Association of Metropolitan Water Agencies
2018 Sustainable Water Utility Management Award
Part I – Utility Profile

1. **Does your utility provide drinking water only or combined drinking water/wastewater?**
   Scottsdale Water provides both drinking water and water reclamation.

2. **What are your water sources, i.e., groundwater, surface water, desalination, etc.?**
   Prior to the mid 1980s, Scottsdale relied almost entirely on groundwater for its water supply. Today, about 90 percent of its drinking water comes from two renewable surface water sources: the Central Arizona Project, which delivers water from the Colorado River, and the Salt River Project, which brings water from the Salt and Verde rivers. Recycled water makes up approximately 12 percent of our total water supply. Scottsdale uses groundwater to meet peak demands, but annually recharges more water than we withdraw from the aquifer.

3. **Characterize your climate, i.e., arid, tropic, etc.**
   Located in the Sonoran Desert, Scottsdale, Ariz. has a very arid climate, averaging less than seven inches of rainfall annually.

4. **Does your utility have watershed management responsibilities? If yes, please describe briefly.**
   In 2014, Scottsdale Water assumed watershed protection responsibilities when the stormwater quality program was moved from the city’s Planning Division to the Water Quality Department within Scottsdale Water. The stormwater quality program has one of the most significant impacts on watershed protection within the Scottsdale municipal boundaries.

5. **Is your utility a wholesaler, retailer or combination?**
   Scottsdale Water is a retailer.

6. **Are you a stand-alone utility or part of a municipal organization?**
   Scottsdale Water – formally the City of Scottsdale Water Resources Division – is a financially stand-alone, self-supporting municipal water and sewer utility.

7. **What is your governance structure?**
   Scottsdale Water is managed by an executive director, who reports to the city manager. City council guides the division’s authority and responsibilities through resolutions and ordinances.

8. **What is your population served?**
   Scottsdale has a population of approximately 238,000.

9. **What is your annual budget?**
   Annual operating budget, including annual debt service, is approximately $122.7 million.

10. **Other relevant profile information?**
    Scottsdale is a long narrow city, stretching 32 miles from south to north and 11 miles from east to west with an elevation change of over 3,700 feet. To maintain consistent water pressure across this significant elevation change, Scottsdale Water maintains 18 pressure zones and 147 sub pressure zones over a 185 square mile service area.

    In 2017, a global partnership of water sector organizations with input from the EPA named Scottsdale Water as a recipient of the inaugural Utility of the Future Today Recognition Program. Scottsdale was recognized for fostering an “Organizational Culture of the Future” and for exceptional achievement in the areas of water reuse, energy efficiency and community partnering and engagement.
PART II – SCOTTSDALE WATER VISION

Water Sustainability through Stewardship, Innovation and People

Scottsdale Water’s vision – Water Sustainability through Stewardship, Innovation and People – is more than a statement in a planning document; it is who we are as a utility and what we work to achieve every day. Scottsdale Water constantly communicates our vision to both our employees and our customers. Our sustainability vision appears on all division communications, including collateral and display boards, customer notifications, presentations and handouts, internal communications, business cards, letterheads and email signatures. Scottsdale Water is committed to ensuring our product, our services and our culture exemplify our sustainability vision.

Leaky Loo and Wayne Drop take the Scottsdale Water Conservation van – wrapped in our Vision – to schools and community events.

Conservation Office giveaways carry the Scottsdale Water Vision

Why choose tap over bottled water?

- **AFFORDABLE**
  - A 25-ounce bottle can be refilled 1,200 times for just $1.
  - Your recommended 8 glasses of water a day cost 80 cents a year from Scottsdale Water.

- **SAFE**
  - Scottsdale Water performs over 17,000 tests on drinking water samples annually. That’s in addition to 24/7 automated testing!
  - Scottsdale Water is tested for over 180 substances every day!

- **SUSTAINABLE**
  - On average, only 1 in 5 plastic water bottles are recycled.
  - 80% end up in landfills and waterways.
  - 90% of Scottsdale’s drinking water comes from renewable surface water supplies ensuring Scottsdale’s long-term water sustainability.

The Choose Tap! campaign, which encourages drinking tap over bottled water, is guided by the Scottsdale Water sustainability vision.
PART III – FINANCIAL MANAGEMENT

As an enterprise fund of the City of Scottsdale, Arizona, Scottsdale Water is maintained and operated as a self-supporting fund, similar to a private business, that assesses rates, fees and charges to cover all costs of operations and maintenance and to reinvest in capital expansion, replacement and rehabilitation.

Financial Sustainability and Rate Predictability

Annually, Scottsdale Water finance staff prepares multiyear financial forecasts, budgets and rate design analyses, and makes budgets-to-actual variances and justifications available to the public monthly.

The water and sewer rate structures reflect the cost of service and support the full life-cycle of the utility. Every five years, each utility (i.e. water and sewer) conducts a cost-of-service study to evaluate the revenue requirement, functional cost analysis, water demands and wastewater characteristics and rate design. These components are evaluated to ensure that rates proportionally recover costs from system users and are designed to balance conservation goals with revenue needs.

Water Rates

Scottsdale Water’s rate-setting process aligns rates with local practices and objectives, encourages conservation and strives to achieve a stable and predictable revenue stream. Due to statewide economic pressures, water rates were held flat between fiscal years 2009 and 2012. Water rates were restructured in fiscal year 2013 to expand the number of usage-based tiers and recalibrated in fiscal years 2014 and 2015. Water rates were increased in 2017 and 2018. Scottsdale Water plans to adjust water rates in fiscal years 2020 through 2024 to generate between 1.5 and 3.5 percent of additional water rate revenue annually.

The next water rate adjustment will occur in fiscal year 2018/19 and will increase the base fees and upper usage tiers. A sewer rate increase will increase the base fees and commodity rates for each customer category. The combined utility fund impact will be 2.5 percent.

The residential water rate structure includes a flat monthly service charge, based on water meter size, and five usage-based commodity tiers. Effective Nov. 1, 2019, assuming 8,000 gallons of monthly water usage, water charges total $39.70 for a one-inch meter, single-family residential customer. In total, 21 percent of Scottsdale Water’s revenue is generated from the flat monthly service charge, while water sales (commodity tiers) and miscellaneous charges account for 79 percent.

As part of comprehensive planning efforts, the impact on the combined utility bill is carefully considered in determining the appropriate balance between rate increases and debt financing. To accomplish this objective, Scottsdale systematically incorporates marginal rate increases in conjunction with debt financing to avoid acute rate escalations at any point in time. The utilities have implemented rate adjustments in three of the last four years and issued new long-term debt, financing sewer infrastructure in 2015 and water infrastructure in 2017.

Scottsdale Water’s rate proposals are thoroughly vetted by utility staff, city treasurer’s staff, the city manager and the mayor and city council. The public is encouraged to participate in discussions and is provided opportunities at public hearings or one-on-one meetings with city staff and elected officials.

Financial Planning

Annually, Scottsdale Water prepares a short- and medium-range financial plan for the current year plus a rolling 20-year period. The plan includes revenue forecasts, including rate adjustments, operating expenses
and capital expenditure forecasts, including escalation factors. Significant emphasis is placed on the first five years while the remaining years are used to determine the preliminary timing for capital efforts, preliminary timing and amount of long-term debt needs and annual rate increases that will maintain a strategy of small but consistent increases to guarantee the fund is fully self-supporting.

**Drought Reserve**

Due to below average rainfall and snowpack for the last 18 years in the Colorado River Watershed, the Bureau of Reclamation has been considering declaring an official drought. As a result, the Central Arizona Water Conservation District, the entity that delivers the Colorado River water through the Central Arizona Project, developed several drought plan rate alternatives. The rate alternatives proposed have not yet been enacted but provide insight to the significant increase in the cost of water that Scottsdale would immediately experience upon a drought declaration.

In anticipation of this eventual price increase, Scottsdale Water implemented a drought reserve in the fiscal year 2018/19 financial plan. The reserve funds would be used to offset the initial rate increase if drought plan rates were enacted. Although the reserve will not entirely offset the cost impact and would only be available for the first year of drought plan rate impacts, it would allow the city to phase in the higher costs with less immediate impact on rate payers.

**Bond Credit Rating**

In January 2018, Fitch Ratings reaffirmed the AAA long-term rating on Scottsdale’s water and wastewater revenue bonds. In reaffirming its highest bond rating, Fitch noted Scottsdale’s strong service area economy, stable and diverse customer base, diverse water supply portfolio, sufficient system capacity, very strong historical and projected debt service coverage levels and a strong liquidity position. Moody’s Investors Services, Standard and Poor’s Rating Group and Fitch Investors Services have rated Scottsdale Water’s revenue bonds “Aaa,” “AAA” and “AAA”, respectively, since 2010.

**Strategic and Long-Term Planning**

Scottsdale Water has a long history of thinking and acting strategically with our water resources. Scottsdale was the first Arizona water utility to implement indirect potable reuse with the Advanced Water Treatment (AWT) facility located at our award-winning Scottsdale Water Campus, which has a 70 million gallon per day water treatment plant, a 20 mgd water reclamation facility, a 20 mgd advanced water treatment facility, a groundwater recharge facility and a state-of-the-art water quality laboratory. Scottsdale was the first Arizona water utility to implement a true water campus.

Scottsdale has traditionally implemented strategic planning within our integrated master planning process. The master plans are implemented on a five-year cycle and have helped guide Scottsdale Water through periods of dramatic growth. Since 2010, Scottsdale has added over 25,000 new residents.

**Effective Utility Management**

In 2014, Scottsdale Water implemented the Effective Utility Management process as an additional tool for strategic planning and continual improvement. Every year, Scottsdale Water’s management team selects up to three EUM attributes to focus on improving during the next fiscal year. Many of the programs and accomplishments that will be highlighted in this AMWA application were direct results of the EUM process, including the Apprenticeship Program, Citizen Academy, Technology Master Plan and the Choose Tap! campaign and water trailer.

**Asset Management System and System Maintenance and Renewal**

As Scottsdale’s water resources infrastructure matures, fewer system and infrastructure projects are driven by growth and expansion. Rather, an increasing proportion of capital needs is driven by asset rehabilitation and replacement. To respond to this need, Scottsdale Water made a significant investment
to develop an Asset Management Program that employs a database to predict the future rehabilitation or full replacement year for assets that have reached the end of their useful service lives.

The primary goal of the AMP is to efficiently manage the division’s capital assets from installation to end of service life. There are over 5,000 assets currently documented in the AMP database. Not only is the database a critical tool in assessing the condition of water and wastewater infrastructure, but it also allows staff to run reports that summarize projected year-by-year asset replacements. These reports help staff better plan the rehabilitation and replacement efforts that will result in more stable year-over-year costs and provide a management framework and system database that assists the city in maintaining a high level of service as our system matures.

**Funding Capital Improvement Planning**

The utility’s capital program is forecasted annually and funded with rates, impact fees and miscellaneous charges. Capital needs are identified from field staff, operators, maintenance records, utility engineers and consultants that assist with planning. These needs are supported with full cost estimates, including future operating impacts if applicable. It is only after the capital program’s financial impacts are known that the utility’s rate requirements are calculated. Once the full financial impact of the capital program is evaluated and rate impacts are identified, if it is determined that rates are significantly impacted, the timing of certain capital program efforts may be delayed for a phased-in approach.

**Technology Master Plan**

Scottsdale Water understands that continuous improvement of utility operations and business functions rely heavily on the analysis and use of available data. In 2016, Scottsdale Water initiated a comprehensive technology master planning effort to take a strategic approach to our use of information technology and control systems to support optimal operational and business needs. This effort addressed all major aspects of technology systems, including communications networks, cyber security, SCADA, smart water networks, knowledge management, information technology and operational technology governance, major business applications and systems integration.

Ongoing efforts to isolate and secure the SCADA systems were initiated to improve the resiliency and reliability of both the operational technology systems and the associated data output to utility business systems. Since 2015, Scottsdale Water has been working with the U.S. Department of Homeland Security and Idaho National Labs ICS-CERT to assess SCADA network infrastructure, interconnection, architecture, and cybersecurity policies and practices. Regular cybersecurity vulnerability scans and intrusion assessments are performed on the SCADA networks. Information collected during these activities enables Scottsdale Water to maintain a proactive approach to securing its operational technology systems.

Additional efforts are underway to increase the granularity of data available to utility business systems without a corresponding increase in technology assets. This provides more refined data for operational and business analytics, trend analysis and performance metrics.

By taking this holistic approach, the optimization program provides a win-win situation for both customers and employees. For customers, the efficiencies created from these efforts has kept costs for quality and reliable water and wastewater services at an affordable price, despite annual increases in chemicals, electricity and new regulatory requirements. For employees, the optimization program has improved performance and enhanced their career development by providing training and advancement opportunities in new technology and efficiency procedures.
Operational Resiliency

Scottsdale Water Optimization Program

In 2010, Scottsdale Water launched an operations optimization project to implement a new organizational structure, business processes and technology to bring all utility operations together under one integrated system of operation.

Three main goals were created for Scottsdale’s Optimization Program:

1. Effectively monitor, evaluate and coordinate the various utility operating systems.
2. Maximize system effectiveness through efficient cost saving operations.
3. Develop and maintain the highest level of value, quality and service reliability.

Scottsdale Water took a business approach to optimizing its systems and adopted Lean principles to map out organizational and business processes to eliminate redundancy and highlight areas to streamline. Twenty-seven separate processes were mapped and evaluated to improve the business of producing, delivering, collecting and treating water and wastewater. Technology components were identified to aid in data compilation and accessibility, further enhancing overall utility operations. These early efforts helped Scottsdale begin to identify and eliminate departmental silos and move forward with a more collaborative approach toward operations.

A key component in the operational planning process was the formation of the weekly Operations Planning and Scheduling meeting, which includes representation from all functional areas of the utility. These meetings allow previously disparate work areas to regularly discuss system operations. Annual and daily operating plans are formulated, discussed and revised to maximize resources, ensure system resiliency and minimize operating costs.

Through development and revision of these operating plans, infrastructure availability is coordinated with major capital plans and scheduled maintenance activities. Water supply availability and infrastructure use are coordinated to increase underground storage of water, leverage regional partnerships to reduce operating costs and project supply blends for irrigation uses upon which irrigation rates are forecasted. This forum allows for increased knowledge sharing and retention and results in a holistic team atmosphere throughout the utility.

To effectively monitor system operations, a centralized control room that operates 24/7/365, was developed. All system alarms and events are received, triaged and effectively responded to by the systems operators. (Previously alarms were sent out via auto dialers to multiple staff.) This change in alarm management resulted in faster field response times to main breaks and other situations and eliminated the redundancy of multiple crews responding to the same alarm.

By streamlining operations and maximizing available resources, an additional 111,584 acre-feet of water (or more than 36.5 billion gallons) has been recharged underground since inception of the optimization program. Underground storage is preferred to minimize high evaporation losses in our arid environment. This stored water can be used in the future to meet customer needs during drought or other supply shortages, thereby enhancing service resiliency and reliability to utility customers. Through better coordination of these recharge activities with regional partners, Scottsdale Water was able to initiate cost savings of approximately $300,000 associated with this water storage activity.

Coordinated system operations has enabled Scottsdale Water to meet and maintain its internal performance goal of system-wide disinfection-by-product concentration of less than 80 percent of the regulatory limit. This was achieved through improved management of available water supplies, targeted granular activated carbon use and reduction of system water age through efficient reservoir management while maintaining fire flow capacity requirements.
**pH Balancing at the Central Groundwater Treatment Facility**

The Central Groundwater Treatment Facility (CGTF) – part of the North Indian Bend Wash Superfund site – utilizes packed columns to treat groundwater from four Scottsdale supply wells impacted by trichloroethylene. The groundwater from these wells is considered very hard – with calcium carbonate concentrations ranging from approximately 190 to 650 mg/L. Water hardness and carbonate alkalinity, combined with the treatment plant’s air stripping process (and associated pH rise) has resulted in scale formation within the CGTF and the downstream distribution system that has created an ongoing operation and maintenance challenge, locking up hundreds of meters in the area every year and significantly impacting distribution pipes and the treatment plant itself.

Scottsdale pilot tested different chemicals to inhibit the formation of scale in the city’s southern water distribution system. Based on the recommended alkalinity and pH control, the dosing of sulfuric acid was analyzed to determine the full range of flows and how sulfuric acid dose will be impacted by other process variables, including raw water alkalinity, temperature, and the desired stability of the finished water. Through successful pilot testing, a 93 percent sulfuric acid injection system was determined to be the most effective scale inhibitor.

The acid feed system was successfully implemented in May 2017, is currently operational and appears to have produced a full correction of the carbonate-locked meter problem. From June to September of 2016, distribution staff identified and replaced 373 no-flow meters in the CGTF area that were rendered inoperable due to significant scale formation. In the same period of 2017, with the acid feed in place, six clogged meters were identified. The long-term goal of the pH balancing project – to ensure water distribution pipes, meters and booster station pumps are not prematurely replaced due to scale build up – was achieved in the first year of implementation.

**Invasive Species Mitigation**

Scottsdale’s 70 mgd CAP Water Treatment Plant, which treats Colorado River surface water, is Scottsdale’s primary source of potable water. In recent years, Quagga mussels – an invasive species to the Colorado River – have established themselves in the CAP WTP raw water pump station, causing an infestation in the CAP wet well. These mussels and shell fragments cause several problems, including wear and tear of pump impellers, clogging of heat exchange tubes associated with the gas engines used for pump backup power, clogging of wye strainers, clogging of engine gearbox cooling water supply lines and pump seal water strainers, and the buildup of shells and sediment along the entire length of the pump columns.

A pilot study completed fully in-house in the fall of 2015 evaluated several options for controlling mussel growth and attachment, including physical barriers, specialized coatings, chemical oxidants and copper-based compounds. The team ultimately determined that a copper sulfate injection system was the most economical option with the least impact to the system and water quality. The system began operation in June 2018.

**Potable Water System Upgrade**

The 30 mgd Chaparral WTP receives water from the Salt and Verde rivers of Arizona. This facility has been in operation since 2006 and incorporates 100 percent ultrafiltration membranes and GAC treatment. It is the largest potable water membrane facility in Arizona.

After investigating options to increase the efficiency of the membrane system, Scottsdale Water pilot tested Aluminum Chlorohydrate (ACH) versus the previously used coagulant ferric sulfate. ACH proved to be a more effective coagulant to support the membrane system and the system was fully converted to ACH coagulants in 2014. The switch to ACH from ferric sulfate increased the operational resiliency of the membrane system and reduced the frequency of membrane cleaning. Upgraded control strategies were also implemented to improve the efficiency of the membrane system.
SMART Meter Implementation
Scottsdale has over 90,000 water meters with about 50,000 currently fitted with Automated Meter Reader or Advanced Meter Information technology. All of the city’s manually read services will be converted to AMR or AMI by 2022 by adding Electronic Reading Technology (ERT) to young meters or installing new meters with internal ERTs.

The pace of this timetable can be met with the current staff of meter changers and the transitioned replacement rate makes staffing and capital budgeting fairly uniform, not requiring a large capital investment in any one year. From a workforce standpoint, the gradual reduction in required meter readers can be accommodated through both natural attrition and cross-training within the division.

Scottsdale uses AMI in the flatter and more densely populated southern area of the city. AMR is used in the hilly neighborhoods, which are generally managed by HOAs that do not favor the introduction of AMI communication towers. The selected ERT accommodates both AMI and AMR.

Customer Service
Another key aspect of Scottsdale Water’s ongoing commitment to customer satisfaction is the division’s exemplary customer service department. Scottsdale Water front-line call takers assist an average of 2,000 customers each month with a wide variety of water and sewer related inquiries, questions and concerns. Using an extensive set of SOPs that are routinely reviewed and updated, 85 percent of customer calls are resolved through the initial phone call.

In 2016, Scottsdale Water initiated a new customer service evaluation program to measure the interaction between Scottsdale Water staff and water customers through comment cards, electronic surveys and phone surveys. Quarterly, surveys are sent to a random sampling of 10 percent of customers who have interacted with the organization through field or support staff. With nearly two years of data, over 99 percent of respondents have ranked their interactions as Excellent or Good.

Internal Communication
Scottsdale Water is committed to its vision of Water sustainability through stewardship, innovation and people. We manage a robust internal communication program to ensure a knowledgeable and invested workforce. The program includes all-division biannual meetings, lead supervisor meetings between division director and operation groups’ lead operators, bimonthly safety meetings and anonymous suggestion boxes placed at multiple facilities. In 2017, the division’s printed quarterly newsletter was replaced with an electronic newsletter. The newsletter, which is housed on a Water-specific section of the city’s intranet, highlights key programs and individual accomplishments to keep staff throughout the division informed and engaged. Approximately 50 stories are published to the site annually.

Performance Measurement
Scottsdale Water utilizes a number of performance measures in its decision-making processes. Key Performance Indicators from all of the division’s utility systems are tracked, measured and reported monthly to the division management team. Data included in the robust monthly KPI reports includes information related to water production, delivery and supply, customer service, vacant positions, safety and operating costs.

PART IV – ENVIRONMENTAL STEWARDSHIP

Water Supply Management
Scottsdale has a diversified water supply portfolio ensuring adequate supplies to meet current and future demands and is consistent with the Arizona Groundwater Management Act-mandated 100-Year Assured
Water Supply regulations. Scottsdale’s renewable and sustainable surface water supplies consist of Colorado River water delivered by the Central Arizona Project (CAP), and Salt and Verde river water delivered through the Salt River Project (SRP).

Scottsdale’s original CAP subcontract, dated 1984, gave Scottsdale an allocation of 19,700 acre feet per year of CAP water. Since that time, the city has aggressively pursued the acquisition of additional CAP supplies and Indian leases, and today holds the third largest municipal CAP allocation in the state, over 81,000 acre feet per year. Scottsdale Water fully utilizes its CAP allocation by recharging the unused portion, about 20 percent, to offset future groundwater pumping and earn long-term storage credits. CAP water can be used throughout the service area. The SRP water supply provides three acre-feet per acre of land, based upon the number of acres within SRP’s service area.

Scottsdale Water also has a robust supply of recycled water, which is an important component of the water portfolio, and has implemented strategies to enable the local use and recharge of our recycled water. Scottsdale has been a leader in the utilization of reclaimed water for over two decades.

Safe Yield
Scottsdale is located within the Phoenix Active Management Area (AMA), which is a determination created by the 1980 Groundwater Management Act. The GMA established safe yield – where groundwater replenishment equals groundwater pumped – as a goal to be reached in the Phoenix AMA by 2025. Scottsdale was the first city in Arizona to reach safe yield and did so in 2006, nearly 20 years before the mandated attainment date. Scottsdale Water has continued to achieve safe yield for 12 consecutive years through multiple strategies, including reduced reliance on groundwater, increased use of renewable water supplies and increased groundwater recharge within the service area.

Scottsdale has also been aggressively recharging its unused allocation of CAP water at facilities located within the same sub-basin as Scottsdale – the East Salt River Valley Sub-basin – to earn long-term storage credits that can be used to offset groundwater pumping during times of surface water supply shortages.

Leaders in Water Reuse Innovation
The Scottsdale Water Campus is one of the largest and most sophisticated water reuse facilities in the world and has been an industry leader in this realm since the facility began operation in October of 1998. The facility has two distinct components: the Water Reclamation Plant, which has the capacity to produce 20 mgd of A+ tertiary effluent daily, and the Advanced Water Treatment (AWT) facility, which has the capacity to further treat over 20 mgd of effluent to purity levels that exceed drinking water standards.

Indirect Potable Reuse
The AWT, which was recognized by the American Membrane Technology Association and American Water Works Association as the 2018 Membrane Treatment Facility of the Year, utilizes microfiltration and reverse osmosis for treatment and an advanced oxidation process (AOP) to address Compounds of Potential Concerns (CPCs) prior to recharge. The AOP, which consists of a stepped chloramination, ozonation and high-intensity ultraviolet photolysis disinfection process, significantly reduces the presence of CPCs in the groundwater recharge.

The RO permeate finished water is injected into a series of 63 on-site vadose zone wells where it flows through an additional 400 feet of natural filtration before reaching the drinking water aquifer. Scottsdale recharges over 1.7 billion gallons of purified recycled water annually.

Reclaimed Water Distribution System
In the early 1990s Scottsdale formed a public-private partnership with private developers to provide non-potable water to several golf courses located in north Scottsdale with the goal of eliminating the reliance on groundwater to irrigate golf courses within city limits. This partnership, known as the Reclaimed Water
Distribution System (RWDS), has grown over the years and now includes significant treatment capacity at the AWT and a 14-mile delivery system including pipes, pump stations and other facilities.

When the RWDS was first established, the city pumped raw surface water from the Central Arizona Project canal, which is also the city’s main source of surface water, to the member courses. When the city’s Water Reclamation Plant came online in 1998, the courses began receiving a combination of raw CAP water and tertiary effluent.

Concurrent to the city’s master planning efforts in the 2000s, an RWDS water quality study – conducted and funded by the golf courses – determined that high levels of total dissolved solids and sodium concentration in the water they received was significantly impacting the courses’ turf germination.

City staff met with golf course superintendents, general managers and owners to hear their perspectives firsthand and discuss solutions to reduce the sodium levels in the RWDS water. The most cost-effective solution to reduce sodium levels to an acceptable level (<125 mg/L) was to utilize a portion of treated water from the AWT, which contains virtually no sodium, and blend it with effluent from the conventional water reclamation plant. A direct approach to this solution would have had a substantial impact to Scottsdale residents as the AWT was originally designed strictly for recharge efforts and there was no infrastructure in place to allow blending of the two water sources.

Over a two-year negotiation period, it was agreed that the RWDS users would contribute financially to expand the AWT from 14 mgd to its current capacity of 20.6 mgd and reengineer the infrastructure to include blending and expanded distribution capabilities. In return, Scottsdale implemented water quality standards and provided a schedule of penalties if the standards are not met.

The agreement resulted in an overall RWDS user capital contribution of approximately $22 million along with a rate structure that covers the operation and maintenance of the AWT product water attributed to the blended water source. The agreement ensures that the golf courses incur all costs of operations, maintenance and improvements and does not impact city water and sewer rate customers. As an added benefit to the city, the increased capacity of the AWT provides for additional groundwater recharge supplies in the colder months when golf course demand is lower.

Sub-Regional Operating Group
In 1979, the Sub-Regional Operating Group, or SROG, was formed among several Valley cities to jointly own and operate a regional wastewater conveyance and treatment system to help meet the needs of a rapidly growing central Arizona. The configuration of both the ownership and the treatment system has changed over the years and Scottsdale Water is today one of five owners in the system, the primary holding of which is the 91st Avenue Wastewater Treatment Plant and its vast interceptor and redistribution system. Upon completion of the most recent expansion in 2010, the plant has a certified treatment capacity of 230 mgd and receives an average daily flow in excess of 133 million gallons. The plant supplies high-quality effluent to multiple major recycled water-use facilities and projects:

- The majority of the water from the plant supplies cooling capacity to the Palo Verde Nuclear Generating Facility – the largest power plant by net generation in the United States and the only nuclear power plant in the world that is not located near a large body of water. The carbon-free facility, which uses more than 2 billion gallons of recycled water annually, serves the power needs of approximately 4 million people in Arizona and California.
- Located adjacent to the treatment plant, the Tres Rios Environmental Restoration Project is an ambitious environmental engineering project designed to rehabilitate nearly 700 acres in and around the Salt River by restoring a vital wetland and riparian habitat, improve wastewater quality by reducing nitrate levels through natural water polishing, and help a community with flood risk by establishing marshes and riparian corridors.
• SROG water also supplies the Buckeye Irrigation District, which provides a renewable source of irrigation support for crucial agricultural endeavors.
• In 2017, SROG entered into a public-private partnership to clean the methane discharged from the solids processing at the treatment plant. The 91st Avenue Biogas Project will process the raw biogas generated in the anaerobic digesters into renewable natural gas that will be sold to the vehicle market through a natural gas pipeline grid. With a project size of 3,250 standard cubic feet per minute capacity, the project is expected to be largest of its kind in the nation.

**Contributions to Direct Potable Reuse Regulatory Reform**
While Scottsdale was a world leader in indirect potable reuse, *direct* potable reuse has historically been regulatorily prohibited in Arizona. In 2016, Scottsdale Water – at the request of the WateReuse Association and the Arizona Department of Environmental Quality – participated in a working group to develop a guidance document on the development of direct potable reuse regulations by the State of Arizona. This group – primarily made up of environmental regulators, environmental scientists, engineers and university academic researchers – provided detailed recommendations on how to regulate direct potable reuse projects in Arizona. In January 2018, ADEQ accepted the recommendations in the document and lifted the prohibition on direct reuse in Arizona.

**Water Conservation**
The Scottsdale Water Conservation Office has been helping Scottsdale residents and businesses be more water wise since 1982. The robust program manages multiple rebate programs, home water efficiency audits and water conservation educational workshops, which focus on water-saving topics like rainwater harvesting, drip irrigation, finding leaks, water-efficient landscaping and sustainable plant growth.

**Water Efficiency Rebates**
Scottsdale offers multiple rebates – more than any other city in the Phoenix metro area – to incentivize efficient water use both inside and outside the home. Rebates cover both residential and non-residential customers and provide a credit on the customers’ water bills according to the type of rebate. Rebates are available for installing WaterSense-certified toilets, urinals and showerheads and qualified smart irrigation timers, and for removing turf, pools and spas and water softeners. Scottsdale began offering rebates for pool and spa removals in 2016 and is the only city in the Valley to offer this aggressive rebate.

Scottsdale’s source water is considered very hard and it is estimated that approximately 80 percent of Scottsdale homes use salt-based water softeners, which are not water efficient and introduce extremely high amounts of salt into the wastewater supply. In 2014, Scottsdale developed a rebate program to incentivize water softener removal as a means of addressing the salinity levels entering the Scottsdale wastewater stream. The program was the first rebate program in Arizona aimed at salt reduction.

**Commercial, Industrial and Institutional Audit Program**
In the spring of 2018, Water Conservation launched an ambitious water audit program for commercial, industrial and institutional customers, specifically targeting the hospitality and food service industry, office buildings, retail establishments and educational facilities. Through the program, a consultant – with water conservation staff oversight – conducts in-depth audits for unique or large CII properties.

The audits include measuring water use inside CII building structures and completing a water budget for outside water use to create a water audit balance sheet. The sheet will list metered or “actual” water use against known water uses. The main goals of an audit are to benchmark data, identify the greatest opportunities for improved efficiency and determine which water-use efficiency actions will give CII property owners a reasonable financial return on investment. The program goals include measuring key drivers of water consumption, analyzing and minimizing TDS levels in wastewater, and suggesting prioritized and quantified water efficiency improvement measures.
**Tiered Water Consumption Rates**
Scottsdale Water has a tiered rate structure under which the price customers pay for water increases as the volume consumed increases. This provides a pricing incentive for customers to use water more efficiently since higher-volume usage, usually associated with using treated drinking water for extensive outdoor watering, is charged at a higher rate.

In 2014, Scottsdale upgraded its utility billing processes, which ultimately gave Scottsdale Water greater input on the content displayed on the bills and provided the opportunity to highlight the tiered structure. All bills now show the rate structure on the back of the bill and the individual customer data on the front of the bill specifies exactly how much water the customer used at each pricing tier – showing how much they need to reduce their water use to get down to the lower tiers.

**Sustainable Energy Management**
Scottsdale is a long, skinny city, stretching 32 miles from south to north, with an elevation change of greater than 3,700 feet. Every day, Scottsdale Water treats and delivers an average of 68 million gallons of drinking water, collects and treats about 20 million gallons of sewage, and delivers up to another 20 million gallons of recycled water. Moving and treating that much water – especially given the city’s significant elevation changes – requires an extraordinary amount of energy. Scottsdale Water uses more electricity annually than all other city departments combined and is constantly looking for ways to curtail energy use and costs.

The utility requires an average of almost 39,000 kW and over 143,000,000 kWh of electrical power annually to continuously provide high quality, reliable water and sewer service to its customers. This power has historically been provided through a combination of Arizona Public Service (APS) and Salt River Project with an annual fiscal impact of more than $16 million, or about 18 percent of the utility’s operating budget.

**Hoover Dam Hydroelectric Power**
In an effort to diversify our energy supply portfolio with renewable energy resources and achieve power cost savings, Scottsdale Water submitted an application in 2014 seeking an allocation of low-cost, renewable hydropower generated from Hoover Dam. Among all new applicants in the highly competitive process, Scottsdale Water was successful in receiving the second largest municipal allocation of Hoover power in Arizona.

The 50-year contract awarded Scottsdale Water an allocation of 2,371 kW and 5,176,974 kWh of Hoover power. This allocation represents approximately 3.7 percent of Scottsdale Water’s total annual energy use, and approximately 12.7 percent of the annual energy use at the Scottsdale Water Campus facility.

The net cost savings based upon projected power rates and the associated transmission costs is anticipated to be $0.02/kWh, meaning Scottsdale Water is expected to realize approximately $3.9 million in electrical power cost savings throughout the term of the agreement. On Oct. 1, 2017, Scottsdale Water began receiving energy from Hoover Dam – a significant step in the utility’s commitment to environmental and financial stewardship.

**APS Peak Solutions Participation**
APS Peak Solutions for Business is a demand response program that encourages business customers to reduce their electricity load during peak demand times. Scottsdale Water has been a participant in the program since its inception in 2010.

Decreasing energy use during peak demand times is a challenge for all businesses, but it is a particularly tricky balancing act for a water utility since peak energy demand comes on the hottest, driest summer days (when temperatures in the desert can average between 110 to 118 degrees) – at the same time as peak water demand. To meet electricity load reduction during peak demand events, Scottsdale Water must take
several systems offline temporarily, relying on reserve water stored in reservoirs, alternative energy sources and minimized building cooling systems. The operational adjustments are only sustainable for a few hours a day, a few days a year.

Scottsdale Water is the third largest participant in the APS Peak Solutions program among all businesses in the state and the largest municipal contributor. In 10 years in the program, Scottsdale Water has reduced our peak demand usage by more than 30,000 kwh and received direct APS rebates in excess of $912,000.

**Water Campus Solar Project**

In 2015, in an effort to further diversify our energy supply portfolio and achieve power cost savings, Scottsdale Water issued a Request for Proposals seeking a solar services package for a portion of the annual electric power required to operate the city’s 145-acre Scottsdale Water Campus. The successful proposal was required to economically compete with grid-supplied power while offering a sustainable, renewable energy source and provide a complete turnkey solar energy system including financing, procurement, engineering, construction, operation and maintenance, utility coordination and interconnect agreement, all labor and materials and any necessary temporary or interim facilities.

Based on the proposed size of the solar power system by the winning bidder, Tesla (which acquired the original bidder, Solar City), Scottsdale Water anticipates offsetting approximately 10 percent of grid-supplied electricity at the Water Campus with an estimated cost savings of approximately $1.4 million in over the 20-year life of the solar services agreement.

During the detailed agreement development, it was determined that the integration of on-site battery storage could significantly increase the cost benefits received by the city. By recognizing rapid increases in power demand, the “smart” battery system software engages the batteries to alleviate power spikes registered by the electric utility. This in turn curbs demand at the utility meter, thereby reducing demand charges. This integrated solar-battery system also benefits the electric utility by limiting power spikes at the Water Campus to a more predictable range.

The design and construction of the solar conduit system is completed. Tesla is now at the 90 percent design stage for the solar system and is expected to obtain the interconnect agreement with APS in 2018 and construction of the system is anticipated in 2019.

**Drought Management Plan**

While Scottsdale’s long-term planning for sustainable water supplies has significantly reduced the city’s vulnerability to drought, we are a city built in the desert and are extremely cognizant of constantly planning for the reality of continued prolonged drought and a potential reduction in the city’s water supplies.

Every five years, Scottsdale updates our Drought Management Plan, the most recent of which was approved by the city council in 2015. The drought plan is based upon four stages of surface water reduction with appropriate corresponding best management practices for each stage.

The drought responses represent three key areas: public outreach, supply-side management (where the city has the ability to redirect surface water supplies during a shortage) and demand-side management (response options at each stage for the municipal, residential and nonresidential customer classes). The Drought plan authorizes the establishment of a Drought Management Team, which will be comprised of key members of Scottsdale Water staff as well as representatives from other city departments as appropriate. The main responsibility of the drought team is to identify the appropriate responses to a water supply shortage and make recommendations to the city manager and city council.
GAC Recharge Facility

Scottsdale Water’s primary source of potable water comes through our 70 mgd Central Arizona Project Water Treatment Plant, which treats Colorado River water through a 20 mgd membrane ultrafiltration system blended with a 50 mgd conventional water treatment system. Water is further treated with granular activated carbon (GAC) for taste and odor control and the control of disinfection by-products. Using more than four million pounds of GAC annually, the facility is one of the largest such systems in the country for the control of disinfection by-products.

Scottsdale Water, along with the cities of Phoenix and Glendale, partnered with Calgon Carbon to build a state-of-the-art Granular Activated Carbon reactivation facility in central Arizona. Prior to the completion of the facility, the nearest reactivation facility was located more than 1,000 miles away in northern California. The Calgon GAC reactivation facility lowered Scottsdale Water’s operating costs for GAC services by over $1 million a year while significantly lowering the city’s carbon footprint by replacing the 2,100-mile round trip required for GAC reactivation to under 200 miles.

PART V – SOCIAL RESPONSIBILITY

Community Health and Ecological Sustainability

Stormwater Protection
In 2014, the stormwater quality responsibilities for the City of Scottsdale were moved from the Planning Division to the Water Quality Department within Scottsdale Water. The stormwater quality program has one of the biggest impacts on watershed protection within the Scottsdale municipal boundaries. Scottsdale Water staff have been able to respond quicker to reports of illicit discharges, stop poor practices at businesses that power wash into storm drains, inspect and educate businesses on best management practices on the storage and disposal of pollutants. The program also formed a Low Impact Development team to study ways the city can implement LID to minimize run-off and pollutant exposure.

Watershed Health and Forest Restoration
On a statewide focus, Scottsdale Water is an active partner with the National Forest Foundation in the Four Forest Restoration Initiative, which urges federal lawmakers to restore the state’s overgrown forests to prevent devastating fires in Arizona watersheds. Two catastrophic fires have occurred in adjoining forests in the last decade. The result has been years of increased run-off with significantly higher pollutant loading. Proactive protection of the forests in the watershed that brings precious surface water to the desert is crucial for source water sustainability.

North Indian Bend Wash Superfund Cleanup
In 1981, groundwater contaminated from industrial chemicals, primarily trichloroethylene (TCE), was discovered in the southern part of Scottsdale. Investigation revealed that the contamination was the result of past improper chemical disposal by several industrial companies in the area.

The U.S. Environmental Protection Agency placed the contaminated aquifer on the National Priority List and declared it the North Indian Bend Wash (NIBW) Superfund Site. The EPA identified the parties potentially responsible for causing the contamination and determined that a long-term cleanup effort would be required to both restore the availability of safe, quality drinking water and to ultimately eliminate the underground contamination plume.

As part of the clean-up remedy, the potentially responsible parties – led by Motorola Solutions – built the Central Groundwater Treatment Facility (CGTF) in 1995 and the NIBW Granular Activated Carbon Treatment Facility (NGTF) in 2012. Scottsdale Water owns and operates the CGTF, operates the NGTF on behalf of Motorola Solutions, and is obligated to deliver the water from both facilities to customers. The
water produced by both plants meets or surpasses all federal and state standards for safe and healthy drinking water. The facilities remove TCE from the water to a level that is considered non-detect (less than 0.5 parts per billion), which is far below the EPA standard of 5 parts per billion.

It’s estimated that the cleanup will take approximately 60 more years. Large portions of the groundwater plume cleanup should be completed before that time. In March 2013, the EPA announced that the upper aquifer plume has decreased in size by 84 percent, and the total mass of contaminants in the upper aquifer groundwater has decreased by over 97 percent. Because the upper aquifer is almost restored, 25 NIBW upper aquifer monitoring wells were closed in 2013. Clean-up will continue in the middle and lower aquifers until they reach the same level of clean-up.

Lead Testing in Schools
In early 2017, the Arizona Department of Environmental Quality began coordinating with multiple state and local agencies, public water systems and public schools to screen for the presence of lead in drinking water in 7,000 buildings at over 1,000 public schools statewide. Scottsdale Water volunteered to sample and analyze for lead at all public schools in Scottsdale to help fulfill the ADEQ goal. During Phase I of the project, Water Quality staff collected first draw samples from each school building with additional samples taken from food prep sinks, nurses’ offices and onsite daycare facilities.

A total of 438 samples were taken and analyzed at the Scottsdale Water Quality Laboratory. Of those samples, more than 20 had lead above the Action Level. Each fountain/sink that had a lead result above the Action Level was immediately taken out of service by the school. Scottsdale Water staff then returned to schools with positive results and took samples of all remaining fountains and sinks in the buildings. This resulted in an additional 230 samples. Though ADEQ made the decision to only sample public schools, Scottsdale Water contacted all private and charter schools and daycares in the city and offered to sample their facilities at no charge.

Social Responsibility, Community Involvement and Education

Scottsdale Water Citizen Academy
Now in its third year of successful implementation, the Scottsdale Water Citizen Academy is a multiweek, in-depth course that gives small groups of stakeholders and customers an inside look at all aspects of the water utility. Participants in the five-week academy participate in presentations, tours and hands on demonstrations to learn about drinking water, recycled water, stormwater, industrial pretreatment, Superfund cleanup, enterprise finance, engineering, regulatory requirements and optimization.

Class size is limited to 30 participants per session. Approximately 22 spots are filled by customers while the remaining spots are reserved for our key stakeholders from regulatory agencies, teachers, power companies, water wholesalers, advisory boards and other key partners. The academy has been extraordinarily successful, with customer-designated spots filling up within the first few hours of the registration period each session. Evaluation forms are handed out nightly and responses consistently rank all presentations and tours for the three-hour nightly sessions Very Good or Excellent.

A key part of the academy is the focus on Scottsdale’s water reuse efforts and includes an in-depth tour inside the Advanced Water Treatment facility, widely recognized as one of the world’s most innovative water purification projects. Due to this focus, the Scottsdale Water Citizen Academy was named the 2017 Public Education Program of the Year by the national WateReuse Association.

Environmental Quality Advisory Board
The Environmental Quality Advisory Board provides guidance on the prioritization of future environmental activities and recommends environmental policies to the city council. This board is comprised of a group of citizens that are appointed by the city council and meets monthly. Scottsdale Water takes all issues that
have an environmental impact before the board for input prior to finalizing what will be taken to the full council. At least one member of the Environmental Quality Advisory Board attends the Citizen Academy each session. This helps inform the group about all aspects of Scottsdale Water, not just those issues that may come before the committee specifically.

**Careers in Water High School Outreach Program**

In 2017, Scottsdale Water, like many municipalities, identified that recruitment to the water industry is struggling. As part of Scottsdale Water's annual EUM projects, staff started a program called *Careers in Water* aimed at introducing high school aged students to careers in the water industry through interactive career fairs that showcase distribution, maintenance, SCADA, laboratory, engineering and water quality jobs and include staff from each area along with “tools of the trade.” Over 1,000 students attended the pilot career fair held in the spring of 2018 and the plan is to expand the career fairs to all Scottsdale high schools, visiting two schools per year (making it to all five high schools every three years).

**Choose Tap! Campaign and Water Trailer**

As part of ongoing efforts to improve customer satisfaction with Scottsdale Water quality, the utility is in the process of launching an extensive tap water campaign aimed at improving customer understanding of tap water quality and increasing consumption of tap water as a safe, affordable alternative to bottled water. The campaign is called *Choose Tap!* and will seek to increase satisfaction with and consumption of tap water both at home and on the go in Scottsdale, while also focusing on the environmental impact of single-use disposable water bottles.

The centerpiece of the campaign is the *Choose Tap!* Water Trailer, which has been approved for purchase in the FY 2018/19 budget. The high-profile water trailer will be a customized Quench Buggy®, which will provide chilled tap water through eight drinking water taps and bottle fillers, plus a dog bowl tap. The trailer will hook up directly to a potable water source (typically a fire hydrant) and provide free, cold tap water at all major city events. The trailer will always be staffed with a Scottsdale Water host who will provide information on Scottsdale Water quality and why customers should choose tap over bottled water.

Scottsdale Water has also invested in 20 Elkay EZH20 drinking fountains with attached water bottle filling stations, which are being installed at the highest-profile city parks and public facilities, including the world-renowned McCormick-Stillman Railroad Park and Scottsdale Stadium, the Spring Training home of the San Francisco Giants.

Both the trailer and the bottle filling stations are cobranded with the *Choose Tap!* and Scottsdale Water logos. Other aspects of the *Choose Tap!* campaign include social media advertising, infographic-style posters in all city facilities, public-service announcements, sustainable giveaways and bumper stickers/magnets on all Scottsdale Water vehicles.

**Water Reuse Education**

Scottsdale Water hosts about 20 tours of the Advanced Water Treatment facility annually. While the majority of these tours are to industry groups from around the world who come to Scottsdale specifically to learn best practices from our 20-year history of successful indirect potable reuse and advanced recycled water purification, we also conduct tours for school groups, the Citizen Academy other nontechnical groups. In an effort to enhance the tour experience for these groups, staff worked with an outside animation developer to create several short videos that graphically explain the ultrafiltration, reverse osmosis and ultraviolet light photolysis processes. The videos are available on large-screen monitors at two key locations in our typical tour paths and we are in the process of redesigning a water reuse education Web portal to share the videos more broadly.

In 2015, the WaterReuse Research Foundation and the Australian Water Recycling Centre of Excellence recognized the Scottsdale Water Campus and the Reclaimed Water Distribution System among the world’s
most innovative water purification projects in their Global Connections map – an online tool that included narratives and videos demonstrating the needs, benefits, safety and technologies of key recycled water projects around the world. The videos are also showcased in the Recycled Water section of our website.

**Regional Collaboration**

Scottsdale is one of 22 cities that make up the Phoenix-metro area. To maximize outreach and advocacy capabilities, Scottsdale is very active in several regional water-related collaboratives, including:

- Formed nearly 50 years ago, the **Association of Metropolitan Area Water Users** protects its members’ ability to provide assured, safe and sustainable water supplies to their communities. Working collaboratively, the group advocates responsible water stewardship that supports economic prosperity and safeguards Arizona’s water supplies for future generations. AMWUA’s membership is limited to ten large municipalities in Maricopa County. Collectively, the AMWUA members serve nearly 3.5 million people – more than 50 percent of the state’s population.
- The **Water – Use It Wisely** campaign was launched in 1999 to promote an ongoing water conservation ethic among Arizona’s rapidly growing population. Member municipalities and organizations provide a financial contribution and regional collaboration to unify their message and provide better buying power and greater marketing possibilities for sponsorships.
- **Tap Into Quality** is a public education campaign supported by Valley cities, the Central Arizona Project, the Salt River Project and the Arizona Water Association aimed at increasing awareness about the safety, convenience and affordability of the region’s tap water.
- **STormwater Outreach for Regional Municipalities** – STORM – is a regional organization promoting stormwater quality education within the greater Phoenix metropolitan area. STORM uses a multimedia approach targeting audiences through radio, television and special events, and providing permit information to the public and the regulated community.

**Scottsdale Xeriscape Garden: Demonstrating the Beauty of Saving Water**

In 2012, Scottsdale Water opened the Scottsdale Xeriscape Garden at Chaparral Park. The 5.5-acre demonstration garden provides an educational resource where growing regionally appropriate plants also grows public awareness to reduce outdoor water use, fosters development of sustainable landscaping and enlists community participation to conserve water resources for the future. The garden, which is a National Wildlife Federation Certified Wildlife Habitat, conceals a buried 5.5 million gallon reservoir from the adjacent Chaparral Water Treatment Plant and showcases over 7,000 plants from 200 species. Through signage and an interactive plant guide, park visitors can learn about low-water use plants and trees, water harvesting and other tips for caring for desert landscape.

**Employee Community Involvement**

Every October, the city of Scottsdale partners with Valley of the Sun United Way to encourage employees to make charitable contributions to the community through the annual Scottsdale Employees’ Charitable Choice campaign. Since 2014, the Scottsdale Water director has entered into a challenge with the Scottsdale Fire Chief to see which division – Fire or Water – will lead all city divisions for the highest percentage of participating employees. The director and the chief are extremely encouraging – last year even creating a promotional video that involved a mock boxing match – and make a production of passing the traveling trophy (a painted fire hydrant) back and forth between the winner. Since 2014, an average of **72 percent of all Scottsdale Water employees** participate through either one-time donations or payroll deductions. The division consistently ranks first or second for highest citywide participation in the important campaign.