



جامعة الإمارات العربية المتحدة  
United Arab Emirates University

**The College of Graduate Studies and the College of Engineering Cordially  
Invite You to a**

**Master Thesis Defense**

Entitled

*SELECTION OF BEST SITES FOR AQUIFER STORAGE & RECOVERY IN THE EASTERN DISTRICT OF  
ABU DHABI*

by

Karim A. Mahfouz Abdou Khalil

Faculty Advisor

Dr. Mohamed Mostafa Mohamed, Department of Civil and Environmental Engineering  
College of Engineering

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Abstract

The Emirate of Abu Dhabi relied on groundwater as the main source of fresh water for several decades in the past. This resulted in the deterioration of the non-renewable groundwater aquifers; and thus, desalination plants have become the major source of fresh water supply in UAE. Diminishing natural groundwater is a serious threat to fresh water security in arid regions. Because UAE has the world's highest per capita water consumption rate, more than 70 desalination plants have been built in the last two decades. A major concern, therefore, is the vulnerability of these desalination plants to pollution and emergency conditions. In emergency conditions, the maximum amount of stored water in reservoirs and distribution systems will be enough for only 48 hours. Currently, production of these plants exceeds national water demand and the surplus is used to recharge groundwater in specific locations. While production of desalination plants is constant, demand is continuously increasing and soon will exceed production and then new plants will be needed. This would require investments of billions of Dirhams; not to mention the effect of these plants on the environment. In other words, construction of new desalination plants cannot continue forever. The main aim of this thesis will be on increasing strategic water reserves in the eastern district of Abu Dhabi through selecting the best locations for ASR. A limiting factor in applying ASR technology is the lack of suitable sites. Finding best locations for artificial recharge is one of crucial design steps. Aquifer Storage & Recovery (ASR) technology offers an opportunity to store large volumes of water for later beneficial use. The artificial aquifer recharge with water for variety of applications has been successfully used worldwide. There are a range of methods used to recharge aquifers, including infiltration systems and injection wells. The choice of method depends on the type of aquifer, land area available and intended uses of the recovered water. Upon completion, this study would enhance water management in Al-Ain to build a back-up reservoir to face potential threats of shortage in freshwater supply from desalination plants. Many hydrogeological factors need to be considered during the site selection process for ASR projects. These factors will be considered to assess the hydrological feasibility includes identifications of the best geological layers to receive the injected water. This work will provide a feasibility study of implementing managed aquifer recharge projects in Al-Ain area, to increase the groundwater storage in suitable sites in Al-Ain city and modelling the Groundwater Aquifers and the feasibility to extract water from an aquifer to satisfy critical needs if a reserve had been established through implementation of an ASR program.

**Keywords:** Aquifer Storage & Recovery, Groundwater, Modelling, ASR, Desalination, Water security, Hydrogeological, Reservoirs, arid region, Abu Dhabi Emirates, Al-Ain region.