rise in attacks of malaria. General Stevens ordered every case to be investigated, and doubled the brigade's dosage of Atebrin to 2 tablets per day as a precaution. The number of cases dropped off, but when the brigade reverted to the regular dosage in January, cases climbed again. General Blamey convened a conference on the matter at 6th Division headquarters on 29 January 1945 and a draconian drill was adopted in which a tablet was placed in each soldier's mouth, which was then inspected to make sure that it had been swallowed. The whole division was placed on double doses. The incidence of malaria dropped to low levels in February, but another rise occurred after the 16th Infantry Brigade went back to the single dose on 22 March. The epidemic peaked in June. Unfortunately, Colonel Fairley was out of the country at this time, but on his return on 21 May Blamey ordered him to investigate. By this time the evidence of a strain of malaria that was resistant to Atebrin was considerable, if not incontrovertible. The 6th Division

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84 6th Division, *Report on Operations Aitape - Wewak Campaign, 26 Oct 44 - 13 Sep 45*, AWM54 603/6/5.

85 CRE 6th Division, *History of Campaign Aitape-Wewak*, AWM54 313/3/6.

86 War Diary, 6th Division GS Branch, 17-19 March 1945, AWM52 1/5/12.

went back on the double dose on 22 June and the epidemic subsided. In all, some 4,838 soldiers suffered one or more attacks of malaria, four of them fatal.[87]

On 19 March Blamey ordered the capture of Wewak, thus completely changing the concept of the campaign. Stevens prepared two sets of plans, one for an overland assault, and another involving an amphibious operation at Dove Bay, east of Wewak. For the latter operation he requested another 10 LCTs and 14 LCMs to replace C Company, 593rd EBSR, which sailed for Morotai on 1 April; two more *Dakotas*; another squadron of attack aircraft; a tactical reconnaissance flight to replace that of the No. 4 Army Cooperation Squadron, which was being withdrawn; four light aircraft; and naval support.[88] Blamey felt that "there was little hope of securing sufficient craft", but within days MacArthur assigned ten more LCTs for the attack and Sturdee ordered 10 ALC40s and an ALC120 of the 41st Landing Craft Company to move from New Britain. The RAAF sent two *Austers* from Bougainville, three *Tiger Moths* from Melbourne,[89] three *Boomerangs* and a *Wirraway* from Jacquinot Bay, and two additional *Dakotas*.[90] Admiral Kinkaid assembled a small fleet to support the operation: the light cruisers HMAS *Hobart* and HMS *Newfoundland*, destroyers HMAS *Arunta* and *Warramunga*, sloop HMAS *Swan*, corvettes HMAS *Colac* and *Dubbo*, and motor launches *ML427, ML804, ML808, ML816* and *ML820*.[91] The 623 assault troops, mainly from the 2/6th Commando Regiment, travelled from But aboard *Swan, Colac* and *Dubbo*, and transferred to seven ALC40s of the 43rd Landing Craft Company off Wewak. An ALC40 carried fuel for the return trip, and another accompanied the force as a spare. Three LCTs embarked troops and heavy equipment at But.[92]

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87 Sweeney, *Malaria Frontline*, pp. 167-190, Walker, *Clinical Problems of War*, pp. 133-145.

88 6th Division, *Report on Operations Aitape - Wewak Campaign, 26 Oct 44 - 13 Sep 34*, AWM54 603/6/5.

89 GHQ to First Army, 24 March 1945, NAA (ACT): A2653/1 1945/7; War Diary, 6th Division GS Branch, 17-25 March 1945, AWM52 1/5/1.

90 War Diary, 6th Division GS Branch, 13 April 1945, AWM52 1/5/1.

91 Gill, *Royal Australian Navy 1942-1945*, pp. 629-633.

92 6th Division, *Report on Operations Aitape - Wewak Campaign, 26 Oct 44 - 13 Sep 34*, AWM54 603/6/5; Long, *The Final Campaigns*, pp. 343-351.

The capture of Wewak dramatically reduced driving distances and put the trucks onto a network of better roads. Road work now centred on construction of Big Road, which was reconnoitred by air. Coral was obtained from the Wewak Pit and some 200 truckloads per day were tipped on the road. Dry weather in late June sped up progress, but July was wet, with only 17 days of fine weather, during which mechanical equipment could be used on only twelve. Contingency plans were prepared and drop zones lined up in case Big Road failed, but it remained in operation, reaching the western slopes of Mount Shiburangu by August.

A new *Dakota* strip was pegged out on the site of the old Japanese aerodrome at Wewak and work commenced on 23 May. A 1,100-metre strip was cleared, levelled and graded, taking advantage of the well-drained sandy loam soil. The largest obstacle was the bomb craters, of which there were 35 to be filled in. Two dozers and two autopatrols were employed, along with two old Japanese rollers. A *Tiger Moth* landed on 5 June and the first *Dakota* the next day. On 14 June Blamey landed in a *Dakota* after 150 mm of rain had fallen the night before. On 25 June, it was decided to extend the strip by 200 metres, resurface it with coral, and construct eight dispersal bays. Work was carried out by night so that the strip could be used during the day. Each night some 400 truckloads of coral was delivered, enough for 200 metres of surfacing. Despite heavy rains on 3, 4 and 7 July, work was completed on 8 July. The 12th Air Maintenance Platoon arrived from Tadji and the strip became the main air supply strip for the 17th Infantry Brigade by 14 July, greatly shortening the distances that needed to be flown.[93]

An FMC was established at Wewak and the process began of relocating all the forward installations. At this point the 6th Division had some 30 days' stores for 14,000 men at or forward of But.[94] Long before Wewak was captured, orders were issued for the movement of the entire 3rd Base Sub Area to Wewak, to be effected by ALC40, ALC120 and LCT, which were expected to be able to move around 230 m^3 per day. Colonel Allan

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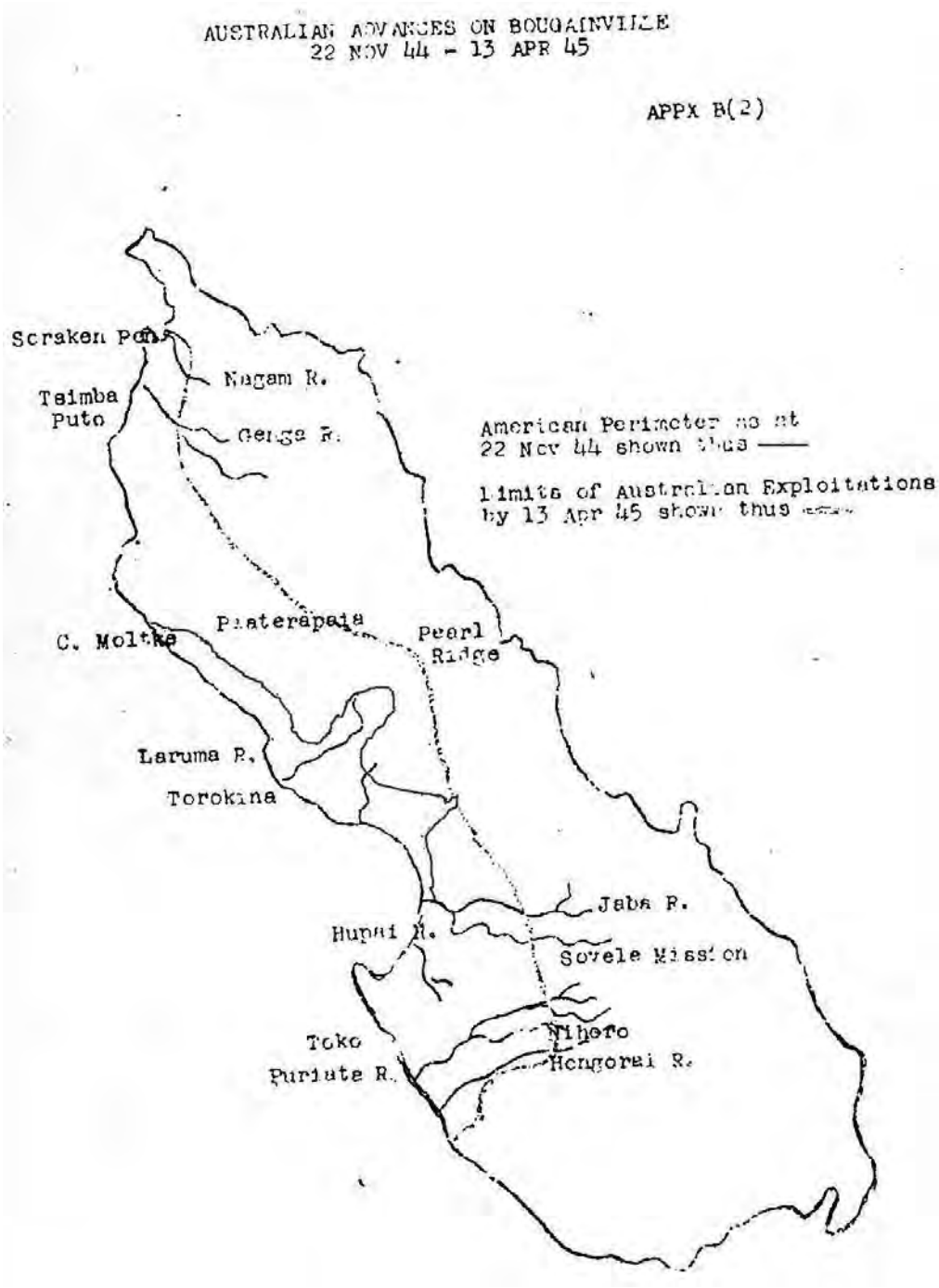
93 CRE 6th Division, *History of Campaign Aitape-Wewak*, AWM54 313/3/6.

94 "Report on Visit to 6 Aust Div and 3 Base Sub Area by AQMG", [April 1945], AWM54 603/3/6.

moved his headquarters to Wewak on 23 May. Units, except for construction units, moved as facilities were ready for them and most had relocated by the end of July.[95]



Map 18 Bougainville

Source: *War Cabinet Agendum* 167/1945, NAA (ACT): A2653 1945 vol. 3.

95 War Diary, 3rd Base Sub Area, 23 May 1945, AWM52 1/8/12.

Bougainville

US I Marine Amphibious Corps landed on the west coast of Bougainville near Cape Torokina on 1 November 1943 and established an airbase at Piva for the air offensive against Rabaul. After nearly two months of fighting, the marines were relieved by the US XIV Corps on 15 December. The Japanese launched an offensive in March 1944 which was defeated after bitter fighting during which over 5,000 Japanese soldiers were killed.[96] Although geographically the largest of the Solomon Islands, Bougainville was politically part of Australian New Guinea and Prime Minister Curtin desired that Australia should contribute to the garrison.[97] General Savige's II Corps was ordered to "reduce enemy resistance on Bougainville Island as opportunity offers without committing major forces".[98] GHQ reckoned that there were no more than 12,000 Japanese left on Bougainville, while LHQ estimated 25,000.[99] Actually, more than 40,000 were still alive on Bougainville in November 1944.

A reconnaissance party arrived at Torokina on 30 August 1944, headed by Brigadier E. L. Vowles. They found a large American base installation occupying all the most desirable sites.[100] The Americans agreed to provide some storage space for essential Australian stores and agreement was reached concerning the transfer of certain installations under Lend Lease. This included 1,000 m^3 of refrigeration space, an ice making plant and farms which were taken over by three Australian farm platoons.[101] The Australian Comforts Fund purchased two ice cream plants and a soft drink bottling plant for £7,000.[102] Blamey had made arrangements in December 1944 for ice cream plant to be issued to all general hospitals but this enabled all soldiers on Bougainville, even those in forward areas, to

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96 Shaw and Kane, *Isolation of Rabaul*, pp. 207, 280-288.

97 Curtin to Hankinson, 7 November 1944, NAA (ACT): A1608 S41/1/9.

98 LHQ *Operation Instruction No. 66*, "Roles of First Aust Army", 18 October 1944, AWM113 MH 1/154.

99 DMI to Fwd Ech LHQ, "Enemy Strength, Bougainville", 15 November 1944, Blamey Papers 3DRL 6643 2/54.

100 *Report on Operations – Establishment of 4 Aust Base Sub Area at Torokina*, 5 April 1945, AWM54 613/7/65.

101 *Report on Recce Solomons Area*, 23 August 1944, AWM54 613/7/65.

102 Lt Gen S. G. Savige, "Notes on Volume VI Chapter IV", [undated], Savige Papers, AWM 3DRL 2529 128.

have an occasional ice cream.[103] An agreement was reached under which works or buildings that were due to be written off would be handed over in return for an amount of timber equal to that used in their construction.[104]

The advance party of the 4th Base Sub Area, a Type C headquarters under the command of Brigadier Vowles, recently raised from the Lae Base Sub Area,[105] arrived from Lae by air on 8 September. It became operational three days later, despite the fact that it was incomplete and had no prior opportunity to work together. Its accommodation was opened but unfinished on 25 September. Vowles himself did not return until 27 September.[106] He was succeeded by Brigadier R.H. Nimmo on 15 March,[107] who in turn was replaced by Brigadier L. G. Binns on 18 June 1945.[108] Construction of the new Australian base was the responsibility of the 5th CRE (Works). Since departing Australia in September 1943 this unit had directed the construction of the bases at Lae and Madang. Unfortunately, its commander was evacuated on 7 October 1944 and his replacement did not assume command for over a month.[109]

Vowles' reconnaissance party warned that, while operational units could be accommodated in areas vacated by outgoing American units, American facilities would not be vacated before the Australian ones had to be in use:

> In general, accommodation and coverage for all base troops will require construction from Aust[ralian] resources. A programme of works construction is being prepared for implementation by base units on arrival… Action will be taken to ensure that engineer and construction units with all mechanical equipment available, are placed on the highest priority within the movement schedule.[110]

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103 QMG to CinC AMF, 21 December 1944, Blamey Papers, AWM 3DRL 6643 2/91.

104 "Procedure for Lend Lease Adjustments and Taking over of US Facilities at Torokina", AWM54 613/7/65.

105 DA&QMG NGF, "Raising of HQ 4 Aust Base Sub Area, HQ 5 Aust Base Sub Area", 7 September 1944, War Diary NGF War Diary, NGF A Branch, AWM52 1/5/52.

106 War Diary, 4th Base Sub Area GS Branch, 8, 27 September 1944, AWM52 1/8/16.

107 *Field Return of Officers*, 17 March 1945, War Diary, 4th Base Sub Area, AWM52 1/8/7.

108 AA&QMG 4th Base Sub Area, 18 June 1945, War Diary, 4th Base Sub Area, AWM52 1/8/7.

109 *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45*, AWM54 313/3/11.

110 *Report on Reconnaissance – Solomons Area*, 28 August 1945, AWM54 213//23.

This could not be done, for there were no mechanical equipment units available other than those already assigned to New Guinea Force, which decided that priority should be given to Jacquinot Bay, as this was an undeveloped site, so the 2/3rd Railway Construction Company was sent there instead.[111]

Thus, the only equipment available was a D6 bulldozer on charge to the 16th Advanced Ordnance Depot, which arrived in October, and no mechanical equipment unit was available until the 58th Field Park Company arrived in November on *James Oliver*, the 18th ship to arrive. US XIV Corps loaned three bulldozers with operators for three weeks, and a grader to the 10th Field Company to help maintain the roads. Sand was carted from two American sand pits but American vehicles had priority, so an Australian sand pit was opened on the Laruma River on 1 December. A second pit with a Chinaman loader was opened in January 1945. An average of over 500 m^3 of sand per week was carted from the two pits. The maintenance requirements of the mechanical equipment were high, for much of it had seen over a year of service in New Guinea. Following his visit to Bougainville in April 1945, acting Army Minister Fraser, while accepting that a shortage of shipping was probably the root cause of the shortage of mechanical equipment that he observed, asked Blamey to provide a full order of battle of engineer units, with details of their heavy equipment and dates of arrival in operational areas.[112] By this time, the 2/1st Railway Construction Company (less a detachment at Madang, a platoon at Lae, and the one at Aitape) had been sent to Torokina, and the 6th Mechanical Equipment Company was en route. [113]

Nor were the shipping schedules reorganised. Movements proceeded as originally scheduled. Road traffic on Bougainville switched from driving on the right to driving on the left on 12 September.[114] The first ship, *Jane Adams*, arrived from Cairns on 20 September with 644 base troops and 106 vehicles.[115] II Corps assumed tactical command

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111 DA&QMG to NGF, 11 September 1944, AWM54 213/4/23.

112 Acting Minister of the Army to Cdr ALF, 16 April 1945, AWM113 MH 1/154.

113 CinC AMF to Acting Minister of the Army, 17 April 1945, AWM113 MH 1/154

114 *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45,* AWM54 313/3/11.

115 *Report on Operations – Establishment of 4 Aust Base Sub Area at Torokina,* 5 April 1945, AWM54 613/7/65.

from US XIV Corps on 22 November, but the 4th Base Sub Area remained directly under the First Army until 1 July 1945.[116]

If mechanical equipment was the most glaring example of poor scheduling of incoming units, it was far from the only one. Most of the 2/1st General Hospital arrived on *Duntroon* on 4 October 1944, although it would be months before its site was complete,[117] and the hospital finally opened on 10 January 1945.[118] This was in spite of the fact that the reconnaissance party had reported that the only suitable site was occupied by an American evacuation hospital and would not be available for handing over to the Australian Army until December.[119] Two dental units arrived in October and a third in November, providing an abundance of dental care, but no pay facilities were available in the first month, so while the American PX was opened to Australian servicemen, many were unable to make purchases through lack of cash. This was a clear case of error; a field cash office was a small unit with little equipment and could easily have been added, and would have been required even if the assumption about taking over American accommodation had held true.

The departing Americans could also be disorganised at times. A site was selected for the BSD adjacent to the American quartermaster dump with the expectation of eventually taking over the American site. Work was completed on 7 October, but the Americans discovered that additional shipments were coming from America which were not required but could not be diverted. Not only were they unable to vacate the dump, it actually had to be expanded. The new BSD was handed over to the Americans and work recommenced at another site. The 2/1st General Hospital also had to be relocated when Japanese snipers were found in the area. Given that this was far from the Army's first sea movement, the quality of the logistical staff work was disappointing, and casts considerable doubt about the Army's capacity to learn from its earlier mistakes.

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116 War Diary, II Corps G Branch, 21 November 1944, AWM52 1/4/8; *Report on Operational and Administrative Activities – II Corps in the Northern Solomons Area*, AWM54 613/7/40.

117 *Report on Operations – Establishment of 4 Aust Base Sub Area at Torokina*, 5 April 1945, AWM54 613/7/65.

118 Walker, *The Island Campaigns*, p. 305.

119 *Report on Reconnaissance – Solomons Area*, 28 August 1945, AWM54 213//23.

Fortunately, due to the overall operational and logistical situation, the Americans' departure was much slower than anticipated, and the last of the 80 km of roads in the Torokina area was not handed over to the Australians until 29 June 1945. When, in March 1945, the Torokina River burst its banks, flooding about 400 metres of the road leading to Motupena Point, the 2/1st Railway Construction Company diverted the river back to its old course. Problems with roads were not solely related to water; there was also dust. The American engineers used water carts to suppress the dust but the Australians had none, so they were improvised by mounting 400-gallon tanks on trucks with improvised sprinkler attachments. Unfortunately, there were insufficient spare trucks to convert enough to fix the dust problem.

Since construction materials were not included with the first shipments and building materials were not readily available in New Guinea, First Army's initial response was slow. Area Command Madang reported that it had a surplus of 50,000 sq ft (4,600 m^2) of tentage and Firt Army sent 10,000 sq ft (900 m^2) to Torokina.[120] Units subsequently departing Australia brought their tentage with them, and LHQ sent 1,200 tents.[121] Nails, cordage, roofing materials and tarpaulins were obtained from the Americans under Lend Lease while 275 pyramid tents and cooking equipment were borrowed to establish a transit camp. The first nails arrived by air in late October, as did cement, arc mesh and cordage. Work ceased several times due to a chronic shortage of nails. About 95 tonnes of corrugated iron arrived from Lae and some Pabcotite from the mainland, allowing the completion of the BSD, AOD and Canteen depot, but by November, construction was at a standstill for want of roofing materials, adequate supplies of which were not received until February 1945.

Timber was also in short supply and the Americans promised only 200 m^3. First efforts to obtain an American sawmill were stymied by GHQ, but an agreement was reached

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[120] Col (Q) First Army, AQMG's Conference Nores, 6 October 1944, War Diary First Army QMG Branch, October 1944, AWM52 1/3/11

[121] Col (Q) First Army, AQMG's Conference Nores, 5 October 1944, War Diary First Army QMG Branch, October 1944, AWM52 1/3/11

whereby the 3rd Platoon, 2/2nd Forestry Company took over one in October 1944.[122] This unit was part of three forestry companies that had been formed in 1940 and 1941 at the request of the British government, which paid for their equipment. Concerned at the need for timber for construction projects in New Guinea, in mid-1943 Blamey asked Army Minister Forde to see if they could be brought home.[123] The British government agreed to release them and the 2/2nd and 2/3rd Forestry Companies and 1st CRE Forestry sailed for home in September 1943.[124] Travelling by way of the United States, they paraded through New York on 1 October and arrived in Melbourne on 8 November.[125] The 2/1st Forestry Company followed, embarking on 13 November and arriving on 23 December.[126] Cabinet approved the purchase of £73,880 worth of equipment for them.[127] The Department of Munitions believed that the forestry companies were best employed in Australia, as timber in New Guinea could continue to be milled by ANGAU,[128] but Forde did not agree, and the 2/2nd and 2/3rd Forestry Companies were allocated to New Guinea Force,[129] while the 2/1st Forestry Company went to Darwin.[130] The 2/2nd and 2/3rd Forestry Companies arrived at Lae in May 1944, coming under the Lae Base Sub Area. They took over sawmills in the area and provided detachments to log the Labu Swamp, where Toredo-resistant timbers grew that were sought after for wharf piles. The 2/2nd moved to Jacquinot Bay in November, but was replaced by the 2/1st, which arrived from Darwin in April 1945. [131]

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122 *Report on Operations – Establishment of 4 Aust Base Sub Area at Torokina*, 5 April 1945, AWM54 613/7/65; *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45*, AWM54 313/3/11.

123 Minister for the Army to Prime Minister, 29 June 1943, NAA (ACT): A816 52/301/126.

124 Secretary of State for Dominion Affairs to Prime Minister, 7 August 1943; Secretary, Department of the Army to Minister for the Army, "Return of AIF Forestry Units", 30 September 1943, NAA (ACT): A816 52/301/126.

125 "Forestry Unit in New York", *Sydney Morning Herald*, 2 October 1943; "Forestry Unit Back from Scotland", *The Herald*, 8 November 1943, NAA (ACT): A816 52/301/126.

126 *Weekly Report by the Commander-in-Chief Australian Military Forces for the Week Ending 4 December 1943*; *Monthly Information Letter No. 9*, 5 January 1944, NAA (ACT): A816 52/301/126.

127 *War Cabinet Agendum 28/1944*, 19 April 1944, Blamey Papers 3DRL 6643.

128 Secretary, Department of Munitions to LGA, 14 September 1943, Blamey Papers 3DRL 6643.

129 LGA to NGF, 13 October 1943, Blamey Papers 3DRL 6643.

130 Minister for the Army to Minister of Munitions, [undated], NAA (ACT): A816 52/301/126.

131 McNicoll, *Teeth and Tail*, pp. 352-353.

Ultimately, a majority of the timber production of Australian forces was attributable to the three forestry companies:

Table 17. Estimated Total Production of Timber in New Guinea 1942-1946 [132]

Source	**Volume (m^3)**
2/1st Forestry Company	8,923
2/2nd Forestry Company	23,369
2/3rd Forestry Company	24,759
Platoon attached to 9th Workshop and Park Company	1,298
Other RAE units	18,261
Other Army units (including ANGAU)	19,435
RAAF	4,710
US units	90,069
South Eastern Japan Force	727
Total	**191,551**

Indiscriminate woodcutting by the US and Australian forces was viewed with concern by those with an interest in the future of New Guinea. General Steele accepted a proposal that a forest survey group assess and map the New Guinea forests. Two forest survey companies were formed and placed under a new headquarters, CRE New Guinea Forests. Officers of the new units were professional foresters or old New Guinea hands. The 1st Forest Survey Company was assigned to New Britain, and the 2nd to Papua and New Guinea, including Bougainville and Manus.[133] The 2nd Forest Survey Company conducted a survey of Bougainville between January and May 1945, locating and identifying the different stands of timber, especially *Casuarina*, the only type considered suitable for bridges and piles. Unfortunately, many otherwise excellent stands had been rendered

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[132] Major W. T. Graham, *Report on Activities of the Australian Forestry Coys in Operation in Great Britain and South West Pacific Area*, AWM54 355/3/1. Estimates are conservative, especially for US forces, due to underreporting, since timber was counted towards Reverse Lend Lease. See Bennett, Judith A., "Local Resource Use in the Pacific War with Japan: Logging in Western Melanesia", *War and Society*, Volume 23 Number 1, (May 2003), pp. 83-118.

[133] McNicoll, *Teeth and Tail*, pp. 354-356.

unusable by shrapnel. In all, over 8,000 m^3 of sawn timber was produced on Bougainville by August 1945, while another 2,400 m^3 or so was imported from Australia.

It was agreed that two-sevenths of the Bougainville mill's output would be made available to the Americans. This arrangement worked well for about a week before US XIV Corps urgently needed 2,400 m^3 of bridge timbers. One of two six-hour shifts per day was handed over to the Americans, and the Australian supply was reduced to 120 m^3 per week, of which two-sevenths still had to be handed over, leaving an output of 85 m^3 per week as against requirements of 470 m^3. The American requirement was reduced to 12 m^3 per day in April 1945 before being discontinued in July. A second mill was established by the 5th Army Troops Company at its campsite in October 1944. Timber in its area became depleted, and it moved operations to a new mill in April 1945.[134]

A legacy of the American occupation was an electrical system that used 110 or 220 Volts, while Australian equipment ran on 240 Volts. The result, after much ingenuity and improvisation, was many installations running on dual voltages. Electrical equipment was in short supply, as no cable, fittings or generators were allotted for establishing the base, so the Americans and New Zealanders helped out with electrical supplies. American lighting used screw type lamps that were seldom available from Australian sources. The 5th Army Troops Company began electrical installations in September 1944, and was responsible for all electrical and refrigeration work on the base until it was relieved by the 7th Army Troops Company in May 1945.[135] The 5th Army Troops returned to Australia, having been overseas since April 1943.[136]

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134 *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45*, AWM54 313/3/11.

135 *Report on Operations – Establishment of 4 Aust Base Sub Area at Torokina,* 5 April 1945, AWM54 613/7/65; *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45*, AWM54 313/3/11.

136 CinC AMF to Acting Minister of the Army, 17 April 1945, AWM113 MH 1/154

Water supply presented less difficulty. By August 1945, some fifteen water points were in operation and 1,542 kl per day were being used. Wooden water storage tanks left behind by departing American units were snapped up by the base engineers.[137]

Like Aitape, Torokina was an open roadstead where loading and unloading had to be done by lighters. The port was worked by the USN with 25 LCMs, 25 LCVPs and some LCTs.[138] The Australians found them "helpful and cooperative", but planning to depart the Northern Solomons.[139] An agreement for the retention of 17 LCTs was reached with the US Seventh Fleet in December, but in January 1945 it suggested that they be transferred to the Australian Army or RAN.[140] The RAN agreed that it could take them, but since each LCT had a normal complement of thirteen, it wanted an extra manpower allotment of 280 men.[141] At this stage of the war, the monthly intake of men into the three services was just 3,000, and both the Army and the RAN were feeling the manpower pinch.[142] The only place that this manpower could come from was the Army's allotment, and that being the case, General Northcott felt that the Army might as well man the LCTs.[143] MacArthur raised the matter with the Prime Minister, to no avail.[144] The LCTs began withdrawing only after hostilities ended in August.[145]

This non-decision would still have far-reaching effects. The Army already manned ALC120s; now the RAN encouraged the Army to acquire LCTs. This is not to say that the RAN was not interested in amphibious warfare – it still pushed hard to be allowed to

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137 *Summary of Engineer Works, 4 Base Sub Area Torokina – Bougainville carried out by 5 Aust CRE (Wks) and RAE units under Command, Period 9 Sep 44 – 8 Sep 45*, AWM54 313/3/11.

138 CE II Corps to First Army, "Water Transportation Bougainville", 9 November 1944, AWM54 613/7/19.

139 Col (Mvt&Tn) First Army, "Port Working Torokina", 23 October 1944, AWM54 613/7/19.

140 BGS First Army, "Future US Naval Activities – Solomon Islands", 12 December 1944, AWM54 642/1/1; LandOps to GHQ, 28 January 1945, AWM54 642/2/6.

141 *Defence Committee Agendum 50/1945*, "Manning of Landing Craft Tank at Torokina", 2 March 1945, NAA (ACT): A5954 518/2.

142 Gill, *Royal Australian Navy 1942-1945*, p. 471; Long, *The Final Campaigns*, pp. 32-34

143 *Defence Committee Agendum 50/1945*, "Manning of Landing Craft Tank at Torokina", 2 March 1945, NAA (ACT): A5954 518/2.

144 MacArthur to Prime Minister, 28 April 1945, NAA (ACT): A5954 518/2.

145 War Diary, 2/1st Movement and Transportation Group, August 1945, AWM52 40/1/13.

construct and man three LSTs – but its interest did not extend to "brown water" operations.[146] After the war, it would be the Army that operated the landing ships.

A contrast may be drawn with the attitude of the RAAF. In August 1943, General Blamey ordered helicopters for RAE reconnaissance in New Guinea.[147] The RAAF may not have been interested in helicopters, but it immediately sought and obtained a ruling that the purchase of aircraft was a responsibility of the Department of Air.[148] In response to Blamey's request for 25 helicopters as an urgent military requirement, the RAAF recommended the purchase of six Sikorsky R5 helicopters at a cost of £108,000.[149] As they had to be purchased through Lend Lease, the Prime Minister obtained General MacArthur's approval.[150] The helicopters were not delivered before the war ended, and the order was cancelled in October 1945.[151] This too would have effects after the war.

Maintenance of Torokina was by direct shipment from Australia, except for occasional emergency shipments from Lae. The outer islands were maintained from Torokina by small ships of the 13th Small Ships Company. This formed part of the 1st Water Transport Group, which also included the 42nd Landing Craft Company and a detachment of the 1st Water Ambulance Convoy. The 13th Small Ships Company operated a small fleet that included four 300-ton cargo ships, a 300-ton refrigeration vessel, three 120-foot and two 106-foot ocean going lighters, four 66-foot trawlers, twelve 40-foot work boats and four 38-foot fast supply launches. While the trawlers handled coastal maintenance in Northern Bougainville, larger craft were employed in the maintenance of the outer islands. This was done under the direction of the 2/1st Movement and Transportation Group, which controlled the port, shipping to and from the mainland and the outer islands, and air movements.

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146 Gill, *Royal Australian Navy 1942-1945*, pp. 470-472

147 Sec Defence Committee, "RAE Reconnaissance Craft for New Guinea", 14 August 1943, NAA (ACT): A816 6/301/475

148 Defence Committee Agendum No. 177/1943, "Helcopters for RAE Reconnaissance", 19 August 1943, NAA (ACT): A816 6/301/475

149 War Cabinet Agendum No. 331/1944, "Helcopters for RAE Reconnaissance", 29 June 1944, NAA (ACT): A816 6/301/475

150 MacArthur to Prime Minister, 22 July 1944, NAA (ACT): A816 6/301/475

151 War Cabinet Agendum No. 452/1945, "Helcopters for RAE Reconnaissance", 4 October 1945, NAA (ACT): A816 6/301/475

The number of small craft available to the 1st Water Transport Group was limited. Only twelve ALC20s arrived by December 1944 and efforts were made to acquire more craft. In January, four LCVPs and eight LCPRs were transferred from the USN at Munda, and, following a visit from HMS *Lothian*, five LCAs were transferred from the British Navy.[152] At the end of January 1945 General Cannan reported that a backlog of some 130 small craft had accumulated at mainland ports, including twenty 40-foot workboats, six 38-foot fast supply launches, 28 ALC20s and 65 ALC15s. Of these, 73 were earmarked for Torokina. Larger craft like ALC40s could make the trip under their own power, but these smaller ones needed to be shipped. An average of eleven were shipped monthly as against production of ten 40-foot workboats, two 38-foot fast supply launches, six ALC20s and nine ALC15s, so the backlog accumulated.[153]

Blamey pressed GHQ for a Landing Ship, Dock (LSD) to move the backlog, but only one, USS *Carter Hall*, was assigned to SWPA and it could not be spared.[154] Curtin raised the matter with MacArthur, who promised that 30 craft per month would be moved by USASOS vessels. The BMWT was approached for a heavy lift ship. One was allocated to SWPA, *Empire Charmian*, which sailed from the UK on 30 January 1945 with stores for the British Pacific Fleet. The BMWT agreed to make it available for a couple of voyages.[155] It sailed from Cairns on 5 May 1945 with four ALC15s and eight ALC20s. [156] Between 1 January and 8 May 1945 six small craft made the trip under their own power, 93 were shipped, and 11 towed, a total of 110. Some 56 larger craft also made the trip themselves, leaving 176 craft awaiting movement.[157] The first ALC15 arrived at Torokina in March, and by the end of the month the 42nd Landing Craft Company also had 15 ALC20s, eight ALC40s, and three LCMs acquired from the USN.

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152 *Report on Operational and Administrative Activities – II Corps in the Northern Solomons Area*, AWM54 613/7/40; War Diary, II Corps QMG Branch, 4 January 1945, AWM52 1/4/11; Lt Gen S. G. Savige, "Notes on Volume VI Chapter IV", [undated], Savige Papers, AWM 3DRL 2529 128.

153 Naval Historical Society of Australia, http://www.navyhistory.org.au/4-june-1945/, accessed 21 August 2007.

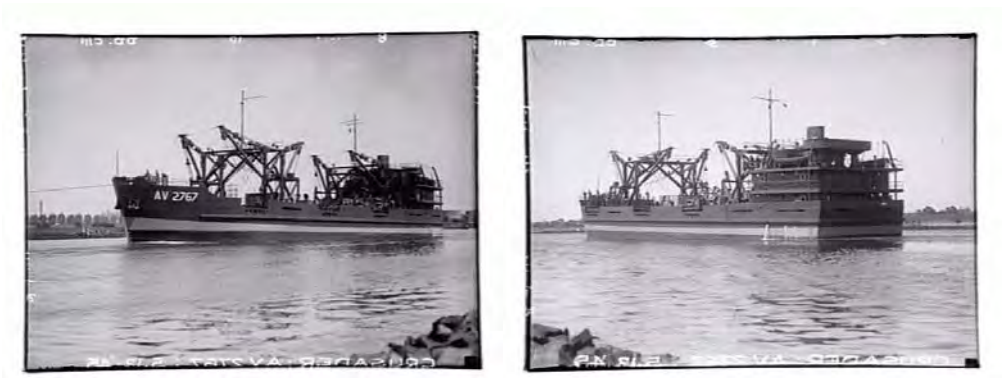
154 Berryman to Blamey, 6 February 1945, Blamey Papers 3DRL6643 2/54.

155 QMG to CGS, "Provision of Shipping for AMF", 16 May 1945, Blamey Papers 3DRL6643 2/94.

156 DA&QMG First Army, "*Empire Charmian* – Cairns for Torokina', 7 June 1945, War Diary First Army QMG Branch, October 1944, AWM52 1/3/11

157 QMG to CGS, "Provision of Shipping for AMF", 16 May 1945, Blamey Papers 3DRL6643 2/94.

The serviceability rate of landing craft in the initial stages of the campaign hovered around 50%. Repairs were carried out by the workshop section of the 42nd Landing Craft Company, which did not have adequate facilities. Nor was it always possible to carry out proper maintenance. The belated arrival of the 2nd Landing Craft Workshop at the end of March produced a turn-around and serviceability rose to 70%. A Board of Investigation made a number of recommendations, including changes to establishments and improvements in workshop facilities.[158]



26. Two views of the heavy lift ship AV2767 *Crusader*, taken 5 December 1945

General Steele's answer to the problem of moving small craft and heavy engineering equipment was to design and build his own heavy lift ship, the 1,500 ton *Crusader*. Built at the Williamstown Dockyard in Victoria and launched in August 1945, it was the largest all-welded steel vessel built in Australia up to that time.[159] While the "unorthodox design did not greatly impress marine engineers",[160] the ship was able to perform the job for which it was intended. It was employed in returning stores and equipment to Australia after the war.[161]

Reviewing the shipping situation in mid-1945, the Quartermaster General's Branch concluded that there was sufficient Australian controlled shipping for 6,000 personnel and

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158 *Report on Operational and Administrative Activities – II Corps in the Northern Solomons Area*, AWM54 613/7/40; War Diary, II Corps QMG Branch, 4 January 1945, AWM52 1/4/11; Long, *The Final Campaigns*, pp. 104-105.

159 McNicoll, *Teeth and Tail*, p. 322.

160 Mellor, *The Role of Science and Industry*, p. 479.

161 *On this Day*, http://www.defence.gov.au/army/ahu/On_This_Day/August/8_August.htm. Accessed 21 August 2007.

137,000 m^3 of cargo, plus an allocation of US shipping for 10,000 personnel and 177,000 m^3 of cargo, as against requirements for 22,000 personnel and 275,000 m^3 of cargo for July through December 1945. Thus, there was sufficient cargo capacity, although 14,000 m^3 of it was Dutch shipping that had formerly been under USASOS, and had since passed to Australian Army control, but which might revert to the Netherlands government at any time. There remained a shortage of 6,000 troop places. Blamey recommended that the government seek the release of HMAS *Kanimbla*, *Manoora* and *Westralia*, which between them could carry 3,600 troops.[162] The new Prime Minister, Ben Chifley, raised the matter with MacArthur, who agreed to let them return Australian personnel to Australia if they backloaded US personnel from Australia and New Guinea to the Philippines.[163] With the end of the war, all three were released to Australian control.[164]

The 6th Docks Operating Company arrived at Torokina on 2 October 1944 and began unloading ships, using four gangs per six-hour shift. Beach labour was drawn from available units until the 16th Works Company arrived on 16 October, deploying five gangs of six men on the ships and 41 on the beach per shift. Checkers arrived on 16 October, prior to which the 4th Ordnance Port Detachment carried out the work as best it could.[165] The port was worked efficiently but, as time went by, the work became harder. The availability of LCTs declined and American labour dried up as they departed. The 16th Works Company was unable to keep up and the 38th Works Company, ANGAU and operational troops filled the gap. The main bottleneck was that there was berthing space for only eight LCTs, which also made it difficult to keep the beach dredged, due to the continual traffic.[166]

One thing that kept the 2/1st Movement and Transportation Group busy in late 1944 was the provision of Christmas fare. *Rannah*, a 125-foot wooden cargo vessel with a

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162 QMG to CGS, "Shipping Requirements for Australian Forces in SWPA", 12 July 1945, NAA (ACT): A2653/1 M140/1945.

163 "Notes for QMG", [August 1945], NAA (ACT): A2653/1 M140/1945.

164 QMG to Secretary of Army, "Aust Vessels *Manoora, Kanimbla Westralia*", 30 August 1945, NAA (ACT): A2653/1 M140/1945.

165 OC 6th Docks Operating Company, *Monthly Report for Month Ending 31 October 1944*, AWM54 613/7/19.

166 War Diary, 2/1st Movement and Transportation Group, August 1945, AWM52 40/1/13.

refrigerated hold belonging to the 13th Small Ships Company, took on a load of turkey at Townsville on 2 December, arriving at Torokina on 18 December 1944. This did not leave time to make deliveries to both the northern and southern outer islands, so an RNZAF *Dakota* delivered turkey to Stirling and Munda, while *Rannah* made a run to Green and Emirau, also carrying hampers and beer. It was then discovered that the number of personnel on Emirau had been undercounted, so the balance was delivered by air on 23 December. Christmas hampers, beer and pudding arrived at Torokina on *Pocetava Archer* on 10 December but was overstowed with vehicles and landing craft, and troop transports had a higher priority, so it did not start to get unloaded until 19 December. The USN agreed to help out. Beer and hampers for Stirling were loaded onto *LCT 944*. A convoy heading from Guadalcanal to Green detached a ship to Torokina that took fare to the north, while *SC 518* carried fare to the south.[167]

The 3rd Division took over from the Americans in eastern Bougainville immediately on arrival. A DID was established in the mountains roughly 22 km from Torokina, which was maintained by 3-ton trucks over a rough track that followed a riverbed. The Numa Numa Trail crossed the river in 25 places, some of which were difficult crossings for 3-ton trucks, before coming to an abrupt end at the bottom of Barges Hill, a 300 metre rise that was too steep for vehicles. Over time, the trail was improved. Crossings were cleared of heavy boulders and deliberately silted up to provide a more even depth. Some were eliminated altogether, decreasing the number of crossings to 21. Trucks were modified to make fording easier by raising the battery, and extending the exhaust pipe. Engine and gearbox breathers and steel guards were bolted under the differentials to prevent damage from boulders. Sappers constructed a loop road at the foot of Barges Hill to permit more rapid turnaround of traffic.

Supplies were carried to the top of Barges Hill by native carriers and thence by jeep. The jeeps were dismantled and carried up Barges Hill. POL for them was airdropped. Construction of a jeep road forward from Barges Hill began in January 1945. A route was selected which followed a ridgeline. It had a steep maximum grade of 1:4 but this saved time and labour in construction. Careful attention was paid to matters of drainage. An R4

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[167] War Diary, 2/1st Movement and Transportation Group, December 1945, AWM52 40/1/13.

dozer brought up to help took six days to get to the top of Barges Hill, pulling itself up with its own winch. The jeep road was run from Barge's Hill to Arty Ridge, where it remained until late April when work began on an extension to Pearl Ridge, which was completed by 21 May. The whole jeep track was then upgraded to an all-weather road.

In June 1945 the carry to the top of Barges Hill was replaced by a 2-foot gauge light railway 684 metres long. It had a maximum slope of 1:1 with a total rise of 272 metres in two lifts. Constructed largely of steel tubing, it had three sets of trestles and was powered by two Ford V8 engines. Designed to carry 10 tonnes of stores per day (600 carrier loads), with a maximum load of 1 ton, its capacity was gradually ramped up to 25 tonnes per day, thus saving 200 carriers for work elsewhere. Plans to move the DID forward in August 1945 were cancelled when the war ended.[168]

The northern sector had no usable roads or tracks from Torokina, so DIDs were established along the coast. As the advance progressed, an FSD was established at Freddie Beach and a DID at Ratsua Inlet. The FSD was maintained by small ships out of Torokina. Supplies were moved forward to Ratsua by landing craft. Fresh commodities were delivered to a drop zone near the FSD until July, when the practice was discontinued to free up aircraft for missions in the southern sector. Instead, a courier vessel made a twice-weekly run from Torokina with fresh commodities and urgent stores.

Fresh commodities were initially in short supply owing to lack of refrigerated shipping and storage, but in December 1944 First Army announced an issue of refrigerators. Major units and supply depot platoons received large 8,500 litre refrigerators while minor units got 2,900 litre refrigerators. II Corps' allocation was 27 large and 31 small refrigerators. These arrived over several shipments, so sufficient refrigerators were not on hand until March 1945. From then on, fresh commodities could be stored at the DIDs and issues became routine, with six issues of meat, two of butter, and three of vegetables in a typical week. When road conditions permitted, vehicles would travel by night from Torokina to the DIDs. When the 3rd Division FSD moved to Toko, *Rannah* was used to ferry fresh commodities from Torokina. When the refrigerators became full, surplus commodities

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[168] *RAE Operations in Solomon Islands, New Guinea and New Britain*, 7 December 1945, AWM54 313/3/13.

were issued direct from *Rannah*, which returned to Torokina to refill when emptied. Fresh bread presented a particular problem owing to the amount of time required for moving and handling. This was overcome by mounting an oven on a chassis that could be towed on and off a landing craft, enabling the ovens to be moved to the DIDs, where sections of the field bakery platoons baked fresh bread.

In the southern sector, the original intention of using landing craft was modified to a land line of communications, supplemented by sea. DIDs were established along an existing track that ran parallel to the coast. As the Australian advance progressed new DIDs and FSDs were opened, with the supply depot platoons leapfrogging each other. The trucks and jeeps were supplemented by landing craft since they were close to the beach. Normally, a DID would be established and stocked by airdropping until it held several days' supplies. The road would then be pushed forward to the DID, enabling restocking by road from Toko or DIDs being closed out.

While most units which arrived from the mainland had new vehicles, some of those which came from New Guinea brought vehicles that had seen service in earlier campaigns, sometimes in the Middle East. Where going was heavy, trains of jeep trailers were used, drawn by a tractor. Heavy rains in July cut the Buin Road between Runai and the DID at Ogorata, forcing the DID to be maintained by air.

Forward units everywhere were maintained by jeeps and native carrier lines. As in earlier operations in New Guinea, the Australians relied heavily on local labour. US XIV Corps had employed only 675 workers. First Army immediately ordered ANGAU to transfer 500 more from other parts of New Guinea by the end of October. By the end of November II Corps estimated its requirements at 1,600 while the 4th Base Sub Area needed another 1,300. II Corps subsequently revised its estimate upwards to 2,000. Local recruitment was introduced while more workers were brought in from elsewhere in New Guinea and this figure was reached by June 1945.

POL was sometimes in short supply owing to erratic shipment, and II Corps was forced to ration it within the Torokina perimeter for a time, but stocks never fell below a week's supply. At one point, in order to save on fuel and motor transport, 44-gallon drums of POL were dropped overboard from a small ship on a rising tide and floated ashore, where

they were recovered and stacked by native labourers. Of 1,200 drums unloaded this way from *FS 284* on 29 April 1945, only five were unaccounted for by nightfall.

27. Bougainville, 25 December 1944. A storepedo is prepared for dropping.

Units operating more distant from the DIDs had to be supplied by air. This commenced with AIB patrols in northern and central Bougainville in November 1944. Initially, air supply was by *Wirraways* carrying pairs of storepedoes, cylindrical steel parachute containers capable of holding around 200 lb (90 kg) of stores. This represented a wasteful use of storepedoes, which were intended only for dropping fragile items, but it was necessitated by the aircraft, and a shortage of packing materials. POL was dropped this way, with three 4-gallon drums inside the storepedo. The alternative, dropping four 4-gallon drums roped together, was preferable, but required a 24-foot parachute, which were in short supply. From an operational point of view, the limited capacity was also a problem, as too many missions over the same dropping area tended to give away unit locations to the enemy.

As demand increased II Corps turned to the US Marines and RNZAF, which supplied aircraft capable of delivering 550 kg. By the end of December two had been lost on air supply runs. II Corps then attempted to get a RAAF *Dakota*. On 12 January 1945 permission was granted to use the RAAF daily courier aircraft from Lae for airdropping. A *Dakota* arrived on 27 January for air supply duties. Crews were relieved fortnightly, with relief crews first being flown over the dropping areas for familiarisation. By this time 15,000 kg were being dropped per week. By February, this had doubled.

Initially, packages for dropping were prepared by several personnel with air maintenance experience in the 2nd BDS, who also established a school to train others. As deliveries increased, it became clear that a dedicated unit was required. A detachment of the 2nd Air Maintenance Company was allotted, but it was diverted to Aitape. In March 1945, the 121st Supply Depot Platoon and a section of the 12th Air Maintenance Platoon arrived. These units, subsequently joined by two more sections of the 12th Air Maintenance Platoon, set up camp near the Piva airstrip. A second *Dakota* arrived from Townsville on 14 March. In May, 150,000 kg was airdropped in one week. Extremely wet weather in July required still heavier use of air supply, beyond the capacity of the two RAAF aircraft. The US 1st Marine Air Wing provided two *Dakotas* on five days in July and August, allowing 18 to 20 missions to be flown on those days.[169]

Maintenance of the airstrips on Torokina, Green, Emirau and Munda was the job of No. 7 Airbase Construction Squadron, which relieved the Seabees in March 1945. The Army supplied the RAAF with rations, expense and canteen stores and POL, except for aviation fuel and oil, which was supplied by the Americans. RAAF units drew their supplies directly from Army DIDs.[170] In January 1945 the Army unexpectedly found itself also being charged with the logistical support of RNZAF units. This was a consequence of the Allied Air Forces' regrouping for the campaigns in the Philippines and Borneo, under which responsibility for the Rabaul area was given to the RNZAF.[171] Blamey's reaction was that the Army was unable to accept this commitment, which might involve raising new units or utilising ones earmarked for other operations.[172] Nonetheless, MacArthur ordered him to supply the RNZAF on Bougainville, Emirau and Green, from 1 April.[173] The RNZAF retained responsibility for their own storage, distribution, repair, postal and

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169 *Report on Operational and Administrative Activities – II Corps in the Northern Solomons Area*, AWM54 613/7/40; War Diary, II Corps G Branch, 12 January 1945, AWM52 1/4/8; War Diary, II Corps QMG Branch, 14 March 1945, AWM52 1/4/11.

170 *II Corps Administrative Instruction No. 6*, 15 March 1945, War Diary, II Corps QMG Branch, AWM52 1/4/11.

171 *History of the Far East Air Force*, Vol. II, p. 111, NAA (ACT): AA1966/5 208.

172 LandOps to ForLand, 15 January 1945, AWM54 642/2/6.

173 CinC SWPA, "Logistic Support of Allied Air Forces Troops in the Northern Solomons Axis", NAA (ACT): A2653/1 M63/1945.

recreational facilities.[174] When RNZAF units moved to Jacquinot Bay in May, the Army was charged with their support as well.[175]

The "Mopping Up" Campaigns attracted the most severe criticism of the Army's logistics since the Papuan Campaign. Acting Army Minister Fraser visited Aitape, New Britain and Bougainville in April 1945, and he submitted a scathing report to the Prime Minister, highlighting critical shortages of mechanical equipment, small craft, and shipping. MacArthur and Blamey were asked to explain.[176] A number of mistakes were indeed made, some of them not for the first time. Yet it no less true that, while reserves may have gotten low at times, staff work was sometimes defective and "stuff ups" did occur, far from being "a creaky administrative and logistics system" that "nearly jeopardised the entire campaign before it began,"[177] the Australian Army's logistical system had generally performed with unprecedented efficiency.

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174 GOC First Army, 15 January 1945, AWM54 642/2/62.

175 DA&QMG First Army to 5th Base Sub Area, 12 May 1945, NAA (ACT): A2653/1 M63/1945.

176 *War Cabinet Minute No. 167/1945*, 9 May 1945, NAA (ACT): A2653/1 M75/1945.

177 Charlton, Peter, *The Unnecessary War: Island Campaigns of the South-West Pacific 1944-45*, (Hong Kong: Macmillan, 1983), p. 124.

11. Borneo

In preparation for operations against the Philippines, General MacArthur moved the advance element of GHQ to Hollandia in Dutch West Papua, where it opened in late August 1944. To maintain contact with GHQ, General Blamey formed a new headquarters, Forward Echelon LHQ, which opened at Hollandia on 7 September under General Berryman, who became his personal representative at GHQ. As well as liaising with GHQ, it became responsible for planning operations involving Australian troops.[1] Advanced LHQ followed, opening at Hollandia on 15 December, but while GHQ and Forward Echelon LHQ moved to Leyte in February 1945, and Manila in April, Advanced LHQ remained at Hollandia until it moved to Morotai in April 1945.[2]

I Corps, now under General Morshead, was on the Atherton Tableland with the 7th and 9th Divisions. The process of re-equipping them began even before they returned to Australia, with advance notice of likely deficiencies sent from New Guinea. This was complicated by some unit equipment not being properly stored and deteriorating over the following weeks while units went on leave, and by new tables of equipment, based on the recent campaign. A last-minute hitch occurred when floodwaters in Queensland damaged the rail bridge over the Burdekin River, resulting in some units departing without all their stores. These were taken to Morotai by units that embarked later. LHQ intended that, since it might not be possible to strike tents while dry, units would make do with existing tents in Queensland, and then be issued with new ones on embarkation. Wet weather in Queensland and production delays prevented this, but all embarking units were issued with dry and serviceable, if not necessarily new, tents. I Corps probably embarked better equipped than any other Australian formation in the war.[3]

While the Army was short of manpower, basic weapons were no longer a problem. With its order of battle reduced to just six divisions, the Army needed 406 25-pounders, but had 1,516. Although it needed only 530 2-pounder or 6-pounder anti-tank guns, it possessed

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1 *LHQ Operation Instruction No. 63*, 30 August 1944, War Diary, New Guinea Force, AWM52 1/5/51.

2 Cdr ALF SWPA, *Report on Operations by Australian Military Forces in Borneo 1 May 1945 to 15 August 1945*, AWM54 617/7/43.

3 *I Corps Ordnance Services – Report on Operations*, 2 September 1945, AWM54 617/7/32.

1,941. It now manned only 73 3.7-inch anti-aircraft guns, but had 640, and against requirements for 9,438 Bren guns, it had 21,139.[4]

As amphibious operations were contemplated – although where and when remained undecided – the Army reconsidered the problems of over-the-beach logistics, drawing on the lessons of the landings at Lae and Finschhafen and the Sicilian operation in Europe.[5] The result, after much discussion and debate, was the formation of the 1st Beach Group in November 1943.[6] Since operations might be carried out against separate and distant objectives, a 2nd Beach Group was formed in March 1944.[7] Commanded by full colonels, and with over 1,800 personnel, each contained a full range of logistical units to run a brigade beachhead, including RAN beach commandos for communicating with the fleet. Although similar in composition and function to the British Army's beach groups, they were tailored for conditions in SWPA, incorporating, for example, a malaria control unit. Most of their sub-units were already in existence, but some were raised for the purpose.[8]

It was not intended that the beach groups should provide all logistic support beyond the initial stages of an amphibious operation. For longer term support the 1st and 2nd Base Sub Areas were formed in mid 1944 as Type C base sub areas, each capable of administering up to 20,000 troops. The former was based in Brisbane and commanded by Brigadier Fullarton, who brought with him a number of experienced staff from the Lae Base Sub Area, including Colonel Kessels as his AA&QMG. The 2nd Base Sub Area, near Sydney, was commanded by Brigadier H. Wrigley,[9] who, like Fullarton, had won the Military Cross in the Great War. More recently, he had commanded the 2/5th Infantry Battalion in Greece and the 20th Infantry Brigade at El Alamein.[10] Since then he had been

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4 Long, *The Final Campaigns*, p. 36.

5 CGS, "Beach Organisation", 25 January 1944; *Report of War Office Committee on Beach Organisation*, AWM54 721/29/5.

6 SD LHQ, 10 November 1943 AWM54 923/3/10.

7 I Corps Circular, 2 March 1944, AWM54 721/29/11.

8 AG, "1, 2 AAMC Coy (Beach Gp) – Raising of", 8 April 1944, AWM54 721/29/20.

9 "Notes on the History of 1 Base Sub Area", 8 January 1946, War Diary, 1st Base Sub Area, AWM52 1/8/7.

10 Long, Gavin, *Greece, Crete and Syria*, (Adelaide: Australian War Memorial, 1953), p. 161; Maughan, *Tobruk and El Alamein*, pp. 659, 671, 680.

commanding reinforcement training in the Middle East and Queensland.[11] Forward Echelon LHQ worked on a plan for an operation at Aparri in northern Luzon, tentatively scheduled for February 1945, as a preliminary to the main American landing at Lingayen. With the two divisions of I Corps operating in the same area, only base sub area was required, so they were consolidated as a Type B base sub area, the 1st Base Sub Area, under the command of Wrigley, who was senior to Fullarton.[12]

Soon after, the operation was thrown into doubt. From ULTRA sources, General Willoughby, the intelligence officer at GHQ, identified the *Japanese 103rd Division* at Aparri.[13] Although MacArthur did not accept this assessment,[14] Blamey concluded that with a Japanese division in the area and possibly two more arriving within three weeks of a landing, "the basis, for planning at this stage, should be a corps of three divisions, including an armoured brigade", which meant taking the 6th Division from Aitape as well.[15] This would have been the largest Australian amphibious operation ever, involving some 86,000 troops and 120,000 m^3 of stores. Most of the amphibious lift would have come from the US Pacific Fleet, along with aircraft carriers, as Aparri was out of range of land-based aircraft.[16] Prospects for the operation soon dimmed, as it might have delayed rather than advanced the main attack at Lingayen. Still, as a planning exercise, it was good experience for Forward Echelon LHQ. Berryman felt that it was "poorly done but many lessons were learned", particularly on the logistics side, but he had confidence in his logistics staff, under Brigadier Secombe and Colonel Grant, whom he rated highly.[17] MacArthur now intended to use the Australians elsewhere on Luzon and later in Northern Borneo and the Southern Philippines.[18] In February 1945, opposition from Washington to

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11 *AMF Gradation List of Officers*, 1945, p. 14.

12 Cdr ALF SWPA, *Report on Operations by Australian Military Forces in Borneo 1 May 1945 to 15 August 1945*, AWM54 617/7/43; "Conference on Regrouping of the ANMF", 11 August 1944, AWM54 213/4/23.

13 G2 GHQ SWPA, "Trend of Reinforcement of Northern Luzon", 8 September 1944, Berryman Papers PR84/370 49.

14 Berryman to Blamey, "Aparri Operation", 10 September 1944, Berryman Papers PR84/370 49.

15 Cdr ALF SWPA to GHQ SWPA, "Draft Directive for Aparri Operation", Blamey Papers 3DRL 6643 2/45.

16 Berryman to Blamey, "Aparri Operation", 14 September 1944, Berryman Papers PR84/370 49.

17 Berryman to Blamey, 30 December 1944, Berryman Papers PR84/370 49.

18 Berryman to Blamey, 5 September 1944, AWM54 647/3/26.

the commitment of large numbers of US troops in Indonesia led to the southern Philippines mission being swapped for operations on Borneo and Java.[19]

Morotai

Wherever the objective, shipping could be saved by moving units to a forward staging area in troopships and cargo ships, only travelling combat-loaded in amphibious shipping from there to the objective. Secombe reconnoitred sites for staging areas in November 1944 and selected Hollandia in West Papua and Morotai in the Moluccas.[20] The 1st Base Sub Area formed two small headquarters from its own resources. The 1st Staging Area, under Lieutenant Colonel F. H. Costello, was assigned to Hollandia, and the 2nd, under Lieutenant Colonel N. A. Norris, to Morotai. Colonel Norris had commanded the Milne Bay and 3rd Base Sub Areas in 1943 and was AA&QMG of the Buna and Madang Base Sub Areas during 1944. The staging areas were not set up as base sub areas, and had only 40 men, yet plans called for over 5,500 troops to be assigned to each, providing accommodation for over 29,000 troops for 40 days.[21]

The 2nd Staging Area embarked from Brisbane on *Gorgon* on 19 November 1944, and arrived at Morotai on *Edgar W. Nye* on 13 December after changing ships at Hollandia. The only Australian Army unit on Morotai, it was dependent on the US Army and the RAAF. Its only transport was two jeeps intended for use by the commander and his staff, which had to be diverted to hauling water, rations, and firewood until a truck could be borrowed from the RAAF. The unit had sufficient tents, clothing and cooking equipment for its own use, but was ill-equipped to handle visitors. It had no tools or construction materials. Saws and hammers were borrowed from the RAAF and Americans. Nor was it well-organised for its designated task. It had no draughtsmen, no drawing implements, and not one touch typist. Parties from 1st CRE (Works) arrived by air in December and January with survey equipment, but no draughting equipment. This was unfortunate as maps of the area proved to be inaccurate. The planned staging plan was found to be

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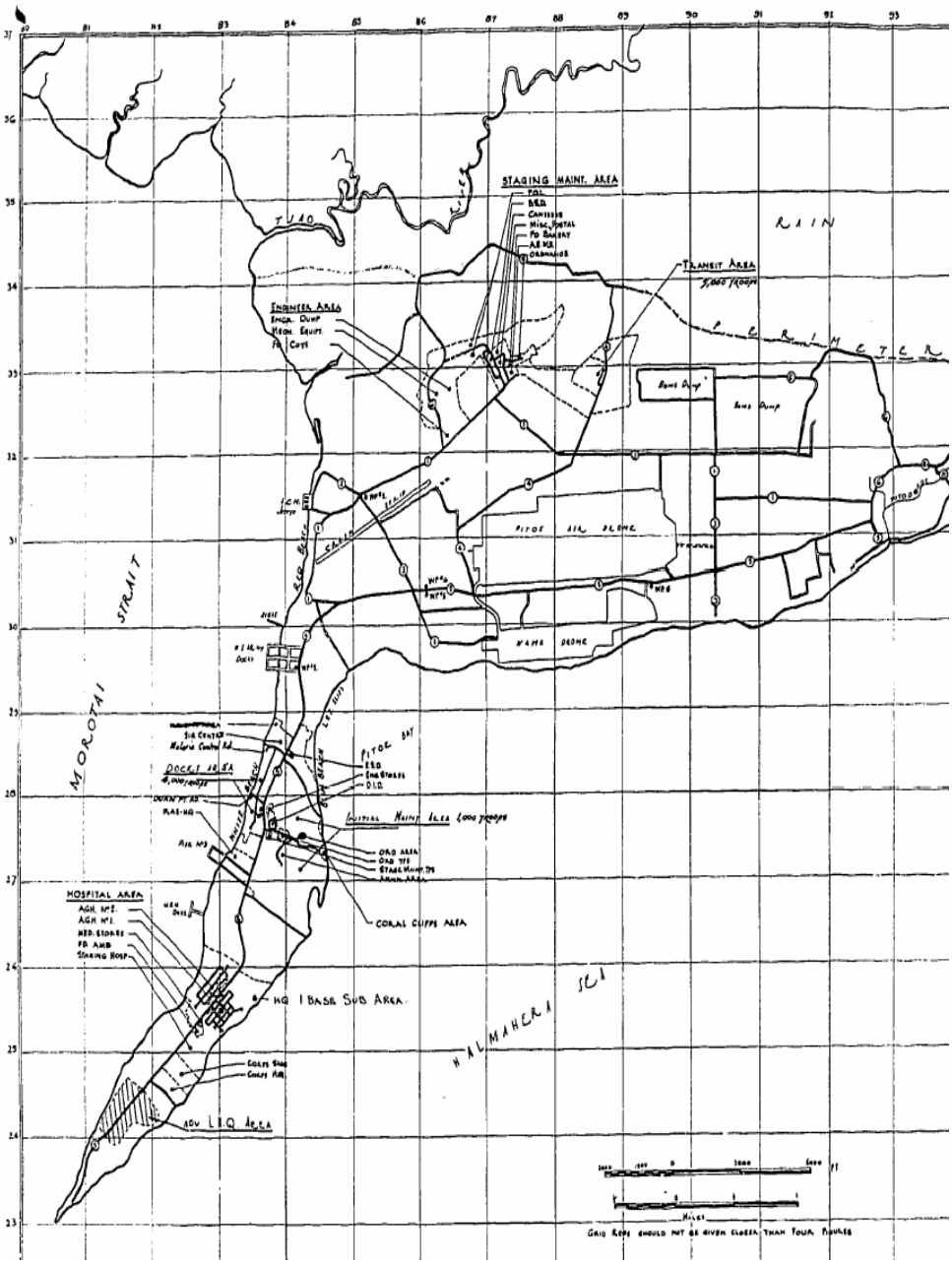
19 *History of the Far East Air Force*, Vol. II, p. 126, NAA (ACT): AA1966/5 208.

20 Berryman to Blamey, 11 November 1944, Berryman Papers PR84/370 49.

21 *Forward Echelon LHQ Administrative Instruction No. 1*, 1 December 1944, War Diary, 2nd Staging Area, AWM52 1/8/8.

impractical, forcing a search for suitable areas outside the American perimeter on the Gila Peninsula.



Map 19. Morotai Staging Area

. Source: War Diary, 2nd Staging Area, AWM52 1/8/8.

In the end, space was found for 15,000 troops within the American perimeter and 45,000 outside. The area occupied by the headquarters of the US 5th Bombardment Group was earmarked for Advanced LHQ. The Americans were cooperative, agreeing to move

certain units, although they were unwilling to relocate all their antiaircraft guns away from the hospital area. Colonel Norris and 1st CRE (Works) laid out the staging area with prismatic compass and chain. Clerks guarded survey personnel working outside the perimeter from the 800 Japanese that remained on Morotai in December 1944, irregularly supplied from Halmahera. Small parties harassed the American defences until an American offensive in late December ended organised resistance.[22] Air raids were frequent, with 82 between September 1944 and February 1945, but the RAAF suppressed the Japanese airfields on Halmahera and the last raid occurred on 22 March.[23]

The presence of 16,000 RAAF personnel on Morotai worried the Army planners.[24] They understood that GHQ had positioned them there to support the Army's advance, in accordance with Australian government policy, but were concerned that their logistic support would become an Australian Army responsibility, and I Corps and the 1st Base Sub Area were not organised to support a large RAAF contingent.[25] Secombe convened a conference with the RAAF to discuss the matter. An agreement was drawn up, covering everything from electricity and water supply to rations and toilet paper, the gist of which was that the USASOS would continue to support the RAAF; but the Army would underwrite the logistical effort, supplying whatever USASOS and RAAF could not, with one important exception: the Army refused to undertake airfield construction. The RAAF would have to use its airfield construction squadrons, although none were yet allocated to its 1st Tactical Air Force.[26]

GHQ estimated that moving I Corps to Hollandia and Morotai would require 87 shiploads. In addition to ships assigned to SWPA, 10 trans-Pacific troopships and 57 cargo ships would be needed. General MacArthur asked Washington for permission to

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22 OC Morotai Staging Area, "Arrangements for Staging I Aust Corps – Morotai", 22 June 1945, AWM54 39/8/3; War Diary, 2nd Staging Area, November 1944 - February 1945, AWM52 1/8/8; "Arrangements for Staging 1 Aust Corps – Morotai", 6 February 1945, AWM54 39/8/6.

23 Smith, Robert Ross, *The Approach to the Philippines*, (Washington, DC: Office of the Chief of Military History, Department of the Army, 1953), pp. 489-493.

24 Adv LHQ *Administration Instruction No. 32*, "Maintenance of 9 Aust Div Task Force and Units Remaining in Morotai", 27 April 1945, War Diary Adv LHQ AQMG, AWM52 1/2/8.

25 Berryman to Blamey, 3 November 1944, Berryman Papers PR84/370 49.

26 Minutes, "Conference to Discuss Responsibilities in Connection with Projected Operations", 23 January 1945, AWM54 917/1/6.

retain 48 Liberty ships, the maximum number that would be employed at any one time, for eight weeks. The War Department replied that although troop ships could be provided, no Liberty ships were available due to "an almost unmanageable deficit" of shipping in both the Pacific and Atlantic.[27]

As a two-division operation was no longer on the cards, Advanced LHQ decided to abandon Hollandia and concentrate on Morotai. *George M. Embiricos*, bound for Hollandia with heavy engineering equipment, was diverted to Morotai, while *Bontekoe* brought stores and 500 personnel from Hollandia. All units at Hollandia, including Advanced LHQ, moved to Morotai.[28] The 1st Staging Area arrived in April. Part of it was attached to the 2nd Staging Area, while the rest prepared the Transit Camp with the aid of a company of pioneers. Within a fortnight, the Transit Camp held 3,000 troops.[29]

GHQ issued orders for the Borneo operation on 21 March.[30] Plans now called for a brigade of the 6th Division to stage at Aitape and assault Tarakan (codenamed OBOE I) on 18 April. The 9th Division, staging at Morotai, would assault Balikpapan (OBOE II) on 7 May. A brigade from Balikpapan would attack Bandjarmasin (OBOE III) on 27 May. Finally, the 6th Division, from Aitape and Tarakan, and the 7th Division, from Australia, would assault Surabaja (OBOE IV) on 1 July.[31] Blamey felt that this strategy was flawed. "It would be the logical and strategically correct sequence in the following operations," he informed Curtin, "to move down the Western coast of Borneo. This would isolate all Japanese forces in Borneo, give a complete control of the South China Sea and facilitate the approach to Malaya."[32] He was concerned that the long voyage from Australia to Java in amphibious shipping would be very uncomfortable for the 7th Division and suggested

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27 MacArthur to Marshall, 3 February 1945; Marshall to MacArthur, 5 February 1945, NACP: RG218 Box 198.

28 ForLand to Landforces, 17 February 1945, Berryman Papers PR84/370 49.

29 OC Morotai Staging Area, "Arrangements for Staging I Aust Corps – Morotai", 22 June 1945, AWM54 39/8/3.

30 *GHQ Operation Instruction No. 99*, 21 March 1945, AWM54 617/3/13.

31 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps G Branch AWM52 1/4/1.

32 Blamey to Curtin, 5 April 1945, NAA (ACT): A5954 Box 570.

that the decision to use only one staging area be reconsidered, but Berryman reassured him that the 7th Division would take a break at Morotai.[33]

In January 1945, LHQ decided to form two Type D base sub areas to run the staging areas. The Queensland Line of Communications Area raised a 7th Base Sub Area for Hollandia and an 8th for Morotai, to be commanded by Colonels Costello and Norris respectively. The 7th Base Sub Area was preparing to move in March when its destination was altered to Morotai. The 8th followed in April. On arrival on Morotai, they absorbed the 1st and 2nd Staging Areas. The 7th assumed responsibility for the administration of the island on 1 May, by which time it was responsible for 20,000 troops. For OBOE, the 7th Base Sub Area was attached to the 7th Division while the 8th Base Sub Area was attached to the 9th Division. The main body of the 1st Base Sub Area arrived at the end of May and took over from the 7th Base Sub Area, which shipped out for Balikpapan. It became responsible for general administration on the island as well as the base units, coming directly under Advanced LHQ rather than I Corps.[34]

The use of the 6th Division was attractive to GHQ and Advanced LHQ because it could stage at nearby Aitape, thereby saving shipping, but it was short of logistical troops. It could bring the 3rd Base Sub Area with it from Aitape, but would still require an additional 1,000 AIF troops. In turn, its relief, the 11th Division, would need its own base sub area at Aitape, requiring another 4,000 AMF troops. Berryman believed that they could be obtained from First Army, which he estimated had 30,000 base troops, not counting the 3rd Base Sub Area. While the war establishment of First Army's base units was 31,316, most units were under strength, so the actual total came to only 26,993, with 3,530 at Aitape, 7,859 at Lae, 7,956 on Bougainville, 4,061 on New Britain, 2,116 at Moresby and 903 at Madang. There were also critical shortages of certain units, such as medical and port working units.[35]

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33 Berryman to Blamey, 17 February 1945; Blamey to Berryman, 19 February 1945; Berryman to Blamey, 19 February 1945, Berryman Papers PR84/370 49.

34 "Notes on the History of 1 Base Sub Area", 8 January 1946, War Diary, 1st Base Sub Area, AWM52 1/8/7.

35 Forland to Landops, 20, 23 February 1945, Berryman Papers PR84/370 49; "List of L of C Units under Command First Army", 20 February 1945, Blamey Papers 3DRL 6643 2/49.

Moreover, the Army's strength was declining. Pressed by the government to release men to industry, its strength decreased from 493,000 in June 1943 to 443,000 in June 1944 and 385,000 in June 1945.[36] By mid-1945, the US Army's "division slice" – the number of soldiers divided by the number of divisions – was nearly 68,000, whereas the Australian Army's was around 64,000. Within SWPA, the US Army's division slice was 34,000, which was lower than most other theatres, a legacy of the support it had drawn from Australia, yet the equivalent slice for Australian troops outside Australia was only 31,000. This was too low, insofar as it restricted operations, thereby reducing the divisions' value. The problem was partly of the Australian government's making. Concerned that the Army's logistical "tail" was too large, the War Cabinet had transferred authority to create new service units or alter the establishment of existing ones from Blamey to Army Minister Forde.[37]

Curtin took the matter up with MacArthur:

> As the use of a corps of two divisions would alone entail the provision of 30,000 men for base and line of communication units, the proposed use of the 6th Division... would make heavy demands on the capacity of Australian manpower to maintain the Australian Army at strength… I feel that we should adhere to the basis of our previous discussion and limit the Australian component of your spearhead forces to the 7th and 9th Divisions. [38]

A brigade of the 9th Division was therefore assigned to Tarakan.[39] Carrying operations on to Java might require three divisions so the 6th Division still featured in OBOE II and IV. In the hope that it could reduce the enemy garrison at Wewak to the point where it could be relieved by a single brigade, and thus be available for OBOE IV, MacArthur allocated ten LCTs to support its Wewak operations.[40] He wrote back to Curtin seeking to keep open the possibility of its use.[41] Then, on 4 April, the Joint Chiefs approved the operation

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36 *Interim Report – Army Establishments Committee*, 8 August 1945, NAA (ACT): A2653/1 M61/1945.

37 Leighton and Coakley, *Global Logistics and Strategy 1943-1945*, p. 838; Long, *The Final Campaigns*, pp. 35-36, 581.

38 Curtin to MacArthur, "Future Operation Use and Command of the Australian Military Forces", 27 February 1945, NAA (ACT): A5954 Box 2313.

39 Forland to Landforces, 27 February 1945, Berryman Papers PR84/370 49.

40 Forland to Landforces, 2 April 1945, Berryman Papers PR84/370 49.

41 MacArthur to Curtin, 5 March 1945, NAA (ACT): A5954 Box 570.

against Brunei Bay, which became OBOE VI.[42] The 9th Division was assigned to OBOE VI and the 7th took its place in the Balikpapan operation. GHQ calculated that OBOE I, II and VI could be carried out without delaying the invasion of Japan, but OBOE III and IV could not, and were therefore shelved.[43]

Although Morotai had been selected as a staging area back in November 1944, there were only 129 Australian soldiers in the area at the end of February 1945. This changed with the arrival of *George M. Embiricos.* This ship presented difficulty, for its gear could handle loads no greater than 3 tonnes, but it carried 160 lifts greater than that, the heaviest being 19-ton D8 bulldozers. The Americans moored a Liberty ship alongside and commenced unloading the ship with its gear, but its boom could not plumb the lower hold. As his docks unit was inexperienced, the American commander asked for the assistance from the 2/1st Docks Operating Company. With considerable ingenuity, the Australians managed to unload the heavy lifts. *Gorgon* and *Anhui* arrived over next few days bringing troops from Hollandia, including the 2nd Field Company and 5th Mechanical Equipment Company, which had been working on the staging area there. Construction work on Morotai got underway at last on 10 March. Road works were hindered by 70 mm of rain over the next six weeks, but coverage work ran ahead of the supply of materials.

Staging units, including Advanced LHQ, the 26th Infantry Brigade and the 2nd Beach Group, began arriving in late March, By the end of the month there were over 6,600 Australian troops on Morotai. The Sabatai River had not yet been bridged and the staging area had not been opened, nor was the transit camp ready. They therefore moved to their campsites with what accommodation stores they had. Often these were in the holds of the troopships they arrived in, overstowed by other stores. Clearing the holds frequently required the rigging of derricks and other gear, and could not be accomplished in less than two or three days. In the meantime, the staging units were fostered by base units, which assisted with shelters, stores and meals. Infantry battalions bivouacked in the transit camp area, while the rest were accommodated on the Gila Peninsula. This became overcrowded by the end of March, when a Bailey bridge was erected over the Sabatai River allowing

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42 JCS to MacArthur, 4 April 1945, NAA (Vic): B6121/3 62G.

43 Forland to Landforces, 6 April 1945, Berryman Papers PR84/370 49.

units to move into the staging area proper. Initially, only one general transport platoon was available to carry personnel, unit equipment and stores, supplementing its vehicles with ones borrowed from the Americans and RAAF, and at one point only two water carts were available for 10,000 troops, requiring water to be rationed. Ultimately, all transport was pooled under the 1st Base Sub Area.

The port of Morotai became exceptionally busy in April. Not only were Australian troops arriving, the US 93rd Infantry Division was also arriving to relieve the US 31st Infantry Division which was shipping out for Mindanao. The four wharves were inadequate for the combined effort, so vessels were discharged in the stream using LCMs and LCTs, and unit equipment piled on the beaches. The stores of many units became mixed up, and had to be sorted. Extraordinary efforts were taken to minimise pilferage, with canteen stores bottom stowed, and Special Investigation Branch guards on ships.

The first ships discharged supplies without a depot to receive them, so one was improvised from the 1st Staging Area headquarters. Depots began operating on 4 April with the arrival of the troops to man them on *Charles Goodnight*. An Advanced Stores Depot (ASD) opened in the Staging Area, manned by two supply depot platoons, while a DID was established on the peninsula. POL was drawn in 44-gallon drums from the American filling plant, and supplied from two petrol points manned by BIPOD personnel. A successful innovation was placing the DID, bakery, canteens, pay and postal units together to form a military "shopping centre", where vehicles could collect all their unit's needs in one trip. As ships arrived, bringing in 62,000 m^3 of stores and 17,000 troops in April, the base troops' workload became heavy. At one point, seven hatches were discharging stores into the ASD. The units manning the depots did not have lighting equipment, so it was borrowed from those earmarked for Tarakan. When one of the three planned hospitals was cancelled, its lighting was used for depots and wharves.[44] Ration strength on Morotai declined from 36,720 on 1 July to 25,865 on 17 July, as units shipped out for OBOE, of which about 74% were Army and 24% RAAF.[45]

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44 OC Morotai Staging Area, "Arrangements for Staging I Aust Corps – Morotai", 22 June 1945, AWM54 39/8/3; War Diary, 5th Mechanical Equipment Company, February 1945, AWM52 5/21/3.

45 War Diary, CASC 1st Base Sub Area, 1, 16 July 1945, AWM52 10/2/35.

Map 20. Borneo Operations

Source: *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, Volume I, p. 384.

Tarakan

Preliminary planning for OBOE I was undertaken by Forward Echelon LHQ based upon a draft of GHQ's staff study.[46] Conferences were held at GHQ on Leyte. Following a calculation of the amphibious lift required, Morshead requested another LSD, AKA and three LST in addition to the 20 LST, 4 LSM, 12 LCT and 11 LCI allotted. GHQ added the LSD USS *Rushmore*, AKA USS *Titania* and HMAS *Manoora* and *Westralia*. He also asked for some LVTs (Landing Vehicle, Tracked), or amtracs, tracked and armoured amphibious vehicles useful for crossing reefs.[47] The Australian Army had never used these operationally before, although two amtrac units had been formed in February 1945.[48] Morshead's request met an immediate protest that none were available, for there were only three battalions in SWPA, but MacArthur ordered the US 727th Amphibious Tractor Battalion to load on two Liberty ships at Lingayen, and proceed to Morotai.[49] Meanwhile, B Company, 593rd EBSR received orders to move there from Noemfoor. Its LCMs would transport high priority tanks and bulldozers.[50]

Planning teams arrived on Morotai in late March. Rear Admiral F. B. Royal, USN, commander of VII Amphibious Force's Amphibious Group 6, was appointed attack group commander and arrived on his headquarters ship, USS *Rocky Mount*, on 6 April. Air Vice Marshal A. D. Bostock was appointed air commander and Brigadier D. A. Whitehead of the 26th Infantry Brigade as land commander. This placed a considerable burden on his small brigade staff, which was not designed for complex logistical responsibilities and the staff captain, Captain J. O. Geddes, had to perform tasks resembling those of a division AA&QMG.[51] The final troop list for the land forces was:

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46 *GHQ Staff Study Operation OBOE I*, 18 March 1945, AWM54 617/6/16.

47 Minutes of Conference at GHQ, Leyte, 17 March 1945.

48 Hopkins, R. N. L, *Australian Armour: A History of the Royal Australian Armoured Corps 1927-1972*, (Puckapunyal, Vic: The Royal Australian Armoured Corps Tank Museum, 1993), p. 144.

49 Minutes of Conference at GHQ, Leyte, 17 March 1945; MacArthur to CG US Sixth Army, 19 March 1945, AWM54 617/7/32.

50 Casey, *Amphibian Engineer Operations*, p. 660.

51 Long, *The Final Campaigns*, pp. 450-451.

Table 18. Troops for Tarakan Operation [52]

Units	Personnel	Vehicles, guns and trailers
26th Infantry Brigade	5,240	593
2nd Beach Group	2,605	348
I Corps troops	1,607	325
1st Base Sub Area troops	213	28
Netherlands East Indies troops	250	20
US troops	724	115
RAAF airfield construction squadrons	1,165	437
Total	**11,804**	**1,866**

The target dates for OBOE I and VI were set at 29 April and 22 May respectively, but a study of tidal conditions revealed that the highest tide of the month was on 1 May, so GHQ agreed to move the target date from 29 April to then. This also provided extra time for the arrival of No. 8 Airfield Construction Squadron, whose ship, *Swartenhondt*, had a late departure from Sydney.[53] No. 2 Airfield Construction Squadron on Morotai was alerted to take its place, but *Swartenhondt* arrived at Morotai on 25 April, just in time.[54]

The assault convoy departed Morotai on 27 April carrying 12 days' supply of MT80 and distillate, 6½ days' of avgas, 20 days' of ammunition and 18 days' of other supplies. A floating reserve was held of two shipments of 15 days' WUR of ammunition and two of packaged POL, consisting of 400 drums of MT80, 200 drums of distillate and 600 drums of avgas. Provision was made for the emergency delivery of ration and ammunition from Morotai by air.[55]

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52 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

53 War Diary I Corps GS Branch, 8 April 1945, AWM52 1/4/1.

54 I Corps to GHQ, 25 April 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

55 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

Not since Tarawa had beach conditions been so formidable. The tidal range was about 3 metres with the low water mark 100 metres from the dune line on the beach. There was a neap tide on 1 May, resulting in the first wave landing on a 4 knot flood. The beach itself was mud which would not support a man's weight when wet, and was pockmarked with bomb and shell craters. Beyond lay a wall of earth and logs, a water-filled ditch and soft clay before one reached the lateral road. In selecting such a difficult beach, the Australians were relying on the Japanese adhering to their doctrine of not opposing landings on the beach.[56]

Seven LSTs, each carrying a pontoon causeway, were beached but, although they drove well on to the beach, there remained a water gap of 50 metres and in two cases, the exits from the beach were unavailable or obstructed and vehicles and stores were unloaded onto the pontoon causeways. Unloading was delayed by several hours until earth ramps were created to connect the pontoons to the shore and the beach exits were ready. Five more LSTs were beached that evening, and all twelve were unloaded during the night. On the morning high tide, they attempted to retract but were unable to do so. The Principal Beachmaster, Commander B. J. B Morris, RANVR of RAN Beach Commando B, attended a crisis conference with Admiral Royal on *Rocky Mount*. With twelve LSTs stuck on the beach, it was decided to unload the remaining eight in the stream. The stranded LSTs were lightened by pumping out their fuel and water tanks and, with torpedo boats and a destroyer escort making high speed runs nearby to create a wash, five managed to retract on 3 May. The remaining seven had to await the return of the spring tide, retracting on 12, 13 and 14 May.

Top priority was given to unloading *Manoora* and *Westralia*, and all available craft were deployed to help. Both were unloaded on the morning of 2 May, allowing them to depart for Morotai along with *Rushmore* that evening. The US 111th Naval Construction Battalion placed eight 50-metre "strings" of pontoon causeways together to form a pier, with two additional strings making a T at one end, with two cranes. Troops disembarked from *Westralia* and *Manoora* on the causeway section instead of Green Beach as planned. Five LSTs were unloaded in the stream, while another 19 were unloaded onto the

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[56] COHQ Bulletin Y/50, *Tarakan, Borneo, 1st May 1945*, October 1945, NACP: RG496 Box 2365.

28. USS *Titania* docks at the South Wharf while LSTs are beached in the background.

causeway, using LCMs as tugs. The remaining two strings were used to construct an unloading point on Yellow Beach for LSMs.

With the beach incapable of handling craft, attention turned to the wharves. There were two in the assault area. South Wharf on Green Beach was 500 metres long with a T-head in 10 metres of water at low tide. It had been badly damaged by burning, and a sniper had the wharf in his sights, causing ten casualties on 1 and 2 May. Sappers bridged two gaps with captured Japanese timber girders, spliced onto the piles at low water. A Bailey bridge was used to span one gap, and a panel bridge another. Burnt decking was replaced with captured material and the wharf opened to one-way motor vehicle traffic on 4 May, by which time 450 m^3 of stores had been dumped on the T-head. This was cleared away by the next day, allowing *Titania* to dock. Once *Titania*'s No. 5 hold was cleared, Commander Morris ordered *Titania* to use her gear to unload a US Army supply ship while still discharging cargo from its other holds. *Titania* completed unloading and sailed on 9 May.

North Wharf was narrow and could not handle traffic larger than a jeep and trailer. It too had been damaged, but the small gaps were repaired with ARC mesh, and later timber,

and it was opened on 2 May to LCIs carrying personnel, and LCMs and LCVPs carrying stores from *Westralia* and *Manoora*. A company of the 2/2nd Pioneer Battalion worked the pier. The Sebenkok River was also developed as an LCM and LCVP unloading point. An LCM was beached with a bulldozer to develop an unloading point allowing LCMs to unload there from the evening of 1 May. Unfortunately, it was usable only for two or three hours around high tide.[57]

The entire assault convoy was discharged, and all stores were in the dumps by noon on 9 May. Although parts of the Beach Maintenance Area were reconnoitred on 2 May, operational considerations prevented use of the whole area until 7 May. A 6 km circuit served all the dumps and installations. Although the town buildings had been destroyed, their concrete floors were used as hardstandings. Dumps established near the beaches were then closed out. The DID commenced operation on 8 May, and the bakery the next day, permitting a daily issue of 8 oz (250g) per man. The POL dump was established on the outskirts of the town and a kerbside bowser was put into operation, replenished by RAAF tankers. From 5 May, units were required to exchange empty drums for full ones. Owing to the small size of the island, supply points were not established and deliveries were made direct from the depots and dumps to operational units. POL was never in short supply, with receipts of MT80 being five times greater than issues, and distillate seven times greater, so the floating reserve was not needed.[58]

Water supply presented more difficulty, as it took several days to capture the town supply. This had been anticipated in the planning phase and all available 2- and 4-gallon containers on Morotai were shipped with the assault convoy. Water was issued in these until 7 May. Water points were established at Yarra Creek on 3 May and Tiger Creek on 5 May, but the latter was found unsatisfactory owing to oil content, while the access road to the former was negotiable only by jeep and deteriorated rapidly. A pipeline was laid and water was pumped into tanks, filtered, and superchlorinated, producing up to 220,000 litres per day. The pumping station and part of the treatment works had been destroyed and other parts of the system damaged by bombing, but once the supply was secured, a

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57 PBM B, *Report on Operation Oboe I*, NAA (Vic): B6121 61D; *Building the Navy's Bases*, p. 396; CRE I Corps Troops, *Engineer Report on OBOE I Operation*, AWM54 313/4/18.

58 Capt (Q) Maint, I Corps, *Report on Q Aspects – Operation OBOE I*, 22 May 1945, AWM54 617/7/21.

pump intended for the bulk oil installation was installed at the treatment works. The pipelines were repaired, and the daily output gradually increased to 680,000 litres.[59]

Nonetheless, it was ammunition supply that caused the greatest concern. Twenty days' supply at the intense WUR was shipped with the assault convoy, including 19,200 25-pounder HE rounds, but in seven days of fighting, 6,705 rounds were fired.[60] A floating reserve of 15 days' WUR of ammunition was held on the ships *Balikpapan* and *Alfred Lunt*, but it turned out to be unbalanced, with only 264 25-pounder rounds instead of 28,760 and no M36 hand grenades or belted .303 ammunition for the machine guns.[61] Another 2,500 25-pounder rounds were shipped on *Luther Hurd* in the follow up convoy. This left just 20 days' supply for OBOE VI plus 7,740 rounds in reserve at Morotai.[62] Brigadier Whitehead was forced to ration 25-pounder ammunition to 500 rounds per day. To make up for it, more mortar and machine gun ammunition was used and despite withdrawing 3,000 rounds of 3-inch mortar ammunition from *Balikpapan*, they too had to be rationed on 23 May.[63] Arrangements were made to increase production of 3-inch mortar ammunition in Australia by 50%.[64] On the afternoon of 4 June, six *Dakotas* dropped 1,296 3-inch mortar rounds by parachute.[65] None was lost, despite packing having to be carried out by inexperienced staff, because the 1st Air Maintenance Company had been sent to Tarakan in preparation for OBOE VI.[66] There was also unusually high expenditure of 3.7-inch antiaircraft ammunition, as antiaircraft guns were used as field artillery; of 2-pounder and 7.92 mm ammunition used by the *Matilda* tanks, 30 days'

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59 CRE I Corps Troops, *Engineer Report on OBOE I Operation*, AWM54 313/4/18.

60 OC 26th Infantry Brigade Group, *Daily Operational Letter Report No 5*, 7 May 1945, War Diary, 26th Infantry Brigade, AWM52 8//2/26.

61 Capt (Q) Maint, I Corps, *Report on Q Aspects – Operation OBOE I*, 22 May 1945, AWM54 617/7/21.

62 DA&QMG I Corps, "Ammunition OBOE I and OBOE VI", [May 1945], AWM54 617/7/8.

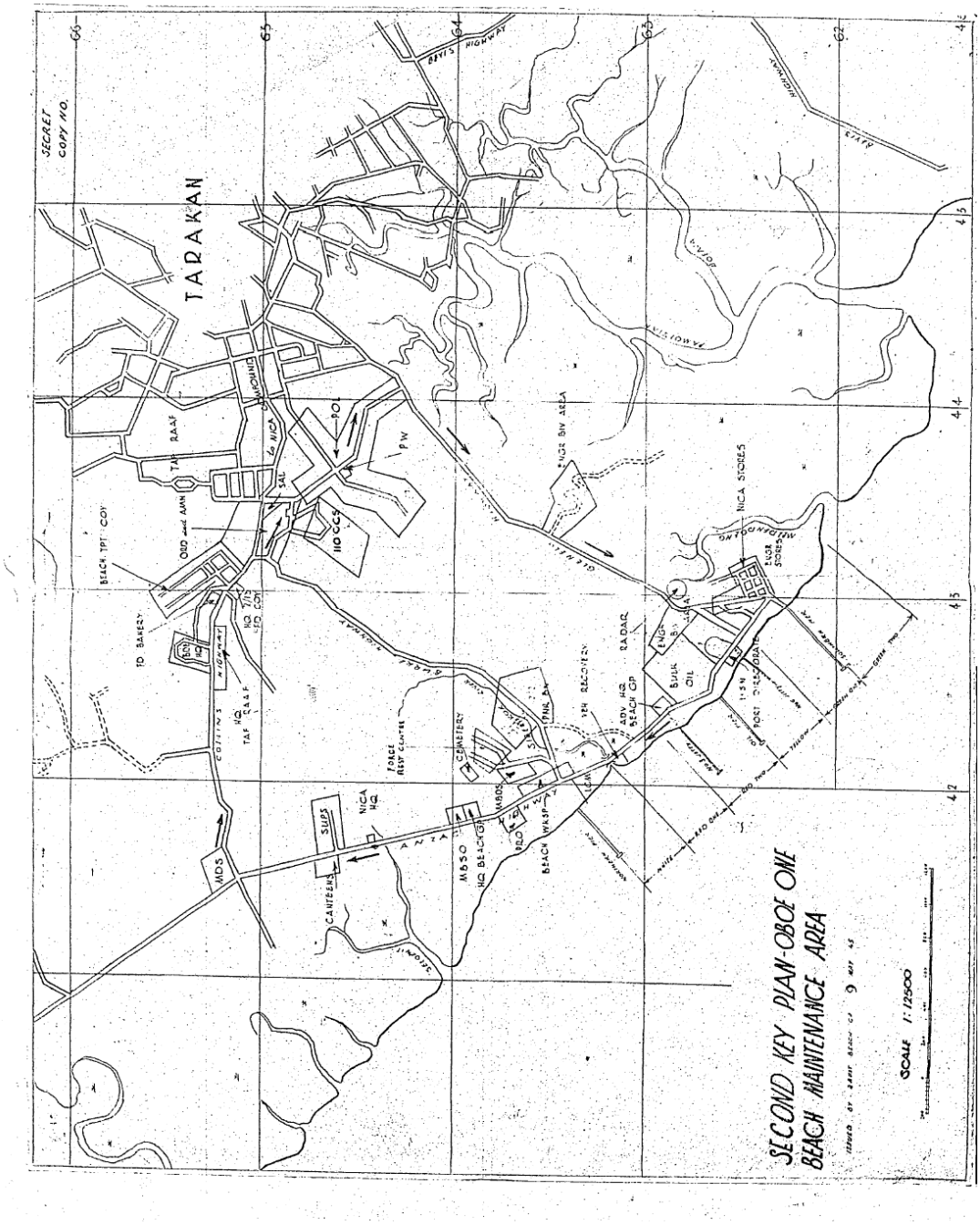
63 OC 26th Infantry Brigade Group, *Daily Operational Letter Report No 11*, 13 May 1945, War Diary, 26th Infantry Brigade, AWM52 8/2/26; Long, *The Final Campaigns*, p. 439.

64 War Diary, I Corps GS Branch, 25 June 1945, AWM52 1/4/1.

65 OC 26th Infantry Brigade Group, *Daily Operational Letter Report No 31*, 4 June 1945, War Diary, 26th Infantry Brigade, AWM52 8/2/26.

66 *Report Covering Q Branch and Services Activities Associated with the Planning for Operations OBOE I, Oboe VI and Oboe II*, [August 1945], AWM54 617/3/11.

supply of which was expended in the first ten on Tarakan; and of 9mm Owen gun ammunition.[67]



Map 21. Tarakan Beach Maintenance Area

Source: War Diary 2nd Beach Group, May 1945, AWM52 1/11/4

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67 Capt (Q) Maint, I Corps, *Report on Q Aspects – Operation OBOE I*, 22 May 1945, AWM54 617/7/21.

29. Tarakan, 4 June 1945. Civilians and No. 8 Airfield Construction Squadron fill a crater with gravel-filled drums

30. Tarakan, 4 June 1945. Laying Marston mat

31. Tarakan, 28 June 1945. A *Beaufighter* fighter bomber lands.

GHQ wanted facilities on Tarakan for an Army cooperation flight and fighter wing by 7 May and an attack bomber wing by 16 May in order to support OBOE II and VI.[68] Held up by "hard going, determined resistance and all forms of demolitions and booby traps", the airfield was not captured until 3 May. Army and RAAF bomb disposal units cleared away the mines and booby traps and Group Captain D. J. Rooney's No. 61 Airfield Construction Wing, with Nos 1 and 8 Airfield Construction Squadrons, commenced work on 6 May.[69]

Their task was daunting. Numerous bomb craters up to 18 metres in diameter and 3 metres deep, filled with water to within 60 cm of the surface, had thrown up a mixture of clay, silt and peat that had to be removed from the runway area with bulldozers. They had to be pumped out and filled in.[70] The RAAF found its pumps had difficulty and turned to the Army for assistance.[71] A search for material to fill the craters found that sand from the nearby ridges was high in silt, and bands of clay were present. Better sand was found in a pocket south of the runway. Unless promptly filled, craters refilled with seepage and overnight rainwater, but filling them with sand

68 GHQ *Operation Instruction 99/1*, 10 April 1945, AWM54 617/3/13.

69 *Daily Operation Letter Report No. 4*, 6 May 1945, War Diary, 26th Infantry Brigade, May 1945, AWM52 8/2/26.

70 RAAF Unit History sheet, No 1 ACS, May 1945, NAA (ACT): A9186 263.

71 OC 61 ACW to 1 TAF, 14 June 1945, NAA (ACT): A12250 2410/6/W Part 2.

proved to be a mistake, as it became saturated and they had to be pumped out again.[72] Two gravel pits were located local at Snag's Track following their capture on 11 May.[73] Some 40,000 m^3 of gravel was hauled over three km of this track and Anzac Highway,[74] which was corduroyed with oil pipes.[75] The futility of hauling over muddy roads was again demonstrated, with the time gained subsequently lost in additional road maintenance, and the gravel delivered was sometimes so wet that it would not dry out, and subsequently had to be removed. Later, craters were filled with drums filled with stones and gravel.[76]

The airfield drainage system had been destroyed by bombing and culverts had been filled in by the Japanese rather than repaired. Mud bogged mechanical equipment and forced work to be done by hand using RAAF personnel and civilian labourers.[77] They excavated below the level required, and laid a "raft" of timber and salvaged metal which was covered with gravel. The whole strip ultimately had to be covered with Marston mat, of which there was a shortage. The 2nd Beach Group was supposed to deliver 1,450 tonnes at a rate of 500 tonnes per day, but the ship carrying it arrived at Morotai late with the mat stored deep in her hold. Some had been used before.[78] While it was possible to rip up Marston mat, straighten it out and reuse it, the process stretched it, so it was inadvisable to combine new and used mat.[79]

On 14 June, Rooney reported that "most of the runway gravelled is a little spongy and no matter what we do we don't seem to be able to settle it down. We ran a loaded truck over it and it gave a deflection of 1½ inches [40 mm] and bent the mat. We decided to pull the

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72 RAAF Unit History sheet, No 1 ACS, May 1945, NAA (ACT): A9186 263.

73 Minutes, Conference 20 May 1945, War Diary 9th Division GS Branch, AWM52 1/5/20.

74 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

75 OC 61 ACW to 1 TAF, "OBOE I Airfield", 1 June 1945, NAA (ACT): A12250 2410/6/W Part 2.

76 Wilson, *Always First*, pp. 84-85; RAAF Unit History sheet, No 8 ACS, May 1945, NAA (ACT): A9186 272.

77 RAAF Unit History sheet, No 1 ACS, May 1945, NAA (ACT): A9186 263.

78 *26th Infantry Brigade Report on Operation OBOE I*, AWM54 617/7/14; OC 1 ACS, *Operation Order No. 1 OBOE I Operation*, NAA (ACT): A12250 2410/6/W Part 1.

79 Casey, *Airfield and Base Development*, p. 101.

section up. Water had converted the gravel to slurry."[80] A *Liberator* crash-landed on the runway on 20 June. Luckily, the crew was unhurt and there was negligible damage to the Marston mat. Finally, on 28 June, the first aircraft landed, a *Beaufighter*. Another four *Beaufighters* and 23 *Kittyhawks* arrived during the day, and twelve *Spitfires* the next, just in time for OBOE II, fortunately doing less damage than the truckload of sand. On 29 June, No. 8 Airfield Construction Squadron packed for Balikpapan, leaving No. 1 to maintain the strip for the rest of the war.[81]

Plans called for the airfield to be supported by a bulk fuel installation of five 1,000-barrel tanks and a 10,000-barrel tank.[82] Its construction was undertaken without the help of any of specialist welding platoons, using welders and fitters drawn from engineer units and civilian oil industry workers who volunteered their services. Owing to the slow progress on the airstrip, there was little sense of urgency. Work began on the oil jetty first, on 6 May, as bulk installation stores had not yet been unloaded. It was repaired and a pipeline laid to the lateral road by 10 May. Five 1,000-barrel tanks were completed by the end of May. Work began on the 10,000-barrel tank in June, but some parts were found to be missing, so two additional 1,000-barrel tanks and a 2,000-barrel tank were erected. Replacement parts for the 10,000-barrel tank arrived in early June, and it was completed on 12 July. The fuel jetty was extended to accommodate tankers drawing up to 5 metres, and by mid July the installation comprised storage for 2.2 million litres of avgas, 636,000 litres of MT80 and 160,000 litres of distillate.[83]

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80 OC 61 ACW to 1 TAF, 14 June 1945, NAA (ACT): A12250 2410/6/W Part 2.

81 OC 61 ACW to DWB RAAF, "Tarakan Airfield", 21 July 1945, NAA (ACT): A12250 2410/6/W Part 2; OC 61 ACW, 18 June 1945, A12276 2411/4/W Part 1.

82 GHQ *Operation Instruction 99/1*, 10 April 1945, AWM54 617/3/13.

83 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1; Casey, *Airfield and Base Development*, pp. 381-382; McNicoll, *Teeth and Tail*, pp. 258-259; Capt (Q) Maint, I Corps, *Report on Q Aspects – Operation OBOE I*, 22 May 1945, AWM54 617/7/21.

Map 22. Brunei Bay operations

Source: *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, Volume I, p. 384.

Brunei Bay

On 14 April GHQ released its draft staff study for OBOE VI, the capture of the Brunei Bay area in order to establish an advanced fleet base and secure its oil and rubber. It was expected that most units would be concentrated on Morotai by 15 May, from whence Brunei Bay was seven days' sailing, so the target date, Z-Day, was set at 23 May. Units which did not arrive in time would join the follow-up convoy. Ample lift was available. VII Amphibious Force was now large enough to land more than one division, and this operation had GHQ's top priority. The force included *Kanimbla, Manoora*, *Westralia*, *Titania,* the LSD USS *Carter Hall*, 5 APDs, 34 LSTs, 21 LCIs, 20 LSMs and 6 LCTs. The LSTs were also required for OBOE II and therefore had to be released by Z+23, although other amphibious shipping, including APDs, was available for coastal operations. The Boat Battalion of the 593rd EBSR and the 727th Amphibious Tractor Battalion were likewise required and would have to be relieved early. To ensure a quick turnaround of amphibious shipping, only essential equipment would be loaded on it. The rest, including most of the vehicles, would travel in USASOS shipping with the resupply convoys.[84]

By 1 May, there was concern about the target date. Some 2,200 of the 9th Division's troops and 1,200 of its vehicles and guns were still in Queensland and essential stores would not arrive at Morotai until 25 May. GHQ insisted that the target date was firm, so the 9th Division worked up two new plans, one involving taking troops from Tarakan, the other restricting operations to one brigade. GHQ did not like either one and decided to postpone Z-Day to 10 June. I Corps assumed that the interval between OBOE VI and OBOE II would remain the same, but a week later GHQ set F-Day, the target date for OBOE II, to 1 July, thus reducing the interval between the two operations. This meant that there would not be enough time for the amtracs to participate in coastal operations, so GHQ was asked for another battalion. None was available, but the headquarters and one company of the US 672nd Amphibious Tractor Battalion were ordered to move from Luzon to Morotai, to be joined by one from the 727th following its release from OBOE VI. No LSD was available, so they would travel on an LST, which departed on 11 June. Nor would APDs

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84 GHQ *Operations Instruction No. 102*, 21 April 1945, Blamey Papers, AWM 3DRL 6643 3/113; Minutes, Conference at GHQ, 19 April 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

be available for coastal operations, for they had to return to Morotai by 20 June.[85] The postponement permitted a change to the supply arrangements. Instead of shipping 30 days' maintenance from Morotai with the assault convoy in amphibious shipping, what would have been the subsequent 30 days' maintenance was substituted. This came direct from Australia, leaving the stores on Morotai as 30 days' reserve.[86]

Special measures were adopted to ensure that all units would be on hand by the new target date. LHQ expedited the loading and clearance of ships from the mainland. Allied Naval Forces provided special escorts so ships could sail direct from Morotai to Biak without waiting for the fortnightly convoy. It assigned additional LCTs to the port and two more platoons of the 543rd EBSR were flown in to operate 23 LCMs at Morotai in addition to the 28 already providing lighterage there. The US 93rd Infantry Division assisted with labour and transport, and the GHQ Coordinator at Morotai gave OBOE top priority. As a result, all personnel, and all but a few vehicles, were on hand by 27 May.[87] *Titania* and six LSTs began loading on 20 May. Other ships followed, and all embarkation was completed on the night of 3 June.[88]

The assault convoy took 15 days' supply of avgas with it in 4,166 44-gallon drums, 15 days' supply of MT80 in 7,236 44-gallon drums and 26,809 4-gallon drums, and 30 days' supply of distillate in 5,476 44-gallon and 13,326 4-gallon drums. The floating reserve consisted of 1,200 44-gallon drums of avgas and 800 of MT80 carried in *FS 166* and *FS 178*, two small US Army vessels manned by the US Coast Guard. Initial supply sailed with the slow convoy, which arrived on 14 June. This consisted of the coastal tanker *Y46*, with 5,600 barrels and six barges with 400 barrels of avgas each; the coastal tanker *Y35*,

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85 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1; GHQ *Operations Instruction No. 103/4*, 24 May 1945, Blamey Papers, AWM 3DRL 6643 3/113.

86 DDOS I Corps, *Report – Operations of I Aust Corps*, 2 September 1945, AWM54 617/7/32.

87 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945; *3rd Engineer Special Brigade Historical Report*, June 1945, USACE: X-81 E-36.

88 War Diary 9th Division GS Branch, 20 May, 4 June 1945, AWM52 1/5/20.

with 5,600 barrels and barges with 2,400 barrels of MT80; and the tanker *Winoolki* with 3,200 barrels and two barges each with 400 barrels of distillate.[89]

By this time it was clear that Tarakan airstrip would not be available in time for OBOE VI, so the airstrip on Sanga Sanga Island in the Sulu Archipelago was substituted. Captured by the US 41st Infantry Division on 2 April, it had a good all-weather coral runway, which was extended to 1,500 metres, but parking space for only 50 aircraft. A detachment of No. 6 Airfield Construction Squadron left Morotai for Sanga Sanga on *LST 699* on 21 May, and by 6 June, it had provided parking facilities for another 60 aircraft.[90]

On 10 June the 24th Infantry Brigade landed on Labuan Island at Brown Beach, while the 24th Infantry Brigade landed on Muara Island at White Beach and on Brunei Bluff at Green Beach.[91] The assault waves got ashore easily enough in their amtracs and the LCMs and LCTs were able to beach, but the LCIs and LSMs grounded on a sand bar 30 metres from the shore with over a metre of water under their ramps. Most of the heavy equipment of the 1st Beach Group was on the LSMs and LSTs, and could not get ashore until the tide fell. As a result of the experience on Tarakan, the LCIs, LSMs and LSTs were the responsibility of the USN LST Beaching Officer, who was not under the command of the Principal Beach Master, Lieutenant Commander R. McKauge, RANVR of RAN Beach Commando A, and none of the LSTs could be persuaded to beach.

Fortunately, although the LCMs of C Company, 593rd EBSR were mostly carrying *Matilda* tanks, they also brought ashore a D6 tractor and some D4 tractors and dozers, which were able to assist in clearing the exits and towing stranded vehicles. In the original plan, *Carter Hall* was to have made two trips bringing the amphibian engineers from Morotai, but now only one trip was possible, carrying 18 LCMs. The 593rd hitched rides or tows to Tarakan for its rocket boat, three picket boats, and two LCMs of the US 198th Gas Supply Company that had been converted to fuel barges. There, they joined the

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89 SORE (II) Oil to CE I Corps, "Oboe VI POL Supply", 18 June 1945, AWM54 619/4/14; "Coast Guard-manned Army Vessels", http://www.uscg.mil/hq/g-cp/history/FS_Vessels.html, accessed 12 February 2006.

90 *History of the Far East Air Force*, Vol. II, pp. 377-378, NAA (ACT): AA1966/5 208; Casey, *Airfield and Base Development*, pp. 372-373; Wilson, *Always First*, p. 86.

91 Cdr ALF SWPA, *Report on Operations by Australian Military Forces in Borneo 1 May 1945 to 15 August 1945*, AWM54 617/7/43.

LCMs of B Company which, less six LCMs left at Tarakan to assist the 26th Infantry Brigade, made the trip around the top of Borneo, a distance of 950 km, under their own power, arriving at Brunei Bay on 11 June. Another eight LCMs made the trip on *Titania*, one on *Kanimbla* and six on Liberty ships, leaving 11 LCMs and two crash boats behind. GHQ had allocated the Australians two 2,000-barrel barges of distillate, and the amphibian engineers persuaded I Corps to let them have one. They left Morotai on 4 June and arrived at Labuan with the slow convoy on 20 June.[92] The barges were replenished by the 4th Bulk Petroleum Storage Company.[93]

The LSTs tried beaching in the afternoon but grounded 60 to 90 metres offshore. GHQ had asked that pontoon causeways not be used unless absolutely necessary, so they waited until low tide, at around 1730, when they beached with dry ramps. The 1st Beach Group's mobile cranes were unloaded, and started to help unloading the LCMs, but so many stores had been brought ashore that the Beach Maintenance Area (BMA) was unable to receive vehicles from the LSTs until 2100, by which time the tide had risen again. As a result, many vehicles drowned coming ashore.

Unloading of the LSTs continued through the night using the bow lights of the LSTs and beach lighting, two scaffolding towers each with three 1,000 W lights and a PA system. Six LCTs arrived the next day, and helped the amphibian engineers' LCMs and the DUKWs of the 2/106th General Transport Company to bridge the water gap between low tides. By noon on 11 June, some 1,000 vehicles and 1,500 tons of stores had been unloaded, including the contents of the three LSIs and 17 LSTs, although three LSTs remained unloaded until 13 June. Most of the unloading work was done by ten mobile cranes, six at the beach and four at the dumps. Five hundred cargo nets were available. Stores were lowered in them from the ships onto landing craft or DUKWs, lifted onto trucks by the mobile cranes on the beach, and unloaded from the trucks by the cranes at the dumps.[94] This method of unloading was very quick, but the triple slinging resulted in

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92 GHQ *Operations Instruction No. 102*, 21 April 1945, Blamey Papers, AWM 3DRL 6643 3/113; *3rd Engineer Special Brigade Historical Report*, 1 June 1945 to 30 June 1945, USACE X-81 E36.

93 *3rd Engineer Special Brigade Historical Report*, 1 July 1945 to 31 July 1945, USACE X-81 E37.

94 *RAE Observer's Report on OBOE VI Operation*, 24 June 1945, AWM54 619/4/14; SNOBU, *Report of Proceedings of RAN Beach Unit Operation "OBOE VI" Landings by 9 Aust Division at Labuan Island and Brunei, North West Borneo*, 21 July 1945, NAA (Vic): B6121 62F.

a higher rate of breakages of crates than normal.[95] Labour was supplied by the 1st Beach Group's 2/4th Pioneer Battalion.

The roads in the BMA were narrow and sealed with bitumen that soon disintegrated under heavy traffic, but the sandy soil under them held, aided by continuous grading and ARC mesh. The roads were eventually widened to carry two-way traffic.[96] Craters were filled with rubble from destroyed buildings using shovels, dozers, and tip trucks. Larger craters were bypassed by grading detours. These often had to go over soft ground, which was corduroyed with coconut palms and timber from demolished buildings. Craters too large to fill or detour quickly were bridged. When time permitted, they were filled in, and the bridging removed.[97] The main circuit through the supply and POL dump was poor, and was completely rebuilt by the sappers. The BMA plan was generally carried out, except that the area allocated to the BIPOD was too low lying and it was moved to an adjacent area allocated to the 2/106th General Transport Company, which huddled in a corner of its allocated area.

There were two general transport companies on Labuan: the 2/166th General Transport Company was equipped with GMC 6x6 trucks, which once again demonstrated that they were the best vehicles for operations in forward areas, and the 2/106th General Transport Company, equipped with DUKWs. As it turned out, conditions in this operation were ideal for DUKWs, and besides being the backbone of the discharge effort, they were also used as ambulances, as ferries, for dumping defused bombs at sea, for refuelling flying boats, for towing pontoon, and many other tasks. The DUKWs were operated 24 hours a day, with the co-driver taking over for the second shift. Their greatest enemies were potholes in the roads and submerged 44-gallon drums and driftwood, most of it dunnage tossed overboard by ships, which damaged propellers and shafts. At one point, seventeen DUKWs were out of commission, being worked on by the workshop platoons of both general transport companies.[98] Admiral Royal declared that OBOE VI was "the neatest job

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95 *S&T Observer's Report: OBOE VI*, 26 June 1945, AWM54 619/7/33.

96 *RAE Observer's Report on OBOE VI Operation*, 24 June 1945, AWM54 619/4/14.

97 OC 1st ME Pl, *Report on Operation and Employment of Mech Eqpt on Operation Oboe VI*, 30 July 1945, AWM54 619/7/32.

98 *S&T Observer's Report: OBOE VI*, 26 June 1945, AWM54 619/7/33; OC 2/106th General Transport Company, *Report on Operation OBOE VI*, 26 June 1945, AWM54 619/7/40.

he had ever seen as far as the control and clearance of the beaches and stacking at dumps was concerned".[99] The 8th Base Sub Area assumed command of the base installations on 2 July. [100]

It was not intended to develop Brunei Bay as a major base, but only to carry out such development as was necessary to support the units there. Morotai would remain the main base although shipments would be made direct to Brunei Bay and Balikpapan when it was economical to do so.[101] Nonetheless the construction program was considerable and the CRE 9th Division, as Task Force Engineer, controlled some 3,000 sappers, including the 9th CRE (Works) and No. 62 Airfield Construction Wing.[102]

Two *Auster* airstrips were prepared on Labuan. The 2/7th Field Company converted a road using ARC mesh and an autopatrol, which was ready midday on 12 June, while the No. 62 Airfield Construction Wing rehabilitated part of the Labuan airfield, which was first used on 14 June. *Auster* airstrips were also prepared at Brooketon and Brunei, which were first used on 12 and 16 June. All were 270 metres long and 12 metres wide. Labuan airstrip looked scarcely better than Tarakan, with some 400 craters, each 10 metres or so in diameter and up to 3 metres deep, most of which were filled with water. Some 30 to 40,000 m^3 of fill were required. The surface was grass, on fine white sand over sandy clay, and there was no hard surfacing material in the vicinity. It was clear that GHQ's objective of a 1,500 metre all-weather runway by 16 June was not going to be met. Wing Commander Dale decided to prepare a temporary airstrip, using the best part of the runway, at a 5° angle to the final alignment, so as to permit work on the permanent runway to continue.

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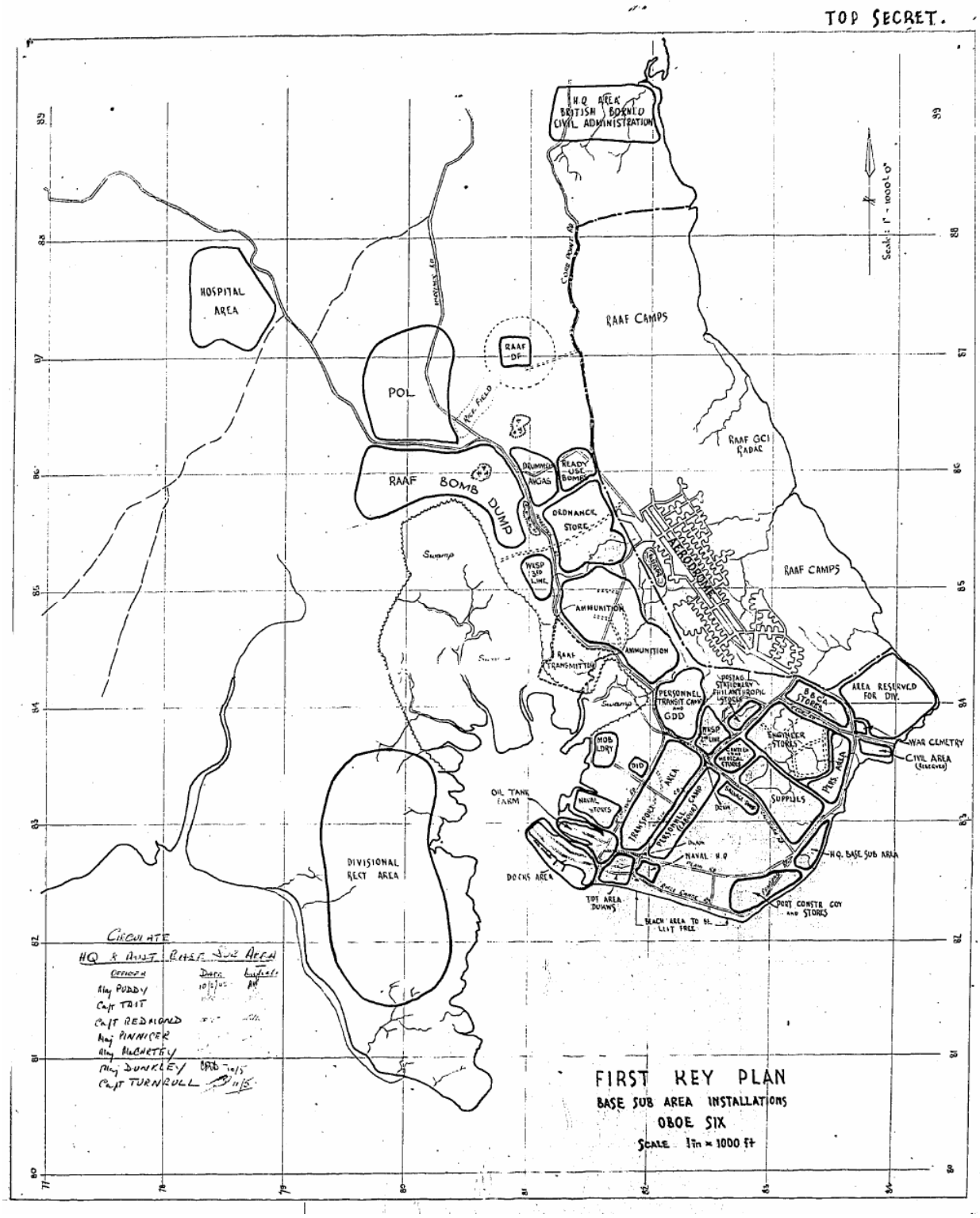
99 OC 1st Beach Group, 14 June 1945, War Diary, 1st Beach Group, AWM52 1/11/3.

100 *AASC Report No. 4 Week Ending 7 July 1945*, War Diary, 9th Division AASC, AWM52 10./2/24.

101 *Report of Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary I Corps GS Branch, AWM52 1/4/1.

102 McNicoll, *Teeth and Tail*, pp. 260-61.



Map 23. Labuan Base Sub Area layout

Source: War Diary 8th Base Sub Area, January – May 1945, AWM52 1/8/20.

Nos 4 and 5 Airfield Construction Squadrons commenced work on 13 June, dewatering the craters. Two methods were used. The first was to pump them out, as had been done on Tarakan. All available pumps on Labuan were employed. The other was squeeze the water out, by digging a drain and gradually filling the crater with spoil. Fortunately, the weather held off so a 750 metre fair-weather airstrip was ready by 18 June. That day, two *Kittyhawks* and two *Dakotas* landed at 1000, followed by twelve *Spitfires* of No. 457 Squadron at 1200,[103] the last two of which were written off when they landed off the completed portion of the airstrip. The use of the temporary airstrip was necessary because Sanga Sanga was temporarily closed due to heavy rains and the airstrip was now required for the longer range *Lightnings* needed to cover OBOE II, since Tarakan was not yet ready. Within two days, No. 457 Squadron had shot down a Japanese plane.[104] Marston Mat had not been brought along, owing to faulty engineer intelligence that had indicated hard sandstone and gravel were available.[105] Low grade sandstone was obtained from a quarry at the North end of the island and placed over the subbase. A coral outcrop was discovered on the West coast which was crushed and used for surfacing. The runway was sealed with bitumen. The 1,500 metre all-weather runway completed on 28 July brought RAAF *Liberators* within range of Singapore.[106]

The plan called for a bulk oil installation with three 1,000-barrel bolted tanks, one each for avgas, MT80 and distillate, and eight (later reduced to seven) 100,000-gallon welded tanks. Stores for the first stage of construction were carried by *Manoora* and transferred to LSMs which brought them ashore. They were trucked to the construction site, an area in the ruins of the town. Only two boxes, containing trigger nozzles and 4-inch adaptors, were found to be missing, which AEME and the 4th Bulk Petroleum Storage Company managed to improvise. Stores for later stages of construction arrived over the next few days. The 2/1st Mechanical Equipment Company carved out access roads and prepared level rubble mounds in the town 2 metres high that were topped with sand and Sisalkraft,

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103 *RAE Observer's Report on OBOE VI Operation*, 24 June 1945, AWM54 619/4/14.

104 Odgers, George *Air War Against Japan 1943-1945*, (Adelaide: Australian War Memorial, 1963), p. 472.

105 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps G Branch AWM52 1/4/1.

106 Casey, *Airfield and Base Development*, p. 382; McNicoll, *Teeth and Tail*, p. 265.

upon which the 14th Field Company erected the bolted tanks, the first of which was ready for testing on 20 June. The welded tanks were the task of the 1st and 2nd Welding Platoons, the units which had built the oil tank farm at Milne Bay in 1943. All were completed by 12 July. Meanwhile, the 18th Field Company bridged a 12 metre gap on Harrison and Crossfield Wharf with a light catwalk. Three 6-inch pipelines, one each for MT80, avgas, and distillate, and a 4-inch pipeline for PT boats were laid, transforming it into a fuel jetty. The end of the wharf was in five metres of water at low tide, but this was adequate for 'Y' tankers. It was later repaired to allow it to take small ships as well.

To provide berthing for Liberty ships, a new T-head wharf was constructed. A site was chosen where a 60 metre wharf had 10 metres of water at low time but still provided plenty of manoeuvre room in the basin. Wharf stores were on *Alfred C. Lunt* and *Matthew Flinders*. The latter carried piles, which were unloaded by the 2nd Port Construction Company using ten self-propelled pontoon causeways.[107] Pontoon causeways were shipped to Labuan on the sides of LSTs without their propulsion units fitted. These were attached on *Carter Hall*. The pile frames were mounted on pontoon causeways and 360 piles were driven 6 metres into the sand and coral seabed. Meanwhile the 18th Field Company laid the superstructure atop the piles.[108] The first Liberty ship docked on 10 July, just 22 days after pile driving commenced.

Construction of the hospital was delayed, first while a suitable site was reconnoitred, and then while it was cleared of Japanese. As casualties were lighter than anticipated, there was little sense of urgency. Work began on a 600-bed hospital 22 June and the 2/4th General Hospital opened on 16 July. Work then commenced on a 1,200-bed hospital for the 2/6th General Hospital, which was completed on 17 September.[109]

A 15-man detachment of the 11th Air Maintenance Platoon arrived by air from Tarakan on 21 June.[110] Most drops were small ones to SRD patrols in the deep jungle and the

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107 *RAE Observer's Report on OBOE VI Operation*, 24 June 1945, AWM54 619/4/14; War Diary, 1 Welding Platoon, June 1945, AWM52 5/29/1; War Diary, 2 Welding Platoon, June 1945, AWM52 5/29/1.

108 *RAE Observer's Report on OBOE VI Operation*, 24 June 1945, AWM54 619/4/14.

109 Casey, *Airfield and Base Development*, pp. 382-383; Walker, *The Island Campaigns*, p. 386.

110 War Diary, 9th Division AASC, 21 June 1945, AWM52 10/2/24.

detachment was used as conductors as well as packers.[111] The 9th Division used the amphibian engineers not just to move troops and supplies along the coast, but into the interior as well, using the rivers as highways. During the week of 10 to 16 July alone, they carried over 30,000 m3 of cargo and 25,000 passengers.[112]

The metre-gauge light rail lines that ran between Beaufort and Weston, Papar, and Tenom were discovered in a reasonable state of repair, although some parts were submerged due to blocked drainage, others had been cut by bomb craters, and a number of bridges had been demolished by the Japanese or the Allied Air Forces.

32. Beaufort tramline.

Sappers of the 2/15th and 2/16th Field Companies repaired the line. Gaps were bridged, craters filled in, bridges repaired or replaced. New sleepers were manufactured locally. No metre gauge locomotives were in stock, but it was discovered that a jeep had a gauge of 1.245 metres, which could be reduced with flanged wheels made from the wheels of Japanese trucks. A steam locomotive was repaired and used to haul heavy loads up to 60 tonnes.[113]

At Seria, "one of the great Australian victories of the war was achieved off the battlefield".[114] The retreating Japanese had set 37 oil wells on fire, and a platoon of the 2/3rd Field Company under Lieutenant E. B. Underwood was ordered to put them out. Captain R.H. Beukema, a Netherlands Indies Civil Administration (NICA) officer who had been an oilfield engineer before the war, provided technical advice, and about two

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111 *AASC Report No. 7 Week Ending 28 July 1945*, War Diary, 9th Division AASC, AWM52 10./2/24.

112 *3rd Engineer Special Brigade Historical Report*, July 1945, USACE: X-81 E-37.

113 McNicoll, *Teeth and Tail*, pp. 268-270.

114 Casey, H. J. (ed), *Engineers of the Southwest Pacific 1941-1945: Volume VIII: Critique*, (Washington, DC: Government Printing Office, 1951), p. 323.

hundred civilian oil workers came out of hiding and joined the firefighting effort. Water pumps were repaired and the water supply restored to the oilfields. Reservoirs of mud were prepared for firefighting. An oil well was put back into production again so the boilers could be fired and the forges in the workshops restored to operation. Firefighting equipment strewn around the oilfields could then be repaired. In the process, water and gas were restored to the surrounding area.

The effort concentrated on the fires that looked easiest to extinguish, using improvised fire-fighting equipment. Four of the fires simply went out of their own accord, as sand thrown up with the oil choked them off. Three small fires were extinguished by shovelling or bulldozing sand over them. Special long-handled tools were used to shut off the master valves in cases where these were undamaged. Once shut off, the fire could then be smothered with sand. Another eleven fires were put out this way. The rest required more equipment and ingenuity. The 1st Welding Platoon was placed under Underwood's command and a variety of equipment was provided, including D4 and HD7 bulldozers, a semi-trailer, a tow truck, two mobile cranes, and a wingless *Wirraway* used as a wind machine. A fire in a well producing gas but not oil was put out with water. Sprayed on the hot sand, it produced steam that mixed with the gas to form an inflammable mix that smothered the fire. Three other wells were extinguished by smothering with steam, while two were sealed off by pumping mud into them at high pressure.

On 17 August Patton & Son, a father and son team of firefighters, arrived from the United States. They devised a new technique, involving a mobile crane with a length of tapered pipe, through which high-pressure water was fed. The idea was to force this into the well. To work, it was necessary that the fire was burning from a single vertical outlet. In cases where it was burning from a horizontal one, a 2-pounder was used to rectify the situation. Some twelve fires were put out with this equipment. The last fire was extinguished on 26 September.[115]

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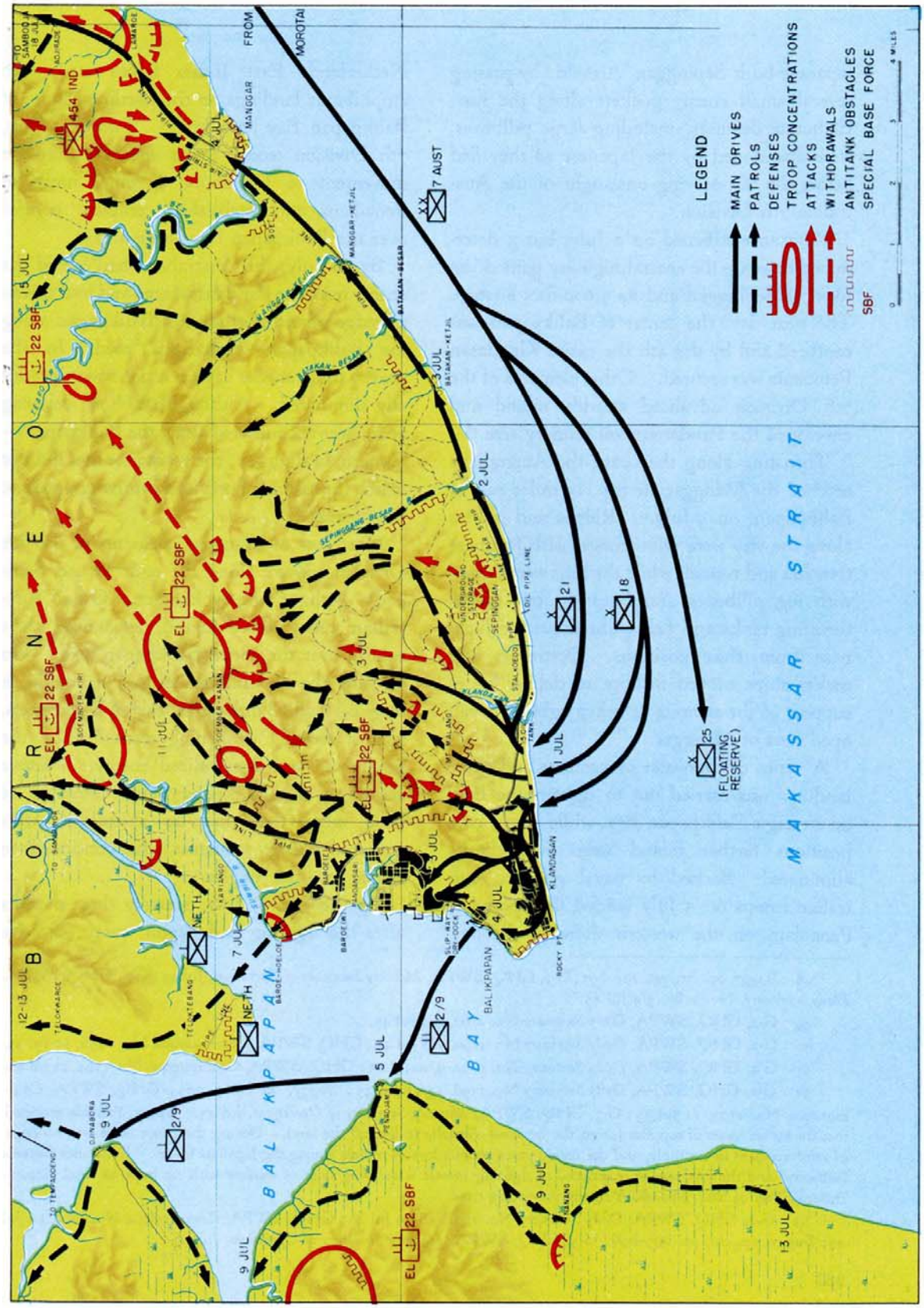
[115] Ward-Harvey, Ken, *The Sappers' War with Ninth Australian Division Engineers 1939-1945*, (Neutral Bay, NSW: Sakoga, 1992), pp. 189-196; Long, *The Final Campaigns*, pp. 485-486.



Map 24. Balikpapan Operations
Source: *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific, Volume I*, p. 384.

Balikpapan

Delayed by the requirements of OBOE I and VI, the first ship carrying major units of the Major General Milford's 7th Division to Morotai, the *Benjamin Carpenter*, sailed from Cairns on 23 May, a week later than originally planned.[116] Thereafter, a steady procession of ships sailed from Sydney, Brisbane, Cairns, and Townsville. To ensure that everything would be at Morotai on time, GHQ allotted an additional 25 LSTs to transport units from Cairns to Morotai.[117] Fifteen LSTs carrying troops and equipment were held up by bad weather.[118] One Liberty ship carrying vehicles and stores for OBOE II, *Millen Griffiths*, struck a rock off Finschhafen,[119] while another, *Henry Thoreau*, caught on fire shortly after leaving Brisbane on 1 June, and had to return to port.[120] *Edward J. O'Brien*, loading in Brisbane, was ordered to take on its undamaged cargo, but it was found that *Henry Thoreau* could be repaired and restowed.[121] It sailed again from Sydney on 12 June.[122] As it was carrying 19 *Matilda* tanks of the 1st Armoured Regiment, 22 tanks held in reserve on Morotai were reconditioned and readied as replacements.[123]

A planning team of the 7th Division arrived at Morotai by air on 22 May,[124] where they were accommodated by Advanced LHQ until the main body of 7th Division Planning Headquarters arrived by sea on 26 May. Like most units of the 7th Division, they moved into an area recently vacated by the 9th Division, in this case, by its Planning Headquarters. The 2nd Beach Group arrived from Tarakan on 24 May. The planners were particularly concerned about the availability of the airstrip on Tarakan. The postponement of its completion date to 28 June meant that air cover for preliminary air and naval

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116 *Daily Summary of Movement No. 52*, 25 May 1945, War Diary I Corps QMG Branch, AWM52 1/4/3.

117 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

118 War Diary, 7th Division GS Branch, 6 June 1945, AWM52 1/5/14.

119 War Diary, I Corps GS Branch, 8 June 1945, AWM52 1/4/1.

120 *Daily Summary of Important Q Branch Activities*, 2 June 1945, War Diary I Corps QMG Branch, AWM52 1/4/3.

121 *Daily Summary of Movement No.61*, 3 June 1945, War Diary I Corps QMG Branch, AWM52 1/4/3.

122 *Daily Summary of Movement No.83*, 25 June 1945, War Diary I Corps QMG Branch, AWM52 1/4/3.

123 War Diary, 7th Division GS Branch, 3 June 1945, AWM52 1/5/14.

124 *Daily Summary of Movement No. 49*, 22 May 1945, War Diary I Corps QMG Branch, AWM52 1/4/3.

operations had to be provided by US Thirteenth Air Force *Lightning* fighters based at Sanga Sanga, but as this was at the extreme edge of their range,[125] the Attack Group commander, Rear Admiral A. G. Noble of Amphibious Group 8, requested small aircraft carriers to cover the initial stages of the operation. The US Pacific Fleet sent three from Okinawa, USS *Suwannee*, *Chenango* and *Gilbert Island*, the last named carrying a US Marine Corps air group specially trained in close air support.[126] As No. 1 Airfield Construction Squadron was now required to maintain the Tarakan airstrip, GHQ was asked to make another squadron available for OBOE II. No. 3 Airfield Construction Squadron on Mindoro was assigned,[127] sailing for Morotai in four LSTs on 19 June.[128]

Another concern at the planning stage was that GHQ had allotted amphibious shipping for only two assault brigades; the 25th Infantry Brigade on Morotai and the 26th on Tarakan were in reserve,[129] but shipping had been provided to move 10,500 RAAF personnel to Balikpapan in the first fortnight. With GHQ's permission, 7,000 of them were deleted and the 25th Infantry Brigade was included in the assault. This entailed a delay before all OBOE II units were assembled on Morotai and some units had little time for rest before their stores had to be repacked for re-embarkation,[130] which began on 18 June. The assault convoy departed for Balikpapan on 26 June.[131] It carried 35,181 troops and 4,258 vehicles, including 1,297 jeeps, 542 2½-ton 6x6s, 617 3-ton 4x4s, and 293 pieces of mechanical equipment,[132] in a force that included *Carter Hall*, *Titania*, *Kanimbla*, *Manoora*, *Westralia*, 5 APDs, 22 LSMs, 36 LSTs, 24 LCTs and 16 LCIs. [133] A Company,

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125 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

126 Morison, S. E., *Volume XIII: The Liberation of the Philippines: Luzon, Mindanao, the Visayas 1944-1945*, (Boston: Little, Brown and Co. 1959), p. 272.

127 War Diary, I Corps GS Branch, 4, 9 June 1945, AWM52 1/4/1.

128 Wilson, *Always First*, p. 81.

129 GHQ *Operations Instruction No. 103*, 3 May 1945, Blamey Papers, AWM 3DRL 6643 3/113.

130 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

131 War Diary, 7th Division GS Branch, 3 June 1945, AWM52 1/5/14; War Diary, I Corps GS Branch, 23 to 26 June 1945, AWM52 1/4/1.

132 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

133 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

593rd EBSR brought 45 LCMs, of which 18 were carried by *Carter Hall*, along with 2 J-Boats, and six by *Titania*. The remainder were towed by LSTs and LSMs.[134]

Landings took place on F-Day, 1 July, on three adjacent beaches near Balikpapan. Red Beach was soon closed, as it was unsuitable for craft larger than LCVPs. Yellow Beach was used for most unloading during the first two hours, as the exits were developed there more quickly than on Green, but only Green was capable of handling LCTs. Even so, LCTs had a three to five metre water gap at high tide with 60 to 90 cm of water at the ramp, which was sometimes too much for vehicles. DUKWs and occasionally LVTs had to be used to unload them, slowing things down. The LSMs and LSTs could not beach at all and had to be unloaded in the stream into LCMs, LCTs, DUKWs and LVTs.

Commander Morris was again Principal Beachmaster, with RAN Beach Commandos B and D under his command, as was USN Beach Party 12, but the experiment of divided command was not repeated. Morris ordered construction of a pontoon wharf near the junction of Green and Yellow Beaches, using twelve of the fourteen available pontoon strings. The remaining two were used for a causeway on Green Beach for LSMs, over which the LSMs were unloaded from the afternoon of F-Day.[135] Seabees of the US 111th Naval Construction Battalion, veterans of Normandy,[136] used the pontoons to create a U-shaped dock capable of handling four LSTs at a time. Morris chose the site on the advice of USN Underwater Demolition Team 11, but the RAN Hydrographic Survey Group discovered a sand and coral bar off the end of the dock, and Morris was forced to relocate it to the centre of Green Beach. Opened on 3 July, it never handled more than two LSTs simultaneously due to the action of the wind and surf on the horizontal part of the U, which was removed on 7 July. Still, it was never vacant and it greatly sped up unloading of LSTs, for which the average unloading time was about seven hours.

Morris selected a new landing for LSTs on the south side of Balikpapan Harbour. The approaches were swept by USN minesweepers and ramps constructed by the 2/11th Field

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134 Casey, *Amphibian Engineer Operations*, p. 676.

135 SNOBU, *Report of Proceedings of RAN Beach Unit in Operation "OBOE Two", 7 Aust Div Landing at Klandasan, Near Balikpapan, South East Borneo*, AWM54 505/10/5; Q Liaison Officer, I Corps, *Report on Operation "OBOE Two", Balikpapan area, 1 July 1945*, 12 July 1945, AWM52 617/7/31.

136 *Building the Navy's Bases*, pp. 109, 117, 118, 396.

Company. The new beach, named Brown Beach, was opened on 10 July and was capable of handling eight LSTs at a time, unloading them in an average of ten hours. The first LST beached there on 14 July. Pontoon strings were towed from Green Beach, and laid side by side. Each was capable of handling two cranes and two LCTs. Cargo ships were then unloaded in the harbour by LCTs, using the LCT docks.[137]

The beaches were composed of hard sand backed by dunes. Nine exits were established by bulldozing tracks through the dunes and laying 12 cm of sand on top of ARC mesh on Sisalkraft. The ARC mesh was held down with iron pickets. The heavy amtracs, of course, had to be kept well way from these exits. Beyond the beaches lay the Vasey Highway, named for the former commander of the 7th Division killed in a plane crash on 6 March 1945. An all-weather road, it was found in good condition, with concrete bridges over Lahey's and Wilmouth's Creeks intact, although the road surface was thin and easily damaged, and there was no suitable resurfacing material. Smaller craters were filled with corduroy, upon which Sisalkraft, ARC mesh, and sand were piled. Large craters were bridged.[138]

American observers were very impressed with the handling of the assault phase of the landing, which they described as "one of the most perfectly executed of any Allied amphibious operations", but given that the beaches were above average, the dumps accessible, and labour, equipment, and vehicles were plentiful, they were disappointed with the pace of unloading.[139] Some 1,100 m^3 was unloaded in the first 24 hours, and an average of nearly 1,200 m^3 in the first eleven days,[140] as compared with the target of 1,700 m^3 per day. Labour was indeed plentiful, with an average of 1,230 troops per day available from the 2/1st and 2/2nd Pioneer Battalions and the 28th Works Company.[141] The

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137 SNOBU, *Report of Proceedings of RAN Beach Unit in Operation "Oboe Two", 7 Aust Div Landing at Klandasan, Near Balikpapan, South East Borneo*, AWM54 505/10/5; War Diary, 2nd Beach Group, 14 July 1945, AWM52 1/11/4.

138 Captain R. D. King-Scot to CE SWPA, *Report on OBOE II Operation – From F-Day to F plus 6 Day* July 1945, USACE: X-72; DQMG (Mov & Tn), 6 March 1945, Blamey Papers 3DRL6643 2/86.

139 Casey, *Critique*, pp. 325-326. The figures given therein – only 200 tons of supplies in the first 48 hours against reasonable expectations of 10,000 – are clearly wrong. The former should read 2,000 tons.

140 SNOBU, *Report of Proceedings of RAN Beach Unit in Operation "Oboe Two", 7 Aust Div Landing at Klandasan, Near Balikpapan, South East Borneo*, NAA (Vic): B6121 60A/2.

141 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

biggest problem was that the LSTs and cargo ships had to wait some distance off the beach. While the pontoons were being assembled and the mines and obstacles cleared away, the LSTs, instead of waiting offshore could have been run aground. There would have still been a water gap, but they could have then been unloaded by DUKWs and LVTs instead of LCMs and LCTs. After the debacle off Tarakan, there was probably little chance of this. Moreover, the beaches were under artillery fire. An airburst killed one man and wounded another on board *LST 1017* on 3 July.[142] Admiral Noble told General Milford that he would not risk even a destroyer in Balikpapan Bay if it was in range of Japanese guns, thereby forcing Milford to mount an expedition to the Western side of the bay. "An interesting example," noted Gavin Long, "of a course of aggressive action being forced on a commander by the administrative requirements".[143] The four platoons of the 2/3rd Docks Operating Company were reorganised to work ten hatches in 12-hour shifts, but could not do so. An additional 50 men had to be allocated by the 2nd Beach Group.[144] Another factor delaying unloading was the surf. Waves of up to 2.5 metres slowed the unloading of LSTs into LCTs. The result of the slow unloading was mainly felt in the stockpiling of reserves at the dumps. Even though only 56 m^3 of POL had reached the BIPOD by 1800 on 2 July, since every vehicle carried 80 km worth drummed MT80, the impact was not serious.[145]

The 7th Division also wanted POL for its flamethrowers, 490 kg of napalm for initially filling them plus 9,235 kg of geletrol.[146] Some 360 kg of napalm was located but not in time for the initial filling of flamethrowers, while only 3,600 kg of geletrol was available on Morotai. More geletrol arrived, but not until after the assault convoy was loaded and so was included in the later convoys. Fortunately, the use of flamethrowers was not as great as anticipated, and the supply of geletrol was adequate.[147] None was landed on the first

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142 War Diary, 2nd Beach Group, 3 July 1945, AWM52 1/11/4.

143 Long, *The Final Campaigns*, pp. 539-540.

144 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1; OC 2nd Beach Group, *Report on Operation OBOE Two*, 11 August 1945, AWM52 1/11/4.

145 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

146 Aluminium sesquioleate, which forms a gel when mixed with petrol.

147 ADOS 7th Division, *Report on Ordnance Service – 7 Aust Div Operation – Oboe Two*, 7 August 1945, AWM54 621/7/53.

two days, so on the morning of 3 July, a DUKW went out to each of the LSTs known to be carrying geletrol. Not all was accessible, but a quantity was obtained.

Units landing on 1 and 2 July carried water in 2-gallon containers, with one container for every three men, and the 7th Division carried a reserve of 7,000 filled 2-gallon cans.[148] A water point was established on the evening of 2 July, with an output of 3,400 litres per hour. The water was so muddy that the filter prevented it from maintaining a reasonable output, and was disconnected. Water points established over the next few days had quality that was so good that filtration was unnecessary. As a precaution against cholera, bilharzia, and other diseases, all water was superchlorinated,[149] resulting in a heavy consumption of sterilising powder.[150] On 9 July, 1,000 water sterilizing outfits were gathered up from the base troops for issue to forward units, but only 300 were issued before more outfits were received on 12 July.[151] Water was delivered by the 2/108th General Transport Company on the basis of 1 gallon (4.5 litres) per man per day.[152] From 21 July, water points in the port area began to be supplied from the town water supply.[153]

O2 rations were issued to each man in the assault convoy, with another ration per man held by units. This depleted the available stocks and left less than three days' supply in reserve. Fortunately, consumption tailed off and soon only forward units and the 2/108th General Transport Company were still using them, the latter because its drivers' work clearing the beaches made it difficult for them to eat regular meals.

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148 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

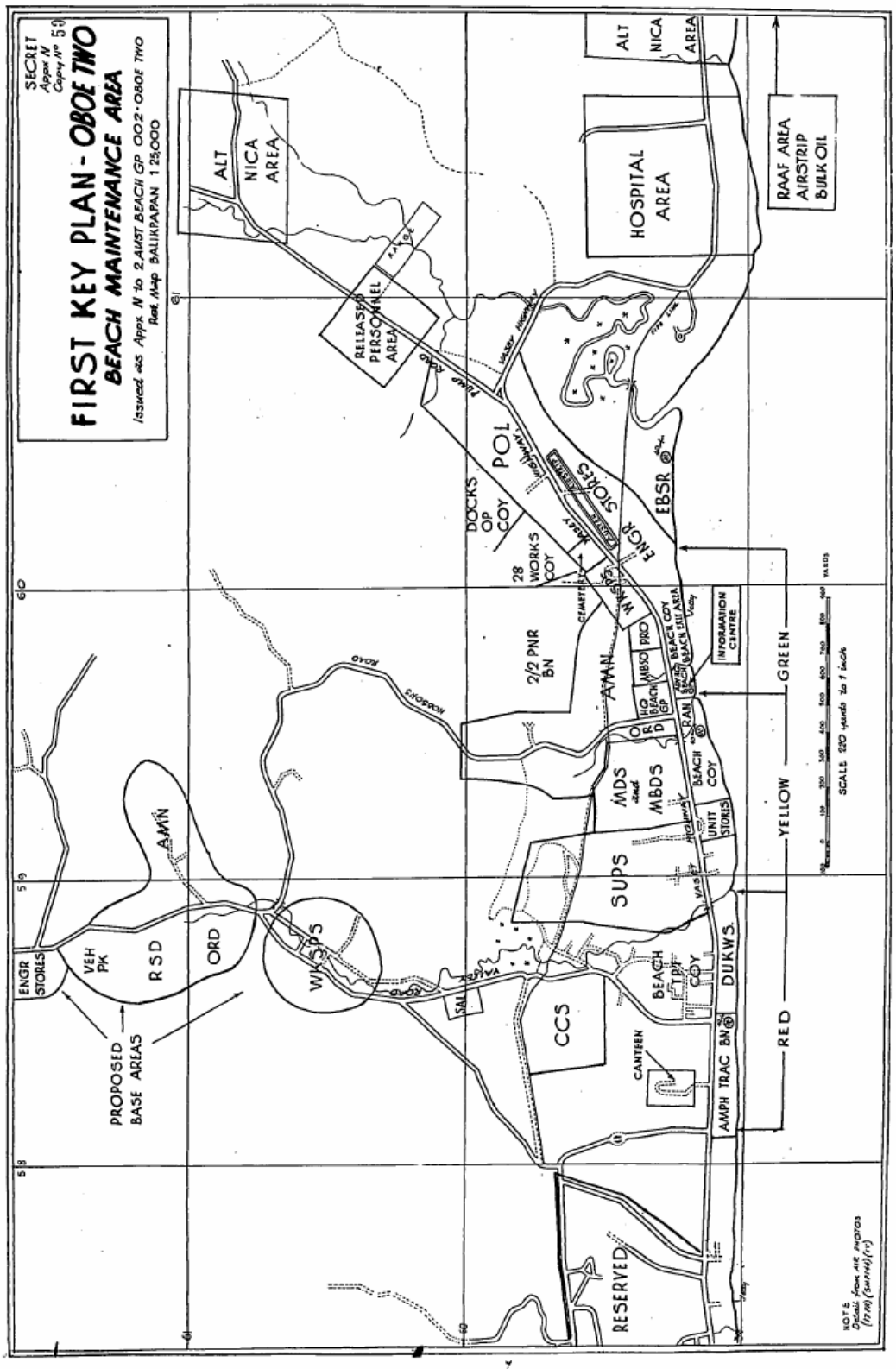
149 Captain R. D. King-Scot to CE SWPA, *Report on OBOE II Operation – From F-Day to F plus 6 Day*, July 1945, USACE: X-72.

150 ADOS 7th Division, *Report on Ordnance Service – 7 Aust Div Operation – Oboe Two*, 7 August 1945, AWM54 621/7/53.

151 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

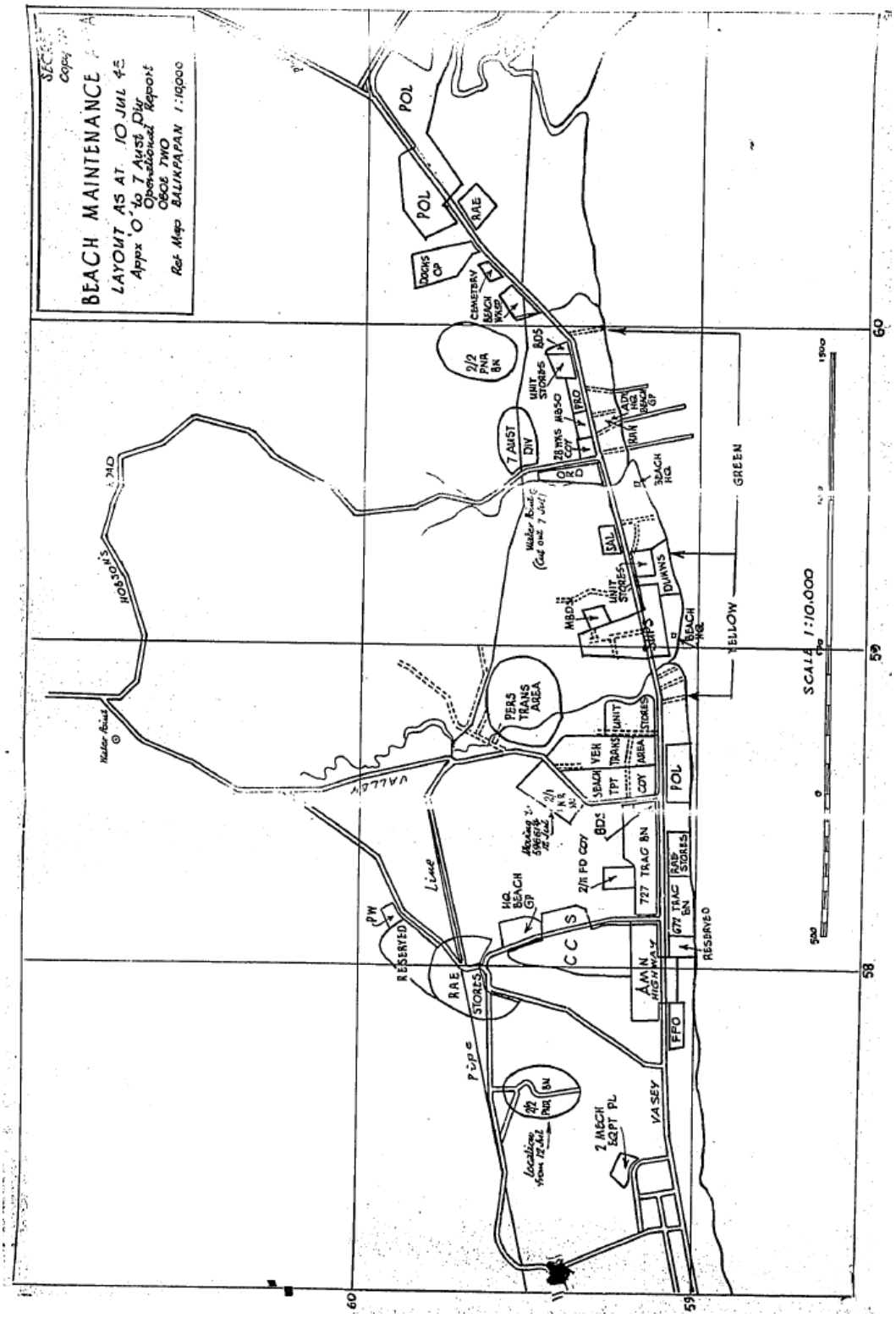
152 Q Liaison Officer, I Corps, Report *on Operation "OBOE Two", Balikpapan area, 1 July 1945*, 12 July 1945, AWM52 617/7/31.

153 CRE 7th Division, *Report on Operation OBOE Two*, 7 August 1945, AWM54 621/7/6.



Map 25. The Balikpapan Beach Maintenance Area as planned.

Source: War Diary 2nd Beach Group, June 1945, AWM52 1/11/4.



Map 26. The Beach Maintenance Area as established on 10 July.

Source: *Report on Operation OBOE II*, 28 September 1945,

War Diary 7th Division GS Branch, October 1945, AWM52 1/5/14.

It was intended that the assault convoy would carry 20 days' WUR but this was not possible due to shortages of 3-inch and 4.2-inch mortar rounds, white phosphorus grenades, and tank ammunition. As with Oboe I and VI, there was a floating ammunition reserve of two ships. The floating reserve ship for OBOE VI was reused for OBOE II, topped up with a few additional items.[154] On 9 July, a requirement for belted .303 and 25-pounder ammunition caused the 2/1st Ordnance Beach Detachment to break into the floating reserve. It was found to be unsuitably loaded for selective discharge – a serious error – and therefore was unloaded completely. The second reserve ship was then called forward from Morotai, but was not unloaded, as demand for ammunition had dropped off sharply.[155]

Dispersed beach dumps were established for ammunition, POL in 4-gallon drums and engineering stores. The Beach Maintenance Area was reconnoitred and signposted within two hours of the landing depots and unit areas were established in accordance with the first key plan and were receiving stores by the evening of 2 July.[156] In the initial stages, DUKWs brought 3-inch and 4.2-inch mortar and 25-pounder ammunition directly from the ships to the weapons, while other ammunition was shipped to beach dumps operated by the 2/1st Ordnance Beach Detachment. These remained in use longer than anticipated, because the dump area allocated on the first key plan was found to be unsuitable. A new site was selected on 2 July and 2,260 m^2 of temporary coverage was in use by 8 July. Indeed, of all the sites selected for ordnance installations, only that assigned to the 145th Field Ordnance Depot proved suitable.[157] The 58th and 66th BIPOD Platoons found the area allocated for the POL dump was swampy and badly cratered, but were compelled to accept it. On 9 July, they took over an adjacent area previously occupied by NICA, which was chosen as the permanent site. Another site in the port area was allocated on 14 July and the 66th BIPOD Platoon began developing it too. A new firm key plan was issued on

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154 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

155 ADOS 7th Division, *Report on Ordnance Service – 7 Aust Div Operation – Oboe Two*, 7 August 1945, AWM54 621/7/53.

156 Q Liaison Officer, I Corps, *Report on Operation "OBOE Two", Balikpapan area, 1 July 1945*, 12 July 1945, AWM52 617/7/31.

157 ADOS 7th Division, *Report on Ordnance Service – 7 Aust Div Operation – Oboe Two*, 7 August 1945, AWM54 621/7/53.

12 July.[158] The 2nd Beach Group handed over responsibility for the base installations to the 7th Base Sub Area on 21 July.[159]

A great deal of enemy equipment was captured, including 5 tonnes of nails, 3,000 litres of paint, and 14,000 calico bags. Particularly welcome were 220 tyres suitable for use with the 2½-ton 6x6 trucks. Tyre usage was high in July, as bomb and shell fragments on the roads caused 853 punctures and blowouts, while 734 tyres had to be replaced. Most captured enemy vehicles and small craft were handed over to NICA, although some were retained by the 7th Division.[160]

Although it was not intended to develop Balikpapan as a major base, the Task Force Engineer had responsibility for an extensive program, with the 12th CRE (Works) handling base development, and No. 61 Airfield Construction Wing for airbase development.[161] The 9th Army Troops Company constructed a 600-bed hospital for the 2/12th General Hospital.[162]

Port construction was the responsibility of the 1st Port Construction Company and the 2/4th Field Squadron. The commanders of these units made a reconnaissance of the port on 5 July. They found it badly damaged, with most of the wharves burnt down to the water line, but the roads in the area were surfaced with bitumen, and were in good condition. So was the metre gauge railway, except that the two locomotives were damaged beyond repair.[163] The two units commenced work in the port area on 7 July. Their first task was to erect a pontoon wharf at the site of No. 3 Pier. Debris was cleared away, and six pontoon causeway strings were brought from Green Beach. These had been damaged by the heavy surf, and repairs were in order before they could be re-erected. The

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158 *Report on Operations I Aust Corps Borneo Campaign*, 15 September 1945, War Diary, I Corps GS Branch AWM52 1/4/1.

159 War Diary, 2nd Beach Group, 21 July 1945, AWM52 1/11/4.

160 ADOS 7th Division, *Report on Ordnance Service – 7 Aust Div Operation – Oboe Two*, 7 August 1945, AWM54 621/7/53.

161 McNicoll, *Teeth and Tail*, pp. 260-61.

162 CRE 7th Division, *Report on Operation OBOE Two*, 7 August 1945, AWM54 621/7/6; Walker, *The Island Campaigns*, p. 390.

163 Captain R. D. King-Scot to CE SWPA, *Report on OBOE II Operation – From F-Day to F plus 6 Day*, July 1945, USACE: X-72.

damaged pontoons floated at different levels, complicating the job of fitting them together. The first Liberty ship berthed on 12 July. The next task was the rehabilitation of No. 5 Pier, using two pontoon causeways taken from Red Beach, where they had been used as landing causeways for LSTs. A Bailey bridge was used to connect the wharf head to the pontoons. Piles were driven into the mud with the 1st Port Construction Company's steam pile driving hammer. Decking was carried out to the wharf on folding boats. A one-ton crane was ferried out to the head to aid unloading. The new wharf, which was opened on 23 July, was large enough to berth two Liberty ships at the same time. Finally, No. 6 Pier was repaired as an oil tanker berth,[164] receiving its first discharge from an oil barge on 18 July.[165]

The bulk POL installation was assigned to the 21st Field Company and the 3rd and 5th Welding Platoons. Two existing 9,300-barrel tanks were repaired by giving them new roofs. The welding platoons constructed four 2,300-barrel welded tanks while the 21st Field Company erected six 1,000-barrel bolted tanks. The result was storage for 2.9 million litres of avgas, 2.3 million litres of MT80, and 477,000 litres of distillate. Some 3,600 metres of 6-inch and 18,000 metres of 4-inch Victaulic pipe were laid, connecting the oil barge berth and No. 6 Pier to vehicle filling points, and Sepinggang and Manggar airstrips.[166]

The site originally proposed for an *Auster* strip was found to be heavily cratered and waterlogged, so a new site was chosen on the undamaged Western end of the Sepinggang airstrip, which was in operation by midday on 3 July.[167] Group Captain Rooney was once again in charge of airbase development, his No. 61 Airfield Construction Wing now consisting of Nos 2, 3, 6, 8 and part of No. 14 Airfield Construction Squadrons.[168] As the

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164 OC 1 Port Construction Company, *Report on Operation OBOE Two*, 2 August 1945, AWM54 621/7/6; OC 2/4 Field Squadron, *Report on Operation OBOE 2*, 2 August 1945, AWM54 621/7/6; CRE 7th Division, *Report on Operation OBOE Two*, 7 August 1945, AWM54 621/7/6.

165 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39.

166 OC 21 Field Company, *Report on Operation OBOE Two (Bulk Oil Installation)*, 2 August 1945, AWM54 621/7/6; CRE 7th Division, *Report on Operation OBOE Two*, 7 August 1945, AWM54 621/7/6; War Diary, 3rd Welding Platoon, 2,13,22,25 July 1945, AWM51 5/29/3; Casey, *Airfield and Base Development*, p. 385.

167 Captain R. D. King-Scot to CE SWPA, *Report on OBOE II Operation – From F-Day to F plus 6 Day*, July 1945, USACE: X-72.

168 Wilson, *Always First*, p. 89.

road to the airstrip at Sepinggang was not capable of handling the RAAF's heavy construction equipment, the 2nd Beach Group opened the beach at Sepinggang, which DUKWs had already been using to supply the 21st Infantry Brigade, as Orange Beach. RAAF equipment was unloaded onto the wharf at Green Beach and transhipped to Orange Beach in ten LCTs, where it was unloaded onto a 4-string pontoon causeway. At first it was hoped that the hard sand there could be used for a beach lateral road, but a trailer immediately bogged in a soft patch. ARC mesh to cover it was fetched by LCT, and laid by the RAAF and RAN Beach Commandos. Unfortunately, it was washed away by a storm that evening, which also created a sand bar off the end of the pontoon. The next day, sappers laid the lateral while Seabees added a fifth string to the pontoon causeway.[169] Work on the airstrip commenced on 8 July. Craters were pumped out and filled in. Drains were opened. The strip was sealed with bitumen and opened on 15 July, with *Dakotas*, *Spitfires* and a *Catalina* landing.[170] Pending completion of the bulk POL installation, the RAAF was issued with avgas in 44-gallon drums. On 20 July the floating POL reserve was called in, and 590 44-gallon drums were handed over to the RAAF.[171] Meanwhile, the airstrip at Mangarr was captured. No. 8 Airfield Construction Squadron commenced development of a 2,000 metre bomber strip there on 9 August.[172]

GHQ signalled its intention to withdraw the 593rd EBSR at the conclusion of the OBOE operations, and offered to turn over 42 LCMs to the Australian Army at that time. In view of the difficulty of shipping Australian landing craft from the mainland, Advanced LHQ decided to accept the offer, subject to the handover also including spare parts for twelve months.[173] The arrival of 10 ALC40s in July permitted the withdrawal of a boat company from Balikpapan and the LCMs at Tarakan. To allow the entire 593rd EBSR to be released by 1 September, Advanced LHQ asked for another 24 LCMs and 2 J-Boats.[174] In August, the 66 LCMs were transferred to the 41st Landing Craft Company, which moved from

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169 SNOBU, *Report of Proceedings of RAN Beach Unit in Operation "Oboe Two", 7 Aust Div Landing at Klandasan, Near Balikpapan, South East Borneo*, AWM54 505/10/5.

170 RAAF Unit History sheet, No 6 ACS, 7 to 15 July 1945, NAA (ACT): A9186 269.

171 CASC 7th Division, *Report on AASC Operations with Force OBOE II*, 28 July 1945, AWM52 621/7/39

172 Wilson, *Always First*, p. 89.

173 LandOps to First Army, 20 May 1945, Blamey Papers 3DRL 6643 2/53.

174 LandOps to GHQ, 20 July 1945, AWM54 917/4/12.

New Britain to Labuan.[175] On average, the LCMs were around twelve months old, with hard service in New Guinea and Borneo.[176]

The war ended before the base development effort on Borneo was complete but it is fair to say that this campaign represented the high water of Australian Army logistics.

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175 McNicoll, *Teeth and Tail*, p. 321.

176 Casey, *Amphibian Engineer Operations*, p. 682.

12. Conclusion

What lessons might have been drawn from the Army's experience of logistics from 1943 to 1945?

The principal lesson was that in 1943-45 the Army handled its own logistics. There still remains a belief today that the US Army supplied most of the logistical support. Nothing could be further from the truth. The US Army arrived in the theatre with inadequate logistical support and for a long time relied on its Australian counterpart.

An important lesson of this was that the Army should always to be prepared to support more than just itself. The Army unexpectedly found itself called upon to supply the US Army with subsistence and POL, to support the RAAF, and to support the RNZAF.

This highlighted the fact that logistics had political consequences. Given the scarcity of manpower and resources, the government and the Army had to make hard choices. The Army's initial structure contained too far many operational units and nowhere near enough logistical ones. A proposal by General MacArthur to transform the Army into an entirely logistical organisation was rejected. In the end, the Army was still not quite balanced, with operations being curtailed due to a shortage of logistical units.

An outstanding lesson was value of pre-war investment in logistics. The decision to sell off the Government Line had been almost suicidal. Neglect of the nation's ports and railways had also likewise Australia unprepared for war. Another factor was the failure to organise and train sufficient logistical units in peacetime. Some units, such as docks operating and mechanical equipment companies, remained scarce to the very end. Above all, the need was felt for staff properly trained in logistical planning.

Successful logistics required the highest degree of cooperation between the Allies and the services. The war forced the Australian Army into close cooperation with the RAAF, RAN and American services. While friction was inevitable, there are few examples of closer or better cooperation between allies. None was more successful.

Although ship-to-shore logistics using amphibious ships proved to be the most effective means of overcoming the long distances, inhospitable climate and rugged terrain of New Guinea and the islands, all means of transport were found to have their strengths and weaknesses. The Army still needed road and water transport, and access to transport aircraft. The different modes of transportation fitted together to create a successful logistics system.

The Army entered the Pacific war with doctrine developed for a war in Europe that was found to be unsatisfactory in attempting to centralise control of general administration in a staff that might be remote from the base in question. Doctrinal flexibility enabled the Army to develop a more satisfactory organisation.

Despite the overall complexity of the logistics problem, there were few aspects that could not be solved with simple logic and common sense. Some problems were as simple as storing 44-gallon drums on their sides so water could not collect on the tops. Nonetheless, in some cases, such as the investigation into tropic proofing, the development of better rations, and the battle against Malaria, the experts had to be called in. The Army successfully tapped into the nation's pool of human talent.

Despite all its shortcomings, the Army did, in the end, manage to solve its logistical problem and make a contribution to the Allied victory.

Abbreviations

AA ..... Antiaircraft
AA&QMG ..... Assistant Adjutant and Quartermaster General
AACC ..... Australian Army Catering Corps
AAD ..... Advanced Ammunition Depot
AAMC ..... Australian Army Medical Corps
AAMWS ..... Australian Army Medical Women's Service
AANS ..... Australian Army Nursing Service
AAOC ..... Australian Army Ordnance Corps
AASC ..... Australian Army Service Corps
AB ..... Army Barge
ACS ..... Airfield Construction Squadron
ACT ..... Australian Capital Territory
ACW ..... Airfield Construction Wing
Adm ..... Administration
ADMS ..... Assistant Director, Medical Services
ADOS ..... Assistant Director, Ordnance Services
Adv LHQ ..... Advanced Land Headquarters
Advon ..... Advanced Echelon, US Fifth Air Force
AEME ..... Australian Electrical and Mechanical Engineers
AIF ..... Australian Imperial Force
AK ..... Army Ketch
AK ..... Cargo Ship (US)
AKA ..... Attack Cargo Ship (US)
ALC ..... Australian Landing Craft
ALCM ..... Australian Landing Craft, Medium
ALCV ..... Australian Landing Craft, Vehicles
AMF ..... Australian Military Forces
ANGAU ..... Australian New Guinea Administrative Unit
AOD ..... Advanced Ordnance Depot
AP ..... Transport (US)

APA .....Attack Transport (US)
APc ..... Coastal Transport (US)
APD ..... Destroyer Transport (US)
ARC mesh ..... Cyclone wire
AS ..... Army Ship
ASD .....Advanced Stores Depot
Aust .....Australian
Avgas .....Aviation Gasoline
AWAS ..... Australian Women's Army Service
AWM ..... Australian War Memorial
Bde ..... Brigade
BG ..... Barge, Gasoline
BGS ..... Brigadier, General Staff
BIPOD .....Bulk Issues Petrol and Oil Depot
BMWT ..... British Ministry of War Transport
Bn ..... Battalion
BPS ..... Bulk Petroleum Storage
Brig ..... Brigadier
BSA ..... Base Sub Area
BSD ..... Bulk Supply Depot
Capt ..... Captain
CASC .....Commander, Army Service Corps
Cav ..... Cavalry
Cdo ..... Commando
Cdr ..... Commander
Cpl ..... Corporal
CE ..... Chief Engineer
CGS ..... Chief of the General Staff
CinC ..... Commander in Chief
CMF ..... Citizen Military Forces
Col ..... Colonel
COO ..... Chief Ordnance Officer
CoS ..... Chief of Staff

COSC ..... Combined Operational Service Command
Coy ..... Company
CRA ..... Commander, Royal Artillery
CRE ..... Commander, Royal Engineers
CV ..... Aircraft Carrier (US)
CVE ..... Aircraft Carrier, Escort (US)
DA&QMG ..... Deputy Adjutant and Quartermaster General
DCGS ..... Deputy Chief of the General Staff
DCRE ..... Deputy Commander, Royal Engineers
DDMS ..... Assistant Director, Medical Services
DDOS ..... Deputy Director, Ordnance Services
DID ..... Detail Issues Depot
Div ..... Division
DSO ..... Distinguished Service Order
DUKW ..... Amphibious Truck
EBSR ..... Engineer Boat and Shore Regiment
ed ..... Editor
eds ..... Editors
EinC ..... Engineer in Chief
engr ..... engineer
ESB ..... Engineer Special Brigade
FAD ..... Field Ammunition Depot
FOD ..... Field Ordnance Depot
Forland ..... Forward Echelon Land Headquarters
FSD ..... Field Supply Depot
Fwd Ech LHQ ..... Forward Echelon Land Headquarters
Gen ..... General
GHQ ..... General Headquarters
GOC ..... General Officer Commanding
GS ..... General Staff
HE ..... High Explosive
HMAS ..... His Majesty's Australian Ship
HQ ..... Headquarters

Inf ..... Infantry
J-Boat ..... a small steel-hulled patrol boat
km ..... kilometres
l ..... litres
Landforces ..... Land Forces Headquarters
LandOps.....Advanced Land Headquarters
LCI ..... Landing Craft, Infantry
LCM ..... Landing Craft, Mechanised
LCP(R) .....Landing Craft, Personnel (Ramp)
LCS(S) ..... Landing Craft, Support (Small)
LCT ..... Landing Craft, Tank
LCVP ..... Landing Craft, Vehicles, Personnel
LGA ..... Lieutenant General Administration
LHQ ..... Allied Land Forces Headquarters
LOB ..... Left Out of Battle
LoC ..... Line of Communications
LSD ..... Landing Ship, Dock
LSI ..... Landing Ship, Infantry
LSM ..... Landing Ship, Medium
LST ..... Landing Ship, Tank
Lt ..... Lieutenant
m ..... metres
MAC ..... Motor Ambulance Convoy
Maj ..... Major
MC ..... Military Cross
ME ..... Mechanical Equipment
MEC ..... Mechanical Equipment Company
MGGS..... Major General, General Staff
ML ..... motor launch
mm ..... millimetres
Mogas ..... 80 octane petrol
MT ..... Mechanical Transport
MT80 ..... 80 octane petrol

NAA ..... National Archives of Australia
NACP ..... US National Archives at College Park
NGF ..... New Guinea Force
NICA ..... Netherlands Indies Civil Administration
NSW ..... New South Wales
NUGSEC ..... New Guinea Base Section (US)
O2 ..... Operational ration
OBE ..... Order of the British Empire
OC ..... Officer Commanding
OO ..... Ordnance Officer
Pl ..... Platoon
PMF ..... Permanent Military Forces
PMG ..... Post Master General
POL ..... Petrol, Oil and Lubricants
PVC ..... Polyvinyl Chloride
PX ..... Post Exchange (US)
Qld ..... Queensland
QMG ..... Quartermaster General
RAAF ..... Royal Australian Air Force
RAN ..... Royal Australian Navy
RANR ..... Royal Australian Navy Reserve
RANVR ..... Royal Australian Navy Volunteer Reserve
RDI ..... Relief Driver Increment
Recce ..... reconnaissance
Regt ..... Regiment
RNZAF ..... Royal New Zealand Air Force
RSD ..... Returned Stores Depot
SA ..... South Australia
SAA ..... Small Arms Ammunition
SC ..... Staff Captain
Sgt ..... Sergeant
SIB ..... Special Investigation Branch
SNOBU ..... Senior Naval Officer, Beach Unit

SOinC ..... Signal Officer in Chief
SOPAC ..... South Pacific Area
SWPA ..... South West Pacific Area
UK ..... United Kingdom
US ..... United States
USAAF ..... United States Army Air Forces
USACE ..... United States Army Corps of Engineers
USACMH ..... United States Army Center of Military History
USAFFE ..... United States Army Forces in the Far East
USAFIA ..... United States Army Forces in Australia
USASOS ..... United States Army Services of Supply
USMC ..... United States Marine Corps
USN ..... United States Navy
USNHC ..... United States Navy Historical Center
USS ..... United States Ship
Vic ..... Victoria
WA ..... Western Australia
WE ..... War Establishment
WOI ..... Warrant Officer, Class I
WOII ..... Warrant Officer, Class II
WUR ..... War Usage Rate.

Units of Measurement

A full description of all the weights and measures of the WWII period and the push towards standardisation and metrication would occupy a thesis in its own right. The most important are described here, together with the conversion factors used in the text.

Monetary Units

Australian currency was the pound. There were 12 pence to the shilling and 20 shillings to the pound. Values were normally written with a stroke between them, so 6/6 represented 6 shillings and 6 pence. I always use the other form, expressing this as 6s 6d.

The exchange rate with the US dollar was fixed during the war years at AU ₤1 = US $3.23. Its actual value was estimated at being closer to AU ₤1 = US $4.20.[1] As international trade as such was impossible during the war years, an estimate is all we have.

Linear Measurement

Australia and America used similar but different system systems of measurement, known as the Imperial and US systems. Prior to the war, the US inch was slightly smaller than the Imperial inch. In 1941, the so-called Canadian inch was adopted, setting the length of the inch at exactly 25.4 mm. There were 12 inches to the foot and three feet to the yard. These could be abbreviated to in, ft and yd but the symbols ", ' and ^{x} respectively were also used.

1 inch = 25.4 mm exactly

1 foot = 12 inches = 0.3048 m exactly

1 yard = 3 feet = 0.9144 m exactly

1 chain = 22 yards = 20.1168 m

1 mile = 5,280 feet = 1,760 yards = 80 chains = 1.609344 km

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[1] Butlin, S.J. and Schedvin, C. B., *War Economy 1942-1945*, (Adelaide: Australian War Memorial), 1977, p. 129

Nautical Measurement

The Navy had its own system of measurement, which differed between the two navies. Specifically, the two differed on the length of the *cable*. They also had the *nautical mile*, which was defined as the length of a degree of longitude at the equator.

1 fathom = 6 feet = 1.8288 m

100 fathoms = 600 feet = 1 cable (USN) = 182.88 m

608 feet = 1 cable (RAN) = 185.32 m

1 nautical mile = 1.852 km exactly

Volume

Australia and America used different units of volume measurement, albeit with the same names. A 44-gallon drum held 44 Australian gallons. Petroleum was sometimes measured in *barrels*, where a barrel contained 42 US gallons.

1 US gallon = 0.8327 Imperial gallon = 3.785 litres

1 Imperial gallon = 4.5461 litres

1 barrel = 42 US gallons = 158.97 litres

1 cubic foot = 0.02832 m^3

1 cubic yard = 0.7646 m^3

Lumber was measured in *super feet* (also known as *board feet* outside Australia and New Zealand). One super foot is the volume of a one-foot length of a "standard board" one foot wide and one inch thick.

1 super foot = 144 cubic inches = 2.360 litres = 0.002360 m^3

When it comes to shipping, there were certain units called tons but which were not in fact units of weight. Most common was the shipping or measurement ton which was actually a unit of volume, being roughly the shipping space occupied by a ton of cargo. It was Australian Army practice to use deadweight (long) tons or measurement tons, *whichever was greater* to describe stores. In other words, *to add weights and volumes together*.

1 measurement ton = 40 cubic feet = 1133.0 litres = 1.133 cubic metres

In describing ships themselves, *gross tonnage* was used. Again, this was a unit of volume, but equal to 100 cubic feet (2.8325 m^3). *Net tonnage* was the volume available for carrying cargo. *Deadweight tonnage* was the *cargo carrying capacity* of the ship in long tons and not, as is often assumed, the weight of the ship itself. This is known as the *displacement*, which was normally used only for warships.[2]

Mass

Three different types of tons were in general use: *short*, *long* and *metric* tons. The long ton was normally used by ocean freight, while US railways used the short ton. All are fairly close in value.

1 pound = 0.4536 kg

1 short ton = 2,000 pounds = 0.9072 tonne

1 long ton = 2,240 pounds = 1.0160 tonne

Power

Power of engines was measured in horsepower, where

1 horsepower = 745.7 Watts

Electric power was measured in Volt-Amperes. Today, this is known as a Watt.

[2] Morison, S. E., Volume I: The Battle of the Atlantic, September 1939 - May 1943, Little, Brown and Co, Boston, 1947, p. 292

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