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LOCATION OF MAORI DEFENCES AT TE RANGA BATTLE SITE NEAR
TAURANGA, DETERMINED BY GEOPHYSICAL PROSPECTING METHODS

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INTRODUCTION

Te Ranga, near Tauranga (Figure 1), is the site of a battle which took place on 21 June 1864 between British and Maori forces. Maori defences, an unfinished line of rifle pits connected by a trench, straddled a ridge and in them after the battle, more than 100 Maori dead were buried. The Te Ranga Battle Site is now an Historic Reserve and the battle is commemorated by an Historic Places Trust plaque set in a concrete cairn. The Maori defences however, can no longer be seen. They are shown on an early survey plan dated 1881, referred to in the Te Ranga Battle Site Management Plan published by the Department of Lands and Survey, and are thought to be about 10m from the southern boundary of the reserve. The reserve's management committee consider it desirable that their exact location be found.

The defences cannot be located by digging because of the buried dead. The rifle pits are reported to be about 1m deep and 0.5m wide; and the line of defences, about 150m long. It is likely that iron objects: guns and cannon balls etc, were buried in the trench with the bodies. The writer was requested to try and locate the position of the trench using geophysical prospecting methods. This paper describes the results of a proton magnetometer survey supplemented by a short resistivity traverse.

MAGNETOMETER SURVEY

The magnetometer survey was carried out using an ELSEC Proton Magnetometer, which measures magnetic intensity. The earth's magnetic field is distorted when a trench is dug and refilled, and by measuring changes in magnetic intensity in the vicinity of a an infilled trench it is often possible to detect the trench as a "magnetic anomaly." The measured strength of the anomaly depends on the height of the detector, a bottle of water or alcohol, above ground level.

An area of approximately 1300 metres² was surveyed, measurements being taken at 5m intervals with the bottle at a height of 60cm on the end of a brass rod. Lines of equal magnetic intensity, drawn from magnetometer readings, are shown on Figure 2 as contours. The "20" contour represents a meter reading of 42000 which is equivalent to a magnetic intensity of 57264 gamma, and each contour interval is equivalent to about 133 gamma. An increase in contour represents a decrease in magnetic intensity.

An anomaly, indicated by a "saddle" formed by the contours, probably marks the position of the Maori defences. Low readings near a circular concrete water tank may be partly due to the tank. The lowest readings, along the line L---L on Figure 2, probably mark the bottom of the defences. They were determined from measurements taken 1m apart along traverse lines 2m apart across the saddle, with the bottle at a height of 8cm resting on wood.

A magnetometer profile along the line a-b in Figure 2 is shown in Figure 3B. It is expressed as difference in magnetic intensity from point a, and shows a marked positive anomaly 2m from point a. The anomaly is consistent with those of infilled pits described by Tite (1972: 18).

RESISTIVITY TRAVERSE

To confirm the position of the defences the resistivity traverse was made along the line a'-a-b on Figure 2 using a MEGGER Earth Tester. Resistance of the ground to an electric current is altered when a trench is dug and later refilled, and is measured from four equally-spaced electrodes inserted into the ground. The measured resistance is representative of the earth below the electrodes to a depth roughly equal to the spacing of the electrodes. Two sets of readings were taken with electrodes spaced 0.5m and 1m apart. The results are shown by the profiles in Figure 3A.

Both sets of readings show a high resistance 3m from point a', at the same place as the marked positive magnetic anomaly. A very low resistance 2m from a' (1m spacing) is thought to be due to a short between the electrodes caused by a metal tape used to measure electrode separation. A high resistance may occur in a trench filled with rubble, or with very dry sand; a low resistance, in a trench filled with damp earth (Tite, 1972: 25-26). According to the Management plan, the defences at Te Ranga were filled with sand by local Maoris who intended to erect a monument, and conditions prior to the survey were very dry, which would account for the high resistance.

CONCLUSION

The Maori defences (Figure 2) are thought to lie within a strip of land 5m wide immediately behind the concrete cairn and running in a southeasterly direction between the cairn and the concrete water tank.

ACKNOWLEDGEMENT

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REFERENCES

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Dept of Lands and Survey N.Z. |
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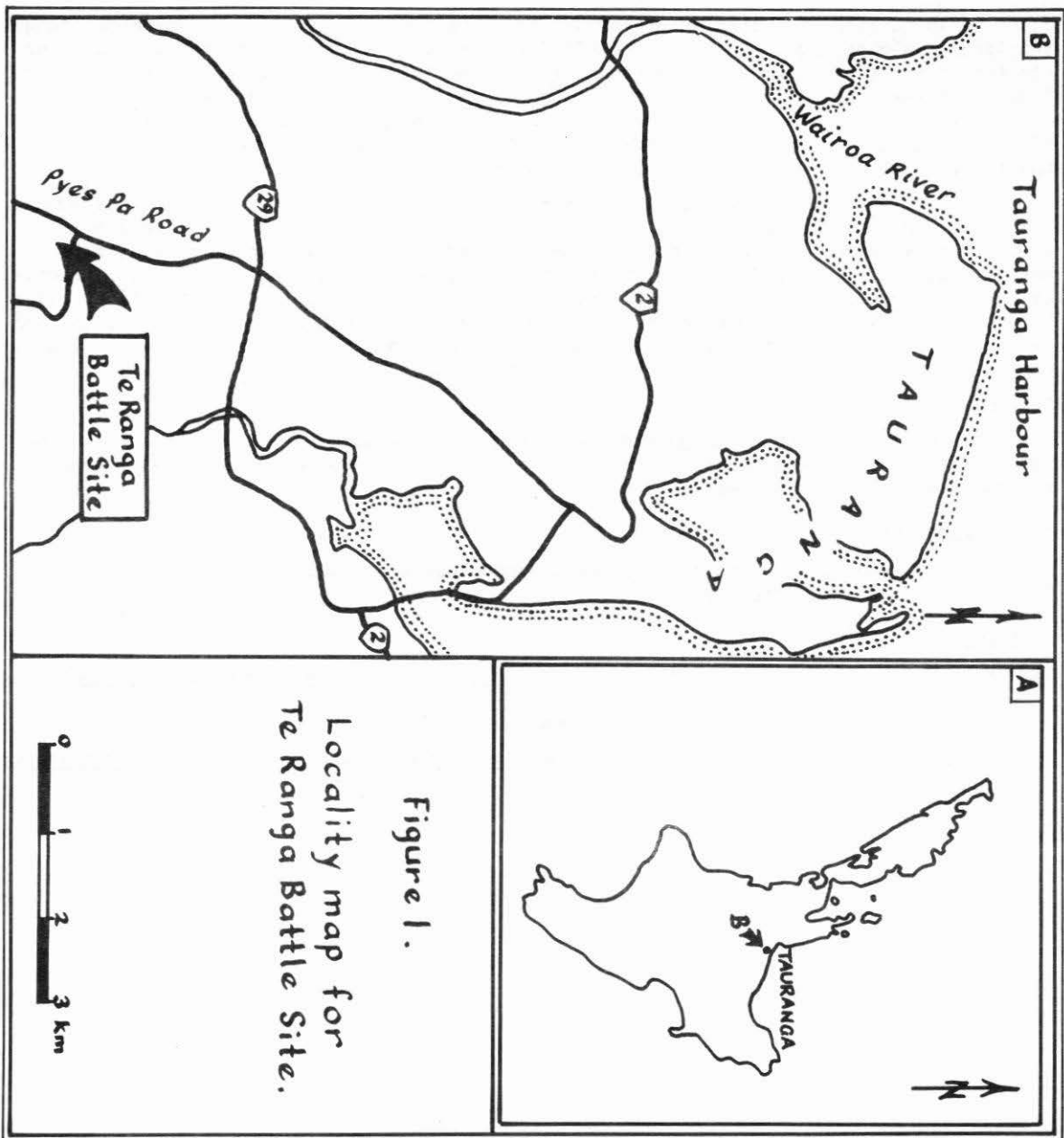


Figure 1.
Locality map for
Te Ranga Battle Site.



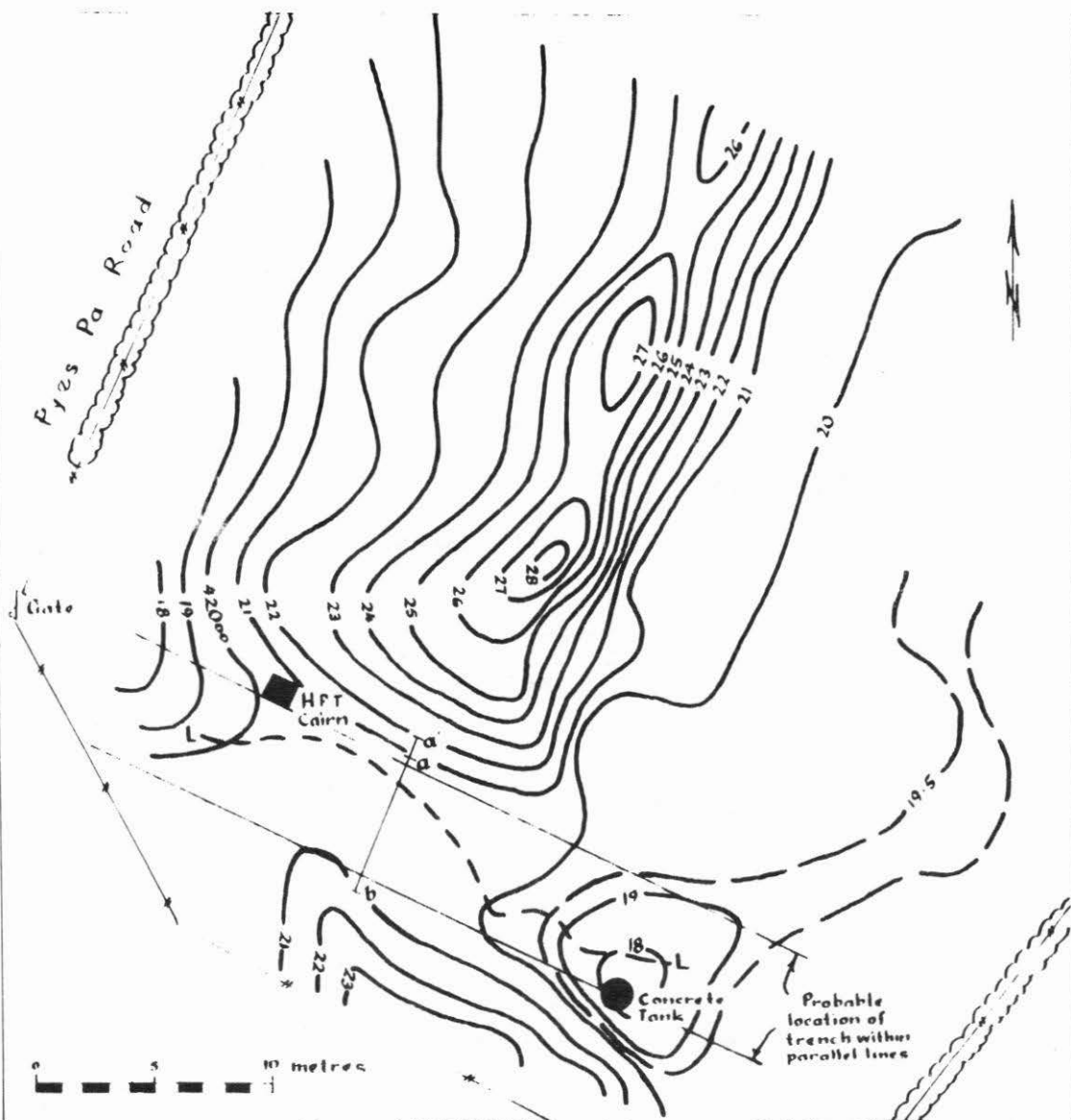


Figure 2.

Proton-magnetometer survey of Te Ranga Historic Reserve. Contours are lines of equal magnetic intensity (for explanation, see text). L-L = line of lowest magnetometer readings. a'-a-b = line of resistivity and magnetometer profiles in Fig. 3.

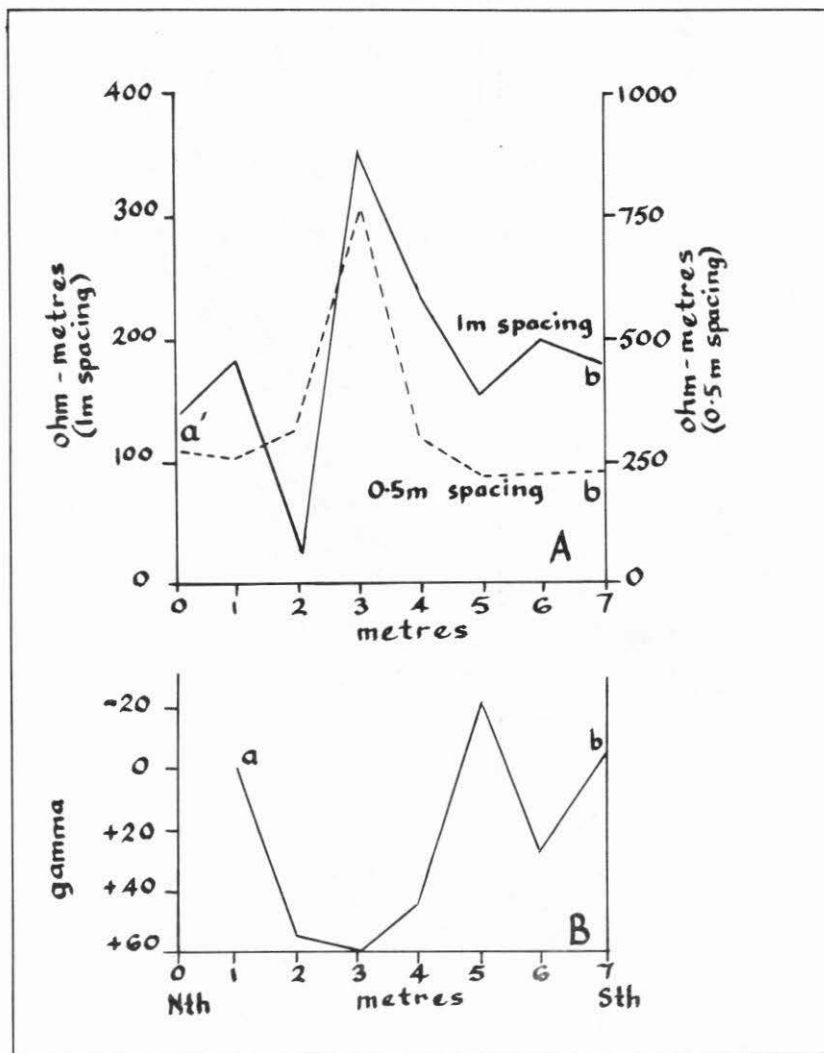


Figure 3.

A: Resistivity profile along line a'-b in Figure 2.

B: Magnetometer profile along line a-b in Figure 2.