

INTEGRATION OF HYDROGEOLOGICAL ATTRIBUTES, AND GIS SPATIAL MODELING TECHNIQUES IN DETERMINING PRIORITY AREAS FOR SUSTAINABLE DEVELOPMENT OF EAST UWEINAT AREA, WESTERN DESERT, EGYPT

Elewa HH¹, Fathy RG² and Qaddah AA³

1 National Authority for Remote Sensing & Space Sciences (NARSS), Cairo, Egypt,

hossh2@yahoo.com

2 General Authority for Rehabilitation Project and Agricultural Development (GARPAD), Cairo, Egypt

3 Egyptian Environmental Affair Agency (EEAA), Cairo, Egypt

Abstract. East Uweinat is an important new reclaimed area located at the far southern part of the Western Desert of Egypt. The Nubia Sandstone aquifer system is the sole groundwater resource used for agricultural and domestic purposes. The hydrogeological attributes represented by depth to water, tested useful thickness, total dissolved solids and sodium adsorption ratio were integrated into performing a geographic information system (GIS) and weighted spatial suitability model (WSSM) to determine the hydrogeological priority areas for development. An output map reflecting these priority areas indicated that the priority areas 1, 2, 3 and 4 occupy only 30 % of the total developmental area, which expresses to a certain extent the aquifer hydrogeological degradation. The measured changes of potentiometric levels from 1908s, 1990s and 2008 indicate depletion from 250, 245 and 230 masl, respectively. This magnitude of depletion impressively reflects the expected relative values reached from the previously published mathematical flow models performed for the southern Western Desert of Egypt. The trend of gradual, but somewhat relative accelerated depletion of water levels in the last few decades highlights the urgent need for better management schemes to preserve this precious groundwater aquifer system.