



8. WATER RESOURCES ELEMENT

A. INTRODUCTION

In 2005/06, Cottonwood purchased the six private water companies that serve water to the City and surrounding area. At the time, there was some criticism about this move, but from a water management perspective, it was a wise decision. Seven years later, these acquisitions and other measures have paid off. The City is pumping about 15 percent less water today than it did in 2005 and almost 20 percent less than what it was projected to pump in 2012. The City's total gallons per capita per daily (GPCD) use has been reduced by almost 30 percent. The City's continuous upgrades and maintenance of the water delivery system has reduced system losses by almost 80 percent.

While these accomplishments already benefit Cottonwood's citizens and its natural environment, the City is looking toward the future and believes it will serve the community even better by meeting all of the conservation standards it has envisioned. The City of Cottonwood has already achieved impressive results in its water conservation efforts, creating an example for other municipal water providers in Arizona. These accomplishments are the result of a water management strategy that has included a mix of acquisitions, upgrades and conservation measures. Cottonwood will continue to honor its commitment to upgrade and improve the water delivery system and will also expand its water conservation, water reuse and recharge efforts.

Like many other cities and towns throughout the arid west, Cottonwood is developing and will be implementing public outreach programs, offering financial incentives, and passing ordinances designed to encourage and even mandate the conservation and management of water. The City recently adopted a water management strategy that outlines seven key policies rooted in smart relations and values. They include protecting the Verde River, conserving groundwater, relying on accurate hydrologic data, recognizing the value of surface water rights, maintaining good relations with neighboring communities, embracing opportunities and being fiscally accountable in its water management practices. Cottonwood also completed a proposed comprehensive conservation program that consists of education and outreach programs, incentivized rebates, and new policies and ordinances. The City plans on formally adopting and implementing a comprehensive conservation program in 2014. When implemented, the conservation plan will reduce the City's already-low GPCD -- making it one of the lowest in the state.

The City has already committed to constructing and operating a state of the art reclamation plant capable of removing contaminants of emerging concern (pharmaceuticals, endocrine disruptors, etc.) and is investigating the feasibility of increasing the current reuse of reclaimed water and recharging all unused reclaimed water back to the groundwater system. The goal is to eventually reuse and/or recharge 100 percent of the reclaimed water. This effort, in conjunction with a comprehensive conservation program and the ongoing operation and maintenance efforts, will position the City of Cottonwood to be on the leading edge of water and wastewater treatment, management and conservation in Arizona.

Much of the information included in this section is derived from the Verde River Watershed Study prepared by the Arizona Department of Water Resources (ADWR), the Hydrogeology of the Upper and Middle Verde Watersheds, Central Arizona Study prepared by the U.S. Geological Survey (USGS), and the Central Yavapai Highlands Water Resource Management Study Phase I and Phase II Reports.



B. LEGISLATIVE REQUIREMENTS

Arizona Revised Statutes (ARS §9-461.05.5) specifies that a general plan must have a Water Resources Element that addresses:

- (a) The known legally and physically available surface water, groundwater and effluent supplies.
- (b) The demand for water that will result from future growth projected in the general plan, added to existing uses.
- (c) An analysis of how the demand for water that will result from future growth projected in the general plan will be served by the water supplies identified in subdivision (a) of this paragraph or a plan to obtain additional necessary water supplies.

C. KEY ISSUES

1. Regional study of water supplies.

Safe, dependable water resources are critical to the health and well-being of current and future residents as well as to the environment of the region. The City of Cottonwood is highly dependent on local groundwater sources from the Verde Formation. Extensive amounts of information from numerous studies initiated by the Arizona Department of Water Resources (ADWR) and Yavapai County Water Advisory Committee (WAC) in conjunction with the U. S. Geologic Survey and the U.S. Bureau of Reclamation, as well as from studies conducted independently by the City have been utilized for developing plans to meet the projected future water needs. Utilizing these studies in the planning process is essential for ensuring the City's water development efforts will have no impacts on the River or the ecology of the region. The City continues to work independently as well as in concert with others on hydro-geologic studies conducted within the Verde Valley to fully understand the hydro-geology of the region. The information garnered from these studies will be utilized in the development of plans that will aid in preserving the base flows of the River. Some of the more notable studies completed to date are: Verde Watershed Study, 2000, ADWR; Hydrogeology of the Upper and Middle Verde River Watersheds, Central Arizona, 2005, U.S. Geologic Survey (USGS); Arizona Water Atlas, 2010, ADWR; Water Resources Development Commission (WRDC) Final Report Volumes I & 2, 2011, and WRDC Supplemental Report, 2012; Regional Groundwater-Flow Model of the Redwall-Muav, Coconino, and Alluvial Basin Aquifers Systems of Northern and Central Arizona, SIR 2010-5180, USGS, 2010; and the Central Yavapai Highlands Water Resource Management Study, anticipated completion 2014, U.S. Bureau of Reclamation.

2. Development of additional water resources.

The City of Cottonwood's appeal for visitors and residents alike is its riparian environment, coupled with historical novelties and a modern business climate catering to practical needs and tourism. Cottonwood expects that over the next decades, it will continue to grow and thrive – but in order to accommodate this growth, the City has developed a water strategy that recognizes and deals with the challenges the City faces. The City's water management policies are rooted in "smart relations" with environmental, practical and community values. The City is currently developing a long-term water budget that will identify the current and committed water demands through build-out of currently available lands within the City and lands currently outside of the City that are anticipated to be annexed and developed in the future. In 2009 the City of Cottonwood obtained a Designation of Adequate Water Supply for 6,000 acre-feet of water annually from the Arizona Department of Water Resources. To obtain this Designation the City demonstrated it could withdraw continuously 6,000 acre-feet (more than twice the City's current water demand) of water annually for 100 years without causing the level of the groundwater to decline below a statutorily defined limit. In addition to the development of additional groundwater the City is actively pursuing the acquisition of surface water



rights to broaden and diversify its portfolio of water resource options. With reclaimed water being the only renewable source of supply that increases with population, the City is committed to reusing and recharging all reclaimed water in order to minimize the volume of groundwater that is anticipated to be needed to meet projected demands at build-out.

3. Water Quality.

The City complies with all safe drinking water standards and continues to monitor and update its treatment processes as new regulations initiated by the EPA occur. An example of this was the EPA's reduction of the acceptable limits of arsenic in drinking water from 50 micrograms per liter (50 parts per billion (ppb)) to 10 micrograms per liter (10 ppb), which went into effect in 2006. In response to this change in regulatory requirements, the City implemented an extensive and very costly arsenic treatment program. In addition to the significant costs associated with treatment there is an increased water use requirement associated with the treatment process. The volume of water associated specifically with the arsenic treatment process is approximately 23 million gallons (70 acre-feet), which is enough water to meet the needs of 600 to 1,000 people annually. The City is also actively engaged in minimizing and eliminating the run-off of contaminants, including non-point source pollutants, and is encouraging the maintenance of vegetative buffers along stream channels that may help to filter pollutants.

4. Water Conservation.

The City has achieved impressive results in its water conservation efforts, creating an example for other municipal water providers throughout the region and in Arizona. These accomplishments are the result of a water management strategy that has included a mix of acquisitions, upgrades and conservation measures. The City is pumping about 15 percent less water today than it did in 2005 and almost 20 percent less than what was projected to be needed in 2012. The City's total gallons per capita per daily (GPCD) use have been reduced by almost 30 percent. The City's continuous upgrades and maintenance of the water delivery system has reduced system losses by almost 80 percent. While these accomplishments already benefit Cottonwood's citizens and its natural environment, the City is looking toward the future and believes it will serve the community even better by meeting all of the conservation standards it has envisioned. A comprehensive conservation program that consists of education and outreach programs, incentivized rebates and new policies and ordinance has been drafted and is expected to be formally adopted by Council in 2014. Cottonwood will continue to honor its commitment to upgrade and improve the water delivery system and will also expand its water conservation, water reuse and recharge efforts. The City recently adopted a water management strategy that outlines seven key policies rooted in smart relations and values and protecting the Verde River and conserving groundwater are at the top of that list. The City has participated in the development of a conservation curriculum for Kindergartners and fourth graders and is partnering with the Natural Resource Conservation District (NRCD) to expand its conservation education program to include all grades K thru 8th.

5. Reclaimed Water.

Reclaimed water is the only increasing renewable supply of water that is currently available to the City. The City recognizes this fact and is committed to reusing and recharging all reclaimed water captured by the City. The City currently captures and treats almost 70 percent of all water delivered to homes on sewer, which is about 46% of the total water delivered to all customers. The current use of reclaimed water is limited to the common areas of a Cottonwood Ranch and the cemetery. Some recharge of reclaimed water is also occurring as a result of the discharges into Del Monte Wash. The volume of reclaimed water that is actually recharging back to the aquifer is unknown. Recently there has been a significant amount of concern expressed by individuals and groups regarding the possible negative human health effects resulting from the presence of contaminants of emerging concern (CEC), i.e. endocrine disrupters, pharmaceuticals, antibiotics, etc. Numerous studies have



been conducted by the EPA and others and thus far no negative human health effects have been identified from the reuse or recharge of A+ quality treated reclaimed water, which is what the City's current wastewater treatment plant produces. In anticipation of possible future regulation of CECs in reclaimed water by the EPA, the City has committed to constructing and operating a state of the art reclaimed water treatment facility that will have the capability to remove CECs. By taking this stand the City has positioned itself as a leader in the reclaimed water industry statewide, nationally and internationally. This position will also ensure the City's ability to fully utilize through reuse and recharge all reclaimed water produced by the City. In addition to the capture, treatment, reuse and recharge of reclaimed water, the City has adopted an ordinance requiring all new subdivisions install dual plumbing to capture and reuse gray water.

D. WATER RESOURCES

I. REGIONAL WATER USE AND DEMAND

Projected water demands in the Verde Valley sub-basin (Valley) have been developed as part of the USGS studies and the Central Yavapai Highlands Water Resource Management Study (CYHWRMS) for all water use categories including agriculture, municipal, private domestic, industrial including golf courses, and vegetation/riparian. Water use for irrigation of agriculture remains the single largest water use category at approximately 16,600 acre-feet per year followed by the water demand of the natural vegetation/riparian systems at more than 10,000 acre-feet annually. The CYHWRMS Phase I report projects the water demand for agriculture to decline in the Valley to around 11,000 acre-feet per year by 2050, as agricultural lands shift to other development uses. The recent success of the viticulture (wine) industry in the Valley and the anticipated increase in the number of irrigated acres converting to vineyards, however, may slow and or reduce the originally projected number of irrigated acres expected to shift to other development purposes. As to how much of an impact the viticulture industry will have on the total water use for irrigating agriculture in the Valley is still unknown. It should be pointed out that viticulture does employ sub-surface irrigation methods for watering the vines, which is significantly more efficient than the traditional flood irrigation methods employed in the Valley. Wherever possible the City will promote the use of reclaimed water for irrigating existing and proposed new agriculture including viticulture. An example of this commitment is the recently approved construction of a pipeline from the existing wastewater treatment plant to the newly constructed vineyards operated by Yavapai College as part of their viticulture program. This effort will allow the College to use reclaimed water rather than using potable water from the aquifer. Expansion of other types of local agriculture that rely on flood irrigation is not anticipated to occur because of the laws governing the use of surface water.

The U.S. Census completed in 2010 estimated Cottonwood's population to be slightly more than 11,000, which is about 2,000 more people than was estimated in 2000. Since 2007, with the onset of the current economic slowdown, the population of Cottonwood has remained fairly static hovering around the current population of about 11,300. In addition to the 11,300 people residing within the city limits, the City provides water service to a total population of about 23,000. Significant increases in population in the future are unlikely to occur until there is a substantial increase in the economy, but one thing is for certain, Arizona remains a popular place to live so it is only a matter of time before interest picks up again.

The CYHWRMS study projected the population of the Valley to more than double by the year 2050 (70,000 to 181,000) and predicted Cottonwood's projected water service area population to increase to more than 77,600 by the year 2050. Based on these projections, the study estimated an additional 16,000 acre-feet of water development would have to occur to meet the projected increase in total water demands for the entire Valley. This study also estimated Cottonwood's total annual municipal and industrial water demand in 2006 and 2050 to be about 3,145 acre-feet and almost 9,600 acre-feet



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respectively. Projecting water use out to 2050 with any accuracy is difficult as can be seen by Cottonwood’s historical use trend, which was increasing up until the City purchased the private water companies serving Cottonwood. In 2001, the private water companies providing water to the Cottonwood service area pumped almost 3,400 acre-feet of water, which did not include the Verde Santa Fe area. Twelve years later in 2012, and after acquiring the six private water companies that served City and surrounding area, the City pumped 2874 acre-feet to meet the water needs of its customers. This equates to a 15 percent decrease in water pumped despite an increase of nearly 4,000 people in the population served by the City and the additional 23 million gallons of water required annually to remove arsenic. The City will continue to pursue additional conservation and system efficiency measures to further reduce the projected water demands. Possible other solutions the City may employ to minimize and/or eliminate groundwater depletion include, increased groundwater recharge, enhanced storm water recharge, acquisition of surface water rights for conversion to municipal use in accordance with Arizona Water Rights law, and importation of water into the region.

Verde Valley Municipal, Domestic, and Industrial Water Demand (Ac-feet)*						
Demand Center	2006			2050		
	Population	Demand (ac-ft)	GPCD	Population	Demand (ac-ft)	GPCD
Camp Verde	12,497	2484	177	23,277	2,920	112
Clarkdale	3,999	481	107	22,460	1,887	75
Cottonwood Verde Villages	23,773	3145 2870**	108	77,630	9,565	110
Jerome	510	282	494	800	229	255
Sedona	11,080	3834	309	16,300	5,478	300
Big Park CDP	7,731	2514	290	8,810	1,954	198
Cornville CDP	4,075	959	210	7,448	1,543	185
Lake Montezuma	4,237	1383	291	8,308	1,117	120
Verde CCD	1,644	1232	669	4,377	1,152	235
Mingus Mtn CCD	510	353	618	1358	327	215
Humboldt CCD	225	53	210	600	114	170

- “Central Yavapai Highlands Water Resources Management Study - Phase I” excludes surface water agriculture demands
- ** Actual groundwater pumped by Cottonwood in 2012 for all uses
- 30% of Mingus Mountain CCD water planning area is within the Verde Valley Sub-basin
- 98% of Humboldt CCD water planning area is within the Verde Valley Sub-basin
- CDP: Census Designated Place
- CCD: County Control Division



2. HYDRO-GEOLOGIC CONDITIONS

Yavapai County is geologically complex and lies mostly within the Transition Zone geologic province situated between the Colorado Plateau to the north and the Basin and Range to the south. While rock types and water production amounts vary by location, the primary source of drinking water for Yavapai County residents is groundwater pumped from wells drilled into aquifers. The primary water providers are municipalities, private water companies, special districts and private domestic wells. The primary source of water for agriculture use is surface water diverted from rivers and streams within the Verde Valley. Average annual precipitation in the Cottonwood area is estimated at 14-16 inches annually with average annual precipitation ranging from 24 to 30 inches on the upper portions of the nearby mountain slopes.

The geology of the Verde watershed is complex, varying widely in age, lithology, and structure. Rock units within the Verde watershed are grouped by age into four broad categories from oldest to youngest: Precambrian rocks, Paleozoic rocks, Tertiary and Quaternary volcanic rocks and Tertiary and Quaternary basin fill alluvium. Precambrian age rocks occur widely in several areas of the watershed and form the basement complex, which extends to great depth. Precambrian age rocks are nearly impermeable except where fractured or faulted and are not considered to be water bearing units. Rocks of Paleozoic age generally lie just above the Precambrian rocks and consist of sandstone, limestone, and shale. Rock formations within this age category that may be water bearing include the Supai formation, Coconino sandstone, Toroweap formation, Kaibab limestone and Redwall limestone. In the Valley, tertiary and quaternary age basin fill alluvium overlies much of the Precambrian to tertiary age consolidated bedrock. Extensive deposits of basin fill alluvium occur in the Big Chino and Verde Valley. Much of the younger Quaternary stream alluvium consists of unconsolidated sand, gravel and silt deposited within present stream channels as flood plain alluvium and channel fill. The Verde Formation in the center of the Verde Valley is composed mostly of chalky lake limestone and siltstone deposits. The Verde Formation is believed to have been deposited between three and six million years ago in freshwater lakes created when volcanic flows dammed streams in the ancestral Verde Valley. The water bearing Verde Formation covers as much as 325 square miles and supplies most of the groundwater to growing communities within the Verde Valley.

The City of Cottonwood overlies a series of water yielding geolithic formations, including alluvial gravels, silts and clays from the Quaternary and Tertiary alluvium that makes up the Verde Formation. Immediately to the west and northwest of the City are series of faults that expose certain Paleozoic and Precambrian formations. To the north of the City are both Tertiary volcanic calderas (in Flagstaff) and basaltic flows (such as House Mountain, a “shield” volcano) and outcrops of Paleozoic sedimentary rocks typical of the Sedona and Jerome areas and the mountain front west of the Cottonwood area.

The most reliable and accessible groundwater resource in Yavapai County is located within the aquifers composed of younger (Cenozoic age) sedimentary and volcanic rocks, not the older granitic and metamorphic “basement” rocks. In the Verde River groundwater basin, which encompasses three sub-basins (Big Chino, Little Chino, Verde Valley), these younger materials fill the basins beneath the Big Chino, Little Chino and Verde Valleys, (modified from Blasch *et al* 2006). The water is accessible through wells drilled into the saturated zones of the differing aquifer zones.

The 2,500-square-mile Verde Valley sub-basin of the Verde River groundwater basin coincides very closely with the middle Verde River watershed. The regional aquifer in the sub-basin is composed predominantly of Paleozoic units present in the Coconino Plateau and of the basin-fill sediments, including the Verde Formation. The basin-fill sediments are the major aquifers as determined by interpretation of geophysical information (Langenheim, *et al*, 2005; Blasch, *et al*, 2006). The exact boundaries are not discernible. The saturated areas are the places (aquifers) where water is collected and stored until it is pumped, consumptively used by vegetation, or discharged to an outflow point such as a spring, creek, or River.



Estimates of groundwater in storage for the entire groundwater basin range from 13 million to 28 million acre-feet down to a depth of 1,200 feet below land surface. The USGS estimates natural and artificial recharge in the Big Chino and Verde Valley Sub-basins to be 27,720 acre-feet and 149,570 acre-feet respectively (Blasch *et al* 2006).

An important reference for the Verde Groundwater Basin is the USGS report by Blasch *et al*, 2006 (SIR 2005-5198) "Hydrogeology of the Upper and Middle Verde River Watersheds, Central Arizona." This is the conceptual model report; and it served as the basis for the development of the Northern Arizona Regional Groundwater Flow Model, which was completed by the USGS in 2012. For the Verde basin and the 50 other groundwater basins in Arizona, The Arizona Water Atlas by ADWR and the Water Resources Development Commission (WRDC) Final Report, Volumes 1 and 2, 2011 are also good sources of information related to the question of water availability.

3. LEGALLY AVAILABLE WATER

As defined in Arizona Revised Statutes (ARS), there are four categories of legally recognized water supplies available in Arizona: Colorado River water, surface water other than Colorado River water, ground water and effluent, (ARS § 45-101, ARS § 141, A). Each water supply is administered in a different manner.

a. Colorado River Water.

Arizona has a 50,000 acre-feet upper basin allocation and a 2.8 million acre-feet lower basin Colorado River allocation. All Lower Basin Colorado River allocations are administered by the Secretary of Interior. Arizona's upper basin Colorado River Allocation requires a federal contract and a State surface water right to exercise the use of that right. The 50,000 acre-feet of upper basin Colorado River water allocated to Arizona is held by the City of Page and the Salt River Project and any unused portion of that allocation is designated for use by the Navajo Nation. The 2.8 million acre-feet of lower basin water is allocated to cities, tribes, districts and farmers located along the Colorado River and in the three county areas of Maricopa, Pima and Pinal served by the Central Arizona Project (CAP). The cities, towns, tribes and districts served by the CAP are allocated 1.5 million acre-feet of the State's 2.8 million acre-feet of lower basin Colorado River allocation. The remaining 1.3 million acre-feet is allocated to the cities, towns, tribes, federal entities, and districts along the River.

b. Surface Water.

Surface water rights are administered by ADWR and are based upon the Doctrine of Prior Appropriation, which means the person who puts the water to beneficial use first has the senior right to the use of that water. Prior to June 12, 1919, a person could acquire a surface water right simply by applying the water to a beneficial use and posting a notice of the appropriation at the point of diversion. On June 12, 1919, the Arizona surface water code was enacted. Now known as the Public Water Code, this law provides that "a person must apply for and obtain a permit in order to appropriate (capture and or divert for use) surface water" (ADWR). As defined in Arizona Revised Statutes, "Surface water" means the waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent, floodwater, wastewater or surplus water, and of lakes, ponds and springs on the surface... (ARS § 45-141, A). Surface water diverted from the Verde and its tributaries is used exclusively for irrigation. Current agricultural water demand is estimated to be about 16,600 acre-feet annually (CYHWRMS).

Since 1979 the State has been attempting to resolve the status of all rights for the use of surface water in the Gila River Watershed, which includes the Salt, Verde, Gila, and San Pedro Rivers as well as the tributaries to these rivers. Because of the over allocation and complex hydro-geologic relationship that exists between surface and groundwater this is a difficult and controversial process and to date no groundwater basin has been adjudicated. The Adjudication Court over the last several years has primarily focused its efforts on determining the sub-flow issue in the San Pedro Basin, which is the delineation of



when groundwater is reclassified as appropriable groundwater or surface water. Adjudication efforts in the Verde basin are not anticipated to ramp up until the Court has rendered a final Decision and Order in the San Pedro on the sub-flow issue and several other outstanding issues such as the Cone of Depression Test and the Deminimus Standard.

c. Groundwater.

Groundwater use is regulated and administered by ADWR. Groundwater rights are only issued within Active Management Areas (AMA). As defined in Arizona Revised Statutes, "Groundwater" means water under the surface of the earth regardless of the geologic structure in which it is standing or moving. Groundwater does not include water flowing in underground streams with ascertainable beds and banks (ARS § 45-101, 5). There are five AMAs in Arizona and the Prescott AMA, which encompasses Prescott, Prescott Valley and Chino Valley is the only AMA located within Yavapai County. The rest of Yavapai County is outside of an AMA and as such no groundwater rights exist. The regulation of groundwater outside of an AMA is based upon the Doctrine of Reasonable and Beneficial Use, which means if a person owns property they have the legal right to access groundwater for reasonable and beneficial use. The only state regulations governing the development of groundwater outside of an AMA are a prohibition on the interbasin transfer of groundwater and the requirement that a well must be drilled by a licensed well driller. There is also County stipulation that prohibits the development of a well within so many feet of a septic system. In Yavapai County that distance is 100 feet.

As of December 2012, the ADWR well registry indicated a total of 9,289 wells in the Verde Valley Sub-basin. Of that total, 7,856 were identified as either domestic or exempt wells (wells pumping less than 35 gallons per minute (gpm)) and 933 wells that were identified as non-exempt (wells that pump greater than 35 gpm). The remaining 501 wells were identified as monitoring, mineral exploration or other. Municipal and domestic groundwater use in 2006 was estimated in the CYHWRMS study to be about 13,000 acre-feet annually for the Verde Valley sub-basin. The Water Resources Development Commission estimated the 2006 municipal and domestic groundwater use to be about 16,000 acre-feet annually for the entire Verde River groundwater basin, which includes the Big Chino, Little Chino and Verde Valley sub-basins.

In 2009 the City of Cottonwood obtained from ADWR a Designation of Adequate Water Supply for 6,000 acre-feet of water annually. In order to obtain this designation the City demonstrated to ADWR that 6,000 acre-feet of groundwater will be continuously available to be pumped from the aquifer for 100 years without causing the groundwater table to decline below a statutorily defined limit. As part of this process the City is required to annually report its groundwater use to ADWR in order to maintain its designation. The City has worked independently of and in cooperation with the Yavapai County Water Advisory Committee (WAC), ADWR and the USGS to complete a series of scientific studies to determine the groundwater resources within the Verde Valley and the Verde River groundwater basin.

d. Effluent.

Effluent is regulated and administered by the Arizona Department of Environmental Quality (ADEQ). Effluent is defined in Arizona Revised Statutes, as water that has been collected in a sanitary sewer for subsequent treatment in a facility that is regulated pursuant to ARS Title 49, Chapter 2. Such water remains effluent until it acquires the characteristics of groundwater or surface water" (ARS § 45-101, 4). A city that produces and maintains control of the effluent is free to use it without regard to the laws governing surface water and groundwater. Effluent, better known as reclaimed water, is considered to be the only renewable supply that increases in volume with increasing population. The City of Cottonwood currently provides reclaimed water for irrigation, construction, dust control and other uses.



City of Cottonwood Reclaim Wastewater Treatment Facility: Construction of a new reclaimed water treatment plant is scheduled to begin in 2014 at the Riverfront Park complex. This new plant will significantly improve the quality of reclaimed water available for reuse. Recharge from septic systems in the Valley was estimated to be 2,120 acre-feet in 1996 (Verde Watershed Study, 2000). The exact amount of recharge that is occurring from septic systems is unknown. The existing wastewater treatment plant currently captures about 1,100 acre-feet of effluent annually and discharges more than 600 acre-feet to Del Monte Wash. How much of that discharge is recharged and how much evaporates is unknown. The current wastewater treatment plant has the capacity to capture and treat about 1,680 acre feet of effluent annually. Construction of the new plant will increase the City's capacity to treat more than 2000 acre-feet annually. The City is committed to reusing and/or recharging 100 percent of its reclaimed water.

4. WATER QUALITY

Water Quality is a term used to describe the chemical, physical, and biological characteristics of water, usually in relation to its suitability for a particular purpose, such as drinking water or wildlife use. The City currently meets or exceeds all safe drinking water standards set by the EPA and regulated by ADEQ.

a. Non-point Source Pollution (NPS).

Non-point source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution may be caused by inadvertent discharges of water from homes or business, rainfall, or snowmelt that results in runoff flowing over and through the ground. As the runoff moves, it picks up and transports naturally occurring and human-made pollutants, finally discharging them into lakes, rivers, wetlands, and coastal waters. Rainfall or snowmelt that percolates into the ground may also transport naturally occurring and human made pollutants, which can impact the quality of the groundwater used for drinking. These pollutants may include:

- Chemical and animal based fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic pollutants from urban runoff and energy production;
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Harmful bacteria and other pathogens from animals, livestock, and pet wastes and faulty septic systems;

b. Total Maximum Daily Load (TMDL).

The Total Maximum Daily Load (TMDL) program, established under 303(d) of the Clean Water Act, focuses on identifying and restoring polluted rivers, streams, lakes and other surface water bodies. TMDLs involve collecting data in lakes, rivers and streams to determine total point and non-point source pollution loads and using the data to set maximum allowable loads from each of these sources. Loads are the quantity of pollution contributed to a stream by a single source, (i.e., a wastewater treatment plant) or by a group of sources (i.e., developments, agriculture fields, etc.). Point sources of pollution typically involve direct discharge into streams, such as from a wastewater treatment plant. Non-point sources, such as farms, lawns, or construction sites contribute pollution primarily through run-off.

TMDLs are generally developed one pollutant at a time for each particular water body and the limitation is defined by the intended use and purpose of the water body. For example, a TMDL may be developed for nitrogen in a particular stream segment that may vary from a different segment based on numerous factors. For many water bodies, multiple TMDLs for different pollutants are developed. Because it is difficult to identify specific non-point sources, TMDLs focus on estimating the aggregate contribution for all non-point sources along a body of water. The regulation of TMDLs falls to the states, territories and tribes. In Arizona the responsibility to regulate falls to ADEQ.



c. Best Management Practices (BMPs).

Best management practice (BMPs) in addressing water quality and non-point source pollution are effective, practical, structural or non-structural methods which prevent or reduce the movement of sediment, nutrients, pesticides, and other pollutants from the land to surface or groundwater. A thorough understanding of the BMPs and the flexibility in their application are of vital importance in selecting BMPs which offer site specific control of potential non-point source pollution. With each situation encountered at various sites, there may be more than one correct BMP for reducing or controlling potential non-point source pollutions. Care must also be taken to select BMPs that are practical and economical for maintaining water quality without impacting the quality of the environment.

d. Water Quality Management (WQM).

The purpose of water quality management is to achieve sustainable use of our water resources by protecting and enhancing their quality while maintaining economic and social development. Water quality management involves the identification and assessment of point and non-point source pollutants and their sources, and then determining the best management practices to control those pollutants to meet water quality standards.

5. REGIONAL WATER MANAGEMENT ACTIVITIES THE CITY IS A MEMBER OF OR HAS BEEN ENGAGED IN

The Verde River basin covers approximately 5,500 square miles of Central Arizona and covers parts of Yavapai, Coconino and Gila counties. It extends from the Coconino Plateau in the north to the USGS gauging station on the Verde River below Tangle Creek in the south, and from the Juniper and Santa Maria Mountains in the west to the Mogollon Rim in the east. The Verde River is a tributary of the Salt River; a tributary to the Gila River, which is a tributary of the Colorado River.

There are numerous federal, state, local and private organizations and agencies that are involved with water management, planning and advocacy. The City of Cottonwood has been actively involved over the years with a number of State and regional water groups, including the Yavapai County Water Advisory Committee (WAC), Northern Arizona Municipal Water Users Association (NAMWUA), Water Resources Development Commission (WRDC), and the Statewide Water Advisory Group (SWAG). Currently the City is an active member of WAC and NAMWUA.

Yavapai County Water Advisory Committee (WAC)

<http://www.yavapai.us/boards-and-commissions/yavapai-county-water-advisory-committee/>

In 1999, the Yavapai County Board of Supervisors in conjunction with eight cities and towns, two Tribes and ADWR created the Yavapai County WAC in recognition of the lack of and need for regional water planning. The role of the WAC, as envisioned, was to function as a County-wide committee reporting to the Board of Supervisors with the mission of developing and recommending by consensus a total water management strategy for preserving sustainable water resources for future generations while enhancing the economic viability of the County.

The WAC's key objectives are:

1. Identify and promote Yavapai County regional water management and conservation strategies that ensure sustainable use of water supplies, enhance economic vitality, and protect the base flows of the County's rivers and streams.
2. Maintain strong communication links among federal, tribal, state, county, local government, individual citizens and all other stakeholders.



3. Promote education regarding water resource knowledge and promote informed use of water resource studies and planning tools.
4. Monitor and analyze enabling legislation that will provide a local basis for management of water resources (Yavapai County, 2011) In its research and communications with all stakeholders, the WAC shares information and resources with many government agencies and committees, boards and citizen groups, most of which are delineated in a list in the appendix.

Northern Arizona Municipal Water Users Association (NAMWUA)

<http://www.namwua.org/>

Created in 2002, NAMWUA represents nine northern Arizona municipalities that cooperate as a collective voice for water policy and the development of sustainable regional water supplies. In 2010, NAMWUA played an integral role in getting legislation passed that created the State's Water Resources Development Commission, which was tasked with conducting a statewide assessment of current and future water supplies and demands, and with identifying solutions to ensure a sustainable supply of water is available to meet the projected demands of the State through 2110. NAMWUA continues to play an active role in this and other statewide water policy and legislative efforts. The final report from the WRDC to the legislature was completed in September 30, 2012. The final report included two recommendations: 1) Draft legislation that would allow for the creation of regional water augmentation authorities, and 2) establish a source of funding for the water supply development revolving fund, which was established to assist cities, towns, water districts and others with funding necessary infrastructure to meet their projected needs; but has yet to be funded. HB2338 was drafted and introduced in 2013 to address both recommendations, but failed to make it through the legislative process.



E. WATER CONSERVATION

Water conservation typically takes place only under moral suasion, incentivized reward, or direct regulation. For purposes of this Plan, conservation programs are classified into three categories: education and outreach, incentivized, and mandatory. Education and outreach programs play on the moral suasion of the consumer by providing purpose, perspective, and positive reminders of the importance of conserving water. Incentivized programs typically offer financial rewards to customers that implement City approved conservation practices. Mandatory conservation programs are generally the last conservation programs to be initiated and are accomplished through the adoption and implementation of policies and ordinances.

A comprehensive and effective water conservation program should include all three categories of water conservation and should be directed at all types of water use, including municipal/residential, commercial, industrial, and agriculture. One component of water conservation that tends to be forgotten in the decision making process of selecting which programs to pursue is the cost of implementation and the quantification of water conserved. Conducting these two evaluations of each conservation program provides a cost benefit analysis, which aids in the decision making process of selecting which programs to implement. The City has developed a draft comprehensive water conservation plan that includes programs from all three categories and is directed at all water use customers supplied water by the City. The City is expected to formally adopt the plan in 2014. A key component of the program will be the continual monitoring and evaluation to determine the effectiveness of each component of the program.

I. EDUCATION AND OUTREACH

Education and outreach conservation programs are generally considered voluntary in that any conservation of water that may occur is the direct result of voluntary actions taken by the consumers. This typically consists of educational programs targeted for grade schools, conservation signage, and the distribution and availability of conservation related information designed to educate, remind, and encourage citizens to conserve water. Although it is voluntary for the end user to take the initiative to conserve water, it may require passage of resolutions or ordinances by Council to mandate specific commercial enterprises post proper signage or make available conservation related information. Current education and outreach programs recommended in the City's proposed draft comprehensive water conservation program are as follows:

- The conservation tips and suggestion cards recently completed are recommended to be continued being made available at City offices with plans to expand the availability to other locations such as the library and recreation center. Other locations that may be considered for future distribution are nurseries.
- A water conservation webpage is recommended to be developed that provides conservation tips and reminders, current level of water conservation strategy and its associated conservation requirements, and links to information about water conservation and water resources.
- Sponsorship of a leadership training academy is recommended to be held annually for public and potentially interested political candidates to learn about water resources, water systems and conservation programs, as well as the different functions of the City departments, land use plans, etc.
- City staff is recommended to work in concert with the Cooperative Extension to offer conservation home and business audits.
- City staff is recommended to work with the Natural Resource Conservation District to expand and develop the current public schools water curriculum to include K thru 8th grade.
- City staff is recommended to initiate a contest within the local high school and perhaps even the middle school to produce a conservation video that will be judged by local citizens at an evening at the movies in the park or other venues.
- City staff is recommended to initiate a water conservation poster contest for 4th graders.



The City currently provides literature covering 10 areas of conservation topics including landscaping, irrigation efficiency, invasive species, indoor appliances, low-water use plant varieties, etc. The City supports the Project WET program and as mentioned above is proposing to expand this program to include a K thru 8th grade water curriculum in cooperation with the NRCDC. The City participates in the development and teaching of a water literacy program for kindergartners. The City is a co-sponsor of and supports an annual water festival. City Staff also teaches a water sustainability class each semester at northern Arizona University. The City will continue to evaluate the potential for implementing additional educational information outreach programs as they are identified. Education and outreach programs will be an integral part of the overall comprehensive water conservation program the City adopts and implements.

2. INCENTIVIZED CONSERVATION

The use of incentives in water conservation in the form of rebates or price breaks has been shown to be quite successful, if the measure of success is simply based on the number of people who take advantage of the program. If the measure of success is determined exclusively by the amount of water conserved, many if not most incentivized water conservation programs would be considered somewhat of a failure. In terms of the actual volume of water saved, most incentivized conservation programs result in very small volumes of water savings. Some would argue, however, that the actual water conserved, albeit important, is only one piece of the bigger picture. The bigger picture in this case is the heightened awareness of the consumer, which ultimately results in the development of a culture of conservation. The acceptability of these types of programs tends to be fairly high, but even these types of programs are not without issue. Incentivized conservation programs recommended for inclusion in the City's proposed draft comprehensive water conservation program are as follows:

Conservation Pricing.

- Water rates can be more than a means of meeting utility revenue requirements. Water rates can be used to communicate to water users the private and social costs of water development. Water users can then base their consumption decisions on a more accurate accounting of the benefits and costs of using more or less water. If done and presented correctly, conservation pricing of water can be a powerful means of signaling the importance and scarcity of the resource to water users, most of whom experience very little connection between their water usage and their total bill. At a time when water demands are increasing while water supplies are remaining constant, conservation pricing is an effective way to communicate the true value of water. The most successful pricing programs are those that include an inverted rate block or tiered rate structure. These types of programs have a pricing escalator included in the structure, such that the more water the consumer uses the more the water costs per gallon. The City of Cottonwood currently has a four block tiered rate structure.

Installation of Waterless Urinals (commercial)

- Waterless urinals installed in public restrooms have been estimated to conserve as much as 25,000 gallons per toilet annually. The actual savings are dependent upon the number of uses of the urinal. Problems associated with waterless urinals have been mostly associated with sediment buildup in the traps and pipes and odor problems if not properly maintained. Generally maintenance includes regular flushes of water to minimize and or eliminate sediment buildup and proper refilling of liquid sealants to prevent the escaping of sewer gas. The recommended program for implementing this conservation effort includes a rebate that will cover the cost of purchase and installation of the waterless units. For newly proposed commercial construction projects it is recommended the City consider adopting an ordinance that will require the installation of waterless urinals in all newly proposed commercial facilities with public restrooms.



Replacement of Low Efficiency Toilets with High Efficiency Toilets (residential) ≤ 1.6 gpf

- Toilets have been shown to be the number one user of water in all residences accounting for as much as 26 percent of the total indoor water use. Homes with toilets manufactured before 1994 used more than 3.5 gallons per flush (gpf). Toilets manufactured after 1994 were required to use no more than 1.6 gpf. Currently there are toilets that now use a maximum of 0.8 gpf, which is 50 percent less than the current national plumbing standard. Replacing one 3.5 gpf toilet with a 1.6 gpf toilet or a 0.8 gpf toilet in a household of 2.3 people per household could respectively conserve more than 6,000 to 9,000 gallons of water per year. Replacing 200 toilets that flush at more than 3.5 gpf in the average household with a 1.6 or 0.8 gpf toilet could potentially conserve between 1.3 and 1.8 million gallons of water or 3.9 to 5.5 acre-feet of water per year. It is recommended that the City implement this program and provide a rebate that will cover the cost of the toilet and either all or a portion of the installation costs.

Landscape irrigation audits (commercial)

- It is recommended the City work with the NRCD and/or Cooperative Extension to provide as a service to commercial customers landscape irrigation audits. The objective would be to provide the necessary information to the end-use customer to improve the efficiency of their irrigation systems and potentially reduce their monthly costs for water while reducing their overall water use.

Rainwater cisterns.

- It is recommended rainwater cisterns of a certain size be promoted and a possible rebate offered for residences and commercial facilities that install a rainwater cistern for the purpose of irrigating existing landscaping in place of using potable water.

Landscape conversion to automatic drip systems and incorporation of rainwater sensors.

- It is recommended that this program be included and promoted as part of the landscape irrigation audits. For large turf facilities the City would provide a rebate as an incentive to convert to drip or to install rainwater sensors into an existing sprinkler irrigation system.

Installation of low water use spray rinse nozzles in commercial restaurants.

- The City already participates in this program and is recommended to continue offering low water use spray rinse nozzles in commercial restaurants.
- Replacement of low efficiency showerheads with high efficiency shower heads

Hot water recirculation systems.

- It is recommended the City through ordinance require all newly constructed homes include a hot water recirculation system. The objective of these systems is to supply hot water on demand. Actual volumes of water flowing down the drain while waiting for hot water to flow from a tap are unknown, but estimates range from 2,000 to more than 10,000 gallons per residence per year.

As stated previously, the City adopted the rinse smart program whereby low-flow power rinse nozzles for commercial restaurants are made available at no cost. The City's current tiered pricing structured is considered to be a fairly aggressive conservation pricing program and in comparison to other cities in Arizona is considered one of the better conservation pricing programs. The City is currently conducting a thorough review of incentivized water conservation programs with the intent of incorporating them into a comprehensive water conservation program. Initial efforts will focus on rebate programs for replacement of low efficiency toilets in public restrooms with waterless urinals and replacement of low efficiency toilets in residences with high efficiency toilets. Implementation of additional incentivized rebate programs will be based upon the availability of funds.



3. MANDATORY CONSERVATION

Historically, water conservation ordinances mandating immediate actions by end-use customers have only been initiated when the situation warranted the immediate conservation of water in order to ensure delivery of water to all customers, or to ensure compliance with State mandated regulatory requirements. In recent years, there has been an increase in the adoption of water conservation ordinances by some cities without some impending emergency or looming regulatory requirement requiring the passage of an ordinance. Most water conservation ordinances that are adopted focus primarily on new developments, but there have been exceptions where the adopted ordinances apply to existing water users. For water conservation ordinances that apply to existing customers, cities generally offer an incentive to offset or lessen any upfront out of pocket expenses that may be associated with the ordinance. An example of this is the ordinance passed by the Town of Payson requiring the replacement of all urinals in public restrooms with waterless urinals. To offset the cost to the business owner, the Town provided a rebate that covered the entire cost of the acquiring and installing a new waterless urinal.

Many customers of cities and towns feel it is unfair to shoulder the costs associated with developing new water resources that will be needed to meet the demands of future customers. Based on this premise, many cities and towns adopt ordinances that specifically require “new” developments to comply with fairly restrictive conservation measures in order to be approved and to minimize the potential impacts to existing customers. Examples of these types of ordinances include no evaporative cooling, limited or no turf landscaping, re-circulating hot water systems, no swimming pools, gray water reuse systems (purple pipe), no RO or salt-based water softening systems, etc. Requiring these types of programs for all new developments is much more easily accomplished and less expensive to implement than requiring existing customers to retrofit existing homes and business. Mandating certain conservation measures to existing customers will generally require offering a rebate or some other means of incentive in order to gain acceptance.

It is recommended the City adopt the Demand Reduction Strategy I level of conservation year round. Other water conservation ordinance recommended for inclusion in the City’s proposed draft comprehensive water conservation program are as follows:

Indoor Residential Water Conservation

- Mandatory restriction on the installation of evaporative coolers in new homes.
- Mandatory restrictions on the installation of RO and salt-based water softening units.

Indoor Commercial/Industrial Water Conservation

- Mandatory requirement for all existing public restrooms to retrofit with waterless urinals.
- Mandatory required use of waterless urinals for all new public, commercial, multi-family-residential common-use buildings, and in all commercial and industrial restroom remodels.
- Mandatory requirement to use self-closing faucets in all new commercial restrooms.
- Mandatory installation of high efficiency washers in new multi-family and commercial laundry.
- No new reverse osmosis water vending machines.
- Mandatory restriction on the installation of evaporative coolers in new commercial and industrial buildings.

Outdoor Residential Water Conservation

- Limited or no turf allowed for new homes.
- No expansion of existing turf areas.
- Mandatory use of reclaimed water on all existing turf areas greater than 5 acres if available.
- No watering of native plants.
- Hosing of sidewalks and driveways prohibited.



Commercial/Industrial Water Conservation

- Hosing of sidewalks, parking lots and driveways prohibited.
- No installation of evaporative coolers in commercial buildings.
- Mandatory requirement to install recirculating systems for all new evaporative cooling systems, decorative water fountains, car washes and commercial and industrial clothes washers.
- No spas in motel rooms.
- No new swimming pools.
- Mandatory low water use spray rinsers in commercial restaurants.
- No new golf courses or at a minimum mandatory use of reclaimed water for all new golf courses.
- No spray type decorative fountains.
- No treated, metered, potable water from the municipal water supply system may be used for the purpose of filling or refilling artificial lakes.
- Zoning restrictions related to water use.

The City is currently conducting a thorough review of mandatory conservation programs with the intent of including them as part of the overall comprehensive conservation program. The Drought and Water Shortage Preparedness Plan already adopted by council and listed below presents the Demand Reduction Strategies. As stated previously it is recommended the stipulations listed in Demand Reduction Strategy I be included as part of the proposed draft comprehensive water conservation program and enforced year round rather than just for the months of May through September as is currently required.



PLANNED AREA DEVELOPMENT (PAD) ZONING – WATER CONSERVATION

The City of Cottonwood Zoning Ordinance includes procedures and standards for proposed master planned communities. Applicants have the option to request Planned Area Development (PAD) Zoning, since this approach can provide greater flexibility with property development standards in return for providing a project that exceeds various public policy objectives. Meeting the highest standards for water conservation with drought tolerant landscaping, appropriate site design, conservation plumbing and effective water use methods is part of the expectations for consideration of PAD zoning.

Cottonwood Zoning Ordinance, Section 407 (Landscaping Requirements) includes requirements for drought-tolerant landscaping. This applies to new commercial development, multi-unit residential and master planned communities. Existing individual residential uses that are not part of a planned development are exempt from the landscaping code but are encouraged to voluntarily use low water use landscaping. The Landscaping ordinance encourages the use of xeriscape landscaping techniques, rainwater harvesting, and grey water reuse. Additionally, a recommended plant list describes native and appropriate non-native plants for the Cottonwood area. This list is further broken out to recognize appropriate riparian (river) area plants for sites near the Verde River or its major washes, in addition to the dry upland chaparral plants.

Cottonwood Zoning Ordinance, Section 424 (Planned Area Development Zone) includes requirements and options for water conservation features to be submitted with the Master Development Plan for a Planned Area Development (PAD) zoning application. The intent of this ordinance is to encourage comprehensive, neighborhood-scale solutions to address water conservation in new master planned communities.

PAD Master Development Plan - Water Conservation Program: Dual drainage systems to accommodate gray water use are required for certain types of residential development, as per the City of Cottonwood Plumbing Code, as amended. A Planned Area Development (PAD) may propose alternative water conservation systems, other than dual type plumbing systems, as part of its Master Development Plan. The City Council may waive the dual type plumbing system requirement as part of its approval of the PAD and/or development agreement upon finding that the project will incorporate superior water conservation, re-use and/or recharge features, such as a reclaimed water system serving the PAD.

Among the factors the City Council will evaluate in considering PAD Zoning requests include:

- The greater efficiency of a master planned community-wide application of water conservation, re-use and recharge features, demonstrating responsible use of reclaimed water as provided for in the approved Master Development Plan.
- That all City Council requirements be formalized in the Master Development Plan required for PAD approval, through the ordinance approval of the zoning amendment, and through any Development Agreement that may be included.
- The installation of any re-use system or reclaimed water system is approved by and installed to all Federal, State, County and Municipal standards as they apply.



F. 100 YEAR ADEQUATE WATER SUPPLY

In 1973, in an attempt to ensure that buyers of real estate in Arizona were informed about the availability of water for all new subdivisions, the legislature passed what is known as the Adequate Water Supply Program. The intent of the Adequate Water Supply Program was to be a consumer advisory program to ensure that potential real estate buyers were informed about the availability of water supplies for all new subdivisions.

The provisions of Adequate Water Supply Program, described in A.R.S. § 45-108, require a developer of a subdivision outside of an Active Management Area to obtain a determination from ADWR of whether or not there is an adequate supply of water of sufficient quantity and quality to meet the projected needs of a proposed subdivision for 100 years prior to marketing or selling lots. In cases where a determination of inadequate water supply is made by ADWR, the developer is required to disclose the determination of inadequacy to the first buyer of each lot of a newly developed subdivision. For proposed subdivisions outside of AMAs, a water adequacy determination is required before a subdivision plat can be approved by a city or county and before the Department of Real Estate can authorize the sale of lots.

A city can also apply to ADWR to become designated as having an Adequate Water Supply for its entire service area. When a city becomes a Designated Adequate Water provider, a developer can develop a subdivision within the city's service area without obtaining a determination water adequacy so long as the city provides a written commitment of service to the developer, and as long as the projected demand of the subdivision doesn't exceed the volume of water the city is designated for.

Recognizing the importance of a sustainable supply of water, the City of Cottonwood in 2009 obtained from the Arizona Department of Water Resources (ADWR) a Designation of Adequate Water Supply for 6,000 acre-feet of water annually, which is more than twice the volume of groundwater pumped in 2013. In order to obtain this designation the City demonstrated to ADWR that 6,000 acre-feet of groundwater will be continuously available to be pumped from the aquifer for 100 years without causing the groundwater table to decline below a statutorily defined limit. By becoming a Designated Adequate Water Provider, all proposed subdivisions within the City's service area are assured of having a sustainable supply of water to meet their needs. Developers will also not be required to submit the costly hydrologic study that would be required to demonstrate an adequate water supply.

With water considered to be one the most precious natural resources on Earth, having an adequate water supply is an essential element in human survival, ecosystem health, energy and food production, and economic sustainability. With a growing population, increasing demands and changing climate cycles it is necessary to ensure the ongoing availability of water supplies. As a result of these concerns, the City of Cottonwood continues to be actively engaged in developing plans and setting goals that will ensure the sustainability of water resources.



G. DROUGHT AND WATER SHORTAGE PREPAREDNESS PLAN

Chapter 13.16 of the Cottonwood Municipal Code was amended in November 2006 to add the City of Cottonwood Drought and Water Shortage Preparedness Plan (DWSPP). In adherence to the Arizona Drought Preparedness Plan issued by the Governor of Arizona, the City of Cottonwood developed its Drought and Water Shortage Preparedness Plan (DWSPP).

The City of Cottonwood recognizes the necessity for protection of its water supply by monitoring water use to existing, pending, and future development within its water service areas in order to ensure the continuing economic development and stability of the City, and to promote the health safety and welfare of all citizens, visitors and users of the Cottonwood Municipal Water Utility. The DWSPP addresses various options and drought mitigation strategies in the event there is a serious level of drought or other water shortages to the Cottonwood Municipal Water Utility Users.

PURPOSE AND INTENT

The purpose of the DWSPP is to provide strategies and procedures for periods of time when the City's normal and customary water supplies may not be able to meet the City's needs due to below normal rainfall or other issues that have affected the municipality's water supply. A DWSPP plan is also a resource that can be used should a drought last for several years.

The intent of the plan is to provide ways for the City, businesses, and residents to aid in water demand reduction when a water supply insufficiency occurs, and to provide a framework for operations of the Cottonwood Municipal Water Utility during times of drought and water shortage.

DEMAND REDUCTION STRATEGIES

1. The Demand Reduction Strategies outlined in this plan incorporate a variety of measures to reduce the use of potable water in response to water drought or supply insufficiency conditions. Demand reduction includes measures that would restrict water further than a normal conservation minded desert lifestyle.
2. Compliance with demand reduction strategies is **mandatory**, for all cottonwood municipal water utility users, and any violation of the demand reduction strategies may result in surcharges being added to a city of cottonwood municipal water facility user's utility bill, as further provided in § 13.16.050 of this DWSPP.
3. Water demand reduction during a drought may incorporate both voluntary and mandatory measures. Many of the organizational demand reduction strategies to a drought condition, including conservation measures, are appropriate for responding to a short-duration supply insufficiency. Generally, responses to a systemic failure will be more rapid and may omit intermediate steps normally associated with an incremental drought response plan.
4. It is evident that drought is not a constant or totally predictable condition in occurrence or duration. Rather, there are levels of drought and levels of drought impact, and therefore, levels of demand reduction strategies. The **three levels** of Demand Reduction Strategies included in the plan are as follows:



DEMAND REDUCTION STRATEGY I “WATER ALERT”

Goal: The goal of Strategy I is to reduce water demand to a level where safe production capability exceeds water demand. Demand Reduction Strategy I is designed to work in concert with Resource Status Level I. The following measures are mandatory:

- a. Water shall be conserved both inside and outside the home using best practices available to minimize waste.
- b. Landscaping for residential uses shall be accomplished with plant materials that require little or no supplemental irrigation water.
- c. Outdoor water usage shall not occur between the hours of 9:00am – 5:00pm. Watering days shall be coordinated with your address. Even numbered addresses may irrigate on Wednesday, Friday and Sunday. Odd numbered addresses may irrigate on Tuesday, Thursday and Saturday. For places where there is no discernible address, the even date schedule should be followed (right-of-ways, medians, etc.). No irrigation shall be allowed on Monday.
- d. Automobile washing shall only be undertaken with a bucket and hose with shut off nozzle, other water saving devices such as a pressure washer, or at carwashes that recycle or re-circulate water.
- e. No person shall waste water (see definitions section under “wasting water”).
- f. Cooling of outdoor areas with water or misting devices is prohibited.
- g. Restaurants shall serve water to customers upon request only, and shall display table tents or other types of public notice to this affect.
- h. Hotels shall wash a customer’s linens if a stay is in excess of one night on request only, and the hotel shall display notice to this affect.
- i. Construction projects are required to use reclaimed water or effluent for construction and dust control purposes.
- j. Requests for Commercial Provisions must be made to the Cottonwood Utilities Director.

DEMAND REDUCTION STRATEGY II “WATER EMERGENCY”

Goal: The goal of Strategy II is to reduce water demand to a level where safe production capability exceeds water demand for ten (10) consecutive days. **Demand Reduction Strategy II includes all Demand Reduction Strategy I requirements (§13.16.030(A)(5), with the following additional, mandatory measures:**

- a. Sidewalks, driveways, parking areas, tennis courts, patios, or other similar paved surfaces shall not be washed down with water.
- b. Water shall not be added to fountains, water features, recreational swimming pools, spas, or wading pools holding more than one hundred (100) gallons of water.
- c. No new landscaping for commercial projects shall be installed.
- d. Landscaping not installed, which was required by the City of Cottonwood to meet the Landscaping Requirements of the Cottonwood City Code or Zoning Code, will not delay a Certificate of Occupancy to be issued, providing its installation is delayed as a result of a suspension of new landscaping permits and a surety is provided that is acceptable to the Community Development Department.



DEMAND REDUCTION STRATEGY III “WATER CRISIS”

Goal: The goal of Strategy III is to reduce water demand to a level deemed necessary to recover from the loss of supply due to a temporary or permanent failure of any major supply or distribution facility in the water distribution system or to increase water in storage a point where fire protection for the City is not impaired.

Demand Reduction Strategy III includes all Demand Reduction Strategy II requirements (§13.16.030(A)(6), with the following additional, mandatory measures:

- a. No potable water shall be used for outdoor purposes.
- b. No potable water may be used in violation of any other restriction deemed necessary by the Cottonwood City Council for the purpose of protecting the welfare of the citizens of Cottonwood.
- c. Water system connection permits shall not be issued and permitted new connections shall not be activated.
- d. No new Commercial Provisions shall be allowed unless approved by the Cottonwood City Council.

Water is our most precious natural resource and is increasingly stressed by the demands our society places on this resource. Adequate water supplies are an essential element in human survival, ecosystem health, energy production, and economic sustainability. Changes in climate patterns have historically played a significant role in the availability of water supplies. Although it is not fully known what changes to the climate will occur most scientists forecast a change in the near term that will be warmer and dryer. Whether this is a temporary cyclical change or a new norm is uncertain, but either way it has the potential for impacting historically available water supplies. As a result of these potential impacts, the City continues to be actively engaged in developing plans and setting goals that will ensure the sustainability of the resource, while meeting the water needs of its customers and preserving the environment. The City is fully committed to taking the necessary steps to ensure it has secured a sustainable water supply for its customers and in 2009 applied for and received a determination of a 100 year adequate water supply from the Arizona Department of Water Resources.

REFERENCES

- *Reconnaissance Watershed Analysis on the Upper and Middle Verde Watershed*, Loyd O. Barnett and Richard H. Hawkins, School of Renewable Natural Resources University of Arizona, Tucson, Arizona; funded by Arizona Rural Watershed Initiative and administered by Arizona Department of Water Resources. June 2002.
- *Arizona Water Atlas Volume 5: Central Highlands Planning Area*, Section 5.5 Verde River Basin. Arizona Department of Water Resources. June 2007.
- *Hydrogeology of the Upper and Middle Verde River Watersheds, Central Arizona*. USGS report by Blasch et al, 2006.
- *Central Yavapai Highlands Water Resources Management Study, Phase I and II Reports*, Bureau of Reclamation, Yavapai County Technical Work Group, 2011.
- *Water Resources Development Commission Final Report, Volumes I and II*. October 1, 2011



H. GOALS AND OBJECTIVES – Water Resources

GOAL 8-1 MAINTAIN AND IMPROVE WATER SUPPLY FOR USERS OF THE COTTONWOOD WATER SYSTEM TO MEET EXISTING AND LONG TERM NEEDS.

- Objective 8-1. A** Support regional and statewide efforts related to the planning, management, development and conservation of water resources within the Verde Valley.
- Objective 8-1. B** Develop an integrated water resource management plan that provides guidance for long-term planning, quantifies the needs for water resources, and determines the necessary water, wastewater and reclaimed water infrastructure needed over time.
- Objective 8-1. C** Support legislation that protects local riparian habitats and water supplies.
- Objective 8-1. D** Pursue the recharge and reuse of all reclaimed water.
- Objective 8-1. E** Actively pursue the acquisition of surface water rights from all available sources.
- Objective 8-1. F** Regularly update and maintain the distribution system to optimize efficiencies and provide a reliable supply for all uses including fire flows.

GOAL 8-2 MAINTAIN AND IMPROVE WATER QUALITY.

- Objective 8-2. A** Support monitoring of water quality data by federal, state and local agencies.
- Objective 8-2. B** Support additional water quality base line studies.
- Objective 8-2. C** Develop standards that prohibit any development that may adversely affect surface and groundwater quality.
- Objective 8-2. D** Identify potential sources of surface and ground water pollution and develop methods to prevent and/or mitigate impacts that may occur.
- Objective 8-2. E** Maintain buffers of natural vegetation along washes and rivers to restrict and/or minimize impacts from non-point source pollution.

GOAL 8-3 PROTECT THE VERDE RIVER BASEFLOW AND MAINTAIN RIPARIAN HABITATS ALONG THE RIVER CORRIDOR AND TRIBUTARIES.

- Objective 8-3. A** Monitor and support measures that maintain historical base flow levels in the river system.
- Objective 8-3. B** Designate protective corridors and buffers for the river and major tributaries as part of land use planning and design review.
- Objective 8-3. C** Support educational programs that inform people of all ages of the importance and role the river plays in supporting the riparian habitat, wildlife and the culture of the region.



GOAL 8-4 PROMOTE WATER CONSERVATION, RECLAIMED WATER, RECHARGE AND REUSE.

- Objective 8-4. A** Construct a state-of-the-art reclaimed water treatment plant and expand the distribution system where feasible to make reclaimed water available for use throughout the city system.
- Objective 8-4. B** Develop and adopt a comprehensive water conservation program.
- Objective 8-4. C** Strategically develop and locate recharge projects that will offset groundwater pumping and recharge all unused reclaimed water.
- Objective 8-4. D** Amend the Zoning Ordinance to limit the amount of irrigated turf for any new golf course to minimum levels based on conservation standards for arid landscapes (5 acres or less of irrigated turf per hole) and require them to be irrigated with reclaimed water only.
- Objective 8-4. E** Reduce the annual Total Gallons per Capita per Day (GPCD) water to 104 (5% reduction) by 2020.

GOAL 8-5 DEVELOP SUSTAINABLE FUNDING SOURCES FOR WATER DEVELOPMENT.

- Objective 8-5. A** Develop a funding plan to pursue the acquisition of surface water rights and the implementation of upgrades to the water supply and distribution system.
- Objective 8-5. B** Coordinate water related improvements and funding with the Capital Improvements Plan.