

# KEM Takes Innovative Wastewater Treatment Design to Construction

## Description:

The Richland County Commissioners, contracted with K.E. McCartney & Associates, Inc. (KEM) to provide professional engineering services to determine the feasibility of wastewater treatment and collection facilities for Shenandoah, an unincorporated hamlet of northern Richland County. The community consists of 35 residences, a Church, a General Store and a community center.

Bids were opened in June of 2006 with an estimated total construction cost of \$918,880. Projected financing for the project follows:

## Funding Source Amount:

CDBG Water and Sewer Grant  
\$502,122

OPWC Grant  
\$105,000

OWDA Grant  
\$250,000

OPWC Loan  
\$295,000

Richland County Wastewater will provide Operation and Maintenance for the Shenandoah facilities. Residences of Shenandoah will pay the same monthly charge as all residences of Richland County that are connected to Richland County Sewers. In addition, each residence of Shenandoah will pay a monthly fee to cover the required loans.

## Project: Shenandoah Wastewater Treatment Plant, Utilizing Peat Biofilters and Elevated Sand Mounds

**Project Owner: Richland County Commissioners**  
**Location: Bloominggrove Township, Ohio**

In April 1999, a preliminary engineering study was authorized by the Richland County Commissioners to determine feasible options to handle wastewater treatment for the unincorporated Hamlet of Shenandoah. KEM took an "out-of-the-box" approach to the study due to the high cost associated with treating so few households (Shenandoah consists of 35 residences, 1 church, 1 general store and 2 other commercial establishments). Every possible treatment alternative was considered along with a cost analysis for each, with special attention paid to innovative designs that would ultimately help acquire additional grant funding. The most difficult aspect of the project development process was satisfying the Ohio EPA while at the same time meeting the criteria for grants being pursued. It was a difficult balancing act requiring significant effort to bring all the different aspects together to mesh into one coherent, constructible design that would not over burden the residents financially. Following is a brief technical description of the design and project components associated with this effort:

After multiple iterations to maximize grant funding and satisfy Ohio EPA requirements the final design consisted of combination low pressure sanitary sewers (LPSS) and conventional gravity sewers. The laterals connected to the LPSS are served by e-one grinder pump units which will be maintained by the Richland County Commissioners. The LPSS flows to a gravity sewer which outlets at the wastewater treatment facility. Gravity pipe is SDR 35 PVC and LPSS pipe is SDR 7 HDPE.

Wastewater treatment is achieved through a system of three settling tanks followed by peat biofilters and elevated sand mounds for disposal of biofilter effluent. Plant influent flows by gravity through three septic tanks. The first tank has a capacity of 6472 gallons, the second tank 6294 gallons, and the third tank 6116 gallons. Each tank is equipped with a Zabel effluent filter model A100.

Following the septic tanks, effluent flows to the biofilter dosing station. This station has a volume of 7020 gallons. Three dosing pumps are located within the station. The pumps are Zoeller Model 6123, 3.0 hp capable of pumping 215 gpm at 28' TDH. The dosing volume of each pump is 270 gallons. Each pump is equipped with a SIM/TEC STF-100A3 discharge filter. A separate valve box is included before dosing to the biofilters. The pumps are to operate in an alternating manner with each pump being connected to an individual bank of biofilters. A high water alarm is provided.

The biofilters are Puraflo® Peat Biofilters as manufactured by Bord na Móna Environmental Products. The biofilters are arranged in three separate banks of 18 units each. A common header pipe serves each bank and allows for the distribution of the wastewater to each separate unit. The effluent from each unit flows to a drainage tile. Two drainage tiles serve each bank of 18 units, and a sampling port is located at the end of each tile. The drainage tiles flow to a common tile that leads to the sand mound dosing tank.

The sand mound dosing tank houses five dosing pumps. A non-potable process wash pump is also included, Zoeller Model E140. The dosing pump working volume is 562 gallons. An external valve box is provided. The pumps operate in an alternating manner with each pump being connected to an individual sand mound. A high water alarm is also provided.

Due to the combined team effort of KEM, Richland County Commissioners, the Ohio EPA, The Ohio Department of Health and Ohio RCAP, the residences of Shenandoah are being provided wastewater collection and treatment at a reasonable cost for each user.

*For additional information regarding this project or to visit the construction site, feel free to contact Wayne Bishop, P.E., KEM Project Manager at 419.525.0093.*