



## Development of the Chino Basin Recharge Master Plan, Chino Basin Watermaster

### Background

The Chino Basin Watermaster (CBWM) was formed in 1978 pursuant to the stipulated agreement (Judgment) in the litigation of Chino Basin Municipal Water District vs. the city of Chino, et al. The CBWM is unique among watermasters in California; in addition to administering the terms of the Judgment, the CBWM functions as a regional water resource planning and management agency. The CBWM is a consensus-based organization that facilitates the development and utilization of the Chino Groundwater Basin (Basin). The CBWM consists of various entities that pump water from the Basin, including cities, water districts, water companies, agricultural,

commercial, and other private interests. The CBWM's mission is "To manage the Chino Groundwater Basin in the most beneficial manner and to equitably administer and enforce the provisions of the Judgment."

### Optimum Basin Management Program

In 2000, the CBWM developed the Optimum Basin Management Program (OBMP); a comprehensive watershed management program, that required: construction of desalter facilities in the lower part of the Chino Basin; expanded the recharge of imported, recycled and stormwater; comprehensive monitoring; developing partnerships with regulatory agencies to speed up the management of contaminated groundwater; and implementation of groundwater storage programs.

In the mid 1990s, it was becoming clear that the recharge capacity of the Chino Basin would need

to be expanded to meet future replenishment obligations.

### Program Element 2 of the OBMP

The Program Element 2 of the OBMP involves the development and implementation of a comprehensive recharge master plan. WEI was retained by the CBWM to develop the Phase 1 Recharge Master Plan for the Chino Basin.

The goals of this program element are to maximize the capture of storm flows for recharge of the groundwater basin and to maximize the recharge capacity for supplemental water for replenishment purposes pursuant to the Judgment and for conjunctive use. The CBWM and Inland Utilities Agency (IEUA) completed a recharge master plan in 2001 and immediately advanced that plan through design and construction. As of October 2004, two new recharge basins were constructed and 15 existing retention facilities were improved to be recharge basins. These facilities are controlled through a SCADA system by IEUA. The cost of these recharge enhancement is about \$40 million. The volume of new stormwater recharge that is expected to be captured in these facilities is about 12,000



*Chino Basin area*



## Development of the Chino Basin Recharge Master Plan, cont'd

acre-ft/yr, which is worth about \$3 million per year. The supplemental water recharge capacity has been expanded from about 25,000 acre-ft/yr to about 80,000 acre-ft/yr. Additional improvements are being planned to increase the stormwater recharge to about 18,000 acre-ft/yr and the supplemental water recharge capacity to about 100,000 acre-ft/yr. Approximately 80 percent of the supplemental water recharge will come from imported State Water project water and 20 percent will come from recycled water developed by IEUA. It is likely that the recycled water contribution will be increased as high as 50 percent of the supplemental water recharge within ten years.

### Surface Water Models

Wildermuth Environmental, Inc. (WEI) developed and applied surface water models using 50 years of rainfall water to estimate the occurrence of runoff and the long-term average stormwater recharge at existing facilities, at existing

facilities with improvements, and at new facilities identified in the investigation. Using these models, WEI was able to determine how often these facilities would be available for supplemental water recharge. In addition, WEI developed cost estimates for these improvements. Most of the facilities identified in the Phase 1 Recharge Master Plan have been constructed and are now in operation.

The average annual recharge is the recharge that is expected to

occur given the current facilities and mode of operation of these facilities, and assuming the facilities and mode of operation remained unchanged for a long time. These estimates were derived from simulation models developed by WEI for the CBWM and Chino Basin Water Conservation District (CBWCD). The simulation models are described in the *Phase 1 Final Report, Chino Basin Recharge Master Plan (Wildermuth, 1998)*.

The average annual recharge statistic is based on 50 years of daily runoff that is estimated with the models. The runoff time history is routed through the existing



*Artificial recharge in the Chino Basin*



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drainage network with the facilities operated as they are in the year 2000. The models and data used in the Recharge Master Plan have been completely revised since the Phase 1 Recharge Master Plan was published.

Major revisions include incorporation of depth-percolation rate relationships obtained from CBWCD percolation monitoring program, revised basin geometry and outlet hydraulics, and updates to the input and output features of the Runoff and Router modules.

### Existing Basin Recharge Estimates

The daily recharge at each basin was estimated using the daily runoff and routing model. Monthly and annual recharge estimates were developed by aggregating daily recharge values. Other statistics include standard deviation, coefficient of variance, maximum, and minimum, the frequency of recharge occurring in a given month, and the fraction of annual recharge that occurs in a given month.

The statistics for the spreading basins illustrates recharge occurrence and variability for

the spreading basins recharge activities over the 50-year period. The monthly averages, maximums, and minimums show the relative magnitude and range of stormwater recharge occurring at the spreading basins. Calculated average percent totals for each month is the percentage of annual recharge that occurs during that month for the spreading basin. The standard deviation and the coefficient of variation describes the variability within each month and year.

### Key Benefits

Along with the OBMP, the Chino Basin Recharge Master Plan provides the foundation for programs such as the Chino Basin Recycled Water Groundwater Recharge Program, which offers multiple benefits to all stakeholders in the Chino Groundwater Basin. The Recharge Master Plan enables Watermaster to effectively manage the Basin and identify and prioritize opportunities for groundwater recharge. Furthermore the Recharge Master Plan helps to ensure a drought-proof water supply and improve water quality for all users of the Chino Groundwater Basin.



*Turner Basin recharge in the Chino Basin*