The Yooroonah Tank Barrier

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2. The historical context.

2a. War in the Pacific

Not long after Japan's entry into the war in 1941, Australian national security was threatened by successful and aggressive Imperial campaigns in the Pacific. By February 1942, it seemed clear to Australian war-time leaders that Japan was eminently capable of invading their country, and that British or American pledges for help in its defence were unreliable. This resulted in a broad perception of extreme vulnerability, summed up in the following formal appreciation by Australian and New Zealand Chiefs of Staff, tabled before the War Cabinet on 26-2-42:

1. The present position of the war in the Pacific is that, in the west, Malaya and Singapore have fallen, the Japanese have invaded Burma and are now threatening Rangoon and the Burma Road; in the southwest. Borneo, Celebes, Sumatra, Ambon and Timor have been occupied and an attack on Java is impending. Darwin has been attacked by air and an attempt to occupy it is not unlikely; further to the east, New Britain, including Rabaul and New Ireland, are in Japanese hands and the enemy force in that area immediately threatens Port Moresby, New Caledonia and Fiji.
2. The Japanese have decisive air superiority and control of the seas in the areas in which they are operating and there is no present prospect of the main Japanese fleet being successfully brought to action by the fleets of the Allied Nations.
3. Australia and New Zealand are therefore in danger of attack.

Not only did Australian forces find difficulty in combating the Japanese overseas, but resources for defence purposes within Australia itself were dangerously limited. Major military reversals in Malaya, Singapore, Rabaul, Timor and Java resulted in the loss of many thousands of Australian troops and weapons, while Australian industry had great trouble in the rapid production of armaments of any description. The major problems here were identified as a general shortage of manpower (sic), "for which there are heavy competing demands by the Armed Forces, munitions industries, essential civil industry and agriculture" (Robertson & McCarthy 1984: 259, 260, quoting AA: A 2671. 31/1942), and a lack of industrial capacity, related specifically to a shortage of machine tools and skilled labour. An appreciation of defence capability by the Australian Chiefs of Staff concluded in late January 1942 that:

It is clearly beyond our capacity to meet any attack of the weight that the Japanese could launch either on the mainland or in the islands. At the same time, our limitations in manpower and equipment deny us the capacity to increase our forces to any appreciable extent. Land and air forces can only be sent to increase a garrison at one point by weakening our strength at another. (Robertson & McCarthy, *ibid.).*

In the face of this seeming desperation, detailed and integrated plans for coastal evacuations, the destruction of communications, industry and crops, and the defence of coastal and tableland *entrepots* were quickly formulated. The following statement by

the Premier of N.S.W., tabled before the Canberra Conference of Commonwealth and State Ministers on 5-2-42, gives the sense that such strategies were the only clear options available to Australians at the time:

...superficially, it might appear that any aid at present being given to us by America, or any help promised to us in the near future by the same nation or by Britain, should be enough to render unnecessary any immediate steps toward evacuation. But can we, in the light of experience, rely on protection either given or promised by other people? (AA: Series MP 729/6/0, Item 16/402/14)

2b. The home front

The history of construction of the tank barrier at Yooroonah can be regarded within this national and international context. The defences of N.S.W. were co-ordinated by Eastern Military Command, which directed, from early *January* 1942, the urgent construction of beach defences, road barriers and supplementary inland aerodromes, in co-operation chiefly with the N.S.W. Department of Main Roads and local Shire Councils. Eastern Command also directed, through the supervision of organisations like the N.S.W. Stock, Dispersal Committee, the *Primary* Industries Evacuation Committee and the State War Effort Co-ordination Committee, dovetailed evacuation procedures for stock, produce and population - implemented on the ground by the N.S.W. Police Department and various local platoons of the Volunteer Defence Corps. These arrangements are well-documented for the Armidale district in the papers and writings of P.A. Wright, himself a one-time member of the Dumaresq Shire Council and the VDC (Wright 1982; U.N.E. Archives A 430.4).

The geography of the eastern scarp of the Great Dividing Range emphasises the contribution of roads to communications in this region. The sometimes precipitous fall from tableland to coast, combined with the prevalence of deep gorges, the absence of navigable rivers and the heavily-forested nature of the surrounding countryside, meant that the few easterly roads extant in 1942 were of critical strategic importance. Roads represented the only means for the removal of coastal populations and stock to the relative safety of the interior, and for the local deployment of troops and supplies in the event of an emergency. As roadways would also have served the main thrust of any Japanese incursion to inland areas, construction works designed to control their access assumed an enormous significance in the projected defence of N.S.W. These included, simultaneously, the improvement of road surfaces, the strengthening of bridges, the construction of demolition mines and tank barriers, and the mining of bridges.

Defence roadworks in the Armidale district were undertaken and supervised by the N.S.W. Department of Main Roads, in collaboration with Dumaresq Shire Council The Shire participated initially in the construction of four main roadblock installations, one on Trunk Road 74 (Armidale-Ebor Road), and three on Trunk Road 75 (Armidale-Kempsey Road). The sites were code-designated in all correspondence as T/l, T/4, T/5 and T/6. and consisted of the excavation of substantial road mines. Their purpose was to slow the advance of the enemy, who it was considered could navigate resulting craters only in tracked vehicles, and then only after many hours of pick and shovel work "on the lips" (AO 10/27341, file 42m51). Of course, the mines could only be even this effective if

no bypassing of the roads was possible, and to ensure this, flanking barrier works were erected at each site, and designated T/l A, T/4A, T/5A and T/6A respectively. In all there were eight roadblock sites ultimately constructed in the Dumaresq Shire. The Shire Council was also closely involved in preparing the mining of the bridges along these two Trunk roads, and in their strengthening for the carrying of "special heavy military loads" (U.N.E.Archives A128, T254, 255). In the following detailed survey of the Yooroonah roadblocks, all references to correspondence, except where indicated otherwise, refer to the file series 10/27341 file 42m51, held by the N.S.W. Archives Office

3. The construction history of roadblocks T/5 **and** T/5A, **Trunk Road 74.**

3a. Introduction

This documentary history begins with a letter from Lieutenant-Colonel Stewart of 4 Aust. C.R.E. (Works), Australian Military Forces Eastern Command, Chief Engineer's Branch, to the Secretary, N.S.W. DMR, dated 8-1-42. Stewart reported there that, after survey by military and Main Roads engineers, 50 roadblocks had been planned for eastern N.S.W. Blueprint plans of those sites located in Northwestern Division were enclosed, along with particular suggestions for their application. Stewart further instructed that work on these blocks was to proceed immediately as a matter of urgency, that all jobs should be started simultaneously if possible, and that men were to work in double shifts, six days per week. In accordance with a military communication" of 10-1-42, suggesting that "in any case where the work would be expedited if carried out by the local Council, arrangements should be made accordingly", a letter of request was written from the DMR Divisional Engineer to the Clerk of Dumaresq Shire. The Shire quickly affirmed its willingness to assist, but advised that the Shire Engineer was to leave Armidale on 17-1-42 for war service in Central Australia. The DMR then decided to supervise the Dumaresq Shire construction jobs directly from its Tamworth divisional office, "with any assistance which can be readily made available by your Council in the way of equipment and labour" (U.N.E. Archives A128, T254 [2]). As it turned out, work on the Dumaresq sites could not all be started at once, due mainly to difficulties in obtaining men with suitable mining experience. T/1 was thus begun first, on about 15-1-42, three miners having been employed from the workings at Hillgrove and Rocky River, with a fourth man - Dave Sauer - supplied, along with tools, by Dumaresq Shire. Once other available miners were found, work on T/5 was started, and after 30-1-42, it appears that work at all sites proceeded simultaneously.

As originally conceived, T/5 comprised a tunnel excavated under the Armidale-Ebor Road, 43.1 miles from Armidale, to be packed with explosives and detonated when destruction of the roadway was deemed necessary. On 12-2-42 a new site, T/5 A, was described by Eastern Command as an anti-tank barrier, to be erected flanking the tunnel, "in order to make (it) reasonably effective..." Work was to begin on this site once the tunnel was excavated and charged, and would comprise the erection of a line of stump and concrete blocking running north-south for approximately 90 yards. The following overall construction schedules for T/5 and T/5A are abstracted from regular progress reports supplied by the DMR Divisional Engineers. These will be further contextualized by detailed descriptions of the construction of both sites.

3b. Chronological summary of work progress on block T/5:
28-1-1942: Men and tools taken to site, 43.1m. Ebor Road, by carrier W.Dell.
30-1-42: Work on T/5 commenced.
6-2-42: 10% complete.
13-2-42: 35% complete.
20-2-42: 50% complete and road fracture done. Considerable delays due to a fortnight of wet weather.
27-2-42: 70% complete.
3-3-42: Work slowed by hard granite, the loss of 2 men, and the non-availability of plant.
6-3-42: 75% complete.
13-3-42: 85% complete.
20-3-42: 95% complete.
27-3-42: Excavation complete, chamber-concreting in progress.
3-4-42: Concreting 50% complete.
10-4-42: Concreting complete, funk holes excavated, iron lining of chamber 80% complete.
24-4-42: Lining of chamber complete.
6-5-42: Charge complement for T/5 ordered. Block to be charged
13-5-42. 8-5-42: Work on T/5, including delivery of explosives, stopped pending enquiries as to its strategic effectiveness.
14-7-42: Decision to continue work on T/5 A only, the progress of T/5 to remain suspended.
27-7-42: T/6 charged. All blocks now charged and sealed except T/5.

3c. Chronological summary of work progress on block T/5A:
12-2-1942: T/5A first mentioned in correspondence by Eastern Command.
9-4-42: Work on T/5 A commenced
24-4-42: 15% complete.
1-5-42: 17% complete.
8-5-42: 25% complete.
12-5-42: Work on T/5 A suspended.
15-5-42: 30% complete.
14-7-42: Recommendation to resume work on T/5 A.
17-7-42: 30% complete.
24-7-42: 30% complete.
7-8-42: 30% complete.
18-8-42: Work on T/5A resumed, only upon completion of blocksT/6 & T/6A.
21-8-42: 35% complete
3-9-42: 42% complete (posts and holes only).
16-9-42: 50% complete. Nearly all posts cut. Casting of tetrahedra not yet begun.
29-10-42: 100% completion of T/5 A.

3.d. Technical construction of demolition mine T/5: Block T/5, at the time its work progress was suspended, comprised the following elements: excavated approach trench and mine tunnel, iron- and concrete-lined explosive chambers, road fracture-lines and

funk holes. According to the original military sketch of T/5, the tunnel was to have been flanked by two short lines of concrete tetrahedra. These were dispensed with in subsequent plans, and are discussed in the following section dealing with block T/5A. - Imperial measurements only will be used through the remainder of this report. These can be converted using the table contained in the appendix.

3d.1. *The trench, tunnel and chambers:* The technical construction details here included were gleaned as accurately as possible from the correspondence. Unfortunately, nearly all annexure referred to as sketches, plans, diagrams and schedules are missing from the files, leaving a fair degree of educated guesswork necessary for any historical "reconstruction". The T/5 tunnel differed from all others in the Northwestern division in that it was to be cut into a long, gently-sloping bank (see Figure 2), where other mines were cut straight into the road batters. Here, approximately 50' of slope needed to be penetrated before hard rock was engaged and the tunnel proper could be started. This initial slope was excavated as an open trench (involving the shifting of 30 cubic yards of material), which was not only a quicker and cheaper method than tunneling, but was also necessary to find sufficient depth for the tunnel to be placed 10' under the road, with a drive sloping back towards its entrance.

The tunnel itself was designated as a "Type 2" block - appearing as a "T" in plan view - which type consists of a main shaft, and a head formed by a lateral drive culminating in two chambers dug to receive the explosive charges (see Figure 3). In the original plan (see figure 2), it can be seen that the main drive, 4' high and 3' wide, was to extend at least 17' into the solid rock, its roof to lie 10' below the surface of the road, and inclined towards the tunnel mouth for drainage purposes. The explosive chambers were each to measure 4' x 3' x 5'6", and to be spaced at 33' centres. In the absence of correctly-scaled plans of the mine, this would indicate that the lateral drive is *276"* long. If correct, the total length of roofed runnel should then measure 55'6", which is roughly consistent with contemporary descriptions which put it at "approximately 53"[!]. In a directive of 20-1-42, the dimensioning of the main drive was changed, as it was predicted that the 4' height originally planned would make excavation work overly difficult. New instructions thus called for a roof height of 5', from a point about 5' into the solid rock.

As the Type 2 mine was designed for a level road, careful local modifications were encouraged by the military engineers, to ensure correct drainage of the explosive chambers if the covering road exhibited even a slight grade. But however such adjustments affected the subsequent placing of the chambers, the military insisted that the position of each chamber relative to the road's surface and edge was to be kept strictly to plan, and that the sum of the length of drives was to measure at least 19'. In the case of T/5, it is likely that the main drive was cut at a lower level than the "downgrade" chamber, so that the latter could drain effectively, it being critical that the charge remain completely dry. A further modification was made to the size of the chambers, now to measure 4' x 5' x 6', as the explosive was to be supplied in longer boxes than it was originally thought.

To further ensure the successful storage and performance of the charge, the chambers were lined to air tightness with heavy-gauge (26g.) galvanised sheet iron (as it happened, this could not be supplied, so "terae" iron[1] was used instead), their floors concreted, and

sprinkled with unslaked lime dust to absorb moisture. The edges of the iron lining sheets were soldered together and their joints sealed with bituminous paint. As this apparently caused some problems with the terae iron, red lead was also used for sealing edges. The obvious danger involved in soldering in a charged tunnel, was to some extent obviated by placing the fires for heating the soldering irons outside, and to the leeward side of the excavation. It seems also that sheets of asbestos board were to be laid over the iron sheeting, at least at the drive end .of the chamber, presumably to help protect the charge from exploding if fire did by chance sweep into the tunnel. Once the charges were packed and primed, and wiring, switches and terminals laid, the chambers were to be tightly tamped with bagged fill, the end lining of the chamber soldered shut, and the tunnel backpacked with sandbags and at least 10' of "solid material". Two small timber boxes were to be placed at the mouth of the tunnel, one housing the electric circuit blocks, the other the fuse gear. The whole was then to be closed in behind a wooden door, locked with a hasp, staple and padlock.

Although specific details do not occur for T/5, evidence from the nearby T/l block indicates that the timber props for the tunnel would have been cut on site, while short planks of 2" second-grade hardwood for shoring (if needed) would have been obtained from J.F. Nott's Styx River mill near Jeogla. The digging of the tunnel initially involved two shifts of two men each (totaling 15 hours work per day, 6 days per week), each miner alternating between work at the rock face and clearing away excavated rubble. Another man was later appointed as leading hand to oversee work on the site. The work on T/5, although it was considered such as to require the use of a jackhammer and compressor, was eventually completed without the assistance of plant, as none became available. Hand tools and small charges of gelignite thus represent the only tunneling apparatus used here. Although picks and drills were able to be kept sharp by virtue of a forge erected on the site, problems were encountered due to the sheer hardness of the granite, and because it was laid in "faulty beds", making drilling, digging and blasting all difficult. The fact that the excavation job was successfully completed owes much to the skill and experience of the miners from Rocky River and elsewhere who were employed at T/5. These included the following men, listed as present at the final inspection of the job: R.M. Thompson (leading hand), A. Spradley, R. Pennell, L. Sattler, R. Clutterbuck and (possibly) A. Nixon. In finishing-off the excavation work, employees were instructed to remove any tree or boulders which might obstruct the material blown out by the blast, and to clear away any material left over after packing the tunnel - either by pushing it down the sideling, or by distributing it over the road batters. While a small amount was to be left as a platform for the firing detachment, it was made very clear by the military engineers that, in all cases, debris was to be well hidden from observation from the air.

The charged and locked tunnel was to be protected by a permanent military guard, known in the local area as "greenleeks" - the vernacular name for the green-breasted lorikeet - on account of the bright colour of their uniforms (Jim Hyatt, *pers. comm.* 1996). The permanent guard was later dispensed with, presumably owing to a shortage of personnel, and replaced by a system of patrols. To this end, the door was to be removed from the mouth of the tunnel, which was now to be sealed by a concrete wall, 9" thick, that would need to be "chopped through" with picks in the event the mine needed firing.

The designation number of the block was then to be painted in black figures on the exterior of the wall.

3d.2. *The charge:* The blueprint plan suggests that each chamber at T/5 was to be packed with 1800lbs. of gelignite, stored in 36x501b. cases, - a total complement of over a ton and a half of explosive. This would be consigned by rail from Sydney to arrive at Armidale the day before packing the tunnel took place, and would be accompanied by a military guard. The charging itself could only be carried out by approved technicians, and to this end, Eastern Command organised a two-day school on the Glen-Innes-Grafton Road to train explosives handlers in their specific duties. As it eventuated, the instructor from Sydney, Pat Hogan, stayed on to wire and charge all the blocks in the northern part of the state, and to train members of the various firing detachments. "Exploders" and a 450 yard reel of firing cable were consigned to each block, to be stored inside the mouth of the tunnel awaiting the signal to remote-detonate the charge. The firing detachment would then connect up to the switch-block, run the firing cable out to a protective funk hole dug for the specific purpose (see below), and fire the mine. For reasons that are not entirely clear at this stage, T/5 was never charged, a situation which is discussed in more detail below.

3d.3. ***Funk-holes:*** It was pointed out above that the firing detachment at each site was supplied with 450 yards of firing cable. This was to be unspooled to a point of relative safety between 350 and 450 yards from the mine, measured as the cable was laid on the ground, and the charge detonated remotely. In tests completed early in 1942, the Army considered that this distance did not guarantee the safety of the firing detachment, and instructed the digging of funk hole shelters which faced away from the direction of the blast, one on each side of every block, to ensure the protection of its personnel. These funk holes, if suitable natural rock formations could not be found, were to be excavated in solid rock to a depth of 3', a width of 4' and a height of 3'6". A roof of rock with a minimum thickness of 3' was mandatory, unless this was impossible. In such a case, a minimum rock covering of 18" was allowable, but only if supported by timber props. Where suitable holes could not be dug "off the road", it was considered suitable if they were constructed "in the solid" in the side cutting.

3d.4. ***Road fracture-lines:*** Each demolition mine required fracture lines to be blown beneath the surface of the road. A line of fracture holes was dug across the road at each end of the block, and each hole packed with a maximum of 21bs. of gelignite. The military engineers warned workmen not to exceed this amount, or "the radius of the fracture line may extend so far longitudinally as to defeat the object of the fracture line". It seems likely then, that fracturing was designed to delineate the extent of cratering on the block when the mine was fired, ensuring maximum damage to the road with minimum damage to adjacent stump-blocking. Fracture lines on T/5 involved the removal of 15 cubic yards of material, a process carried out when the tunnel was only 50% complete, no doubt before the chambers were dug. Trenching could apparently serve in lieu of fracture, if the latter were not considered appropriate for the site.

Two consideration points emerge from the foregoing descriptions. One highlights the necessity and capacity for precision in blowing up the road at T/5. Many of the mine's elements - the size of charge, depth of chambers, type and extent of packing, and the disposition of road fractures - were calculated to inflict just enough damage and no more, or else the possibility of effectively blocking the road would be lost. The other point is that the design and construction of the mines were considerably constrained by the availability of skilled labour and resources, a recurring theme in all-discussions of Australian defence in 1942.

3e. Technical construction of flanking block T/5A: From its first conception, demolition mine T/5 was to have been supported by a flanking anti-tank barrier of concrete tetrahedra (see Figure 2) - to block the possible bypassing of the road between the mine and the rocky outcrop to its north-west. The exact disposition of these was left for later determination, resulting in enquiries from the DMR Divisional Engineer C.K.Oliver to his Chief Engineer on 24-1-42. In reply, he was advised on 11-2-42 that "it is understood that the Military Authorities require surface blocking of posts sunk into the ground in staggered positions in lieu of tetrahedrons..." This was followed a day later by instructions from Lieutenant-Colonel Stewart, who wrote that all flanking blocks were to comprise, where the ground was sound and diggable, four rows of heavy posts of varying height, presumably staggered as to distances between centres. Where these posts extended to water or marshy ground, or where a passable rocky surface was encountered, blocks should be continued with a double row of reinforced concrete tetrahedra. In the case of passable rock, Stewart considered that the blasting of an artificial scarp - of a minimum height of 8', or width of 20' if constructed in the form of a ditch - was to be preferred over tetrahedra. The block flanking T/5 was to be designated T/5 A, and was to commence as soon as T/5 was excavated, lined and charged. Following are Eastern Command's specifications for the Yooroonah flanking barrier.

Specifications for anti-tank barrier T/5A:

Subsidiary blocking to extend from 175 as follows: 90 yds of post block extending to marshy creek on North side taking in rocky outcrop. Concrete tetrahedrons (25 yards) to be used at edge of creek and to block gap through rocky bluff on South (high) side of block T/5 in accordance with standard design.

This description, read in conjunction with other Eastern Command communications, is slightly ambiguous. It is uncertain, for example, whether all of the twenty tetrahedra specified were to be used at the creek, or whether eight were to be used there, as eventually transpired, and twelve were to be used to block the rocky bluff. The latter interpretation would seem to be the more likely, as by 17-4-42, the number of tetrahedra required for T/5A had been reduced to eight to be used to block the marsh only. Again the-military had implied a preference for posts or scarps over tetrahedra, perhaps not so much because of any superiority in blocking capability, as in consideration of relative expenditures of time and money.

In responding to Eastern Command's instructions, C. K. Oliver contacted Newcastle City Council regarding its method of constructing tetrahedra, that organisation having become very experienced in their use. At Stockton Beach alone, a block comprising 3,100 tetrahedra had recently been erected, all "laced together with old wire ropes" (AA.

Series SP857/6, Item PH/1271). Newcastle provided the DMR with a summary of construction which comprised the following information:

Quantities (of steel reinforcement) for one tetrahedron (7'0" edges): $^{7}/_{8}$" dia.

reinforcement 16'-6"

$^{3}/_{4}$" " (points of anchorage & support) 20'-0"

(stirrups) 125'-6"

%" " 48'-0"

Quantity of cement required = 10.5 bags per tetra, using a 1:2:4 mix. The DMR was initially going to order the steel itself, and added to Newcastle's list 44' of $^{5}/_{8}$" reinforcing as well as 16 "U" bolts, including plates and nuts. However, as Newcastle City Council normally bent and fabricated the steel reinforcing units at its own works, the DMR arranged with the Council to supply the units ready made, along with the standard formwork necessary to cast the concrete. The Council also supplied diagrams showing how the tetrahedra were to be anchored, using old wire cable threaded through the U bolts. While these do not survive on file, the DMR Chief Engineer did inform Oliver that each tetrahedron was to be cast on site, on its top apex, and withdrawn from the mould by lifting "from the bottom loop bar". As each tetrahedron weighed nearly three tons, this would have created considerable difficulties in their accurate positioning on site, especially as no plant was available at T/5A to help with this work. Oliver was further instructed that each tetrahedron was to be set into the ground at a depth of 12", the front anchor cable buried at this depth, the back buried just below the surface. The eight tetrahedra were thus probably laced together, making their capsize most improbable using any available offensive technology.

Work commenced on T/5A on 9-4-42, proceeding quickly until it was suspended on 11-5-42, pending enquiries as to the effectiveness of the overall block. Questions had been raised by military inspectors about the apparent ease with which the block could be skirted. An old section of the Armidale-Ebor Road, superseded some years earlier but still in good condition, was found to join the current road on each side of T/5, affording a complete and effective bypass of the block. This greatly concerned both Eastern Command and the DMR, as considerable resources had already been deployed on T/5. On 23-6-42, C.K.Oliver wrote a rather sharp note to his immediate superior, complaining that:

The site is a very poor one in my opinion, and the attention of Military Officers has been drawn to it on three occasions and the view expressed that, whilst it was admittedly a poor block, it would probably have some nuisance value...the work done to date, if it be decided to suspend further action, might have some value if it were arranged as a landmine, thus being some return for the expenditure incurred to date.

At this stage T/5 A was 30% complete, and as the tetrahedron reinforcing units were not dispatched from Newcastle until 1-6-42, this figure obviously referred to the construction of the stump barrier only. This initial section of stump block seems to have involved relatively easy digging. Later sections proved more difficult, and although not recorded for this particular site, some pestholes at T/4 had to be blown in rock and the posts concreted in place.

The forms and reinforcing units for the tetrahedra arrived in Armidale on 19-6-42, while work on T/5 A was still under suspension. Their arrival prompted a review of the

situation by Eastern Command, which gave the verbal instruction to proceed with the work on 10-7-42. Obviously the block had now to extend across the bypass road, representing a further investment of time and resources. Somewhat puzzlingly, work on T/5, which had proceeded to charging stage, was to remain under suspension. 160' of wire cable was ordered for the tetrahedra on 20-7-42, but work on T/5 A was not resumed immediately. It seems that the men had been redeployed from there to the last of the demolition blocks, as T/5 A was not resurrected until T/6 had been completed. The resumption finally occurred on 13-8-42. DMR Engineer Moroney inspected the site on 3-9-42, reported the job as 42% complete, and found post-holes being dug while posts were being cut and carted to the site. The tetrahedra reinforcing units had been delivered to the block, and aggregate for concrete was being obtained from mining dumps at Hillgrove. Work on the tetrahedra was expected to start a fortnight after this time. On 16-9-42, Moroney visited again, found that virtually all the "stump posts" had been cut, but some still wanted carting to the site (probably in the miner Battler's 30cwt Chevrolet truck, which was used from time to time in the work on an "hourly plus mileage" basis). Digging of the holes was said by Moroney to be "fairly well advanced", but while most of the materials were now on site, the construction of the tetrahedra had still not begun. A number of difficult pestholes remained to be dug, the delay owing to the hardness of the rocky ground. The carting of posts was also expected to take some further time. Morpney's overall judgment was that 50% of the job had been completed, and "that it will be possibly 6 to 8 weeks...before the stump posts and tetrahedrons will be finished", suggesting that work would henceforth proceed simultaneously on both counts. Moroney's prediction was accurate, as T/5A was completed on 29-10-42, 6 ½ months after it was started, the work representing 3V-> months' continuous construction. Ironically, Captain Frost of Eastern Command visited the divisional office of the DMR on that very same day, to report that all the blocks in the Shire were to be decharged, probably as a result of a need to adjust the detonation procedure for the mines. T/5 A turned out to be the longest of all the flanking blocks, and was far and away the most expensive item in the Northwestern divisional roadblock programme.

4. The evidence of costings: This last is not the only useful evidence to be gleaned from the DMR's final costing documents. A breakdown of the costs over all the blocks reveals that while a greater wage component was charged against T/5A than any other site, materials costing was proportionately quite low, with haulage costs very high. In the absence of any other clearly-defined causes, this may indicate that timber for posts was cut at some distance from the site, an assertion which accords with evidence that the army did not want this lightly-timbered area to be further cleared in any way (U.N.E. Archives A128, U954). The timber appears not to have been purchased or milled, or the materials cost item would have been much higher for such a great number of posts. While the site archaeologist describes chisel points having been produced on the end of some posts by circular saw, I believe, after inspection, that these points are not inconsistent with evidence of the skilful felling of green timber with a well-sharpened axe. Logs were presumably felled, then sawn into lengths. Only that length comprising the butt of the tree would display the chisel point, and presumably the posts so formed

were always sunk into the ground point-uppermost. This interpretation would help explain the array of methods in which the posts were terminated, and seems to be consistent with the archaeological data.
Perusal of the DMR's costings also reveals that if shelters were built at T/5 A, as the archaeological report assumes, they were certainly not costed in any way, although funk holes were itemised. This evidence (or lack thereof), reflects at least two possibilities - that the three shelters identified by the archaeologist are not part of the military site, or that they were built *ex tempore* by the men working there at their own cost. The documents show that the men were dropped, with appropriate tools, at T/5 I two days before excavation began. Preliminary work here could have included, as it did at T/l, "selecting a camp site, clearing a track, cutting props for timbering the tunnel..." The style of work there described is at least consistent with the erection of a rough timber or bark hut, as the alternative was tent-accommodation, to be found by the men themselves. If the main "quarters" does form part of the military site, I would , guess that it was clad in bark, as otherwise, sheet iron would surely appear in the documentation as a costed item (it has already been shown that galvanised iron was not available for even top-priority defence work here). If this reasoning is accurate, then the adjacent shelter, described by the archaeologist as "the canvas lookout", may have served as a detached galley, a very common feature of bush camps of the time. Again, the "collapsed structure" of the archaeological report could have been the camp forge-site, at which the mining tools were sharpened, and soldering irons heated.

5. Two further questions raised by the evidence: No doubt owing to the extreme secrecy of military plans, neither Dumaresq Shire Council nor the DMR was apprised of contingencies for the active defence of the Yooroonah tank barrier. It was expressed by a number of those involved in their construction, that the purpose of the barriers was to slow the advance of the Japanese into the interior of N.S.W., presumably so that their lines could be the more effectively harried by necessarily inferior forces on the ground or from the air. Alternatively - or additionally - the barriers may have been intended to so impede the enemy's progress as to enable a major concentration of defence forces to join them in battle further to the west, say at Armidale. Whatever the strategy, if the Japanese were to have invaded northern NSW by sea, they would have met with several obstacles to their progress over the escarpment. Not only were roadblocks similar to T/5 organised elsewhere through the region, all the road bridges between Armidale and the coast were to be mined.
It is suggested that one of the most effective means of conserving the site lies in further historical analysis, and in the broad dissemination of the resulting information. This could occur indirectly, in the form of publications, and in a more immediate fashion by signposting the tank-barrier, both as a whole and with regard to its separate elements - much as has been done with the Mt. Yarrowyck Nature Reserve. It is very difficult of course, to increase this site's accessibility without at the same time increasing its vulnerability to abuse, but it is felt that informing the public of its significance may have some positive safeguarding effect. It is further considered that conservation measures should apply to the whole of the barrier, including its southernmost features, which are important to a proper understanding of its function.

7. **Suggestions for further historical research:** The most obvious task for further historical work is the location and analysis of the relevant Eastern Command correspondence. Oral historical evidence will also be important in revealing how local people related to defence preparations, but it is a resource that must be engaged sooner than later. Aerial photographs, especially the series taken of the area by Auslig in 1943, will help with a number of persistent problems, such as identifying a possible local timber-source for the posts erected at T/5 A. Examination of other surviving blocks in the Shire may throw light on the history of the Yooroonah barrier, but it is suggested that, before this is done, a supplementary survey of T5 itself be implemented. This is rendered necessary by the documents revealing significance that was not obvious at the time of the archaeological survey. Further survey should include, if possible, an examination of the tunnel, which must now be seen as the "heart" of the block, a search for the funk holes and road fractures, and the testing of structures to ascertain the nature and origin of their materials.

TANKS FOR THE MEMORIES

After 60 years a forgotten piece of Australian military history is back on the agenda with a dedicated band of New England locals aiming to put it on the tourist map.

Kylie Adam and Gary Fry report. Photos: Gary Fry

AS PREPARATIONS for the region's Anzac Day commemorations were completed this week, it seemed only fitting that planning for the preservation of a significant World War n historical site in the New England was reaching its culmination.

The story begins in the early days of World War II when the threat of a Japanese invasion of Australia loomed large and a plan to counter this kind of attack was put into action.

At the time there were very real fears that the Japanese would invade Australia, landing at Coffs Harbour and heading inland so a top secret military defence strategy was formulated.

A series of tank traps was built through the region, with the one at Yooroonah near Ebor, constructed in 1942, designed to stop Japanese troops getting through the mountains in the Ebor area.

It obviously proved unnecessary and once the war was over it was largely forgotten.

However, more than 60 years later, interest in the tank trap has been reignited and a small group is fighting to save the site and put it onto the region's list of tourist attractions.

"It's the only one in this area and I think it should be preserved and improved," Armidale RSL Sub-Branch president Bob Holloway said.

The tank trap, which is about 15km west of Ebor, is made up of a tunnel that runs under the old Grafton Rd, which was packed with explosives that would not only have destroyed the route across the mountains but may also have brought some of the adjacent hill down on the invaders. A large trench leads out from the tunnel and further down the slope are rows of wooden poles to impede encroaching tanks.

The final phase of the tank trap defence was a series of 2m high cement pyramids between the slope and a swamp, which even today are in perfect condition and create quite a bizarre blip on the bush landscape.

Tank trap preservation co-ordinator and an Ebor-based "Nasho" Harold Heffernan said the poles and pyramids wouldn't stop today's military hardware but in those days would have at

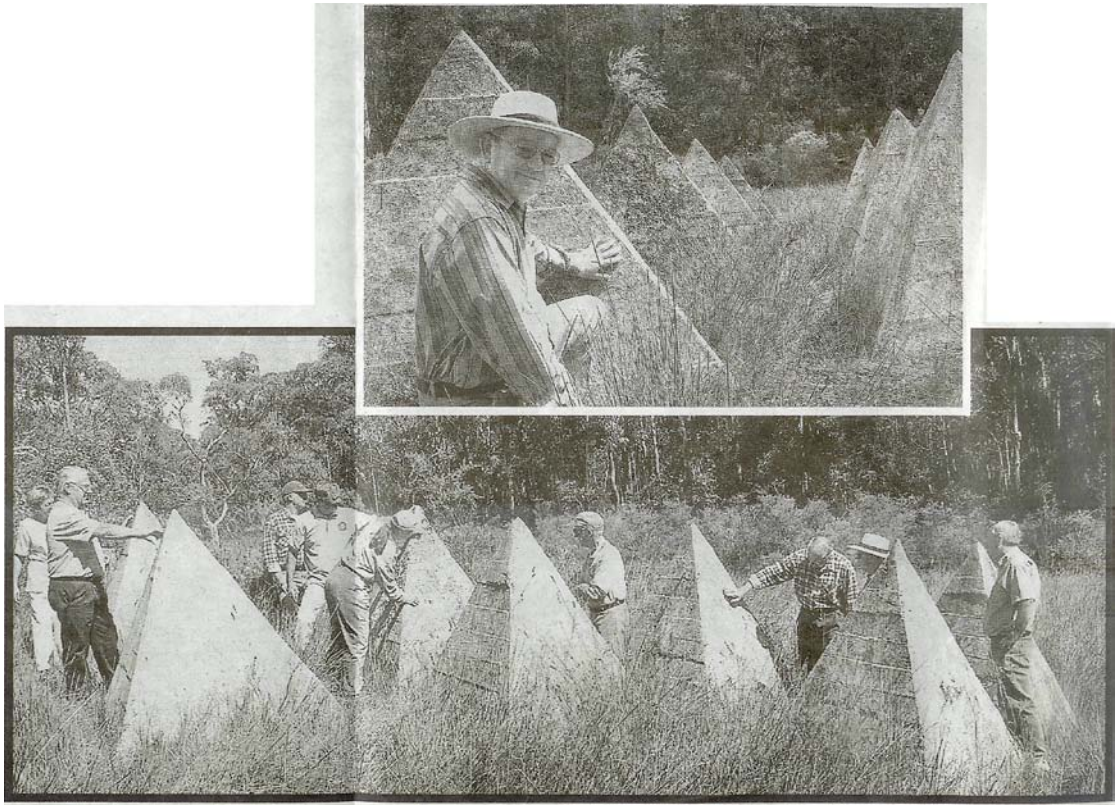
least halted the progress of the invading army and made them an easy target for Australian troops.
While other tank traps have been badly damaged by the likes of roadworks over the years, the Yooroonah tank trap is almost as it was all those years ago, apart from some of the poles being burnt in six decades of bushfires.
Driving the preservation push though are fears the trap will continue to deteriorate and at present very few people know about its existence.
The sub-branch has joined with the National Servicemen's Association, the National Trust and the Ebor and District Lions Club to secure the funding necessary to turn the site into a legitimate tourist attraction and an important part of the region's cultural heritage.
With gravel already donated for walking paths and hopes equipment and labour can also be secured free-of-charge, the group is confident they will need only a few thousand dollars to complete the project, with plans to apply for a grant under the federal and state governments' and RSL's scheme *Their Service - Our Heritage*.
If successful, the group will construct a rest stop on the Waterfall Way so that people can pull over and walk about 300m to the site where there will be an interpretative panel to show how the structures were designed to work. The entrance to the tunnel would be blocked in such a way people could still look in but couldn't climb into.
Armidale Dumaresq Council heritage adviser and chairman of the local National Trust branch, Graham Wilson, is enthusiastic about the tank trap, which was once allocated top secret status, at least outside the local area.
"The ironic thing is that it was a secret . . . but a lot of locals worked on the site so while very few people outside the region knew about it, that wasn't the case around here," he said.
Mr Wilson said it was important to preserve the trap because of its cultural significance and its potential to build a greater understanding of this period of Australia's history among current generations.
For the community of Ebor there are potential advantages as well, with Ebor Falls Hotel Motel owner Brian Tyson of the belief the tank trap could be another reason for people to call into the tiny community.
"It's part of history and should be developed so people can see it," he said.
"It could also mean more people coming to the area, stopping and looking around our lovely, quaint village, which would be great for the local economy."

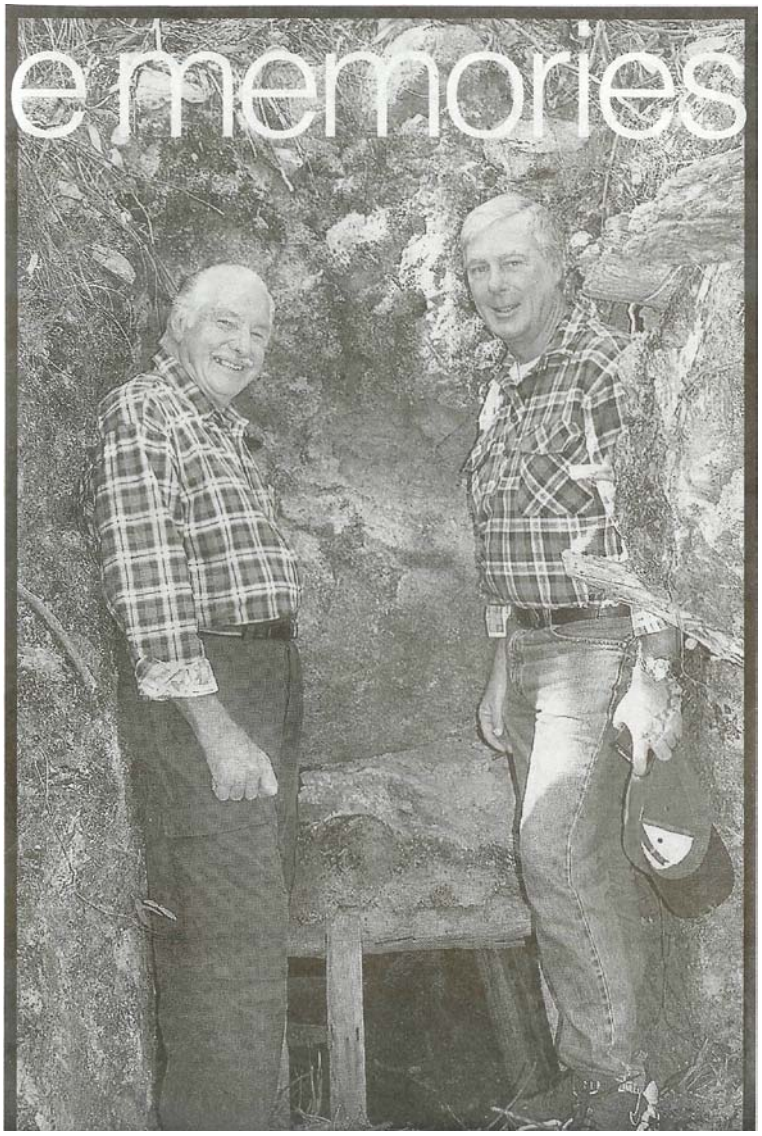
Photos

1. Enemy at the gates: Pictured with one of the poles that made up part of the tank trap are preservation co-ordinator Harold Heffernan and Armidale RSL Sub-Branch president Bob Holloway.

2. Standing test of time:
Armidale Dumaresq Council heritage advisor Graham Wilson next to one of the "pyramids of Ebor" that formed the final line of defence in the tank trap.

3. Preserving the past: Tank trap preservation co-ordinator Harold Heffernan and the Ebor Fall Hotel Motel owner Brian Tyson in the trench outside the tunnel opening.




e memories