Efficient management of groundwater resources is important because groundwater availability is limited and, locally, groundwater quality has been impaired because of contamination. Here we present a multi-objective optimization framework for improving the management of a water works that operates with infiltration basins, injection wells and abstraction wells. The two management objectives are to minimize the amount of water needed for infiltration and to minimize the risk of getting contaminated water into the drinking water wells. The management is subject to a daily demand fulfilment constraint. Two different optimization methods are tested. Constant scheduling where decision variables are held constant during the time of optimization, and sequential scheduling where the optimization is performed stepwise for daily time steps. The latter is developed to work in a real-time situation. Case study optimization results are presented for the Hardhof water works in Zurich, Switzerland. It is found that both methods perform better than the historical management. The constant scheduling performs best in fairly stable conditions, whereas the sequential optimization performs best in extreme situations with heavy rainfall or large changes in water demand.