



Hydraulic Control Monitoring Program, Chino Basin Watermaster/Inland Empire Utilities Agency

Background

The Chino Basin Watermaster (CBWM) is a consensus-based organization that facilitates the development and utilization of the Chino Basin, a large groundwater basin in the Inland Empire of southern California. 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 expedite the management of contaminated groundwater; and implementation of groundwater storage programs.

In January 2004, the Santa Ana Regional Water Quality Control Board (RWQCB) amended the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin to incorporate an updated total dissolved solids (TDS) and nitrogen management plan. This amendment included

revised groundwater subbasin boundaries, revised TDS and nitrate-nitrogen groundwater quality objectives for groundwater, revised TDS and nitrogen wasteload allocations, revised reach designations, and beneficial uses for specific surface waters.

Basin Plan Amendment

The Basin Plan Amendment includes both “antidegradation” and “maximum benefit” objectives for TDS and nitrate-nitrogen in the Chino North and Cucamonga groundwater management zones. The applica-

tion of the “maximum benefit” objectives allows for the recharge of highly-treated recycled water while concomitantly requiring the CBWM and Inland Empire Utilities Agency (IEUA) to implement a specific program of projects and requirements that are integral to the OBMP. For the establishment of “maximum benefit” based objectives, the RWQCB has required that the CBWM and IEUA demonstrate that raising the TDS objective to 430 mg/L and the nitrate objective to 5 mg/L will not impact downstream beneficial uses or significantly impact the quality of the Santa Ana River. The CBWM and IEUA must demonstrate hydraulic control to ensure that downstream beneficial uses



Portion of the Santa Ana River located within the monitoring area



Hydraulic Control Monitoring Program, cont'd

are not impaired by management activities in the Chino North management zone.

The IEUA and the CBWM are co-permittees for the recharge of recycled water in the Chino Basin. They have obligations codified in the 2004 Basin Plan Amendment that require them to manage the Chino Basin in such a way that there is no groundwater outflow to the Santa Ana River from the main part of the Chino Basin. The elimination of groundwater outflow from the main part of the Chino Basin to the Santa Ana River is referred to as hydraulic control.

This concept was advanced by Wildermuth Environmental, Inc. (WEI) as a preferred basin management strategy because it maximizes the yield of the Chino Basin and protects downstream beneficial uses by capturing the groundwater degraded by agriculture and dairies that would otherwise discharge to the Santa Ana River.



Well Sampling

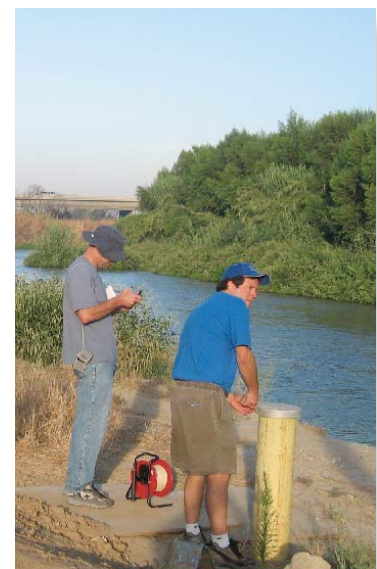
Hydraulic Control

By demonstrating hydraulic, it will:

- *Maximize and maintain basin yield. One of the goals of the Chino Desalter Program is to minimize or eliminate groundwater outflow, thereby maintaining or increasing safe yield in Chino Basin.*
- *Minimize and eliminate loss of stored water. The CBWM, IEUA, and Chino Basin producers either store or will store supplemental and native water in the Basin. These entities want to minimize the loss of stored water from the Chino Basin to protect the investments of the producers*

and minimize the import of State Project Water.

- *Protect Santa Ana River water quality. The CBWM and IEUA have committed to hydraulic control in recent California Environmental Quality Act (CEQA) documents as a means to protect and prevent significant impacts to Santa Ana River water quality.*
- *Protect riparian habitat. The CBWM and IEUA have committed (in recent CEQA documents) to monitor the effects of hydraulic control and desalter production on riparian vegetation upstream of Prado Dam.*



Well Sampling at the Santa Ana River

Hydraulic Control Monitoring Program, cont'd

Operating Strategies and Implementation

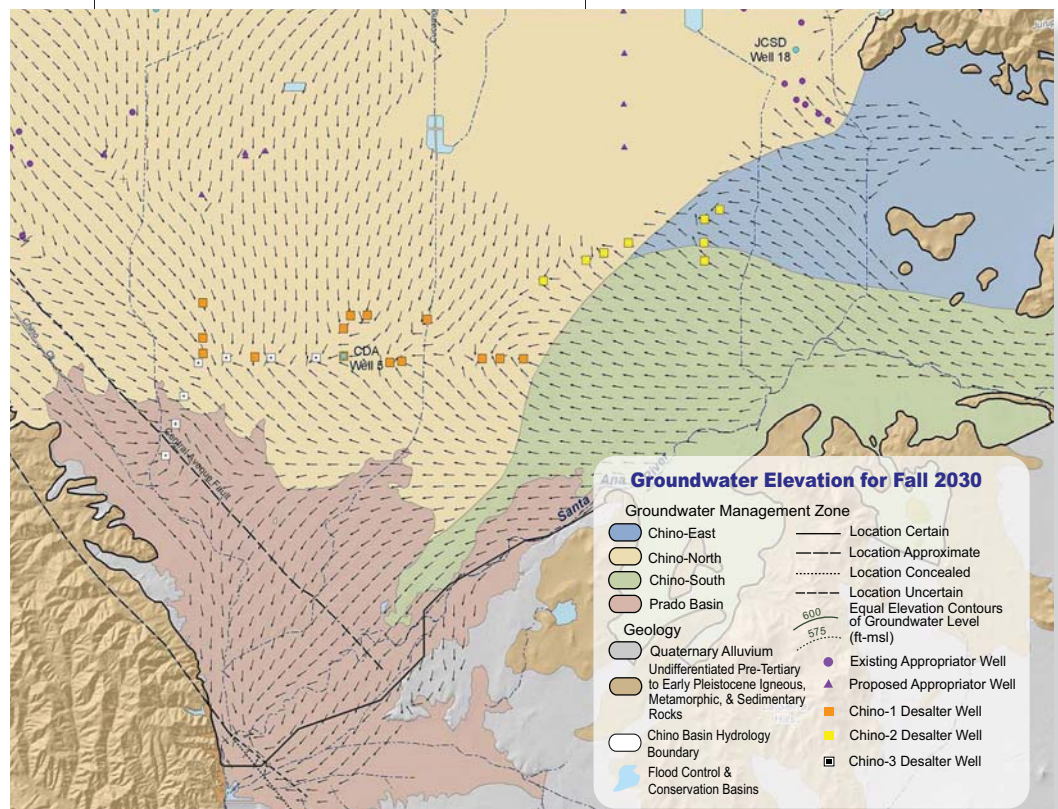
WEI developed operating strategies for Chino Basin that ensure hydraulic control, and include the planned lowering of groundwater storage in certain parts of the basin and the construction of new groundwater desalter facilities. As part of the Hydraulic Control Monitoring Program (HCMP), WEI used four engineering or scientific showings to corroboratively demonstrate whether hydraulic control is occurring in the southern portion of Chino Basin. These scientific showings include:

- water chemistry
- hydrologic balance
- piezometric levels, and
- groundwater modeling

While any individual element may not be adequate to demonstrate complete containment, all four elements can be combined to assess the state of hydraulic control and to optimize the management of the basin to maximize

yield and to eliminate discharge to the Santa Ana River. These demonstrations require the collection and analyses of large quantities of high-resolution field data, including: groundwater elevation measurements (often 15-minute data collected with pressure transducers), groundwater and surface water quality samples, stream discharge measurements, and POTW discharge and quality data.

The first two years of data were analyzed and used to site and design additional groundwater desalter facilities, to improve hydraulic control. The HCMP is an ongoing study to ensure that hydraulic control is achieved and the Basin is managed in accordance with the Basin Plan.



Groundwater model flow vectors demonstrate hydraulic control in Chino Basin