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# Environmental geophysical study for ideal locations of landfill within Iraqi Southern Desert

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ABSTRACT

Solid wastes and toxic chemicals are the main contributors, which influence the environment and quality of life. Demographic population, economic and building structures considered as major factors that are controlling such pollution. Therefore, it is very important to find proper areas to dispose of these pollutants. The current study aims to find best locations for wastes disposal areas that comply with the national and international standards. The study area, the Iraqi Southern Desert had been subjected to comprehensive study for geology, gravity and magnetic investigations. The existence of impermeable beds, tectonic, seismology and structural features show that the area understudy is located in the stable shelf that has no folding and faulting complexity; however, the saline groundwater lies at about 150 m depth. The gravity field data were analyzed using three methods: Trend Surface Analysis, Average Smooth Matrix and the First Vertical Derivative. Negative and positive gravity anomalies were noticed and interpreted. Remote sensing is also carried out in order to locate linear features, drainage patterns and watersheds within the Southern Desert depending on the interpretation of satellite images of the study area. Finally, a comparison of natural and environmental factors with remote sensing and both gravity and magnetic analyses gives thirteen locations of different coordinates. Only sites 1, 2, 3,10 and 13 yield good environment satisfaction agreement that permits us to choose them as a good locations for future landfill waste purposes.

## 1. Introduction

Landfill solids (disposal of solid wastes) are the solid waste residues of all sources or undesirable materials resulted from several human activities. Arab countries including Iraq use exposed landfills with less cost and easier to implement. Since the methods used in this type of projects are almost to bury pollutants by earth soils inside uncased landfill, which leads to cause leakage of toxic fluids infiltrate and transport to groundwater and rivers, however the emission of gases and bad odors (resulting from the decomposition of organic matters) will surely increase the danger of these wastes (Keller, 1985).

Generally, the Iraqi Southern Desert represents the extension of the northern part of the regional plateau of the Arabian Peninsula covered by Tertiary marine carbonate and younger continental clastic deposits. It is dissected by systems of N—S and NE–SW wadies. The desert is built up mainly by carbonate facies, clastics and evaporites sequences; while, most of its parts, still not well explored or mapped to allow a fair understanding of its geology and mineral resources, their ages range from Paleocene to Recent. The desert, which occupies about 76,000 $Km^2$ is located between longitudes 48°- 42°30′ E and latitudes 32°- 29° N. Administratively, four governorates share the area of the Southern Desert; they are Najaf, Samawa, Nasiriya and Basrah Provinces. Because of its harmful climate and deficiency of water, the majority of the Southern Desert is not populated. Therefore, most of the present towns are located either along the Euphrates River or as small towns far away from these cities as shown in (Fig. 1). It has relatively flat terrain, sloping gently towards NE. The elevated part (300–400) meters (a.s.l.) exists along the Iraqi–Saudi Arabian borders; while the apparently depressed part (20–150) meters (a.s.l.) is developed along the western side of Euphrates River. The depressed area comprises morphologic features, such as Bahr Al-Najaf, Sawa Saline Lake depressions (Ma'ala, 2009).

Unfortunately, there are few studies in Iraq deal with this type of researches. Al-Halbusy, (2008) performed a geological-geophysical-environmental study in order to locate the right sites for getting grid of polluted wastes within northwestern Iraq using remote sensing, magnetic and gravity information. The aim of this research is to explore the suitable locations within the Iraqi Southern Desert used to get quite of the industrial pollution and/or contamination such as solid waste and