

A conceptual model for the development and management of the Cape Flats aquifer, South Africa

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Abstract

This paper provides an integrated approach to the analysis of the geological, hydrological and hydrogeological characteristics of the Cape Flats: a coastal plain sand formed within the mountains of the Cape Town metropolitan area. The study is mainly based on evaluation of available data, on surface water and groundwater, rainfall and selected springs, to describe the Cape Flats aquifer. Qualitative analysis has shown that both surface water and groundwater of the investigated area are of good quality; whereas sources of contamination indicated are restricted to certain parts of the area. Interpretation of hydrogeological data and aquifer parameters revealed that the Cape Flats aquifer has good storage characteristics to support its development for water supply, although the generally unconfined conditions render it highly susceptible to pollution from the surface. From the analysis of long-term climate data in Cape Town, it is evident that fluctuation exists in the pattern of rainfall; this rainfall pattern has implications for recharge and water management issues in the city. Therefore, a conceptual hydrogeological model was developed to elucidate groundwater flow and recharge mechanisms in the Cape Flats.

Keywords: water resource management, Cape Town, water quality, surface-water/groundwater relations, conceptualisation