

## Conservation

# Farmers install multipurpose drainage management practices

**Editor's note:** In the June 2013 issue of *The Farmer*, Al Kean with the Board of Water and Soil Resources discussed multipurpose drainage management. This follow-up article profiles three Minnesota farmers who have integrated multipurpose drainage management practices into their operations.

By AL KEAN



FARMERS in the Red River Valley, such as Brian Rinke, know the importance of managing the rainfall and snowmelt on their lands, which can often be too much in the spring and too little in mid

to late summer.

Rinke, a third-generation farmer since 1977, runs a corn and soybean operation near Wheaton. Like many other farmers in the region, Rinke decided to pattern tile some of his fields in recent years. He also installed control structures in his subsurface drainage systems to enable retention of some of the late-spring and summer rains longer into the row-crop growing season.

"It seemed like there had to be a way to control the water," Rinke says. "We were going to put in a valve system, but it was recommended by others that we'd have a lot easier management using inline water control structures with stop logs."

### Controlled subsurface drainage

The flat topography on Rinke's farm is particularly suited to controlled subsurface drainage. Of his four inline control structures, one controls 120 acres, one 35 acres and two control 150 acres each. He lowers the stop logs in the spring prior to planting to ensure access for planting and raises them to within 20 to 24 inches of the ground surface for the growing season to retain water for crop use. This also reduces subsurface drainage volume and the associated transport of nutrients downstream, such as nitrates and soluble phosphorus, helping protect water quality.

Rinke doesn't have a lot of data since the structures were installed in 2012. However, he had a great crop from these fields that year when the rain was meager during the mid and late parts of the

### Key Points

- Farmers share how they manage water and drainage in their fields.
- Use of controlled drainage, bioreactor will have impacts over time.
- Water and sediment control basins prove their worth.

growing season. The system allowed him to use millions of gallons of water during the summer months.

With 2013's late spring, Rinke used the pattern tile systems to get an estimated 10-day jump planting his corn, which he says could make a big difference this fall.

Would he would recommend controlled subsurface drainage structures to other farmers?

"Controlling a whole quarter with one structure is amazing," Rinke says. "If you are putting in pattern tiling, controlled subsurface drainage structures are a must to incorporate into the design where it works."

### Water, sediment control basins

Ten years ago, Dave Estrem installed one water and sediment control basin to prevent gully washing on his farm between Nerstand and Dennison. Today, Dave and his brothers have more than 60 basins on their farms.

The Estrems are a second-generation farming family with Dave; his son Travis; brother Kevin and his sons, Michael and Derek; and brother Mark operating in Rice County. Together, they run multiple operations, with more than 2,000 hogs, and grow corn and soybeans.

Working with the Rice County Soil and Water Conservation District and the USDA-Natural Resources Conservation Service for financial and technical assistance, the Estrems have planned and installed water and sediment control basins to retain topsoil and fertility, as well as reduce erosion and sediment transport, by slowing and metering runoff and trapping sediment. With one major grassed waterway running through their property, and several other small waterways, the Estrems have connected tile outlets from multiple water and sediment control basins to the tile lines in

**CONTROLLED SUBSURFACE DRAINAGE:** Farmer Brian Rinke (left) and Jon Roschlein, Bois de Sioux Watershed District administrator (right), explain how the tile system manages the water table at the Tiling and Conservation Drainage Field Tour and Workshop, August 2012.



or along the grassed waterways.

"At first we questioned how we could farm around the basins," Dave says. "But ever since the first one was put in, we had an improvement of 30 to 40 bushels per acre of corn in what was previously a highly erodible area. It's been fabulous."

The Estrems farm on the contour, parallel with the basin embankments, and their GPS equipment has enabled efficient adaptation. They also plant no-till soybeans to help maintain residue and reduce erosion.

Where they can, the Estrems have switched from using grassed waterways to water and sediment control basins. Basins are easier to manage with larger machinery and avoid what can be a problem of erosion along the sides of grassed waterways.

"There are great benefits. The basins keep soil and fertility in place and have really cut back on erosion," Dave says.

### Treatment pond and bioreactor

When Lyle and Bonnie Kruegel and their son, Todd, were approached by the Mower County SWCD to install a demonstration conservation drainage practice on their land where some idle, low land existed adjacent to County Ditch No. 8, they soon agreed.

"We are trying to be conscientious landowners," Lyle says.

The Kruegels, who own land near Grand Meadow, first worked with the SWCD, the Nature Conservancy, Minnesota Department of Agriculture and a private consultant to design, install and finance a treatment pond at the outlet of a subsurface tile system and surface drainage swale on an 80-acre parcel. The treatment pond provides temporary storage to reduce peak flows downstream, as well as perennial vegetation and associated biological activity that helps reduce nutrients in the surface and subsurface runoff. It also provides some wildlife habitat.

Subsequently, the Kruegels agreed to install a denitrifying wood chip bioreactor adjacent to the treatment pond to reduce nitrates in a portion of the tile drainage water before it enters the pond. The Board of Water and Soil Resources helped provide funding for this demonstration practice. Natural bacteria and microbes use the wood chips as an energy source to break down nitrates into harmless nitrogen gas. The inline control structure on the tile diverts up to about 20% of the tile capacity through the wood chip bioreactor.

The Kruegels also installed a 12-acre controlled subsurface drainage area across the county ditch from the treatment pond and bioreactor. The Mower SWCD is helping to monitor and refine the operation of these multipurpose drainage management practices.

"The practices the Kruegels installed are a great testament to how new drainage ideas can fit into many different landscapes," says Cody Fox, Mower SWCD technician. "They will help us learn and evaluate where these practices will fit and be most economical."

### Multipurpose drainage practices

Controlled subsurface drainage, water and sediment control basins, treatment ponds and denitrifying bioreactors are just a few of the tools used to address multipurpose drainage. If you are interested in these or other practices, contact your local soil and water conservation district or NRCS office.

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**TREATMENT POND, DENITRIFYING BIOREACTOR:** Here are views from the air and on the ground of the Kruegels' treatment pond site with the underground denitrifying bioreactor.