

Abstract

Evaluation of the performance of irrigation and drainage networks not only help to design the new systems successfully, but also can deliver the same system from failure to success by implementing the necessary reforms in the system. In this study, apart of the 840-hectare project of underground drainage system of the Ran Agro-Industrial Company, located in the Behshahr city, is evaluated for the performance of the lowering the water level table. To do so, ten wells are drilled and fluctuations of their water tables are measured and recorded. then, the water level fluctuations at different time steps are simulated by the MODFLOW mathematical model as an indirect method. The required data prepared from Consultant Company, Meteorology and Geological Survey Institutes enters the model and then it is calibrated for the region. The correlation coefficient and RMSE values of all field data and calculated one are obtained to be as 0.95 and 1.0, respectively. The underground water levels in non-steady state are simulated by entering the amount of rain as a steady state designed feeding and by assuming a value of 0.1 m for the initial depth of water table. The underground drainage system performance is evaluated by comparing the calculated values for the most critical points (the middle two lines underground drainage pipes) with the values considered in the design. This comparison shows that for both steady state and non-steady state, the system did not work well and actually has a poor performance. With field studies and surveys conducted, the main causes of inefficiency in the system are determined as lack of proper maintenance, incorrect operation and undoing the consulting company recommended programs by the beneficiary. Especially the use of organic materials (rice husk) as the filter cover and drainage pipes can be considered as the main cause of system poor performance, because this material with time practically rotten and cause clogging and blocking the drainage pipes which highly reduces the functionality of the system.

Key words: Performance evaluation of drainage, Mathematical model, Simulation of groundwater table, Ran Agro-Industrial Company, Behshahr, MODFLOW



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