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**Subsurface Geophysical Characteristics
of Lakes Area in Wadi Hanifah, Southern Riyadh
City**

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Abstract

The study area is located between latitudes 24° & $24^{\circ} 30'$ N and longitudes $46^{\circ} 40'$ & $47^{\circ} 10'$ E. in southern part of Wadi Hanifa, which penetrates Riyadh city from northwest to southeast with a total length 120 km.

The study is carried out to investigate subsurface layers, depths and thicknesses of water bearing layers through studying of resistivity and electrical conductivity applying vertical electrical sounding and seismic refraction techniques to indicate surface structures and its effect on the water table variations and ground water trends.

Hydrogeological and hydrochemical characteristics, water quality and contamination degree. were determined.

Subsurface structures have affected hydrogeological trend of the study area, where there are two sets of joints at which main Wadi and sub Wadis make their erosion which have caused the Wadi floor rocks to be fractured and to act as a good shallow water reservoir sharing with Wadi alluvial sediments. These faults and fractures are extended to sub surface rocks leading to increasing of electrical conductivity of these rocks at areas of fracturing extension.

Geophysical studies are carried out using Schlumberger array and seismic refraction, where 20 seismic profiles are done on both sites of the main wadi and some profiles showed presence of two sets of faults.

These faults are one main fault extended from north west to south east parallel to main wadi channel, while the other fault is normal to the main one and so there is a probability of presence of a hydraulic connection between the surface channel water and ground water.

Twenty three VES have been carried out on the two sites of the wadi, and 11 electric profiles have been constructed, leading to two water reservoirs, the upper one is shallow, with high electric conductivity and is represented by some lenses of silty and muddy sand within wadi alluvium deposits. The lower reservoir is deep represented by fractured limestone within the limestone deep formations.

Seven water samples have been collected from the main channel in the study area sharing with Arriyadh Development Authority (ADA), where PH, Conductivity have been measured during sampling using Myron 6P Ultrameter, while other parameters have been tested in laboratory, at which metals have been measured using ICP of high accuracy. The studied parameters are PH, Conductivity, TDS, Alkalinity, Nitrates, Phosphates, Metals and Bacteria.

Results of water testing show high conductivity, TDS, Bacteria and Phosphate, which may be resulted from the human activities, while metals show low and acceptable values. High conductivity and TDS is related to presence of ground water within the Jubaila and Arab formations which have high conductivity in areas of faults due to dissolution of Calcium Carbonates and calcium Sulfates of these rocks, while there are some values of Total Coli forms are high in some wells which is due to infiltration of surface water vertically. Nitrates are high in some wells which is related to farms discharge fertilizers, while metals values are low and acceptable.

Generally speaking, integrating of all geologic, seismic, electrical, hydro geological and hydrochemical parameters lead to the presence of water seepage from surface channel water to subsurface reservoirs through faults and other subsurface structures which affect on groundwater quality in the study area.