

## **A Sustainable Water Supply for the City of McPherson**

The Equus Beds Aquifer is a critical source water of for irrigation, industrial, and municipal use that supports a population of over a half a million people in south central Kansas. This includes the City of McPherson who maintains a wellfield operated by the McPherson Board of Public Utilities (BPU) located within and near the City of McPherson.

The current water supply for the City of McPherson is provided by a well field located within the McPherson Intensive Groundwater Use Control Area (IGUCA). The sustainable yield of the Equus Beds aquifer in the McPherson IGUCA has been exceeded causing ongoing groundwater declines. In 2005 the Bureau of Reclamation (BOR) developed a water supply augmentation study for the City of McPherson. In this study, the BOR estimated current total demands including municipal, industrial, remedial, and irrigation to be approximately 11,600-acre feet per year (AFY). The sustainable yield of the aquifer has been estimated at only 10,000 AFY by the Kansas Geological Survey (KGS). BOR also projected that demands will increase to over 12,000 AFY on average by the year 2040. These estimates result in a current sustainable regional water supply deficit of approximately 1,600 AFY and a projected 2040 deficit of greater than 2,000 AFY.

An additional review of reported water use for the McPherson IGUCA indicates that total consumptive use already exceeds an average of 12,500 AFY over the period of 2000 through 2014. During dry years such as 2006, 2011, and 2012, total demand from the aquifer can surpass 15,000 AFY. The BOR findings, recent water use data, and a McPherson IGUCA report issued by the Kansas Division of Water Resources (DWR) Chief Engineer indicate that without a significant reduction in the amount of groundwater pumped in the area, water levels within the McPherson BPU well field will continue to decline.

- In response to declining water levels and at the recommendations within the 2005 BOR Study, McPherson BPU along with the City of McPherson initiated, planned, and implemented several programs and projects to secure a sustainable water supply for the future of the region. These

programs align closely with Equus Beds – Walnut RAC Priority Goals and Action Plans.

These programs included:

- Wastewater reuse and recycling: The City of McPherson provides a significant percentage of its treated wastewater effluent to CHS refinery for additional treatment and subsequent reuse to support cooling and process requirements within the refinery. The result is decreased demand and stress on CHS Refinery and BPU water resources providing value to all aquifer users.
- Treatment and utilization of impaired water resources:
  - McPherson BPU is currently treating and utilizing groundwater impacted by Volatile Organic Compounds (VOCs) as part of the public water supply (PWS) system. This project combines groundwater remediation and beneficial reuse of the treated groundwater to minimize the impact on the local aquifer.
  - McPherson BPU also constructed a water blending facility to manage nitrate impacted water resources within their water system. This initiative allows for continued use of the local groundwater resources that would be unusable for PWS if not effectively managed.
- Acquisition of available irrigation water rights:
  - BPU has acquired water rights in the McPherson IGUCA and placed them in the Water Rights Conservation Program (WCRP) reducing aquifer stress and preserving water for future use.

To further address the augmentation needs as described in the BOR Study BPU began the evaluation of an opportunity to acquire property approximately twenty miles south of McPherson in a highly rechargeable area of the Equus Beds Aquifer. The property is located outside of the McPherson IGUCA within a region of sandhills that has not been compatible with agricultural development. The

absence of irrigation in the area has resulted in the availability of a significant quantity of sustainable groundwater rights. The evaluation and permitting process associated with the development of new water rights (approximately 2,900 AF) included site specific and areal water quality analysis along with groundwater modeling to analyze the impacts of well field development on long term groundwater conditions. Of particular concern was the chloride contamination in the vicinity sourced from historic oil field brine disposal. The groundwater modeling indicated that the existing chloride contamination would not be mobilized by the development of the new well field. A network of monitoring wells was also constructed to facilitate future groundwater level and water quality monitoring.

The McPherson South Wellfield (SWF) project will consist of the development of three new public water supply wells, well houses and appurtenances, raw water collection piping, power supply, and access roads to each new well site. The new well field is approximately twenty miles south of McPherson and will require the construction of a new 20" water transmission line to an existing Water Blending Facility. The water quality associated with the new source of supply will require treatment prior to distribution to support existing finished water quality goals. New primary treatment will consist of iron and manganese removal using Greensand filtration. The new water treatment facility design will also accommodate the potential for future finished water quality treatment. Finished water from the new treatment facility will be blended with current groundwater supplies and introduced into the distribution system through the existing High Service Pump Station.

The SWF and new treatment facilities are a critical next step in pursuing a sustainable groundwater supply for the City of McPherson and surrounding aquifer users. The future of continued economic growth in agriculture and industry in the area depends upon a sustainable water supply for all aquifer users. The City of McPherson is home to multiple critical industrial, manufacturing, and refinery facilities that rely upon a local sustainable water supply.

The development of the McPherson SWF Project will reduce the stress on the existing well field and allow for operation of groundwater wells within sustainable

levels to the benefit of all water users within the McPherson IGUCA. Additionally, future consideration may be given to remedial, or water supply management strategies focused on reduction of chloride contamination in the area north of the SWF. The SWF Project directly aligns with the first two priority goals of the Equus Beds-Walnut Regional Advisory Committee priority goals.

**Priority Goal #1: Promote sustainable balance of groundwater withdrawals with annual recharge in the Equus Beds Aquifer.**

**Priority Goal #2: Encourage the development and use of comprehensive water supply plans by major water users in the region. Plans should account for long-term supply and demand, vulnerabilities within a water supply system, and potential for improved water efficiency.**