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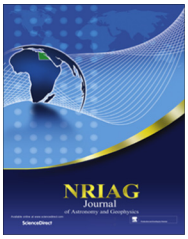

Geophysical investigation to reveal the groundwater condition at new Borg El-Arab industrial city, Egypt

Alhussein A. Basheer *, **Khamis Q. Mansour, Mohammed A. Abdalla**

National Research Institute of Astronomy and Geophysics, 11722 Helwan, Cairo, Egypt

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Abstract New Borg El-Arab City, 60 km to the southwest of Alexandria City, is one of new industrial cities planned by the Egyptian Government through its program to transfer the population from the condensed Nile Delta to other places in Egypt. Because such a city includes airport, huge buildings, factories, and worker settlements, a careful geophysical study is planned to reveal the groundwater condition. This will help in defining the places of wells that are supposed to be drilled. Therefore more industrial and agricultural activities will be flourished.

The present study embraces Vertical Electrical Soundings (VES'es) and Time Domain Electromagnetic sounding (TEM) to investigate the study area. The study aims **to** delineate the main subsurface conditions from the viewpoint of groundwater location, depth and water quality. Analysis and interpretation of the obtained results reveal that the subsurface consists of five geoelectrical layers with a gentle general slope toward the Mediterranean Sea. The third and the fourth layers in the succession are suggested to be the two water bearing formations of which the third layer is saturated with fresh water overlying saline water at the bottom of the fourth one. It is worth mentioning that the fresh water depth varies between 50 and 354 m under the ground surface. The thickness of the fresh water aquifer varies from 9.5 to 66 m; and the saline water depth varies between 116 and 384 m below the ground surface, the thickness of saline water aquifer differs from 34 to 90.5 m.

1. Introduction

The new Borg El-Arab City is one of the new industrial and agricultural cities. It covers an area of about 90 km^2. It lies between latitudes 30.75043221 and 31.04684093 N and longitudes 29.44052705 and 29.6723497 E (Fig. 1). The city, as industrial and agriculture one, needs a careful study to provide new sources of water. It is also required to delineate

* Corresponding author. Tel.: +20 1122802222; fax: +20 225548020.
E-mail address: Alhussein.adham.basheer.mohammed@gmail.com (A.A. Basheer).

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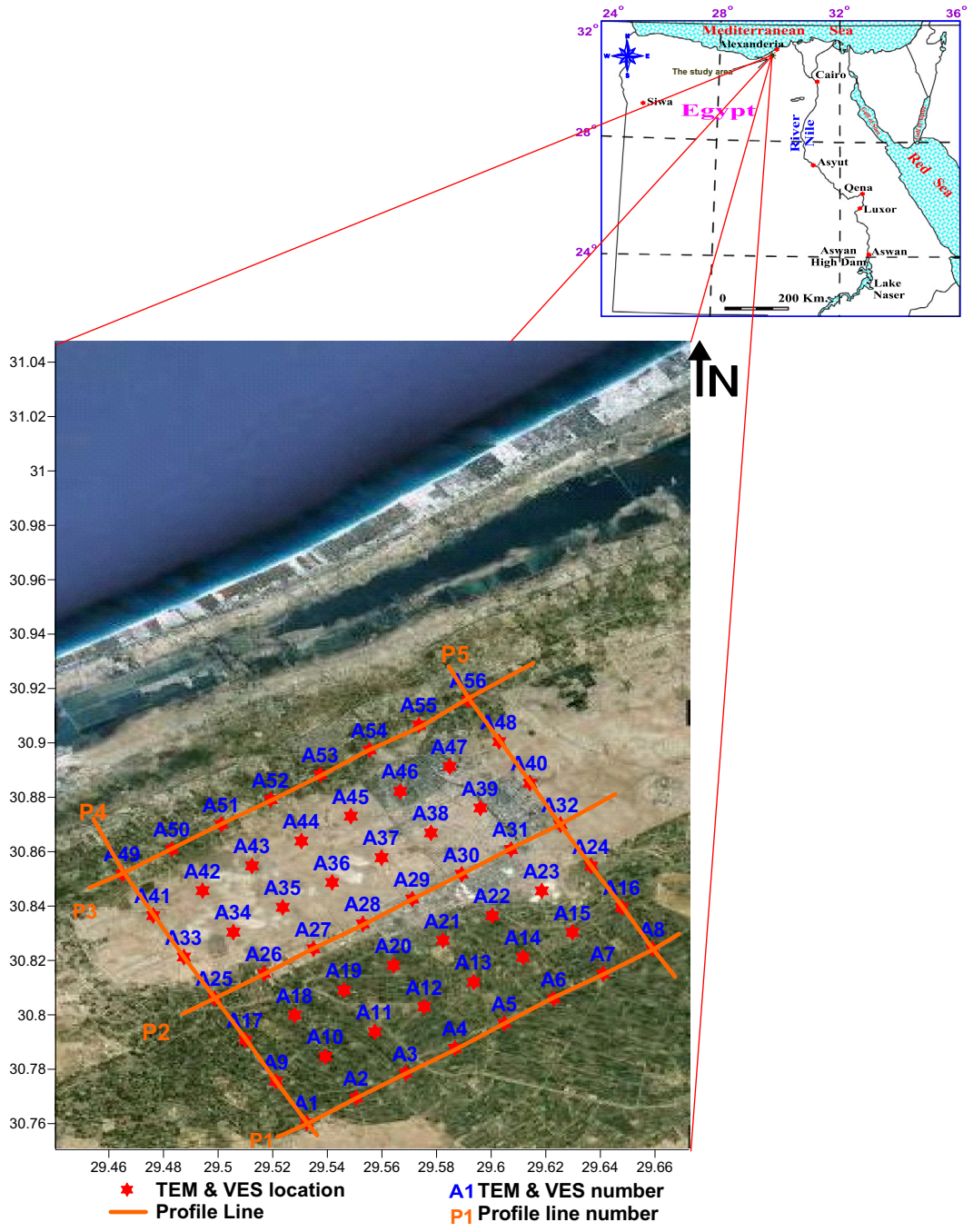

Fig. 1 Location map of both VES'es station and TEM's stations with cross sections along the study area.

the groundwater and its ability to be used and extracted to help in domestic, industrial and agricultural activities.

In this regard, the present geophysical survey at the suggested location of new Borg El-Arab City, utilized Vertical Electrical Soundings VES'es and Time domain electromagnetic surveys. It will assist in detecting the best sites to drill water wells, most excellent places to cover with vegetation, and is capable of furnishing useful information of groundwater characteristics in the area.

The integrated interpretation of these techniques classified the subsurface succession into five geoelectrical layers. The first layer composes weathered sandy clay. The second layer consists of sand belonging to "Oligocene age". The third layer composes sand saturated with fresh water. The fourth layer consists of sand saturated with saline water. The fifth layer of the study area composes limestone belong to "Miocene" age.

2. Geological setting

According to El shaazly (1964), the geological setting of the study area is related to the delta formation, this formation is a landform that is formed at the mouth of a river, where the river flows into a sea, this formation consists of (from top to