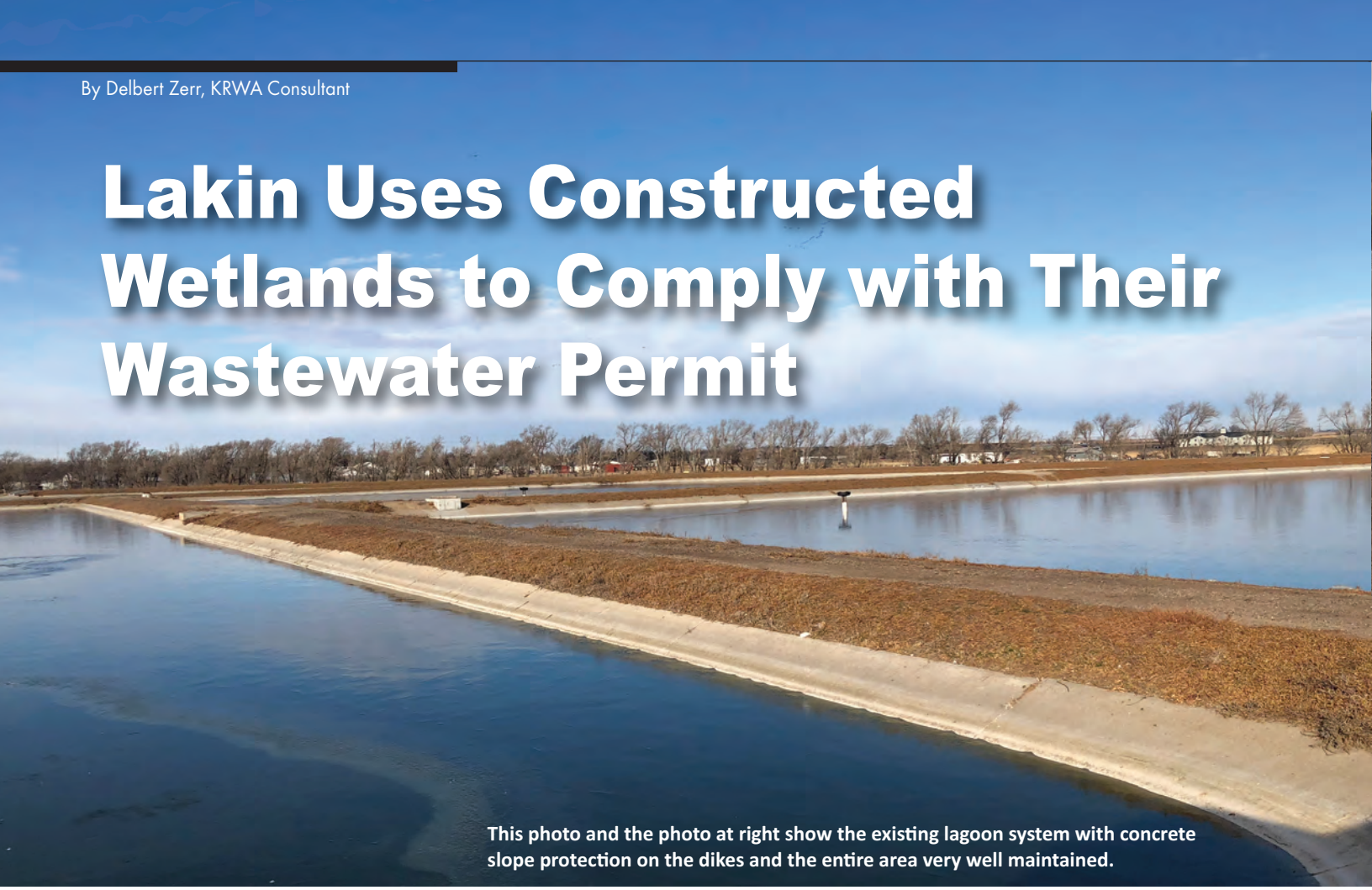
By Delbert Zerr, KRWA Consultant

Lakin Uses Constructed Wetlands to Comply with Their Wastewater Permit



This photo and the photo at right show the existing lagoon system with concrete slope protection on the dikes and the entire area very well maintained.

Lakin is located at the intersection of U.S Highway 50/400 and State Highway 25 in the west-southwest part of Kansas, about 25 miles west of Garden City. The city was founded in 1873 and has served as the county seat since 1894. Like so many cities in Kansas, wastewater treatment has been an ongoing issue for the city of Lakin. In 1972 when the Clean Water Act was passed, many cities were required to either upgrade their wastewater treatment system or construct new facilities. In 1978, as result of the new law, Lakin constructed a new lagoon system. The lagoon system currently in use is a four-cell facility that was designed to be non-discharging relying on evaporation. This system performed fairly well for a number of year. But the mid 1990's a result of increased city growth, the raw wastewater flow had increased to a point where the lagoon system was no longer capable of operating as a non-discharging facility. In response to this situation, the Kansas Department of Health and Environment (KDHE) issued a discharging permit allowing lagoon effluent to overflow into the Arkansas River.

This handsome welcome sign greets travelers entering Lakin.

The ramification of changing from a non-discharging facility to a discharging facility is that the new permit has effluent limits and requires monitoring. Unfortunately, the change to a discharging facility was not the total answer as the city had problems complying with effluent limits, especially Biochemical Oxygen Demand (BOD). Over the years, the city tried several options to bring the lagoon system into compliance including solar mixers, recirculating pumps, stair step aeration, and redirecting the flow by re-plumbing, but none of these options were completely successful. Finally, in 2014, the city received word that an ammonia standard would be added to their permit. It was obvious that the existing lagoon system likely would not meet the standard for ammonia. Since the

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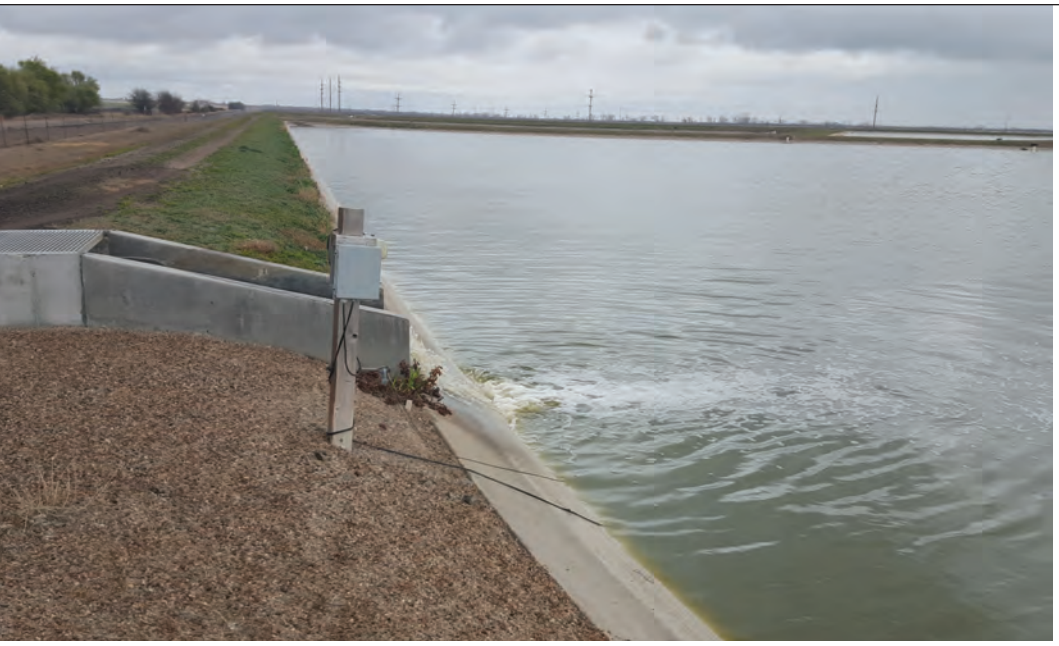


What is a "Wetland"?

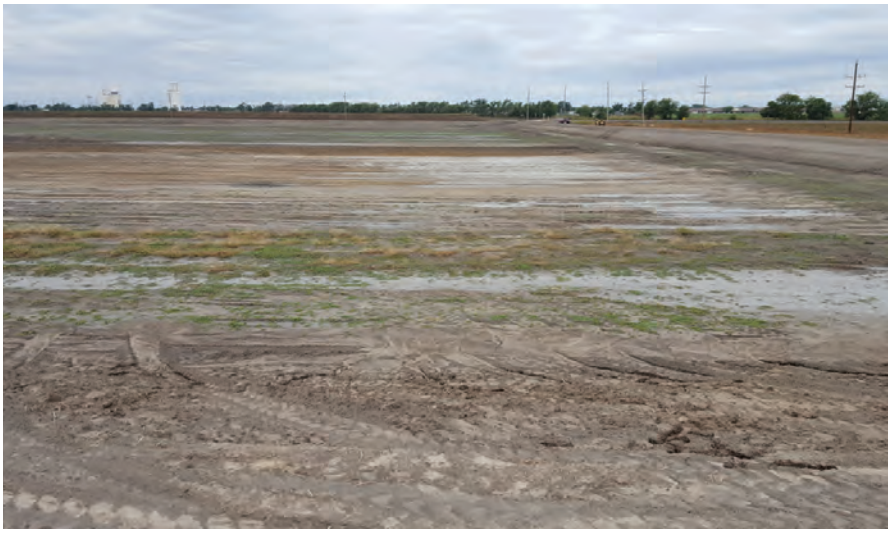
Natural wetland systems have often been described as the "earth's kidneys" because they filter pollutants from water that flows through on its way to receiving lakes, streams, and oceans. Because these systems can improve water quality, engineers and scientists construct systems that replicate the functions of natural wetlands. Constructed wetlands are treatment systems that use natural processes involving wetland vegetation, soils, and their associated microbial assemblages to improve water quality.

The above was taken from an EPA publication "Constructed Treatment Wetlands", (EPA 843-F-03-013). The publication can be viewed at the following web address: https://nepis.epa.gov/Exe/ZyPDF.cgi/30005UPS.PDF?Dockey=30005UPS.PDF

most recent permit contained a schedule of compliance and with the plant already failing to meet the BOD limit at times, the city was faced with a possible major upgrade that they could not afford after undertaking a major improvement with the water system a few years ago.

The water system improvement consisted of the construction of a $6,634,000 membrane water treatment plant to remove uranium from the city's drinking water. By taking advantage of a grant and loan from the United States Department of Agriculture (USDA), Rural Development (RD), the loan amount remaining for the city was $4,395,000. According to City Administrator Michael Heinitz, the city could not afford another expensive project after completing the water project.

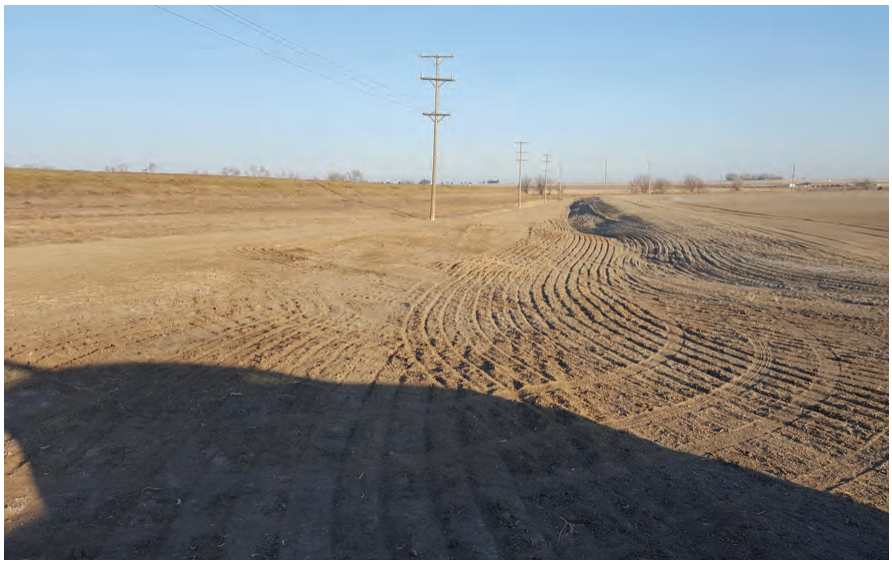
It was obvious that construction of a new mechanical treatment plant was too costly. Also, Alan Luttrell, with Evans-Bierly- Hutchison & Associates (EBH) noted that additional lagoon capacity was considered but about 40 acres of surface area would have been required to remain non-discharging. To reduce costs, the other option needed to



This photo and the photo on the facing page show the wetlands cell being constructed. The construction was expected to be completed by January 31 and have water flowing into the cell.

be considered. City staff and KDHE personnel worked together to find a better solution. The option eventually chosen was to construct a pond to the east of the existing lagoon system which would serve as a wetlands cell.

Rod Geisler, Municipal Programs Section Chief, stated that the non-discharging wetlands option was chosen only after considering all other treatment options within convention. Since the city already had a four cell lagoon system in place, the addition of a wetlands cell seemed to be the most appropriate, especially considering the overall cost, but also as a non-discharging facility, it would hopefully meet other objectives including



compliance with both current and future effluent standards, and should allow for overall easy maintenance.

As noted earlier, controlling cost on this wetlands project was atop priority. To this end, the city approached the Kearny County Commissioners for assistance with construction. The following statement was prepared by Mike Heinitz and City Clerk Amanda Riedl for the local newspaper, *The Lakin Independent*: "Gary Gilbert and the talented crew at Kearny County Road & Bridge spent the summer and part of the fall constructing the dykes and handling all the dirt work to bring the wetlands concept to life. City crews constructed the piping and concrete work to allow flow of water from the lagoons to the wetlands".

The wetlands cell was designed by Alan Luttrell and Richard Ammal with EBH Engineering and has a surface area of 24 acres. The cell was constructed with four elevations; stair stepped in six inch increments. The water depth can vary from 3.5 feet to 5 feet; however it is not anticipated that the water level will reach the 5 foot level, at least not in the near future.

Cost estimate to have the project completed by a contractor was approximately $300,000. With the county and city working together on the project, the cost was $61,504.75, a saving of $238,495.25. The county was reimbursed for their expenditures in completing this project.

As noted by both Mike and Amanda, another project priority was to have it completed without increasing rates to customers, which they were able to do. Also, this is an example of two local governments working together to save taxpayers money and allow for continued growth in the heart of small town Kansas.

Bert Zerr is currently a consultant with KRWA. He has been with KRWA since 2005. Prior to that, Bert was a District Engineer with the KDHE in the Salina District Office for 32 years.