

WESTFIELD MA Wells 5 and 6

From document prepared by Ransom Environmental April 10, 1996 for city of Westfield, MA

4.0 EVALUATION OF INDUCED INFILTRATION

4.1 Review of Past Information and Stream Depletion Estimate

In March 1989, Dufresne-Henry, Inc. completed a "Delineation of Wellhead Protection Zones" for wells No. 5 and No. 6 as well as municipal well Nos. 1, 2, 7, and 8. Based on this study, the wells are located in a relatively small zone of high transmissivity bordering the river, and that the wells are recharged most significantly by induced infiltration from the Little River. D-H estimated the capture zone of the wells using an analytical ground water flow model developed by HydroAnalysis, Inc. D-H estimated the aquifer transmissivity at 10,000 gpd/ft (1,400 ft²/day), which may be a low estimate based on a review of the Chapman pump test data. D-H estimated that 85% of the water recharging the wells would come from induced infiltration after 180 days of pumping.

Ransom used the Hydropal analytical computer model for stream depletion, developed by Watershed Research, Inc. to estimate stream depletion in the Little River using the estimated aquifer parameters. At the request of DWS, Ransom has provided a copy of the Hydropal analytical computer program disks and background information in a separate submittal. This Hydropal model assumes isotropic conditions, the stream fully penetrates the aquifer, the stream bank offers negligible restriction to ground water flow, and that the drawdown is negligible compared with the aquifer thickness. Ransom assumed a combined flow rate of 375 gpm, an aquifer transmissivity and storativity of 50,000 gpd/ft and 0.06 respectively, and a distance to the river of 170 feet (based on the distance of the midpoint between the wells to the streambed center). Ransom determined that after 1 day of pumping, about 70% of the recharge of 375 gpm will result from induced infiltration. After 7 days of continuous pumping, 89% of the water recharging the well will be from induced infiltration. If pumped continuously for 180 days, the model predicts that up to 98% of the water recharging the well will result from induced infiltration. It is likely that these estimates are high because the wells are not pumped continuously, but only intermittently during the year.