

UNREPLENISHED GROUNDWATER WITHDRAWALS

ISSUE STATEMENT

In Arizona's active management areas (AMAs), unreplenished groundwater withdrawals by all water-using sectors, combined with a lack of sufficient incentives to either reduce withdrawals or mitigate the impacts, may limit the State's ability to meet the AMA long-term groundwater management goals.

BACKGROUND

Unreplenished groundwater withdrawals refer to groundwater that is legally withdrawn **without requirement or obligation** to artificially replenish or replace that volume of water back into the aquifer and is not offset by incidental recharge. These withdrawals are also referred to as 'allowable groundwater.' Through Arizona's current regulatory framework, the State has sought to restrict the overall reliance on non-renewable groundwater supplies. The 1980 Groundwater Management Act (GMA or Code) was passed to specifically address issues associated with severe groundwater overdraft. The GMA established the Arizona Department of Water Resources (ADWR) to oversee the State-wide water planning and regulations and created AMAs where groundwater would be regulated by ADWR in order to reduce groundwater withdrawals.

The State's approach to groundwater management includes requiring new development in the AMAs to limit the amount of groundwater that may be pumped without replenishing the aquifer through recharge of a renewable supply, and water users in all sectors are subject to mandatory conservation requirements that aim to reduce the amount of groundwater used over time. Despite these requirements, various existing and new groundwater users within the AMAs are allowed to continue or increase their use of unreplenished groundwater over time. Existing groundwater use was grandfathered into the Code, and other exceptions were made that allow for the continued use of groundwater in all sectors. Since, by definition unreplenished groundwater withdrawals are not required to be replenished, withdrawals that exceed natural and incidental recharge contribute to overdraft.

UNREPLENISHED GROUNDWATER WITHDRAWALS BY SECTOR

Groundwater use is authorized under various rights and permits within each water-using sector. The sectors and the types of current and ongoing allowable groundwater withdrawals are described below. **Table 1** also provides data on recent groundwater demands and unreplenished groundwater withdrawals by sector and AMA to assist in developing a common understanding of groundwater demands in the AMAs on which to base future conversations and decisions.

Agricultural Sector

As part of the adoption of the Code, Irrigation Grandfathered Groundwater Rights (IGFRs) were granted that allow growers to withdraw groundwater for irrigation use. No new IGFRs may be created and land that may be irrigated is limited to that which was historically irrigated between January 1, 1975 and January 1, 1980.¹ IGFRs represent a perpetual authority to withdraw groundwater without a replenishment requirement. This type of groundwater withdrawal can be expected to continue as long as the land is used for agricultural purposes. This is because the

¹ A.R.S. § 45-452(A).

cost of groundwater pumping is generally less expensive than the costs associated with delivering and using renewable supplies, when they are available.² The agricultural sector does not have a replenishment requirement, but some replenishment occurs after water is applied to crops and percolates below the root zone and reaches an aquifer. This replenishment is known as incidental recharge. The agricultural sector also includes estimated groundwater demands associated with tribal agricultural uses.

Some irrigation districts and farming operations delivering water to IGFRs serve as groundwater savings facilities (GSFs), enabling them to utilize renewable water supplies in lieu of groundwater in a given year. However, for water accounting purposes, ADWR legally considers the irrigation district's use of the renewable supply to be groundwater, because the volume of groundwater saved becomes stored water for the entity supplying the water. The stored water then becomes a long-term storage credit, reserved for future pumping, or it can be recovered within the same year. The GSF operation functionally reduces the amount of groundwater in storage equivalent to the amount of renewable water used on the farm, less a statutorily-required 5% cut to the aquifer, even though physical pumping may not occur for years to come.

In the West Salt River Valley Sub-basin of the Phoenix AMA, the Buckeye Water Logged Area was established in 1988 to exempt three agricultural districts in the area from conservation requirements and exempt others pumping groundwater pursuant to IGFRs from meeting irrigation water duties or paying groundwater withdrawal fees.³ They are responsible for paying a water duty exemption fee of twenty-five cents per irrigation acre per year for each irrigation acre in the exempted area.⁴ These exemptions allow water users to drain and dewater the area to address the shallow depth to groundwater that would otherwise prevent crop growth and to manage the high salinity of the groundwater.⁵ Although withdrawals from the Buckeye Water Logged Area are incentivized, they contribute to groundwater overdraft and are included in this summary of agricultural groundwater demands.

Municipal Sector

The municipal sector is comprised of small and large municipal water providers, both publicly- and privately-owned and both with and without a designation of Assured Water Supply (AWS). Small municipal providers are those that use 250 acre-feet (AF) or less water per year.⁶ Thus, large providers are those that use more than 250 AF of water per year. In addition to these provider types, several entities are regulated as large untreated providers in the Phoenix AMA. These include cities, towns, private-water companies and irrigation districts that serve 100 or more AF per year or 500 or more people with untreated water for non-irrigation purposes, usually for residential or commercial flood irrigation of turf.⁷

Under the AWS Program, the municipal sector is required to develop and utilize renewable water supplies for future growth.⁸ However, existing municipal groundwater uses are exempt from this requirement, unless a water provider serving existing demands chooses to become designated as having an AWS. In the Phoenix, Pinal, Tucson and Prescott AMAs, a groundwater allowance is permitted and extinguishment credits may be pledged to offset new groundwater withdrawals. It should be noted that all allowable groundwater pumping by designated municipal water providers is limited by the physical availability of groundwater in their service area. Also, the Santa Cruz AMA was split off from the Tucson AMA around the same time that ADWR adopted AWS rules for the

² Phoenix Active Management Area Fourth Management Plan 11-3 (2020).

³ A.R.S. § 45-411.01

⁴ A.R.S. § 45-411.01(D)

⁵ Phoenix Active Management Area Fourth Management Plan 2-15 (2020).

⁶ *Id.* at 5-3.

⁷ *Id.* at 3-10.

⁸ Phoenix Active Management Area Third Management Plan 12-2 (1999).

other AMAs, and ADWR has not yet adopted AWS rules for the Santa Cruz AMA. Because of this, all groundwater use is unreplenished in the Santa Cruz AMA.

Pre-1995 Subdivisions –Subdivisions platted before the 1995 AWS Rules and served by undesignated water providers are allowed to use groundwater without replenishment.

Groundwater Allowance – Another type of municipal unreplenished groundwater withdrawal is the ‘groundwater allowance’ granted upon issuance of a Certificate or Designation of Assured Water Supply (CAWS or DAWS). Under the AWS Rules, a predetermined volume of groundwater can be withdrawn by the CAWS holder or DAWS provider and not be replenished or offset. This groundwater allowance, also referred to as ‘Phase-in Credits’ in some Designations, was initially designed to help municipal providers transition from groundwater to renewable supplies.^{9,10} Whether a DAWS includes a groundwater allowance, and the manner in which the groundwater allowance is calculated, depends on the AMA in which the provider is located and the date on which the provider either began serving customers or applied for the DAWS. The groundwater allowances for some DAWS in the Pinal and Prescott AMAs are relatively large because they include a volume of groundwater equivalent to the demands of subdivisions platted in those AMAs before a certain date (2007 for the Pinal AMA and 1999 for the Prescott AMA).

For CAWS in the Phoenix, Prescott and Tucson AMAs, the groundwater allowance is gradually reduced over time depending on the date of application until it goes away completely for applications filed beginning in 2025. As a result of an amendment of ADWR’s AWS Rules effective January 1, 2019, applications for CAWS in the Pinal AMA no longer receive a groundwater allowance. Designated providers in the Phoenix, Pinal, and Tucson AMAs are also allowed an annual addition to the groundwater allowance typically equal to 4% of total demand, based on the assumption that this volume is being returned to the aquifer via incidental recharge associated with the provider’s service area.¹¹ In recent years, groundwater allowances have been utilized by designated and undesignated providers in the four AMAs where they are available.

Extinguishment Credits – Existing agricultural IGFRs, Type 1 non-irrigation GFRs and Type 2 non-irrigation GFRs may be extinguished for credits, known as ‘extinguishment credits’, and pledged to a DAWS or CAWS located in the same AMA. Credits pledged to a DAWS or CAWS are added to any groundwater allowance associated with the DAWS or CAWS and thus not subject to replenishment.¹² The method of calculating extinguishment credits varies by AMA, as described in the AWS Rules.^{5,13} Also, GFRs in the Phoenix, Prescott and Tucson AMAs may be extinguished for extinguishment credits only until 2025. While the use of extinguishment credits contributes to unreplenished groundwater pumping, it does not add to net groundwater withdrawals if the owner of the original grandfathered rights would have continued to withdraw groundwater pursuant to the right if it had not been extinguished; in practice, extinguishment credits represent a reduction in previously allowable withdrawals.

Exempt Wells – Pumping from exempt wells, limited to not more than 35 gallons per minute, is not regulated by ADWR and therefore is not required to be measured or subject to conservation requirements. Exempt wells are largely, but not exclusively, for domestic use. The volume of pumping associated with these small wells contributes to the overall amount of unreplenished groundwater in all AMAs. ADWR creates estimates for these withdrawals each year based on the number of people in that AMA that are not served by municipal water providers.

Remediated Groundwater – Until 2025, pumping of ‘remediated groundwater’ is incentivized in order to facilitate the treatment and beneficial use of contaminated groundwater. The use of remediated groundwater by certain

⁹ Prescott Active Management Area Fourth Management Plan 10-8 (2019).

¹⁰ Phoenix Active Management Area Fourth Management Plan 11-4 (2020).

¹¹ Arizona Administrative Code, Title 12, Chapter 15, Sections 724(A)(4), 725(3), and 727(A)(4).

¹² Arizona Administrative Code, Title 12, Chapter 15, Section 723.

¹³ Arizona Administrative Code, Title 12, Chapter 15, Sections 724, 725.01, 726 and 727.

designated providers in the Phoenix and Tucson AMAs is deemed consistent with the AMA's management goal and thus not subject to replenishment.¹⁴ Also, remediated groundwater is counted the same as surface water in determining compliance with Management Plan conservation requirements. Although remediated groundwater use is treated the same as surface water use for these purposes, it retains its legal character as groundwater, and therefore contributes to overdraft in the AMAs where it is withdrawn.

Industrial Sector

The Code defines industrial use as a non-irrigation use of water, not supplied by a city, town or private-water company, including animal industry use such as dairies and feedlots, and expansions of those uses.¹⁵ The industrial sector has no renewable water resource requirements, yet it is expected to grow along with municipal growth as it is largely dependent on population growth and the economy.^{16,17} The sector includes electric power plants, sand and gravel facilities, turf facilities¹⁸, mining, dairy, cattle feedlots, and other industrial uses. Industrial water users receive water from a number of sources, including surface water, Central Arizona Project water, effluent, and groundwater. Pre-Code industrial groundwater users are allowed to withdraw water from their own wells under grandfathered rights. Under certain circumstances, new industrial groundwater users may acquire groundwater withdrawal permits, including general industrial use permits, from ADWR. They also may purchase or lease non-irrigation GFRs, which are an authority to pump groundwater for non-irrigation use (e.g., Type 1 and Type 2 non-irrigation GFRs). Many of the industrial subsectors utilize a combination of these authorities. As described in relation to extinguishment credits above, the utilization of Type 1 rights represents a reduction in allowable groundwater mining under the Code, because the converted right is likely a lesser volume than would have been utilized by the original IGFR holder. Although there are incentives for utilizing renewable supplies like effluent, there is no regulatory or statutory authority at this time to require industrial water users to convert to renewable supplies or replenish their groundwater use.¹⁹

Summary of Unreplenished Demand by Sector

Table 1 provides a breakout of 2012 through 2016 average annual groundwater demand pursuant to the unreplenished groundwater uses described in this brief, by sector and AMA. These values include groundwater demands such as pumping and GSF demand, but do not include the recovery of water stored underground and not legally classified as groundwater, such as effluent that had been stored for long-term storage credits. All values are shown to illustrate the extent to which allowable groundwater rights are exercised in each AMA. The table also includes the offsets to those demands that can be attributed to a given sector. Groundwater withdrawals, in combination with the use of other water supplies, may contribute to incidental recharge. CAGRDR replenishment is also accounted for under the municipal sector. Overall, certain incidental and artificial recharge offsets are provided by sector in order to demonstrate the final average unreplenished groundwater demand by sector and AMA.

¹⁴ Arizona Administrative Code, Title 12, Chapter 15, Section 729.

¹⁵ A.R.S. § 45-561(5).

¹⁶ Phoenix Active Management Area Third Management Plan 12-2 (1999).

¹⁷ Phoenix Active Management Area Fourth Management Plan 3-10 (2020).

¹⁸ "A turf-related facility is any facility, including schools, parks, cemeteries, golf courses, or common areas within a housing subdivision, with ten or more acres of water-intensive landscaped area." Phoenix Active Management Area Fourth Management Plan 6-2 (2020).

¹⁹ *Id.* at 11-3.

IMPACTS OF UNREPLENISHED GROUNDWATER WITHDRAWALS

One of the most difficult challenges for the State is that for the past 40 years, each water use sector has become accustomed to utilizing various types of allowable groundwater withdrawals. Water users have made investments and economic decisions based upon these groundwater rights and their associated costs under the current framework. At the same time, rigorous groundwater management goals have been established in the AMAs. The State has recognized that unreplenished or “residual” groundwater withdrawals create a hurdle for AMAs to reach their respective management goals. In regard to the Phoenix AMA, ADWR acknowledged in its Third Management Plan that the authorization of continued groundwater use under the Code “was not made with a full understanding of its relationship to the attainment of safe-yield.”²⁰

Based on the perpetual nature and volume of these rights and exemptions alone, the State will need to explicitly quantify these exemptions and determine whether additional conservation requirements, reductions in groundwater withdrawals, or other mitigating actions should be established to provide a counterbalance to the amount of allowable groundwater withdrawals. Natural, incidental, and artificial recharge in each AMA has been and will most likely continue to be less than the volume of allowable groundwater withdrawals.²¹ Until they are addressed, the continued and further development of these groundwater rights and withdrawal exemptions will exacerbate water management challenges, including overdraft and physical availability of groundwater, no matter what the management goals may be beyond 2025.²²

²⁰ Phoenix Active Management Area Third Management Plan 12-5 (1999).

²¹ See ADWR Phoenix Active Management Area Fourth Management Plan (2020); ADWR Phoenix Active Management Area Third Management Plan 12-6. (1999); ADWR AMA Annual Supply and Demand Dashboard. Online Dataset. Accessed April 1, 2020. <https://new.azwater.gov/ama/ama-data>.

²² DRAFT Pinal Active Management Area Fourth Management Plan 11-4 (2020).

Table 1: 2012-2016 Average Unreplenished Groundwater Demand by AMA and Sector (AF/year)

Sector and Type	Active Management Area				
	Prescott	Phoenix	Pinal	Tucson	Santa Cruz
GROUNDWATER DEMAND					
5-Year Average (2012-2016)					
Agricultural Sector	1,939	623,307	611,059	101,784	10,134
Groundwater	1,939	350,586	422,694	76,666	10,134
GSF Accounting	-	179,935	124,841	24,909	-
Tribal	-	92,786	63,524	209	-
Municipal Sector	12,970	226,061	30,996	36,345	6,448
Large Designated Providers	4,584	54,040	9,671	12,290	3,121
Large Undesignated Providers	5,098	89,468	16,290	16,560	2,845
Small Providers	1,062	3,688	1,521	4,046	313
Large Untreated Providers/Urban Irrigation	-	68,690	21	-	-
Domestic Exempt Well Demand	2,227	10,175	3,494	3,450	170
Industrial Sector	1,592	107,024	18,273	57,107	1,161
Sand & Gravel	316	11,311	570	3,855	150
Mining	-	30	-	35,995	-
Turf	976	58,972	4,016	10,773	886
Electric Power	-	11,617	-	1,591	-
Dairy	-	11,216	9,414	131	-
Cattle Feedlots	-	85	1,755	-	-
Other	300	13,793	2,518	4,762	125
TOTAL All Sectors	16,501	956,392	660,329	195,236	17,743
OFFSETS TO GROUNDWATER DEMAND					
Agricultural Sector					
Incidental Recharge	1,419	467,183	250,668	22,036	2,375
Municipal Sector					
Replenishment (CAGR)	-	35,942	394	2,796	-
Incidental Recharge	-	67,968	1,461	6,401	-
Industrial Sector					
Incidental Recharge	238	9,149	786	5,322	148
TOTAL All Sectors	1,657	580,241	253,308	36,555	2,524
UNREPLENISHED GROUNDWATER DEMAND*					
Agricultural Sector	520	156,125	360,391	79,748	7,758
Municipal Sector	12,970	122,151	29,142	27,148	6,448
Industrial Sector	1,354	97,875	17,487	51,785	1,013
TOTAL All Sectors	14,844	376,150	407,021	158,681	15,219
*Average Unreplenished Demands are not the same as average Overdraft because they do not include natural recharge components.					