

Characterization of structural control on groundwater using magnetic and electrical resistivity method in Enderit area, Kenya

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Abstract:

The study area herein referred to as 'Enderit area', is part of the classic East African Rift System which traverses through Kenya in a north-south direction and is generally a low lying area with its principal land-use being agricultural and dairy farming. It is evident that more water is needed in the larger Nakuru area. Enderit area is semi-arid and cannot rely on rainfall; thus the only other option is to get more groundwater. Groundwater occurrence and distribution is fairly well known in areas with high density of faults, but within the plains of Enderit, its occurrence in particular the structural controls can only be postulated. The marginal rift faults and the system of grid faulting on the Rift floor undoubtedly have a substantial effect on the groundwater flow systems of the area. In general faults are considered to have two effects on fluid flow. They may facilitate flow by providing channels of high permeability, or they may prove to be barriers to flow by offsetting zones of relatively high permeability. For the purpose of identifying and establishing these inferred buried structures, two geophysical techniques were used, ground magnetic and electrical resistivity tomography. The results show that the Enderit area has numerous faults and fractures that are buried. Some of these faults are deep while others are shallow. Most of the faults are high angled with an average dip angle of 75 degrees and dipping towards East. Characteristically a single high angle fault that dips to the west has been identified across all the magnetic profiles with an average dip of 77 degrees. These high angled faults are related to the rifting process. On magnetic profile Line_2S, an intrusion has been inferred and seems to occur on almost all profiles. An igneous intrusion has also been clearly delineated using electrical resistivity and magnetic methods. In addition, a 17 to 30 metres thick aquifer has been established. These findings from the integrated approach have met the objectives outlined herein.