APPLICATION OF 2D ELECTRICAL RESISTIVITY TOMOGRAPHY TO ASSESS THE INFLUENCE OF GEOLOGY AND GEOLOGICAL STRUCTURES ON GROUNDWATER OCCURRENCE AND POTENTIAL IN KONZA AREA, KENYA

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This dissertation is my original work and has not been presented for a degree in any other University

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Abstract

Groundwater occurrence in metamorphic rocks is highly influenced by geological structures. These geological structures, unless mapped with precision, groundwater exploration may end up with low yielding or dry boreholes. Konza area herein referred as study area; is dominated by metamorphic rocks and geological structures in the area are less known.

Geologically, the study area is underlain by metamorphic rocks covered by black soils. The crystalline nature of igneous and metamorphic rocks in study area lack permeability zones for groundwater occurrence and transmission, except in weathered or fractured condition.

This dissertation attempts to advance knowledge of groundwater occurrence, improve techniques of hydrogeological survey within the Mozambique Metamorphic belt terrain and reveal geological structures undetected in the area.

An integration of geophysical techniques was applied. Electrical Resistivity Tomography (ERT) was used to provide 2D sections to outline the geological structures. This method was complemented with Vertical Electrical Sounding (VES) and borehole data to depict groundwater occurrence in the study area.

This study delineated groundwater potential regions for future groundwater exploration. A general understanding of the influence of geological structures to groundwater occurrence in the study area was achieved through the study. The depth of bedrock and geological structures was estimated with high accuracy. The problem related to low yield and dry borehole of groundwater drilled within the study area was identified. This is mainly due to the dominance of clay material filled within fracture zones. The Shallow unweathered formation was also noted to be related to this problem.

Fracture lines cutting through in a north west – south east direction running parallel to each other was mapped in the area.

Table of Contents