

## **Appendix B:**

### **Project Demand Calculator Arizona Department of Water Resources (ADWR)**

### **Table B – Water Conservation Measures (Pima County Form)**

### **Annual Water Level Monitoring Report Metropolitan Domestic Water Improvement District**

October 4, 2015

**PROJECT DEMAND CALCULATOR**

Name of Proposed Project:

**Linda Vista Rezoning**

**INSTRUCTIONS:** This spreadsheet is designed to help you calculate the water demand for your proposed development for purposes of applying for a Certificate of Assured Water Supply, Water Adequacy Report or Analysis of Assured (or Adequate) Water Supply. Please enter information into the blue boxes as applicable. If you need help with this form, please contact the Office of Assured and Adequate Water Supply at (602) 771-8599.

**NOTE:** This sheet, when completed, does not constitute approval of the demand estimate for your proposed development. It is intended for general estimation purposes only. The final, official demand estimates will be determined by the Department upon review of your complete application.

Enter the AMA the subdivision is located in\*: **TUC** \* Enter PHX for Phoenix, TUC for Tucson, PIN for Pinal, PRE for Prescott or SCR for Santa Cruz.  
 If you are not sure if you are located inside or outside of an AMA, contact the Office of Assured and Adequate Water Supply at (602) 771-8599.

Enter the COUNTY the subdivision is located in: **PIMA** \* Enter either APACHE, COCHISE, COCONINO, GILA, GRAHAM, GREENLEE, LA PAZ, MARICOPA, MOHAVE, NAVAJO, PIMA, PINAL, SANTA CRUZ, YAVAPAI, or YUMA.

**Residential Usage\***

Category	PPHU	GPCD or per house/day	Demand/HU/YR (af/yr)	No. HU (Lots)	Residential Demand/Yr (af/yr)
Single Family (int)	3.60	57.00	0.23	36.00	8.27
Multi-Family (int)		57.00	0.00		0.00
Single Family Landscape (ext)	1.00	118.00	0.13	36.00	4.76
Multi-Family Landscape (ext)	0.00	21.00	0.00	0.00	0.00
Single family Demand/HU/YR			0.36		
Multifamily Demand/HU/YR			0.00		

	Square Feet	Acres	Demand Factor (af/yr)	No. HU (Lots)	Large Lot Adjustment Demand/Yr (af/yr)
Average Lot Size (sq. ft)**	6300.00	0.14			
TMP Model Lot Size (sq. ft)	7,500 - 10,000	0.17 - 0.23			
Large Lot Adjustment	0.00	0.00			
1/2 low water use	0.00	0.00	1.50	0.00	0.00
1/2 turf	0.00	0.00	4.60	0.00	0.00

\*\*NOTE: If the subdivision contains several groupings of lot sizes, the large lot adjustment needs to be calculated for each grouping of large lot sizes. If CC&Rs with landscaping restrictions for the residential lots will be adopted, a modified large lot adjustment can be calculated based on the specific landscaping restrictions. Contact the Office of Assured and Adequate Water Supply for assistance in calculating the large lot adjustment for subdivisions with several groupings of large lot sizes or if CC&Rs limiting landscaping within the residential lots will be adopted.

**Total Residential Demand** **13.03**

**Non-Residential Usage\*\*\***

For each category please enter either square feet or acres of land for that type of non-residential use within your subdivision.

Category	Square Feet	Acres	Demand Factor (af/ac)	Non-Residential Demand (af/yr)
Common Area1		1.25	1.50 low water use	1.88
Common Area2		0.00	4.60 turf	0.00
Right of Way		0.00	1.50 low water use	0.00
Golf Course		0.00	AMA Turf Program - contact AMA	0.00
Commercial use		0.00	2.25 all acres	0.00
Public Pool (length x width = square feet)		0.00	Based on closest AMA pool	0.00
Parks1		0.00	1.50 low water use	0.00
Parks2		0.00	4.60 turf	0.00
Retention/Detention Basins		1.50	1.50 low water use	2.25
Retention/Detention Basins		0.00	4.60 turf	0.00
School Landscape1		0.00	1.50 low water use	0.00
School Landscape2		0.00	4.60 turf	0.00
Elementary school interior use	Number of students		25 GPCD interior demand	0.00
Middle/High School interior use			43 GPCD interior demand	0.00

\*\*\*NOTE: If your application is for a change of ownership from a previously issued Certificate of Assured Water Supply, and is for only a portion of the original Certificate, contact the Office of Assured and Adequate Water Supply to pro-rate non-residential area acreage.

**Total Non-Residential Demand** **4.13**

**Distribution Losses**

	Residential	Non-Residential	Total	Loss Factor %	Distribution Losses (af/yr)
Demand af/yr	13.03	4.13	17.16	10.00	1.72

**Construction**

	No. of Lots	Demand (gals/lot)	100 yr demand (af)	Construction Demand (af/yr)
	36.00	10000.00	1.47	0.01

**Total Demand Per Year**

Residential Usage af/yr	Non-Residential Usage	Lost & Unaccounted for	Construction	Total Non-Res	Total Demand Per Year (af/yr)
13.03	4.13	1.72	0.01	5.86	18.89

Residential Usage GPCD

90

Total Demand GPCD

130

Annual Build Out Demand

18.89

**Table B - Water Conservation Measures**  
**Indoor and Outdoor Options**  
 (15-point Minimum; Must include at least one Outdoor Conservation Measure)

Indoor Options	Possible Points	Points Achieved
• I-1 Install grey water plumbing lines, labeled and stubbed out to exterior of residence	1	1
I-2 Install a "central-core" plumbing system with all water-using fixture fittings ≤5 ft. from HW heater	1	
I-3 Install a manifold "home run" structured plumbing system; with fixtures ≤ 1/2" in diameter	2	2
• I-4 Install a manual or motion activated on-demand hot water circulation pumping system	2	
I-5 Install a point-of-use tankless hot water heater that uses only cold water supply or solar-assisted preheating for any fixture > 20 pipe run feet from water heater	3	
• I-6 Install lavatory faucets that meet the proposed EPA's WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi of pressure	3	3
• I-7 Install showerheads that meet the proposed EPA's WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi of pressure	3	3
I-8 Install toilets that meet the EPA's WaterSense™ rating (1.28 gpf) OR	3	3
• I-9 Install dual flush toilets with 1.6 gpf/1.8 gpf or less water use	3	
I-10 Install a washing machine with a water factor of 6.0 or less	2	
I-11 Install composting toilet(s), 2 pts/fixture; no maximum	2	
I-12 Install a refrigerator with an in-door filtered water system	0.5	
I-13 Install excess flow check valves or excess water shutoff connectors at fixtures	3	
I-14 No garbage disposal	1	
<b>Outdoor Options</b>		
O-1 Install a rainwater harvesting system capable of retaining and storing 50% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	6	
O-2 Install a rainwater harvesting system capable of retaining and storing 25% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	4	
O-3 Install a rainwater harvesting system capable of retaining and storing 10% or more of the average annual available rainfall on the catchment surface. (min. Catchment Area = 500 ft.)	2	
O-4 Install a gutter and downspout system or canals that tie to storm water infiltration trenches, bioswales, or rain gardens	2	
O-5 Install grey water plumbing lines, labeled and stubbed out to exterior of residence, but with connection to an onsite landscaping drip irrigation system	2	
O-6 No swimming pool	2	
• O-7 No decorative water features or mister systems that use potable water.	1	1
O-8 Impervious driveway & walkway surfaces shall be <5% of total site area (≤ 5 acres); OR 1% of the site area (over 5 acres)	2	
O-9 Construct no impervious surfaces outside the building footprint	2	
O-10 Install a vegetative roof system (min 50% of roof area) to reduce impervious surfaces	3	
O-11 Install drought-tolerant, non-irrigated landscaping design by a licensed landscape professional	3	
O-12 Install drought-tolerant, non-irrigated landscaping design by a licensed landscape professional. Plant species limited to native plants only.	4	
• O-13 Irrigation system designed and installed by an EPA WaterSense™ certified professional	1	1
O-14 Provide recharge/retention plan for rainwater	1	
• O-15 Install a high efficiency irrigation system that uses:		
a. "Smart Controllers" (w/ moisture sensor and rain delay controllers) & high efficiency nozzles;	0.5	
b. Check valves in heads and heads matched to the beds distinct watering needs;	0.5	
c. Separate sprinkler zones for beds, with plants grouped based on watering needs (hydrozoning);	0.5	
• d. A timer/controller that irrigates during the hours of 1- pm-8am to minimize evaporation;	0.5	0.5
• e. Drip irrigation for all planting beds;	0.5	0.5

**TOTAL POINTS: 15.0**

**Metropolitan Domestic Water Improvement District  
Board of Directors Meeting**

**March 9, 2015**

**Annual Water Level Monitoring Report**

**Synopsis**

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

**Background**

The District began the annual groundwater level monitoring program in 1993. 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, both active and inactive, within five of the District's service areas 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 Metro to measure and report annual groundwater levels from within the service area. Metro also uses the water level change information to determine if its CAP recovery wells in Metro Main are in compliance with ADWR's decline limit of 4 feet per year averaged over a five year period for each of our 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 Southwest E&T were added in 2012. Water levels for Metro Southwest-Lazy B are not taken due to the small size of the well that does not allow access for water measurements.

Water Sustainability staff manually measures each of the 57 wells that are part of the annual monitoring program. To improve efficiencies and gather additional data throughout the year, water level monitoring systems (water level transducer and continuous data logger) have been installed at eight locations in Metro Main and one in Metro Hub. Figure 1 depicts the locations of the eight automated monitoring locations in Metro Main, and Figure 2 shows the same for Metro Hub.

## **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 163 feet to 332 feet below land surface (Table 1). Groundwater level changes varied at the wells from a 9 foot rise to a decline of 6.6 feet since last year. The variation in water level change is a function of the amount of pumpage at Metro Main wells and the amount of recharge over the past year. The average well field change was a 1.0 foot decline. The water level hydrographs for the La Colina and Las Palmas East Wells show water levels continue to 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 274 feet to 448 feet (Table 1). The northern portion also experienced a wide range of water level changes from a rise of 2.4 feet to a decline of 10.5 feet. The average change was a decrease of 2.8 feet. Water levels at Tucson National North Well have remained fairly stable, but show the influence of nearby Metro wells when they are operating (Figure 4). However, water levels to the north at Stiller Well continue to have 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 reducing groundwater pumping and the associated costs with a depleting groundwater supply.

### *Metro Hub*

Depth to water at the five active and three inactive Hub wells ranged from 49 feet to 94 feet below land surface (Table 4). The average groundwater level change at the six Hub wells was an increase of 0.7 feet within the service area since last year. Groundwater level changes ranged from a decline of 4.9 feet to a rise of 8.3 feet.

Table 5 shows that Metro Hub had an average rise of 0.9 foot per year over five years. For the entire service area, groundwater levels over the last ten years have risen on the average 0.4 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 208 feet to 214 feet below land surface. The groundwater level changes at the two wells varied from an increase of 0.6 feet to an increase

of 1.3 feet since last year. The average was a one foot rise. Metro West had an average decline of 0.2 foot per year over five years. A ten year change calculation is not possible for comparison because annual measurements only began in 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 463 feet to 504 feet below land surface. The average water level change from the last year was a rise of 6.3 feet. These increases are assumed to reflect the rising 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 comparable to that in the Hub service area. Water levels varied from 68 to 75 feet below land surface. The average water level change from the last year was a rise of 1.8 feet.

#### *Avra Valley Recharge Project*

Depth to water is measured monthly at the Avra Valley Recharge Project monitor well (AVMW-01) (Figure 6). The winter measurement was 190 feet below land surface. The change from last year was an increase of 0.8 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. Since the operation of the Avra Valley Recharge Project began in 1997, groundwater levels have increased 5 feet per year.

#### **Future Monitoring Efforts**

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. Additional measurements are collected via transducers that log continual water-level measurements at select wells throughout the year, which provides further information about the aquifer. 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 so that Water Sustainability staff only needs to visit those well sites three times a year to download the data and monitor the charge of the data logger battery rather than doing monthly manual measurements.

The Water Sustainability staff would like to expand the use of transducers. A transducer is awaiting installation at Metro Southwest Diablo Village. Likewise, in the Hub service area, the transducer from the HEX-2 test well will be redeployed to inactive Hub Well No. 1 this fiscal year now that Hub Well No. 1A is active. Staff is proposing a transducer installation in Metro

E&T for next fiscal year. To save money, several existing transducers are being repurposed. The new active wells of Old Magee Trail, Riverside Crossing, and Hub No. 1A have been outfitted with pressure transducers to display 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 for the next fiscal year to have a driller open the blockage in the Rasmussen well to resume water level measurements and install a pressure transducer and data logger. In a subsequent fiscal year, 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.

### **Summary**

The Board of Directors is requested to discuss with staff this water level monitoring update. Long-term water level trends continue to show the importance of the District working with the other Northwest Water Providers and Tucson Water to treat and directly deliver its CAP allocation. No motion is required for this agenda item.

Respectfully submitted,

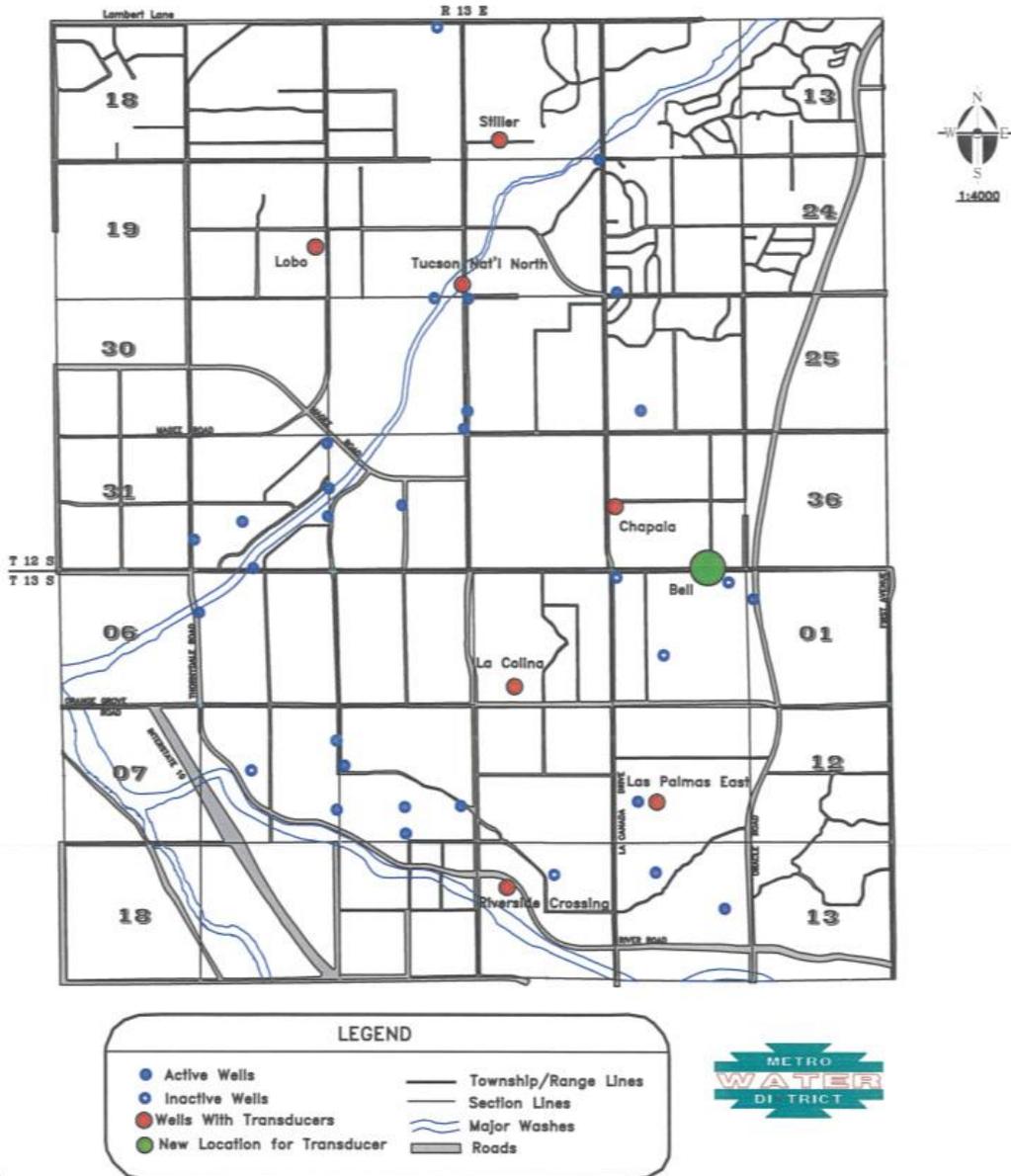
Warren Tenney  
Assistant General Manager

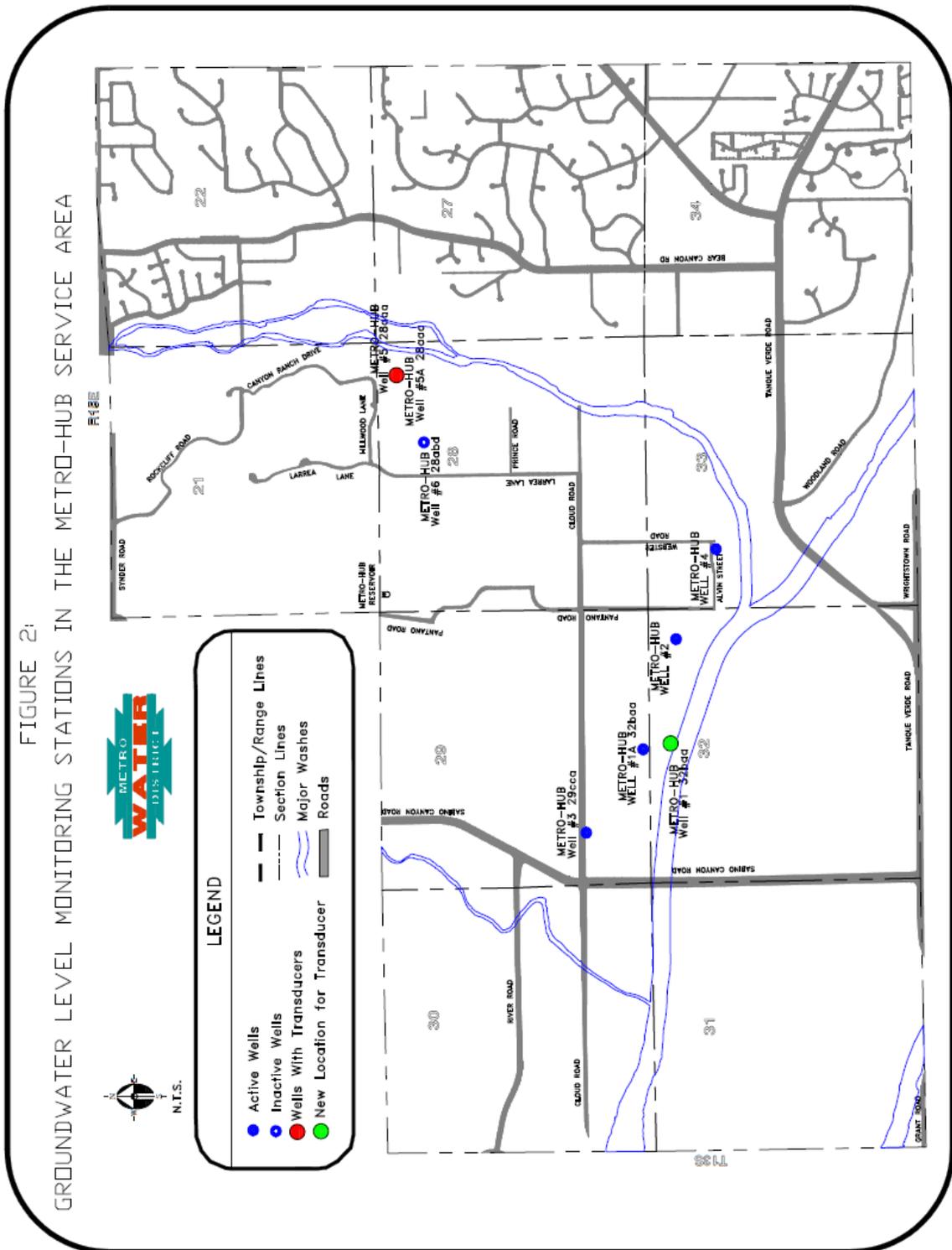
I concur with staff's recommendation.

Respectfully submitted,

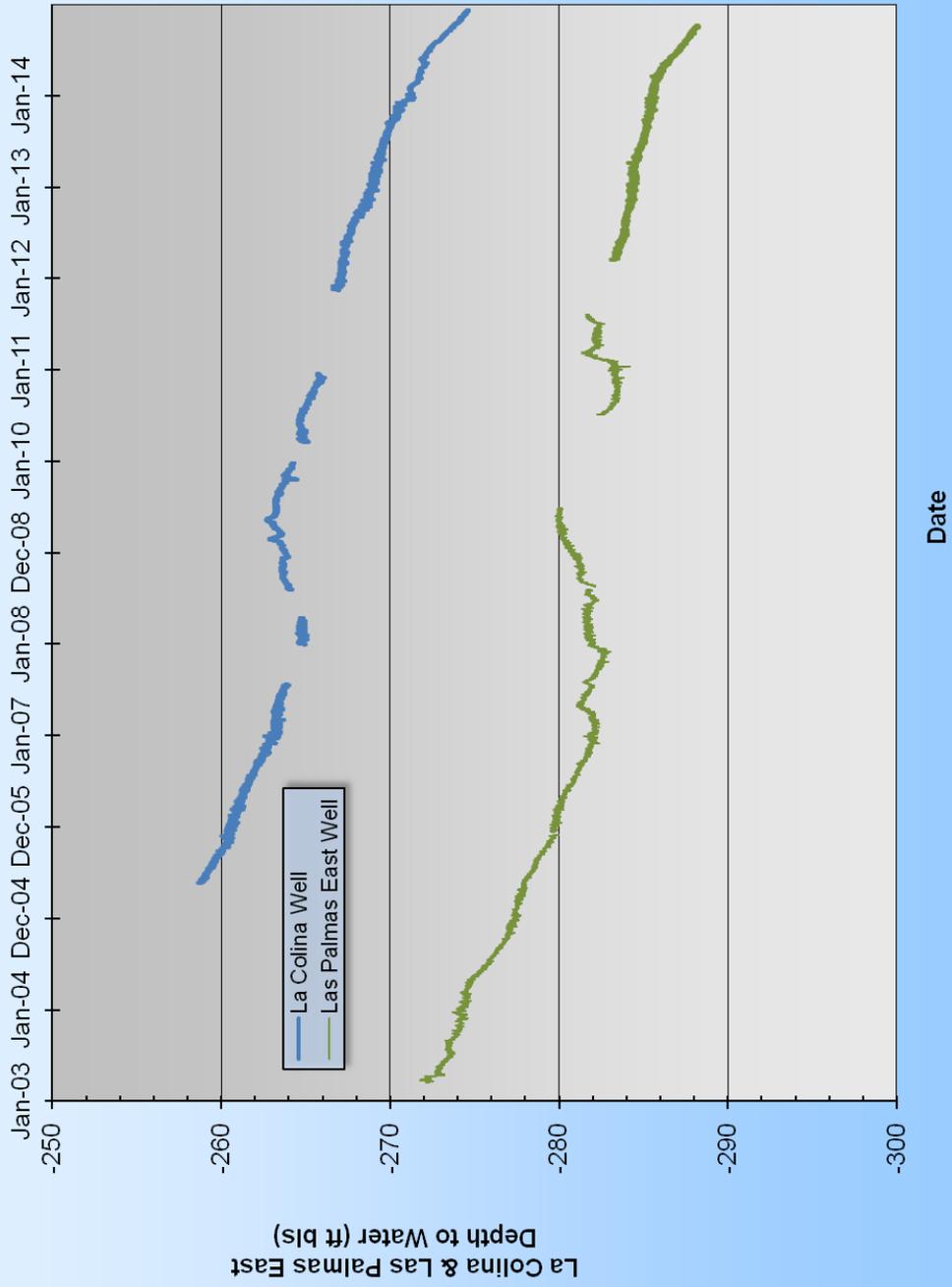
Joseph Olsen, P.E.  
General Manager

Figure 1  
Continuous Groundwater  
Monitoring Stations  
Metro Main

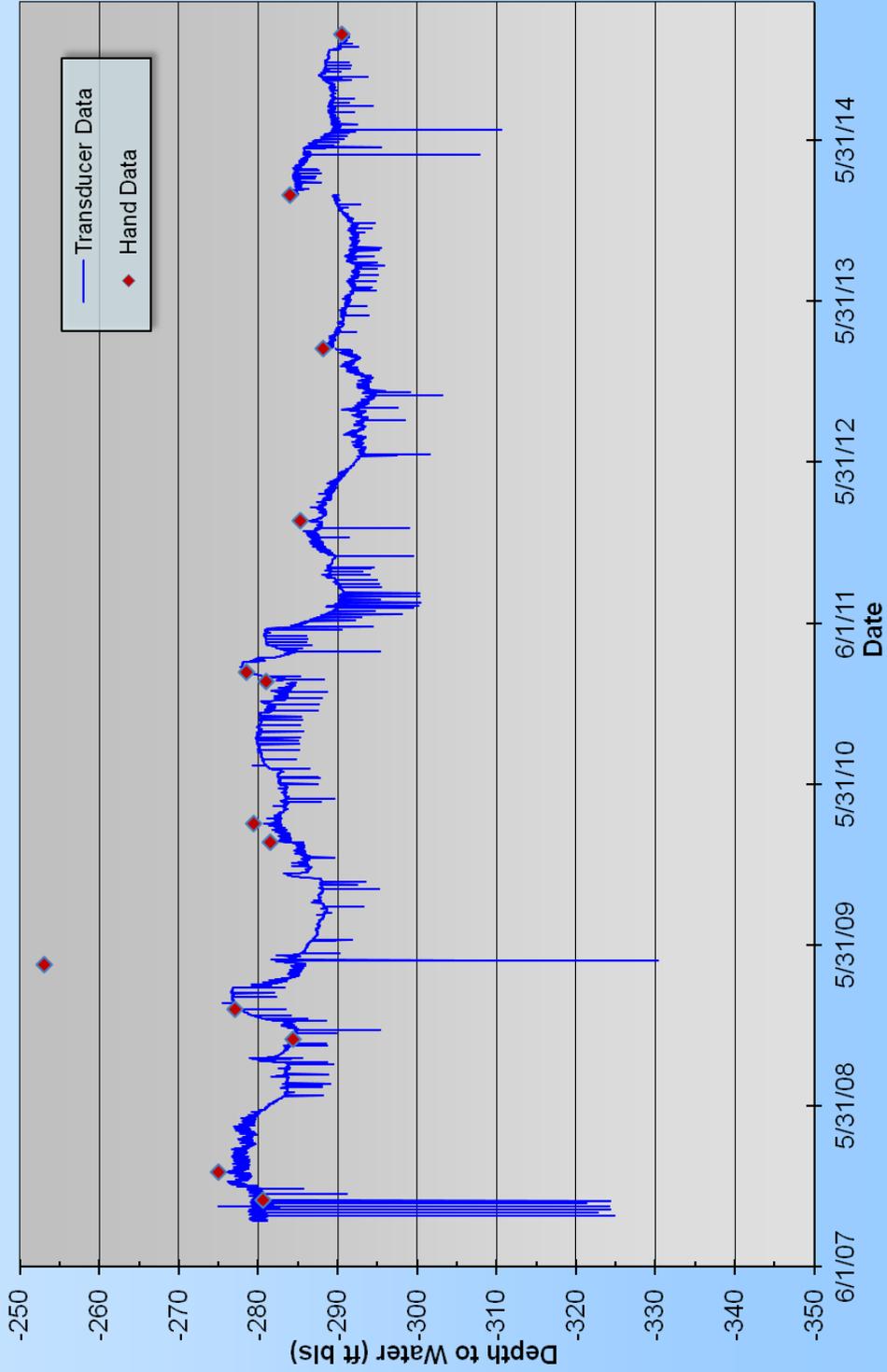




**Figure 3: Average Water Level Hydrographs  
Metro-Main Service Area**



**Figure 4:**  
**Tucson National North Average Water Level Hydrograph**  
**12-13-21 DDD**



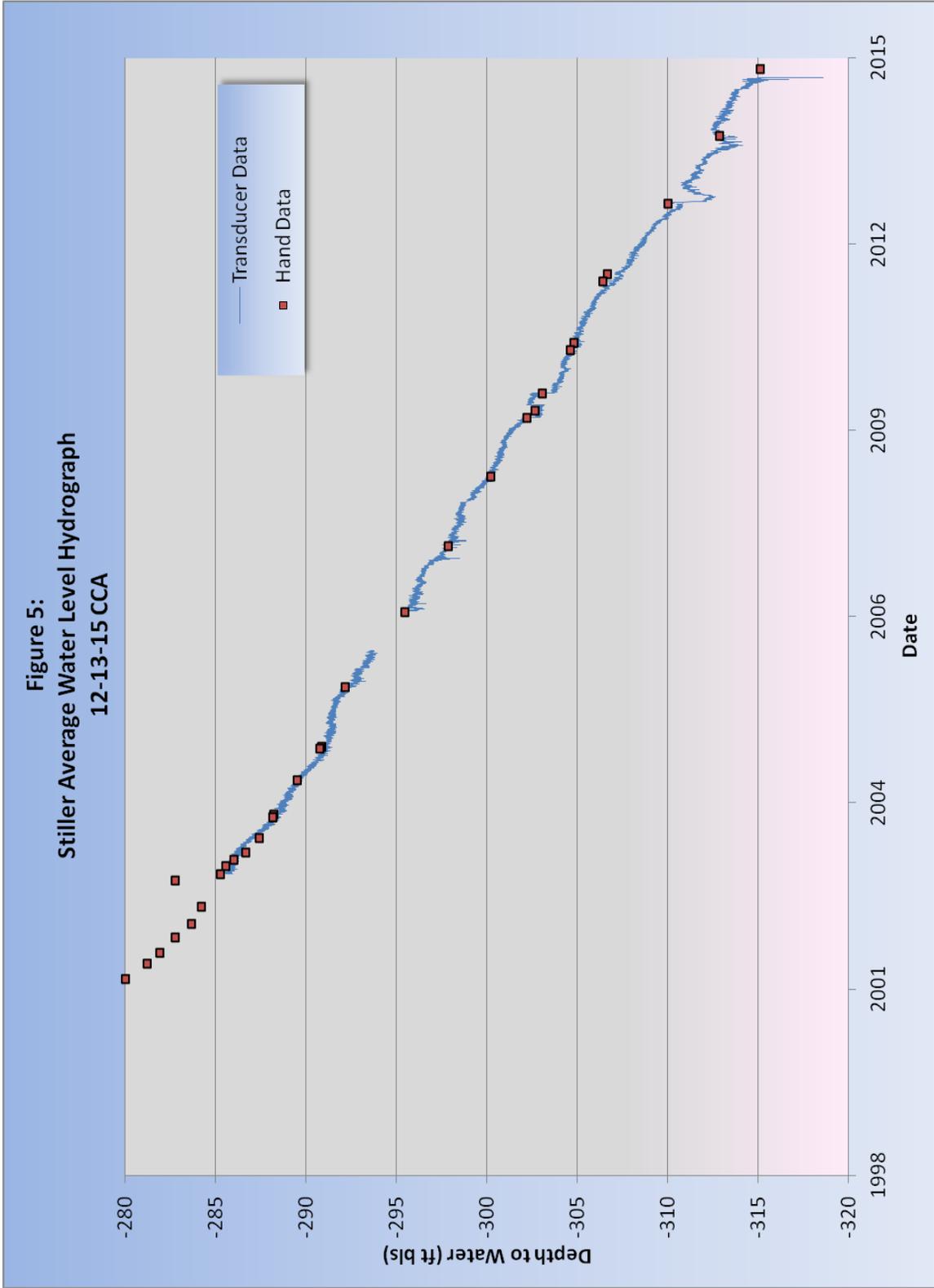


Figure 6: Avra Valley Recharge Project  
Depth to Water at AVMW-1

