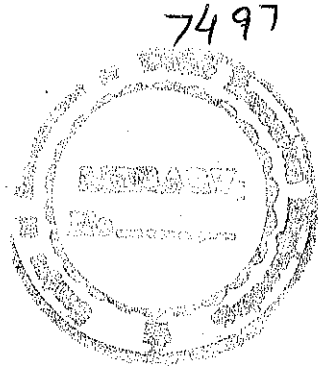
M.Sc. Thesis

GROUNDWATER RECHARGE OF LAHORE CITY BY PONDING IN RIVER RAVI



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2019

ABSTRACT

Groundwater plays an important role for domestic, agriculture, urban and in industrial purposes for the city of Lahore. Due to continuous increase in population and people moving towards the urbanized areas causes the extra groundwater extraction cause depletion in aquifer. To enhance groundwater recharge and control of groundwater depletion a dam is proposed at 3 mile Upstream of Mohlanwall and 5 mile downstream of motorway bridge. The height of the proposed dam is 10 ft against which a back watering of 12.5 mile was simulated using HEC-RAS.

HEC-RAS model was used to check the backwater effect in river Ravi due to dam structure. Model was calibrated using manning roughness values between 0.015-0.025 for the main channel, left over bank (LOB) and right over bank (ROB).

Recharge rate of the river Ravi was calculated by Zhukovsky's method against a maximum discharge of 18000 cusec observed in last two decades and found out that River Ravi has a recharging capacity of about 6978783 ft^3 /year. The slope of the River was found to line 1.4ft/mile which was from the longitudinal section of River Ravi. Visual MODFLOW was run to check the effect of river stage on the groundwater level. Pumping data of about 3200 tube wells were used for modelling and R^2 value of about 0.9 was observed during calibration period. A groundwater level of about 20-40ft was observed in the surrounding areas of River Ravi and about 3ft depletion rate in groundwater level was found under normal circumstances. After the proposed dam the extra recharge capacity 24666069 ft^3 /year of River Ravi was calculated.

A rise of 3-6 ft. was simulated in the areas close to the proposed site with a coverage area of 36.33 $mile^2$ on the left side of the river towards Lahore site. It is recommended to install more piezometric tube wells to check the groundwater levels situation and to maintain water levels more recharging options should also be considered.