San Antonio Water System's

Agriculture Water Conservation Program

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SAWS' AGRICULTURE WATER CONSERVATION PPROGRAM

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SAWS HISTORY & CHRONOLOGY

San Antonio has always relied upon the Edwards Aquifer for its water supply. The Edwards feeds the San Pedro and San Antonio springs which, until the middle of the 20th Century, provided the base flow for the San Pedro Creek and the San Antonio River. The springs were the site of Indian encampments centuries ago and were the reason that the Spanish established San Antonio in 1718.

The primary water distribution system in the area was the acequias, or community water ditches. The acequias were supplemented by shallow wells and provided water for both irrigation and consumption. In 1836, the San Pedro Ditch was reserved for drinking and cooking water only; penalties were established for using it for bathing or as a sewer. Although crude, this water and wastewater operation served the City's needs until 1866 when a severe cholera epidemic prompted real efforts to establish a satisfactory water supply system.

Many water development proposals were discussed and subsequently discarded over the years until the City finally entered into a water supply contract with J.B. LaCoste and Associates on April 3, 1877. LaCoste constructed a pumphouse near the headwaters of the San Antonio River in what is now Brackenridge Park. Water pressure operated a pump, which lifted water to a reservoir near the old Austin highway on the present site of the Botanical Gardens. This site was high enough for the water to flow by gravity into the distribution system.

In 1883 a new company, led by George W. Brackenridge, acquired the water system. Recognizing that the source of the springs was possibly a subterranean reservoir under high pressure, Brackenridge proposed that his firm purchase property along the river and drill a well. In 1889, the first artesian well was bored in what later became Brackenridge Park. By 1900, all of the system's water was obtained from artesian wells linked directly to the distribution system.

In 1905, George Brackenridge sold his interests in the water company to George Kobusch of St. Louis. At that time the name was changed to the San Antonio Water Supply Company. Shortly thereafter, Mr. Kobusch sold the business to a Belgian syndicate. The Belgians sold the waterworks to a group of local investors in 1920. Contract and rate disagreements marred the relationship between the City and the new water entity. In 1924, the company demanded a rate increase, and since an agreement could not be reached, the new rates were put into effect and the City was enjoined from interfering. This situation prompted the City to issue seven million dollars in revenue bonds and purchase the system outright. On June 1, 1925, the utility became known as the City Water Board (CWB) and its management was placed under a Board of Trustees appointed by the City Council.

During the Depression and the war years the City Water Board was able to keep pace with increasing demand without much difficulty. However, the post-war building boom and the impact of the 1950's drought significantly taxed the Board's capabilities.

In 1979, a committee established by the City Planning Commission reported to the City Council that San Antonio should pursue the necessary federal and state permits to construct San Antonio's first surface water supply project known as the Applewhite Reservoir. The Water Board received the state permit from the Texas Water Commission in 1982, and the 404 Permit from the U.S. Army Corps of Engineers on August 28, 1989. Construction on the Lake began a few months later. On May 4, 1991, the citizens of San Antonio, by a narrow margin, voted to discontinue the Applewhite Project.

In 1989 the City of San Antonio asked the State Legislature to pass a bill, which would permit the creation of a district devoted to reuse of the municipality's effluent. The Governor signed senate Bill 1667, which established the Alamo Water Conservation and Reuse District, on June 16, 1989. In 1991, the District applied for a permit to divert water from the Leon Creek Plant for reuse purposes.

The controversy brought on by competing water agencies prompted the City Council to vote in December 1991 to establish a single utility responsible for water, wastewater, stormwater, and reuse.

The refinancing of $635 million in water and wastewater bonds made the merger possible. A new entity, The San Antonio Water System (SAWS), became a reality on May 19, 1992.

SAWS was created through the consolidation of the City Water Board (the previous city-owned water supply utility); the City Wastewater Department (a department of the city government responsible for sewage collection and treatment); and the Alamo Water Conservation and Reuse District (an independent city agency created to develop a system for reuse of the city's treated wastewater).

SAWS also owns and operates as a separate utility the former City Water Board's chilled water and steam plant, which is a centralized heating and cooling system for the buildings in and around HemisFair Park.

SAWS was also assigned the responsibility for complying with federal permit requirements for treatment of the city's stormwater runoff. In addition, the water resources planning staff of the City Planning Department was realigned to the new agency, to give it a complete package of related functions.

An important component of SAWS' planning role is the responsibility to protect the purity of the city's water supply from the Edwards Aquifer, including enforcing certain city ordinances related to subdivision development.

EDWARDS AQUIFER GEOLOGY

The Edwards Aquifer is intensely faulted and fractured carbonate limestone that lies within the Balcones fault zone. The dynamics and size of this geologic anomaly make it one of the most wondrous aquifers in the nation, through its storage capacity, flow characteristics, water producing capabilities and efficient recharging ability.

The Edwards aquifer and its catchment area in the San Antonio region is about 8,000 square miles and includes all or part of 13 counties in south-central Texas.

The recharge and artesian areas of the Edwards aquifer underlie the six counties south and east of the Balcones fault escarpment. The aquifer underlies approximately 3,600 square miles, is about 180 miles long from west to east and varies from 5 to 30 miles wide. The Edwards aquifer receives most of its water from the drainage basins located on the Edwards Plateau. The catchment area, about 4,400 square miles, contains the drainage basins of the streams that recharge the Edwards aquifer.

In the San Antonio region, the Edwards limestone attains a thickness of approximately 450 to 500 feet. The water wells supplying SAWS customers' number a total of 92 with an average daily pumpage of 136.50 million gallons per day or 418 acre-feet. From 1934 through 1994 the average recharge to the Edwards aquifer was 676,600 acre-feet.

EDWARDS AQUIFER ZONES

Stretching across portions of ten counties, the Edwards Aquifer is 180 miles long with a width that varies between five and 40 miles. Its primary geologic component is Edwards limestone, and it is one of the most permeable and productive aquifers in the United States. The Edwards Aquifer occurs in three distinct segments: the drainage zone, the recharge zone and artesian zone.

Drainage Area (Contributing Zone)

The area north and west of the aquifer is called the Edwards Plateau or more commonly, the Texas Hill Country. Portions of this area serve as the catchment or drainage zone of the aquifer.

Including all or part of thirteen counties, Edwards, Kinney, Real, Uvalde, Kerr, Bandera, Medina, Gillespie, Kendall, Bexar, Blanco, Comal, and Hays counties. The drainage area is the largest component of the aquifer system, spanning approximately 4,400 square miles. Rain falling in the drainage area soaks into the limestone of the plateau forming spring-fed streams. These streams flow over relatively impermeable older rock formations until they reach the recharge zone.

Recharge Zone

The recharge zone is geologically known as the Balcones Fault Zone. An abundance of Edwards limestone exposed at the surface, with its permeable and porous nature, provides the path for water to reach the artesian zone.

Recharge is water that enters the aquifer through features such as fractures, sinkholes and caves. Streams from the Edwards Plateau flow across the recharge zone, percolating into the ground. Rain falling directly on the recharge zone also percolates into the ground and enters the Edwards Aquifer.

The recharge zone encompasses approximately 1,500 square miles and forms the northern boundary of the artesian zone in Kinney, Uvalde, Medina, Bexar, Comal and Hays counties. Although average precipitation is greater in the eastern counties, the largest amount of recharge to the Edwards Aquifer occurs in the catchment area of the western counties. The Nueces River basin, the Frio-Sabinal River basins and the Seco-Hondo Creek and Medina River basins (located in Kinney, Uvalde and Medina counties) supply about 70 percent of the total recharge to the aquifer. These western basins are characterized by larger catchment areas and larger recharge areas than those in the east.

Artesian Zone

The Edwards Aquifer has great capacity for storing and moving water. The artesian zone is a complex network of interconnecting spaces varying from microscopic pores to open caverns. The artesian zone differs from the recharge zone because it is located between two relatively less permeable layers that confine the water and pressure the system.

The artesian zone underlies all or a portion of the ten counties south and east of the Balcones Fault Zone. Those ten counties are Kinney, Uvalde, Medina, Bexar, Comal, Hays, Atascosa, Guadalupe, Frio and Zavala counties. The artesian zone spans 180 miles from west to east, and varies from less than one to 35 miles wide, underlying about 2,100 square miles. Water cannot seep directly into the artesian zone from the ground surface because of impermeable layers, such as clays, between the surface and the aquifer.

In certain places where there is enough artesian pressure, some of the water is forced to the surface through faults, forming springs. Artesian pressure can also cause some wells to flow without a pump. Water leaving the aquifer is referred to as discharge. Water is discharged from the aquifer through springs or wells.

EDWARDS AQUIFER HISTORY

For centuries, people settled in the Edwards Aquifer region, because of the abundance of fresh, pure spring water. The Edwards Aquifer has supported civilization for more than 12,000 years and today it is the primary source of water for about 1.7 million people.

The southern portion of the Edwards Aquifer is one of the world's unique groundwater resources, extending 180 miles from Brackettville in Kinney County to Kyle in Hays County. While it is our primary source of water, it is the sole-source of water for a unique system of aquatic life, including several threatened and endangered species. Cities, towns, rural communities, and farm and ranch lands all depend on the aquifer's water for household, agricultural, industrial and recreational purposes. The diversity of uses illustrates the importance of the aquifer to the lives and livelihoods of residents in the Edwards Aquifer region.

For years, it was thought the Edwards Aquifer was a never-ending supply of fresh drinkable water. In 1940, the region was pumping 120,000 acre-feet of water or 39 billion gallons, a year. But in the 1950s, a seven-year drought drastically lowered water levels in the aquifer. In the 1980s and 1990s, droughts of shorter duration occurred, requiring heavy pumping from wells. Also, average pumping from Edwards wells has increased dramatically in the last five decades because of population growth and demand. In San Antonio alone, population has increased from about 200,000 people in 1940 to more than one million in 1990. Populations of other communities in the region, such as Uvalde, Hondo, New Braunfels, and San Marcos have also grown. In 1989, regional pumping reached a maximum of 542,000 acre-feet of water per year - more than 175 billion gallons. In the 1990s, the amount of aquifer water pumped ranged from 327,000 acre-feet in 1992, to 493,000 acre-feet in 1996. Average springflow discharge from 1934 to 1999 is 366,700 acre-feet a year.

The Edwards Aquifer will continue to be the primary source of water for the region. Various groups and entities in the Edwards Aquifer region have undertaken the difficult task of addressing present and future water needs. The need for planning is continuous. The need for stewardship is essential. The need for management is critical.

BACKGROUND ON THE EDWARDS AQUIFER AUTHORITY

In 1959, following several years of intense drought, regulation of the Edwards Aquifer began with the creation of the Edwards Underground Water District (EUWD) by the 56th Texas Legislature. The EUWD was given a limited mandate to protect the Edwards Aquifer as a resource, but it was not given regulatory powers to limit withdrawals. The Texas Water Quality Act of 1967 empowered the Texas Water Quality Board to protect underground water quality. Following a short but intense drought in 1984, the counties overlying the Edwards Aquifer began to develop mutually supporting conservation and drought management plans.

During the late 1980s the State Legislature began to seriously consider regulating groundwater withdrawals from the Edwards Aquifer. The EUWD Act was revised in 1987 to require the District to adopt a Drought Management Plan to relieve some of the stress on the Comal and San Marcos Springs. Two years later a proposal to regulate groundwater under an Edwards Aquifer Management Plan failed and a Legislative Committee was appointed to study the Edwards Aquifer.

In 1991, the Sierra Club filed a lawsuit against the U.S. Fish and Wildlife Service of the Department of the Interior alleging violations of the Endangered Species Act at the San Marcos and Comal Springs. The premise of the lawsuit (Sierra Club et al. v. Manual Lujan, Jr.) was that the Fish and Wildlife Service had failed to protect endangered species by allowing Edwards Aquifer users to overdraft the aquifer.

In February 1993, U.S. District Court Judge Lucius Bunton handed down judgment in the case. The judgement identified minimum springflow requirements for Comal and San Marcos springs and "strongly suggested" the Texas Legislature develop a regulatory system to avoid "unlawful takings" of endangered species by May 31,1993.

Senate Bill 1477 was passed by the 73rd Texas Legislature on May 23, 1993, and it was signed by the Governor on June 11, 1993. This Act established the Edwards Aquifer Authority as the successor to the Edwards Underground Water District, effective September 1, 1993. After court challenges, the newly created EAA began operations at the end of June 1996.

REGULATION BY WITHDRAWAL LIMITS

The EAA's general mandate is to protect terrestrial and aquatic life, domestic and municipal water supplies, the operation of existing industries and the economic development of the state by managing the aquifer as a regional resource. Its primary purpose is to regulate groundwater withdrawals from the Edwards Aquifer in order to ensure an adequate supply to the region's historical users and to maintain springflow at Comal and San Marcos Springs.

The EAA is required by its enabling Act to limit withdrawals from the aquifer to 450,000 acre-feet per year and to further reduce withdrawals to 400,000 acre-feet per year by 2008. The Act also provides for increases in these pumping limits if the yield from the aquifer can be increased through recharge enhancement projects or other management technologies to protect springflows. In addition, SB 1477 requires the EAA to implement and enforce water management practices, procedures, and methods to ensure that, by December 31, 2012, continuous minimum springflows at Comal and San Marcos Springs are maintained to protect endangered and threatened species.

The statutory withdrawal limit is being implemented through a groundwater permitting process. Every Edwards aquifer user, with the exception of domestic and livestock well owners using less than 25,000 gallons a day, will be required to obtain a permit with a specified annual limit on aquifer water withdrawal. SAWS' current water use is approximately 170,000 acre-feet per year, and its historic high pumping (the basis for its permit application) was 193,944 acre-feet in 1984. SAWS has recently agreed to a permit of 159,000 acre-feet, which represents the Systems 21-year average.

REGULATION BY CRITICAL PERIOD MANAGEMENT

In addition to the annual withdrawal limits from the aquifer described above, withdrawals will be further reduced during "critical periods" of low rainfall or reduced springflows through further restrictions on water uses and monthly limits on total water use. These reductions are governed by the Critical Period Management Plan originally adopted by the EAA in December of 1996 and amended to the present rules that are in place today. During critical periods, SAWS' withdrawal permits will be reduced from ten to twenty-three percent of the summer demand peak, depending on the severity of the critical period. Prudent planning requires that sufficient supplies be acquired to reduce the impact of these water use restrictions in the future.

SAWS' AGRICULTURE WATER CONSERVATION PPROGRAM

During the last twenty years, 21 to 36 percent of the total Edwards Aquifer water use has been for agriculture use; therefore, agriculture water conservation is an important component in reducing the demands on the Edwards Aquifer. SAWS, as a good neighbor, is supportive of the rural economies. To stretch the use of this limited resource, the SAWS Water Resources Department created in 1999, **the Agriculture Water Conservation Program**.

The AWCP supports research projects in agriculture water conservation. The AWCP has joined other partners in supporting financially, research in brush control, juniper water use, drip irrigation, the development of crop coefficients, and irrigation scheduling. The AWCP supports the creation of the Irrigation Technology Center (ITC) in San Antonio. The ITC is associated with the Texas A & M University System. Some of ITC's duties will be to offer demonstrations in landscape water conservation and certifications for irrigation equipment. We are currently funding agriculture water conservation studies with the following regional partners: Lower Colorado River Authority and Guadalupe-Blanco River Authority in the adjoining basins for future water supply projects. We have made improvements in irrigation efficiency on farms, purchased by SAWS for their Edwards Aquifer water rights. We will finance improvements in irrigation efficiency for farmers that participate in irrigation scheduling projects in exchange for conserved water.