Metropolitan Domestic Water Improvement District
Board of Directors Meeting

March 10, 2014

Annual Water Level Monitoring Program

Synopsis

The Board of Directors is requested to review with staff the water level information gained from the recently completed annual water level monitoring effort. This information gives an important review of the aquifers and wells that provide District customers with water.

Background

In 1993, the District began the annual groundwater level monitoring program. The initial purpose was to track the annual declines in the Metro-Main service area at its 36 wells to help with the design of pump replacements. The monitoring program now includes 57 wells within the District's five service areas, both active and inactive, to meet operational and regulatory requirements.

After Metro-Main received its 100-Year Designation of Assured Water Supply (DAWS) from the Arizona Department of Water Resources (ADWR) in 1996, ADWR required the District to measure and report annual groundwater levels from within the service area. The District also uses the water level change information to determine if its CAP recovery wells within Metro-Main are in compliance with ADWR's decline limit of 4 feet per year averaged over a five year period for each of its four wellfield areas. Annual water level measurements at Metro-Hub wells were added to the monitoring program in 1999 when Metro-Hub was purchased. Metro West was added in 2006 when it received its DAWS. Water levels for Metro Southwest-Diablo Village were added in 2011 and Metro-E&T was added in 2012.

As the monitoring program expanded to 57 wells, Water Sustainability staff would manually measure each well but managed its field time at wells requiring more than annual measurements by purchasing and installing each year one automated water level monitoring system (water level transducer and continuous data logger) to avoid previous monthly or quarterly manual collection of measurements. Figure 1 depicts the locations of the eight automated monitoring locations in Metro-Main, and Figure 2 shows the same for Metro-Hub. Also, Water Sustainability staff adopted as an efficiency tool a computerized form for a field laptop that eliminates recording the measurements by hand on paper and later entering the data back at the office into the Hydrology water level database.

Groundwater Levels

Metro-Main

Depth to water in the south half of Metro-Main in the Western CDO Wash and Rillito Creek Wellfields ranged from 160 feet to 329 feet below land surface (Table 1). Groundwater level changes varied at the wells from a 1.2 foot decline to a decline of 14.8 feet since last year. The variation in water level change is a function of the amount of pumpage by Metro wells and the nearby non-Metro wells, and the amount of natural recharge over the past year. The average was a 4.0 foot decline. The water level hydrographs for the La Colina and Las Palmas East Wells show water levels continue to decline but the rate of decline has lessened somewhat since 2006 from their earlier steep decline (Figure 3).

Depth to water in the north half of the service area in the Catalina Foothills and Eastern CDO Wash Wellfields varied from 271 feet to 446 feet (Table 1). The northern portion also experienced a wide range of water level changes from a rise of 13.2 feet to a decline of 7.4 feet. The average was a 0.2 foot decline. Water levels at Tucson National North Well have remained fairly stable but show the influence of when nearby District wells are running (Figure 4). However, water levels to the north at Stiller Well continue to show a steady decline as shown in Figure 5.

The 5-year change table shows that Metro's four wellfield areas met ADWR's less than 4 foot decline criteria for recovery well use (Table 2).

For the entire service area, groundwater levels over the last ten years have declined on the average 2.0 feet per year (Table 3). Well productivity has continued to decline as the water table drops. This information highlights the importance of the District pursuing its CAP Water Recharge, Recovery & Delivery System by utilizing a renewable supply and reduce groundwater pumping and the associated costs with a depleting groundwater supply.

Metro-Hub

Depth to water at the six Hub wells ranged from 53 feet to 89 feet below land surface (Table 4). Groundwater level changes ranged from a rise of 0.8 feet to a rise of 13.3 feet. The average groundwater level change at Hub's six wells was an increase of five feet since last year.

Table 5 shows that Metro-Hub had an average of 1.5 foot per year of decline over five years. For the entire service area, groundwater levels over the last ten years have risen on the average 0.5 feet per year (Table 6). The aquifer appears sensitive to natural recharge and pumpage as demonstrated by annual rises and declines.

Metro-West

Depth to water at the two Metro-West wells varied from 209 feet to 216 feet below land surface. The groundwater level changes at the two wells varied from a rise of 4.7 feet to a decline of 8.0

since last year. The average was a 1.6 foot decline. The wide variance in groundwater change since last year could be caused by nearby pumping wells and direct CAP water use by agriculture. A ten year change calculation is preferred butnot possible for comparison because annual measurements did not occur until 2006. Water Sustainability staff schedules the annual measurement at these two wells with the required monthly water level monitoring at the Avra Valley Recharge Project since the two facilities are in proximity.

Metro-Southwest

Depth to water at the two Diablo wells varied from 470 feet to 509 feet below land surface. The water level change from the last year was a rise of 3.8 to 5.4 feet. The average was a rise of 4.6 feet. These rises are assumed to reflect the increase in water levels from the nearby City of Tucson's Southern Avra Valley Recharge and Recovery Project. A transducer and an automated recorder are waiting to be installed in this service area because of its remoteness.

Depth to groundwater beneath the E&T service area is relatively shallow with water levels varying from 70 to 76 feet below land surface. Compared to the two wells which were able to be measured last year, groundwater levels are fairly stable decreasing less than 1 foot a year.

Avra Valley Recharge Project

Depth to water is measured monthly at the Avra Valley Recharge Project monitor well (AVMW-01) (Figure 6). The December 2013 measurement was 191 feet below land surface. The change from last year was a rise of 3.2 feet. Water levels at this site constantly fluctuate and are influenced by monthly recharge volumes at the site, the adjacent Lower Santa Cruz Recharge Project owned by the Central Arizona Water Conservation District, and nearby irrigation well pumpage.

Recommended Future Work

Since groundwater is currently the only source of drinking water that the District serves its customers, it is imperative that we continue to monitor the state of the aquifer. Staff will continue to manually measure groundwater levels annually at each well. Staff collects additional measurements during the year to gain further information about the wells and the aquifer by having transducers at select wells to log continual measurement for most of the District's wellfields. Transducers measure pressure of water within a well, and the data loggers convert pressure to groundwater levels in feet below land surface. The data loggers continually record the water level measurements; therefore, Water Sustainability staff then only needs to visit the well sites with recorders a three times a year to download the data and monitor the charge of the data logger battery.

The Water Sustainability staff would like to increase the use of transducers. A transducer is awaiting installation at Metro Southwest-Diablo Village. Staff is proposing a transducer installation in Metro-E&T for next fiscal year. To save money, several existing transducers are being re-purposed. The self-powered transducer that was in the once-inactive Riverside

Crossing Well will be redeployed at the inactive Estes Well to monitor the Rillito Creek Wellfield. Likewise, in the Hub service area, the transducer from the HEX-2 test well will be redeployed to Hub Well No. 1 after Hub Well No. 1A becomes active. The new, active wells Old Magee Trail, Riverside Crossing, and Hub No. 1A are being outfitted with pressure transducers to track continuously both static and pumping water levels.

The inactive Rasmussen well is situated in Metro-Main's Western CDO Wash Wellfield. The Rasmussen well is in a strategic location to monitor groundwater levels in this very productive wellfield. Unfortunately, a stuck and collapsed section of column pipe within the well prevents water level measurements. Water Sustainability staff will propose to have a driller open the blockage in the Rasmussen well to resume water level measurements and install a pressure transducer and data logger.

Summary

The Board of Directors is requested to discuss with staff any aspect of this update. Overall, long-term water level trends continue to show the importance of the District moving towards the CAP Water Recharge, Recovery, and Delivery System. No motion is required for this agenda item.

Respectfully submitted,

Warren Tenney
Assistant General Manager

I concur with this report.

Respectfully submitted,

Joseph Olsen, P.E.
General Manager