City of Goodyear
Initial Vadose Zone Recharge

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Executive Summary

Mining underground water supplies is an unsustainable water management practice. The State of Arizona established a Groundwater Management Code of laws and regulations when subsidence and water quality problems vividly demonstrated the cost of this practice in the 1970s. The Code requires water providers in the Phoenix Active Management Area (AMA) to replace each gallon of water they pump from the ground with another gallon (the practice called safe-yield).

Utilizing reclaimed water supplies with underground storage is essential in sustaining water resources in the arid southwest. The State of Arizona recognizes this by permitting water providers that have stored water underground to recover it by pumping groundwater at another location within the same sub-basin. This practice satisfies the safe-yield requirement.

Currently, the City of Goodyear (City) relies upon recovery of previously stored Central Arizona Project (CAP) water to serve its potable water customers and does not recharge its reclaimed water. Its CAP water supply was stored outside the City at Central Arizona Water Conservation District Underground Storage Facilities. The City is shifting from pumping that water allocation from the aquifer and replenishing it to the direct treatment and use of CAP surface water. In the meantime, storing its reclaimed water underground would allow the City to better meet the safe yield requirement.

Once the City does shift to directly using CAP water as its primary supply, storing a locally produced water source inside its own service area for future recovery will build sustainable reserves against future shortages. The City has a locally produced water source: the water it reclaims from sewer flow to its water reclamation facilities. To store this water locally, the City will construct vadose zone injection wells to recharge the A+ quality reclaimed water that is currently discharged to areas downstream of the City. The project proposed here will construct an initial set of five vadose zone wells to begin recharging the water reclaimed in the populous center of the City.

This proposal requests Bureau of Reclamation funding of $300,000 (Task A Water Conservation, Funding Group 1) to match $1,865,350 in City funding to design and construct recharge capacity to save 2800 AF per year of reclaimed water for 15 years, a total of 42,000 AF of water.

Estimated Project Duration and Completion: 21 months; October 2014

Background Data

Location Maps: ***Attachment A*** is a map showing the location of the project within the City of Goodyear and Goodyear within the state and relative to the Phoenix metropolitan area. ***Attachment B*** depicts the project area and its surroundings. Vadose zone wells will be sited within the area shown as the City Center or in the corridor adjoining the north-south reclaimed transmission line along Estrella Parkway. The hydrology study to be completed prior to the time that Reclamation announces awards will determine the best City-owned or licensed sites within the project area.

Sources of Current Water Supply:

The City's current water supply, 12,719.4 AF, seen in **Figure 1** below, consists of approximately 64% stored water recovered through pumping, 3% groundwater pumped from wells and 33% of available reclaimed water.

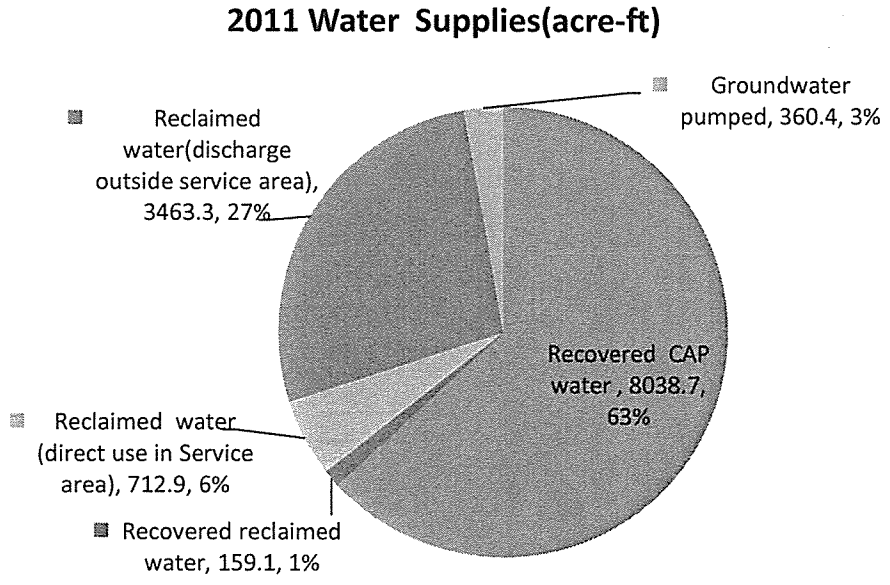
The recovered Colorado River Water (8038.7 AF/yr) was originally delivered through the CAP Canal to a Central Arizona Water Conservation District underground storage site through the City's subcontract. The City recovers the water through pumping within its own service area in years following the storage under a recovery permit issued by the State of Arizona.

In the past the City recharged some of its reclaimed water at a set of spreading basins that were closed in 2007. Recovered reclaimed water from recharge at this site provided the City with 159.1 AF of water in 2011.

Reclaimed water is produced by the City at the City-owned and operated 157th Avenue, Corgett Wash, and Rainbow Valley Water Reclamation Facilities. In 2011, the City directly used or discharged 4176.2 AF of reclaimed water. Water that is subsequently recovered is stored water from the CAP, which operates under a Bureau of Reclamation contract.

The City pumped a limited amount (345.4 AF) of groundwater within its own area.

Figure 1: 2011 Water Supply



Water Rights:

The City is a large water provider within the State of Arizona holding an Assured Water Supply Designation. Designations identify the portion of the water portfolio that the state certifies as reliable for 100 years from the expiration of the designation. The City's 2011 designation includes CAP subcontract water, leased Gila River Indian Community-Central Arizona Project water, reclaimed water, and groundwater within its service area that has been determined to be legally, physically and continuously available for 100 years.

Table 1: City of Goodyear Designated Assured Supplies

Type Water	Quantity (AF/yr)	Limitation of use
Groundwater	5,025	Service area
Stored Water Credits	723.02	Previously stored at CAWCD sites and City site
Central Arizona Project	7,516.98	Available for recharge and recovery
Reclaimed Water	1,377	2008 Demand used as limit
Total:	14,642.56	

The City's subcontract (Sub-Contract No.07-xx-30-W0498) with Central Arizona Water Conservation District for CAP Municipal and Industrial water makes CAP water legally available as a City water supply. The City holds a subcontract with Reclamation for 10,742 AF/yr of surface water that is municipal and industrial priority water. The City also holds a lease on Indian CAP municipal and industrial priority water for an additional 7,000 AF per year as a result of the Gila River Indian Community settlement. This makes 17,742 AF per year of CAP municipal and industrial water legally available for Assured Water Supply purposes.

While this amount is legally available, the *physical* availability of this supply is limited to recharge and recovery until the City constructs a surface water treatment facility and transmission lines connecting the canal to its service area. Because the City cannot directly take take its CAP water the State only recognizes 7,516 AF of the entire allocation annually. The City has permitted its twelve production wells as Recovery Wells to allow legal recovery of Central Arizona Project water recharged to underground storage. Such recovered water does not count as mined groundwater.

The City has previously stored CAP water at underground storage facilities owned by Central Arizona Water Conservation District and a much smaller amount of reclaimed water at its former storage facility. This banking has earned the City 72,300 AF of water credits it can legally recover by pumping over the next 100 years. By storing its reclaimed water at the proposed vadose zone wells the City would increase the number of water credits it can withdraw from its bank by 2,800 AF/yr in future years.

Legal availability of groundwater is based on the City's Service Area Right, 56-002019.0000, granted under Arizona Revised Statute § 45-492. All City wells permitted as Service Area Wells are legally authorized to pump groundwater with replenishment. The City's Assured Water Supply Designation identifies 5,025 AF of groundwater as legally and physically available annually.

The City's designation also identifies 1,377 AF of its reclaimed water as available for direct re-use, based on the amount directly used within its service area in 2008. By conserving reclaimed water that is currently discharged outside the City, this project will increase the amount of reclaimed water that is readily available, and increase the amount recognized by the State within the City's assured water supply.

Water uses:

Figures for 2011 are provided.
The City's recovered water (CAP and reclaimed) and pumped groundwater is used for municipal purposes and industrial customers within the City. The City served its customers 8112.5 AF of potable water from these sources in 2011.

The City's A+ quality reclaimed water is either directly re-used for turf irrigation and dust control (712.9 AF/yr) or discharged to the Buckeye Irrigation District Canal outside the 157th Avenue Water Reclamation Facility and transported over 20 miles downstream to Palo Verde Nuclear Power Generating Station outside the City service area (2532.9 AF). The balance (930.8 AF) is discharged to Corgett Wash (from the Corgett Water Reclamation Facility) and from the 157th Avenue Water Reclamation Facility to the Gila River when the canal to Palo Verde is closed for maintenance.

This project will construct vadose zone recharge wells to initially permit underground storage of up to 2,800 AF of A+ quality reclaimed water treated at 157th Avenue Water Reclamation Facility per year within the City's service area. Storage of this reclaimed water inside the service area will increase the sustainability of City water supplies by permitting recovery in times of shortage.

Number of water users served:

Total service area population for 2011 = 36,998
Total single family connections for 2011 =13,364
Total other connections for 2011= 1,001

Water system description:

The City's service area lies south of Interstate 10 within the City boundaries. The City also serves water to a small strip of land between the I-10 Interstate and McDowell Road. The City's service area currently extends south of the Gila River to the southern-most master-planned residential development (Newland Communities) west of the Estrella Mountains.

Number of production wells (all permitted for recovery): 12
Number of miles distribution lines: 311.16
Total permitted constructed water reclamation capacity: 6216 AF/yr
157th Avenue Water Reclamation Facility(WRF): 4480 AF/yr
Corgett Wash WRF: 896 AF/yr

Rainbow Valley WRF: 840 AF/yr
Underground water storage permits at Central Arizona Water Conservation District facilities:
Hieroglyphics Facility: 13,000 AF per year
Agua Fria Managed Facility: 13,000 AF per year
Number of Reservoirs: 10
Available City Storage Capacity: 15.9 MG
Number of Boosters: 10

Current and projected water demand:

Overall demand for the City of Goodyear for municipal and industrial purposes through 2030 is presented below:

Table 2: Projected Water Demand

Year	Projected Water Demand (AF)
2012	8,715
2013	9,233
2014	9,751
2015	10,269
2016	10,787
2017	11,305
2018	11,823
2019	12,341
2020	12,859
2021	13,377
2022	13,895
2023	14,413
2024	14,931
2025	15,449
2026	15,967
2027	16,485
2028	17,003
2029	17,521
2030	18,039

This projected demand includes all current deliveries, committed, and anticipated future demand, based on current City population projections and development plans, inside the City's current service area. Areas served by private water companies are excluded. Figures are shown in AF per year.

Potential shortfalls in water supply:

The City projects that supplies currently available for its use under State of Arizona water management regulations will be insufficient to meet projected demand early in the 2020s due to projected population growth. The City is committed to increasing its sustainable water supplies to serve future residents. To that end, the City will apply for additional CAP water through the current non-Indian Allocation process. In addition, the City will begin to store a portion of its reclaimed water through groundwater recharge using the proposed vadose zone wells in 2014. Recharging reclaimed water through the wells that make up this project will increase the City's stored water, providing an additional legal supply for use in the event of shortfalls.

The City will be dependent on surface water supplies delivered through the CAP canal for the majority of its future water supply. Severe drought has resulted in shortages of surface water many times in the past, and drought is expected to recur in the future. The recently completed Colorado River Basin Study projects that the Lower Basin will be vulnerable to shortages for up to 18% of the years between 2041 and 2060, depending on actions taken prior to then throughout the entire basin. (2012 Colorado River Basin Water Supply & Demand Study, Executive Summary) River shortages that result in lower delivery volumes must be covered by increasing pumping of wells, which will require underground storage in advance in order to have recovered water available for pumping.

Working relationships with Reclamation:

The City holds a municipal and industrial subcontract for Colorado River water from the CAP canal (Sub-Contract No.07-xx-30-W0498). The City holds a lease with the Gila River Indian Community for an additional 7,000 AF of CAP water. As described above, 63% of the City's current water supplies come from Reclamation projects (recovered, stored CAP water). Once the City establishes physical access to the CAP canal, the City will switch from pumping to recover stored water to using CAP surface water and the water reclaimed from indoor use of that surface water as its direct sources.

The City holds permits to recharge CAP water at the Central Arizona Water Conservation District's (CAWCD) Agua Fria Managed Project (73-569775) for 13,000 AF, Agua Fria Constructed (73-569776) for 13,000 AF; and Hieroglyphics Recharge Project (73-584466) for up to 13,000 AF of underground storage annually. The City currently has a total of 92,000 AF of CAP water in underground storage at CAWCD sites. CAWCD is a Reclamation contractor.

The City has a long track record of successfully working collaboratively with Reclamation and fellow west valley water providers on water sustainability projects including the Central Arizona Salinity Study and WestCAPS (West Valley Central Arizona Project Subcontractors). WestCAPS, with a current membership of three private and six municipal water providers, has collaborated to bring CAP water to its membership and otherwise improve the sustainability of local water supplies for twenty years. Bureau of Reclamation staff has frequently provided technical assistance in planning efforts and a representative attends most meetings. Most recently, the group completed a north-south pipeline transmission study (2005-2009) and improved ground water modeling of the west valley (2005-2009).

The City is currently cooperating directly with Reclamation and City of Phoenix on a pilot project testing a green solution for brine waste (2009-present). The City's Bullard Water Campus produces 133 million gallons of brine concentrate annually as byproduct of reverse osmosis treatment of recovered ground water with high total dissolved solids. This makes brine disposal a major and costly loss of limited water resources. The pilot project tests the efficacy of using artificial wetlands to reduce the levels of several heavy metals in the waste. If this treatment is successful, the City may be permitted to discharge the treated water into a stretch of the Gila River depleted by upstream diversions, which would enhance degraded riparian habitat.

The City received a grant from Reclamation to initiate planning and design of a SCADA system, including establishment of some gauges, in 2005. Reclamation also supported the City's 2008 audit of municipal water use and a modification of that audit (2009) to study the efficiency of irrigation along an additional 12.2 miles of rights-of-way. The City reduced its water usage by 36.9 AF in the first year following the audit, and identified the potential for reductions of approximately 126 additional AF per year in future years within the audited usage of 359.2 AF gallons per year for City-managed property.

Technical Project Description

Rationale

The City is compliant with Arizona requirements to replenish all groundwater that is pumped. The City recharges surface water into the aquifer by storing CAP water at underground storage facilities that are as much as 25 miles from the City. The City recovers the stored water by pumping inside its service area. While this practice satisfies legal requirements, it does not replenish the aquifer in the immediate area where water is being pumped.

Replenishing water that has been pumped with a locally available, renewable supply in order to save groundwater is a more sustainable means of meeting this requirement. For the long-term benefit of the aquifer where water is pumped, the City proposes to build a facility to recharge reclaimed water within one to three miles of several City production wells.

The renewable supply that is available to the City is the water it reclaims from return sewer flows through its 157th Avenue Water Reclamation Facility (WRF). The 157th Avenue WRF receives an average of 3.1 million gallons of effluent daily. The water is treated to produce A+ Quality reclaimed water (the highest quality effluent recognized by the State). The City's only direct-delivery customer is the Goodyear Ballpark and Recreation Complex (152.4 acre-ft/yr). The City and construction contractors use 346.3 acre-ft for dust control and facility needs. The City discharges the remainder to the Buckeye Irrigation District Canal (2532.9 AF/yr) or the Gila River (438.2 AF/yr), which both flow outside the City service area. In the proposed recharge facility, the City would store 2800 AF/yr, nearly all the volume that it currently discharges, (2971.1 AF in 2011).

The City is in the process of switching its operations to directly receive and treat CAP water. Once the City switches over to direct use of surface water supplies, the proposed facility will be used to store renewable water supplies to guard against future shortages.

Site selection and design considerations

The City currently has a 30" reclaimed transmission line running north from the 157th Avenue WRF along Estrella Parkway north to Van Buren (see ***Attachment B***). A branch of this line runs north and east toward Interstate 10 and Bullard Avenue, but the City has no additional transmission lines that extend from the trunk. To reduce project costs, the City plans to site the proposed vadose zone recharge facility within a mile of the existing reclaimed trunk line on City property. To avoid potential obstacles to obtaining an Aquifer Protection Permit for the facility, the City will avoid sites east of the Bullard Wash. The area where the City can best leverage its existing infrastructure and property holdings is marked in ***Attachment B*** with a red border.

Vadose zone injection wells will reduce the City's capital construction and ongoing operations and maintenance costs and reduce the footprint needed for the project. For more than 15 years, the City recharged reclaimed water at spreading basins on City property at the northwest corner of Yuma and Estrella Parkway but had to decommission the facility in 2007 due to anticipated development. To avoid similar problems in the future, staff recommended the use of vadose zone injection wells which will fit within City rights of way, opening miles of potential acreage in close proximity to the trunk line to use for this purpose.

The City will finalize the site selection after reviewing a hydrogeology study that will be complete by May 2013. City staff is preparing the scope of work to ensure the results are delivered before Reclamation announces WaterSMART awards. The study will identify the locations most suitable for vadose zone injection recharge in terms of depth to water table, likely percolation rates, groundwater mounding and adjacent land uses.

A WaterSMART award will sufficiently fund an Aquifer Protection Permit for a Vadose Zone Well Recharge Facility, additional permits and contribute to the construction and equipment costs for five vadose zone injection wells with individual injection capacities of 0.5 million gallons per day and a daily combined recharge capacity of 2.5 million gallons per day or 2,800 AF per year. Due to the significant Aquifer Protection Permit costs ($150,000-$250,000) and associated extensive hydrologic and engineering expenses, the City will plan and apply for a larger recharge capacity, of at least 3.5 million gallons per day. This will reduce additional vadose zone recharge well permitting costs for expansion that the City intends to undertake in 2014-2015. The City of Goodyear Water Resources Critical Strategic Plan (***Attachment D***) specifies that the City will construct two additional wells, for a total of 1.0 million additional gallons per day in that year. Constructing the initial vadose zone recharge capacity is identified as Water Resources Priority 3 within the Critical Strategic plan.

Cost estimating and initial design assumptions for this plan assume that the City will install wells that are approximately 100 – 150 feet deep, based on the fact that water tables are fairly shallow in the region south of Yuma Road. Dimensions of forty-eight inch diameter wells and 12 inch PVC well casings were used by the consultants who shared costs developed on projects in the

Phoenix metropolitan area in 2011. Wells will have 6 inch injection systems and be placed in standard vaults.

Monitoring wells will be required up gradient and down gradient of the injection well system. Because the City anticipates there will be a cluster or linear arrangement of the wells along rights-of-way, the project is estimated using four monitoring wells instead of ten. The City will install instrumentation and controls at monitoring and injection wells to permit supervisory control and data acquisition as part of the City's expanding SCADA system.

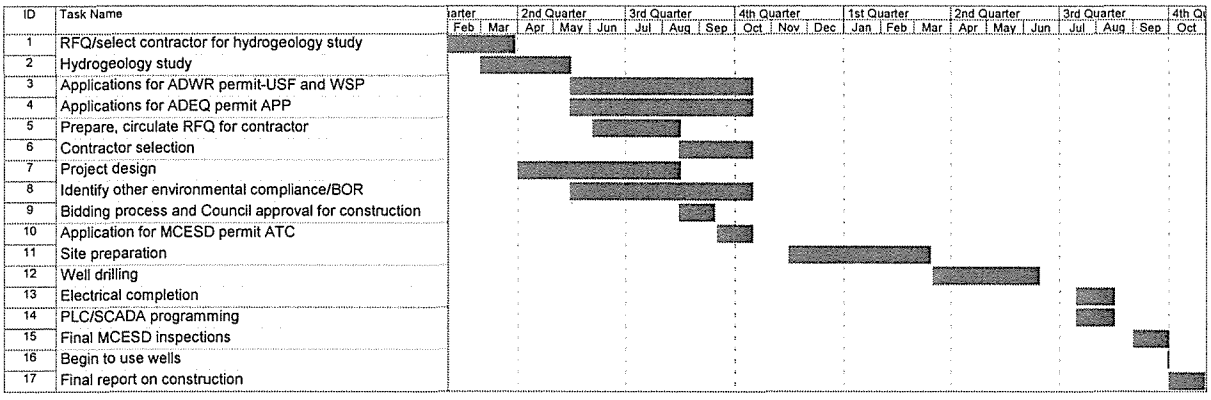
Permitting

The City will apply for the required permits for this project in a linear fashion. After holding initial pre-application meetings with Arizona Department of Environmental Quality, Arizona Department of Water Resources, and Maricopa County Environmental Services Division to determine which portions of the project present potential issues, the City will complete applications, inform agencies of progress, and obtain inspections as required for the individual permits.

Permits for the project will include:

Arizona Department of Water Resources:	Underground Storage Facility
	Water Storage
	Notice of Intent and Drilling Report per well
Arizona Dept of Environmental Quality:	Aquifer Protection Permit
Maricopa County Environmental Svcs.:	Approval to Construct

Project Schedule



Evaluation Criteria

Evaluation Criterion A: Water Conservation

Subcriterion No. A.1.—Water Conservation

In 2011, the latest year for which figures are complete, the City delivered 8112.5 AF of potable water and 712.9 AF of reclaimed water to municipal and industrial customers. The City identified 527.5 AF of lost and unaccounted for water.

The City currently discharges 2532.9 AF/yr of reclaimed water to the Palo Verde Nuclear Generating Station outside its service area and an additional 438.5 AF to the Gila River from the 157th Avenue Water Reclamation Facility. The City also discharges 492.3 AF/yr of reclaimed water to Corgett Wash from the Corgett Water Reclamation Facility.

By recharging reclaimed water the City will be able to store water locally underground within the aquifer and conserve these quantities of water through the reuse of recovered water. The City water reclamation facilities treat approximately 40% of the potable water deliveries.

The City vadose zone injection well project is designed to store reclaimed water that currently leaves the City service area aquifer only from the 157th Avenue WRF. All the stored water will be conserved through recharge to meet replenishment obligations and safe-yield and to meet future demand shortfalls due to drought and increased population.

The five proposed vadose zone wells will each be capable of recharging 0.5 million gallons per day. This conserves a total of 560 AF per well per year.

$$\text{Annual Recharge per Well} = \frac{500{,}000 \text{ gallons per day} \times 365 \text{ days}}{325{,}851 \text{ gallons per acre-ft}} = 560 \text{ acre-ft/yr}$$

Annual Recharge by Project=5 wells * 560 acre-ft/yr = 2800 acre-ft/yr

Quantifiable Water Savings = Annual Recharge by Project = 2800 acre-ft/yr

Water savings will be quantified by reading the amount of flow into each well at the flow meters for each vadose zone injection well. The Arizona Department of Environmental Quality requires annual reporting of flow into recharge projects. This data must also be reported to the Arizona Department of Water Resources for both the water storage facility and the water storage permit. The data from the required readings will provide documentation of the amount of water stored through injection into the vadose zone at each well.

The City will install instrumentation to accommodate remote automated collection and collation of this data via SCADA as a part of this project.

Subcriterion No. A.2.—Percentage of Total Supply

The industry standard for vadose zone wells indicates an average lifecycle of 15-20 years. The City projects that these wells will remain productive, with regular maintenance for at least 15 years.

The City's average demand for potable water is increasing as its population grows. Consequently, the supply of reclaimed water which is produced from the average 40% of water

returned to the reclamation facilities is increasing. This increases the City's overall water supply, as well as its sustainability. Using the demands projected in **Table 2: Projected Water Demand** above, the City is projecting the annual water supplies for the next 15 years through the implementation of vadose zone wells below:

Table 3: Total Water Supply Throughout Project Life-time (AF)

Year	Demand	Reclaimed
2014	9,751	3,900
2015	10,269	4,108
2016	10,787	4,315
2017	11,305	4,522
2018	11,823	4,729
2019	12,341	4,936
2020	12,859	5,144
2021	13,377	5,351
2022	13,895	5,558
2023	14,413	5,765
2024	14,931	5,972
2025	15,449	6,180
2026	15,967	6,387
2027	16,485	6,594
2028	17,003	6,801
Average	**13,377**	

Estimated Amount of Water Conserved = 2800 AF/13,377AF
Average Annual Water Supply (2014-2028) = **20.9% of Average Annual Water Supply**

Over their lifetime, these wells will conserve 20.9% of the City's average annual supply.

Subcriterion No. A.3.—Reasonableness of Costs
The value of 15 years has been used in the following calculations:

The annual AF conserved, as calculated above, is 2800 AF.

The Reasonableness of Costs ratio is then:

$$\frac{\textbf{Total Project Cost}}{\textbf{Acre-feet Conserved x Improvement Life}} = \$2,163,350,750 / (2800 \text{ AF/yr} \times 15 \text{ years})$$

$$= \$2,163,350/42,000 \text{ AF}$$

$$= \textbf{\$51.51/AF}$$

Evaluation Criterion B: Energy-Water Nexus

Because water is conserved in this project by keeping water resources local within the City's aquifer and avoiding discharges to downstream areas outside the service area and aquifer sub-basin, there will be a significant energy savings of not having to pay for the importation for these water supplies in future years. CAP has estimated that it uses 1 megawatt of electricity to move 1 million gallons of water to the Phoenix region.

A. Calculated Savings from Unnecessary Power

Energy savings from water not moved via CAP to City of Goodyear =
Water Stored By Recharge Project (Million Gallons)/yr X Energy Required To Move 1 Million Gallons =

2,800 AF/yr * 325,851 gallons/AF x 1mega watt hr/million gallons x 1000 kwh/megawatt-hr = 1,000,000 gallons/million gallons

= 923,382.8 kwh saved/yr

Currently, the City pays $53 CAP per AF for power to move its allocation to recharge or City locations. This equates to a cost of $148,400 in 2013 to move 2800 AF of water to a CAP recharge location. At current rates, the City would save (15 yr * $53 /AF * 2800 AF) $2,226,000 on power by recharging its own water rather than importing CAP water for storage. This is a minimum estimate. By 2018, CAP anticipates that it will raise this cost to $68 per AF. If the Navajo Generating Station, the primary power source for CAP, is re-permitted in 2019, power costs can be anticipated to climb consistent with that trend. If it is not re-permitted, costs to transport water to the City are anticipated to increase much faster.

B. Fuel savings from project design

The City's inclusion of SCADA in the project design will permit staff to accurately track the amount of water conserved. With SCADA, City staff will not have to travel to the site daily to record the amount of water flowing to each well and the depth to water in each monitoring well.

If the daily trips are reduced by SCADA to periodic trips, there will be a savings of 6 trips per week or (6 x 52 trips) per year. Assuming that the wells are sited together at the northwestern corner of Goodyear Parkway NW (see ***Attachment B***), each round trip would be 6.0 miles from the Public Works Administration Building (4980 S. 157th Avenue). The typical vehicle used for such monitoring trips in the service area gets 8.5 miles per gallon/

Miles saved per year for gauge readings = 312 trips x 6.0 mi RT Public Works to Vadose Zone Wells

= 1872 mi/yr

Project gallons saved/yr = 1872 miles saved/y / 8.5 mpg = 223gallons non-leaded fuel saved/yr

Evaluation Criterion C: Benefits to Endangered Species

The City consulted professionals at Arizona Game and Fish Department and Scottsdale Community College for assistance in assessing possible project impact and enhancements. There are no federally endangered or threatened species that have been found in the immediate vicinity of this project. The urbanized surroundings adjoining roadways and the narrow plots that will be used for vadose zone wells make the sites inappropriate for the riparian species that have designated critical habitat in this area. This project will not directly benefit federal candidate species or accelerate recovery of federally listed threatened or endangered species or designated critical habitat.

Evaluation Criterion D: Water Marketing

Water marketing is illegal in Arizona. This project does not establish water marketing.

Evaluation Criterion E: Other Contributions to Water Supply Sustainability

(1) A WaterSMART Basin Study has not been performed for the West Salt River Sub-Basin or a large basin in which the City lies.
(2) The project does not expedite future on-farm irrigation improvements because it addresses the water supplies of a municipal provider and service to residential customers.
(3) The project **will** significantly increase the sustainability of water supplies for the City and the West Salt River Aquifer by equipping it: a) to address anticipated water supply shortages, b) to meet state requirements to guarantee its supplies prior to future development, c) to assist the region in meeting the State-set water management goals, and d) to improve local water quality.

a) Drought and increased demand due to population growth are both very real threats to the City's water supplies. This project will address these threats by storing reclaimed water supplies underground that will conserve the current water supply for future reuse and grow reclaimed water supplies as insurance for future drought.

Because the City anticipates that it will need significantly greater water supplies in the future to serve its growing population, storing water that is readily available and not needed now to serve its population locally is a prudent way to reduce the likelihood and impact of future shortages.

The City of Goodyear was the fourth fastest growing suburban City in the country during the first five years of this century, experiencing population growth rates as high as 16% per year. Although growth slowed significantly in the recent economic downturn, it did not stop. Housing permits went up from 579 in 2011 to 976 in 2012. Geographically, the City is just over 190 square miles. However, its current population of 68,000 is less than one-tenth of the projected build-out population of 754,000. Water demand currently averages 7.4 million gallons per day. The City has reliable supplies to serve this demand.

By build out, the City will need supplies to serve demand of 114.6 million gallons per day; more than an order of magnitude greater.

The City is committed to expanding its renewable water supplies to meet higher future needs. Acquiring *additional* renewable water supplies via allocations of surface water is a critical endeavor that is well underway. Banking existing renewable supplies within the service area against future shortages is also crucial. The City has a water supply that is renewed locally, and grows as the customer base grows in its reclaimed water from returned sewer flows. The City currently discharges 2,971 AF of this A+ quality water outside the service area. Banking this unused, renewable, reclaimed water supply to make a high quality water resource available in underground storage as a supply against future shortfalls is the ultimate goal for which the City has invested significant capital resources for collection and treatment. This project would construct the first wells to inject reclaimed water into the vadose zone within the City's service area, allowing future recovery from the local aquifer with minimal costs for transport to where it would be needed.

The Colorado River Basin Study of Supply and Demand (2012) modeled a multitude of scenarios to explore the impact climate change may have on water supplies within the Basin. Between 2041 and 2060, when the City will approach build out and will be heavily reliant upon its Colorado River water supplies, the likelihood of shortages that will reduce Lower Basin supplies ranges from 0% to 18% in any given year. In such shortages, Colorado River users will be forced to rely upon other supplies. The City, as a municipal and industrial subcontractor to the CAP will not be subject to the first shortages. Lower priority users will have their deliveries reduced first. The City will also be buffered by the storage that has been done by Arizona Water Banking Authority on behalf of the tax payers. Prolonged shortages due to drought and climate change would reduce deliveries to the City and force it to recover water stored underground for the purpose of shortages. Storing additional water supplies underground for future recovery as the likelihood and severity of droughts increase is the most potent step the City can take to become drought resistant.

b) Over-drafting of groundwater supplies created water quality problems within the groundwater aquifers and reduced groundwater supplies for Arizonans in the 20th century. Recharging renewable supplies in the vicinity of pumping will help the City increase its assured water supply and sustainably meet future water demands.

The State of Arizona experienced widespread subsidence and degradation of water quality in the middle of the twentieth century as groundwater pumping severely over-drafted the aquifer. Some home buyers discovered that there was not enough water for their homes or that the supply would not last long after new homes were built. Stakeholders eventually crafted and passed the Arizona Groundwater Act of 1980 to begin to regulate and reduce groundwater mining or over-drafting.

As the State groundwater planning progressed, a program was designed to directly assure prospective developers and homebuyers that they would have a secure long-term safe

water supply. The Assured Water Supply Program requires large providers to demonstrate to the Arizona Department of Water Resources the amount of water that they have physically and legally available that is of a quality to permit treatment for potable use that will be continuously available for 100 years. Only after additionally demonstrating that they have the financial capability to construct and manage the infrastructure to use that supply and committing to meet all regional conservation requirements (see next item), can their water supply be "designated". The designation specifies how much water meets the criteria. The expiration date of the designation is set for the year in which the current, committed, and future projected demand the water provider is expected to equal the designated supply. For a city planning for the population growth in Goodyear's future, increasing designated supplies is vital.

Retaining reclaimed water within the service area rather than discharging it outside the service area will help the City increase its demonstrably available water supplies. This will increase the amount of water resources recognized by the Arizona Department of Water Resources in the designated volumes and may extend the length of the City's designation, and strengthen consumer confidence regarding sustainable growth within the City.

c) The Groundwater Act of 1980 also established water management goals for 2025 for areas of the state that were already experiencing particularly acute water problems that were also expected to continue to grow in population. By storing water underground inside its service area, the City will ensure that its portion of the Phoenix Active Management Area (AMA) safe-yield goal is achieved.

The State of Arizona established a goal for the Phoenix AMA (roughly contiguous with Maricopa County) of "safe yield". The state defined "safe yield" as withdrawing no more water from the aquifer than is put into it, on a continuing basis. ADWR monitors groundwater levels and requires water providers and other water users to submit annual reports on their withdrawals and underground storage to assess the condition of the aquifer.

One conservation requirement of the Phoenix AMA's current Management Plan is that individual providers must either meet the safe-yield goal with their own resources or pay the Central Arizona Groundwater Replenishment District to recharge water into the ground on their behalf within the Phoenix AMA each year. The City of Goodyear currently meets this requirement by taking delivery of its CAP water at CAP-owned underground storage facilities and storing it in them. The City cannot recharge reclaimed water within its service area, although this would provide significant conservation of water supplies, because it does not have its own recharge facility. As permitted by state law, the City recovers CAP water within its service area, relying upon the aquifer underneath to serve as a conduit for the CAP water that was recharged and stored at the CAP facilities. This is a costly method of meeting the requirement, and also recovers water at great distances from where it is actually recharged.

The City will meet its requirement to maintain safe-yield in a more sustainable fashion by using its locally available reclaimed water supply for recharge. Installing the vadose zone injection wells will allow the City to inject the majority of its current reclaimed flows, nearly all of it being water that is currently discharged outside the service area. The injection wells will be within 1-3 miles of most of the City's production wells, providing a more direct connection between recharge and recovery of stored water underground.

d) Injection of reclaimed water into the vadose zone will also improve the quality of aquifer water. The quality of the reclaimed water is better than the natural groundwater and thus will provide a great water blending agent that will improve the groundwater quality.

In order to obtain the A+ quality of the reclaimed water produced at the 157th Avenue WRF, the City must treat it to keep nitrate concentrations below 10 ppm. This water will be the source for injection in the vadose zone wells this project will construct.

Background nitrate levels in groundwater in this vicinity have historically been near 28 ppm, due to past where agricultural activity. From the mid-1990s to 2007, the City stored reclaimed water underground using a set of spreading basins at the Soil Aquifer Treatment Facility (SAT site) located at the northwest corner of Yuma Road and Estrella Parkway. (The City was required to close and decommission the SAT site to accommodate anticipated development in 2007.) The City monitored and reported water quality at each of the four monitoring wells at the site to the Arizona Department of Environmental Quality as a condition of its permit. Over the period of the SAT site's operation, the recorded nitrate levels declined. In the final years of recharge staff reported levels at the monitoring wells of 3 ppm.

Improving the quality of water in the aquifer will contribute to the sustainability of the City's water supplies. The background levels of nitrates and total dissolved solids in the aquifer currently requires that the City treat most of the water it pumps by reverse osmosis to reach federal drinking water quality standards. The reverse osmosis process produces brine concentrate equal to 18% of the volume of water put through the process. Reducing nitrate levels in the aquifer where recovery occurs in the future would make these supplies more sustainable, by reducing the volume of pumped water that must be wasted.

The proposed project will not make water directly available to other users, however it will create storage space in the CAP facilities where the City has a right to store water and does not use it – making the storage space available for other users for the future.

The project would not make water available to Indian tribes or to water markets (which are illegal in Arizona).

The recharge project does not involve collaboration with other water providers and users. There is widespread recognition among water providers that recharge of reclaimed water supplies is essential for long-term supply sustainability in Arizona. Neighboring providers facing the

challenges that Goodyear faces are pleased that the City will initiate this practice to their mutual benefit in improved aquifer sustainability.

The proposed project will launch the City into the long-term practice of local water conservation through vadose zone injection. The success of this project will show the Goodyear City Council and residents a strategic method for cost-effective water conservation. This will increase support for expanding recharge facilities to make recharge infrastructure in the vicinity of future well fields a priority investment in the future.

Evaluation Criterion F: Implementation and Results

Subcriterion No. F.1—Project Planning

(1) As previously mentioned the State of Arizona's Phoenix Active Management Area is required by Arizona statute to achieve safe yield by 2025. "Safe yield" is the replacement of each gallon of ground water pumped from the aquifer with a gallon of water from another source. The Assured Water Supply Program the State established to assure proper groundwater management applies this requirement to each large water provider, including the City as a condition for continued development. The State encourages water providers to recharge reclaimed water into underground storage for this purpose. The Assured Water Supply Program requires that all participants meet the conservation requirements of the Management Plan in their area.

The City of Goodyear revised its Water Conservation and Curtailment Plan in 2008 (***Attachment C***: City of Goodyear Water Conservation and Curtailment Plan, 2008). The 2008 plan is still in effect. The curtailment section addresses drought and other events that may result in supply shortages, whether sudden and drastic or prolonged with deepening severity.

The City adopted its latest Integrated Water Master Plan (IWMP) in 2008. The IWMP emphasized the importance of improved management of reclaimed water resources within the City. The IWMP assigns the development and expanded use of recharge facilities to store water underground within the City a high priority for infrastructure planning in this decade.

Toward the end of 2012, the City took the next step to refine its plans by preparing a Critical Strategic Plan for water resources the next five years. (See ***Attachment D***: City of Goodyear Water Resources Critical Strategic Plan). This strategic plan identifies seven steps that include:

1) amending the City designation of assured water supplies that will allow for the increased use of stored water underground; 2) creating an interconnect with an existing CAP water delivery agent for the direct treatment and use of the City's CAP allocation; 3) applying for and purchasing renewable NIA CAP re-allocated water supplies; 4) *beginning to recharge all available reclaimed water supplies underground within the City boundaries*; 5) purchasing CAP surface water treatment capacity and construct a CAP water transmission system from the plant to the City; 6) leasing additional CAP water from the Gila River Indian Community; and 7) updating the City's water conservation strategic plan to accommodate anticipated growth and increase sustainability of City water resources. Construction of five vadose zone wells in 2013-14 and two more in 2014-2015 to enable the City to recharge all reclaimed water produced at the

157th Avenue WRF that will not be delivered for re-use inside the City service area is identified as a critical project.

(2) City staff is currently preparing the scope of work to hire hydrologists to perform a detailed study of Western Goodyear in May 2013. Among other goals, this study (which will encompass the full area shown on ***Attachment B***) will identify the most suitable locations for recharge of water. The results of this study will be available before Reclamation announces award decisions.

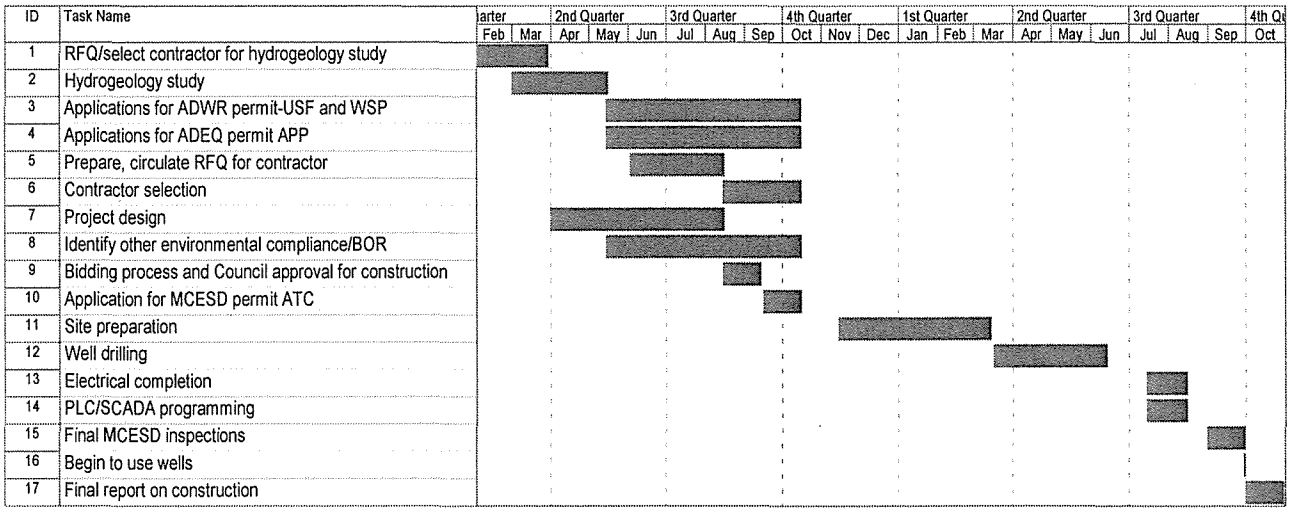
The Project Area has been identified based on knowledge of a) City property-holdings; b) proximity to the existing reclaimed water transmission line; c) past success recharging water in the area bounded by Yuma Road, Estrella Parkway and Van Buren d) shallow water table conditions south of Lower Buckeye Road; and d) Superfund remediation efforts east of Bullard Wash.

(3) The City will continue storing part of its CAP water allocation at Central Arizona Water Conservation District underground storage facilities until it is able to receive this water directly in order to meet the State safe yield requirement. This project will enable the City to store reclaimed water underground within its own service area to meet a portion of this obligation. Storing water closer to the area where it is being recovered is a more hydrologically sound way of meeting the State safe yield requirement.

Designing and installing five vadose zones by the end of 2014 *is* one of the critical actions defined by the City's Critical Strategic Plan.

Subcriterion No. F.2.—Readiness to Proceed

Project Schedule



Implementation Plan

Pre-Award/Pre-Design Planning: City staff will complete the background planning for the project by the time that Reclamation announces awards. City staff members are currently preparing a Request for Qualifications to select the hydrogeological contractor for hydrogeological study of the vicinity of western Goodyear, including the project area. This pre-award activity, to be completed by May, will guide the City's final selection of the most suitable City property for the five vadose zone injection wells within the well-defined project area. (See ***Attachment B***)

Upon selection of the optimal recharge location, the Project Manager, Environmental Services Manager, and Water Resource Manager will hold pre-application meetings with the Arizona Department of Environmental Quality (ADEQ) and Arizona Department of Water Resources (ADWR). These meetings will establish what specific conditions and facilities the agencies will require in the project design in order to issue the Aquifer Protection Permit (ADEQ), Underground Storage Facility Permit (ADWR) and Water Storage Permit (ADWR) that this project will require.

If an award is not received, the City will cut back its project to construct only four vadose zone injection wells, at a cost of $1,800,000, including permits. The City would defer construction of the fifth well until it has the full funding available for it as well as the next two wells.

Environmental Compliance: In the event of an award, the City will complete any necessary Federal environmental compliance with Reclamation between receipt of the award and the finalization of project design. The City will integrate Federal, State, and local and compliance requirements into the scope of work for the vadose zone well contractor, as required.

Contracting Phase: The City will be ready to circulate the Request for Qualifications for the project contractor in June, in order to select a design-build contractor and obtain Council approval of the contract by the end of October 2013.

Design: As noted previously, initial design efforts will commence in-house as the City obtains feedback on the best sites for recharge and Reclamation's decision on an award. Requirements for federal compliance may dictate specific features in the final design. Final design refinements will be made once the contractor comes on board, before the end of 2013.

Construction: Site preparation including removal of pavement or landscaping and any necessary relocations of infrastructure will be spread throughout the first two to four months of the project, depending on whether the wells will be constructed in close proximity in an area away from roadways or on multiple sites along narrow rights of way or medians. Due to the same siting uncertainty, there may be as many as three different mobilizations and periods of drilling to complete the project. The schedule anticipates that all five vadose zone wells and the required monitoring wells can be drilled and installed in three months, March-June, 2014.

As each well is completed and connected to the reclaimed transmission line, electrical connections will be established, instrumentation cabinets and controls installed, and testing of the same completed. This activity will be complete by the end of August 2014. Final inspections by Maricopa County Environmental Service Department are to be completed in September 2014.

Anticipated Recharge of Reclaimed Water into the Vadose Zone: Recharge will commence after all testing and inspections are complete and final permits from ADWR and ADEQ are received. The City expects to begin recharge in October 2014.

Reporting: The City intends to submit its final project report as soon as accounting is complete after initial operation. If Reclamation prefers, the City will hold the report until it has a three or six month history of recharge to better assess vadose zone recharge Performance Measures.

Subcriterion No. F.3.—Performance Measures

Performance Measure 1: Volume of Water Saved instead of Discharging

The City will use the volume of reclaimed water that is conserved locally through underground storage of reclaimed water as a measure of the benefit of this project. The City currently discharges 2971.4 AF of reclaimed water produced at its 157th Avenue WRF to the Gila River and points beyond its service area each year. The five vadose zone wells are being designed to store a total of 2800 AF annually, or nearly all of that currently discharged water, underground within the project area.

The City is required to report the usage of all its water supplies and its underground storage to the Arizona Department of Water Resources annually. The City can provide its finalized 2011 and 2012 Annual Water Reports to Reclamation to document the baseline and its 2013 report to verify initial storage.

Performance Measure 2: Change in Depth of Water Table

The City will measure depth to water at its monitoring wells for the project prior to the start of recharge and monthly thereafter. This data will readily permit the City to track the long-term positive benefits of recharge through the injection wells to the water table. Rising water levels at the monitoring wells will be one line of evidence that injection is increasing the amount of water in the local supplies.

Evaluation Criterion G: Additional Non-Federal Funding

$$\frac{\text{Non-Federal Funding}}{\text{Total Project Cost}} = \frac{\$1{,}863350}{\$2{,}163{,}350} = \textbf{86.1\% non-Federal Funding}$$

The City will provide 86.1% of funds for this project from unspent funds in its development impact fees account.

Evaluation Criterion H: Connection to Reclamation Project Activities

(1) Sixty three per cent of the City's current Assured Water Supplies are attributable to a U.S. Bureau of Reclamation project (i.e. delivered Colorado River water) and the recharge of this

water via a CAP recharge facility. The City currently stores CAP water (Sub-Contract No.07-xx-30-W0498) at either the Central Arizona Water Conservation District's Agua Fria Constructed Water Storage and/or Hieroglyphics Recharge Projects. In keeping with state law, the City recovers the stored water by pumping water from the aquifer under its service area.

This project will construct facilities designed to store reclaimed water supplies developed by the 157th Avenue WRF. The project will create additional renewable water supplies, in the form of underground water storage that will be used to conserve non-renewable water supplies, use as replenishment for current interim pumping activities, and stored underground to address future drought. Reclamation is currently engaged with the Arizona Department of Water Resources, Central Arizona Water Conservation District and Arizona Water Banking Authority (AWBA), as well as subcontractors as stakeholders, in planning for prolonged drought within the Colorado River Basin. Storage of water by water providers themselves in their own service areas significantly minimizes the costs needed for coordinated recovery of water stored by AWBA in the future due to the location of that stored water supply and lack of alternative recovery infrastructure. There are discussions underway regarding how the AWBA might partner with water providers that have the ability to recover large percentages of water via their permitted recovery wells. Doing so could provide significant economies of scale for the AWBA to offset recovery costs by allowing water providers to recover long term storage credits via their own permitted recovery wells.

(2) The City of Goodyear currently receives water from the CAP (a Reclamation project and contract holder) through a municipal and industrial subcontract Sub-Contract No.07-xx-30-W0498) for Colorado River water. The City takes deliveries for storage at Central Arizona Water Conservation District underground storage facilities.

(3) The proposed Vadose Zone Recharge Well Project lies within Maricopa County, one of three counties within the Central Arizona Water Conservation District.

The reclaimed water that will be injected in the wells originates from Colorado River Water and is imported through the Central Arizona Project canal, which is a U.S. Bureau of Reclamation project.

(4) The proposed Vadose Zone Well Recharge Project lies within the West Salt River Sub-Basin, which is in the Central Arizona Water Conservation District that was created to operate the CAP canal system. The City and the City of Phoenix are cooperatively operating a pilot project in the Goodyear to test the usefulness of wetlands in treating brine concentrate.

(5) The proposed Vadose Zone Well Recharge Project will store water in the West Salt River Sub-Basin aquifer. Initially this operation will replenish water pumped for recovery from that same section of the aquifer. In later years, the water stored will be water transported directly through the CAP canal and transmission lines to the City and thus stored underground.

Performance Measures

Performance Measure A: Projects with Quantifiable Water Savings

This groundwater recharge project will generate quantifiable savings through recharge to groundwater of reclaimed water. Two performance measures are proposed.

One of the greatest benefits for the City is the ability to replace groundwater used on its behalf close to the location of pumping. The current practice of recharging CAP facilities to meet the safe yield water management requirement does comply with law, but it does not replace water in the area of hydrologic impact of the pumping.

All the water that is recharged via the proposed injection wells will be available for recovery, as many as 6-8 times with appropriate recharge continuing, by the City for future use. Water stored at the CAP facilities can only be recovered once. Local recharge will multiply the value of the stored water. Currently, the City pays $152/AF of CAP water for the water, power to transport it, and recharge. For recharge at the CAP location the City would pay for a separate acre-foot of CAP water for each future use and recharge, for a total of $912/AF for the six recharges of water on top of the cost of local recovery and treatment. Local recharge will accrue lower energy costs (water will be moved only a few miles instead of several hundred) and provide the wet water supply for the next use.

Other cities in the Phoenix area are able to operate vadose injection wells at a cost of $81/acre-foot. The City anticipates costs in the same range.

The selection of vadose well injection over deep injection is anticipated to save the City costs on pre-treatment of the water (as well as construction). Water injected directly into the aquifer must be treated to higher standards than water that will receive some in-situ treatment as it percolates down to the aquifer. The hydrogeology study is expected to confirm this decision.

Performance Measure 1: Volume of Water Saved instead of Discharging

The City will use the volume of reclaimed water that is conserved locally through underground storage of reclaimed water as a measure of the benefit of this project. The five vadose zone wells are being designed to store a total of 2800 AF annually, or nearly the entire total amount of reclaimed water available. The City will plan for a storage capacity on the Underground Storage Facility Permit for the Vadose Zone Well Recharge Project that accommodates recharge, storage, and recovery well into the future and the anticipated increased flows and plant expansion at the 157th Avenue Reclamation Plant.

Pre-Project Baseline: The City discharged 2971.4 AF of reclaimed water produced at its 157th Avenue WRF to the Gila River and points that left the sub-basin in 2011. The City will have final discharge flows verified for 2012 within the next month. The City is not recharging any reclaimed water at this time.

Instrumentation at the Vadose Zone Well Recharge Project will measure water flow into the wells. The City will also use this data to make annual reports on its Water Storage Permit and Underground Storage Facility to Arizona Department of Water Quality and on its Aquifer

Protection Permit to the Arizona Department of Environmental Quality. The City can provide the 2013 Annual Water Reports to document the volume of water stored.

Performance Measure 2: Change in Depth of Water Table Due to Injection of Surface (Reclaimed) Water

The City will compare depth to water at its monitoring wells for the project prior to the start of recharge and monthly thereafter. Rising water levels at the monitoring wells will be one line of evidence that injection of surface water is increasing the amount of water in the local aquifer.

Pre-Project Baseline: The City will measure the depth to water at each of the monitoring wells at the site and static level at its three nearest service area wells prior to the first injection of water.

Depth to water readings is taken monthly at all existing service area wells in the City. Depth to water records is required to be maintained for underground storage facilities. These data will be readily accessible for assessment of the performance of the project. Hydrologic modeling can provide some accurate prediction regarding aquifer benefits and current recovery and pumping activities.

Environmental and Cultural Resources Compliance

(1) The project will require clearing approximately 900 square feet of vegetation or pavement clearing at each well site. In some locations there may be additional disturbance to facilitate construction ingress and egress to the project site. Drilling will remove existing soil and rock from a limited area at each of the nine well sites (five injection and four monitoring wells).

Most of the Project Area lies on existing right of way or medians or very close to it, where land has already been disturbed for installation of utilities or roadways requiring negligible impact to native vegetation or fauna. Water flow will not be impacted since there are storm retention basins and dry wells designed to handle all runoff from the adjoining roads. Dust control will be employed where needed to minimize any potential air quality impacts. The contractor will be required to obtain the necessary permits from Maricopa County Environmental Services Division and the Arizona Department of Environmental Quality and to spray water in open disturbed area to keep down dust. The City makes reclaimed water available for this purpose.

(2) In consultation with the Arizona Game and Fish Department, staff confirmed that there are no federally recognized endangered species in the project area. Further, there are no "Designated" or "Proposed" Critical Habitats in the project area.

(3) There are no wetlands or other surface water that could be classified as "waters of the United States" inside the project area.

(4) The water delivery system in the project area has been developed over the last 20 years. Much of the reclaimed and potable water transmission lines within half a mile of the intersection of Festival Way and Estrella Parkway were constructed as the City built the Goodyear Recreation Complex on the east side of Estrella Parkway.

(5) The project does not involve an irrigation district system.

(6) There are no buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places within the project area.

(7) There are no known archeological sites in the proposed project area.

(8) The project will not have a disproportionately high and adverse effect on low income or minority populations. Most of the proposed project area lies outside any residential area and within areas currently used for agricultural.

(9) The project will not limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands. The nearest Indian sacred sites and tribal lands are over five miles from the site.

(10) The short duration of the construction and small footprint required for the vadose zone injection well sites (maximum of 900 square feet) will prevent the project from contributing to the continued existence or spread of noxious weeds or non-native species known to occur in the area. Because likely contractors for services already use their equipment within this area, the chances of introduction of new non-native invasive species or noxious weeds is extremely low.

Required Permits or Approvals

The City will need to obtain a recharge permit (RP), Underground Storage Facility (USF) Permit, and notices of intent (NOI) permit from the Arizona Department of Water Resources (ADWR) to drill the new vadose zone wells; a Water Storage Permit (WSP) to store water at the site from ADWR; an Aquifer Protection Permit (APP) from Arizona Department of Environmental Quality (ADEQ); and an Approval to Construct and approval of construction from the Maricopa County Environmental Services Division.

The City Water Resource Manager, Environmental Services Manager, and Project Engineer will hold pre-application meetings with the staff at each of these agencies about the project as soon as the hydrology study is completed in May 2013. This early discussion will help all parties align expectations to avoid delays in approvals and construction. At the appropriate project timeframe, the City will formally apply for each of the required regulatory permits. Staff will work closely with each agency to submit the applications and ensure construction oversight so that all plans are submitted and approved in a timely fashion.

The City will contact the Maricopa County Environmental Services Division to schedule an inspection of construction and request the Certificate of Approval of Construction to close its permit at least 30 days in advance of the date the City plans to start up the vadose zone injection wells.

As the Construction Manager for the project, the City's Engineering Department will obtain the necessary City permits relating to construction, traffic control and infrastructure. The City's Engineering Inspectors will conduct all necessary inspections of the project.

Official Resolution

The Goodyear City Council will vote on Resolution 13-4953 on January 28, 2013 to confirm its support and commitment to fund the project as cost-share pending Reclamation's decision on this proposal. The signed final Resolution will be submitted to Reclamation by February 10, 2013.

Project Budget

Funding Plan and Letters of Commitment

(1) The City will fund the cost-share entirely from reclaimed water development impact fees. The City has unspent development impact fees for reclaimed water on hand ($1,863,350) in the amount that will be needed to match Reclamation funds at 86.1% match.

(2) (a) The City will incur the expense of having a contractor conduct a hydrogeology study of the Project Area and its environs in May 2013.
(b) The hydrology study will identify the ideal location of the vadose zone recharge wells within the project area (***Attachment B***), to maximize recharge to the aquifer while maintaining cost-effectiveness. The study results will indicate which sites are closest to the reclaimed water transmission line or its pilot soil aquifer treatment site that will permit maximum water storage. This will reduce the cost of connecting pipelines to the transmission line and reduce costs for pumps to boost water pressure on-site.
(c) The City has budgeted $70,000 for the hydrogeology study expense.
(d) The expense will come due upon receipt and acceptance of the study report, no later than mid-May.

(3) There are no other entities providing financing. No letters of commitment are required or attached.

(4) No funding has been requested or received from other federal partners.

(5) There are no pending funding requests.

Table 4: Summary of non-Federal and Federal funding sources.

Funding Sources	Funding Amount
Non-Federal Entities	0
City of Goodyear Development Impact Fees Account	$1,863,350
Non-Federal Subtotal:	$1,863,350
Other Federal Entities	0
Other Federal Subtotal:	0
Requested Reclamation Funding:	$300,000
Total Project Funding:	$2,163,350

Table 2. is not required because this is a request through Funding Group I.

Budget Proposal

Table 3: Funding Sources

Funding Sources	**Percent of Total Project Cost**	**Total Cost by Source**
Recipient Funding (City of Goodyear)	86.1%	$1,863,350
Reclamation Funding	13.9 %	$ 300,000
Other Federal Funding	0	0
Totals	100%	$ 2,163,350

Continued...

Budget Proposal

Budget Item Description	Computation		Quantity Type (hours/days)	Total Cost
	$/Unit	Quantity		
Salaries and Wages			None assesed to capital project	
Fringe Benefits			None assessed to capital project	
Travel			None assessed to capital project	
Equipment				
SCADA Cabinet	$ 30,000.00	5	Wells	$ 150,000.00
Programming Logic Controls	$ 25,000.00	5	Wells	$ 125,000.00
Other programming and controls	$ 10,200.00	5	Wells	$ 51,000.00
Supplies/Materials			Included in contractual services	
Contractual/Construction				
Mobilization/demobilization/testing	$ 12,500.00	3	Maximum 3 different sites.	$ 37,500.00
Site work	$ 22,000.00	5	Wells	$ 110,000.00
Well head piping and valving	$ 38,500.00	5	Wells	$ 192,500.00
Hydrogeology services	$ 20,500.00	5	Wells	$ 102,500.00
Vadose zone well contractor	$ 57,000.00	5	Wells	$ 285,000.00
Vadose zone well piping/installation	$ 43,000.00	5	Wells	$ 215,000.00
Electricity to line	$ 46,000.00	5	Wells	$ 230,000.00
Monitoring well construction	$ 41,000.00	4	Wells	$ 164,000.00
Project design	$ 166,250.00	1	Project	$ 166,250.00
Environmental and Regulatory Compliance Costs				
ADEQ APP Permit	$250,000	1	AZ Aquifer protection permit	$ 250,000.00
ADWR USF permit	$25,000	1	Max for AZ Underground Storage Facility	$ 25,000.00
ADWR WSpermit	$10,000	1	Max for AZ Water Storage	$10,000
Maricopa County ESD Permits	$9,600	1	Co Approval to construct	$9,600
Environmental and Regulatory Compliance Costs	$40,000	1	To be determine, for City and Reclamation	$ 40,000.00
Other			None assessed to grant	
Total Direct Costs				$ 2,163,350.00
Indirect Costs - _____%			None assessed to grant	$ -
Total Projected Costs				$ 2,163,350.00

Budget Narrative

1. The City's vadose zone injection well recharge project is strictly a Capital Improvement Plan expense. No new staff will be hired nor will any compensation be affected by having current staff engage in the various tasks of the project.

2. *Project (Construction)Manager*: David Ramirez, City Engineer for the City of Goodyear, will serve as the Project Manager. He will oversee the Project Engineer that directly coordinates with the vadose zone contractor, hydrogeologist, and other contractors who handle the daily work associated with project. Environmental Services Manager Jerry Postema, who oversees the operations of the water system, and Water Resources Manager Mark Holmes, who oversees water resource planning, will be associate managers.

3. *Grant Manager*: Sandra Rode, Water Conservation Specialist, will manage the correspondence with Reclamation regarding the grant and coordinate reporting with the Finance and Engineering Departments.

Travel

This project does not require any travel funding.

Equipment

1. SCADA cabinet: $30,000 each (per recent purchases);
2. Programming Logic Controls cabinet $25,000 each (per recent purchases) for each well;
3. Other programming and controls: Each well will also require instrumentation including: level transducer @ $1,200 and 6" mag meter @ $3,000;
4. The City will purchase electronic controls and instrumentation to permit remote monitoring and control of the five individual wells. This will be necessary as flows to the Goodyear Ballpark and Recreation Complex (the sole large customer for the reclaimed water, which lies upstream along the reclaimed transmission line) fluctuate substantially in the peak irrigation season. The number of wells in use daily for injection may need to be changed.

The Contractual cost estimates that have been obtained for this project include the appurtenant equipment, engineering design and professional services.

Materials and Supplies

Materials and supplies for this project will be included in the contracts for professional services listed in the Contractual section of the budget.

Contractual

1. Based on historic hydrologic work at the northwest corner of Yuma and Estrella Parkway and the known conditions of the water table south of Lower Buckeye Road, the estimates are based on drilling 100-foot deep injection wells, 48 inches in diameter, with 12-inch PVC well casing. Each will have a 6-inch injection system and a below ground completion in standard concrete vault.

2. Mobilization/demobilization/testing: The contractor will need to mobilize for each well site if they are spaced at significant distances from each other. To be conservative, pending hydrogeological study results, the budget includes three separate mobilizations @ $12,500. (Estimate from a drilling firm currently under City contract for other work , based on a 2012 project)

3. Site Work: This cost includes cost of removing landscape or pavement, constructing an access road and pad, and restoration of pavement or landscaping as required after the drilling is complete. Materials for paving or landscape as well as labor are included in this figure. This work has been budgeted for each of five wells @ $22,000. (Estimate from a drilling firm currently under City contract for other work, based on a 2012 project)

4. Vadose zone well piping/installation: This cost includes in-ground piping and installation cost for the 12" PVC well casing in a 48-inch diameter well 100-feet deep. Piping to link the well to the transmission line is included, provided this is not a great distance. @ $43,000 per vadose zone injection well.

5. Hydrogeology services at well head: These services include well specifications and design review, permitting and noticing for the well (NOI and other ADWR documents as well), field construction oversight, sieve analysis, geophysical logging (@$2,500), system start-up plan, start-up and operational testing and final completion reports @ a total of $20,500 per well. (Estimate from a consultant with long experience in vadose zone and recharge projects)

6. Vadose zone well contractor: The City will hire a contractor that will subcontract drilling services (@ $20,000 per well including necessary City permits, materials, well casing: $6,000 and gravel and bentonite seal: $1,200) and oversee other construction including: construction labor and miscellaneous costs: $25,000; standard concrete vault: $3,500. (Estimate from consultant and drilling firm currently under City contract for other work, based on recent projects)

7. Miscellaneous yard piping/installation: This includes above-ground piping and valving at the well head. Six-inch injection lines (@$12,000) and 6" control valves @ $6000 are included in the per well estimate of $38,500. (Estimated based on recent experience.)

8. Electricity to line: This includes the cost of conduit, actual line, and connection of electronic controls to the nearest electrical source. Many possible well sites lie close to existing underground conduit, which will reduce these costs. (@ $46,000 per well) (Estimate based on recent costs of a subcontractor currently working for the City on a different project.)

9. Monitoring well construction: The costs for these much simpler installations include drilling, state permit, materials and necessary gauging. Four wells are included in anticipation that some of the vadose zone injection wells will be installed close to one another making it possible to put one well upstream and one downstream at no more than two different sets. (@ $ 41,000 per monitoring well) (Estimate based on costs of recent projects from contractor now under City contract on a different project)

10. Project design costs: are estimated at 10% of the total for construction and equipment listed above. (This is standard practice in the industry.)

Environmental and Regulatory Compliance Costs

1. The City will be required by state and local authorities to obtain several permits to assure the aquifer is protected. The City Water Resources Manager and the contractor for hydrogeology services will work together on applying and obtaining this permit.

2. Aquifer Protection Permit: The City will apply for an additional Aquifer Protection Permit (APP) from the Arizona Department of Environmental Quality for the recharge of reclaimed water to the vadose zone. The minimum state fee for this is $150,000 with additional hourly charges. An additional $30,000 has been allowed here for additional work the department may assess against it. To obtain this permit, as well as the Underground Storage Facility Permit from Arizona Department of Water Resources, the City will be required to conduct a study to document the best recharge sites and their hydrogeological status. This *$70,000 study is a 2013 pre-award cost* the City will bear.

3. Underground Storage Facility Permit: The Arizona Department of Water Resources (ADWR) requires permits for underground storage facilities. (USF) City staff and the hydrogeology contractor will work together on applying for and obtaining these permits. Fees for this would be $25,000.

4. Water Storage Permit: ADWR will require that the City obtain a permit to store water in the new vadose zone well recharge site, separate from the facility report. The fee is $10,000.

5. Approval to Construct and Approval of Construction: The Maricopa County Environmental Services Division will require a permit for construction and certification that it is completed according to plan. The permit for Approval to

Construct will be assessed against each well. The initial fee for each design/build recharge well is $500; five will be $2500. There will also be similar fees for each of the four monitoring wells @$300 for a total of $1200. Additional time spent to process these permits will be billed at $260/hour: the budget allows for an additional 24 hours of work.

6. Environmental and Regulatory Compliance (Federal): Because prior infrastructure projects in the vicinity of the project area have not identified conditions that required attention under applicable Federal environmental laws including NEPA, ESA, NHPA, and the CWA, the expense for additional compliance costs is nominal. The project assigns an additional $40,000 for expenses Reclamation or the City may incur for such compliance.

Reporting

1. Evaluation of performance measures will be carried out by the City's Water Resources staff at no additional cost. The data would already be collected routinely by system operators and SCADA and reviewed for submission of reports to the state and county permitting authorities.

2. The Grant Manager will handle the semi-annual and final reporting required for this grant. No costs will be assessed to the capital project for this effort.

Other Expenses

No other expenses are anticipated.

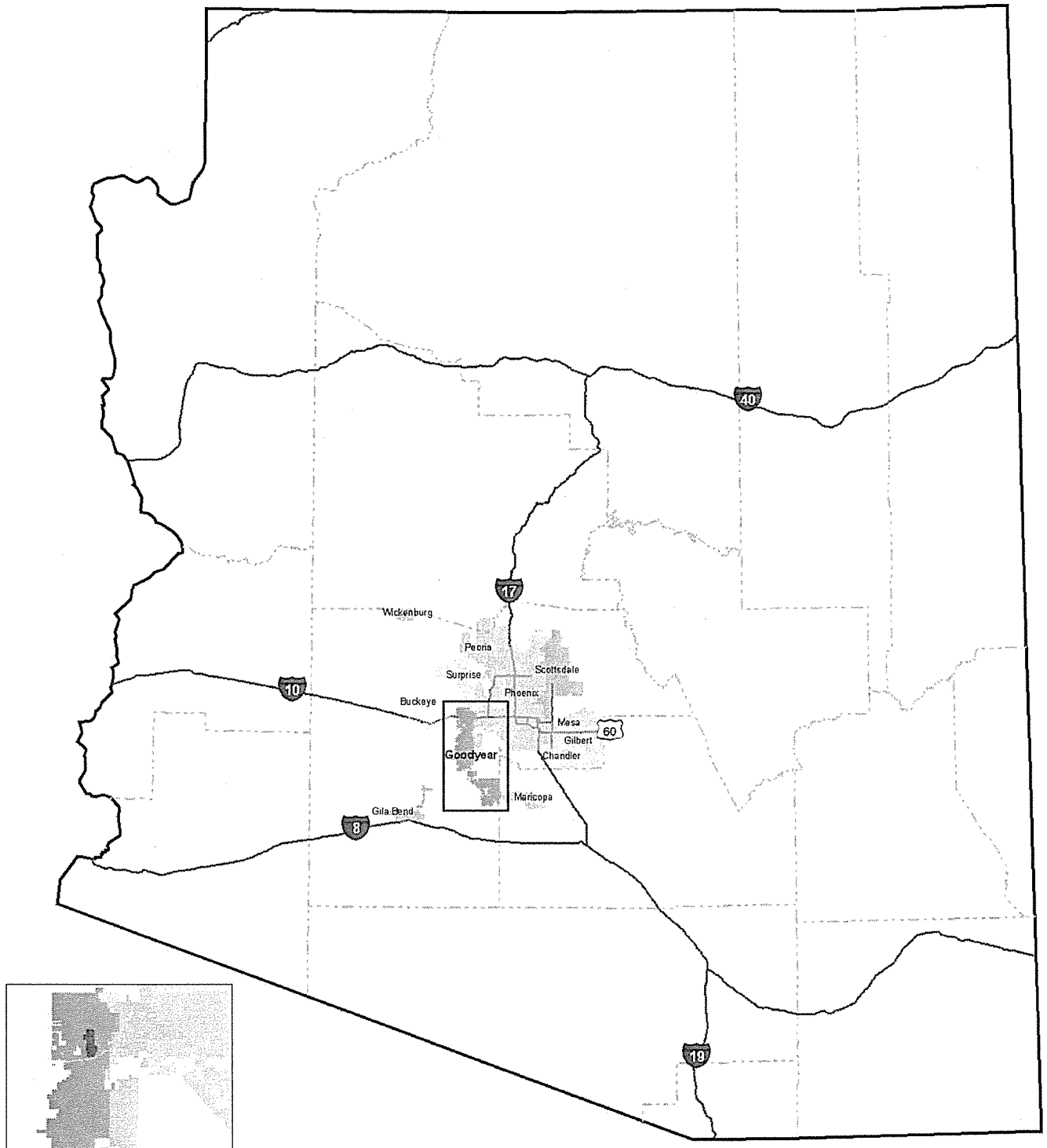
Indirect Costs

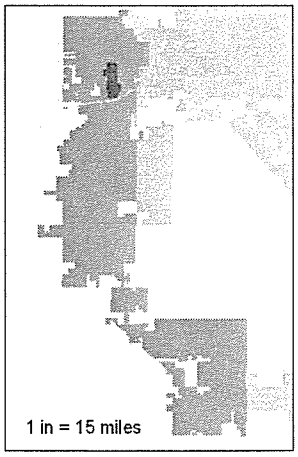
This capital project request excludes all indirect costs.

TOTAL COSTS

The design and construction of five vadose zone wells, with attendant SCADA and electrical work will cost $2,163,350. The Federal (Reclamation) share of this expense will be $300,000. The non-Federal (City of Goodyear) cost-share will be $1,863,350.

Goodyear, Arizona





Legend

- Goodyear Corporate Limits
- Project Area

Attachment A
Locator Map

Date: 1/7/2013

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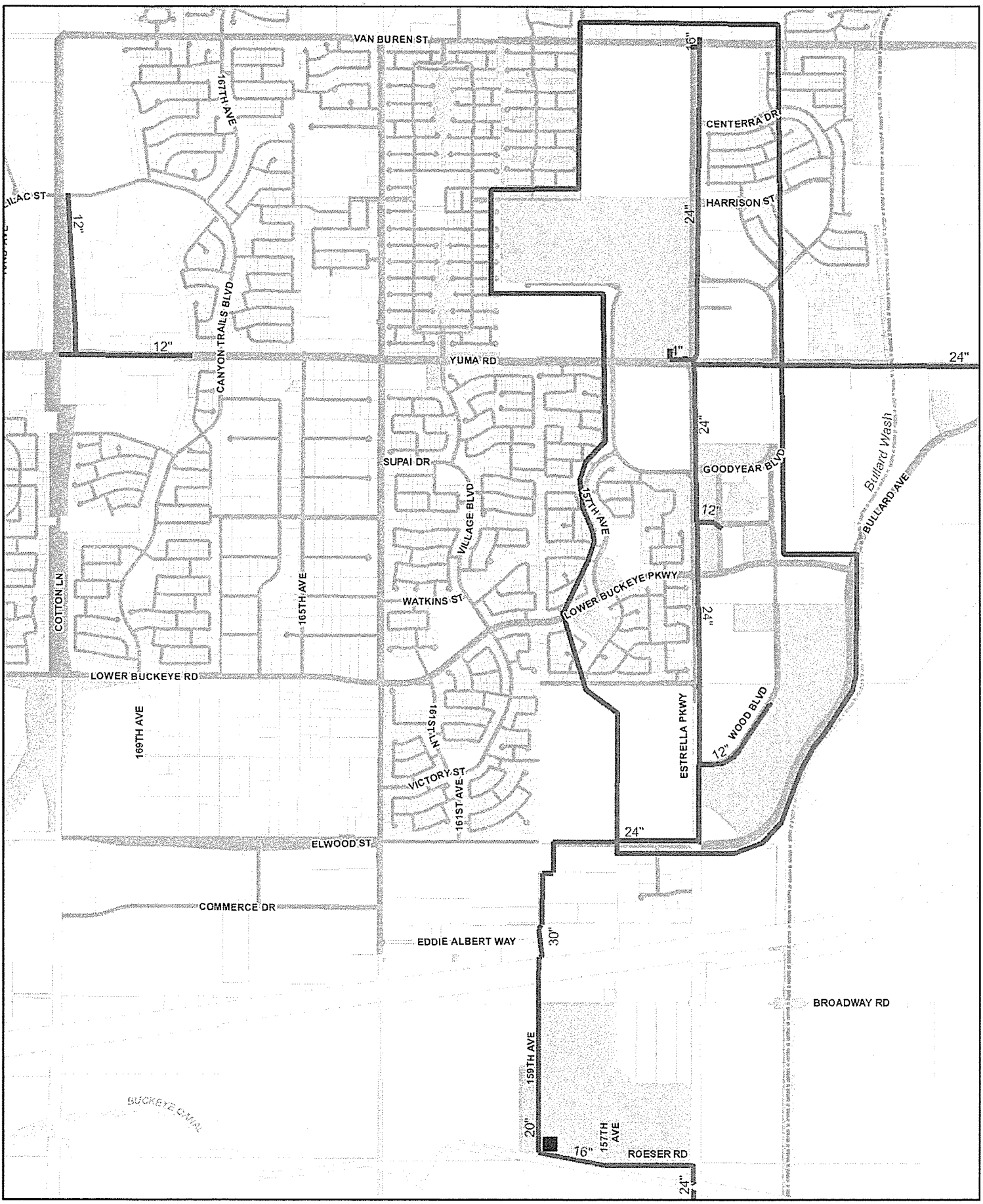


Legend

- Reclaimed water line
- Project Area
- 157th Ave WRF
- Right-of-way
- City owned parcel

0 500 1,000 2,000 Feet

1 inch = 2,000 feet

Attachment B
Project Area Map

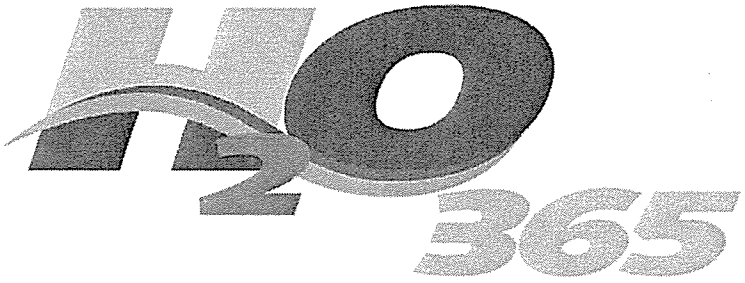
Date: 01/03/2013

N W E S

City of Goodyear

Water Conservation and Curtailment Plan

December, 2008



Summary

The City of Goodyear plans to reduce water demand to protect its resources and residents and to meet its responsibilities under the State of Arizona's Assured Water Supply Program. The Conservation and Curtailment Plan set out here defines water use reduction goals and identifies strategies to be used to protect City water resources as growth continues. The City's overall conservation goal is to reduce gallons per capita daily consumption by 10% by 2015 and by an additional 5% by 2020. The Curtailment Plan prepares the City to rapidly reduce demand to protect essential water uses in the event of water shortages.

Goodyear will meet its Conservation goal by 1) increasing efficiency of water use by the City itself, 2) strengthening the public culture of water conservation, 3) assuring the water conservation program is fiscally sound, 4) providing financial incentives for conservation, and 5) recommending use of appropriate new water saving technologies. The City will fund water conservation through its water rates, placing the heaviest burden for this cost on the highest water use tiers.

The City will target four components of water use. The City will first demonstrate leadership by increasing the efficiency of its own operations, and develop ordinances, policies and guidelines to help residents and developers minimize waste of water. In order to obtain early results, the City will then address other major uses of water in order of their contribution to overall use: landscaping (both residential and commercial, accounting for 48-60% of overall demand), residential indoor (26% of current demand), and commercial and industrial.

Because it relies heavily upon groundwater, the City water service area's greatest threats of water shortages will come from disruptions or contamination of its water system, not drought. Consequently, the City anticipates that its Curtailment Plan would most likely be invoked on short notice to respond to sudden, short term incidents that may affect only portions of the City service area. Advance education about the Plan will speed public response when it is needed.

The Curtailment Plan will be implemented in stages when foreseeable demand reaches specific trigger levels. Stage 1 (Water Watch), Stage 2 (Water Alert), and Stage 3 (Water Warning) will be triggered as demand rises from 90% to 95% and 100% or more of available supplies. "Available supplies" will include all resources available for delivery within 24 hours. The Mayor may declare Stage 4 (Water Emergency) when demand far exceeds supply; the City Manager will declare other stages.

The plan defines increasingly severe water restrictions for Stages 1 through 4. At Stage 1 only the City faces mandatory restrictions on watering, as well as other outdoor water uses. Parallel voluntary measures for all other users in Stage 1 become mandatory at Stage 2. As the stages progress, all users face steeper limits on outdoor uses as well as construction and other expansion of demand. The City may cancel restrictions when the Water Resources Director determines the conditions for that stage no longer exist.

In coordination with existing *Integrated Water Master Plan* prepared in 2007, these documents will guide the City's efforts to assure safe water supplies are delivered and prudently used by its customers.

Table of Contents

Conservation Plan

Introduction

The City's Conservation Plan is formulated around three core principles. First, the City is committed to making Goodyear a sustainable community. Efficient management and conservation of water are essential to accomplish this in the arid environment of Goodyear. Second, the City is committed to meeting its full legal responsibility to the State of Arizona to reduce per capita groundwater use. This will require water conservation as both its population and business community grow and diversify. Third, the resources of Goodyear, including its water and desert landscape, merit protection in their own right.

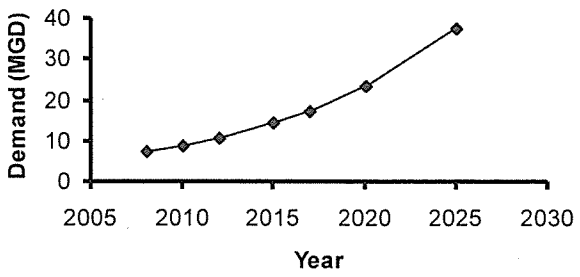
Sustainability: Water Supply and Demand

To make Goodyear sustainable, the City must acquire and manage water resources to reliably serve current and future residents of its service area. That service area includes all of the area within City boundaries south of Interstate-10 (I-10) as well as a strip of land between I-10 and McDowell Road, north of I-10. In anticipation of a projected fourteen-fold population increase by buildout, the City will purchase and develop additional water resources as well as the infrastructure necessary for treatment and delivery. The *2007 Integrated Water Master Plan (IWMP)* prepared by Black & Veatch lays out the resource and infrastructure development requirements to meet those needs in detail.

At buildout the *IWMP* projects that the City will need 92.2 million gallons per day to serve the service area's 502,000 residents, assuming today's usage patterns persist. In 2007, the City used 7.0 million gallons per day to serve just 34,300 people (Maricopa Association of Governments). With Average Daily Usage remaining at current levels, total demand will already exceed 23 MGD by 2020. (See Fig. 1 Average Daily Demand Projection.) Reductions in per capita usage that can be achieved by water conservation will reduce the amount of water that the City must eventually acquire, treat, and deliver. Cost-effective reductions in per capita demand will increase the population the fragile desert environment can support well into the future without depleting City finances.

Fig. 1 **Average Daily Demand Projection**

Assumes 10% annual population increase.



Legal Obligation

As a municipal provider within the State of Arizona, the City of Goodyear must meet conservation requirements established under the Groundwater Act of 1980, including a reduction in reliance upon groundwater. Failure to comply with these requirements would endanger the City service area's Assured Water Supply Designation and consequently prevent further new development.

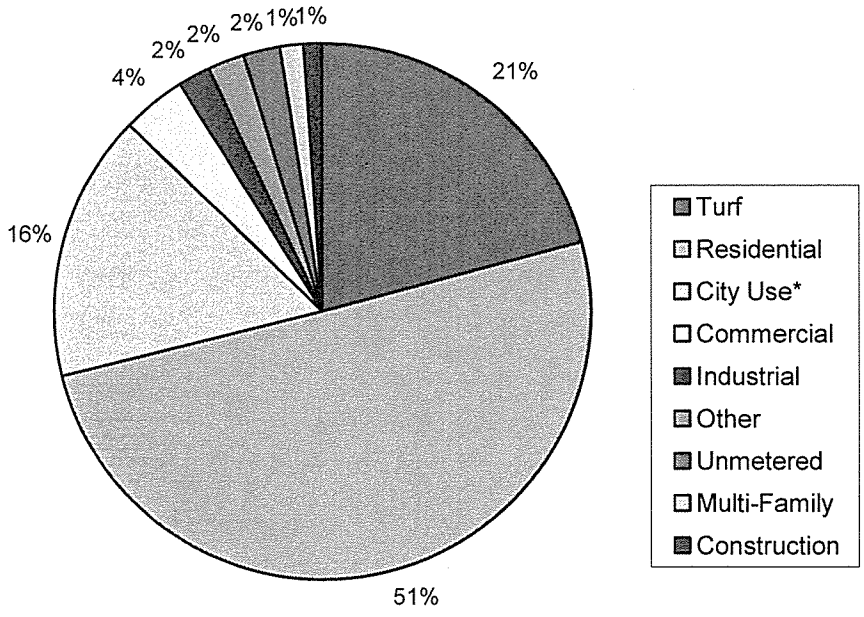
The City intends to continue to meet the State's Conservation Requirements, through participation in the Gallons Per Capita Per Day (GPCD) Program. This program requires that participants make reasonable reductions in the per capita daily demand for water within their service area. The City's Conservation Plan is designed to reduce its per capita daily demand from the 2007 level of 218 GPCD.

As the mix of water users in Goodyear diversifies, all users will need to adopt more efficient water practices to simply maintain the current overall GPCD. Achieving further water savings will require creative, persistent, and diverse initiatives. This plan outlines the framework for those initiatives for the next twelve years, beginning with the current users.

Current Usage Patterns

The latest usage figures available come from 2007. The City delivered 2.57 billion gallons of water that year. Single family residences used more water than any other users. Collectively, they use 51% of City-delivered water. See Fig. 2. Water Use by Customer Type.

Fig. 2. Water Use by Customer Type



* This is use not billed to the City, but reported for Arizona Department of Water Resources

Turf and irrigation use at all types of facilities combined comes in a distant second at 21%. Studies regularly show that Arizona residences use 50-70% of their water outdoors, irrigating landscapes and keeping pools operational. This makes it reasonable to estimate that 47-57% of all water delivered in the City service area is used outdoors.

The City uses 21% of all City-delivered water (including both the portion not billed to the City and the portion billed for rights of way, median and parks as well as facilities), making municipal usage the third highest category. (Finance Department, 2008) The City also uses 102.8 million gallons of water from Litchfield Park Service Company for facilities and irrigation of medians, rights-of-way, and parks north of I-10 (LPSCo, 2008).

Non-residential users of all types collectively used less than 300 million gallons in 2007. Individual sectors within the group have a relatively low impact on demand for City water at this time. These user groups will see the greatest percentage increase in contribution to water demand as Goodyear matures.

Water Conservation Targets and Impact

The City's water conservation goal will be to prevent annual increases in per capita demand, and begin reducing the amounts currently consumed. Successfully doing so may extend the time frame for significant water resource expansion.

Target 1: Reduce per capita daily demand 10% by 2015 (to 196.2). Achieve an additional 5% reduction to reach per capita daily demand of 185.3 by 2020.

If water demand grew in direct proportion to population, total demand would grow in exactly the same pattern as the population over the next seventeen years, as shown in Figure 1 above. But this is only true when growth of both residential and non-residential uses remains at a fixed number of gallons per resident.

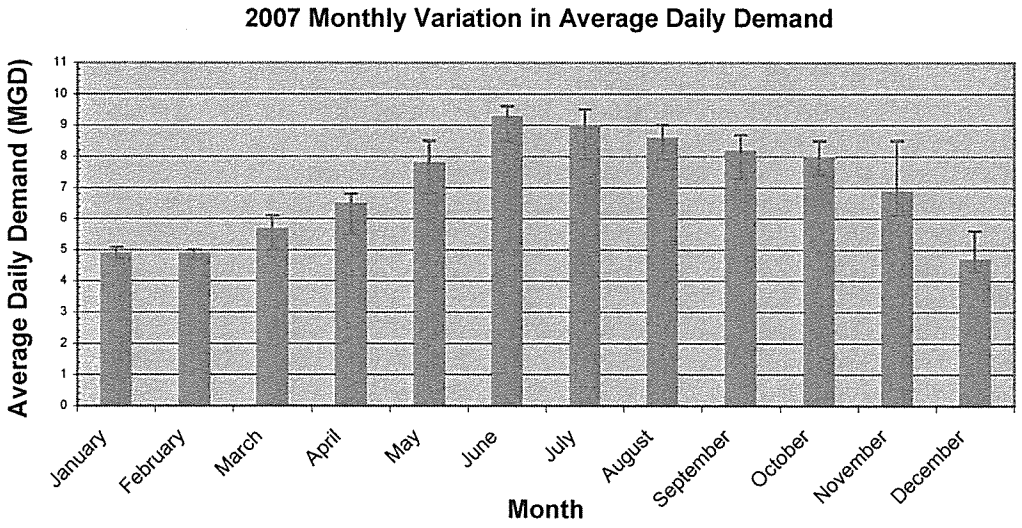
Whenever non-residential demand grows faster than residential demand, the per capita daily demand may rise, even if residential customers do not change behavior. However, the targeted improvements of 1.4% per year (2008-015) and 1.0% per year (2015-2020) understate the amount of conservation that will be required. Currently, Water Resources is using a 10% annual population growth rate to project demand (lower than the Maricopa Area of Governments projection of 16% based on early 2000 growth). Community and Economic Development are projecting retail and office development at the same rate (10%), but projecting industrial growth at 15% per year. To maintain a constant GPCD, the additional 5% per year must be made up by conservation and shifts to surface and reclaimed water for portions of our supply.

With the anticipated expansion of commercial activity in Goodyear, these targets will be sufficiently ambitious for the early years of our program.

Target 2: Reduce the spike of peak demand above annual average daily demand 5% by 2013. Peak demand spikes are measured by dividing the peak day's demand by the annual average daily demand. The six year average for this multiplier was 167% in 2006. A five per cent reduction would hold the peak day demand to 158% of annual average daily demand.

Because the majority of Goodyear's water use is for outdoor landscaping, demand is not spread evenly throughout the year. Plantings require more water during the hottest months of the year. Water demand soars to more than twice the winter quarter low, as property owners extend irrigation times to maintain attractive landscapes. See Fig. 3. Monthly Variation in Demand. Reducing the outdoor demand spike during the 151 day peak period will be essential to achieve significant drops in annual water usage.

Fig. 3 Monthly Variation in Demand



Impact of Reaching Targets: Reducing water use from 218 to 196.3 gallons per capita daily by 2015 will produce water savings of approximately 1.754 billion gallons. Dropping this to 185.3 gallons by 2020 per capita daily will net additional savings of approximately 4.592 billion gallons between 2015 and 2020. See Fig. 4 Effect of Conservation on Demand.

Fig. 4 Effect of Conservation Upon Demand 2008-2020

Assumes 10% population increase.

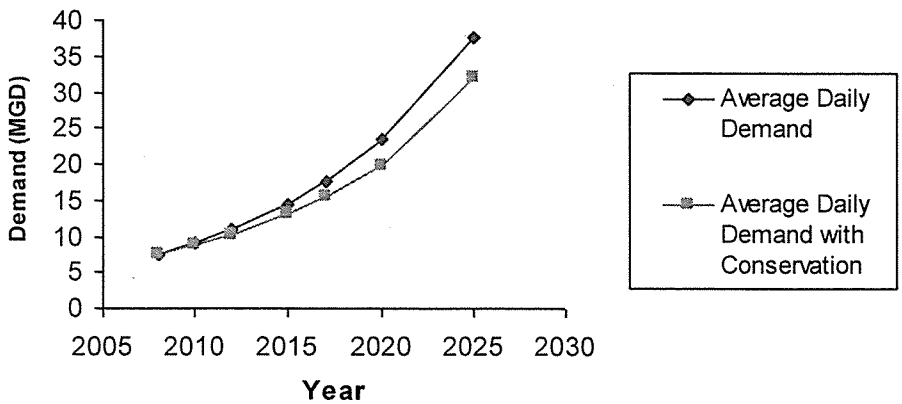


Table 1. Cumulative Water and Monetary Savings through Conservation

Assumes 3% annual inflation on 2007 costs and 10% annual population growth.

Time Interval	Water Savings (MG)	Operating Savings ($M)	Replenishment Savings ($M)
2008-2015	1754.5	$5.1	$1.5
2015-2020	4592.3	$15.4	$4.1
2008-2020	6346.8	$20.5	$5.6

Between now and 2020, the City would save operating and maintenance costs of approximately $20.5 million dollars (Red Oak Consulting, 2007). See Table 1. Water and Monetary Savings through Conservation. The City will also save the cost of replenishing or recharging the unneeded 6,346 million gallons of water and defer the construction costs to build capacity to deliver them. The replenishment cost savings will be substantial. By 2020, cumulative savings on replenishment alone rise to $5.6 million dollars. At 2008 rates, customers would save $23.9 million dollars.

Funding Conservation Efforts

Water conservation will substantially reduce the necessary expenditures for procurement of water resource rights, operations and maintenance, replenishment or recharge, and construction and debt service. These costs make up the cost of service currently used to set rates. The City will incorporate the offsetting water conservation costs into its rate structure.

The City will allocate costs of the conservation program within the rate structure to strengthen incentives for conservation. The City's current rate structure has four residential tiers and three for commercial users. Tiered structures promote conservation by cost-sensitive customers when their usage passes the thresholds between tiers: they pay higher unit costs for their last increment. To intensify this signal, the City will assign the cost for conservation to the highest tiers. This allocation will also place the cost burden on those customers who are capable of gaining the most from water conservation initiatives.

Prioritizing Conservation Efforts

The City will use a mix of conservation measures to assure that all sectors of the City increase efficiency and conserve water where possible. Early successes will build community awareness and make it easier to reach the long term per capita consumption goals. So, the program will target low hanging fruit before adopting tactics that are more costly and slow-acting.

Priority 1: Reduce City demand. The City bears a leadership obligation to conserve water before requiring its citizens to do so. The City is also both the largest single and most readily influenced customer within its service area. It can quickly realize water system operations and regular budget expense reductions if cost-effective means are available to achieve water demand reductions.

Priority 2: Reduce outdoor demand. Outdoor use is the largest type use within the service area. It is also largely discretionary. Many homeowners are unaware of how much water they use outdoors.

Studies repeatedly document that homeowners regularly over-water by 40%. A variety of measures are available to reduce landscape use. Reducing use by 10-15% would generally not have a detrimental effect on appearance. This could produce service area savings on the order of 5-8% of total demand.

Priority 3: Reduce indoor (residential and office) demand. Residential indoor use accounts for 18-27% of total demand. Because Goodyear has little housing stock and commercial space that is over ten years old, most kitchens, and lavatories have low-flow fixtures. There will be greater savings potential in updating codes and guidelines for the 200,000 homes yet to be built than in retrofits of existing housing with current technology. Customer enthusiasm and matching fund availability may drive timing and selection of some offerings.

Priority 4: Increase institutional, commercial, and industrial efficiency. These users collectively represent less than 12% of current demand. The greatest gains in this sector will come from codes and guidelines specifying efficient technology and processes, as well as educational efforts, for future customers opening up in the area.

Financial Standards for Conservation

Water Resources will assess water-savings potential, financial impact for the utility and the customer, and the number of likely participants for all conservation measures prior to adoption. It will also evaluate water savings the City's conservation initiatives realize.

City staff will assess anticipated water savings from individual conservation measures when making recommendations of program options to Mayor and Council. The impacts of services or incentives provided to individual users are amenable to analysis using water consumption histories. Water savings generated by other measures, such as providing educational brochures and school programming for broad audiences are more difficult to assess. Results from Valley and Southwestern metropolitan communities will be used to benchmark the range of likely savings as well as the duration of the effect.

Whenever possible, recommendations will also identify the anticipated range in cost per unit savings, both to the City and to program participants. Piloting programs may be the best and only way to assess the cost-effectiveness for voluntary measures, in which likely participants have a wide range of capabilities to save, at a fixed cost for participation.

Many municipalities have not regularly documented the water savings of their conservation programs. The Water Conservation Office will analyze the water histories of participants in financial incentive and individual service programs (e.g. audits) to document water savings and unit program costs to guide future decision-making. In order to assure the appropriate water consumption data will be available, all participants will be asked to sign a release of water consumption records before participating. The Water Conservation Office will also use participation levels, customer savings and reaction to assess program success.

Existing Conservation Measures

City of Goodyear Operational Efficiency

All supply connections to the City's water distribution system are metered. In 2007, the City performed a comprehensive meter change-out of existing meters, installing a radio-read system. The City also set a requirement that all new meters will be required to have meters for flushing and disinfection. This will reduce unaccounted for water.

The City conducted a leak detection study of its system in 2007. Within four months all leaks were repaired, at an estimated savings of 23 million gallons of water per year.

The City is currently awaiting a report on the water audit conducted on all facilities, rights-of way, medians, and parks held by the City for at least two years. Newer facilities were excluded because there are not established usage patterns for evaluation. The City will review and implement recommendations that are cost-effective and timely as resources permit.

Education

Through its membership in Arizona Municipal Water Users Association for the past 23 years, the City has supported printing and distribution of brochures and booklets on water conservation. It has also supported the regional multi-media water conservation awareness campaign—Water Use it Wisely (WUIW). Tips from WUIW have been regularly used in City newsletters and on its website.

This year, outreach has been expanded with additional web content, branding of the water conservation program (H2O 365—Save H2O 365 days a year), and distribution of a water conservation calendar bound with the Consumer Confidence Report on water quality.

This summer, the City launched its first Beat the Peak summer outdoor water use awareness campaign. This campaign used exhibits at City Hall and the July 4 celebration, distribution of Conserve Water booklets to elementary children, free distribution of rain and sprinkler gauges, messages on the City's phone system, the City newsletter, conservation calendar release, and repeated press releases to build awareness of the peak and customer's role in managing it.

Instructors have been identified and schedules for adult classes on water-efficient yard maintenance and irrigation practices are being set.

Staffing

The City hired its first Water Conservation Specialist in November, 2007 to expand its efforts in water conservation.

Ordinances and Guidelines

The City has Water Waste and Unauthorized Use of Water sections in its City Code. Both are enforced throughout the entire city.

City landscape guidelines for single family residences include the State's limit on maximum turf area.

As Landscape Guidelines for medians, flood retention basins, and rights-of-way were revised this fall, Engineering and Water Conservation staff began to inject more conservation-enhancing language into them. Staff are committed to organize the City's recommended plant list to better communicate the xeriscape principles on its next revision.

City water rates define four usage tiers for residents and three for commercial customers. This structure provides a financial incentive for some conservation. In the future, it may become necessary for additional water consumption tiers to be added.
Rebates and Retrofits

Commercial kitchens throughout the City have been offered the opportunity to participate in the Arizona Rinse Smart pre-rinse valve retrofit program. The Water Conservation Office worked closely with Litchfield Park Service Company to assure that businesses north of its service area would be eligible to participate.

Currently there are no other rebates or retrofit offered. The Water Conservation Office is reviewing the potential savings, costs, and relative advantages of artificial turf, SMART controllers, and turf conversion programs in reducing outdoor water usage. Re-circulating pumps, on-demand heaters, and other point of use devices that will reduce wait time for hot water would also be possible retrofits.

Conservation Goals

The City will build its water conservation program around five strategic goals. Key actions and specific objectives related to each strategy are outlined following the overview of the strategies.

Goal 1. The City will lead water conservation by example. Citizens expect their governmental institutions will practice the discipline City leaders ask residents to follow. The City of Goodyear will display such leadership and manage its water resources prudently by maximizing its own conservation efforts.

Goal 2. Build customer commitment to improve efficiency in all use of water, especially potable water. The fraction of the City service area's water used to meet municipal demand will decrease as further development occurs. Building commitment to water conservation among all customer classes will be essential to achieve and maintain savings. Currently residential users dominate numerically and in collective use. Targeting them before other users will have a greater impact. Enacting guidelines that define water efficiency standards for future businesses and residences before they increase our usage will be cost-efficient for both customers and the City.

Goal 3. Assure water conservation program is fiscally sound. The City will commit a portion of the revenues from its highest rate tiers to conservation efforts. This will provide a cost signal to encourage conservation and place the costs upon users who could most benefit from the initiatives they fund. In addition, Water Resources will actively seek cost-sharing partners for these initiatives. The program will use cost-benefit ratios, participation levels, and customer behavior as measure of success, recognizing that innovative offerings and pilots will incur some risk of low returns on investment.

Goal 4. Assess water conservation technologies and recommend appropriate usage. As awareness of water scarcity increases among society, more creative efforts will be focused upon technology and design practices that maximize water efficiency. In order to create the best possible water conservation program, the City will maintain an active research program, that may include testing of water-saving devices for broader community use.

Goal 5. Create financial incentives that accelerate adoption of water conserving practices and technology. Money talks--and water customers listen. While some listen more when they pay their water bills, and others when they make landscaping and plumbing fixture selections, all notice when conservation efforts pay. The City will use its rate structure, rebates, and retrofits, and water budgeting to make conservation pay for the customer. The City will prioritize its offerings (see Prioritizing Conservation Efforts) without ignoring chances to partner in outside programs, such as Arizona Rinse Smart.

Conservation Activities by Goal

Goal 1. The City will lead water conservation by example.

Action: Reduce municipal water use to meet annual conservation targets, through cooperation among City departments.

Cooperation among operating, regulatory and design departments of the City will present many opportunities to increase municipal conservation as City operations grow during the next decade. The City will accept responsibility to maintain miles of rights-of-way and medians in developments that are currently in design. It will also build a City Center and new parks to serve large numbers of people. Each new facility will offer opportunities to design for maximum efficiency and install fixtures that maximize life cycle efficiencies.

Evaluate and improve City water use at existing facilities and operations.

Proposed Action	Year to be completed
Coordinate City water use audits.	2008 and at 5 year intervals
Implement recommendations from audit.	2 years following audit as budget allows.
Establish annual targets for City water conservation.	December, 2009 and after each audit
Reduce frequency of bay washing at fire stations from twice daily to once a week.	2008
Use non-potable water where quality water is available, for bay washing and fire training. Site hydrants appropriately as firehouses are added.	2009
Implement additional uses for non-potable water in fire and safety functions.	2010
Minimize water use for safety and construction tests to extent allowable in law.	2011

Improve outdoor water use efficiency.

The City maintains a large and growing acreage of street medians, rights-of-way, and park lands. These landscapes are highly visible and display the community's attitude toward appropriate landscaping in the desert. They are all currently irrigated with potable water. Reclaimed effluent is available from the existing reclaimed line along Estrella Parkway.

Proposed Action	Year to be completed
Irrigate practice fields at Goodyear Ball Park Complex with 50%+ reclaimed/remediated water.	2008
Use raw water for irrigation at Bullard Water Complex.	2008
Convert irrigation of medians to reclaimed water where available.	December 2009
Implement plan to reward appropriate water use by maintenance contractors.	2010
Reduce City water use in irrigation of all 2 year-old area by 5%.	June 2010
Shift 50% of City irrigation demand to non-potable water.	2020

Install and build to higher efficiencies.

The City will build its City Center in the next two to four years, and its other facilities will be put to new purposes in the next decade. The City Center presents a special opportunity to showcase the City's commitment to water and resource conservation. Design and construction of each new facility and park will offer opportunities to incorporate more efficient technologies and designs.

Proposed **Action**	**Year to be completed**
Require leak detection studies before City accepts responsibility for landscape maintenance.	2008
Add water budgets and mature plant-size based densities to median and right of way Landscape Guidelines.	2009
Apply water sections of green building codes to minimize City water use at all new facilities.	2010
Exceed standards for water conservation in Landscape Guidelines and Planning and Zoning Ordinance at all new City facilities' landscapes.	2009
Use non-potable water sources at all future City facilities within 200 feet of reclaimed or remediated water lines.	2010
Install demonstrations of rainwater harvesting and gray water at City sites.	2012

Action: Make meaningful contributions to area partnerships and initiatives for water conservation.

The maturing of City water conservation initiatives will give the City additional opportunities to provide West Valley and regional leadership. Collaborative efforts will continue to generate cost savings and provide valuable professional development for staff.

Proposed Action	Timing
Obtain full voting membership in Arizona Municipal Water Users Association. Continue to financially support its efforts.	Ongoing
Finance and participate in regional planning by Water Use it Wisely campaign Regional Partners.	Ongoing
Host at least one regional water conservation meeting per in Goodyear.	Annually

Goal 2. Build customer commitment to improve efficiency in all use of water, especially potable water.

Action: Build public ethic supporting water conservation.

Distribute information and provide education on desert, water sources, and conservation.

Proposed Action	Year to be completed
Conduct xeriscape, irrigation and other water conservation classes for adults.	2009-2020
Prepare and distribute information on water savings and water sources through publication, media, annual calendar/publication, and City website.	2009-2020
Design, pilot, and offer school water education program.	2010-2020
Use City-sponsored events and targeted water conservation events to focus attention on conservation.	Events 2009 and 2014?
Design and build demonstration garden and exhibits interpreting water reclamation and water sources at library/City Center.	2010-2012

Create resources for consumer evaluation of water use.

Proposed Action	Year to be completed
Display prior usage in online billing to aid consumer decision-making	2009
Conduct pilot residential irrigation audit program.	2009
Hire/assign additional staff person to handle irrigation audit service and high use calls as demand grows.	2011

Action: Recommend and support adoption of City ordinances, policies, and guidelines that reduce future city-wide water use.

Enact appropriate ordinances.

Proposed Action	Year to be completed
Conservation and Curtailment Ordinance implementing Curtailment Plan.	2008
Publicize and increase enforcement of Water Waste and Theft ordinances City-wide.	December, 2008
Model Homes Ordinance promoting use of higher efficiency fixtures, rainwater, and gray water.	2009
Reclaimed Water Ordinance including requirement for non-potable water for dust control/construction and within City Water Service Area and requiring that new development on major arterials irrigating stub out irrigation to use non-potable water as it is available.	2009
Adopt 2006 plumbing code revisions that promote water conservation.	2010
Implement green building ordinance incorporating water conservation requirements to establish standards for certification in Goodyear.	2009
Additional ordinances that define water conservation requirements.	As required

Establish policy and administrative guidelines strengthening water conservation.

Proposed Action	Year to be completed
Strengthen water conservation requirements in Engineering, Storm water, and Zoning and Planning Landscape Guidelines.	2009 on
Obtain council approval for performance-based financial incentives.	2010
Discourage semi-annual and monthly commercial sprinkler testing. Continue annual requirement.	2008
Notify all Occupancies that discharge from sprinkler riser testing must be directed to landscaping instead of asphalt or concrete.	January 2009
Eliminate second fire flow tests unless project delays for more than one year.	2008
Create and offer incentive to developers and builders that incorporate more water efficient features into their plans.	2010
Require developers and new businesses to submit and execute water conservation plans that meet specified water budgets.	2012
Modify plumbing codes and landscape guidelines to increase efficiency and clarify code requirements for gray water use and rainwater harvesting.	Ongoing

Action: Promote use of alternative water sources.

Make capital investments and operating decisions to support the expansion of use of these sources.

Proposed Action	Year to be completed
Extend reclaimed and remediated distribution system.	As development fees and demand merit
Site extraction wells for Superfund site where there are irrigation users.	Where feasible
Identify financing mechanism for increased use of reclaimed/remediated water within existing customer base.	2013
Shift 50% of City's irrigation demand to reclaimed/remediated water.	2020

Provide information on how to acquire and use these water sources.

Proposed Action	Year to be completed
Include non-potable water supplies in pre-planning materials (Economic Development)	2009
Publicize Arizona tax incentives for use of alternate water sources at residences.	2009-2012
Conduct workshops and evaluate use of incentives to promote residential gray water and rainwater use.	2011

Action: Target reduction of expensive, infrastructure-intensive summer demand.

These actions will directly address Target 2: reducing the summer demand spike.

Proposed Action	Year to be completed
Conduct Beat the Peak Campaign targeting outdoor water use and waste.	Annually
Pilot residential irrigation audits.	2009
Expand residential audit program if reductions in use are sustained.	2011
Evaluate need for seasonal surcharges adoption.	Rate reviews

Goal 3. Assure water conservation program is fiscally sound.

Action: Set goals for and evaluate cost-efficiency of water savings measures.

Water Conservation staff will estimate water and financial savings to customer and City for all financial incentives. In order to assure the City can make informed financial decisions about water

saving measures the City will require that recipients of all financial incentives release their water history for evaluation purposes.

Proposed Action	Year to be Completed
Identify and schedule interior retrofit initiatives that reduce gallons used per dwelling unit by 20 gallons per day.	2013
Identify and schedule outdoor watering reduction incentives that produce 5% reduction in gallons used per dwelling unit annually.	2009-2010

Action: Identify and procure funding and partnerships to support conservation.

Proposed Actions	Year to be Completed
Add a rate class for irrigation and set rates set to discourage waste.	2009
Dedicate an increasing percentage of highest tier rate to water conservation.	Rate reviews
Identify cost-sharing partners for initiatives north of I-10.	2010
Identify sponsors for at least 50% of cost of large community water education event.	2009, 2014

Goal 4. Assess water conservation technologies and recommend appropriate usage.

Action: Research new conservation technologies and their cost-effectiveness.

Proposed Action	Year to be Completed
Join local, regional, and professional groups' collaborative research and clearing houses on efficiency, reuse, and conservation.	Ongoing
Successively target research to large-scale outdoor water efficiency, interior residential fixtures and appliances, and commercial fixtures and equipment.	Ongoing

Action: Recommend appropriate usage and assist in adoption.

Proposed Action	Year to be Completed
Utilize leak detection service as final condition to certify completion of warranty on landscape irrigation being turned over to the City.	Begin 2009
Set up pilots of technology of interest at City, school, or residential sites, as appropriate.	2013
Install demonstrations of rainwater harvesting and gray water at City sites.	2012
Adopt fixed-base remote meter reading for Amaranth.	2020

Goal 5. Create financial incentives that accelerate adoption of water conserving practices and technology.

Action: Provide financial incentives to reduce key water usage components.

The Water Conservation Office has begun researching costs and relative benefits of several popular rebate programs to identify the best initial offerings. Rebates for customer purchases, bulk contracting for resident discounts, distribution to customers, and direct installation, are all options to provide incentives to use specific efficient fixtures.

Artificial turf, turf conversions to xeriscape, residential audits, and SMART controllers all address the high outdoor water use. Re-circulating pumps, on-demand tankless heaters, and several point of use devices address the indoor water loss while waiting on hot water. Energy savings will increase the value of such retrofits for consumers while costs of operation may sometimes offset water savings.

In addition, when special grants or cost-sharing programs for retrofits, like Arizona Rinse Smart, become available, H2O365 will encourage their adoption.

Proposed Action	**Year to be Completed**
Enact tiered water rates structured to reward conservation.	2009
Set highest rate tier high enough to cover cost of conservation initiatives.	2009
Link rebate/retrofit payments to water savings achieved by recipients.	2010
Implement financial incentives for reducing community associations', multi-family and commercial outdoor use, as well as single family's overall use.	2009-2012 As resources permit
Structure incentives around water budgets and technology adoption for commercial and industrial users.	2014 on

Conclusion

The City of Goodyear commits itself to use a mix of strategies to reduce per capita daily use of groundwater by 10% in the next seven years and an additional 5% in the following five years. The City will lead by example and focus its conservation efforts on outdoor water use and enacting guidelines to assure future customers initiate water-efficient practices when they initiate water service. This will provide a solid underpinning to continue reducing GPCD in a service area where commercial and industrial activity are expected to grow more rapidly in the future than in the past.

Curtailment Plan

Introduction

As the drought in Arizona continued and worsened, the State of Arizona mandated that all municipal providers prepare and utilize drought contingency plans. The plans must identify demand reduction measures, the levels of water shortage at which they would be triggered, and the ways in which the plans would be implemented and enforced.

Because the City of Goodyear currently obtains all its potable water supplies from groundwater and will be heavily reliant upon it for the next ten to fifteen years, drought conditions will not affect its potable water sources as much as other possible events. The City has therefore chosen to prepare a curtailment plan to be used in a broader range of circumstances that may create water shortages, including major breaks in the distribution system, treatment failures, contamination, and other widespread disruptions of service.

Purpose and Objectives

The Curtailment Plan is designed to assure that water shortages do not prevent the City from meeting its obligation to provide healthy and safety services to those in its service area, as well as all its facilities outside its service area, while minimizing economic impact. Preserving capacity supporting medical services, cooling, and fire suppression will take priority over less universally beneficial uses such as lawn and park irrigation, fountains, and outdoor cooling.

The Curtailment Plan enables City leaders to respond promptly and apply restrictions that suit the particular circumstances. By distributing the Plan broadly, the City gives its residential and business customers the same opportunity to promptly react.

The Plan defines water supply drought stages, provides authority and enforcement, and sets demand reductions that go beyond the water conservation lifestyle practices of the Conservation Plan. The Plan has the City set example by reducing its water demand before and more severely than citizenry in water shortages.

Demand Management Options

Public Education for Voluntary Reduction

Voluntary demand reductions may prevent conditions reaching the point that mandatory restrictions will be imposed. Public awareness of the water supply status of the City will build cooperation in reducing demand. The City will conduct regular educational outreach to build understanding of droughts, regional drought status, the Curtailment Plan, and ways to reduce household demand as part of its conservation education program.

The City will post the Curtailment Plan as well as its water supply status on its website. The Water Conservation Office and Public Information Office will escalate communication when demand approaches levels that would trigger implementation of the Curtailment Plan. Broadcast media, marquee signage, web site features, reverse 911 calling, and all other appropriate media will be used in the event the Plan is implemented.

Increasing Financial Incentive Programs

In drought and other long duration water shortages, the City will look at ways to escalate and enhance its rebate, retrofit and other conservation programs that can produce immediate reliable water demand reductions. The City may levy a drought surcharge upon high water use and use revenue from fines for violations of mandatory restrictions to fund such program expansions.

Municipal Use Reductions

The City will set the example by reducing its own potable water use first. Discretionary water use that will not impact services or job creation will be reduced first. For example vehicle washing and irrigation of medians and rights of way would be reduced, before watering of park lands, and finally playing fields.

Outdoor Use Restrictions and Bans

In Goodyear, over half of water consumption occurs outdoors. Because swimming pools, green yards, and flowers are amenities rather than essential life services, it is appropriate to reduce the water used for these functions before other uses. Should water shortages reach extreme levels, it may be necessary to ban certain outdoor water uses. The City would delay imposing restrictions upon the Goodyear Ballpark until the shortages are severe.

All locations using non-potable water, rather than potable water, would be exempt from such restrictions and bans, as long as their water source is not also in short supply. These locations, including the Goodyear Recreational Sports Complex, would be required to post signage identifying that their irrigation uses non-potable sources.

Reduction of New Connections

Goodyear is a growing area, with construction and development continuing to add new demand. The new development provides jobs and revenue to the City. In a water shortage, adding new demand to the water system exacerbates the problem.

Because development is vital to Goodyear's health, the City would only completely halt addition of new customers and construction in the most extreme shortages. Limits on new permits and service would expire with the end of the shortage. During less severe shortages, the City will decrease the issuance of new permits and otherwise limit the addition of new demand. This will avoid magnifying the problem. Applicable federal, state, and local laws will be followed by the City during the implementation of mandatory water restrictions.

Physical Rationing and Mandatory Bans

Physical rationing of water can be imposed through percentage reductions or specific use bans. Percentage reductions assign customers a consumption reduction goal, depending on water use, compared to some established prior use. Violations of physical reduction requirements can only be caught after the water has been used, when meters are read.

Specific use bans are imposed primarily through education and enforcement. Allowing watering only on specified days and prohibiting use of water features and refilling pools can be effective. Bans build awareness and prioritize water uses. They establish as sense of equity within the community. They can be enforced while water is in use, so that the undesired use may be immediately halted. This plan incorporates bans rather than percentage reductions.

Water Use Restriction Stages

The City may invoke four stages of water restrictions based on levels of shortage. Shortage conditions are defined by demand for water as a fraction of currently available water supplies. The restrictions may be imposed on portions of the service area or the entire region, depending upon the cause of the shortage. Additional restrictions may be imposed in accordance with the City Charter.

The demand (seven day average daily demand) and available supply (total production available for delivery within 24 hours notice) are posted on the City's website (Water Use Report).

Stage One Water Watch (Voluntary)
The City of Goodyear invokes voluntary reductions for all users except the City. The City will make mandated reductions. Stage one may be triggered when demand reaches 90% of supply or is expected to do so for the next seven days. Restrictions will be used to reduce demand by 5%.

Stage Two Water Alert
The City invokes mandatory restrictions for all users. Stage Two may be triggered when demand reaches 95% of supply, is anticipated to do so for the next seven days or if Stage One lasts for fourteen days. Restrictions will be used to reduce demand by 10%.

Stage Three Water Warning
More stringent reductions than in Stage Two apply to all users except when non-potable water is used. Stage Three may be triggered when demand exceeds supply or Stage Two has been in effect for 14 days. Restrictions will be used to reduce demand by 15%.

Stage Four Water Emergency
The City invokes the most severe restrictions and may take additional action to address severe disruptions of distribution, storage, or supplies. Restrictions will be used to reduce demand to 5% below supply throughout the duration of the curtailment or drought.

Water Use Restriction by User Category

Exemptions

- Uses to maintain health, welfare and safety of water customers of the City of Goodyear
- Hospitals, medical offices, and clinics
- Sanitation trucks and trucks used to carry food or perishables are exempt from vehicle washing restrictions
- Immediate fire, hazardous waste, or sanitation hazards
- Construction of projects essential to maintain health, safety and welfare of the public
- Users of reclaimed, remediated or other non-potable sources of water

City of Goodyear

Stage One Water Watch

- Outdoor water use is restricted to every other day on even/odd day depending on address.
- Outdoor watering permitted only 8 pm -6 am.
- City irrigation to irrigate 75% of base ET, Goodyear Ball Park exempt.
- Vehicle washing only with damcel or at automatic carwashes with recycling or re-circulating water.
- No washing of sidewalks, driveways, or parking lots except for dust control.
- No street sweeping with potable water.
- Fountains will be shut off unless used for indoor cooling. Must be posted.
- Outdoor misting is prohibited.
- No fall overseeding except at Goodyear Ball Park and Goodyear Sports Complex.
- Pools must be back-washed to landscaping or to a water truck for reuse.
- No trench compaction via water consolidation.

Stage Two Water Alert

All Stage One restrictions apply plus:

- Outdoor water use is restricted to every 3 days.
- City irrigation to irrigate 60% of base ET, except for Goodyear Ball Park.
- No fall overseeding except at Goodyear Ball Park.

Stage Three Water Warning

All Stage Two restrictions apply plus:

- Outdoor water use restricted to Sun. and Thurs.
- No fall overseeding.
- City irrigation to irrigate 60% of base ET.
- No filling or refilling of pools or artificial lakes.
- Drought surcharge may be implemented.
- Line flushing to water trucks or landscape if feasible.
- Construction water use limited and only on approval of Water Resource Director.
- City will reduce reverse osmosis use to Council approved levels.

Stage Four Water Emergency

All Stage Three restrictions apply plus:

- City irrigation to irrigate 50% of base ET.
- Vehicle washing may be restricted to use only recycled water.
- Line flushing may be rescheduled or to water trucks or landscape.

Stage Four Water Emergency City of Goodyear, cont.

- All washing of City vehicles not required for sanitation may be prohibited.
- Permits for all new City construction may be withheld.
- Water demand may be further reduced by methods determined by City Manager.

Residential

Stage One Water Watch (Voluntary)

- Outdoor water use is restricted to every other day on even/odd day depending on address.
- Outdoor watering permitted only 8 pm-6 am.
- Vehicle washing only at automatic carwashes with recycling or re-circulating water .
- Fountains will be shut off unless used for indoor cooling. Must be posted.
- Outdoor misting is prohibited.
- No fall overseeding.
- Pools must be backwashed to landscaping or to a water truck for reuse.

Stage Two Water Alert

All voluntary restrictions in Stage One are now mandatory.

- Outdoor water use is restricted to every other day on even/odd day depending on address.
- Outdoor watering permitted only 8 pm-6 am.
- Vehicle washing only at automatic carwashes with recycling or re-circulating water or.
- Fountains will be shut off unless used for indoor cooling. Must be posted.
- Outdoor misting is prohibited.
- No fall overseeding.
- Pools must be backwashed to landscaping or to a water truck for reuse.

Stage Three Water Warning

All Stage Two restrictions continue to apply plus:

- Outdoor water use restricted to Sat. and Wed.
- New home building may be curtailed.
- Drought surcharge may be implemented.
- May not fill or refill pools or artificial lakes.
- Construction water use limited and only on approval of Water Resource Director.
- Residents asked to voluntarily turn off reverse osmosis and water softeners.

Stage Four Water Emergency

All Stage Three restrictions, continue to apply, plus:

- Water demand may be further reduced by methods determined by City Manager.
- All washing of vehicles, except for commercial car washes that use recycled water, is prohibited.

Stage Four Water Emergency Residential, cont..

- Outdoor watering may be restricted to once a week on assigned days.
- Permits for new residential construction may be withheld.
- Permits for occupancy may be withheld.
- Water service may be halted intermittently within sections of the service area.

Commercial and Industrial

Stage One Water Watch (Voluntary)

- Outdoor water use is restricted to even/odd day schedule.
- Outdoor watering permitted only 8 pm -6 am.
- Vehicle washing only at automatic carwashes with recycling or re-circulating water.
- No washing of sidewalks, driveways, or parking lots except for sanitation and dust control.
- Fountains will be shut off unless used for indoor cooling. Must be posted.
- Outdoor misting is prohibited.
- No fall overseeding.
- Pools must be backwashed to landscaping or to a water truck for reuse.
- No trench compaction via water consolidation.
- Restaurants serve water only upon request.
- Hotels launder linens daily only upon request.

Stage Two Water Alert

All Stage One measures are now mandatory.

- Outdoor water use is restricted to even/odd day schedule.
- Outdoor watering permitted only 8 pm -6 am.
- Vehicle washing only at automatic carwashes with recycling or re-circulating water.
- No washing of sidewalks, driveways, or parking lots except for sanitation and dust control.
- Fountains will be shut off unless used for indoor cooling. Must be posted.
- Outdoor misting is prohibited.
- No fall overseeding.
- Pools must be backwashed to landscaping or to a water truck for reuse.
- No trench compaction via water consolidation.
- Restaurants serve water only upon request.
- Hotels launder linens daily only upon request.

Stage Three Water Warning

All Stage Two measures continue to apply plus:

- Outdoor water use restricted to Mon. and Thurs.
- No construction permits issued for high water users.

Stage Three Water Warning Commercial and Industrial, cont.

- Construction meters restricted to only one meter given out for every two taken in.
- Drought surcharge may be implemented.
- May not fill or refill pools or artificial lakes.
- Construction water use limited and only on approval of Water Resource Director.

Stage Four Water Emergency

All Stage Three measures continue to apply plus:

- Outdoor watering may be reduced to once a week on assigned days.
- All washing of vehicles, except commercial car washes that recycle water, is prohibited.
- Permits for new construction may be withheld.
- Permits for occupancy may be withheld.
- Water service may be halted intermittently within sections of the service area.
- Businesses or institutions may be required to halt operations to reduce demand.
- Water demand may be further reduced by methods determined by City Manager.

Implementation of Plan and Restrictions

The Conservation and Curtailment Ordinance will authorize the City Manager to request that the Water Resources Director or the City Manager's designee update the Plan as needed.

The Curtailment Plan may be initially implemented at any stage, depending on the shortage level. The Water Resources Director or the City Manager's designee will provide information to the City Manager and Mayor and Council on water supplies in the event that shortages appear likely. The City Manager may declare Stage One, Two, Three, or Four as demand reaches the level specified for each stage. Mayor and Council shall be advised of proposed mandatory restrictions during a Stage Four Water Emergency at their next regular meeting.

The City Manager may terminate the Curtailment of any Stage upon learning that the water shortage no longer exists from the Water Resources Director or the City Manager's designee. Applicable federal, state, and local laws will be followed by the City during the implementation of mandatory water restrictions.

Enforcement and Penalties

The City will enforce the mandatory restrictions of each stage of the Curtailment Plan in all parts of the service area that lie within the City. When a report of a violation is investigated or a City Code Enforcement, Water Conservation, or staff designated by the City Manager observes a violation, an educational notice will be handed to the resident or business operator or left at the address. If the violation is not corrected in a timely manner, defined in proportion to the severity of the shortage, enforcement will move to the next step.

Violations of Stage One, Two, and Three restrictions will be treated as civil code violations, as laid out in the current Waste of Water Ordinance (14-7-8). After a warning notice is given on the second report, the City will issue a citation. Each day a violation is not corrected will be treated as a separate violation.

Second and succeeding violations of Stage Four restrictions will be treated as possible misdemeanors as defined in the current Unauthorized Use of Water Ordinance (14-7-6). Each day may be charged separately.

Conclusion

The Curtailment Plan provides an orderly, rapid means for the City to reduce water demand when shortages require prompt action. Publicizing the Curtailment Plan and its trigger levels to build advance awareness will be essential to obtain quick, full cooperation from affected water users. The Curtailment Plan is not a substitute for conservation to expand supplies. Instead it protects supplies and residents from life-threatening situations when water supplies are disrupted.

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Water Resources

Critical Strategic Plan

December 2012

An Evaluation of Water Resource

Critical Needs for 2013 - 2018

Table of Contents

Acronyms

AADF – Annual Average Daily Flow, the total volume of wastewater flowing into a wastewater facility during any consecutive 365 days, divided by 365 and expressed in units of MGD

AF – Acre-feet, one AF equals the volume of one acre with one foot of water, or 325,851 gallons of water

ADWR – Arizona Department of Water Resources, the agency that oversees the water resources within Arizona

AMA – Active Management Area, the region where water resources have the highest regulatory oversight.

AS&R – Annual Storage and Recovery, the process of recharging and recovering water from underground within an annual period of time.

CAP – Central Arizona Project, the 336 mile long canal that diverts Colorado River water at Lake Havasu through Maricopa, Pinal, and Pima counties.

CAWCD – Central Arizona Water Conservation District, the political subdivision that is the current operator of the CAP canal.

CAGRD – Central Arizona Groundwater Replenishment District

CFS – cubic feet per second, the flow volume of a moving body of water, 1 CFS equals 7.48 gallons per second

DAWS – Designation of Assured Water Supply

Dept – The Arizona Department of Water Resources

GMA – Groundwater Management Act; adopted by Arizona to protect the groundwater aquifers within the AMA areas.

GPCD – Gallons per capita per day

GRIC – Gila River Indian Community

GSF – Groundwater Savings Facility, a facility that uses renewable water supplies in lieu of using groundwater will receive credits for each AF of groundwater saved

IPR – Indirect Potable Reuse, this the process of converting non-potable reclaimed water into potable water supplies though a process of recharge and recovery or similar aquifer process

LTSC – Long-Term Storage Credits, these are credits accumulated for the physical recharge of wet water at a USF site.

MAF – Million Acre-Feet, a volume of water, sometimes used with a unit of time for example MAF per year

MGD – Million Gallons per Day, a volume based on millions of gallons and time units of day

NIA – Non-Indian Agricultural water supplies

OM&R – Operations, Maintenance, and Replacement costs

USF – Underground Storage Facility, a facility that is capable of recharging and storing water underground for future recovery and use.

List of Figures

1.0 STRATEGIC PLAN OVERVIEW AND PURPOSE

The ability of providing a safe, reliable and affordable water supply to all residential, commercial, and industrial sectors for the City of Goodyear now and far into the future is very complex. The timing of the acquisition, development and use of Goodyear's water resources must be carefully and critically planned to meet the current and future water demands for each sector.

This Water Resources Critical Strategic Plan includes: 1) water demand and supply projections; 2) information on current supplies and water supply development; and 3) reclaimed water supply management. In addition, this plan recommends current critical strategic actions and near future projected strategic actions needed to provide adequate, reliable, and economical water supplies to meet future water demands of the community.

2.0 BACKGROUND

2.1 CITY OF GOODYEAR HISTORIC WATER PRODUCTION TRENDS

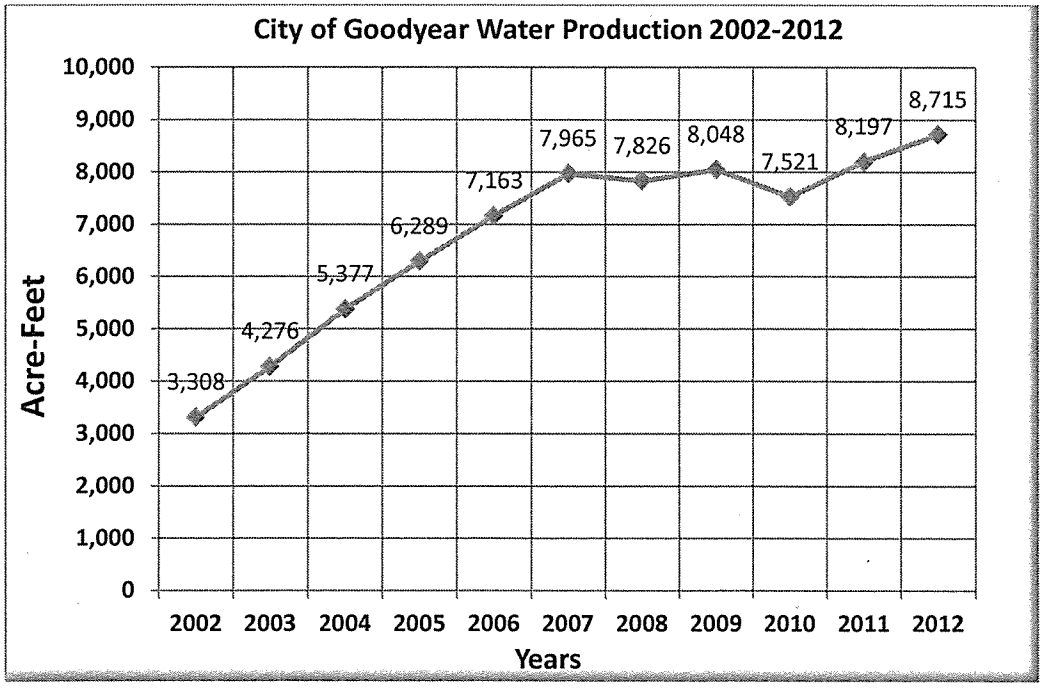

Figure 1 – Chart showing historic water production trends from 2002-2012.

The City delivered 3,308 AF of water in 2002 and 10 years later delivered 8,715 AF of water. This is an average annual increase of 540 AF per year. The City's primary water service area is located between I-10 and the Gila River. The entire water supply is derived via groundwater through City owned wells and bulk water delivery agreements currently with Liberty Utilities and Adaman Water Company. Approximately 40,800 residents were served water by the City water utility in 2012. The total water production for 2012 is estimated at 8,715 AF. This provides a coefficient of 190 gallons per person per day (GPCD) for the entire water service area and includes all aggregated water demands such as commercial, industrial, irrigation and residential water demands.

Based on both a water production and population based trend model out to the year 2035 within the current water service area of the City, approximately 20,000 acre-feet of water resources will be needed to serve an estimated population of more 80,000 residents (Figure 2).

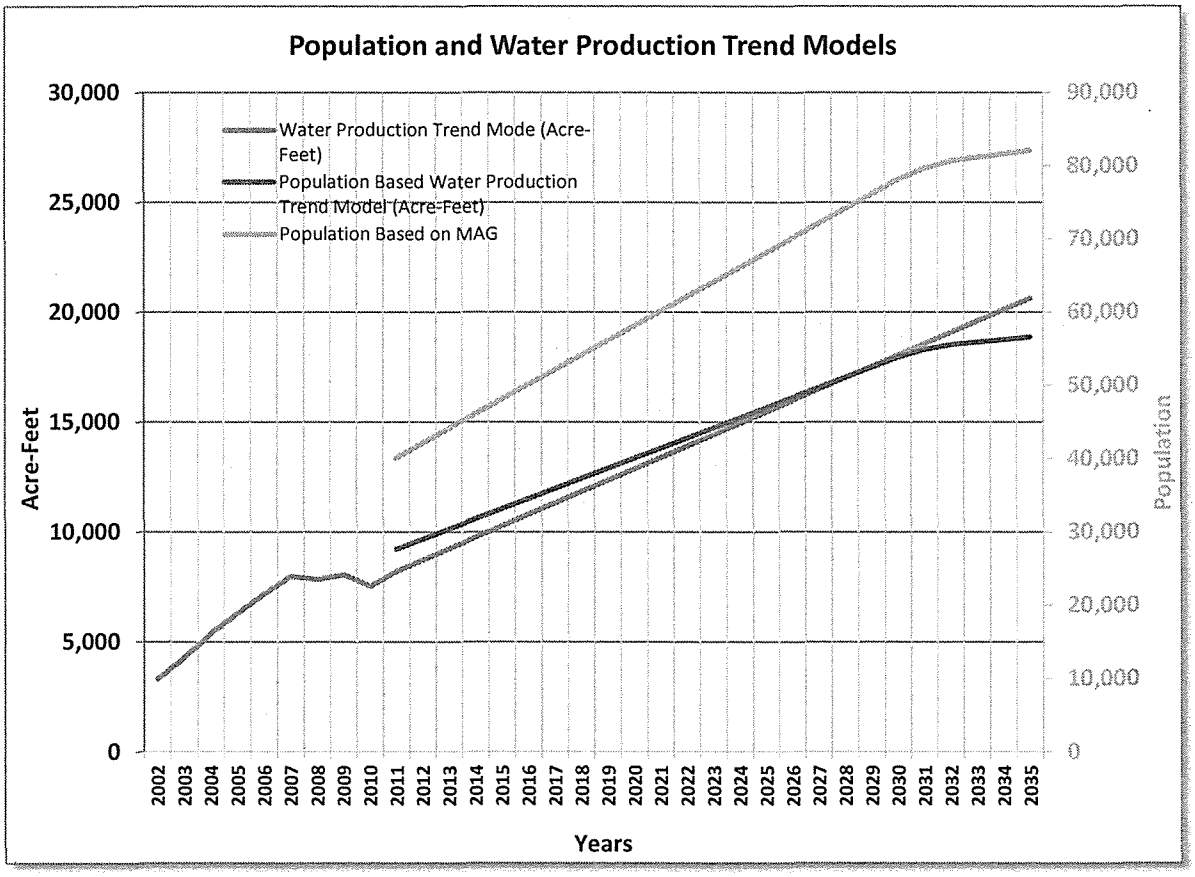

Figure 2 – Chart showing 1) the water production trend model (blue line; 2) water production trend model based on the population of the I-10 to Gila River corridor only (red line); and 3) future projected population within the I-10 and including the Gila River corridor south (green line).

2.2 CITY OF GOODYEAR ASSURED WATER SUPPLY PORTFOLIO

The City of Goodyear has been issued a designation of assured water supplies (DAWS) from the Arizona Department of Water Resources (ADWR) in the amount of 14,642.56 acre-feet per year consisting of a Colorado River water supplies, groundwater, long term storage credits, and effluent water rights (Figure 3). However, the City currently has a total of 28,367.58 AF within its water resources portfolio (Figure 4).

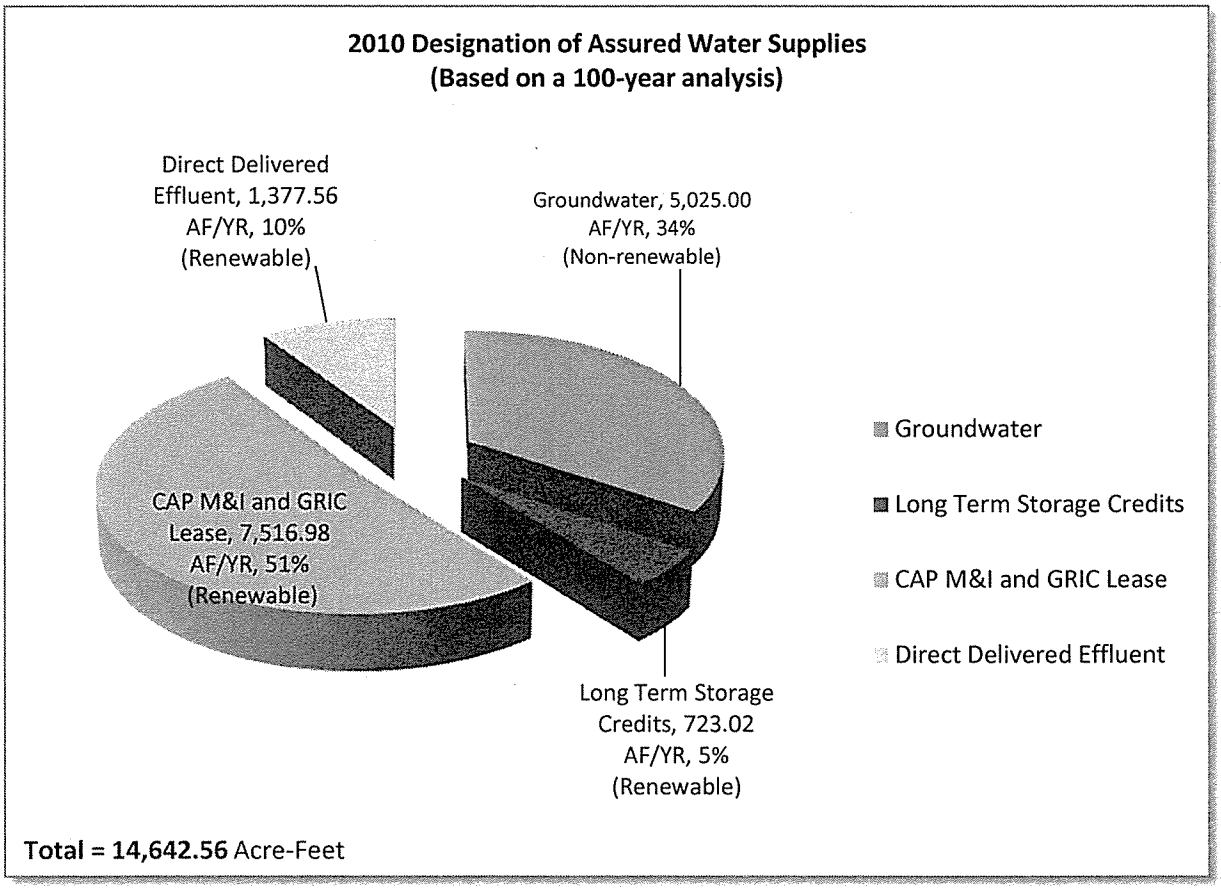

Figure 3 – Chart showing the various types of water supplies within the City's designation of assured water supplies and the total recognized amount of each by the Arizona Department of Water Resources.

Within the Decision and Order issued by ADWR for the City's designation of assured water supplies (DAWS), the Department indicated two critical limitations to water supplies that significantly reduce the amount of water recognized by ADWR.

First, the City cannot directly treat and deliver CAP water supplies to its water service area. The City must annual order and recharge CAP water within the CAP or other CAP owned recharge facilities and recover CAP water through its wells outside the area of hydrologic impact. Recovering CAP water outside the area of hydrologic impact means that when the City pumps

groundwater within its wells and that there are no net positive influences or no net increases of the CAP water recharged underground to any of the City wells. Therefore, ADWR decreased the determination regarding the City's CAP water supplies to 7,516.98 AF/year versus the entire City CAP entitlement of 17,742 AF/year. This is a reduction of 10,225.02 AF/year. To overcome this recognized shortfall, the City will need to promptly take direct delivery of its CAP water supplies. How this can be reconciled is outlined in Section 4.1 and 4.4.

Second, due to the ADWR reduced CAP recognized volume; the City's designation of assured water supplies will have projected unmet demands before the year 2020. This means that time is off the essence and that the City will need to configure a solution by determining the best method(s) of increasing ADWR's recognition of more CAP water for the City. This recognition will occur through the direct delivery of CAP water to the City's water service area. The City will need to apply for modification of its designation of assured water supplies either before December 31, 2014 or when the City's water demands reach 13,881.67, whichever comes first. Therefore, activities to resolve this shortfall will need to be outlined and planned before either of these triggers is reached.

Third, the physical water production associated with the Adaman bulk water delivery agreement was significantly reduced by ADWR within the designation of assured water supplies due to the objection from the Liberty Water Utilities about concerns of the Phoenix Goodyear Airport North superfund contaminant plume migrating towards the northwest due to increased pumping at the Adaman wells. Due to this objection ADWR reduced the amount that could be pumped from Adaman. The current bulk water agreement between the City and Adaman was approved at 10 MGD (11,201 AF/year) and was reduced to 4 MGD (4,480 AF/year) by ADWR which is a difference of 6,721 AF/year of physical wet water for use within the distribution system.

Overcoming the above mentioned hurdles will allow the City to increase the volume of recognized CAP water and increase the amount of water produced at Adaman for the City. See Figure 4 that shows the current potential total water resources for the City.

2.3 CITY OF GOODYEAR CURRENT AND FUTURE PROJECTED WATER DEMANDS

Currently the City's annual water production is approaching 9,000 AF/year which serves approximately 40,800 residents within the Central planning area from I-10 to the Gila River. Therefore, there are approximately 28,000 residents not being served municipal water. These residents are being served via a private water utility. The total production includes all components of water production, treatment, distribution, and water losses primarily due to treatment.

Solely using the total water production and dividing it by the population served a coefficient of 190 gallons per person per day can be calculated. This number should not be misconstrued with

the gallons per capita per day efficiency metric which is partitioned and normalized base on the demand side specific service class users.

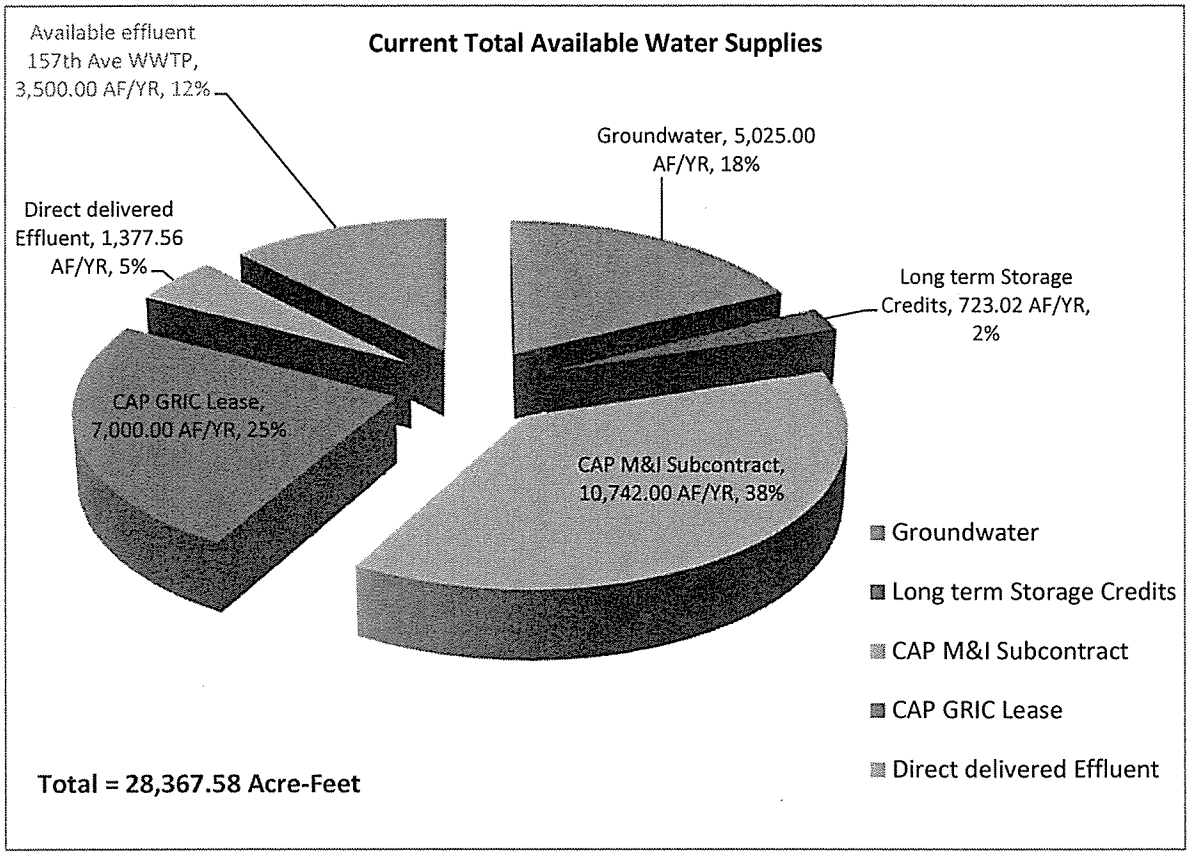

Figure 4 – Chart showing the total volumes of various types of water supplies within the City's water resources portfolio

The 190 gallons per person per day coefficient will solely be used in water resource supply side calculations to better determine future water resource needs.

Analyzing future build-out populations with an adjusted water-use coefficient (Figure 6), the future projected water demands can be estimated. The adjusted water use coefficient was conservatively reduced through time based on projected increased conservation measures becoming implemented. It should also be noted that this future model assumes that the entire population of the City will be solely served by municipal water. This model assumes that at some point in the future that private water utilities will become part of the City's water service area.

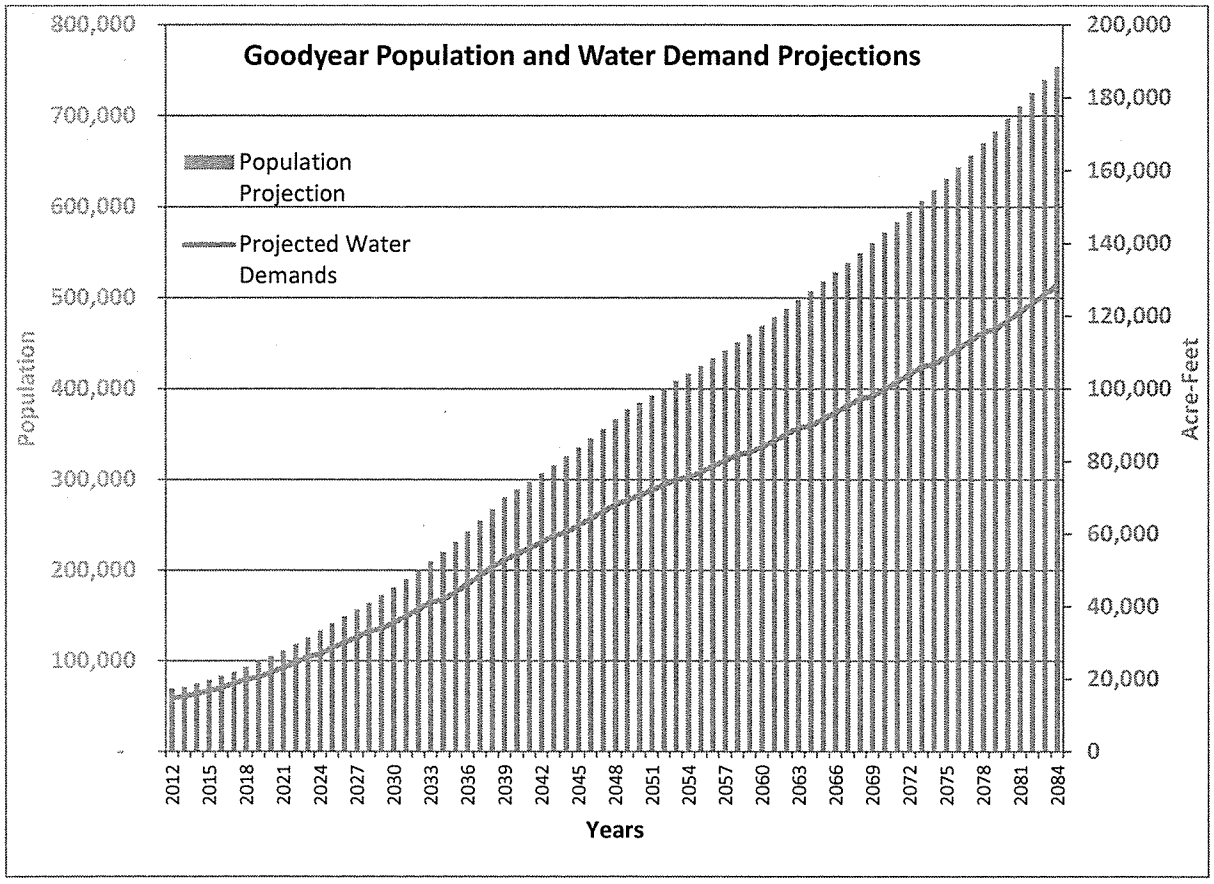

Figure 5 – Chart showing the future projected build-out population and projected water demands

Using the current water demand coefficient of 190 gallons per person per day, the overall water demand for the City's current total population of 69,000 residents is a little more than 14,000 AF per year. At build-out in 2084, the projected water demand is estimated at 128,000 acre-feet based on the population of 754,000 residents.

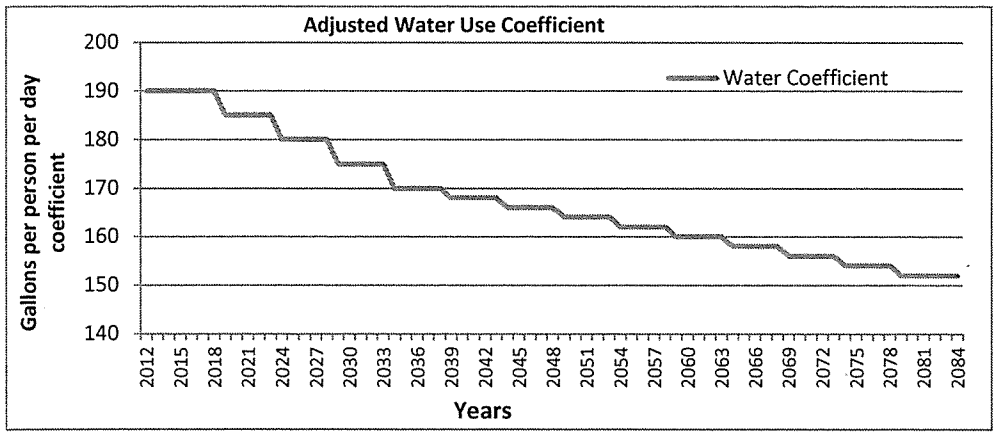

Figure 6 – Chart showing the gallons per person per day coefficient and adjustments through time

2.4 CITY OF GOODYEAR CURRENT COST OF WATER

As mentioned earlier, all of the City water production is derived from groundwater which has significant water quality problems that have led to capital expenditures such as reverse osmosis, arsenic, nitrate, and total dissolved solids treatments systems and are attributable with very high annual operation and maintenance costs.

In addition to water quality costs associated with treatment are the replenishment obligations of using groundwater and having the requirements of replacing the groundwater consumed with another water supply. This is required under State law. Currently, the City has been using its long term storage credit account to replenish annual groundwater pumped with CAP and effluent water that was recharged years earlier when water was very inexpensive. The long term storage credits were established through the historic purchase of CAP water and using effluent and recharging these water supplies underground. Similar to a bank savings account, the use of this account without future water deposits will cause this account to eventually decrease to zero. If this should happen, the City would have to replenish all of its annually pumped groundwater by either ordering CAP water or have the Central Arizona Groundwater Replenishment District (CAGRD) replenish that water for the City through the existing CAGRD agreement. The current difference in cost between these two replenishment obligations is significant. The current CAP cost for water is $137 per acre-foot while the current cost for CAGRD replenishment is $437 per acre-foot. Based on the current water production of 9,000 AF; CAP water would cost $1,233,000 while CAGRD replenishment would cost $3,933,000, thus CAP water would be $2,700,000 less than using the CAGRD in today's dollars. It should be noted that the CAGRD costs are anticipated to increase substantially over the next 3-5 years due to financial obligations and thus CAP water will be even more substantially cheaper in the short and long roads.

The current use of poor quality groundwater, associated water treatment, and replenishment costs make this water supply very expensive to produce. Also, this water supply is not considered renewable or sustainable. The total accumulative costs for continuing to use groundwater are estimated to be well over $200 million dollars by the year 2035. Contrary, the total accumulative costs associated CAP water supplies that are treated and direct delivery to the City are estimated to cost $20 million dollars by the year 2035. CAP water is and will remain a better financial water supply. Also, CAP water supplies are renewable and sustainable and make up the largest portion of the City's water resources portfolio illustrated earlier.

3.0 RECLAIMED WATER

3.1 RECLAIMED WATER SUPPLIES

Reclaimed water supplies are equally as important as CAP water supplies. Because all CAP water supplies will become allocated with the final re-allocation of the Non-Indian Agricultural (NIA) CAP water in 2013-14, meaning there will not be any additional CAP water resources available in the future. The future is uncertain regarding additional water supplies acquired and delivered through an expansion of the CAP canal. This process was formerly known as the "ADD Water" negotiations whereby interested stakeholders discussed the opportunities of acquiring main stem Colorado River water rights for use within the CAP three-county service area. These negotiations failed after several years and it is uncertain whether they will resume in the future.

As the City converts from solely using groundwater and replenishment to imported, treated, and delivered CAP water, a large percent of this used CAP water will be collected and treated at the various reclamation plants. On average, about 40% of potable water delivered is collected and treated and becomes a viable water resource within the City's water portfolio. Reclaimed water is currently being used throughout the State for potable use through a process known as "indirect potable reuse" (IPR). IPR is the process whereby high-quality effluent is recharged back into the aquifer through ADWR and ADEQ permits creating long term storage credits (LTSC) for the recharge entity. These LTSC can later be recovered via groundwater wells permitted by ADWR for potable use.

The LTSC account will need to be managed from a perspective of saving enough credits to ensure they are available in the future when absolutely needed. Also, LTSC can be a financial tool to for water purchases and exchanges, but again the amount of LTSC used for such activities will need to be properly balanced with current and future water needs.

Currently, the City is producing approximately 3,500 AF/year of effluent that is all being delivered to the APS Palo Verde Nuclear Power Generating Station via an effluent transmission system without any payment. The City needs to recharge all of its LTSC every year to ensure it has the maximum return on investment both from a current and future water supply and financial tool aspect. The current market value of 1 AF of LTSC is $150 -$190. Thus, the City minimally losing an approximate value of $525,000 every year it does not bank these effluent credits. Also, by the year 2035, it is estimated that the City will have accumulatively generated approximately 140,000 AF of effluent. If all of this effluent was recharged and banked, it would be the equivalent of 1,400 AF/year of assured water supplies within the City's water portfolio. This is a significant total amount but quite small when evaluated within the City water resources portfolio. However, the City may annual store and recover effluent when the City needs additional water supplies beyond all available CAP water supplies.

4.0 STRATEGIC WATER CONSERVATION PLANNING

4.1 STRATEGIC WATER CONSERVATION PLANNING

With future projected increased water demands, the limitation of available renewable surface water supplies, and the significant costs associated with water resources, a strategic water conservation plan is needed to be implemented to ensure the highest efficiency of water resources use and recovery. This long term plan will need determine efficiency standards far into the future that allow for the maximum use of the very limited water resources. Primarily 60% of the entire water demand is associated with exterior water demands and essentially becomes a loss resource through evaporation and transpiration. Innovations in augmentations and exterior landscapes will need to evolve into water saving systems while still providing a beautiful community, quality of life, and providing heat buffering against the urban heat island phenomenon.

5.0 CRITICAL STRATEGIC PLANNING

5.1 WATER RESOURCES PRIORITY ONE –Increased Adaman pumping & EPCOR interconnect (Begin Immediately Jan 2013)

The City's designation of assured water supplies was impacted two-fold in that; 1) the Adaman bulk water delivery was reduced from 10 MGD to 4 MGD and significantly impacted the amount of high quality wet water that can be delivered to the City due to objections by Liberty Utilities that the Phoenix-Goodyear Airport superfund contamination plume would migrate to their wells; and 2) less than half of the City's CAP water resources were recognized due to the fact that the City cannot take CAP water directly and what it is taking is recharged outside the area of hydrologic connection to the area of recovery within our current wells. To solve these problems with the City's designation of assured water supplies the following recommendations are provided.

RECOMMENDATIONS

1. ***Prepare a new application for the City's designation of assured water supplies that would challenge the migration of the Phoenix-Goodyear Airport superfund contamination plume, (Use the Brown & Caldwell groundwater model that disproves plume migration). The US Environmental Protection Agency and the Arizona Department of Environmental Quality***

support the proposed 10 MGD being pumped at Adaman and are willing to send letters of support regarding increasing pumping at Adaman.

2. ***Begin immediate negotiations to develop an agreement with EPCOR to construct a water distribution interconnect between the City's water distribution system and EPCOR's distribution system. The water interconnect would provide 4- 5 MGD of the City's CAP water to be delivered to its water service area. This would require an immediate $8,000,000 within the current CIP for FY 2013-14. The water interconnect with EPCOR should also be included within the new application for modification of the DAWS.***

5.2 WATER RESOURCES PRIORITY TWO – Purchase NIA CAP water supplies (Begin Immediately -2013)

Based on the ***water demand trend model*** and ***service area population water demand model,*** and the assumption of only serving water within the I-10 to Gila River corridor, it is projected that the City will have enough CAP water supplies to meet future projected water demands until 2028 – 2030. At that point additional CAP water supplies will be required to meet future projected water demands. Should the City acquire the private water service area north of I-10 (which does not have a water supply and is providing water via the Central Arizona Groundwater Replenishment District (CAGRD) replenishment obligations), and/or begin serving water south of the Gila River, the population projections suggest that the City has enough CAP water to meet those increased water demands until 2018 -2020. This is based on the premise that ADWR is recognizing all of the City's CAP water supplies.

Currently ADWR is creating a reallocation process for the last CAP water entitlements. This water is referred to as Non-Indian Agricultural (NIA) water and was set aside during the Arizona water settlements act. This is the last bucket of CAP water to be allocated and therefore is extremely important to acquire as much as is appropriated to the City by ADWR. The City is currently queued for the top of the applicant list due to the fact that the City's has unmet water demands before 2020. This water supply is currently being priced at $2,230 per AF for the initial one-time payment to secure this supply. If the City were fortunate to apply for and receive 5,000 AF of this water supply, it would require the City to pay $11,150,000 upfront.

RECOMMENDATION

1. ***Create a $12,000,000 line-item expenditure within the CIP for FY 2013/14 for the purchase of NIA CAP water supplies.***

5.3 WATER RESOURCES PRIORITY THREE – Begin recharging all effluent (2013)

The City's future need for water resources and current uncertainty of additional CAP water supplies becoming available place a critical importance upon the indirect potable reuse of effluent. At some point in the future, the City's water demands will exceed all available CAP water supplies within the water portfolio and therefore the use of effluent will become necessary to meet future demands. The amount of long term storage credits banked today can help buffer future water demands and provide some financial assistance to acquire new water supplies or exchanges.

RECOMMENDATION

1. ***Immediate pursue the temporary use of the former SAT site as an interim recharge option while a permanent recharge system is designed and built.***

2. ***Begin the immediate design and construction of an effluent recharge system based on the current and updated integrated water master plan (IWMP) and additional engineering reports.***

5.4 WATER RESOURCES PRIORITY FOUR – Purchase of EPCOR WTP capacity and construct a water transmission system (2013 begin financial planning through efforts with the updates to the integrated water master plan, cost of service study, and rate modeling)

The City needs a final solution for the treatment and direct delivery of CAP water to its water service area. As mentioned earlier, the EPCOR interconnect will only provide about 4 MGD of CAP water to the City's water service area. The ultimate solution and key for the City's future projected growth is to purchase EPCOR CAP water treatment plant capacity and construct a water transmission system capable of delivering current and future CAP water from this water treatment plant to the City. The current cost of pumping groundwater, replenishment, and treatment costs are significantly higher than the costs of treating high quality CAP water supplies and therefore the cost of service study should evaluate these opportunities as financial strategies for payment for these capital expenditures.

RECOMMENDATION

1. ***Place $110,000,000 within the CIP for FY 18-19 for the purchase of EPCOR CAP plant capacity and a water transmission system. Construct a financial plan as part of the updated***

integrated water master plan, cost of service studies, and rate model planning starting January 2013.

5.5 WATER RESOURCES PRIORITY FIVE – Lease additional GRIC CAP water (2013-14)

If the City should start serving water to areas north of I-10 and/or south of the Gila River and the City is fortunate to have obtained the 5,000 AF of NIA water, the City is projected to exhaust all of its CAP water allocations that include the CAP subcontract (10,742 AF), GRIC lease (7,000 AF), and NIA CAP (5,000 AF) by the year 2022. Therefore, the City should negotiate with the Gila River Indian Community (GRIC) for an additional CAP water lease for an amount starting at 16,000 AF. It is unclear how much CAP water the GRIC will be willing to lease into the future. However, a recent discussion indicates that the GRIC are currently willing to lease CAP water today. There are many other entities that are in need of CAP water will be lining up soon into the future for needed water supplies, this even more so was emphasized by the fact that the CAP no longer offered excess water contracts this year which will drive the going price of leased water higher as demand increases.

RECOMMENDATION

1. ***Begin negotiations for another 100-year CAP water lease with the Gila River Indian Community***

5.6 WATER RESOURCES PRIORITY SIX – Water Conservation Strategic Plan

RECOMMENDATION

1. ***Develop a water conservation strategic plan (2013-14)***