



Hidden hot springs data adapted from Addison et al., 2021. Geological data digitised after Carron, 1978; Wedmore et al., 2019. Other spatial data provided by Malawi Government.

References:
 Addison, M.J., Rivett, M.O., Phil, P., Mwa, N., Mwa, V., McMahon, A.D., Macpherson, L.M.D., Bagg, J., Conway, D.J., Phil, P., Mbatia, E., Manda, I., Kalin, R.M. Hidden Hot Springs as a Source of Groundwater Fluoride and Several Dental Fluorosis in Malawi. *Water* 2021, 13, 1108.

Carron, R.T. Geological Atlas of Malawi, 1st ed.; Government of Malawi: Lilongwe, Malawi, 1978.

Wedmore, L.N.J., Biggs, J., Fagering, A., Duzanya, Z., Mphopo, F., Mota, H. Active Fault Scarps in Southern Malawi and Their Implications for the Distribution of Strain in Inipient Continental Rifts. *Tectonics* 2020, 39.

Aquifer Groups of Malawi and Hot Springs

| | | | | |
|--|--|---|--|---|
| <ul style="list-style-type: none"> • Town/City ★ Hot Spring ★ Hidden Hot Spring (buried) — Malawi International Border — Waterbody — Fault | <p>Consolidated Sedimentary Rock Units</p> <ul style="list-style-type: none"> Coal-bearing shale with sandstone and mudstone Conglomerate Conglomerate and gravel Conglomerate and sandstone Red marl and calcareous sandstone Sandstone Sandstone and conglomerate Sandstone and shale Sandstone with interbedded mudstone Sandstone, conglomerate and shale Sandstones and calcareous shale Sandy calcareous marl and limestone Siltstone and mudstone | <p>Unconsolidated Sedimentary Units overlying Weathered Basement</p> <ul style="list-style-type: none"> Colluvium and alluvium (shallow) overlying weathered basement Colluvium and alluvium overlying weathered basement Fluvium overlying colluvium and alluvium Gravel sand and clay Lacustrine deposits overlying colluvium and alluvium Lacustrine sandpits, bars and beaches | <p>Weathered Basement Units overlying Fractured Basement</p> <ul style="list-style-type: none"> Alkaline igneous intrusive rocks Amphibolite Amphibolite gneiss with amphibolite dykes Basalt lava flows Basic igneous intrusive rocks Biotite gneiss Biotite-muscovite and graphite-gneiss and schist Biotite-muscovite gneiss Carbonate vent Cataclastites, mylonites and phyllonites Chamockitic gneiss | <ul style="list-style-type: none"> Cordierite gneiss Hornblende-biotite-gneiss Marble Migmatite Muscovite and graphite schist Muscovite schist Perthite-gneiss Quartz reef Quartzite Quartzo-feldspathic psammite Quartzofeldspathic gneiss Ultrabasic igneous intrusive rocks Undifferentiated clastic gneiss |
|--|--|---|--|---|

Notes

It is recommended that citation for this work is made as follows:
 Kalin, R.M., Addison, M.J., Mwa, P., Banda, L.C., Butso, Z., Nkhata, M., Rivett, M.O., Mbatia, E., Phil, P., Mbatia, A., Phil, D.C., Kamukwa, D.S., Manda, J., Chetsa, A. Ministry of Water and Sanitation, Government of Malawi 2022. Malawi: 1:4,000,000 Aquifer Groups of Malawi and Hot Springs (Hydrogeology and Groundwater Quality Atlas of Malawi). ISBN 978-9-95509-18-5

Copyright © 2022 Ministry of Water and Sanitation

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without prior permission of the Ministry responsible for Water Affairs.

The editor, authors, steering board, and publisher will not be responsible for any loss, however arising, from the use of, or reliance on, the information contained in this atlas and maps, nor do they assume responsibility or liability for errors or omissions in the publications. Readers are advised to use the information contained herein purely as a guide and to take appropriate professional advice where necessary.