Water Management Plan 2012

DRAFT
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Executive Summary

A Proven Plan

San Antonio’s Water Management Plan is a proven, successful tool. Since the city instituted a policy to reduce its reliance on the Edwards Aquifer, San Antonians have nurtured a nationally recognized conservation ethic and invested wisely in diversified sources of water.

The 2012 update to the Water Management Plan continues to strike a productive balance between water conservation and new supplies. By implementing the plan, San Antonio Water System customers will incrementally save more than 16,500 ac-ft of water per year by 2020 through refocused conservation efforts, and acquire 110,000 ac-ft of additional supplies by 2026. This effort will meet the growing demands of 20,000 new residents per year.

The plan builds on the success of prior efforts. Through thoughtful planning and investment, San Antonio now boasts:

- The best water conservation program in the U.S.
- The nation’s largest direct recycled water system.
- The third largest underground storage facility in the country.

In addition, non-Edwards water sources include supplies from Canyon Lake, the Trinity Aquifer, the Carrizo Aquifer in Bexar County, the Carrizo Aquifer in Gonzales County and numerous others. Together, these accomplishments make San Antonio water’s most resourceful city.

Thanks to thoughtful, strategic water planning, San Antonio’s dependence on the Edwards Aquifer continues to decrease.

Edwards / diversified supply during the worst year of a repeat of the drought of record.
Overcoming Challenges

The implementation of San Antonio’s water strategy has not always been easy, but the city has overcome numerous obstacles and challenges to securing water supplies to meet future demand.

Endangered species protection
In the early 1990s a successful federal environmental lawsuit resulted in limits on pumping from the Edwards Aquifer. Two decades later, San Antonio worked with numerous stakeholders from around the region to develop a Habitat Conservation Plan that protects the spring habitats of several endangered species and provides San Antonio with certainty of supply from the Edwards Aquifer.

Regulatory restrictions
In attempts to develop new non-Edwards water projects, San Antonio faces regulatory hurdles from water districts that oppose pumping from neighboring aquifers. These barriers have resulted in water supply projects that require the investment of more time and resources, but 2013 will see the largest non-Edwards supply in SAWS history come on line.

Weather extremes
Prolonged periods of drought are a way of life in San Antonio. However, San Antonio’s water supply was more than sufficient to navigate the hottest, driest year in recorded Texas history in 2011. The availability of stored supplies from the city’s underground reservoir allowed San Antonio to avoid strict lawn sprinkler restrictions in 2011 and 2012.

BexarMet integration
At the request of the state legislature, San Antonio Water System assumed service for Bexar Metropolitan Water District in early 2012. Adding the demands of a utility the size of Corpus Christi poses the added challenge of acquiring additional supplies for some of the fastest growing areas of San Antonio. The integration of BexarMet continues to run smoothly and professionally.

Groundwater Conservation Districts regulate aquifer pumping all over the state, making it difficult and costly to secure water for San Antonio.
Strategic Elements of the Plan

Through a thoughtful and strategic process, SAWS has developed a well-balanced plan that will ensure the availability of water for a growing population, even in the face of the worst known drought conditions. By implementing the plan, San Antonio will avoid water shortages through 2040. The strategic elements include:

**Continued commitment to water conservation**

Water Conservation is a year-round approach to improve the efficiency of water use. In 2011, a historically dry year, San Antonio recorded water use of 143 gallons per capita per day (GPCD). The Plan calls for a reduction of GPCD to 135. Through a programmatic effort to improve the efficiency of outdoor watering for lawns and landscapes, water conservation will provide a savings of at least 1,650 ac-ft each year, or more than 16,500 ac-ft per year by 2020. Improved year-round conservation and new programs are key to water savings which are included in future water supply calculations.

**Groundwater desalination**

Construction of a Desalination Plant will be completed in 2016, providing 11,200 ac-ft of water annually, tapping a veritable ocean of brackish groundwater in southern Bexar County. Through two additional phases, the Desalination Plant will yield a total of 28,000 ac-ft annually by 2026.

SAWS contractors drill a groundwater desal well in southern Bexar County.
Expansion of Local Carrizo Aquifer supply
San Antonio currently pumps Carrizo Aquifer water in southern Bexar County. However, pumping can be expanded to yield an additional 7,000 ac-ft of annual supply by 2017. Through two additional phases, the local Carrizo Aquifer will yield a total of 21,000 ac-ft by 2026.

Additional Edwards Aquifer rights
The market for Edwards Aquifer water rights is still active, and SAWS has identified 10,900 ac-ft of additional supply available. The permitted supplies already contain environmental protections for the endangered species habitats in the Comal and San Marcos Springs.

<table>
<thead>
<tr>
<th>Planned Supply Source</th>
<th>Action</th>
</tr>
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<tbody>
<tr>
<td>Additional Edwards Rights</td>
<td>10,900 ac-ft acquired</td>
</tr>
<tr>
<td>Brackish Groundwater Desal Plant</td>
<td>11,200 ac-ft/yr on line in 2016</td>
</tr>
<tr>
<td></td>
<td>22,400 ac-ft/yr in 2021</td>
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<tr>
<td></td>
<td>28,000 ac-ft/yr in 2026</td>
</tr>
<tr>
<td>Expanded Local Carrizo</td>
<td>7,000 ac-ft/yr on line in 2017</td>
</tr>
<tr>
<td></td>
<td>14,000 ac-ft/yr in 2022</td>
</tr>
<tr>
<td></td>
<td>21,000 ac-ft/yr in 2026</td>
</tr>
<tr>
<td>Regional Water Supply Project</td>
<td>Up to 50,000 ac-ft/yr starting in 2018</td>
</tr>
<tr>
<td>Demand Reduction</td>
<td></td>
</tr>
<tr>
<td>▪ Water savings from programs to</td>
<td>16,500 ac-ft/yr by 2020</td>
</tr>
<tr>
<td>reduce dry year GPCD to 135</td>
<td></td>
</tr>
<tr>
<td>▪ Aquifer Watch</td>
<td>Starts at 660’ Edwards Aquifer level</td>
</tr>
<tr>
<td>▪ Drought restrictions</td>
<td>Start at 650’ Edwards Aquifer level; 1x per week (spray irrigation)</td>
</tr>
</tbody>
</table>
Regional water supply project
In a unique effort to solicit offers for water supplies from around the state, SAWS received nine proposals from private water developers to bring water to San Antonio. SAWS anticipates selecting the best proposal and committing to an agreement that will provide San Antonio with up to 50,000 ac-ft of annual water supply by 2018.

Water supply pipeline
An additional pipeline is needed to move new and existing supplies from southern Bexar County into San Antonio. While utilizing an existing pipeline to store unused water in our underground reservoir, the new pipeline will be capable of simultaneously moving water from the desalination plant and the local Carrizo Aquifer to high growth areas in western San Antonio.

A new pipeline would bring water from southern Bexar County to the high growth areas of San Antonio.
A Real Solution is at Hand

Charged with providing sustainable affordable water services, SAWS has already invested wisely in the development of new supplies. Building on a track record of success, San Antonio Water System has identified additional supplies to meet the city’s future demands through 2039.

By investing in these supplies today, San Antonio can avoid the limited availability of sources and increased costs in the future. In the wake of the hottest, driest year in recorded history, Texans have grown keenly aware of the importance of water planning.

Competition for water for growing cities, agriculture, industry and power will only increase future water costs.

Population growth in San Antonio will add to the water requirements of a dynamic community that strives to attract new businesses and jobs while maintaining a high quality of life. The appeal of a vibrant city is directly related to the availability of water.

The appeal of a vibrant city is directly related to the availability of water.
Understanding Common Terms and Conventions Used

For ease of understanding, the 2012 Water Management Plan has been broken down into bracketed time periods described as Short Term, Mid Term and Long Term Programs.

The simplified supply and demand chart referenced above in this Executive Summary is for the Mid Term Program (2020-2040), but more detailed supply and demand charts for each period can be found in the relevant Sections of the full plan.

The planned advanced conservation measures (tan) and new water supply projects (various colors) are combined for simplicity of display into a single series (blue). Additional charts with more details are available later in this plan. All current supplies are subjected to the appropriate physical and regulatory assumptions of the particular supply (gray). This includes supplies from the Edwards Aquifer and current non-Edwards supplies. More detailed description of each supply is provided later in the plan.

Unlike other water supplies in this plan, Aquifer Storage and Recovery (ASR) is not an annual supply that renews with the passing of the calendar. Rather, it is a supply reserve of finite supply whose yield is based on artificial recharge as opposed to natural cycles or regulatory management (soft yellow). The ASR plays an important role in the Edwards Aquifer Habitat Conservation Plan (EAHCP – light green).

Unlike in past water plans, the advanced conservation measures contemplated in this plan are identified as a supply, rather than an adjustment to the demand line. In this way, the community can more easily understand the magnitude of water supply development (and cost) avoidance provided by water demand management measures. This follows the convention of Texas’ State Water Plan.

Keeping the color coding and major assumptions in mind will help with the interpretation of supply and demand charts used throughout this document.
Planning Background

San Antonio Water System (SAWS) has a deep history of planning for future water needs. In 1994, SAWS facilitated a citizens committee to address San Antonio’s rapidly changing water resources situation. In 1996 a plan was developed to maintain a fifty-year supply with the feedback of various stakeholder groups in both the community and region at large. In 1996, the City Council appointed a 34-member citizens committee to develop strategic policies and goals for water resource management. The Citizens Committee on Water Policy report, entitled *A Framework for Progress: Recommended Water Policy Strategy for the San Antonio Area*, was unanimously accepted by City Council, becoming the foundation for SAWS Water Resources Plan. On November 5, 1998, the City Council accepted the Water Resources Plan *Securing Our Water Future Together* as the first comprehensive widely supported water resource plan for San Antonio, thus establishing the guiding principles for water resource development and defining SAWS leadership role in the protection and development of water supplies for the San Antonio area. Those water plans were subsequently updated with the *Water Resource Plan Update 2005* and the *2009 Water Management Plan Update (2009 Update)*.

While the plans are typically developed approximately every five years, there have been numerous changes since 2009, including but not limited to: 2010 census data, the integration of the service areas and ratepayers of the former BMWD, now SAWS District Special Project (DSP), the resolution of the Lower Colorado River Authority (LCRA)-SAWS Water Supply Project, increased storage realized in the Aquifer Storage and Recovery (ASR) facility, the Edwards Aquifer Habitat Conservation Plan (EAHCP) resulting from the stakeholder-driven Edwards Aquifer Recovery Implementation Program (EARIP), changes to the Regional Carrizo Water Supply Program and the Brackish Groundwater Desalination Program, as well as the Regional Water Supply Project / Request for Competitive Sealed Proposals (RFCSP). Many of these events alone would be reason enough for an update to the previous plan, and when taken as a whole they constitute

The 2012 Water Management Plan addresses many significant changes that have occurred since the adoption of the 2009 Update.
grounds for the foundation of a new plan, the 2012 Water Management Plan, for water's most resourceful city.

The 2012 Water Management Plan addresses many of these significant changes that have occurred in the SAWS service area and throughout the region since the adoption of the 2009 Update.

Some things that haven’t changed in this plan are: SAWS role as the region’s advocate for the protection and development of water resources, and the community’s leader in the development of water supplies for present and future ratepayers; dedication to water use efficiency and conservation that promotes economic growth; continually updating and improving SAWS analytical capabilities; promoting community development; and thoroughly-considering incremental investments in SAWS’ mission of providing Sustainable, Affordable Water Services.

The leadership provided by the SAWS Board of Trustees and SAWS management recognized the significant changes that had occurred in a relatively short period of time since the 2009 Water Management Plan Update was adopted. On November 15, 2010 and February 1, 2011, SAWS amended the 2009 Water Management Plan Update to recognize the significant progress in water resource investments and projects, namely the Regional Carrizo Water Supply Program. In April 2012, the 2012 Water Management Plan Task Force began a critical review of the successes and changing circumstances that affected the 2009 Water Management Plan Update from the regulatory, technical, environmental, financial, social, opportunity and risk, and supply-demand management perspectives.

The Task Force consisted of:

- Robert R. Puente, President/CEO
- Kelley Neumann, P.E., Senior Vice President of Strategic Resources
- Doug Evanson, Senior Vice President of Financial Services and Chief Financial Officer
- Charles E. Ahrens, Vice President, Water Resources and Conservation
- Greg Flores, Vice President, Public Affairs
- Steve Kosub, Esq., Senior Water Resources Counsel
- Hope E. Wells, Esq., Corporate Counsel
The Task Force recognizes the expertise, significant contributions, and assistance of a number of SAWS staff. Special acknowledgement is extended to:

- Celina Alvarez
- Steven Bereyso
- Kenneth Brooks
- Steve Clouse
- Adam Conner
- Dan Crowley
- Richard Donat
- Lance Freeman
- Elliott Fry
- Allison Greer
- Lisa Guardiola
- Gary Guy
- Karen Guz
- Lou Lendman
- Carlos Mendoza
- Dana Nichols
- Patrick Shriver
- Steven Siebert
- Darren Thompson
- Stephen Turner

Basis for this Revision of the 2009 Water Management Plan Update and 2009 Water Management Plan Update Adjustment

In the period of time between 2009 and 2012, SAWS and the wider region witnessed numerous developments that changed the elemental building blocks of the 2009 Update, such as:

- **Bexar Metropolitan Water District** – On November 8, 2011, the ratepayers of the former Bexar Metropolitan Water District (BMWD) voted to incorporate the District into SAWS. In the first quarter of 2012, the final state and federal clearances were obtained, and SAWS assumed responsibility for all aspects of BMWD. BMWD customers became SAWS customers under the SAWS District Special Project (DSP) and will be integrated into the SAWS infrastructure, rate schedule, and water resource portfolio. This 2012 Water Management Plan includes SAWS assumed all operations of the former BexarMet in January 2012.
DSP’s existing water supplies and the projected growing water demand of DSP service areas, in addition to the SAWS service areas. In this plan, the term SAWS is used inclusive of SAWS and DSP unless context indicates otherwise.

- **Population** – The SAWS service area population was extrapolated based on a relationship between persons per active residential connection as of the 2000 Census for use in the *2009 Update*. This factor is used to estimate the population served by SAWS and has since improved through the application of Geographic Information System (GIS) analysis and improved accuracy in the count of apartment units. SAWS was able to recalibrate its estimates following the 2010 decennial census. Additionally, population estimates and future projections for other areas were incorporated into this *2012 Water Management Plan*. These include adding the area served by DSP and removing the area in the application by SAWS for a Certificate of Convenience and Necessity area in eastern Medina County and northwestern Bexar County.

- **Changes in Demand** – Future demand estimates are based on past and current demand. The factor used is gallons-per-capita-per-day (GPCD) (total potable water production divided by residential population). SAWS is continually improving measurements of production as well as population. Variability in demand (GPCD) has also been influenced by improvements in the way SAWS measures its production of water and sales to customers, weather variability, shifting customer use patterns by sector and both indoor and outdoor, and the addition of customers from the DSP.

- **Edwards Aquifer Recovery Implementation Program (EARIP)** – The EARIP process was a four year effort that culminated in the adoption of an EAHCP and supporting documents by the SAWS Board of Trustees, other Applicants, and a remarkably diverse set of stakeholders and interest group representatives from throughout the Edwards Aquifer region. The EAHCP is intended to protect Edwards Aquifer users as well as federally-listed threatened and endangered species during droughts. Certain elements in the EAHCP commit SAWS to operate the ASR system in a prescribed-yet-flexible manner should record-breaking drought conditions afflict the Edwards Aquifer region during the term of the EAHCP and to store regionally-leased water in the ASR outside of droughts. The EAHCP also prescribes a change to the Demand Management/Critical Period Management regimen instituted by Texas’ Senate Bill 3 (2007) through the addition of a fifth stage of critical period withdrawal.
reductions on all Edwards Aquifer users. Finally, the EAHCP details an initial commitment of Edwards Aquifer supply permits (8,000 acre-feet per year from SAWS current inventory) towards a Regional Conservation Program administered by the Edwards Aquifer Authority (EAA) and designed to assist municipalities and industries in implementing water conservation measures. The 2012 Water Management Plan incorporates the ASR commitment, the initial commitment to the Regional Conservation Program, and the addition of a fifth Stage of withdrawal reductions to be instituted region-wide only as a last resort measure, or as a back-up for the protective measures identified in the EAHCP.

**Regulatory / Legal** – In the period of time since the adoption of the 2009 Update, groundwater districts, Groundwater Management Areas (GMAs), and the Texas Water Development Board (TWDB) have been cooperatively developing and evaluating Desired Future Conditions (DFCs) for the state’s aquifers. SAWS has evaluated its planned groundwater supply projects in light of the relevant DFCs and the 2012 Water Management Plan incorporates these evaluations. In addition, the Environmental Flows Allocation Process has proceeded through rule-making for several Texas river basins, including the Guadalupe-San Antonio River basin.

**Technical** – Since 2009, SAWS has conducted a number of studies on planned water supply projects. Tests on production and injection wells and a pilot reverse-osmosis treatment plant for the Brackish Groundwater Desalination Program have yielded valuable information on Wilcox Aquifer characteristics, potential plant operations, water quality, membrane performance, and many other items. SAWS has also sponsored studies of the Carrizo and Wilcox Aquifers in southern Bexar County in light of the adopted DFC for those aquifers, existing and planned ASR operations, Brackish Groundwater Desalination Program plans, and identified potential for operational synergies between SAWS and DSP facilities in the vicinity. This study identified potential resources which complement SAWS activities and plans in the area (**see Planned Projects for 2012-2020**). SAWS has continued to store Edwards Aquifer water when possible and recover that water when necessary using the ASR facility, generating new understanding of aquifer storage disposition, water quality, storage capacity, and integration of recovered water with existing and planned infrastructure.

- **Regional Cooperation** – An innovative and historic regional partnership between SAWS, the City of Schertz, the City of Seguin, and the Schertz-Seguin Local...
Governmental Corporation (SSLGC) was signed in February 2011 for the purchase, production, and delivery of the largest non-Edwards supply in SAWS history – the Regional Carrizo Water Supply Program. By working together, each of the partners will realize cost savings. This partnership with the SSLGC will allow SAWS to utilize the SSLGC’s infrastructure to transport water from Gonzales County to San Antonio. Instead of building a new pipeline, SAWS will rent available capacity in an existing pipeline owned and operated by SSLGC, saving SAWS ratepayers over $80 million. This partnership has reduced the cost per acre-foot of the Regional Carrizo Water Supply Program by almost 30%. In addition to the water produced with its owned permits, SAWS will be purchasing water that is presently surplus to the current needs of its regional neighbors such as the SSLGC and the Gonzales County Water Supply Corporation (WSC), effectively investing in neighboring communities by becoming a paying customer of these utilities and reducing the partners’ water costs by over 35%.

This report summarizes the deliberations and results of the 2012 Water Management Plan Task Force, which include: population projections, expected water supply availability during extreme drought, prospects for additional supply development, present and projected water demands, drought demand management, and additional conservation programs. Finally, this 2012 Water Management Plan will chart the path that SAWS plans to pursue in the short term that will contribute to positioning this utility to meet the long-term needs of future San Antonio residents through 2070.

Methodology

This 2012 Water Management Plan Task Force used a similar approach to the 2005 Plan and 2009 Update efforts. The 2012 Water Management Plan was phased as follows:

Population Planning
The SAWS population is calibrated with the decennial U.S. Census. Each intervening years’ population is estimated based upon an assumed relationship between active residential water connections and the Census population. Population estimates are the initial step. Estimates provide factors for (1) future assumptions and (2) growth rates. The estimate is the current population of people served by SAWS and the DSP, and is based on the U.S. Census. The factors generated by SAWS are the GPCD factor and the active water connection to population factor. The active water connection to population
factor considers single family dwellings, apartments, and occupancy rates – the factor may need adjustment over time depending on the dominant residential construction trend. Future population is based on projections by the Texas State Data Center (TSDC) and TWDB, which is then allocated throughout the SAWS service area based on a number of Census, land use, parcel, development, and other variables (see Figure 1).

Figure 1: Factors in Population Projection Allocation

Population Estimate Process
The population estimate methodology is based on the smallest U.S. Census data area, census blocks. There are approximately 27,000 blocks in the SAWS service area. Most of Bexar County is served by SAWS (see Figure 2); however, because of irregular boundaries, the census blocks and the SAWS service area may not coincide (approximately 500 blocks). These blocks must be reviewed more critically and the population allocated. Active connections, location of SAWS services, aerial imagery, and known private wells are all used to correctly allocate the population.

Population Projection Process
Significant resources are invested in future population projections by analysts at various levels of local, regional, state, and federal governments. These professionals conduct reviews and analyses of present land-use variables, development variables, other Census variables, economic forecasts, existing and planned transportation networks, and transportation analysis zones (TAZs) County-level population projections are
provided by the TSDC, adopted by the TWDB, and used for allocation in Bexar County. These projections are the future population projections used by SAWS for water supply planning purposes. Within Bexar County, the allocation process includes all of the factors shown in Figure 1.

At the time of the Task Force’s deliberations, current projections based on 2010 Census data had not yet been fully prepared. Best available data from previous TWDB projections was used.

Figure 2: SAWS and DSP Combined Service Area

In the meantime, there are numerous means of validating the selected population projection. The growth rate trajectory selected appears to be consistent with recent empirical data. Recent declines in growth rates due to overall lower migration and birth rates are within tolerance levels of the projections. The approach undertaken by SAWS utilizes the best available information and is reasonable when compared to other available future population scenarios.
Population Projections

The estimated population of the SAWS service area (including the DSP areas) is 1,651,559 people. By 2070, the population is projected to be 2,799,889 people (see Figure 3). These projections are routinely assessed. Additional analysis is planned for growth within the DSP area, growth impacts from business cycles (such as the Eagleford Shale oil and gas activities, and infill development), and changes in households. In the 2040-2070 portion of the planning horizon, population growth rates in the SAWS service area are expected to be lower than growth rates in areas now served by DSP.

Figure 3: Comparison of past and current plan population projections

Additional Population Considerations

Guidance on population projections from the TSDC, TWDB, Alamo Area Council of Governments, and the Metropolitan Planning Organization are expected in the near future following the adoption of this plan. As this data becomes available, SAWS may consider a 2012 Water Management Plan adjustment or incorporate this information in future plan updates.

Typically, population is defined as residents living in the service area for the previous six months. This includes college, military, other group quarters, and detention center
populations. Not included are tourists and out-of-service-area commuter employees. Senate Bill (SB) 181 (2011) recognized that temporary populations are significant water users. Temporary populations, such as tourists, commuters, and seasonal residents were identified as factors that influence a utility’s population and its total water demand. The TWDB was directed by SB 181 (2011) to issue guidance on, among other things, temporary populations. SAWS conducted a preliminary review of temporary populations for the 2012 Water Management Plan. Utilizing data from the San Antonio Convention & Visitors Bureau and the San Antonio-Bexar County Metropolitan Planning Organization, SAWS identified the primary temporary populations for its service area as tourism and commuters. However, until standardized formal guidance on the methodology for considering temporary populations is established by the TWDB, the 2012 Water Management Plan will utilize only permanent residents for population and demand projections.

Water Demand Planning

Since its inception, the SAWS Water Conservation Program and the water saved through the programming deployed by SAWS has been considered among the best sources of water for San Antonio. The role of water conservation in planning for future water demand cannot be overstated: water that is not used today is water that is available tomorrow and that the community does not need to immediately secure.

Water conservation strategies have been included in every Water Management Plan developed by SAWS. In addition to conservation strategies, drought management strategies have been included as an inexpensive way to defer short term supply needs.

One common factor used when measuring water use and conservation is GPCD. The method of calculating GPCD is often customized by and for each community. This makes it difficult to compare GPCDs from one community to another and sometimes from one Water Management Plan to another. It is important to understand the drawbacks of engaging in what can appear on the surface to be simple comparisons. Many variables are part of the GPCD factor, they vary community by community – there is no uniform approach or set of standards – and identifying a common set of standards for GPCD as a tool remains a statewide work-in-progress. SAWS determines GPCD by dividing total potable water production (excluding wholesale connections) by estimated population (excluding wholesale user populations).
It is important to remain mindful that while the factors that determine GPCD (estimated population or potable water production) may cause the GPCD number itself to change, the commitment of SAWS to effective water conservation has not wavered.

SAWS has a proven track record of reducing water use over time (see Figure 4), and will continue to make improvements.

Figure 4: Monthly Average Residential Indoor (winter) Usage in Gallons 1994 – 2012

Water Demand Planning Goals

The San Antonio region has experienced moderate to severe drought conditions in 2008, 2009, and 2011, with 2011 determined to be the hottest, driest year in Texas in modern times. In 2011, with drought restrictions in place and a robust conservation program continuing, SAWS customers and the customers of the DSP used more water than in previous dry years, resulting in a usage of 143 GPCD\(^1\). This is the current demonstrated baseline of water use for the community during an extreme dry year with moderate drought restrictions.

\(^1\) 143 GPCD was determined using the refined SAWS population and potable water production in combination with 2011 data from the DSP. The 2011 GPCD for the SAWS area (excluding DSP) would be 149 GPCD. Future adjustments may be made based on refined population estimates and improved measurement accuracy for DSP.
The goal of this 2012 Water Management Plan is to reduce dry year demand from the present 143 GPCD to 135 GPCD by the year 2020. Each single incremental reduction in GPCD is enough water for 10,000 people, or a cumulative 1,644 acre-feet per year in dry-year savings.

One of the most widely quoted aspects of the 2009 Update was the goal of 116 GPCD by the year 2016. The current dry year goal described in this 2012 Water Management Plan is not significantly different. The goal of 116 GPCD by the year 2016 reflected normal year demand, with normal years being characterized by well-timed, effective precipitation during the growing season. Less well-understood about the 2009 Update was that the goal for a dry year was 126 GPCD by the year 2016.

The 2009 GPCD goals were developed using an estimated population based on updated factors of population-per-residential-connection to estimate population for years between the decennial Census counts using the annually-updated number of active residential water meters (connections). The publication of the 2010 Census and SAWS efforts in obtaining a more accurate count of the number of multifamily residential units in the SAWS service area revealed that the population-per-residential-connection factor had been over-estimated from the Census accounting of population. During the same time period, production meters were updated with measuring tools capable of greater accuracy. As a result, the population-per-residential-connection factor was updated, the more accurate production water meters, and the resulting refined estimated population for 2011 (as well as that years’ 143 GPCD) was used to compute water demand, and develop the water demand planning goals, for the years 2012 – 2020.

More accurate population estimates (revealing less population than previously estimated in 2011) results in a higher number for GPCD even when the same volume of water is actually used. These data refinements account for the adjustment in the GPCD goals.

The Role of Drought Management (Restrictions)

An important distinction needs to be drawn between conservation and drought management.

Conservation programs and policies are:

- Set in place to address long-term water management goals.
- Applicable to all water users.
- Usually voluntary initially (may become requirements over time).
- Intended to provide incremental, year-round, permanent water savings.
Drought management measures are:

- Only implemented as necessary in a response to climactic conditions and accompanying regulatory requirements when an immediate cutback is necessary.
- Focused on discretionary water use.
- Enforced by mandatory rules.
- Temporary.
- Staged to reflect the severity of the climactic and regulatory conditions.

When drought management measures are in place, customers who have already implemented landscape design and discretionary usage management strategies appropriate to a drought prone region through the incentives and tools provided by SAWS conservation programs, the impact of drought management measures to those customers is reduced.

While this 2012 Water Management Plan is largely driven by SAWS responsibility to comply with state regulations concerning pumping cutbacks of various levels (stages) of severity based on Edwards Aquifer index well levels and springflows, an important distinction can be made between these stages and the stages of drought management implemented by SAWS through City ordinances. Importantly, current ordinance allows SAWS the flexibility to consider whether or not it is necessary to implement stages of drought management with limits more restrictive than Stage Two (i.e. Stages Three, Four, or Five). Given the successful implementation of the water supply projects described in Planned Projects, beginning in 2018 SAWS may find it unnecessary to implement drought management measures with limits more restrictive than Stage Two.

Drought of Record
The drought of 1950-1958 in Texas is accepted as the drought of record for water resource planning purposes for most areas. The 2012 Water Management Plan utilizes the drought of record as the basis of supply availability and drought demand management measures.

Planning for a potential future recurrence of drought of record-like conditions is important for considering future water supply availability. The drought of record is examined to determine the firm yield of a water supply. For the 2012 Water Management Plan, firm yield is defined by SAWS as the volume of water which can be produced from a defined source during a repeat of the drought of record under existing regulatory, legal, contractual, hydrological or infrastructure constraints. In this case, each water supply that SAWS uses is subjected to this definition using models of current
supply management and instrumental records from this extended period of extreme hydrologic scarcity, resulting in an evaluation of each water supply’s maximum volume of water available under each of the constraints (legal, infrastructure, etc.). Whichever constraint is the most restrictive determines the firm yield for that supply source.

The 2012 Water Management Plan seeks to fill permitted supply gaps, with sufficient firm yield volumes of water supply or demand management measures, with the goal of successfully ensuring adequate water availability for:

- All indoor domestic use.
- All commercial, business, and industrial activity.
- Institutions such as schools and hospitals.

**Permitted Supply Gaps during a Repeat of Drought of Record-like Conditions**

A permitted supply gap is determined when the estimated demand on water exceeds the estimated supply during any given year. Since most water resources are regulated and administered through an annual permit, it is typically the case that a shortfall of firm yield is regulatory in nature rather than a physical absence of water during extreme drought or any inadequacy in the infrastructure necessary to access that supply. Therefore, the term permitted supply gap should not be construed as an allowable or hydrological deficit of supplies – rather, it is a term chosen to specifically reflect the primarily regulatory nature of firm yield in South-Central Texas at this time.

**Evaluation of Supply & Demand: What is needed?**

In order to evaluate the impact of drought to SAWS water supplies, each existing supply was evaluated. Each supply’s contribution to firm yield was then assessed against projected annual dry-year demand to identify any potential permitted supply gaps.

**Explanation of current supplies: SAWS & DSP**

SAWS and the DSP presently have access to or will shortly be accessing the following existing water supplies or new water supply projects:

- **Edwards Aquifer Authority (EAA) Permit** – The Edwards Aquifer has been, and will continue to remain, the cornerstone of San Antonio’s water supply into the future. As of April 18, 2012, SAWS holds 294,530 acre-feet per year of EAA-permitted groundwater withdrawal rights. Of this amount, 249,254 acre-feet per
year are owned permits issued to SAWS by the EAA, and approximately 45,250 acre-feet per year is leased to SAWS. Access to these permitted groundwater withdrawal rights is subject to varying levels of availability (cutbacks) depending on a management system using water levels at key index wells and springflows. These cutbacks in any given year may range from 0% to 44%. Managing this wonderfully prolific, highly variable, and heavily regulated resource is one example of what makes San Antonio water’s most resourceful city.

- **Medina System Surface Water** – The DSP brought the first modern surface water to San Antonio in 2000 through an ultra-filtration membrane plant located on the Medina River in southwest Bexar County. DSP agreements with the Bexar-Medina-Atascosa Water Control & Improvement District #1 (BMA) gives DSP access to 19,974 acre-feet per year of water stored in Medina Lake and delivered to the treatment plant via the Medina River. DSP also owns and leases run-of-river surface water rights on the Medina River in the amount of 9,214 acre-feet per year. Presently, the ultra-filtration membrane plant has treatment capacity of up to 13,000 acre-feet per year. However, given the drought-sensitivity of the lake, the limited size of the contributing watershed, as presently managed, firm-yield estimates during extreme droughts, such as the drought of record, is zero acre-feet per year. This is consistent with the South-Central Texas Regional Water Planning Group (Region L) and the TWDB State Water Plan.

- **Recycled Water** – The nation’s largest direct-use recycled water system is being recognized globally by water policymakers and distinguished water management experts for the innovative reuse of treated wastewater effluent for irrigation, industry, and the environment. Along with supporting the activities of the direct recycled water customers and the longstanding partnership with CPS Energy, the recycled water system has also brought new jobs, electricity, economic development, conservation of potable water supplies, recreation opportunities,
and environmental restoration and maintenance – all while managing to conserve up to 75,000 acre-feet of potable water resources every year. The Recycled Water System is yet another illustration of the investments that have made San Antonio water’s most resourceful city.

- **Trinity Aquifer Projects** – A number of production facilities built by SAWS or the DSP utilize the Trinity Aquifer as a water resource to continue serving ratepayers in the high-growth areas of north-central San Antonio. The ability to serve this elevated portion of the service area with up to 8,800 acre-feet in an average year is of significant value during non-drought times. By using operational flexibility to balance the costs to serve this area associated with the energy-water nexus, SAWS and DSP ratepayers save on avoided operating costs. In the *2009 Water Management Plan Update*, SAWS did not consider the Trinity Aquifer to be a firm supply. Given experience managing this resource through the record-breaking drought of 2011 and the conjunctive management now possible between SAWS and DSP Trinity operations, the *2012 Water Management Plan* assigns a firm yield of 2,000 acre-feet per year to this supply.

- **Western Canyon Project** – The first surface water supply contracted by SAWS, the Western Canyon Project supplies two delivery points in north-central and northwestern Bexar County with treated water from Canyon Lake and began serving these areas in April 2006. The Western Canyon Project presently delivers slightly more than 8,000 acre-feet per year with the base commitment of 4,000 acre-feet per year. SAWS participation in this regional partnership among other entities in Bexar, Comal, and Kendall Counties expires in 2037, but options exist to the partners to further extend their participation in this project.

- **SAWS Twin Oaks Aquifer Storage and Recovery Project** – The ASR has been an unquestioned success. With the ability to store water during wet times or low demand seasons, and to recover that water during droughts, peak usage, or when demand on the Edwards Aquifer is high, the ASR has proven to be a very capable water management tool. Presently, the ASR has stored over 90,000 acre-feet of Edwards Aquifer water. The project recovered large volumes of previously-stored Edwards Aquifer water to San Antonio during the drought of 2009 and the record-breaking drought of 2011. With the pending EAHCP, the entire Edwards Aquifer region – from the Texas Hill Country to the coastal bays and estuaries – will soon be joining SAWS in further developing the success of this project. The ASR is San Antonio’s (and soon our regional neighbors’) “savings
account for a sunny day” and is a premier example of what has made San Antonio water’s most resourceful city.

- **Local Carrizo** – Both components of the Local Carrizo project have been fully brought online since the *2009 Update*. Through an Interlocal Agreement with the Evergreen Underground Water Conservation District, SAWS has access to up to 6,400 acre-feet per year of Carrizo Aquifer water associated with ownership of land in southern Bexar County for the ASR Project. The Local Carrizo Project assists in countering the natural subsurface drift of stored Edwards Aquifer water volumes in and around the ASR wellfield. The DSP has the installed capacity to produce an additional 1,000 acre-feet per year, bringing the combined Local Carrizo supplies to 7,400 acre-feet per year for this *2012 Water Management Plan*.

- **Regional Carrizo Water Supply Program** – By the end of 2013, up to 17,200 acre-feet per year of Carrizo Aquifer water piped to San Antonio in cooperation with the SSLGC and the Gonzales Water Supply Corporation. This project will supply SAWS ratepayers with the largest non-Edwards water supply to date through an innovative and cost-saving infrastructure-sharing arrangement approved in February 2011. SAWS will be constructing its own production wells, collection pipelines, raw water transmission pipeline, additional pump-station, SAWS Nacogdoches Road pump-station improvements, and treated water transmission pipeline while financing the SSLGC’s necessary expansion of its’ existing water treatment plant in lieu of constructing over 50 miles of pipeline and two pump-stations originally contemplated in the *2009 Update* (see Figure 5).
Figure 5: Comparison of 2009 and 2012 Regional Carrizo Project

- **Canyon Regional Water Authority (CRWA)** – The CRWA is a partnership of water supply districts, utilities, water supply corporations, and cities which purchase untreated surface water from Canyon Lake through the Guadalupe-Blanco River Authority (GBRA). The water is withdrawn from Lake Dunlap and the San Marcos River, treated to potable quality, and distributed to its member entities. The DSP has an agreement to receive up to 4,000 acre-feet per year of treated surface water from Lake Dunlap. However, of this volume, the DSP has a 500 acre-feet per year lease with the City of Cibolo through 2018. CRWA is also working with its members to develop a Carrizo Aquifer project in Gonzales County and a Carrizo-Wilcox Aquifer project in Guadalupe County known as the Wells Ranch Project. Originally a project of the DSP, CRWA is nearing completion on the first phase of this project. The DSP has an agreement for 2,800 acre-feet per year of Carrizo Aquifer water supplies, for a total of 6,800 acre-feet per year from CRWA sources. In addition, the agreement with GBRA expires in 2024. The agreement between DSP and CRWA concerning the Wells Ranch Project expires in 2047 with an option to extend. These factors have been accounted for in the determination of supply from CRWA sources in this 2012 Water Management Plan.
Planned Projects for 2012-2020

The 2012 Water Management Plan Task Force considered numerous projects to address future water supply needs for a growing city. A brief project abstract and project activity status is presented below for the projects that will be pursued during the Short Term (2012-2020).

Additional Edwards Aquifer Supplies
SAWS will acquire 10,900 acre-feet of Edwards Aquifer permitted groundwater withdrawal rights. Examination of present distribution of permits indicates that this volume of water is available for acquisition through lease or purchase.

Advanced Conservation
In preparation for the 2012 Water Management Plan, SAWS conducted a survey to investigate how other municipal water industry leaders account for conservation in supply and demand modeling. Of the nine large utilities examined from across the nation, two utilities perceived conservation as a supply in their latest planning document (Los Angeles Department of Water & Power’s 2010 Urban Water Management Plan, City of Phoenix’s 2011 Water Resource Plan), while the other seven built conservation into the demand projections. Regionally and state-wide, South Central Texas’ 2011 Region L Plan and the 2012 State Water Plan consider conservation to be a water management strategy to be accounted for as a supply.

In the 2012 Water Management Plan, Advanced Conservation is considered on the supply side in order to maintain visibility on the need for continuous maintenance of the program.

An important benefit of making this shift allows SAWS to more intuitively illustrate the complexity of water demand. The demand line in this 2012 Water Management Plan represents dry-year demand moderated by the implementation of Stages I and Stages II. By adding Advanced Conservation to the supply side of the supply and demand charts, it can be defined programmatically and equated to an annual per acre-foot supply goal (1,644 acre-feet per year). Clearly, this is not a physical source of supply. Rather, it is a supply development avoidance to contribute to meeting the defined permitted supply gaps.

Water suppliers often experience fluctuations in customer demand as weather changes. SAWS is no different. The degree to which hot, dry weather results in greater demand
varies greatly. The basis of the SAWS Water Conservation Program revolves around offering incentives and information to individuals and businesses to voluntarily implement structural and behavioral changes that result in water savings.

Examples of structural changes include:

- Conversion of high-flow toilets to high-efficiency toilets and utilizing more efficient faucet aerators and showerheads.
- Changing industrial process that through new equipment results in less water use.
- Choosing a high efficiency clothes-washing machine.
- Installing attractive landscape designs that require less water.

Examples of a behavior change are:

- Applying only the necessary amount of water to a landscape given site conditions and plant material.
- Turning the water off while cleaning dishes.

While structural changes generally require only a single decision (resulting in a change of equipment or technology to save water into the future), behavioral changes require continual individual water use awareness into the future.

While baseline water use has continued to decrease, peak water has been increasing over the past 10 years. This water use is almost universally attributed to discretionary landscape watering and can be traced to an increased installation of irrigation systems at residential and commercial locations.

Given these changes in use patterns and recognizing the significant success of indoor (equipment-based) conservation, future conservation efforts will be focused toward reducing outdoor water use. SAWS currently administers

SAWS conservation consultants teach homeowners to use water more efficiently.
a robust education program paired with incentives intended to encourage outdoor conservation. These programs will be expanded and enhanced through increased incentives directly to customers as well as an expansion of educational tools that assist SAWS customers with increasing the beauty and health of their landscapes while applying less water.

Based on data collected from thousands of customer landscape consultations and interaction with tens of thousands of SAWS customers over almost 20 years, SAWS has determined that there is great opportunity for reduced peak water use through better landscape design and management strategies that will enhance the beauty and dry-year viability of San Antonio’s landscapes.

**Expanded Carrizo Production**

A potential new project is Expanded Carrizo Production in southeastern Bexar County. As described in *Explanation of Current Supplies for SAWS & DSP*, SAWS already has experience in designing, building, and operating projects that produce freshwater from the Carrizo Aquifer in southern Bexar County. Expanded Carrizo Production is a project to develop additional Carrizo Aquifer wells in southern Bexar County proximate to the ASR site.

Hydrologic modeling was conducted to determine the amount of additional Carrizo production that could be supported given current SAWS and DSP activities in the area and the future operation of the Brackish Groundwater Desalination Program. This analysis also examined whether the project would remain within the limits set by the DFCs for the area, any impacts on water stored by SAWS in the ASR facility, and potential impacts on the well mitigation program.

Potential synergies are present with existing and planned SAWS treatment and distribution infrastructure as well as DSP facilities in the vicinity. This project could leverage the benefits of this existing infrastructure, assist in the management of stored Edwards water in the ASR, and provide a comparatively-low cost water supply near San Antonio while remaining within the current DFCs for GMA-13.

The project will be constructed in three phases starting in 2017 at 7,000 acre-feet per year with subsequent phases planned in 7,000 acre-feet per year increments scheduled for 2022 and 2027. Expanded Carrizo Production ultimately provides 21,000 acre-feet per year of supply for the purposes of the **2012 Water Management Plan**.
Brackish Groundwater Desalination Program

On August 2, 2011, the SAWS Board of Trustees approved proceeding on the Brackish Groundwater Desalination (BGD) program. Development of this previously unusable water resource in close proximity to San Antonio will diversify SAWS water resource portfolio with a wholly new, sustainable, drought-proof supply, without directly competing for access to freshwater resources with neighboring water users, and is consistent with the Region L Water Plan – further illustrating San Antonio’s well-earned reputation as water’s most resourceful city.

The BGD program involves the production of brackish water, water too salty to drink, from the Wilcox Aquifer in southern Bexar County and treatment to drinking water quality standards. The BGD program involves construction of new production wellfields and conveyance pipeline, concentrate disposal wells and disposal pipeline(s), a reverse-osmosis treatment plant, and pump-stations supplying a potable water delivery pipeline from the plant site to the southwestern and western portions of the SAWS service area.

Since the 2009 Update, significant progress and some project modifications have been made. Feasibility studies involving site selection, membrane piloting, pipe-loop testing, and injectivity tests have been conducted. Funding to support portions of the Program has been obtained through the TWDB Water Infrastructure Funding in the form of low interest loans. Land for Phases I and II of the production wellfield has been acquired. Permits from the Texas Commission on Environmental Quality (TCEQ) have been received to drill up to five proposed injection wells. In the 2009 Update, the BGD program was divided into three phases, with the first phase being developed in Bexar County and potential subsequent phases in neighboring Atascosa and/or Wilson Counties. However, studies of the operation of the BGD Program in light of the DFCs for the area set by GMA-13 indicate that it is possible to complete all three phases of the project in Bexar County while remaining within the current DFC for GMA-13. SAWS presently plans to complete all three phases of the Program in Bexar County. However, these DFCs are reviewed no later than every five years and the location and spacing of any potential future phases of
the Brackish Groundwater Desalination project will need to be re-evaluated should changes be made to the DFCs by the stakeholders of GMA-13.

At the time of the adoption of the 2012 Water Management Plan, the first test injection well had been completed, five production wells to support Phase I had been drilled, and the construction process was proceeding on the remaining three production wells. The Program is in the conceptual design phase under a Program Manager with the major design work to start early 2013. SAWS plans to procure a Construction Manager at Risk by the end of 2012 to participate in a constructability review of the design work and to provide overall construction management. Construction on the treatment plant, pipelines, pump-stations, and other facilities is expected to begin in 2013, with the plant commissioning expected in late 2015 and full operation in late 2016, providing 11,200 acre-feet per year of drought-proof desalinated groundwater to San Antonio’s taps. Future phases will bring the total supply from this Program to 28,000 acre-feet.

Request for Competitive Sealed Proposals (RFCSP)

The 2009 Update identified Other Water Supplies as a Long-Range strategy (2035-2060) to help meet and fill anticipated permitted supply gaps. In 2009 and 2010, SAWS staff evaluated various ways of obtaining qualified proposals from vendors that might have water available to provide to SAWS in a manner that provides long-term stability and assurance to SAWS while shifting the development risks to the vendor. It was determined that the best method to accomplish these goals was a Request for Competitive Sealed Proposals (RFCSP). A subsequent amendment to the 2009 Update identified the RFCSP as a mid-term strategy at up to 20,000 acre-feet per year, and increasing in the long-term supply up to 60,000 acre-feet per year of firm yield water supplies.

On January 14, 2011, in accordance with the 2009 Update, SAWS requested competitive sealed proposals for a water supply to supplement future water inventory. The RFCSP document specified that SAWS could accept up to 20,000 acre-feet of water per year in 2020 and might gradually increase the quantity by up to 1,500 acre-feet annually beginning in 2021. Nine proposals were received by the July 22, 2011 deadline. An exhaustive evaluation of nine separate proposals resulted in four of the projects being deemed responsive to the utility’s request. Each proposal was analyzed to determine overall responsiveness and qualifications utilizing pre-determined criteria, including ownership and control of water, proposed solution for delivery, price, financial strength, project management and quality control/assurance.
The final steps of the RFCSP process will be conducted in conjunction with completion of the 2012 Water Management Plan. With the completion of the 2012 Water Management Plan, SAWS expects to update and proceed with the RFCSP. This final stage will include recent critical factors such as the integration of DSP, the EAHCP, and 2010 Census data in making the final determination of the size and timing of the RFCSP. The 2012 Water Management Plan projects that up to 50,000 acre-feet per year could be requested in 2018 and additional water, if available, added as required.

Through the rigorous RFCSP process, SAWS hopes to add further to the city’s diverse water supplies and help achieve its goal of a diversified water supply for San Antonio.

By implementing the supply projects and demand measures as described, SAWS ratepayers will be assured water resource security during the harshest of conditions in the Short Term (see Figure 6).

**Figure 6: Water Supply Projects and Demand Management Measures fill the Short-Term permitted supply gap.**
Planned Projects for the Mid Term (2021-2039)

While the 2012 Water Management Plan expects the dry year consumption to remain at 135 GPCD beyond the year 2020, population is expected to continue to grow, resulting in an overall increase in total demand. For this reason, the Mid Term Program calls for SAWS to execute additional phases of the BGD Program and the Expanded Carrizo project.

The 2012 Water Management Plan outlines a water management strategy that maintains SAWS current supplies, successfully develops supplies in the Short Term, and builds on those supplies in the Mid Term:

- Conservation programming that maintains consumption at 135 GPCD.
- Phase II and III of the Brackish Groundwater Desalination Program (additional 11,200 acre-feet per year by the year 2021, followed by an additional 5,600 acre-feet per year by the year 2026) for a total yield of 28,000 acre-feet for the Program.
- Phase II and III of Expanded Carrizo (additional 7,000 acre-feet per year by the year 2022, followed by an additional 7,000 acre-feet per year by the year 2026).
- The completion of the water supplies identified in the Short and Mid Term Programs will ensure that SAWS has water security – even in a future repeat of drought of record-like conditions – until 2039 (see Figure 7).

Edwards Aquifer Habitat Conservation Plan

The Edwards Aquifer HCP has a term that will expire during this timeframe; however, the necessity to balance the needs of the human users of the Edwards Aquifer and the Federally-listed threatened and endangered species associated with it will remain. Some form of Aquifer management for periods of record-breaking drought stress will be required to continue. While those future forms of Aquifer management cannot be predicted, SAWS has chosen to continue to represent the EAHCP commitment on the water supply and demand charts beyond the expiration of the present HCP to illustrate:

- The potential impact of other means of managing the Edwards Aquifer to maintain minimum continuous springflows to the maximum extent practicable under current law based on the level of understanding SAWS presently has.
SAWS intention to be involved in and possibly support whatever future management measures that may develop.

Figure 7: Water Supply Projects and Demand Management Measures fill the Short-Term permitted supply gap.

Conceptual Projects for the Long Term (2040-2070)

The nature of long term planning requires SAWS to examine what might be expected in the future based on the best information available today. There will undoubtedly be significant new information and technology advancements during the timeframes covered by the Short and Mid Term Programs. New information on population growth, water demand, and the changing water regulatory setting will be evaluated by SAWS with an eye towards this future.

By this time, SAWS experience in desalination will be as established as its leadership in conservation and ASR management is today. It is clear that, even developing the full
slate of planned projects, there could be up to approximately 104,000 acre-feet of permitted supply gap in the worst year of a future drought of record-like event that would need to be addressed.

Some conceptual solutions are:

- Ocean Desalination
- Expansion of Brackish Desalination
- Additional ASR capacity or ASR operations
- Future Regional Water Project(s) (RFCSP)

SAWS has chosen to reveal these potential permitted supply gaps in Figure 8, rather than fill them with the conceptual solutions, but will be actively investigating, evaluating, and preparing a firm foundation upon which to build these future supply projects.

Figure 8: Potential Permitted Supply Gaps to be Addressed in the Long Term
Previous Projects Not Currently Feasible

Some projects from the 2009 Water Management Plan Update are no longer being considered as a source of future water supply. Among these are:

- **Edwards Aquifer Recharge Initiatives** – The deliberations of the EARIP assisted in further refining the feasibility, costs, and benefits of artificially enhancing the recharge of the Edwards Aquifer for the purpose of springflow maintenance, but the results were also helpful in evaluating the concept from the water supply perspective. Additionally, the deliberations of the various Environmental Flows science and stakeholder committees for basins crossing the Edwards Aquifer recharge zone provided insight into the proposed future management of surface water in those basins. The present regulatory environment is not favorable for recharge enhancement initiatives for municipal supply purposes. SAWS views the enhancement of recharge as a public good and continues to support its implementation as a regional benefit, but will not be pursuing the matter from the municipal water supply perspective.

- **Recharge & Recirculation** – The EARIP also considered the feasibility, costs, and benefits of this concept. Given the present regulatory environment and uncertainty in the scientific studies of the concept, SAWS will focus on water supply projects with greater certainty.

- **LCRA-SAWS Water Supply Project** – As part of the successful mediated resolution between SAWS and the LCRA that brought the LCRA-SAWS Water Supply Project to a mediated conclusion, SAWS and LCRA agreed to consultation in the future for the purpose of evaluating and securing additional water through efforts benefiting both LCRA and SAWS. SAWS remains willing to doing so on a cooperative, beneficial, regional basis in the future under equitable planning and cost sharing scenarios.
Contribution to Diversification

A diverse water supply continues to be important to SAWS. While the Edwards Aquifer will always be the cornerstone water supply for San Antonio, the growing population in the SAWS service area will be increasingly served by water supplies from other sources. As the water supply projects described in this plan are implemented, SAWS will be managing an increasingly diverse portfolio of water resources (see Figure 9).

Water Resource Risks

Implementing a successful water resource project is not a simple endeavor, and none are without some measure of risk. While the RFCSP is structured in a manner that provides long-term stability and assurance to SAWS while shifting the development risks to the vendor, should the selected supply project be unsuccessful, aspects of the Mid Term projects could be accelerated.

Figure 9: Combined SAWS and DSP Supplies in Drought Conditions by 2030
Financial Analysis

The projected costs of the 2012 Water Management Plan going forward from 2012 are presented in terms of the projected overall capital costs, the estimated operations and maintenance costs through 2030, resulting cost per acre-foot of water, and the predicted impacts of these costs on customer rates.

The cost projections and rate impact estimates shown are the result of a rigorous financial forecasting process undertaken as part of the SAWS annual budget cycle. The forecasting process considers operating costs, long term capital project requirements, available financial resources, and strategic policy guidelines to produce a comprehensive twenty-year forecast of projected costs, revenues and rate impacts. The forecast provides long range perspective to the SAWS Board of Trustees and the San Antonio City Council in the consideration of annual SAWS budget and rate requirements.

The 2012 Water Management Plan plans to pursue five major projects which together will add up to 111,800 acre-feet of firm water to the SAWS inventory. Listed below are the five projects with the additional acre-feet of water expected from each where applicable:

- **Brackish Groundwater Desalination**: 28,000 acre-feet
- **Expanded Bexar County Carrizo Production**: 21,000 acre-feet
- **Request for Competitive Sealed Proposals (RFCSP) Project**: up to 50,000 acre-feet
- **Acquisition of Edwards Aquifer Water Rights**: 10,900 acre-feet
- **The Water Resources Integration Pipeline (WRIP)**: While this project will not add to SAWS water inventory as a stand-alone project, accelerated construction of the previously planned WRIP is required in order to accommodate the Expanded Carrizo Project and the Brackish Groundwater Desalination Program. Specifically, due to the addition of the Expanded Carrizo Project, the construction of the entirety of the pipeline length is planned to be accelerated from 2022 to 2017. The supply yields for these two projects will not be usable without the WRIP to deliver the produced supplies to San Antonio’s water users.
Projected Overall Capital Costs
The total projected capital cost of these five projects is $583.3 million. Table 1 presents the capital costs by project. Total capital project costs from 2012 going forward are presented. Please note that the RFCSP project will be funded primarily by the SAWS operations and maintenance (O&M) budget since the project will be a contract with a vendor to deliver water on a per acre-foot fee basis annually. The estimated RFCSP capital costs shown here are for the integration of the RFCSP project with the SAWS water distribution system, and will vary widely based on the distribution system point ultimately selected for delivery of RFCSP water.

Table 1: Total Projected Capital Cost by Project

<table>
<thead>
<tr>
<th>Project</th>
<th>2012 WMP</th>
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<tbody>
<tr>
<td>Edwards Aquifer</td>
<td>$64,880,171</td>
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<tr>
<td>Brackish Desalination</td>
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<td>Integration Pipeline</td>
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<td>RFCSP Integration</td>
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<td><strong>Total Capital Costs</strong></td>
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* Capital costs in 2012 WMP do not reflect approved budget amounts prior to 2012.

Estimated Operations and Maintenance Costs
As seen in Table 2, from 2012 through 2030, the cumulative operations and maintenance cost of the 2012 Water Management Plan is estimated to range from a minimum of $1.2 billion to a maximum of $2.6 billion. The costs shown reflect 3% annual inflation. The primary cost driver for the purpose of this calculation is the range of estimated costs shown for the RFCSP project. The range of costs shown for the RFCSP reflects the assumptions made by the 2009 Water Management Plan Update for other potential water projects not specifically identified within the 2009 Update. The 2009 Update estimated that the cost for these other projects could range from approximately $1,000 to $2,500 per acre foot.
Table 2: Cumulative Operations and Maintenance Costs by Project

<table>
<thead>
<tr>
<th>Estimated Operations &amp; Maintenance Costs (2012-2030)</th>
<th>2012 WMP - (Min)</th>
<th>2012 WMP - (Max)</th>
</tr>
</thead>
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<tr>
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<td>RFCSP **</td>
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<td><strong>Total Program Costs</strong></td>
<td><strong>$1,218,802,781</strong></td>
<td><strong>$2,572,597,781</strong></td>
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</tbody>
</table>

* Estimated O&M costs for the Edwards Aquifer do not include Aquifer Management Fees (AMF).

** Estimated O&M costs for the RFCSP reflect the $1,000/acre-ft (Min) and $2,500/acre-ft (Max) range.

Cost per Acre-Foot
The annual costs of the projects planned in the 2012 Water Management Plan per acre-foot are shown (see Figure 10). For comparison purposes, the per-acre-foot calculations of other water supply development projects (other than the five major projects of the 2012 Water Management Plan) are also shown. The costs per acre-foot reflect annual debt service costs plus annual operating costs from the start of project operation through 2030. As discussed previously, the costs shown for the RFCSP reflect: (1) the minimum and the maximum estimated operating costs per acre foot for other potential, but unspecified water projects from the 2009 Water Management Plan Update ($1,000 to $2,500 per acre foot) plus (2) the estimated annual debt service cost per acre foot for the RFCSP Integration capital project ($154). To allow for comparability, inflation is not assumed in the per acre-foot costs. The cost of the Water Resources Integration Pipeline is allocated proportionately among the per acre-foot calculations of the water supply-generating projects supported by the pipeline.
Changes to Baseline Customer Rate Projections

The 2012 Water Management Plan includes this projection of the impact on average monthly customer water and sewer user charges for each year through 2022 (see Figure 11). The charges shown are based on average residential consumption of 7,788 gallons per month of water usage. Additionally, the rates underlying the monthly charges assume system-wide water consumption levels consistent with the GPCD projections presented in the 2012 Water Management Plan.

The chart compares the baseline monthly charge projections based on the 2009 Water Management Plan Update, and new projections based on the recommendations of the 2012 Water Management Plan with two variations reflecting the estimated range of costs for the RFCSP. Specifically, the chart shows three projection lines: (1) the 2009 Update baseline projections, (2) the monthly charges needed to support the 2012 Water Management Plan assuming RFCSP annual operating costs at $2,500/acre-foot (Max), and (3) the monthly charges needed to support the 2012 Water Management Plan assuming RFCSP annual operating costs at $1,000/acre-foot (Min). As previously noted, the range of costs projected for the RFCSP is based on the estimated costs for other potential, but unspecified water projects contained in the 2009 Water Management Plan Update.
It is projected that the costs to begin implementing the 2012 Water Management Plan will impact customer rates relative to the Baseline Projection beginning in 2017. The estimated increase in the average monthly bill over the baseline projection is $16 for RFCSP at $2,500 acre-ft and $8 for RFCSP at $1,000 acre-ft in 2018. The primary driver for the increase is the planned adjustment to the schedule for the RFCSP project which accelerates initial water delivery from the project up to 2018 from 2020, and increases initial delivery from 20,000 acre-feet per year to up to 50,000 acre-feet per year. After 2019, projected rates under both the Current Projection baseline and the 2012 Water Management Plan begin to more closely coincide.

While the adjustments to the RFCSP project schedule and scope increase overall annual operations and maintenance costs in 2018, the amount of water added by the 2012 Water Management Plan over the Current Projection is up to 39,900 acre-feet in 2018 alone.
Public Outreach

SAWS citizen committees, the Citizens’ Advisory Panel (CAP) and the Community Conservation Committee (CCC), received presentations as part of the development of the 2012 Water Management Plan. The membership of these community representative committees provided feedback on the formulation of the 2012 Water Management Plan.

SAWS undertook an extensive public outreach effort to report to the community and receive their views on future water supply planning. These audiences represented the diverse interests of the SAWS service area including stakeholder groups, small business owners, elected officials, and community advisory organizations. SAWS proactively briefed the governing bodies of regional water entities as well.

SAWS hosted four public meetings and presented this 2012 Water Management Plan to nearly forty additional community groups and organizations.

Summary

This 2012 Water Management Plan outlines the actions SAWS will be taking in the short term to acquire additional planned supply sources.

SAWS will be acquiring 10,900 acre-feet of Edwards Aquifer permits. Brackish Groundwater Desalination will add 11,200 acre-feet per year by 2016, with the supply growing to 28,000 acre-feet of total yield by 2026. Expanded Local Carrizo production will add 7,000 acre-feet per year of supply by 2017, adding two additional phases of 7,000 acre-feet each in 2022 and 2026. A Regional Water Supply Project (RFCSP) of up to 50,000 acre-feet is planned for 2018.

Advanced Conservation and temporary Drought Management Measures (Restrictions) continue to be important components of the success of the 2012 Water Management Plan. If these planned supplies and conservation measures are implemented, San Antonio will have firm, drought-proof water supplies through any drought, including a repeat of drought-of-record-like conditions, through 2039.
<table>
<thead>
<tr>
<th>Planned Supply Source</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Edwards Rights</td>
<td>10,900 ac-ft acquired</td>
</tr>
<tr>
<td>Brackish Groundwater Desal Plant</td>
<td>11,200 ac-ft/yr on line in 2016</td>
</tr>
<tr>
<td></td>
<td>22,400 ac-ft/yr in 2021</td>
</tr>
<tr>
<td></td>
<td>28,000 ac-ft/yr in 2026</td>
</tr>
<tr>
<td>Expanded Local Carrizo</td>
<td>7,000 ac-ft/yr on line in 2017</td>
</tr>
<tr>
<td></td>
<td>14,000 ac-ft/yr in 2022</td>
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<tr>
<td></td>
<td>21,000 ac-ft/yr in 2026</td>
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<tr>
<td>Regional Water Supply Project (RFCSP)</td>
<td>Up to 50,000 ac-ft/yr starting in 2018</td>
</tr>
<tr>
<td>Demand Reduction</td>
<td></td>
</tr>
<tr>
<td>▪ Water savings from programs to reduce dry year GPCD to 135</td>
<td>16,500 ac-ft/yr by 2020</td>
</tr>
<tr>
<td>▪ Aquifer Watch</td>
<td>Starts at 660’ Edwards Aquifer level</td>
</tr>
<tr>
<td>▪ Drought restrictions</td>
<td>Starts at 650’ Edwards Aquifer level; 1x per week (spray irrigation)</td>
</tr>
</tbody>
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### Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AF/yr</td>
<td>Acre feet per year Acre foot = 325,851 gallons</td>
</tr>
<tr>
<td>ASR</td>
<td>Aquifer Storage &amp; Recovery Facility / underground storage facility</td>
</tr>
<tr>
<td>BGD</td>
<td>Brackish Groundwater Desalination Program</td>
</tr>
<tr>
<td>BMA</td>
<td>Bexar-Medina-Atascosa WCID #1</td>
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<tr>
<td>BMIAC</td>
<td>BexarMet Integration Advisory Committee</td>
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<tr>
<td>BMWD</td>
<td>Bexar Metropolitan Water District</td>
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<tr>
<td>CAP</td>
<td>Citizens’ Advisory Panel</td>
</tr>
<tr>
<td>CCC</td>
<td>Community Conservation Committee</td>
</tr>
<tr>
<td>CCN</td>
<td>Certificate of Convenience and Necessity</td>
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<tr>
<td>CFS</td>
<td>Cubic Feet per Second</td>
</tr>
<tr>
<td>CRWA</td>
<td>Canyon Regional Water Authority</td>
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<tr>
<td>DFC</td>
<td>Desired Future Conditions</td>
</tr>
<tr>
<td>DOR</td>
<td>Drought of Record</td>
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<tr>
<td>DSP</td>
<td>District Special Project</td>
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<tr>
<td>EAA</td>
<td>Edwards Aquifer Authority</td>
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<tr>
<td>EARP</td>
<td>Edwards Aquifer Recovery Implementation Program</td>
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<tr>
<td>EAHP</td>
<td>Edwards Aquifer Habitat Conservation Plan</td>
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<tr>
<td>GBRA</td>
<td>Guadalupe-Blanco River Authority</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>GMA</td>
<td>Groundwater Management Area</td>
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<tr>
<td>GPCD</td>
<td>Gallons per Capita per Day</td>
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<td>HCP</td>
<td>Habitat Conservation Plan</td>
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<tr>
<td>LCRA</td>
<td>Lower Colorado River Authority</td>
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<tr>
<td>MGD</td>
<td>Million Gallons per Day</td>
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<tr>
<td>RCP</td>
<td>Regional Carrizo Project</td>
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<tr>
<td>RFCSP</td>
<td>Request For Competitive Sealed Proposals</td>
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<tr>
<td>SAWS</td>
<td>San Antonio Water System</td>
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<tr>
<td>SB</td>
<td>Senate Bill</td>
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<tr>
<td>SSLGC</td>
<td>Schertz-Seguin Local Governmental Corporation</td>
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<tr>
<td>TAZ</td>
<td>Transportation Analysis Zone</td>
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<tr>
<td>TCEQ</td>
<td>Texas Commission on Environmental Quality</td>
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<tr>
<td>TSDC</td>
<td>Texas State Data Center</td>
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<tr>
<td>TWDB</td>
<td>Texas Water Development Board</td>
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<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>VISPO</td>
<td>Voluntary Irrigation Suspension Program Option</td>
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<td>WCID</td>
<td>Water Control and Improvement District</td>
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<td>WRIP</td>
<td>Water Resources Integration Pipeline</td>
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<td>WMP</td>
<td>Water Management Plan</td>
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<td>WSC</td>
<td>Water Supply Corporation</td>
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