BURNS McDONNELL

CASE STUDY

Equus Beds Aquifer Storage and Recovery Key Component of Sustainable Resource Management

As the largest city in Kansas continued to grow, its water resources remained limited, posing a threat to the local water supply. City of Wichita officials knew the situation was unsustainable. Burns & McDonnell was hired to evaluate the situation, develop solutions, and to implement strategies and projects for the city and its journey toward water supply sustainability.

Challenge

When declining groundwater levels and water quality issues were identified in Wichita, city leaders opted to launch a comprehensive search for solutions: Identify and establish water conservation strategies, optimize utilization of existing resources and secure potential additional water sources. The solutions would prevent existing supplies from depleting and address emerging water quality concerns.

City officials selected Burns & McDonnell to evaluate a broad range of ideas, options and approaches to identify an innovative and comprehensive solution. Water conservation and strategic resource management solutions were needed.

Project Stats

Client
City of Wichita, Kansas

Location
Wichita, Kansas

Team
Burns & McDonnell, Alberici Constructors, CAS Constructors

$74M
FINAL TOTAL COST, PHASE 2

$30M
SAVINGS FROM ORIGINAL BUDGET

35K
ACRES OF AQUIFER RESTORED

Solution

A modified water rate structure and the establishment and promotion of a water conservation program significantly reduced projected demand increases and associated water supply deficits. By making customers aware of how much water they were using and giving them the tools and resources to manage their water use, the conservation program was successful. Ratepayers now have more insight into how much water they use, allowing for people to self-regulate. This created motivation for customers to reduce water use to save money and ultimately conserve water resources.

Resource optimization focused primarily on the greater use of surface water when surface water sources are abundant and resulted in significant reduction of stress on the Equus Beds Aquifer, which is the city's primary source of groundwater. Options to develop or acquire additional water supply sources regionally were limited.

City officials also selected an innovative option centered on capturing, treating and storing intermittently available resources for future recovery and use. Equus Beds Aquifer Storage and Recovery (ASR) is a creative and innovative program used for capturing and treating water from the Little Arkansas River during high-flow periods. Treated water is then stored in the depleted areas of the Equus Beds Aquifer. ASR was structured as a dynamic program that could adjust to fluctuating water demands, changing aquifer conditions, evolving technology, resource management strategies and overall program goals.

As the centerpiece of Phase 2 of the ASR program, Burns & McDonnell provided design-build services for new surface treatment and river intake systems, which together had been projected to cost $104 million — but value engineering and optimized construction methodology helped deliver the project at $74 million, a savings of $30 million.

The unique system combines membrane filtration and advanced oxidation to remove atrazine and other contaminants from as much as 30 million gallons of raw water from the Little Arkansas River, operating only when the river is above established flow triggers. Coordination with the Kansas Department of Health and Environment was a critical element of the planning, design and construction. During the permitting process, protecting ground water quality in the project area was a priority.

The treated water is used both to recharge the aquifer and establish a source of supply for future use. The focus and innovative aspect of ASR is the utilization of a transient water resource that is normally unavailable when it would be needed.

The final design and construction of the river intake and treatment facilities was completed as a design-build project by the team of Burns & McDonnell, Alberici Constructors and CAS Constructors. The recharge wells and basins were designed by Burns & McDonnell and constructed as a design-bid-build project.

Results

In delivering the first ASR project in Kansas, the project's planning team worked with multiple state agencies and conducted a wide-ranging public relations and awareness campaign. The combined results of resource optimization, conservation and ASR implementation have resulted in the restoration and recovery of the Equus Beds Aquifer in the project area to near predevelopment conditions. Continuing efforts focus on system enhancements reflective of current conditions and program goals.

Award-Winning Water Works

Among project honors received:

- Water Project of the Year Finalist, Global Water Summit
- Design-Build Institute of America Mid-America Regional Award
- Engineering Excellence Award, American Council of Engineering Companies (ACEC) of Kansas
- National Recognition Award, ACEC
- Spotlight project, U.S. Water Alliance's One Water Leadership Conference

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