Assessment of Groundwater Potential in the Sunyani and Techiman Areas of Ghana for Urban Water Supply

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Abstract

The groundwater potential of the Sunyani and Techiman areas were assessed to determine the feasibility of using groundwater for water supply to Sunyani and Techiman urban areas. The investigations involved field reconnaissance, geophysical survey, test drilling, pumping test and water quality analysis. The results of the investigations indicate that the regolith varied in thickness from 12.0 m to 52.3 m with a median value of 20.4 m in the Sunyani area, and in the Techiman area the regolith thickness is in the range 10.1-50.0 m with a median value of 20.5 m. In the Sunyani area, borehole yields vary from 3.0 m^3h^{-1} to 19.2 m^3h^{-1} with median value of 3.0 m^3h^{-1} while in the Techiman area, the yields are in the range 4.3-104.5 m^3h^{-1} with median value of 63.2 $m^3 h^{-1}$. The range and median transmissivities in the Sunyani area are 0.2-3.4 $m^2 d^{-1}$ and 0.7 $m^2 d^{-1}$. For the Techiman area, they are 10.4-124.6 $m^2 d^{-1}$ and 95.0 $m^2 d^{-1}$. Apart from slight taste problem that boreholes, particularly those in Sunyani area, may have as a result of low *p*H, the groundwaters in both areas are physico-chemically and bacteriologically good for drinking purposes. Although approximately 75% of test borehole in the Sunyani area yielded higher than the required minimum yield of 3.0 m^3h^{-1} for urban water supply, pumping test results indicate that the aquifers are limited in extent and, therefore, can not support sustained pumping. Boreholes from Techiman area signify good potential aquifers with higher sustainable yields than those obtained from the Sunyani area. Therefore, the groundwater basin in the Techiman area can be developed for water supply to the townships of Sunyani and Techiman.

Introduction

Potable water is supplied to Sunyani, the capital of the Brong Ahafo Region of Ghana, and Techiman, lying north-east of Sunyani from the River Tano. The Abesim head works at Sunyani that supplies water to an estimated population of 150,000 was estimated to produce less than half the 1995 estimated demand of 12,430 m^3/day (Brown and Root Ltd, 1999). The water problem was not associated with the main towns alone; the surrounding villages also face acute water shortages. Consequently, communities in the study area have resorted to using water from streams and dug-outs. Some of these water points are visibly clean sources of water but may contain pathogenic organisms that are detrimental to human health. Thus, these sources act as channels for the propagation of water borne diseases.

Similar to the Sunyani situation, the water supply to Techiman is obtained from a 4,500 m^3day^{-1} water treatment plant at Tanoso, about 15 km south of Techiman. It supplies a population of about 50,000 resulting in many areas within Techiman not having access to piped water supply and, thus, also resorting to the use of water from mostly polluted sources. The Department for International Development (DFID), which has entered into agreement with the Government of Ghana to establish a water project aimed at ameliorating the problem of potable water supply for the people of Ashanti and Brong Ahafo regions has engaged the services of Brown and Root Ltd, a British consulting firm, to carry out detailed studies into improving the water