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GEOLOGICAL SURVEY DEPARTMENT

THE GEOLOGY OF THE THYOLO AREA

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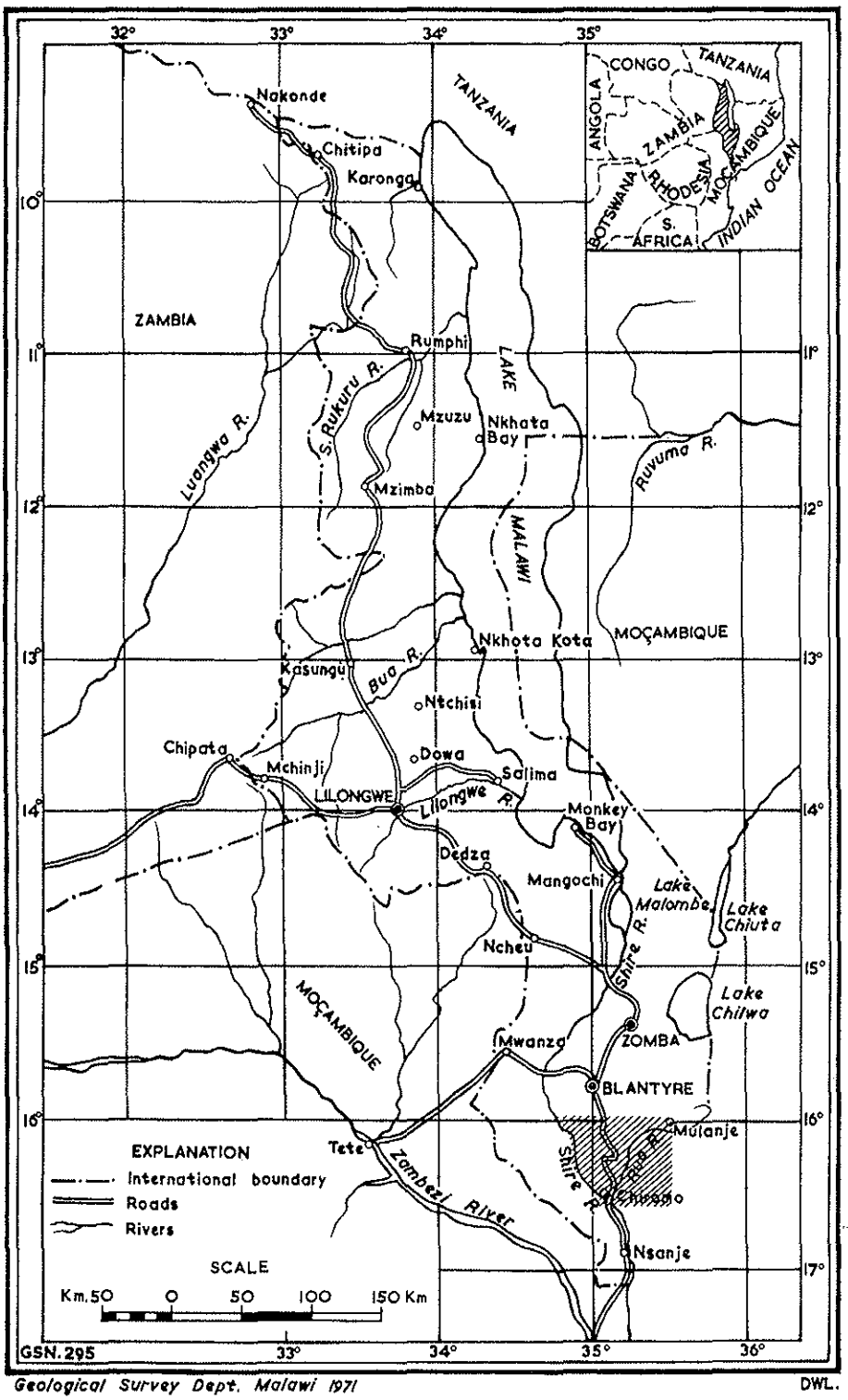


FIG. 1. Location map.

II. PHYSIOGRAPHY

(a) Topography and erosion surfaces

The Thyolo area is one of diverse relief. Elevations range from *c.* 53 m (175 ft) above sea level at Chiromo to 1 462 m (4 796 ft) at the summit of Thyolo Mountain.

Three physiographic zones are recognized (Plate I), namely the Shire Valley plain; the Thyolo fault scarp zone, which forms the eastern boundary of the southern section of the Malawi Rift Valley; and the Thyolo Highlands. The boundary between the first two zones is sharply demarcated. The top of the escarpment, at an altitude of approximately 914 m (3 000 ft) merges imperceptibly into the extensive Thyolo Highlands, but both are overshadowed by the ridge of Thyolo Mountain.

The Thyolo Highlands represent a mid-Tertiary erosion surface (cf. Dixey 1941), slightly tilted away from the Rift Valley escarpment and falling gradually to approximately 610m (2 000 ft) to the southeast of Luchenza. The surface, however, is not uniform and there are significant variations in relief. Only in the extreme northeast does the surface approach that of a plateau characterized by only slight dissection. In that area it is mantled by widespread and generally thick residual soils.

The Thyolo fault scarp zone dominates the eastern side of the Shire Valley and defines the faulted and dissected southwestern margin of the Thyolo Highlands surface. It comprises a number of discontinuous topographic steps that reflect a complex history of post-Stormberg rift faulting. Faulted spurs at the base of the escarpment rise sharply from the adjacent plain and possibly indicate Pleistocene movement along the Thyolo fault. The fault scarp zone as a whole remains one of instability and minor tremors are still experienced periodically.

The Shire Valley plain is relatively flat and featureless and lies between 53 and 91 m (175 and 300 ft) above sea level.

(b) Drainage

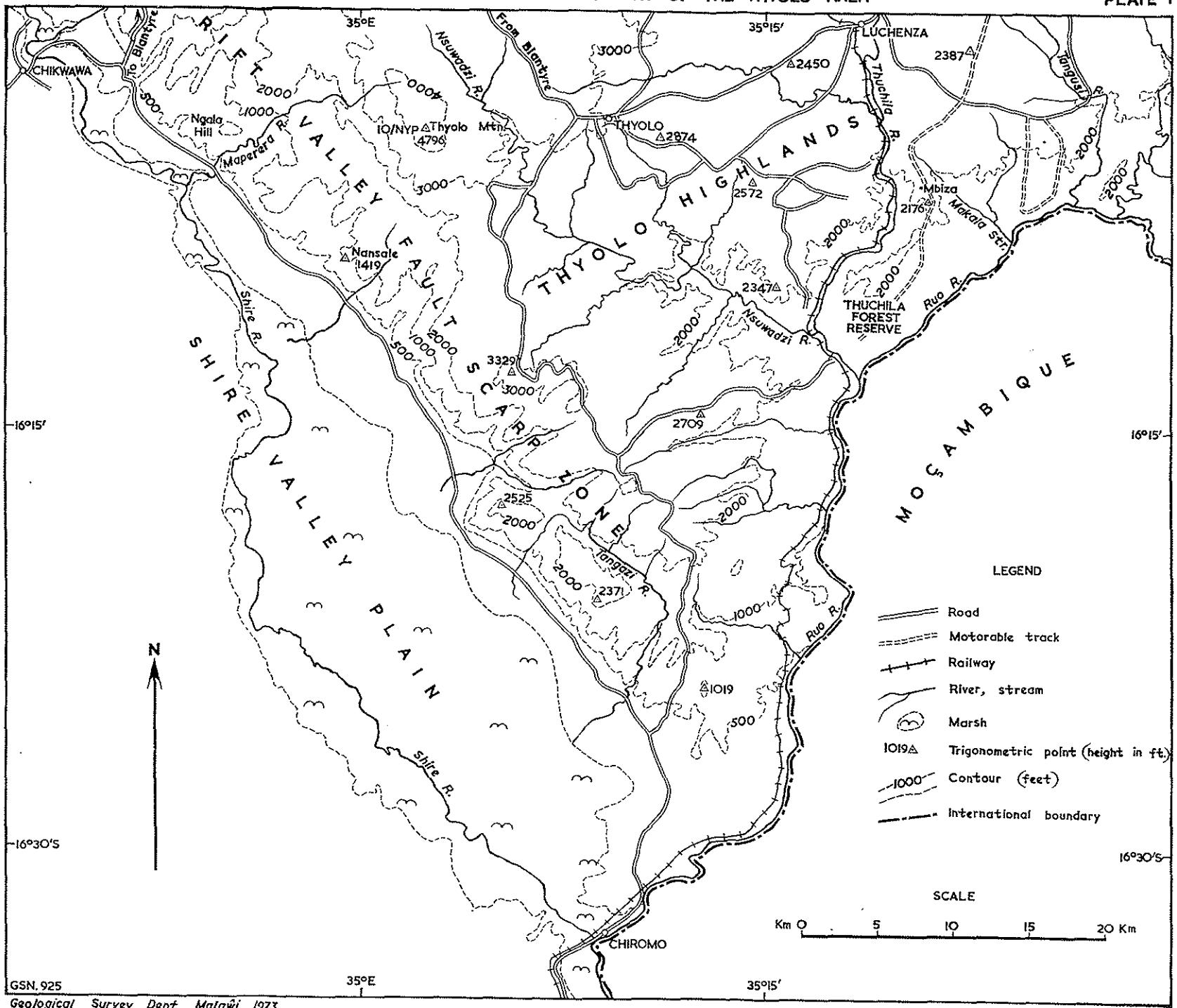
The area is drained by the Shire and Ruo Rivers and their tributaries. A prominent NNW-trending watershed along the ridge of Thyolo Mountain and the crest of the escarpment gives rise to eastward flowing streams draining ino the Ruo and Tuchila Rivers and westward flowing streams draining directly into the Shire River (Plate I). The various tributary streams generally have small catchment areas, but the high rainfall and run-off produce rivers with virtually perennial flow. Flash floods are not unknown.

In the northeast *dambo** drainage is predominant and no significant geological or structural control is apparent. Towards the southwest, however, the country becomes increasingly dissected and the drainage pattern reflects the control imposed by a major dyke swarm and by a fracture system perpendicular to the trend of the dykes. These fractures have controlled the flow of certain tributaries of the Ruo and Tuchila Rivers (e.g. the Makala Stream). Another example of this control is provided by the alignment of the Nsuwadzi River. The Ruo and Tuchila Rivers themselves, however, do not appear to have been strongly influenced by the underlying structure and follow meandering courses, although their general directions of flow are to the southwest, parallel to the trend of the dyke swarm.

* *Dambo:* a Chichewa word translated as broad, grass-covered swampy valley(s).

COMMUNICATIONS AND PHYSIOGRAPHY OF THE THYOLO AREA

PLATE I



VIII. ECONOMIC GEOLOGY

(a) General Statement

With the possible exception of certain of the ultramafic bodies, there would appear to be little prospect of significant concentrations of economic minerals being present in the area.

During the mapping programme a number of prospecting pits in mica-bearing pegmatites were located in the Ruo Valley immediately west of the Zoa Falls. Insufficient large flake was noted, however, for these occurrences to be of further interest (Habgood 1959).

A small deposit of kaolin was recorded in the Makala Stream approximately 16 km southwest of Chitakali (Walshaw 1963, unpublished report) and kaolin-bearing soils are developed to the north of Thyolo Mountain.

Adequate reserves of roadstone and railway ballast are provided by the many dolerite dykes which occur throughout the area.

(b) Copper-nickel

Geochemical reconnaissance and more detailed follow-up surveys have been carried out at the Maperera anomaly, which is located over the Ngala Hill metapyroxenite in the northwest of the area. Malachite coatings have been recorded in an ESE-trending zone measuring approximately 60 m by 15 m, located immediately east of the 'central' summit (343 m, 1 125 ft) of the hill (Walshaw 1968; Smith 1971; both unpublished reports).

As a result of the preliminary investigation by Walshaw (1968, unpublished report) the ultramafic body was shown to be rich in Cu, Ni and Cr, and the more detailed follow-up by Smith (1971, unpublished report) allowed the delimitation of a significant area in the central section of the hill with average copper values (41 samples) of 1 275 ppm Cu. In the same section values for nickel, chromium and cobalt average 525 ppm Ni; 690 ppm Cr; and 160 ppm Co. The values for copper and nickel are of interest and correspond with the area of visible copper mineralization.

Several areas of lesser interest for nickel exist in the same body. The most promising of these lies just to the west of the main copper anomaly whilst a second area is situated near the western edge of the intrusion. Smith (1971, unpublished report) recommended additional work on these two sections and a drilling programme in the mineralized zone.

By analogy with the Ngala Hill ultramafic body, detailed geochemical sampling of the two bodies to the south of Thyolo Mountain would seem warranted. Preliminary sampling of the more easterly of these bodies yielded mean values of 115 ppm Cu (max. 220 ppm); 220 ppm Ni (max. 300 ppm); and 405 ppm Cr (max. 700 ppm).

(c) Groundwater

The Thyolo area receives a generous rainfall and boreholes sited in fracture zones, in zones of weathered gneiss and in the unconsolidated deposits of the Shire Valley give yields which exceptionally attain 2 000 gph. The dolerite dykes act as groundwater traps and may be utilized in groundwater surveys. Details of the boreholes drilled in the area to 1972 are listed in Table I. The location of the boreholes is indicated in Fig. 2.

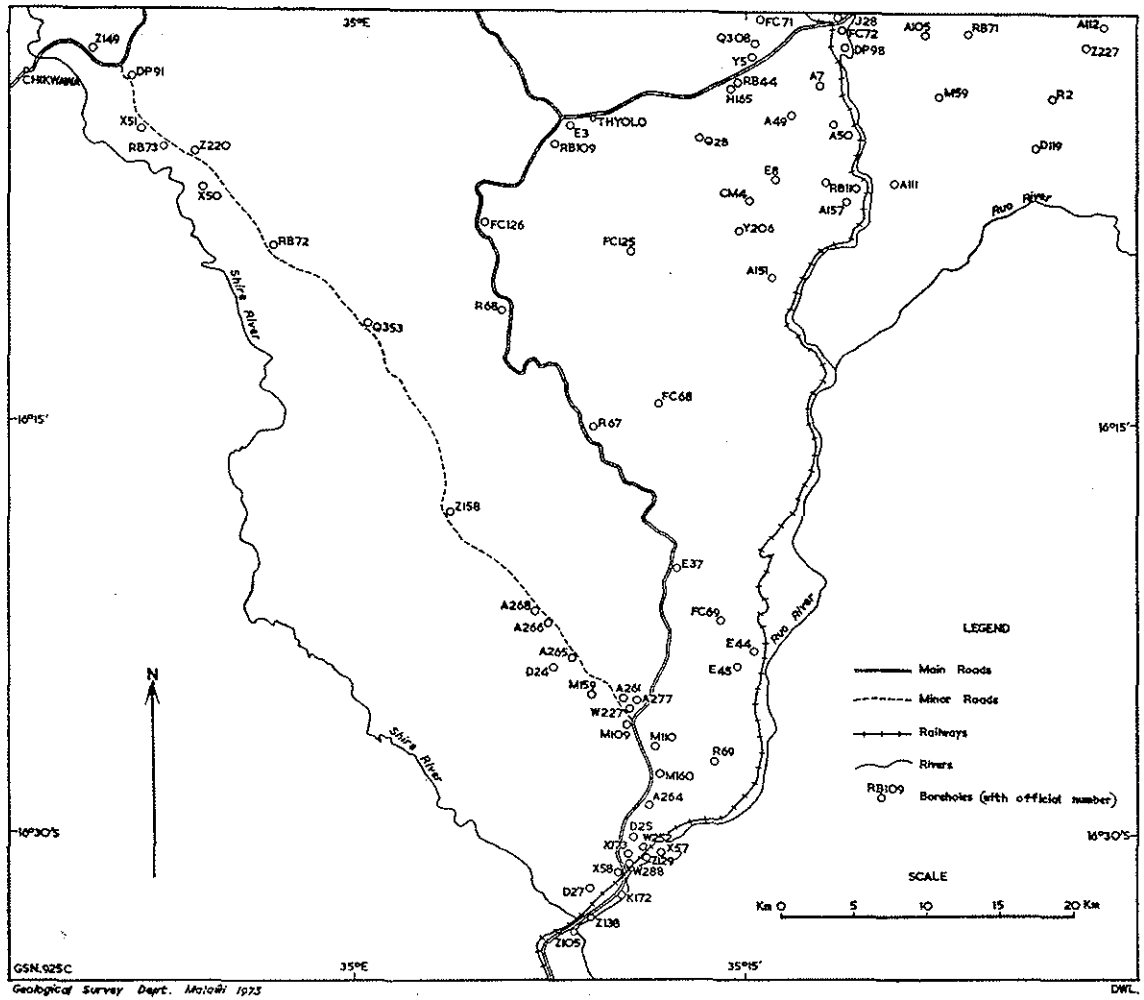


FIG. 2. Location of boreholes in the Thyolo area.

TABLE I

BOREHOLES DRILLED FOR WATER SUPPLY IN THE THYOLO AREA TO 1972

Ref. No.	Locality	Depth (m)	Depth (ft)	Yield (gph)	Rocks penetrated	Year drilled
M 59	Unyolo	37	120	600	Weathered gneiss	1953
M 109	Mlambala	43	140	1 100	Alluvial gravel	1953
M 110	Chatacha	53	175	1 500	Alluvial gravel	1953
M 159	Mlolo Court	34	113	800	Alluvial gravel	1953
M 160	Chambuluka	32	105	900	Alluvial gravel	1953
K 172	Chiromo Boma	43	140	720	Alluvial sand	1955
K 173	Makanga Agric. Stn.	34	110	560	Alluvial sand	1955
E 3	Mchima	27	87	850	Weathered gneiss	1957
E 8	Khonjeni Court	30	100	300	Weathered gneiss	1957
E 37	Mphande Court	37	121	800	Weathered gneiss	1957
E 44	Salanje Market	26	84	600	Weathered gneiss	1957
E 45	Malota	28	93	800	Weathered gneiss	1957
Z 105	Chiromo Rest House	13	42	?	Alluvial sand	1959
Z 129	Masanduko	34	110	900	Alluvial sand	1956
Z 138	No records					
Z 149						
Z 158						
Z 210						
Z 227						
J 28	Luchenza School	34	113	730	Weathered gneiss	1960
W 227	Muona Mission	47	153	150	Weathered gneiss	1960
W 252	Makanga Farm	52	170	900	Alluvial sand	1961
W 287	Muona Mission	48	156	800	Alluvial sand	1961
W 288	Makanga Farm	16	52	?	Alluvial sand	1961
A 7	Nanseta	26	86	675	Weathered gneiss	1961
A 49	Namiwa	27	90	200	Weathered gneiss	1962
A 50	Mberenga	37	123	1 200	Weathered gneiss	1962
A 105	Chikwapa	26	85	1 200	Weathered gneiss	1962
A 111	Misuli	30	100	1 200	Weathered gneiss	1962
A 112	Likabula T.C.	23	75	880	Weathered gneiss	1962
A 151	Kanyera	30	100	1 200	Weathered gneiss	1962
A 157	Mikate	9	30	240	Weathered gneiss	1962
A 261	Muona Mission	56	185	1 900	Alluvial gravel	1963
A 264	Chambuluka School	43	142	1 000	Alluvial gravel	1963
A 265	Chomoto	19	61	?	Alluvial gravel	1963
A 266	Nyongo	14	47	?	Alluvial gravel	1963
A 268	Chinkole	19	63	?	Alluvial gravel	1963
A 277	Muona Mission	67	220	2 000	Alluvial gravel	1963
H 165	Pumula Estate	46	150	1 000	Weathered gneiss	1966
D 24	Chinzeti	49	160	600	Alluvial sand	1967
D 25	Nsusa	40	130	500	Alluvial sand	1967
D 27	Nkolimbo	45	148	720	Alluvial sand	1967
D 119	Thembe	46	152	1 635	Fractured gneiss	1969
Q 308	Kasalika	34	110	276	Weathered gneiss	1969
Q 353	Makwila Dispensary	28	91	1 140	Alluvial gravel	1969
R 2	Golden	31	101	230	Weathered gneiss	1970
R 67	Mphembere Clinic	32	105	200	Weathered gneiss	1969
R 68	Makwasa Market	26	85	150	Weathered gneiss	1969
R 69	Beaton	38	125	184	Weathered gneiss	1969
X 50	Chingambatuka	34	112	720	Alluvial sand	1970
X 51	Khumbulai	30	100	900	Alluvial sand	1970
X 57	Chikonge Scheme	27	90	720	Alluvial sand	1970
X 58	Makanga Farm	34	113	600	Alluvial sand	1970
Y 5	Magunda	24	80	276	Weathered gneiss	1970
Y 206	Ngamwane	34	110	920	Weathered gneiss	1971
FC 68	Nankhungu	37	122	1 100	Weathered gneiss	1971
FC 69	Gombe	30	100	230	Weathered gneiss	1971
FC 71	Mikombe School	32	104	920	Fractured gneiss	1972
FC 72	Luchenza Market	41	133	124	Weathered gneiss	1972

TABLE I – *continued*

Ref. No.	Locality	Depth (m)	Depth (ft)	Yield (gph)	Rocks penetrated	Year drilled
FC 125	Namireme School	40	130	1 100	Weathered gneiss	1972
FC 126	Mutambanyama School	46	150	720	Weathered gneiss	1972
DP 91	Mwampanzi Farm	47	155	1 000	Alluvial gravel	1971
DP 98	Lola	37	120	552	Weathered gneiss	1972
RB 44	Pumula Estate	45	147	1 180	Fractured gneiss	1972
RB 71	Nachimango Estate	36	118	1 140	Fractured gneiss	1972
RB 72	Chagalang'anda	32	105	920	Alluvial sand and gravel	1972
RB 73	Joseph	34	110	552	Alluvial sand and gravel	1972
RB 109	Nachipere School	43	140	720	Weathered gneiss	1972
RB 110	Kumadzi Estate	41	136	720	Weathered gneiss	1972
CM 4	St. Joseph's Church, Mitengo	43	140	600	Fractured gneiss	1972

Depth in metres calculated to nearest whole metre.