RECOMMENDATION PLAN REPORT

WATER CONSERVATION COMMITTEE

May 2018

CONTENTS

This report includes the Water Conservation Committee's and city Staff input regarding the City of Goodyear five-year water conservation recommendations regarding the reduction of outdoor water usage. The final approval authority for these recommendations lies with the city Council.

This report's recommendations were presented to the city Council at its May 21, 2018 work session and staff received comments and directions from the Council on implementing these recommendations and providing updates to the Council. A copy of this report has been posted on the Goodyear website at www.goodyearaz.gov/WCC-Plan.

The citizens of Goodyear are encouraged and invited to provide comments.

Please send written comments to:

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EXECUTIVE SUMMARY

This report presents a culmination of recommendations from the Water Conservation Committee (WCC) and City of Goodyear staff in a proposed 5-year implementation plan. This plan focuses on the reduction of outdoor water usage and improving efficiencies comprised of new initiatives, new programs, and further research and analysis that would provide specific water savings specifically for Goodyear. A total of 35,052 acre-feet of reduced water usage by build-out of the city, determined by the 2016 Integrated Water Master Plan, was the target evaluated by the WCC and staff. Because 60% of all water used within the city's water service area is for outdoor water use, the focus of the WCC and staff recommendations only focused on reducing usage and/or increasing efficiencies in outdoor water usage for existing and future water customers.

This plan consists of 12 recommendations proposed for consideration for the Goodyear city Council. The recommendations are in priority order:

1. **The creation of a new landscape design committee** – establish a new committee to develop a new set of landscape design standards and guidelines for all development within the city.
2. **Water Conservation Rate Structure** – consider a new conservation water rate structure promoting efficient water use and could provide financial support for water conservation programs or projects.
3. **Comprehensive citywide Tree Plan** – mitigate the urban heat island effects, improve water efficiencies in outdoor water usage, and provide a strategy for improving the quality of life outdoors and walkability of the city.
4. **Advanced Metering Instrumentation (AMI)** – develop a citywide expansion of AMI that would allow water customers to see and interact real-time with their water consumption and not only catch water leaks but assist them in better managing their individual water budgets.
5. **Community Education and Awareness** – provide a comprehensive community education and awareness program that provide specific strategies for increasing water efficiency within Goodyear.
6. **A landscape incentive program** – establish a program for the conversion of existing water intensive landscapes to more efficient landscapes.

7. **Pool Committee** – establish a new committee to develop a new set of pool design standards and guidelines for all development that will increase pool water efficiency.
8. **Customer Friendly Services** – provide a more personalized approach to assist customers in the sustainable use of water and access water conserving programs.
9. **Water Main Flushing Program** – explore new technology that conserves and recycles water and enhances water quality within the water distribution system as part of a system-wide water-flushing program.
10. **Smart Controllers Pilot Program** – determine the average percentage of water savings realized by homes using smart irrigation controller technology.
11. **Home Irrigation Check-ups** – re-establish and expand the home irrigation check-up program with an emphasis towards the city's highest residential water users.
12. **Water Intensive Exceptions** – develop new city policies that provide exceptions to certain water-intensive activities where the greater good of the city may have value that exceeds the value of the water resources, efficiencies, and conservation.

Final authorization for adoption of these recommendations lies with the City of Goodyear Council. City staff will propose these recommendations in part of the city's current request activities. These request activities could be part of the annual budget or capital improvement plan request processes.

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INTRODUCTION

City Council Resolution 16-1717 established the Water Conservation Committee in February 2016. In June 2016, the city Council appointed 11 members and 2 alternates to the Water Conservation Committee for a two-year term to provide a recommendation strategy for the reduction of outdoor water usage. The Committee is comprised of diverse stakeholders that represent diverse interests within the city. The Water Conservation Committee is an ad hoc committee of volunteer citizens and representatives of the city's water service area or private water service areas within the city that are associated with residential, commercial, or industrial, development or have landscape industry interests. Members went through an application and interview process and selected by the Council Boards, Commissions, and Committee Appointment Subcommittee.

Committee Members Include:

Mario Columbia – Chair
Jennifer Barber – Vice Chair
Marlon Booth
Arthur Faiello
Jack Gilmore
Susan Kagan
Laura Kaino
Peter Minarik
Jackson Moll
Randy Smith
Pete Teiche

Alternate Committee Members include:

Kristy Lagunas – Resigned January 2017 (Subsequently Resigned)
Thomas Neith – Resigned February 2017 (Subsequently Resigned)

As outlined in the Water Conservation Committee By-Laws, the powers and duties of the WCC include:

"The Committee is an advisory body to city staff and the city Council on matters relating to water efficiency and demand management. The Committee will review and provide recommendations for near term outdoor water conservation actions that support the future growth and sustainability of the city. The Committee will meet in a public environment addressing issues of concern relating to the potential for conservation in the city, specific measures that would lead to conservation of supplies, measures that would preserve supplies in the event of inadequate supply availability or deliverability, and the related implications. Its powers are advisory only, unless additional powers and authority are provided by Resolution, Ordinance or state or federal law or regulation. The powers and duties of the Committee shall include:"

1. Become familiar with the regulatory requirements and water usage patterns which frame the potential and requirements for outdoor water conservation, using the city's latest master water conservation plan as a resource.

2. Review impact of staff-proposed water conservation initiatives on stakeholders, residents, growth and development to ensure initiatives' success.

3. Prioritize and review the cost and return on investment of options to achieve significant reductions in outdoor water use by current customers as data permit.

4. Recommend a prioritized set of conservation actions, which may include changes to existing guidelines, ordinances, new programs and need for further study for the next five years to the city Council for review not later than July 2018.

The WCC met 19 times from July 2016 to April 2018:

Date	**Meeting Topic**
July 19, 2016	Overview of the City of Goodyear Conservation Status.
August 16, 2016	Goodyear's water supplies and anticipated growth.
September 20, 2016	2008 Conservation Plan and US Trends.
October 12, 2016	Tours of Bullard Water Campus and the Goodyear Reclamation Facility.

November 15, 2016	Presentations by Engineering, Development Services, and Parks and Recreation Departments.
December 20, 2016	Presentation Estrella HOA, Climate Change briefing, and Update to the city Council.
January 17, 2017	Discussion of recommendation topics / subjects.
February 21, 2017	Presentations by the Arizona Municipal Water Users Association, City of Goodyear Automated Metering Instrumentation, and Water Resources Staff on water conservation programs within the Phoenix Metropolitan area and State.
March 21, 2017	Discussion of recommendations and prioritization.
April 18, 2017	Arizona State University School of Sustainability team including Warren Rivera, Hannah Luke and Brienna Leonard presented on technology and education. Arizona State University – Decision Center for a Desert City Marshall Styers presented on mitigation strategies for the urban heat island through landscape design. Arizona State University – School of Future Innovation in Sustainability Jessica Givens presented water conservation strategies.
May 16, 2017	Committee worked as group and defined recommendations.
August 15, 2017	Committee forming recommendations and more details for recommendation.
September 19, 2017	Committee continued to discuss more details of various recommendations.
October 17, 2017	Committee continuing to further define and detail recommendations.
November 21, 2017	Committee focusing on the education and awareness recommendations.
December 19, 2017	Committee review of recommendations and providing additional details.
January 2018	The Committee was on break during this month.
February 20, 2018	The Committee reviewed their recommendation write-ups and discussed addition of items for each recommendation.
March 20, 2018	The Committee reached consensus on the recommendations and determined their priority.
April 17, 2018	The Committee discussed refining recommendations, 5-year schedule, and new proposed timetable for presenting to Council.

It is important to note that the WCC is an all-volunteer effort. Committee members were selected to represent varied interests within the community. This conceptual report should not be considered a substitute for a professional analysis of the city's water resources, conservation programs or projects. Recommendations from this committee will require further analysis whereby the city may pursue skilled professionals, city staff, or professional consulting firms to perform professional work or analysis.

INTEGRATED WATER MASTER PLAN - 2016

The city hired Carollo Engineering in 2014 to complete an Integrated Water Master Plan that evaluated the 5-year, 10-year, and build-out conditions regarding: 1) water resource needs; 2) water system needs; 3) wastewater system needs; and 4) reclaimed water needs. This work effort provided some key findings regarding the total water resources needed for the near-term and for build-out of the city. This study also showed physical limitations to the groundwater quantities that could be pumped within the West Salt River Sub-Basin.

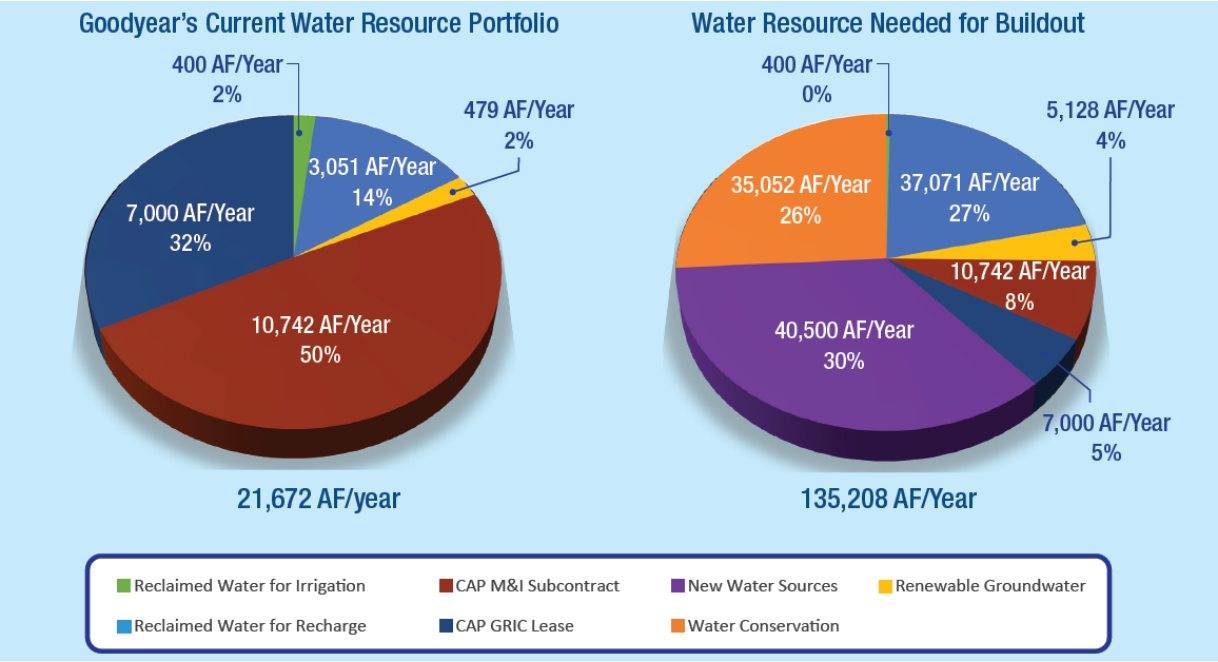

Figure 1 – Chart showing the city's current water resources portfolio of renewable water supplies (left pie chart) and what the city's water resources needs will be at build-out (right pie chart).

Based on city's build-out water demands, a total of 135,208 acre feet (AF) per year will be needed based on current water efficiencies. The build-out water resource requirements for Water Planning Areas 2 & 3 of slightly more than 47,000 AF. Currently, the city has 21,672 AF

per year of renewable water supplies within its water portfolio. There is a need to increase water efficiency for Water Planning Areas 2 & 3 to stretch the current water supplies within the city's water portfolio especially if the city does not acquire any new additional water supplies in the near future. Also, if the city wanted to minimize the total volume of additional water resources needed for build-out, the Plan suggested a 1% increase in water efficiency per year whereby a water resource savings of 35,052 AF per year at build-out be achieved.

In April of 2014, the city Council approved the creation of a Water Planning Committee through resolution 14-1612. On October 6, 2014, the city Council appointed nine (9) members and three (3) alternates to the Water Planning Committee (WPC). The charge of this committee included: 1) secure and optimize existing water supplies and facilities; 2) identify additional water and wastewater capital projects needed to maintain the integrity of Goodyear's water and wastewater infrastructure; and 3) expand water use efficiency efforts.

In June of 2015, the Water Planning Committee and staff presented their Water Planning Committee Recommendations Report. Within this report included a section called "Additional Recommendation" that recommended the following:

> ***"Sustainability and water conservation were important topics for the Water Planning Committee. The committee presented ideas and suggestions on these topics ranging from implementing new programs and initiatives to revising city policies.***
>
> ***While the Water Planning Committee discussed many sustainability and conservation ideas, with limited time and the large task at hand of deciding on future water and wastewater rates, the committee was not able to discuss most of these ideas in-depth. Many of the committee members felt that some of these ideas were valid and should be passed on for staff to evaluate and the city Council to review. However, the majority of the Water Planning Committee was not comfortable voting on these items at the May 19, 2015 meeting.***
>
> ***The Water Planning Committee voted to recommend directing staff to consider implementation of another water citizen group to continue the efforts made by the Water Planning Committee on the issues of sustainability and conservation."***

Based on the recommendation from the Water Planning Committee and the need for water savings provided by the Integrated Water Master Plan, a WCC was created by the city Council to recommend strategies towards a water savings.

Because 60% of the total amount of annually produced water is used outdoors, this is the low hanging fruit of where the WCC focused their efforts.

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BACKGROUND

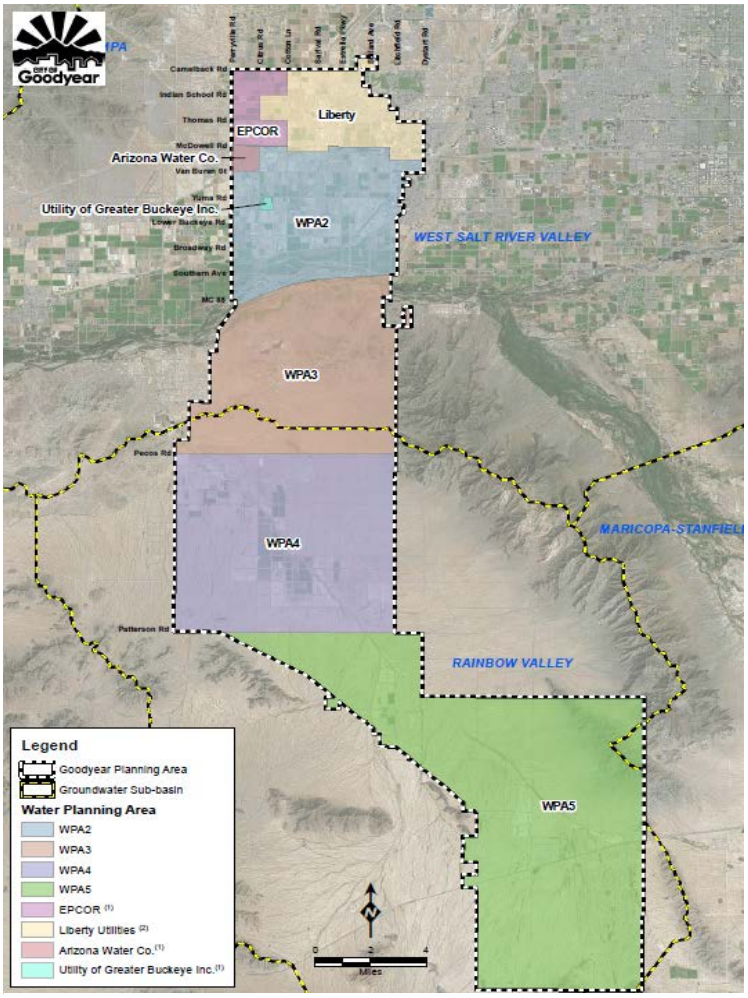

Figure 2 – Map showing the five Water Planning Areas within the City of Goodyear.

The City of Goodyear is divided into five water-planning areas. North of Interstate 10 is Water Planning Area (WPA) 1 is served water primarily by the Liberty Utilities and on the west side by EPCOR water utilities. The city currently serves water to WPA 2 & 3 only. There is no water production or city water service to WPA 4 & 5. In addition, WPA 4 & 5 are geographically located within the Rainbow Valley Sub-basin, which is a very small and closed sub-basin. Based on the future water needs and the calculated volume of water within the Rainbow Valley Sub-basin, the city will need to transport water to this basin to meet future water needs.

All water is produced by groundwater pumping, treatment, and distribution. The city currently orders Central Arizona Project (CAP) water to fulfill the Phoenix Active Management Area (AMA) replenishment obligation. CAP water is ordered annually and recharged within a CAP recharge facilities within the West Salt River Sub-basin.

Due to the city not currently being able to directly deliver its CAP water, the Arizona Department of Water Resources recognizes less than half of the city's total CAP water rights because it is not considered continuously available for 100-years. The IWMP identified another major challenge whereby the city is approaching the physical limits of the total volume of

groundwater that can be pumped within the West Salt River Sub-Basin. This also creates the urgency of direct deliveries of CAP water to the city.

In 2016, the City of Goodyear and the Salt River Project (SRP) received approval for a 100-year agreement whereby SRP agrees to deliver up to 25,000 AF per year of the city's CAP water supplies. This agreement will resolve the lack of CAP direct deliveries and the physical availability challenges. However, this project will come with significant capital expense. To increase the return of investment for this project and maximize the efficient use of this water supply a paradigm shift will need to occur whereby water efficiency is substantially increased. This could be accomplished by increasing water efficiency 1% per year until build-out and ultimately conserve a total of 35,052 AF per year identified in the IWMP. Therefore, this report represents a recommending strategy by the WCC towards reducing outdoor water usage towards the total amount of conservation needed.

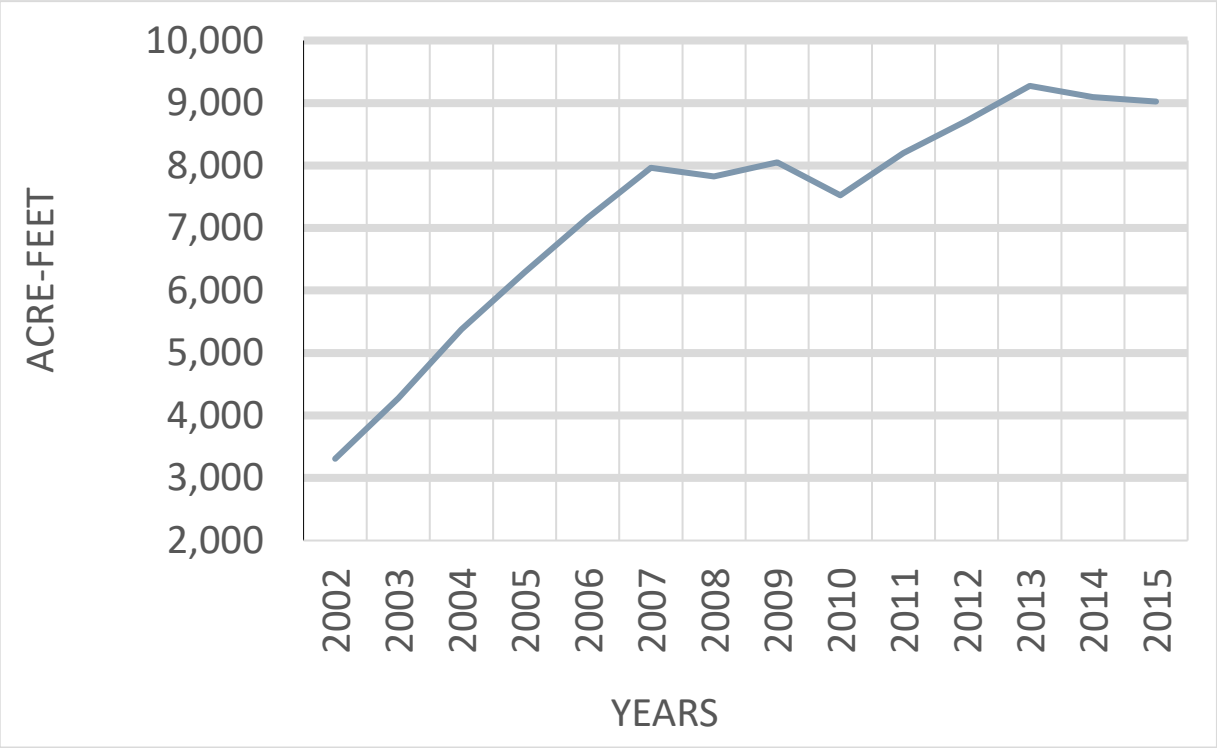

Figure 3 – Chart showing the historical water usage per year for the City's water service area.

The City of Goodyear has grown rapidly in the last 13 years. In 2002, the city was producing slightly more than 3,000 AF per year to meet the total water demands for the entire water service area. However, in 2015, the total volume of water produced was slightly more than 9,000 AF. In 2007 – 2010, the city did experience a recessional pause in growth, as did other Phoenix Valley cities. However, from 2010 through 2013, the growth rate quickly ramped back up and the water production trend was that of the pre-recessional time. In 2016, the water produced for the city's water service area was slightly more than 9,300 acre-feet. Which was a sharp increase of 300 AF above the previous year.

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THE 2008 WATER CONSERVATION PLAN

The City of Goodyear currently has a water conservation plan that was adopted in 2008. The plan is comprised of several priorities that included the following:

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 water 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 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 of about 5-8% of total demand.

Priority 3:

Reduce indoor (residential and office) demand. Residential indoor use accounts for 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.

Excerpts from the 2008 Water Conservation Plan

The city will build its water conservation program around five strategic goals. Key actions and specific objectives related to each strategy include:

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.

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.	**UPDATE**: 2018 - The Water Resources Division has embarked on completing city use audits and make recommendations for conserving water.
Implement recommendations from audit.	Ongoing
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

Excerpts from the 2008 Water Conservation Plan

NOTE: Red text within the table indicates activity for that item and black text indicates the 2008 Conservation Plan's projected date of completion.

The city maintains a large and growing acreage of street medians, rights-of-way, and parklands. These landscapes are highly visible and display the community's attitude toward appropriate landscaping in the desert. They are predominantly irrigated with potable water.

Proposed Action	**Year to be completed**
Irrigate practice fields at Goodyear Ball Park Complex with 50%+ reclaimed/remediated water.	COMPLETED **UPDATE**: The Ball Park Complex is using primarily remediated groundwater form the PGA-S Superfund site
Use raw water for irrigation at Bullard Water Complex.	2008
Convert irrigation of medians to reclaimed water where available.	**UPDATE**: The city has changed its recycled water policy and is recharging its reclaimed water back into the aquifer to the greatest extent possible
Implement a plan to reward appropriate water use by maintenance contractors.	**UPDATE**: 2017 – Canyons Trails 1 & 2 acknowledged by the city for cutting their water consumption in half. The city is currently working with several HOAs to assist them in increasing their water efficiency.
Reduce city water use in irrigation of all 2-year old areas by 5%.	June 2010
Shift 50% of city irrigation demand to non-potable water.	**UPDATE**: 2013 The city's Community Park was converted 100% to remediated groundwater from the PGA-N Superfund site

Install and build to higher efficiencies.

The city will build its city Center in the near future, and its other facilities put to new purposes in the next decade. The city Center presents a special opportunity to highlight 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.

Excerpts from the 2008 Water Conservation Plan

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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.	**UPDATE**: The city has changed its recycled water policy and is recharging its reclaimed water back into the aquifer to the greatest extent possible
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 support its efforts.	COMPLETED
Finance and participate in regional planning by Water Use it Wisely campaign Regional Partners.	COMPLETED
Host at least one regional water conservation meeting per year in Goodyear.	Annually

Excerpts from the 2008 Water Conservation Plan

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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 in their 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.

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.	**UPDATE:** City currently provides classes
Prepare and distribute information on water savings and water sources through publication, media, annual calendar/publication, and city website.	**UPDATE**: Water conservation materials are continuously distributed at public venues or available on media outlets
Design, pilot, and offer school water education program.	2010-2020 Provide tours and information to elementary through high schools
Use city-sponsored events and targeted water conservation events to focus attention on conservation.	Events 2009 and 2014? Provided information at a Ball Park spring training during the fix-a-leak-week, GAIN event, and Tres Rios events.
Design and build demonstration garden and exhibits interpreting water reclamation and water sources at library/city Center.	2010-2012 Completed plans and due diligence for a demonstration landscape project along Litchfield Road completed – funding needed

Excerpts from the 2008 Water Conservation Plan

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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 citywide 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 citywide.	Ongoing
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.	**UPDATE**: The city is recharging reclaimed water back into the aquifer to the greatest extent possible. In addition, the city has rescinded the purple pipe requirements within ordinances to ensure recharge.
Adopt 2006 plumbing code revisions that promote water conservation.	**UPDATE:** The city has adopted the 2012 International Plumbing Codes
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

Excerpts from the 2008 Water Conservation Plan

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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
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.	**UPDATE:** The city is recharging its reclaimed water to the greatest extent possible and has expanded the use of remediated water
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.	**UPDATE:** The Ball Park Complex and the city's Community Park are both utilizing remediated water
Shift 50% of city's irrigation demand to reclaimed/remediated water.	**UPDATE:** The city is recharging its reclaimed water and exploring expansion of remediated water deliveries

Excerpts from the 2008 Water Conservation Plan

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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)	**UPDATE:** The city is recharging its reclaimed water and exploring expansion of remediated water deliveries
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.	Completed
Expand residential audit program if reductions are sustained.	2011
Evaluate need for seasonal surcharges adoption.	Rate reviews

Excerpts from the 2008 Water Conservation Plan

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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 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% cost-share of large community water education events.	2009, 2014

Excerpts from the 2008 Water Conservation Plan

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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 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

Excerpts from the 2008 Water Conservation Plan

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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 collaborate in outside programs, such as Arizona Rinse Smart.

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.	Completed
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 overall use.	2009-2012 As resources permit
Structure incentives around water budgets and technology adoption for commercial and industrial users.	2014 on

Excerpts from the 2008 Water Conservation Plan

NOTE: Red text within the table indicates activity for that item and black text indicates the 2008 Conservation Plan's projected date of completion.

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 activities will grow rapidly in the future.

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WATER CONSERVATION COMMITTEE PROCESS

The process and workflow below enabled the review and finalization of recommendations to ensure city staff and the Committee reached full consensus.

COMMITTEE – Identifies concepts for recommendations (i.e., what is the goal, or metric we are trying to achieve, and why it is important). This information provided to Staff.

STAFF – evaluates Committee Concepts to determine how best to achieve the outcomes, identifies potential resources needed (personnel, materials, studies etc.), determines associated costs or cost estimates, desired outcomes. Staff may look for clarification or id additional information is needed during this process.

Committee – discusses staff information and provides any clarification or additions. Committee then prioritizes recommendations and determines the desired outcomes for the recommendations. From this information, a draft-final document is developed.

Staff – conducts a final staff review of the draft-final document and provides this information to the Committee.

Committee – finalizes the draft-final document through a review / approval process and prepares for the presentation to Council.

The WCC and staff discussed a comprehensive list of water conservation topics during their discussions in 2016-2018. The Committee came prepared to discuss water conservation topics from their interests as did staff regarding staff recommendations. The various topics are included below in no particular order.

1. Provide education and awareness regarding landscaping.
2. Provide water conservation classes.
3. Enhance water usage customer apps that would compare your water usage to your neighbors or similar residence.
4. Provide youth education and awareness.
5. Reduce water losses and waste in streetscapes.
6. Create smart irrigation.
7. Expand Automated Metering Instrumentation (AMI) and customer interactions.
8. Examine landscape designs, criteria, types, quality, placement, and plant materials.
9. Restrict winter over-seeding for turf.
10. Provide water utility opt-in programs like automated shut-offs if leaks are detected and you are away from your home.
11. Provide a demonstration landscape garden – going to the principle of "don't talk about conservation – show us."
12. Create a pilot water conservation program that can demonstrate results.
13. Expand the Home Irrigation Checkups.
14. Examine pool physical or chemical covers that prevent or mitigate evaporation of pool water.
15. Examine pool technology enhancements like activated carbon or other media versus traditional sand filters may reduce the amount of water requirements in backwashing.
16. Provide pool discharge education and/or reporting abilities.
17. Should pool water be captured onsite for use and or recharge?
18. Should there be new city regulations that would mitigate pool evaporation?
19. Evaluate new residential development standards regarding pool usage.
20. Ensure Car Washes use water efficiency or recycle water.
21. Sidewalk, patio, and driveway rinsing – cleaning these surfaces with a blower or a broom versus water would save water supplies.
22. Valuable rainwater loss – the current landscapes or streetscapes are not designed for the passive collection and use of rainwater for landscaped areas.
23. Develop model home water conservation plans with new landscaped designs.
24. Develop technology pilot programs.

25. Commercial landscaping – has some of the highest water usage within the city and is not as efficient as possible.
26. The city needs to lead by example by improving water efficiency at high water use facilities.
27. Develop a leak detection program to reduce losses.
28. Examine new building codes and ordinances regarding pervious materials and other water saving designs.
29. Establish the use of smart irrigation controllers.
30. Move away from cosmetic landscaping styles to water conserving styles.
31. Provide Code variances between HOAs and city landscaping.
32. Provide outreach and education opportunities to HOAs.
33. Provide incentives or leverage for HOAs partnerships.
34. Encourage HOAs to invest in technology.
35. Provide standards or conventions for HOAs.
36. Develop smarter water use designs and maintenance standards.
37. Develop methods for urban heat island mitigation without additional water supply usage.
38. Develop new landscape designs that conserve water.
39. Landscape designs should consider the types of plants, quality, and placement.
40. Develop and/or update a list of low water use landscape materials.
41. Develop landscape design guidelines.
42. Develop a landscape demonstration or garden project that highlights low water use designs and materials.
43. Consider dual metering i.e. interior and exterior water consumption.
44. Develop xeriscape requirements for landscape designs.
45. Develop guidelines and/or regulations using best available technologies for new or improved commercial property.
46. Invest in a citywide tree plan.
47. Invest in having a landscape architect on city staff.
48. Rights of way and common areas – has some of the highest water usage within the city and is not as efficient as possible.
49. Recycle water from hydrants or construction.
50. Develop new city codes and/or ordinances regarding designs i.e. pervious pavement.
51. Change the paradigm from reactive to proactive water management.
52. Shift away from cosmetics landscape appeal to practices that reduce water usage i.e. pruning practices.

53. Design rights of ways that buffer urban heat island effects.
54. Develop design criteria pertaining to types of landscape materials, quality, and placement of landscape materials.
55. Develop and/or update low water use; landscape material list.
56. Develop landscape design guidelines.
57. Develop xeriscape requirements.
58. Invest in comprehensive landscape design plan.
59. Invest in comprehensive landscape demonstration project or garden.
60. Invest in a city landscape architect on staff for review of landscape designs.
61. City parks and schools – has some of the highest water usage within the city and is not as efficient as possible.
62. Develop leak detection programs to reduce loss.
63. Develop new city codes or ordinances for landscape designs.
64. Develop proactive water management.
65. Prohibit winter over-seeding.
66. Develop regulation of pools to mitigate water evaporation.
67. The city needs to lead by example as water efficiency steward.
68. Develop landscape designs that mitigate the urban heat island effects without the use of additional water.
69. Invest in a comprehensive landscape design plan.
70. Invest in a landscape demonstration project.
71. Invest in a city landscape architect on staff to review landscape designs.
72. Municipal – the city is the governing authority for new development and creates lands that have high water consumption i.e. streets.
73. Discourage new golf courses within the city.
74. Develop new street designs that integrate drainage and passive landscape designs that can utilize water from drainage.
75. Evaluate the H2Oownit program and determine how it can better serve outdoor water efficiency.
76. The city needs to incorporate water efficiency benchmarks from other cities and ensure it meets or exceeds water efficiency benchmarks.
77. Ensure the city is partnering with Liberty Utilities.
78. Ensure effective partnering with HOAs and development communities.
79. Develop an immediate water messaging strategy that ensures everyone is acting today.
80. Develop a survey to determine what the best landscape designs for the entire city are.

81. Collect enough data and complete analysis to ensure water efficiency programs or projects achieve the desired results or ROI.
82. Determine all possible consequences financially and politically to water efficiency regulations.
83. Determine the water savings effect of new city water policies.
84. Determine new water rates that encourage water conservation.
85. Determine future climate change effects on new landscape designs and water conservation practices.
86. Develop partner lists for pilot projects and programs.
87. Collaborate with HOAs, builders, developers, private water utilities, and schools.

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RECOMMENDATION REFINEMENT

The WCC then aggregated the numerous list of water saving ideas and concepts into the aggregated recommendations and are identified below.

1. Develop a committee to review and develop design standards for landscapes.
    a. Determine new lists of accepted plants, trees, shrubs, and grasses that use 15-25% less water.
    b. Determine new low water use landscape styles and efficient irrigations landscape and irrigation designs.
    c. Recommend smart irrigation controllers and/or other water conservation technology.
    d. Determine new landscape design that can passively capture more rainwater for landscapes and assist with development drainage issues.
    e. Consider staffing needs – hiring a landscape architect.
    f. Determine cost / benefits of implementing winter over seeding restrictions.
    g. The Goal is to reduce all outdoor water use by 50%.

2. Develop a water conservation financial strategy.
    a. Develop a plan that uses rates from the highest water consumers to pay for water conservation projects or programs.
    b. Develop and maintain a sound financially water conservation program.
    c. Determine financial needs.
    d. Determine costs and benefits.
    e. Determine staffing needs.

3. The city invest in a comprehensive citywide tree plan.
    a. Provide an optimal tree shade and artificial shade coverage plan that would use native trees that do not require supplemental watering once established.
    b. Evaluate the amount of shade and reduced turf not be planted in these shade zones or provide shade for other landscapes and reduce watering needs.
    c. Reduce the overall outdoor landscape water budget by 15% over a specific period.
    d. Define a new updated landscape tree list as part of the new development and engineering standards and guidelines for new development.

e. The plan should identify components for the Engineering Guidelines and Standards that will need adopting by the city.
f. Determine staffing requirements for this plan, implementation, and monitoring.

4. Advanced metering instrumentation (AMI).
    a. Determine the needs – funding, equipment, configuration, and software to maximize the number of customers incorporated.
    b. Determine real water savings from the existing and expanded pilot.
    c. Determine the leak detection effectiveness of the pilot project.
    d. Determine appropriate customer and utility software requirements.
    e. Determine overall expenses, benefits, and return on investment.

5. Community Education
    a. Target efforts for the highest water volume consumers.
    b. Evaluate optimal media outlets and messaging content.
    c. Promote partnerships with entities that use large amounts of water outdoors (schools, HOA's, etc).
    d. Annual review the adopted city plumbing codes and City Design Standards/Guidelines to ensure the promotion of water efficiencies for new homes.
    e. Highlight and promote success stories throughout the city that would provide interest for others to replicate. These success stories would in essence become the demonstration projects for the various types of water users.

6. Develop Landscape Incentives.
    a. Turf to xeriscape conversion or turf to tree conversion.
    b. Deploy smart irrigation controllers.
    c. Determine funding options for incentives.
    d. Determine staffing requirements.

7. Develop a committee that can make recommendations (policy change / ordinance) related to pool efficiency in Goodyear that include:
    a. Pool covers to mitigate water losses through evaporation.
    b. Sand filters versus cartridge filters to mitigate water loss through backwashing.
    c. Pool discharge education / reporting.

d. Regulation of pools.
e. Development standards for residential pools.
f. Goal of 50% reduction in pool water use over the next 10 years.

8. Develop customer friendly services to assist customers in water conservation.
    a. Example – opt in for water shut-offs with permission program.
    b. Example – compare single-family usage to others within the neighborhood with similar size home and yards.
    c. Example – provide assistance for home leak detection.
    d. Perform cost analysis in-house versus outsources, return on investment, and impacts to revenues.
    e. Determine what needs for the program – funding, time demands, permissions, data collection, logistics, equipment, training, and staffing needs.
    f. Determine the realized benefits and savings.

9. Recycle water form hydrants.
    a. Identify technologies available.
    b. Determine costs and benefits.
    c. Develop an implementation strategy.
    d. Determine staffing needs.

10. Smart irrigation controllers.
    a. Determine needs for a pilot program – funding, total number of controllers, installation and maintenance, and duration of the pilot.
    b. Determine the logistics of how data will be collected and analyzed – private property and permissions.
    c. Determine the realized benefits and savings from the pilot and future benefits if expanded.
    d. Determine the return on investment – rebate program.

11. Home irrigation check-ups.
    a. Perform a cost analysis – in-house versus outsourcing, return on investment, and impact to revenues.
    b. Determine needs for the program – funding, time demands, permissions, data collection, logistics, equipment, training, and staffing needs.
    c. Determine the realize benefits and savings.

d. Determine how services could be expanded to commercial properties.

12. Review existing city codes and update codes that prohibit things that are good for conservation.
    a. Review existing codes and ordinances.
    b. Provide a list of recommended changes.
    c. Meet with various staff and city departments
    d. Make recommendations to staff.

13. Internal city reduction plan for all departments.
    a. Adopt the city leads the way in conservation.
    b. Audit all city facilities and establish sustainable water budgets.
    c. Appoint a water manager to every facility to review monthly water usage and billing information.
    d. Determine staffing needs.

14. Review current street design standards – runoff and water harvesting for medians or rights-of-way.
    a. Determine new street designs that can passively capture more rainwater runoff for landscapes.
    b. Determine costs and benefits.
    c. Identify funding sources and impacts to budgets.

15. Outdoor water conservation incentives.
    a. Determine needs for a pilot program – program promotion, marketing, types of rebates, funding, size, and duration of pilot.
    b. Determine how data will be collected and analyzed.
    c. Determine realized benefits and savings from the pilot and future benefits if expanded.
    d. Determine return on investment.

16. Water Intensive Exceptions
    a. The City should not conserve water at all costs.
    b. Provide exceptions to certain water intensive activities where the greatest good of the city is considered.

PRIORITIZATION

The WCC and staff felt that concept #12 & #14 should be combined with concept #1. The WCC and staff combined concept #15 with #6. In addition, city staff removed concept #13 and initiated the work with this concept through an inter-departmental process. Therefore, the 16 concepts were aggregated into 12 final recommendations and are listed in Table 1 below. The recommendations were enhanced with in-depth background information, goal, recommendation, benefits, alternatives, potential water savings, return on investment, measure of success, and references sections based on data avilable. The twelve (12) comprehensive water conservation recommendations have the ability to potentially meet or exceed the proposed Integrated Water Master Plan conservation target of 35,052 acre-feet. The WCC and city staff prioritized the recommendations based on potential labor, costs, and water savings. The table outlining these general estimates is below.

RECOMMENATIONS	RESULTS MATRIX		
	LABOR	COST	WATER SAVINGS
LANDSCAPE DESIGN STANDARDS	LOW	LOW	HIGH
CONSERVATION RATE STRUCTURE	LOW	LOW	MEDIUM
CITYWIDE TREE PLAN	LOW-MEDIUM	LOW	HIGH
AMI IMPLEMENTATION	MEDIUM	HIGH	MEDIUM-HIGH
COMMUNITY EDUCATION	HIGH	LOW	LOW-MEDIUM
LANDSCAPE INCENTIVES	MEDIUM	MEDIUM	LOW-MEDIUM
POOL EFFICIENCY	LOW	LOW	LOW-MEDIUM
CUSTOMER FRIENDLY SERVICES	LOW	LOW	LOW
WATER MAIN FLUSHING PROGRAM	LOW	LOW	LOW
SMART CONTROLLERS - PILOT	LOW-MEDIUM	LOW	LOW-MEDIUM
HOME IRRIGATION CHECK-UPS	HIGH	LOW	LOW-MEDIUM
WATER INTENSIVE EXCEPTIONS	LOW	LOW	LOW

Table 1 – Showing the 12 final recommendations in priority order with a generalized labor, cost, and water savings value.

FINAL RECOMMENDATIONS

RECOMMENDATION #1
Water Conservation Committee

LANDSCAPE DESIGN STANDARDS

BACKGROUND

The current landscape design standards were not created with a prescribed or target water reduction. Water use outdoors, primarily for landscaping, accounts for 60% of the total water use within the City of Goodyear. Landscape designs are primarily designed based on the city's current Engineering Standards, Guidelines, and ordinances. Any proposed changes will require the approval of the city Council.

The City of Goodyear has developed a landscape design chapter within the Engineering Design Standards and Policies Manual to address rights of way, medians, and recreational facilities including flood retention facilities. The current landscape design policy was primarily designed to meet the requirements of the city's General Plan, Zoning Ordinances, and Phoenix Active Management Areas water conservation requirements.

GOAL

Create an outdoor landscape design committee with appropriate stakeholders to develop a new landscape design plan that would reduce the outdoor water usage to the greatest extent possible. Determine and aim for a citywide outdoor aggregated water usage reduction of 50% reduction of residential water usage from adoption to build-out of the city while adhering to the city's master plans.

RECOMMENDATION

Recommend establishing a special landscape design committee with stakeholders that are comprised of 1) landscape architects, 2) home builders, 3) land developers, 4) trade associations, 5) Arizona Landscape Contractors Association, 6) Arizona Municipal Water Users Association's Water Conservation Manager, 7) home owner associations, 8) local residents, and the city departments. City departments would include Development Services, Parks and Recreations, Engineering, Economic Development, Water Resources, and the city's landscape architect and develop a recommendation plan.

1) This proposed committee will develop a plan with the following components that will ultimately be presented to the city Council for consideration and possible action.
    a) While the City meets the Phoenix Active Management Area conservation requirements, develop a new recommended list of accepted plants, trees, shrubs, and grasses that use 15-25% less water.
    b) Develop new low water use landscape styles with efficient water irrigation designs.
    c) Develop smart irrigation controllers and/or water conservation technology recommendations.
    d) Develop new landscape designs that can passively capture more rainwater for landscape usage and assist with development drainage plans.
    e) Consider staffing needs and city landscape architect needs.
    f) Determine costs/benefits of winter over-seeding and make recommendations.
2) The committee will review the city's General Plan and Strategic Action Plan to ensure the core values of the city are maintained.
3) The Committee will review existing city codes and ordinances and develop recommendations for the development, modification that ensure maximum water conservation and/or modification or deletion of codes and ordinances that do not promote water conservation.
    a) Committee will develop a list of recommended changes.
4) The Committee will review existing street design standards and make recommendations towards the utilization of runoff for maximizing rainwater capture and usage for medians, rights of water, and streetscapes.
    a) Committee will develop and/or modify street designs that can passively capture and utilize more rain water for landscape usage
    b) Determine costs and benefits, return on investment, and net present value analyses.

c) Identify funding sources and impacts to budgets.

5) The Committee will develop or propose recommendations towards a citywide tree plan that can ensure urban heat island buffering, improve quality of life, increase the walkability of the community, increase the sense of community, and decrease water consumption.

6) Development Services, Engineering Department, and Water Resources Division will work equally with the new committee.

BENEFITS

The 2016 Integrated Water Master Plan determined that the total water demands for the city's build-out is slightly more than 135,000 acre-feet. Currently, the city is using approximately 10,000 acre-feet with the future water demands estimated at 135,208 acre-feet. If 60% of this total water usage were for outdoor water use, based on the current outdoor water usage patterns, then 75,125 acre-feet would be needed for future outdoor water use. If this total amount of future outdoor water usage was reduced by 50% than 37,562 acre-feet could be saved.

Supports "Taking Care of the Environment" component of the Quality of Life Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

The city could continue implementing the current (existing) landscape design plans through the Engineering Guidelines and Standards with no additional water saving standards.

POTENTIAL WATER SAVINGS

If successful, this water conservation recommendation would meet the Integrated Water Master Plan recommendation towards conserving 35,052 acre-feet by build-out.

MEASURE OF SUCCESS

1) City Council adopts this recommendation to create a landscape design committee

2) A landscape design committee is created and seated

3) The landscape design committee successfully finds consensus and develops recommendation plan for up to a 50% reduction in the total citywide outdoor water used.

4) Conduct outdoor metering comparisons between existing outdoor landscapes and new designed landscapes.

RECOMMENDATION #2
Water Conservation Committee

WATER CONSERVATION RATE STRUCTURE

BACKGROUND

The City of Goodyear is looking at innovative solutions to sustain growth with new demands for water. Pricing structures are increasingly being used to encourage water conservation throughout the U.S. Conservation and efficiency are recognized as a way to effectively reduce long-term costs, and is often the most cost-effective "new water supply" option available, (Pacific Institute, 2013).

1. Conservation Pricing

Conservation pricing communicates to the customer that there is value associated with the resource and encourages efficient water use through a variety of rate structures. Conservation pricing is often applied at a higher rate to discretionary water uses such as landscape irrigation, rather than water used for basic and essential needs.

Studies have shown that flat or uniform fixed water rates do not encourage water conservation and that water use does decrease with increases in water rates. Examples of pricing structures that encourage conservation (U.S. EPA, 2017) include:

a) Increasing block rates or tiered pricing – The per-unit charges for water increases as the amount of water used increases.

b) Time of day pricing – Higher per-unit pricing during peak demand times.

c) Water surcharges – Charging a higher rate for "excessive" water use, e.g. water uses exceeding the average customer water use.

d) Seasonal rates – Pricing that corresponds to seasonal demands, e.g. higher summer pricing when temperatures and demand are higher.

2. Marginal Costs

Marginal Cost Pricing and Budget Based Water Rates. Marginal cost pricing is simply setting the price of a unit of water equal to the cost of supplying an extra unit of water. Implementation can be complicated due to the variables involved in calculating the actual cost of an additional unit of water. Under the budget based water rate structure,

customers are charged for water, using increasing tiers, where the tier breaks are unique to the individual customer, i.e. number of occupants, lot size, local climate, etc. Difficulty of initial data collection and maintenance can be burdensome to the utility.

There are challenges to conservation pricing such as revenue volatility. If the water provider is not charging the customer the amount that each additional unit of water costs to provide, it can lead to revenue instability. A financially sound conservation program will include strategies to address rate instability such as:

a. Robust demand forecasting to predict how implementation of conservation measures will affect revenues as well as projecting long-term demands for population growth or economic changes.
b. Rate stabilization funds to buffer the impacts of occasional revenue shortfalls.
c. Finance policies to include guidance as to how and when revenue stabilization funds will be applied.

GOAL

1. Determine if conservation pricing would have a positive effect for increasing efficiency and conservation.
2. Ensure that any conservation pricing is fair and equitable.

RECOMMENDATIONS

1. Explore water rate structures that would promote increased efficiency and conservation.
2. Examine seasonal rates, new rate tiers, and rate stabilization.
3. Calculate user fee savings to customers with a robust water conservation program as compared to rates without conservation.

BENEFITS

1. The benefits of conservation rate structures are multiple. According to the USEPA WaterSense Program “Rate structures have the advantage of avoiding the costs of overt regulation, restrictions, and policing while retaining a greater degree of individual freedom of choice for water customers.”

2. Conserving water saves money. It avoids the need to build pipelines and reservoirs, expand treatment plants, and pump and treat extra water. In turn, interest does not need to be paid on construction loans or acquisition of new supplies, (ADWR, 2017).

3. Evaluating the price of conservation programs will be key to moving forward with an individual program. In a 2015 audit, the Los Angeles city controller found that water purchased from Metropolitan Water cost $923/AF, while Los Angeles' average water conservation program cost $312/AF." (Harrington and Koehler, 2016). In this example, conservation is a clear choice. For the Phoenix metropolitan area the cost savings of water is more than $4,000 per acre-foot.

4. While water rates continue to increase every year, the costs of water conservation and increasing efficiencies within a water utility will help keep the water rate increases as low as possible. The costs of updating aging water systems and investing in new technologies are the primary drivers of most rate increases. Using less water keeps those costs down over time. By stretching the lifespan of supply sources, water utilities can avoid or delay the costs of securing new supplies; building and maintaining new infrastructure; and treating more water and wastewater. Those savings are passed on to customers.

5. The possible question that should drive conversation rates is not, "Why am I paying more for using less?" but rather "How much more would I be paying without conservation?" The Alliance for Water Efficiency recently worked with communities in Arizona and Colorado to answer this question, (Walton Bret, 2017).

   The answer is straightforward. Rates may be rising, but they don't rise nearly as much with conservation. In Tucson, 30 years of conservation reduced per-person-per-day use from 188 gallons to 130 gallons. Without this reduction, Tucson would have needed to invest $350 million in new infrastructure to deliver and treat more water and wastewater. Because these costs were avoided, rates are at least 11.7 percent lower today, and customers save an average of $112 annually on their water bills.

   In Gilbert, Arizona, two decades of water conservation have brought water use down by 29 percent from 244 gallons to 173 gallons per person per day. Gilbert and its ratepayers have avoided just under $341 million in water and wastewater treatment expenses. Thanks to conservation, Gilbert customers pay rates that are 5.8 percent lower than they would be without conservation.

   Conservation does not only keep rates lower for existing customers; it can help make communities a more attractive place to move or build a business. The development fee for a single-family residential unit to join Gilbert's water and wastewater system is 45 percent lower today – a saving of $7,700 for each new homeowner – thanks to conservation.

OTHER OPTIONS/ALTERNATIVES

Options for funding include “conservation fees”, savings from tiered rate conservation pricing, marginal cost pricing, and budget based water rates, or debt funding.

POTENTIAL WATER SAVINGS

Having water conservation pricing or established fees will produce water savings. It is not currently known what those savings would be in Goodyear.

RETURN ON INVESTMENT

Based on water saved and water efficiency metrics, future cost savings can be determined.

MEASURE OF SUCCESS

1. Measuring water efficiencies through pricing.
2. Determine if there is a cost savings to all customers with conservation versus the status quo.

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RECOMMENDATION #3
Water Conservation Committee

CITY-WIDE TREE PLAN

BACKGROUND

Drought-tolerant plants and trees require less maintenance and water than turf. Growing grass in the desert when it is not functional or has no purpose can be a very inefficient use of water. The average conversion to desert landscaping can save 50 percent or more on outdoor water use. A Bermuda or Bermuda hybrid lawn requires more than 55 inches of water per year (with winter overseed) and over 40 inches per year (without winter overseed). The average desert landscape requires less than 18 inches per year. (AMWUA) Some desert trees may even do well with little to no supplemental watering depending upon their age, relative location to other plants and ability to capture natural rainfall runoff.

It is critically important to choose the right tree for the right location. Implementing a comprehensive citywide tree plan would support the goals of the city's Strategic Action Plan, the General Plan and the Parks and Recreation Master Plan. (The following is an excerpt from *City of Goodyear Preliminary Tree Plan; Envisioning a Tree-Lined, Sustainable Future* (Jones, 2014).

> "Although the cost of planting and properly maintaining trees is significant, it is important to consider it as an investment. When the benefits of trees are quantified, the return on investment is very high. According to the US Department of Agriculture Forest Service, every $1 invested in Arizona trees returns $2.23 in benefits when the trees are properly cared for (McPherson, et. al., 2004).
>
> In order to reap maximum benefits, the city must maintain trees properly for their full life cycles, and ensure that removal and replacement is part of the maintenance plan. In fact a recent study suggests that "environmental benefits alone, such as, energy savings, storm water runoff reduction, and air pollutant uptake, [are] three to five times greater than tree care costs for medium and large trees" (McPherson, et. al., 2004). These types of benefits extend to the

entire community, and have the potential to save taxpayer dollars as well as city time and energy.

Trees provide multiple benefits as noted in the above excerpt. Additionally, trees can help decrease heating and cooling costs for a community. The following is an excerpt from *Greener Years for Goodyear; UHI Mitigation and Tree Plan* (Styers, 2017)

> "The City of Goodyear currently has 90% of its land area undeveloped, presenting the city with an exciting opportunity to change its future and set the example for other communities to follow. When urban area replaces the natural vegetated or agricultural spaces with low albedo (the reflectiveness of a surface) heat retentive materials such as asphalt, increase urban temperatures causing the Urban Heat Island (UHI) effect. The City of Goodyear currently has daily low temperatures that are 10°F warmer than temperatures experienced in Goodyear 60 years ago. Higher temperatures within the city affect the amount of electricity and water consumed by the residents, along with declines in walkability and community satisfaction. As Goodyear grows, UHI will not only worsen, but the impact of the UHI will increase. For every 1 ° F increase in overnight low temperatures, monthly water use per single-family home increased by 290 gallons. Cities with populations of 100,000 or higher, the peak electricity load will increase 1.5-2% for every 1°F increase in temperature (Guhathakurta & Gober, 2007). Increasing canopy cover by 10% decreases ambient temperatures by 1.8°F (McPherson, 2001)."

GOAL

1. Reduce the overall citywide outdoor landscape water budget by 15% with the implementation of a new tree plan.

2. Provide an optimal tree shade and artificial shade coverage plan that would use tree species that require little to no supplemental watering once established.

3. Mitigate the UHI by managing average nighttime temperature increases (increased water use) thereby minimizing water use.

4. Integrate the timing of the citywide tree plan with the Landscape Design Committee to ensure these plans are seamlessly blended.

RECOMMENDATIONS

1. Provide an optimal tree shade and artificial shade coverage plan that would use native or tree species that do not require supplemental watering once established.
2. Evaluate the amount of shade and reduced turf that would not be planted in these shade zones or provide shade for other landscapes and reduce watering needs.
3. Reduce the overall citywide outdoor landscape water budget by 15% through a new citywide tree plan.
4. Ensure the timing of the citywide tree plan with the Landscape Design Committee efforts to ensure these plans are seamlessly blended.
5. Adopt approved city tree plan components and new updated landscape tree list as part of new development and engineering standards and guidelines for new developments, streetscapes, city parks, rights-of-way etc..
6. Plan components should define Engineering guidelines and standards that would need adoption by the city.

BENEFITS

1. Reducing water used for landscape irrigation.
2. Reduce UHI effects.
    a. Reduced water use.
    b. Reduced energy consumption (primarily through cooling).
3. Enhance the habitats for wildlife.
4. Encouragement of native flora.
5. Increased air quality.
6. Reduction in storm water runoff.
7. Community walkability and connectivity.

Supports "Taking Care of the Environment" component of the Quality of Life Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

Continue with internal city revised landscape design standards and guidelines and ordinances.

POTENTIAL WATER SAVINGS

1. Established trees which use little to no water (maximum of 1.5 acre-feet/acre/year*) versus turfed areas and would provide a savings of approximately 3.4 AF per acre.
2. Water savings can be calculated with mitigation of the UHI. According to Arizona State University, research within the Phoenix Metropolitan area there is a 290 gallons/month per household water use increase for every 1 degree Fahrenheit increase in average nighttime temperature. Therefore, buffering the UHI by only a few degrees would be a significant water savings.

MEASURE OF SUCCESS

1. Meet prescribed projected canopy coverage prescribed by city tree plan.
2. Maximize tree versus turf design and planning.
3. Mitigation of UHI – average nighttime temperatures reduced or maintained.

REFERENCES

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RECOMMENDATION #4
Water Conservation Committee

ADVANCED METERING INFRASTRUCTURE

BACKGROUND

As the City of Goodyear expands its AMI infrastructure, consideration should be given to expand the AMI citywide and include a customer portal interface to enhance water efficiency efforts.

Water utilities across the country are literally leaking money. They produce, treat, and pump water to their customers but can be losing much of their product along the way to leaks in the distribution system. That's water that has been treated but will never be billed and referred to as non-revenue water. AMI can assist the utility in identifying leaks that can be addressed quickly.

Early leak detection can reduce unnecessary water loss for the water utility and its customers. AMI technology is highly capable of providing utilities and its customers with sufficient real-time water usage information to address water related issues. A well-established AMI system has the capabilities of alerting water customers of issues in real-time rather than traditional methods of waiting for the monthly water bill. As a result, problems can be addressed much sooner saving water for the utility and unnecessary high water bills to its customers. AMI can be augmented with additional software further improving operational efficiency and customer satisfaction. Customers can access water use information, billing, alert notifications, and conservation ideas through a web-based / phone application interactive portal. Customers are empowered through the customer portal to better manage and understand their own water use and better managing their bills resulting in increased customer satisfaction, increased water management, and lower cost of service.

GOAL

1. Expand the AMI system citywide.
2. Require all new meters for new water service be AMI compatible.
3. Establish a customer portal that empowers customers to better understand and manage their water use and bills through technology that increases customer satisfaction, lowers cost of service, and builds for long-term system improvements.

RECOMMENDATIONS

1. Determine what is needed (infrastructure, funding, integration, and software) for full system implementation.
2. Determine real water savings.
3. Determine appropriate customer and utility software requirements.
4. Determine overall expenses, benefits, and return on investment.
5. Create a partnership with Liberty Utilities and EPCOR Water for the integration of their water customer's real-time water usage data interfaced with the city's AMI portal.

BENEFITS

One the most significant advancements in AMI is time synchronization. This enables the AMI system to take a snapshot of a water utility's distribution system at a given point in time, giving a complete image of consumption. This allows water managers to look at inflows and outflows, for example, and perform comparative analysis on the distribution system.

Typically customers are not notified of high water consumption until approximately 30 days after an issue has started based on billing cycles. For the City of Goodyear, water customer's accounts are flagged and customers are notified when three times the monthly average consumption is recorded by the meter. The expansion of AMI within the city would significantly increase capability in identifying leaks more effectively due to its real-time meter reading capabilities. The ability to notify customers early allows leaks both large and small to be addressed sooner saving money and water.

AMI software alone, however, is not capable of notifying customers directly of continuous or high water consumption. AMI software collects and stores the meter read data but does not have a customer interface component where customers can receive notifications, review their water consumption online, or compare their consumption with neighbors. By acquiring a

software interface tool it would assist customers to interact with their water consumption data and empower them to mitigate the situation themselves.

Specialized software is required to interface with the existing AMI meter reading software to create a usable portal for customers. The software is capable of alerting customers within 24 to 48 hours of continuous water consumption through their meter. This early detection is key to reducing unnecessary water consumption and increasing overall water efficiency. The software gives customers the ability to customize the information provided to them. Customers can determine how and when to be alerted, review consumption history, and access on-demand instructional videos. Customers become an integral and valuable component for better water management within the city.

Research, by the Alliance for Water Efficiency, shows that a typical home loses from 167 to 1,667 gallons of water a month due to unseen or unaddressed leaks. AMI would allow water customers to see real-time increased usage or leaks and quickly take action that would reduce water waste.

The city utility is not the only water provider within the corporate limits. Liberty Utilities and EPCOR provide water to Goodyear residents and businesses north of Interstate 10. The city will determine and encourage an AMI partnership with these private utilities whereby water customers of those water utilities could access their water usage either through the utilities AMI portal or the city's AMI portal.

To find their optimal water budget, Goodyear water customers could use AMI. Water utilities in a water-stressed area, like Goodyear, would like to assist customers on a personalized water budget that matches their household size. If a customer exceeds their budget, they could be subject to a higher monthly water bill. If Goodyear can provide better water information to its water customers on their performance of their specific water budget on a day-to-day basis, there is instant feedback as a useful tool for conservation.

Not having to manually read meters or physically investigate a high water bill complaint means not having to deploy vehicles. This results in cost savings on gasoline and vehicle maintenance, plus a lower carbon footprint.

Using AMI to automate many of the traditionally manual meter-reading functions of water utility staff enables the utility to better utilize its workers into more critical roles. A lean utility is able to tackle other projects that they did not have the resources previously.

For the Goodyear water system where customers are also constituents, customer service is critical. With the detailed usage data available in an AMI system, customer service representatives have immediate access to consumers' consumption information. When a

customer calls with a high water bill complaint, the CS representative can give the customer a complete picture of how much and when water is used.

Supports "Keeping Up with Technology" component of the Fiscal and Resources Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

The city can continue operating and expand its current AMR system with no additional interactive customer software as it currently does. However, customers will remain heavily reliant on city staff to oversee and monitor their consumption as opposed to empowering customers with real-time data and enhancing their customer service experience.

POTENTIAL WATER SAVINGS

There are several water and costs saving advantages to AMI and include:

1. Through better managing non-revenue water.
2. Providing real-time data for customers to manage their water budgets.
3. Decreasing staff time and operational costs associated with traditional meter reading.
4. Providing better customer service.
5. A better understanding the distribution system.

MEASURE OF SUCCESS

1. Full system wide implementation of AMI customer service portal.
2. Sufficient data to determine water savings for the city and customer interaction.
3. Sufficient data to determine leak detection effectiveness and software interfacing.
4. Customer Satisfaction Survey.

REFERENCES

Alliance for Water Efficiency, 2016 - Household Leak Detection and Mitigation Introduction - http://www.allianceforwaterefficiency.org/Household_Leaks.aspx.

RECOMMENDATION #5
Water Conservation Committee

COMMUNITY EDUCATION/AWARENESS

BACKGROUND

The city's WCC was created to evaluate and address outdoor water use. Approximately 60% of all potable water produced within the City of Goodyear is used for outdoor irrigation. Efforts focused on reducing outdoor water use will have greater impact than those concentrating on indoor. The majority of homes and businesses within Goodyear were built after 1995 and been fitted with higher water efficient fixtures. Any program focused on reducing indoor water use would realize minimal savings. Time and effort is better-spent focusing water conservation education programs on outdoor activities and behaviors that promote long-term water savings and efficiencies.

GOAL

Establish water conservation educational programs that promote awareness and provide specific strategies for outdoor efficiencies.

RECOMMENDATIONS

1. Target efforts for the highest water volume consumers.
2. Evaluate optimal media outlets and messaging content.
3. Record and then distribute outdoor water savings techniques via the city web site or YouTube. For example, demonstrating the home irrigation check-up process, irrigation controllers, irrigation systems, leak detection, and proper pool draining. All videos should be formatted for mobile device usage.
4. Market/Broadcast city phone number for water waste reporting.
5. Promote the use of Public Stuff app.

6. Promote partnerships with entities that use large amounts of water outdoors (schools, HOA's, etc).

7. Annual review the adopted city plumbing codes and City Design Standards/Guidelines to ensure the promotion of water efficiencies for new homes.

8. Highlight and promote success stories throughout the city that would provide interest for others to replicate. These success stories would in essence become the demonstration projects for the various types of water users.

BENEFITS

Providing water conservation educational programs is a best management practice adopted by most water providers. The most common use of public education programs is to promote behavioral changes in reducing overall water consumption, reducing water consumption in times of water shortages, such as drought or water supply interruptions (AWE, 2016). Some water purveyors have reported short-term water savings of 20%. Unfortunately, these savings drop off after the first initial year of implementation if messaging is not consistent. Savings can be sustained through continuous and consistent educational programs directed to the individual water user. Continuous efforts in educating and engaging the end users is key for sustained water savings.

Additionally, annual review of the plumbing codes and design standards and guidelines would ensure all newly constructed buildings have the most efficient water fixtures and technology available at the time. Water savings through product efficiencies are not dependent on human behavior and provide the most direct and reliable method for sustained water conservation.

1. Water conservation messaging has a positive influence on water consuming behavior.
2. Collaborating with water customers ensures that the city and its water users are working together to increase efficiencies and creating behavioral changes in times of water shortages, such as drought or water supply interruptions. As the water conservation knowledge of customers improves, the customers are more likely to participate in other programs offered by the utility.
3. Public education on water conservation helps customers make better decisions when purchasing new products or replacing old fixtures and appliances.

Supports "Engaging our Residents" component of the Sense of Community Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

Rely on the Water Resources Division web site to promote and educate residents about water conservation and water efficiency.

Create a water conservation page in the mobile city app.

POTENTIAL WATER SAVINGS

The amounts of water savings for this recommendation are unknown for the City of Goodyear but water conservation programs have shown to increase efficiencies for water providers that deploy these tools.

MEASURE OF SUCCESS

1. Established metrics to measure sustained savings.
2. Established continuous and consistent educational water conservation programs.
3. Work one-on-one with various customers and highlight the successful projects for all the community to see as a demonstration project.
4. Develop water saving targets based on measured success of the various programs implemented.
5. Customer Satisfaction Survey.

REFERENCES

Alliance for Water Efficiency, 2016 - Household Leak Detection and Mitigation Introduction - http://www.allianceforwaterefficiency.org/public_education.aspx.

RECOMMENDATION #6
Water Conservation Committee

LANDSCAPE INCENTIVES (Residential, Commercial, and HOAs)

BACKGROUND

Arizona's outdoor landscapes account for two-thirds of entire residential water supply used. Bermuda and ryegrass require about 60 inches of water each year, but Goodyear receives only an average of 8 inches of rainfall each year. Typically, the additional water is applied with above ground sprinkler systems that are often inefficient, easily damaged and not properly maintained. Getting ryegrass seed to germinate requires watering three times a day or more (Water Use It Wisely).

Turf removal programs specifically reduce water usage by up to an estimated 60% of the total outdoor water consumption by removing turf and converting to native, drought tolerant landscape, or synthetic turf. Even landscapes with minimal to no turf can be overwatered due to sprinkler/drip controllers that are not programmed properly or not seasonally adjusted.

GOAL

To create a fair and equitable landscape incentive program that encourages residents, HOAs and commercial properties to convert high-water use landscape to low-water use landscape/xeriscape and use the most efficient landscape watering technologies.

RECOMMENDATIONS

1. Develop a turf-conversion incentive program.
2. Develop a smart irrigation controller's incentive program with products or devices.
3. Determine what is needed for development and implementation.
4. Determine real water savings.
5. Determine overall, expenses, benefits, and return on investments.

BENEFITS

The average residential customer in Goodyear consumes approximately 7,000 gallons of water per month (0.26 AF per year). Outdoor water use accounts for 60% of the total use or 0.15 AF per household per year (2016 total Goodyear water service area residential outdoor water use was 4,688 AF or 1,527 million gallons.) HOAs can be high water users with large tracks of turf in common areas that may not even be used. In 2016, HOAs with greater than 10 acres of turf used approximately 250 million gallons (767 AF) annually.

The water savings from a turf conversion could range between 20 - 60% reduction of the outdoor water use or 840 gallons to 2,520 gallons per month per residence (10,080 – 30,240 gallons per year) and range from 50 - 153 million gallons per year for the large Home Owners' Associations.

Supports "Engaging our Residents" component of the Sense of Community Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

Provide specific water conservation classes that focus on the benefits of Xeriscape and offer landscape design advice.

POTENTIAL WATER SAVINGS

The landscape incentive program could initially target a 20% reduction of Goodyear's top 10% of water using customers. The incentive program could be expanded to include the top 10-20% of water using customers.

MEASURE OF SUCCESS

1) Target – 20% water reduction for the top 10% water users.
2) Acquire sufficient funding for program implementation and future continuance of programs.
3) Sustained annual water savings after rebate verification.
4) Program Examples:
    a. Turf Removal/Conversion: Reduce water usage by removing turf and converting to drought tolerant landscape or synthetic turf. Increase curb appeal while promoting water savings.
        i. Southern Nevada Water Authority - $2/square foot up to 5,000 square feet

ii. Fresno CA - $0.50/square foot up to 500 square feet (Fresno CA)

iii. Avondale – Up to $400 (residential), $200 per 100 sq. ft. (non-residential)

iv. Chandler – up to $3,000 (residential and non-residential)

v. Glendale - up to $750 (residential), up to $3,000 (non-residential)

vi. Scottsdale – up to $1,500 (residential), up to $15,000 ($5,000/year for 3 years)

vii. Tempe - $0.25/square foot (residential), $0.25/square foot up to $3,000 (non-residential)

viii. Peoria – up to $1,650 (residential and non-residential)

ix. Water Conservation Alliance of Southern Arizona (Water CASA) Study

1. Utility L-1: $0.40/square foot incentive, minimum conversion of 500 sq. ft.

2. Utility L-2: $200 rebate, minimum conversion of 1000 sq. ft. and both front and back yards must be converted

3. Utility L-3: $100 rebate, no minimum conversion but both front and back yards must be converted.

b. Smart Controllers/Weather-based irrigation controllers: Automatically adjusts the irrigation schedule to account for changing weather, soil conditions and plant types.

i. Metropolitan Water District of Southern California - $80/controller for less than 1 acre of landscape, $35/station for > 1 acre

ii. Avondale – up to $200 (non-residential), $50 (residential)

iii. Chandler, Scottsdale, Peoria - $250 (residential and non-residential) with limits

iv. Mesa – 50% of cost, up to $400 each. Installation 50% cost, up to $150 each.

v. Surprise - $125

c. Rotating sprinkler nozzles: Apply water more slowly and uniformly to prevent over-watering and encourage healthy plant growth.

i. Metropolitan Water District of Southern California - $2/nozzle (minimum 30 nozzles)

ii. Mesa - $2/nozzle (minimum 20 nozzles)

d. Pool Removal

i. Scottsdale – up to $1,500

e. New Home Xeriscape –

i. Chandler - $200

REFERENCES

City of Fresno. Department of Public Utilities, Water Division. Lawn to Garden Conversion Rebate. Accessed 1/8/2018. https://www.fresno.gov/publicutilities/wp-content/uploads/sites/16/2016/11/012517-ALL-Lawn-to-Garden-rebate.pdf

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SRP. Water Conservation rebates offered by valley cities. Accessed 1/8/2018. https://www.srpnet.com/water/conservationrebate.aspx

Water Use It Wisely. Top Ten Reasons to Convert to Xeriscape! Accessed 1/8/2018. https://wateruseitwisely.com/top-ten-reasons-convert-xeriscape/

RECOMMENDATION #7
Water Conservation Committee

POOL EFFICIENCY

BACKGROUND

There are currently 8,188 pools within the City of Goodyear. Because there are approximately 36,000 total water connections within the city (including private water providers), this would equate to one pool for every 4.39 water connections. The average pool has dimensions of 14 feet by 28 feet with an average depth of 4.5 feet. This means that the average pool holds about 13,100 gallons. However, the combined amount of water that evaporates from the pool each year (based on the Arizona Department of Water Resources average evaporation rates for the West Valley) is slightly more than 22,246 gallons per year. This means that a total of 182 million gallons or 559 acre-feet per year are needed to keep the 8,188 pools full of water year round within the city.

At build out of the city, with the same ratio of pools constructed (one pool for every 4.39 connections), more than 62,000 pools are predicted. These pools will account for an approximate total volume of 1.37 billion gallons (4,225 acre-feet) per year of water to keep all pools full year-round.

The WCC discussed at great length the use of regulating outdoor pools, evaporation rates within the Phoenix metro area, pool covers, water saving filters and backwashing, compliance, education, development standards, and other water saving appurtenances that could be used to save water for outdoor pools. The WCC reached consensus that more pool industry expert stakeholders were needed to discuss outdoor pools and how water could be saved.

GOAL

Create an outdoor pool committee that would develop a plan that would implement an increased efficiency in the citywide water usage to the greatest extent possible over a ten-year period associated with pools. Determine and aim for a citywide outdoor aggregated water efficiency increase of 50% from adoption to build-out of the city. Note: this goal is not suggesting a reduction in pools, but increasing the efficiency of water used with outdoor pools.

RECOMMENDATIONS

Establish a special outdoor pool usage committee with stakeholders that are comprised of 1) pool builders; 2) home builders; 3) development community; 4) home owner associations; 5) pool suppliers; 6) residents of mixed aged groups; 7) Goodyear Parks & Recreation Department; 8) landscape architects; and 9) the Economic Development Department. This Committee shall develop a 10 year or longer recommendation plan. This plan will need to be presented to the city Council for consideration and possible action.

OTHER OPTIONS/ALTERNATIVES

There are no alternatives other than having appropriate stakeholders and staff find consensus regarding the reduction of water usage for outdoor pools and develop an implementation plan.

POTENTIAL WATER SAVINGS

An annual volume of water saved with increased efficiency of up to 50% in the water used for outdoor pools over the next 10 years and carried forward into the future.

MEASURE OF SUCCESS

1. City Council adopts this recommendation to create a pool committee
2. A pool committee is created and seated
3. The Committee develops an outdoor pool committee that would develop a plan that would implement a reduction of 50% pool water usage over a ten-year period with that efficiency carried forward for all future development.

REFERENCES

Beychock, Milton. “Fundamentals of Stack Gas Dispersion.” July 6, 2012

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Lund, John. “Design Considerations for Pools and Spas (Natatoriums).” Oregon Institute of Technology Geo-Heat Center. 2000.

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RECOMMENDATION #8
Water Conservation Committee

CUSTOMER FRIENDLY SERVICES

BACKGROUND

Water awareness and even belief in the mission of conservation do not necessarily translate to a desired behavior. The heart of conservation is action in which people can participate (AWWA, 2010). Effective conservation outreach efforts are needed to bridge the gap between the messaging campaigns to promote change, such as participation in an incentive program or complying with water use regulations. Investing time with an individual water user and providing tools to become more water efficient, or target an audience may provide the catalyst for bridging the gap. A single generalized message or method does not speak to all water users and there is potential to dilute the message so much that no one receives it.

Examples of targeted Customer Friendly Services that could be available are:

1. Access to one on one services to personally assist customers with sustainable water use. Tasks may include:
    i. Home leak detection (HICs) - Measure is further discussed as a single conservation measure.
    ii. Preparation of an individual home water budget based on lot size, house size and number of people living in the house.
    iii. Provide tips – list of low-water use landscape plants, list of WaterSense fixtures/appliances, how to remove turf, etc.
    iv. Assistance with rebate programs, filling out forms, etc.
    v. Answer specific resident conservation questions.
    vi. Outreach to high water users.
2. Automatic water turn-off. Customer may grant permission in writing to the city allowing public works staff to turn off customer water service in the event of a leak (see note below). Prior to turning off the water, the city would make an effort to

reach out to the customer by phone or in-person. If the customer cannot not be reached within a specified length of time, the city would shut the water off. This not only saves water but also would save the customer money on their water bill. This would be especially beneficial for seasonal residents.

Note: Current city ordinance allows staff to turn off water if the leak is impacting other residents or infrastructure. This customer permission would apply to situations not covered by the current ordinance.

3. Provide, either as a bill insert or separate mail/email showing customers their water use compared to others in their subdivision/building their size similar to SRP's electrical usage mail-out.

GOAL

Provide a more personalized approach to assist customers in the sustainable use of water and access to water conservation programs.

RECOMMENDATIONS

1. Develop customer tool and information concepts and new customer relationships that would promote water customers in reaching out to the city for assistance.
2. Determine what is needed for the program (funding, time demands, permissions, data collection, logistics, equipment, training and staffing needs).
3. Determine metrics and realized benefits and savings.

BENEFITS

The benefit of targeted Customer Friendly Services is to assist customers in taking an action or behavior change such as using water saving tools, participation in an incentive program or complying with water use regulations. The staff member(s) responsible for coordinating activities would focus on a customer's individual water needs and usage to determine a specific course of action that could demonstrate real water savings. Additionally, a dedicated staff member working with the public will put a face to the program and create a sense of community.

1. Working with water customers one-on-one allows the city to better partner with its customers and help tailor services for each customer.
2. By turning off water service due to a leak, saves water and a large customer water bill and allows the customer to take appropriate action.

3. Understanding how a water customer's usage compares to other similar water customers allows them to make decisions towards improvements in efficiencies and conservation.

Supports "Engaging our Residents" component of the Sense of Community Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

The city can continue with current messaging and programs aimed at general water use and conservation with no specific feedback on their success.

Some tasks could be outsourced such as HICs, water budgeting, etc.

POTENTIAL WATER SAVINGS

Water savings will depend upon specific program participation, city outreach success, and customer efforts in utilization of tools to improve their efficiencies and conserving water.

MEASURE OF SUCCESS

1. The city creates an effective messaging campaign that encourages participation.
2. High level of participation in city conservation related programs.
3. Measured water savings from tracked customers.

REFERENCES

American Water Works Association, 2010. Water Conservation Communications Guide. Accessed 1/9/18. https://www.awwa.org/Portals/0/files/resources/publicaffairs/pdfs/conservationGuideBook.pdf

RECOMMENDATION #9
Water Conservation Committee

WATER MAIN FLUSHING

BACKGROUND

The City of Goodyear has 310 miles of water mains and 2,800 fire hydrants within its Water Distribution system. Routine maintenance and attending to water quality issues require city staff to flush an average of 4.9 million gallons of water directly onto the ground each year. The American Water Works Association (AWWA) considers water main flushing on the ground a best management practice, as it improves water quality by ensuring adequate chlorine residuals, eliminates aged water, reduces disinfectant bi-products, improves water temperature, and eliminates taste and odor issues. The practice is necessary to ensure the public is receiving safe reliable water for consumption. Fire hydrants are typically used to flush water mains, as they are capable of flushing the volumes of water necessary for water quality improvement.

Currently the city is developing a system wide water main flushing program whereby water mains would be flushed systematically throughout the city. A system wide flushing program would account for as much as 28 million gallons of water lost per year during the process. This makes it very difficult for the city to take a proactive approach toward maintaining and improving water quality.

The Goodyear Fire Department also tests and exercises fire hydrants whereby water is discharged and conveyed away and is considered wasted.

Water providers throughout the country have begun using inline filtration systems to recirculate the flushed water. These inline filtration systems capture 100% of all the water ensuring that it is not wasted. Utilization of an inline filtration system assists utilities to implement best management practices for maintaining water quality within the water distribution system, and meet their water conservation goals at the same time.

GOAL

Explore new technologies that conserve and recycle water, and enhance water quality within the distribution system as part of a system-wide water-flushing program.

RECOMMENDATIONS

1. Determine what is needed (funding, contracts, etc.) for an inline mobile filtration system.
2. Determine real water savings.
3. Determine overall expenses, benefits, and return on investment.
4. Determine the non-revenue water and develop a financial system for charging entities that currently fall outside the current customer parameters when performing hydrant testing, dust control for streets, and others.

BENEFITS

Utilization of an inline filtration system would allow the city to conserve water annually based on flushing lines when customer complaints are received, and increased volumes of water when a system wide flushing program is implemented. Improvements to water quality, reduced demand on water production infrastructure, and reduced non-revenue water will be realized.

Supports "Never Stop Improving Services" component of the Fiscal & Resource Management Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

The city can continue operating and flushing its distribution system when needs arise. However, this will result in losing water and lost water revenues annually. Additionally, as the distribution system expands, the loss of water and revenues will increase with continuance of current practices.

Staff can directly flush water into the city's sewer collection system if feasible. The collected water will be recycled and recharged back into the aquifer. Although water loss is minimized, this method increases the cost per gallon as the water is treated twice with no realized revenues.

POTENTIAL WATER SAVINGS

The inline mobile filtration system captures all of the water flushed from hydrants and returns it back into the distribution system eliminating any water waste.

MEASURE OF SUCCESS

1. Implementation of a system wide water main flushing program.
2. Sufficient data to determine water savings.

REFERENCES

Friedman, Malinda et al. 2002. “Developing and Implementing a Distribution System Flushing Program”

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RECOMMENDATION #10
Water Conservation Committee

SMART CONTROLLERS PILOT PROJECT

BACKGROUND

Approximately 60% of residential water use in the Valley occurs outdoors. This equates to 4,200 gallons of water each month used by the average resident in Goodyear for maintaining outdoor landscapes. Unfortunately, much of that water is being wasted due to inefficiencies in irrigation methods and systems. Many homeowners simply do not adjust their irrigation schedules to match landscape water needs based on the season. Additionally, no matter how efficient an irrigation controller's watering schedule is, it still does not take into account changing weather conditions – specifically evapotranspiration (ET) and rainfall. ET is the amount of water lost from the soil through evaporation plus the plant's water loss, both of which are dramatically affected by weather conditions.

Smart irrigation controllers can significantly reduce overwatering by applying water only when plants need it. Homeowners can potentially save 10- 30% on their outdoor water consumption by better management. Smart irrigation controllers allow watering schedules to better match plants watering needs. Controllers tell sprinkler systems when to turn on and off by using local weather and landscape conditions to tailor watering schedules to actual conditions on the site. This method is more efficient and effective for water management than utilizing an irrigation controller with a simple clock and preset schedule.

Many arid states and Arizona Valley cities provide incentives for their customers to assist in the purchase of a smart irrigation controller. Incentives vary from city to city with some providing a free smart controller to their customers while others match 50% of the cost. On average, 11 smart controllers per year are installed each year in each of the Valley cities that provide incentives. It is recommended that the City of Goodyear purchase 100 smart irrigation controllers for an initial pilot program and evaluate their effectiveness in managing outdoor water consumption.

GOAL

Determine the average percentage of water savings realized by homes using smart irrigation controller technology within the City of Goodyear.

RECOMMENDATIONS

1. Establish a pilot program of 100 smart irrigation controllers.
2. Determine the logistics of how data is collected and analyzed with private property, permission, data acquisition issues.
3. Analyze real water savings from the pilot, and calculate future benefits if the pilot was expanded.
4. Determine return on investment if an ongoing incentive program was established in the future.

BENEFITS

Smart controller technology allows customers to set up their irrigation system for optimum performance and water savings. Smart irrigation controllers are capable of doing much more than creating start/stop times or turning your irrigation sprinkler system on or off. New controllers will actually take control and decide when it is time to water based on ET (evapotranspiration) or from data taken directly from the water holding capacity of the soils. Outdoor water consumption can be reduced by watering only when needed. Customers can realize a 10-30% reduction or potentially more of outdoor water savings each year.

Supports "Keeping Up with Technology" and "Engaging Our Residents" components of the Fiscal & Resource Management Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

Provide community workshops or classes that include smart controller technologies and benefits from their use.

Smart controllers are one type of technology that can be utilized as a tool for conservation efforts. However, their effectiveness in conserving water makes them a very viable option. Currently, customers do not have a way to monitor their outdoor consumption without manually reading the water meter each day and calculating their consumption. Manually tracking water usage does not provide immediate outdoor water use information to the customer.

POTENTIAL WATER SAVINGS

Conduct a thorough analysis of the pilot program and determine realized water savings from smart controllers.

MEASURE OF SUCCESS

1. Collect sufficient data to determine the average water savings from smart controller pilot implementation.
2. If water savings are realized, establish a plan with timeline, and implementation costs to expand the program.
3. Develop a funding strategy for citywide program implementation.
4. Develop and implement a smart controller program for all customers.

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RECOMMENDATION #11
Water Conservation Committee

HOME IRRIGATION CHECK-UPS

BACKGROUND

In 2008, Council approved a pilot program, with Grant funding from the Bureau of Reclamation to begin Home Irrigation Checkups (HIC's). An HIC can determine the required water usage for a household and compare that to the actual water usage. This information is then provided to the water customer with recommendations of how water could be saved. Home Irrigation Checkups include checking settings on irrigation system, operation of system, measuring plants to determine water budget, and suggestions of ways to reduce usage. The greatest value to customers comes in properly identifying the water needs of their outdoor landscaping water needs. HIC's were discontinued in 2014 due to funding and staffing constraints. On average, residents who participated in a HIC had a 20-30% reduction of water use.

GOAL

Determine an effective strategy to implement and expand the Home Irrigation Check-up program to the greatest number of water customers.

RECOMMENDATIONS

1. Re-establishing the Home Irrigation Check-up program with an initial focus on the highest 1% water using residential accounts and then evaluate the top 10%, 20% etc.
2. Determine needs for the program (funding, time demands, permissions, data collection, logistics, equipment, training, and staffing needs).
3. Determine the realized benefits and savings.

BENEFITS

The average residential customer in Goodyear consumes approximately 7,000 gallons of water per month. Of that total, 60% of the water consumed is for outdoor water use or 4,200 gallons per month. HIC's focus on the reduction of outdoor use and have shown to save customers 20-30% per year.

Additionally, HIC's provide an opportunity to cultivate a strong rapport with our customers. A positive experience during an HIC sets the framework for all future interactions and follow up needed. Studies have shown that continued follow up with customers is a key component for continued water savings after an HIC is completed.

Supports "Engaging our Residents" component of the Sense of Community Principle within the city's 2021 Strategic Action Plan.

OTHER OPTIONS/ALTERNATIVES

Provide specific water conservation classes by the city that focus more on educating customers on how they can perform self-audits and leak checks on their irrigation systems.

POTENTIAL WATER SAVINGS

A 20% savings for the Goodyear average water using residence equates to 10,080 gallons per household per year. Greater savings could be realized for households using more than the average 7,000 gallons per month.

MEASURE OF SUCCESS

Sustained 20% water savings for participants of a HIC.

RECOMMENDATION #12
Water Conservation Committee

WATER INTENSIVE EXCEPTIONS

BACKGROUND

The City of Goodyear has several strategic action plans that attempt to balance sustainable water use with fiscal & resource management, economic vitality, sense of community, and quality of life. As Goodyear grows, it will recruit businesses and industry that may be classified as water intensive. While striving to maximize water conservation and efficiencies, this activity cannot occur at all costs but find a balance with creating new job centers, allowing water intensive industry, or commerce to locate within the city whereby the city and its residents would benefit from an improved local economy.

GOAL

Provide exceptions to certain water intensive activities where the greatest good of the city is considered and may have value that exceeds the water resource, efficiencies, and conservation.

RECOMMENDATIONS

1. Through a city Leadership and interdepartmental process, discuss, develop, and evaluate a best management approach or policy that would provide exceptions for water intensive activities choosing to locate within the city
2. Through a city Leadership and interdepartmental process, discuss, develop, and evaluate a best management approach or policy that would provide exceptions for water intensive projects that are considered within the city.

BENEFITS

Through a well-developed and approved approach or policy, the city can ensure success for water intensive activities or projects within the city.

OTHER OPTIONS/ALTERNATIVES

Without a fully vetted approach or policy, the city could be perceived as subjective or inconsistent in its approach that could lead to inconsistencies or misperceptions of the city that may be misrepresented.

MEASURE OF SUCCESS

1. Staff prepares an opportunity for discussion with city leadership at a work session or Council retreat regarding exceptions to water intensive entities or projects located within the city.
2. The city generates a unified approach or policy that clarifies water intensive exceptions within the city.

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SCHEDULE

The WCC and staff developed a schedule based on the 12 prioritized recommendations. staff will propose each recommendation based on the proposed fiscal year schedule and determine best estimates for cost, labor, water savings, and return on investment as part of the annual budget appropriation methods.

RECOMMENATIONS	YEAR 1 FY20	YEAR 2 FY21	YEAR 3 FY22	YEAR 4 FY23	YEAR 5 FY24
LANDSCAPE DESIGN STANDARDS	X				
CONSERVATION RATE STRUCTURE	X				
CITYWIDE TREE PLAN		X			
AMI IMPLEMENTATION		X			
COMMUNITY EDUCATION		X			
LANDSCAPE INCENTIVES			X		
POOL COMMITTEE			X		
CUSTOMER FRIENDLY SERVICES			X		
WATER MAIN FLUSHING PROGRAM				X	
SMART CONTROLLERS - PILOT				X	
HOME IRRIGATION CHECK-UPS					X
WATER INTENSIVE EXCEPTIONS					X

CONCLUSIONS

The City of Goodyear Council created a WCC based on recommendations from the former Water Planning Committee recommendation plan and the need for significant water conservation and efficiencies identified within the adopted Integrated Water Master Plan. The WCC was created in February 2016 with 11 members and 2 alternates appointed in June of 2016. The Committee represents diverse and comprehensive interests within the city. The members were inclusive of other water provider areas within the city with the majority of the members within the city's water service area.

After almost 2 years and 19 meetings, the committee and staff have developed 12 recommendations that are estimated to meet or possibly exceed the proposed conservation target of the Integrated Water Master Plan of 35,052 acre-feet.

Staff will propose each recommendation, based on the schedule and priority within this plan, through the city's normal budget process with the identification to Council of each proposal as part of this adopted recommendation plan.

The WCC and staff feel that these recommendaitons will not only meet the goals of the Integrated Water Master Plan but also lead other cities in achieving the highest sustainable water use, urban heat island mitigation, and achieving many aspects of the city's strategic action plan.

There have been many studies within Arizona and other arid states that demonstrate water customers pay less for water where conservation and efficiencies are deployed within the water utility. Even though water customers may believe they are paying more for less, the city should collect temporal data and metrics and analyze how much more water customers would be paying for water if enhanced water conservation and improved efficiencies had not been deployed. There are also paradigm shifts occurring within the housing markets where new home-buyers are looking for communities and developments that are practicing sustainability with housing that is part of low impact development. Many studies suggest that properties within sustainable communities and development have increased equity as compared to similar residences within communities that are not considered sustainable.

APPENDIX

GLOSSARY OF TERMS

Acre-feet – The volume of water equivalent to one acre of land with a depth of one foot of water or = equivalent to 325,851 gallons or enough water to meet the needs of 3.8 average water using residences within the City of Goodyear.

Advanced Metering Infrastrcuture (AMI) - A utility metering system that allows the water utility and water customers to see water usage real-time.

Capital Improvement Plan (CIP) – A long-range study or plan of defined capital expenditure / projects.

CAP – Central Arizona Project – a 336-mile long man-made canal that delivers 1.5 million acre-feet per year of Colorado River water to Maricopa, Pinal, and Pima counties.

CAP GRIC Lease – Central Arizona Project – Gila River Indian Community Lease – A 100-year lease between the City of Goodyear and the Gila River Indian Community for an allocation of Colorado River water that delivered through the Central Arizona Project Canal.

CAP M&I Subcontract – Cantal Arizona Project Municipal & Industrial Subcontract - contract between the City of Goodyear and the United States for an allocation of Colorado River water that delivered through the Central Arizona Project Canal.

Fiscal Year – The annual city budget period starting July 1st and ending June 30th.

IWMP – Integrated Water Master Plan – a master plan consisting of 4 master plans that assess 1) water resources needs; 2) water system needs; 3) reclamation needs; and 4) reclaimed water supply needs.

Urban Heat Island – An increase in nighttime temperatures caused by heat being trapped within cities due to increased heat absorbing materials within the urbanization and development of lands with not enough heat reflecting mitigation.

Water Planning Areas – The City of Goodyear is divided into 5 water planning areas based on certain characteristics that allow for each area to be studied and assessed for individual solutions pertaining to each planning area.

Water Conservation Committee – A City of Goodyear Council appointed committee of 11 members and 2 alternates to help establish a water conservation recommendation plan in meeting the goals of the Integrated Water Master Plan.

Water Planning Committee – A City of Goodyear Council appointed committee of 9 members and 3 alternates to help establish a 5-year capital improvement plan and 5-year utility rate study.

ACRONYMS

ADEQ – Arizona Department of Environmental Quality

ADWR – Arizona Department of Water Resources

BAT – Best Available Technology

BWC – Bullard Water Campus

CAP – Central Arizona Project

CIP – Capital Improvement Program

DAWS – Designation of Assured Water Supply

IPR – Indirect Potable Reuse

IWMP – Integrated Water Master Plan

HOA – Homeowners Association

MGD – Million Gallons per Day

SRP – Salt River Project

WPC – Water Planning Committee

WCC – Water Conservation Committee