

Cooperative Efforts Solve Irrigation Challenges:

NRCS Assists with New Irrigation System in Bismarck



The Natural Resources Conservation Service (NRCS) Plant Materials Center (PMC), Lincoln Oaks Nursery (LON) and Cottonwood Park, operated by the Bismarck Parks and Recreation District (BPRD), all require on-demand irrigation water in order to successfully operate throughout the summer. The PMC and LON originally irrigated through the use of on-site wells. However, poor water quality forced these operations to investigate other options. In 1991, through an agreement with neighboring Cottonwood Park, an irrigation intake was installed on the bank of the Missouri River on Fox Island. An easement was granted for installation on a private residential lot. This pumping system supplied irrigation water to both the PMC and LON. A new line was also installed to provide service to neighboring Cottonwood Park.

Issues with the system were identified after a few years of operation. With the pumps being located below ground and operated with complex automatic controls, the system required constant maintenance and repairs. The system was reconstructed in 2012, in response to flood damages and corrosion. The same problems persisted, and the system was unable to provide the required irrigation water for all three entities. Cottonwood Park began irrigating using treated city water at their own expense. Additionally, both LON and the PMC were forced to purchase city water to meet irrigation needs when the system was inoperable. In 2015, the PMC requested assistance from the NRCS ND State Engineer to develop viable alternatives for a

dependable, functional and low maintenance irrigation system.

After evaluating a number of alternatives, it was decided to pursue installing a new pipeline and changing the intake location from the private residence to a location further south along the Missouri River at East Sibley Nature Park. This land is owned by the U.S. Army Corps of Engineers (USACE) but is operated and maintained by the BPRD as a series of nature trails. Rather than housing multiple pumps below ground in a concrete vault, a floating intake was designed, as it is more typically used in irrigation systems utilizing surface water. With the potential to provide irrigation water once again to Cottonwood Park, the BPRD (in conjunction with the USACE) agreed to allow the necessary development and use of the site.

The NRCS Bismarck State Office engineering staff designed the system to provide adequate irrigation water to all entities. The pipeline route was designed to be installed entirely within Burleigh County right-of-ways (ROW), except for a small length that utilized an existing utility easement across a private lot. The county engineering department was consulted and approved installation, which included the clearing of portions of the ROW. Crowded utility corridors along the pipeline route presented challenges during construction, but ultimately proved successful.

Weisz & Sons, a local contractor out of Bismarck, began work on the system in the fall of 2017. Construction



A floating irrigation pump was installed in the Missouri River.

presented many challenges, but the contractor and engineering staff were able to use each issue as an opportunity to develop a solution. Initially, the project was scheduled to be completed in the summer of 2018. However, the summer of 2018 experienced high-water levels on the Missouri River. With the pipeline being installed in the flood plain of the river, the groundwater levels were directly affected. The abnormally high groundwater in the project area prevented installation of the buried pipe; constant dewatering of the four-mile pipeline route was not reasonable given that portions of the pipe were installed up to 15 feet in depth. These depths would have been approximately six feet underwater. Thus, pipeline construction was halted until the water levels receded.

Other associated work on the existing infrastructure was able to be completed, but ultimately the contract was extended into the following year. With continued development of southern Bismarck, the ROWs are rather congested with existing utilities such as gas, rural and city

water, communication, and electric services. At road crossings, where the new pipeline was to be bored, design elevations and grades were often required to be altered to maintain proper clearances and avoid potential damages. In addition, the pipeline was installed to specified grades to allow the system to be drained prior to winter. Strict tolerances were required to ensure proper drainage of the system over relatively flat ground. GPS grade equipment was used to ensure the pipeline was installed as designed. Each challenge was dealt with successfully, and construction was completed in the summer of 2019.

Following the completion of construction, the new system was deemed operational. Both the PMC and LON were able to successfully water for the remainder of the 2019 irrigation season. In the spring of 2020, all users, including Cottonwood Park, began irrigating with the new system. The new system is successfully providing irrigation to three users and is anticipated to save substantial money, as treated city water is no longer required to be purchased.



Trenching and pipe installation.

The pipeline was installed to a specified grade and at varying depths.



The clearing of East Sibley Nature Park for pipe installation.



The cleared area developed as additional nature trail in park.