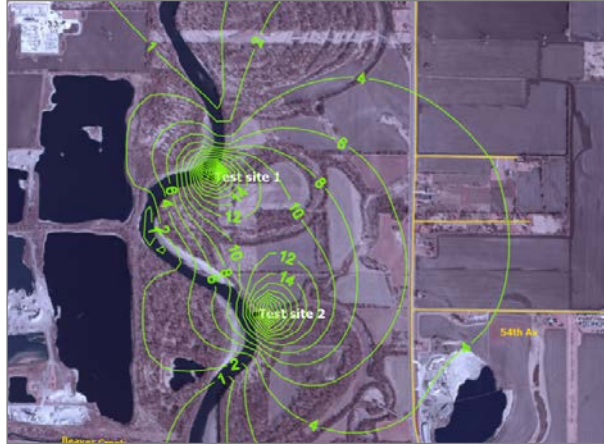


Optimizing Collector Well Design

Saylorville, Iowa



Modeled drawdown caused by two collector wells at the Saylorville Well Field.

Key Project Areas

Collector Well Design

Collector Well Construction

Regulation

Water Quality

To meet increasing water demands, Des Moines Water Works hired Layne to determine optimal designs for two radial collector wells along the Des Moines River. The designs had to balance three criteria: maximize total yield, minimize construction costs, and minimize treatment costs.

For this project, Layne developed a new, efficient framework for designing collector wells based on groundwater flow modeling. Our new method allows realistic representation of the effects of stream properties, lateral elevations, and lateral orientation on yield. Also, we were able to quantitatively compare source water quality and construction and operation costs between the alternate designs.

We used two groundwater flow models to analyze collector well design: a regional two-dimensional model and Layne's patented collector well 3-D modeling tool (Patent No. 7,769,574). Twelve collector well designs that varied in the number of lateral arms, arm elevation, screen length, and orientation were evaluated. Our methods allowed us to estimate well capacity, the percent of surface water captured, and production per unit length of screen.

Layne's Ranney Group constructed the two collector wells in 2008. The post-construction performance test concluded that Layne's study, as intended, conservatively underestimated the wellfield's capacity.

