



Study of the phreatic aquifer behavior in the Mansões Santo Antônio neighborhood, Campinas - SP.

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Abstract

The groundwater monitoring wells that exist in the Mansões Santo Antônio neighborhood have been used for water level and hydraulic conductivity measurements in order to study groundwater recharge. The collected data showed variations of the hydraulic heads in amplitudes over 4 meters and less than 1 meter during the monitoring time (2017 to 2019). The behavior of the groundwater levels is associated to characteristics such as well depth and discrepancies in the rainfall distribution throughout the years.

Key words: Hydrogeology, Groundwater Recharge, Water Table Monitoring.

Introduction

The Mansões Santo Antonio neighborhood is an example of the rapid urban advance, due to the industrial and demographic growth of the city over the last decades. The area is interesting for the study and monitoring of the local aquifer, since it is a site that was contaminated by organochlorines during industrial activities in the 1970s to 1990s. The neighborhood has undergone environmental investigation and has a series of well monitoring systems, which enable water level measurements.

The aim of this work is to study the behavior of the groundwater in the local phreatic aquifer, in order to obtain data for the estimation of groundwater recharge in the study area, as well as conducting slug tests for estimating hydraulic conductivity.

Results and Discussion

The results of the water level monitoring are presented in Figure 1. The water level curves show different amplitudes due to effects of seasonality, recharge behavior and also rainfall index.

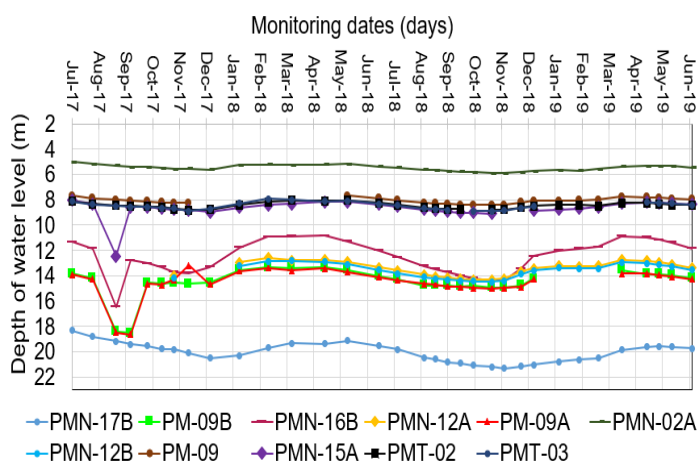


Figure 1. Variation of water levels during the monitoring time.

The lowering of hydraulic heads corresponds to the lesser rainfall in winter. According to data from CEPAGRI (2019), the drought period of 2017 was more intense than the drought period of 2018. In July 2017, there was no precipitation compared to the more distributed rains in the winter of 2018. This explains the 4 meters lowering of

hydraulic heads in 2017 and the less intense lowering in 2018.

The results of the slug tests are presented in Chart 1, along with some construction characteristics of the monitoring wells. Wells that showed hydraulic head variation amplitudes over 4 meters have depths around 20 meters and the regolith is composed of silty sand and sandy silt. The wells with amplitude lower than 1 meter have depths around 10 meters and the regolith around them is composed of sandy silt.

Chart 1. Characteristics of the study wells and hydraulic conductivity estimated from slug tests.

Well	Depth (m)	Regolith	Hydraulic Conductivity (cm/s)
PM-09A	20,00	Silty sand	1,36E-03
PM-09B	25,10	Silty sand	1,27E-03
PM-09	12,00	Sandy silt	1,81E-04
PMT-02	10,00	Sandy silt	8,61E-04
PMT-03	10,00	Sandy silt	2,39E-04
PMN-17B	28,50	Silty sand	2,47E-04
PMN-16B	21,30	Sandy silt	3,61E-04
PMN-15A	18,15	Sandy silt	1,70E-04
PMN-02A	14,70	Sandy silt	5,74E-04
PMN-12A	20,54	Silty sand	1,64E-04
PMN-12B	13,20	Silty sand	7,13E-02

Conclusions

The study of the hydraulic heads and conductivities of the phreatic aquifer in the Mansões Santo Antonio neighborhood lead to the identification of variations of the hydraulic heads in amplitudes over 4 meters to less than 1 meter. This behavior was associated with the depth of the well (deeper wells showed larger variations) and the discrepancies in the pluviometric distribution between 2017 and 2019.

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