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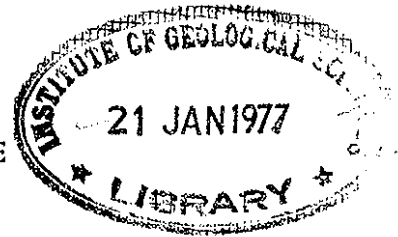
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MALAWI
MINISTRY OF AGRICULTURE
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NATURAL RESOURCES



GEOLOGICAL SURVEY DEPARTMENT

THE GEOLOGY OF THE LILONGWE-DOWA AREA

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(c) Geomorphology

Following Lister (1967), three erosion surfaces are recognized in the Lilongwe-Dowa area (Plate II). The most extensive of these is the Lilongwe Plain, forming part of the late Cretaceous to early Miocene 'African' surface. The surface is gently tilted away from the Rift Valley to the east (cf. section (a) above) and it is probable that this reflects upwarping along the Lake Malawi rift in post-early Miocene times.

The main hills rising above the African surface are interpreted as remnants of the early to mid-Cretaceous 'post-Gondwana' surface. These hills, likewise, decrease in height westwards, again reflecting the westward tilting noted above (Lister 1967). It is possible that lower ground associated with the northern Lingadzi Valley is a remnant of the African surface, separated from the main development of that surface by the post-Gondwana residuals.

The 'post-African' surface of late Miocene and Pliocene age is only present along the main river valleys. It is best developed along the northern Lingadzi Valley and in the lower reaches of the Lilongwe and Lumbadzi Rivers. The post-African surface passes gradationally into the African surface without obvious break or distinctive topographic expression.

(d) Climate and vegetation

These topics are dealt with in some detail by Brown and Young (1965) and only a brief review, based largely on their work, will follow here.

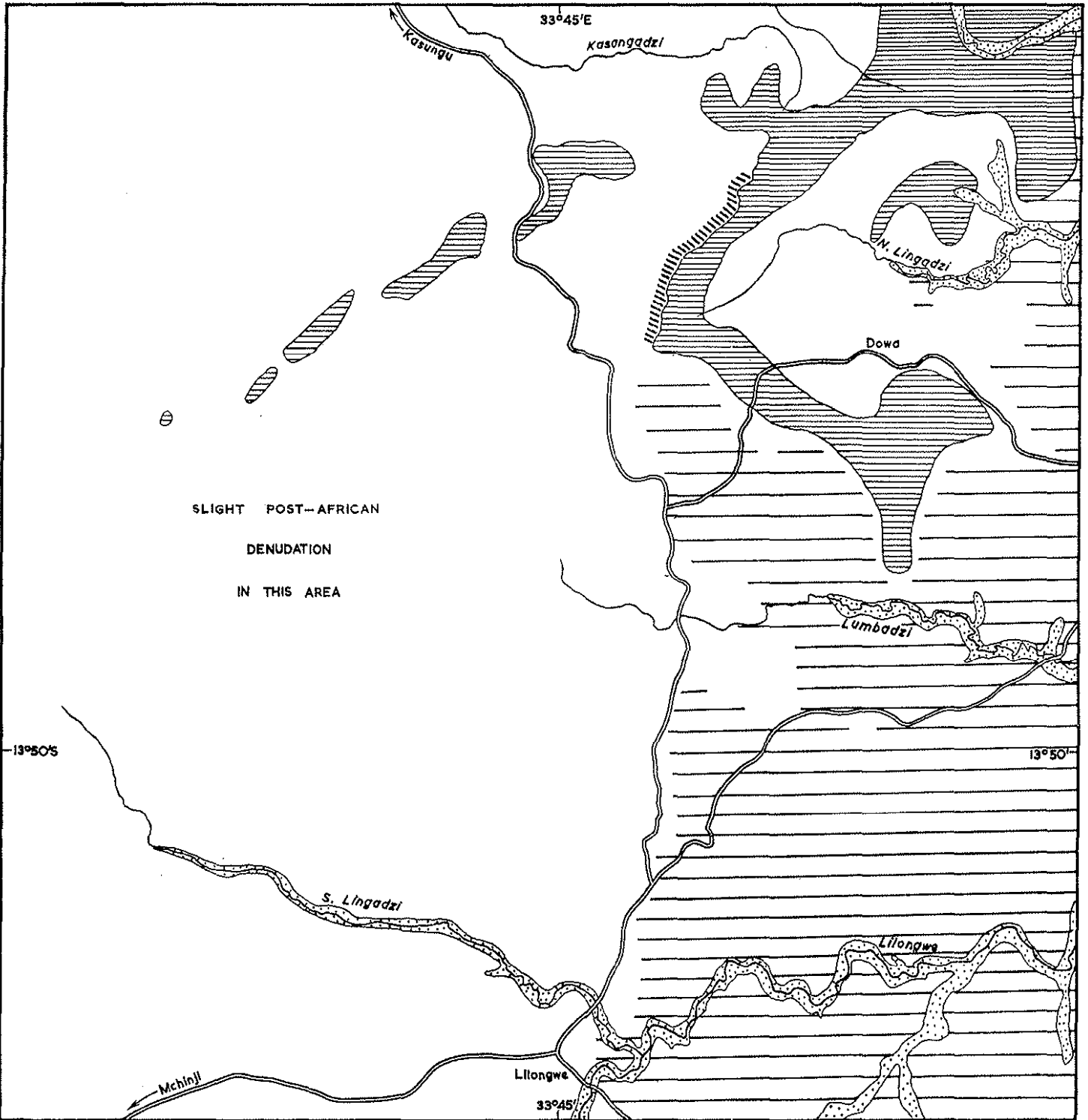
The Lilongwe-Dowa area experiences a tropical continental climate with a single rainy season, lasting approximately from December to March. The mean annual temperature of the Lilongwe Plain is in the range 19° to 21°C and the rainfall in the range 762 to 890 mm. The higher ground around Dowa is cooler (17° to 19°C) and wetter (890 to 1 270 mm).

The natural vegetation of much of the Lilongwe Plain is classified by Brown and Young (1965) as a *Combretum - Acacia - Ptilostygmia* cultivation savanna developed on a fertile ferruginous soil. Less fertile, weakly ferallitic soils carrying *Brachystegia - Julbernardia* woodland are also extensively developed, particularly in the vicinity of Nsaru. During the present survey brakes of bamboo (*Oxytenanthera abyssinica*) were noted in the undulating country between Chiwamba Hill and the Lilongwe River, perhaps indicating that mixed woodlands (cf. the "scarp foothill woodlands" of Brown and Young 1965) also occur in the present area. In the east a narrow strip of country extending northwards from the Limpimbi Valley to Kaolatsitsi Hill and beyond is classified as *Brachystegia* hill woodland and savanna woodland, grading into low montane grassland further north.

The fertile soils of the Lilongwe Plain are ideal for the production of maize, groundnuts and tobacco. Good conditions for coffee growing exist in the Dowa Hills.

EROSION SURFACES IN THE LILONGWE-DOWA AREA

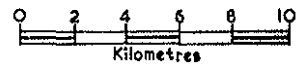
PLATE II



EXPLANATION

- | | |
|---|--|
|  Post-African erosion |  African erosion surface with Post-African dissection increasing in intensity eastwards |
|  African erosion surface |  Post-Gondwana residuals |
| |  Scarp features |

SCALE



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However, the programme failed to reveal any significant centres of mineralization.

The most extensive occurrence described by Andrew and Bailey (1908-9, unpublished report) is known as the "Lungudzi lode." Old trenches have been relocated recently 3 km east-south-east of Chiponde Hill and more quartz veins, regarded by Andrew and Bailey as the southward extension of the lode, lie 3 km south-south-east of the same hill. Geochemical resampling in the vicinity of these occurrences is in progress.

(e) Mica

Several mica pegmatites have been located in the vicinity of Dowa (Craig 1919, unpublished report). Most of the pegmatites are deformed, to the detriment of the mica.

Tourmaline is also common in the pegmatites, a noteworthy occurrence being that on the northern side of the Lilongwe-Mchinji road 1.6 km west of Mpingu Market.

(f) Geochemical drainage reconnaissance

A geochemical sampling programme was carried out in conjunction with the regional mapping and some follow-up work has since been undertaken on the few anomalies located.

In the north-eastern quadrant of the area no concentrations of high values of economic significance have been recorded. Geochemical features for Nb, Sn, Mo, Zn and Pb are ascribed to the presence of underlying alkali syenites, pegmatitic gneisses and massive pegmatites. Features for Cu, Ni, Cr and Co are possibly related to the presence of mafic gneisses (Smith 1970, unpublished report).

In the southern half of the area McArdle and Smith (1971, unpublished report) note that the values obtained are generally rather higher for most elements than elsewhere in the Central Region. This is attributed to a more active drainage regime and to the granitoid and syenoid rocks causing higher background values for Sn and Pb. Three minor anomalies possibly meriting follow-up work have been delineated, two at Dzenza (Ni, Cr) and one at Kamvula (As, Pb, Ag).

(g) Groundwater

Underground water supplies are particularly important in the densely populated areas of the Lilongwe Plain where only the major rivers flow throughout the year. Groundwater is readily obtainable from the thick superficial deposits. In the better exposed country to the east fracture zones and weathered gneisses carrying plentiful supplies of groundwater are quite common.

Details of boreholes drilled to the end of 1971 are listed in Table I. The distribution of the boreholes is indicated in Plate IV; the extensive development in the south-western quadrant of the area has been achieved as part of the Lilongwe Land Development Project financed by International Development Agency.

LOCATION OF BOREHOLES IN THE LILONGWE—DOWA AREA

PLATE IV

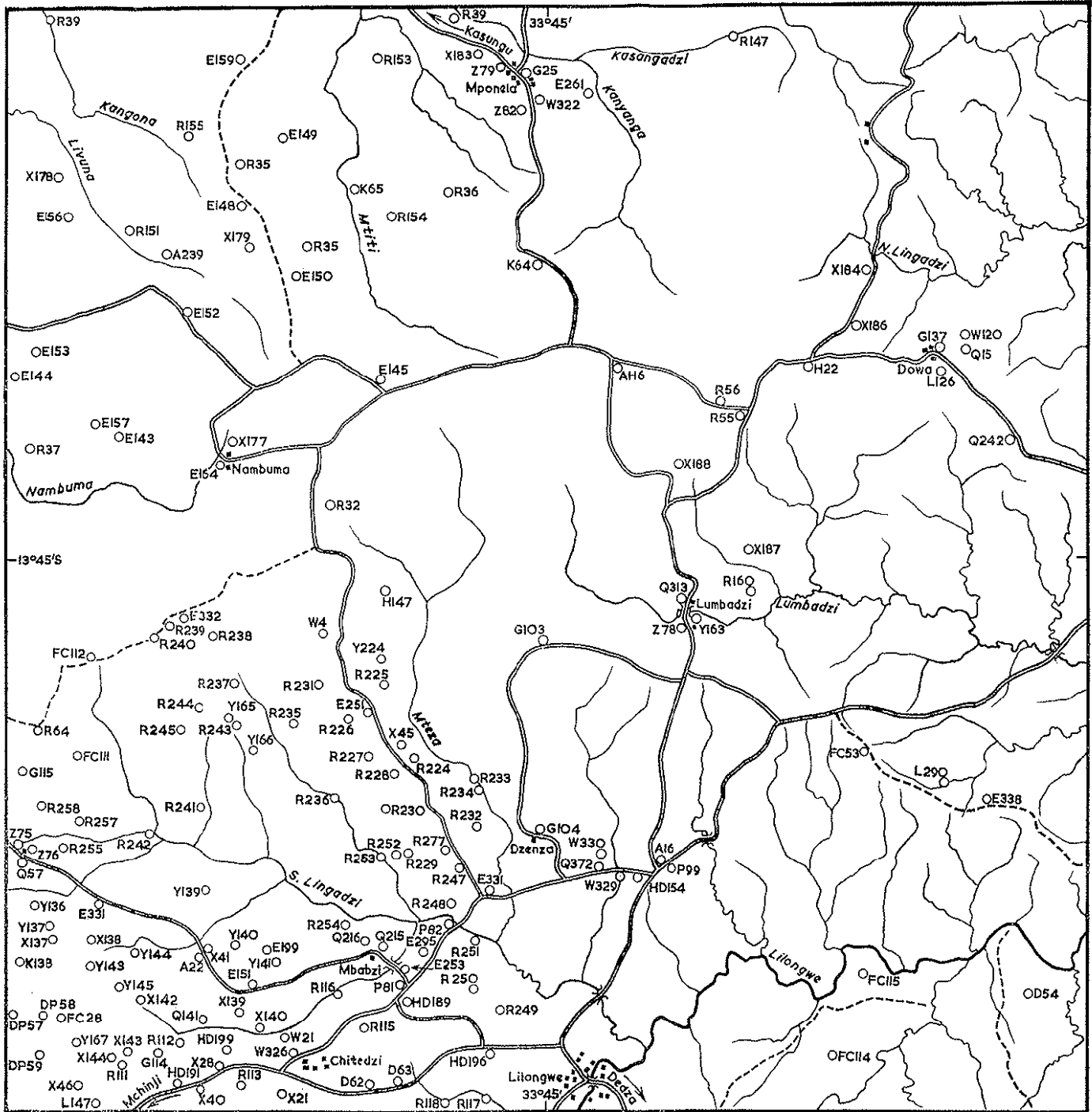


TABLE I

BOREHOLES DRILLED FOR WATER SUPPLY IN THE LILONGWE-DOWA AREA TO 1971

Ref. No.	Locality	Depth (m) (ft)	Yield (g.p.h.)	Rocks penetrated	Year Drilled
Z 75	Nsaru ADMARC	46 150	1 200	Colluvium, gneiss	1936
Z 76	Nsaru ADMARC	76 250	120	Colluvium, gneiss	1936
Z 78	Lombadzi ADMARC	49 160	3 600	Weathered gneiss	1937
Z 79	Mponela Market	34 112	3 600	Colluvium, gneiss	1937
Z 82	Chidoti	57 186	480	Colluvium, gneiss	1938
G 25	Mponela Market	30 100	420	Weathered gneiss	1951
G 103	Chitakula Court	29 95	600	Weathered gneiss	1951
G 104	Dzenza School	38 125	500	Weathered gneiss	1951
G 114	Bwatalika	32 105	720	Weathered gneiss	1952
G 115	Gwiriza	30 100	600	Weathered gneiss	1952
G 137	Dowa Township	62 202	650	Pegmatite, gneiss	1951
K 64	Namwili School	30 100	600	Graphite-biotite gneiss	1954
K 65	Dzoole Court	37 120	650	Weathered gneiss	1954
L 128 C	Dowa Township	23 75	3 600	Weathered gneiss	1956
L 128 D	Dowa Township	30 100	3 600	Gneiss	1956
L 147	Kaliopa	37 120	520	Weathered gneiss	1955
L 290	Gwazamaia	34 110	800	Weathered gneiss	1956
HD 189	Makalani	34 112	480	Weathered gneiss	1956
HD 191	Samu	36 118	520	Weathered gneiss	1956
HD 196	Njewa Court	34 113	500	Weathered gneiss	1956
HD 199	Kapanula	30 100	700	Weathered gneiss	1956
E 143	Beni	27 90	480	Colluvium, gneiss	1958
E 144	Kayembe Chinchira	37 123	800	Colluvium, gneiss	1958
E 145	Dangaliro	31 103	500	Colluvium, gneiss	1958
E 148	Sendeza	30 100	900	Colluvium, gneiss	1958
E 149	Yohani	46 150	550	Colluvium, gneiss	1958
E 150	Ndengwe	38 125	480	Colluvium, gneiss	1958
E 151	Mbangala	31 101	600	Colluvium, gneiss	1958
E 152	Kayembe	28 92	960	Colluvium, gneiss	1958
E 153	Mthunzi	25 81	960	Colluvium, gneiss	1958
E 154	Nambuma Dispensary	43 140	860	Colluvium, gneiss	1958
E 156	Sambani Court	32 106	576	Colluvium, gneiss	1958
E 157	Mzowa	33 108	360	Colluvium, gneiss	1958
E 159	Simbi	30 100	600	Colluvium, gneiss	1958
E 199	Ngongonda	31 103	900	Colluvium, gneiss	1958
E 251	Mtema's Court	37 120	1 200	Weathered gneiss	1958
E 253	Sankhani	37 120	450	Weathered gneiss	1958
E 261	Chiponda Court	34 110	264	Colluvium, gneiss	1958
E 295	Ezekiel Joseph	49 162	660	Colluvium, gneiss	1959
E 331	Thumba	37 123	110	Colluvium, gneiss	1964
E 332	Kalonga	37 121	847	Colluvium, gneiss	1964
E 333	Mutu	54 178	120	Colluvium, gneiss	1964
E 338	Mkupa School	34 110	261	Weathered gneiss	1964
A 16	Ali Malinde	35 115	720	Weathered gneiss	1961
A 22	Nakuwawa	30 97	720	Weathered gneiss	1961
A 239	Ndika	49 162	720	Weathered gneiss	1963
W 2	Mwanjewa	25 82	1 056	Colluvium, gneiss	1959
W 4	Chitsime	46 150	440	Weathered gneiss	1959
W 120	Dowa Township	35 116	2 160	Pegmatite, gneiss	1959
W 322	Mponela Sec. School	60 198	990	Weathered gneiss	1965
W 326	Mwanjema	40 132	880	Weathered gneiss	1965
W 329	National Primary School	52 170	900	Weathered gneiss	1970
W 330	National Primary School	38 125	720	Weathered gneiss	1970
H 22	Dzeleka Prison	54 176	2 250	Weathered gneiss	1965
H 147	Mnkawa	53 174	880	Colluvium, gneiss	1966
D 54	Namelela	27 90	880	Colluvium, gneiss	1967
D 62	Mwanza	46 150	552	Colluvium, gneiss	1968
D 63	Mwanza	36 118	360	Colluvium, gneiss	1968
AH 6	Majega	37 120	880	Colluvium, gneiss	1967
Q 15	Dowa Township	37 123	1 056	Pegmatitic gneiss	1966
Q 57	Nsaru Agric.	46 152	390	Colluvium, gneiss	1967

TABLE I—continued

Locality	Depth		Yield (g.p.h.)	Rocks penetrated	Year Drilled
	(m)	(ft)			
Mbabzi Estate	61	200	800	Colluvium, gneiss	1968
Lingadzi Estate	62	203	900	Colluvium, gneiss	1968
Kafumphe School	49	160	960	Weathered gneiss	1968
Lombadzi Dispensary	40	130	1 500	Weathered gneiss	1969
Lilongwe Brickwork	55	180	1 020	Weathered gneiss	1969
Buli Township	49	160	360	Colluvium, gneiss	1970
Mbabzi Camp	40	130	640	Colluvium, gneiss	1970
Lilongwe ADMARC	57	188	1 350	Colluvium, gneiss	1970
Mwanza	37	120	1 800	Colluvium, gneiss	1969
Tungwe	37	120	475	Colluvium, gneiss	1969
Chibweza	44	145	600	Colluvium, gneiss	1969
Sandulizeni	43	140	1 200	Colluvium, gneiss	1970
Nthanga	46	150	1 200	Colluvium, gneiss	1970
Kawere	46	150	750	Colluvium, gneiss	1969
Mbalame Schoo	40	131	120	Weathered gneiss	1969
Mbanze School	27	90	720	Weathered gneiss	1969
Chadzala	46	150	2 000	Colluvium, gneiss	1970
Khangwi	37	120	500	Colluvium, gneiss	1969
Nyanzo	37	120	600	Colluvium, gneiss	1970
Siyinda	40	130	300	Colluvium, gneiss	1970
Madziakhankhana	38	125	1 500	Colluvium, gneiss	1970
Mgwenje	44	145	600	Colluvium, gneiss	1970
Sankhani Wogera	40	130	4 500	Colluvium, gneiss	1970
Chimphangu	37	120	350	Colluvium, gneiss	1970
Mvase	37	120	1 800	Colluvium, gneiss	1970
Chibanzi School	30	100	450	Colluvium, gneiss	1970
Mahiri	31	101	630	Colluvium, gneiss	1970
Wisikoti	38	125	720	Colluvium, gneiss	1970
Kabudula	38	124	625	Colluvium, gneiss	1970
Mbewa	46	150	550	Colluvium, gneiss	1970
Funsani	31	103	480	Colluvium, gneiss	1970
Mngwangwa	40	132	228	Colluvium, gneiss	1970
Mbalame	55	180	515	Colluvium, gneiss	1971
Bwatha	46	150	3 600	Colluvium, gneiss	1971
Kalimbila No. 2	38	125	1 055	Colluvium, gneiss	1971
Mngwangwa	46	150	225	Colluvium, gneiss	1971
Machakaza	46	150	2 000	Colluvium, gneiss	1971
Chilombo	44	145	600	Colluvium, gneiss	1971
Kambulile	46	150	600	Colluvium, gneiss	1971
Mandala Daya	46	150	360	Colluvium, gneiss	1971
Kudoko	46	150	330	Colluvium, gneiss	1971
Mngwangwa	40	130	330	Colluvium, gneiss	1971
Mtsukwa School	46	150	850	Colluvium, gneiss	1971
Kalimbila No. 1	46	150	300	Colluvium, gneiss	1971
Chinyama	38	125	1 500	Colluvium, gneiss	1971
Katema	43	140	1 500	Colluvium, gneiss	1971
Kasanza No. 2	46	150	330	Colluvium, gneiss	1971
Kasanza No. 1	46	150	1 500	Colluvium, gneiss	1971
Mphetsankhuli	46	150	450	Colluvium, gneiss	1971
Mchoka	37	120	900	Colluvium, gneiss	1971
Kayimbe	43	140	3 600	Colluvium, gneiss	1971
Chilembwe	43	140	1 500	Colluvium, gneiss	1971
Kapalanga	46	150	470	Colluvium, gneiss	1971
Pheleni	37	120	600	Colluvium, gneiss	1971
Mzumanzi	30	100	1 125	Colluvium, gneiss	1971
Tambala	37	120	2 250	Colluvium, gneiss	1971
Mnwenela	46	150	600	Colluvium, gneiss	1971
Muzu No. 1	46	150	1 800	Colluvium, gneiss	1971
Phereni School	37	120	720	Colluvium, gneiss	1970
Chagamba	40	130	1 200	Colluvium, gneiss	1971
Chimwaza	46	150	3 000	Colluvium, gneiss	1971
Seza	46	150	190	Colluvium, gneiss	1971

TABLE I—continued

Ref. No.	Locality	Depth		Yield (g.p.h.)	Rocks penetrated	Year Drilled
		(m)	(ft)			
R 255	Mchiliko	46	150	950	Colluvium, gneiss	1971
R 257	Cheluka	43	140	2 000	Colluvium, gneiss	1971
R 258	Matuwale	46	150	3 600	Colluvium, gneiss	1971
R 261	Kakutha	46	150	720	Colluvium, gneiss	1971
R 277	Chikuthe	61	200	700	Colluvium, gneiss	1971
X 21	Sinyala	34	110	200	Colluvium, gneiss	1970
X 28	Mpingu Market	40	130	560	Colluvium, gneiss	1970
X 40	Mpingu Market	46	150	400	Colluvium, gneiss	1970
X 41	Nakuwawa	46	150	1 000	Colluvium, gneiss	1971
X 45	Mngwangwa	43	140	500	Colluvium, gneiss	1970
X 46	Kambiya	46	150	900	Colluvium, gneiss	1971
X 137	Kochela	46	150	900	Colluvium, gneiss	1971
X 138	Thuma No. 2	61	200	200	Colluvium, gneiss	1971
X 139	Manzi	43	140	450	Colluvium, gneiss	1971
X 140	Kakunga	46	150	600	Colluvium, gneiss	1971
X 141	Mzindo	37	120	1 635	Colluvium, gneiss	1971
X 142	Mziza	61	200	400	Colluvium, gneiss	1971
X 143	Tsakhuta	46	150	1 125	Colluvium, gneiss	1971
X 144	Nkhwangwa	46	153	1 345	Colluvium, gneiss	1971
X 177	Nambuma F.T.C.	46	150	1 000	Colluvium, gneiss	1971
X 178	Kamphenga School	52	170	450	Colluvium, gneiss	1971
X 183	Khumalo	46	150	820	Weathered gneiss	1971
X 186	Besela	46	150	900	Weathered gneiss	1971
X 187	Beza	46	150	1 500	Weathered gneiss	1971
X 188	Chibvala	40	130	780	Weathered gneiss	1971
Y 136	Kanyambe School	52	170	2 000	Colluvium, gneiss	1971
Y 137	Chamkondo	46	150	1 000	Colluvium, gneiss	1971
Y 138	Katsumwa School	46	150	240	Colluvium, gneiss	1971
Y 139	Mchombo	46	150	900	Colluvium, gneiss	1971
Y 140	Nankuwawa	46	150	330	Colluvium, gneiss	1971
Y 141	Mdzela	41	135	2 250	Colluvium, gneiss	1971
Y 143	Kanyandula	46	150	1 800	Colluvium, gneiss	1971
Y 144	Chisembwela	52	170	600	Colluvium, gneiss	1971
Y 145	Chiwoza	52	170	720	Colluvium, gneiss	1971
Y 165	Ukwe Centre	46	150	300	Colluvium, gneiss	1971
Y 166	Kamanga	46	150	545	Colluvium, gneiss	1971
Y 167	Ochadza School	43	140	200	Colluvium, gneiss	1971
Y 224	Mkambwe	46	150	2 570	Colluvium, gneiss	1971
DP 57	Dambo	56	185	1 800	Colluvium, gneiss	1971
DP 58	Sambira	46	150	900	Colluvium, gneiss	1971
DP 59	Kamatira	46	150	1 200	Colluvium, gneiss	1971
FC 28	Sambira	55	180	250	Colluvium, gneiss	1971
FC 53	Chimwa School	43	140	470	Weathered gneiss	1971
RB 2	Nsaru Training Centre	46	150	665	Colluvium, gneiss	1971

Total 166 Average depth 42 m (138 ft). Average yield 976 g.p.h.

Depth in metres calculated to nearest whole metre.